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वार्षिक प्रतिवेदन
Annual Report
2012-13

CSIR-Central Drug Research Institute, Lucknow

वै.औ.अ.प.–केन्द्रीय औषधि अनुसंधान संस्थान
(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद)
CSIR - CENTRAL DRUG RESEARCH INSTITUTE
(COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH)
Sector 10, Jankipuram Extension, Sitapur Road, Lucknow – 226 021

THRUST AREAS OF RESEARCH

1. Malaria and other Parasitic Diseases

- Development of new drugs/drug combinations as therapeutic interventions for malaria, leishmaniasis and filariasis;
- Establish novel target based drug assay protocols for identification of new leads;
- Knowledge generation on parasite biology and host parasite interactions.

2. Reproductive Health Research, Diabetes & Energy Metabolism

- Development of novel agents for fertility regulation (male/female) and management of endocrine disorders through modern drug design, scientific validation of traditional remedies and generation of new knowledge

3. Tuberculosis and Microbial Infections

- Simplification and shortening of treatment for drug-sensitive tuberculosis and search of new treatments for MDR-TB
- Development of new drugs for bacterial, fungal and viral (HIV and JEV) infections and tuberculosis.

4. CVS, CNS and Related Disorders

- Development of new target based drugs to alleviate CVS, CNS and related disorders;
- Carry out excellent basic research to delineate the molecular mechanisms of these pathologies so as to identify suitable targets for drug discovery, as well as to analyze the possible mechanism(s) of action of the candidate drugs.

5. Cancer and Related Areas

- Creation of appropriate platform for interdisciplinary collaborative research;
- Creation of knowledge base in cancer biology;
- Lead identification/optimization to obtain drug-like molecules.

6. Safety & Clinical Development

- Pre-clinical, clinical development and commercialization of new generation affordable drugs for diseases of national importance and international relevance;
- Creation of center of excellence in the field of Clinical trials, Regulatory toxicology, Safety pharmacology, Pharmaceutics and Pharmacokinetics & metabolism and catering to the needs of pharmaceutical industries.

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HIGHLIGHTS OF ACHIEVEMENTS

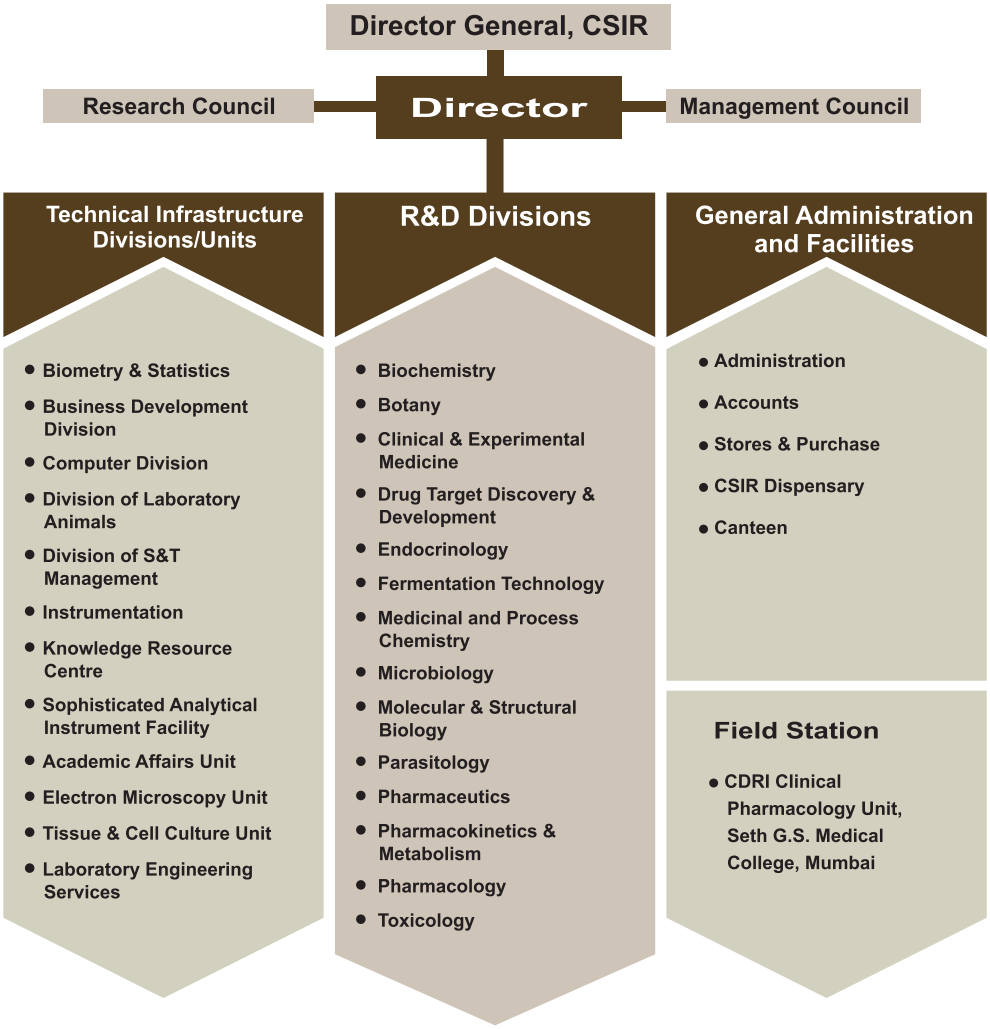
◆ **Technologies Licensed to Industries**	:	**1** CDR914K058
◆ **Publications in SCI Journals (2012)**	:	**291** (321)
- Average Impact Factor	:	**3.21** (2.84)
- Publications with >5 Impact Factor	:	**24** (22)
◆ **Patents (2012)**		
- Filed Abroad	:	**6** (7)
- Filed in India	:	**6** (10)
- Granted Abroad	:	**4** (18)
- Granted in India	:	**5** (2)
◆ **Ph.D. Thesis Submitted (2012)**	:	**60** (56)
◆ **Grant-in-Aid Projects Initiated (2012)**	:	**30** (19)
◆ **Contract Research Undertaken (2012)**	:	**02** (3)
◆ **Total External Budgetary Resources** (anticipated for 2012-13) ₹ in Crore	:	**16.60** (16.86)

Provisional data as on 01/02/2013, Previous year data is given in bracket

The Charter

- Development of new drugs and diagnostics;
- Cellular and molecular studies to understand disease processes and reproductive physiology;
- Development of contraceptive agents and devices;
- Systematic evaluation of medicinal properties of natural products;
- Development of technology for drugs, intermediates and biologicals;
- Dissemination of information in the field of drug research, development and production;
- Consultancy and development of technical manpower.

Organizational Structure



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अनुसंधान उपलब्धियाँ

अन्य गतिविधियाँ

निदेशक की कलम से

अपनी स्थापना के समय से आज तक सीएसआईआर–सीडीआरआई ने जनसाधारण के लिये स्वास्थ्य की देखरेख सुलभ बनाने के लिये अविश्वसनीय से प्रतीत होने वाले मापदण्ड तैयार किये हैं। औषधि निर्माण, औषधि प्रक्रिया, प्रौद्योगिकी एवं वैज्ञानिक खोजों के क्षेत्र में इस संस्थान ने मील के पत्थर स्थापित किये हैं। इस क्षेत्र में अपनी सर्वोच्च स्थिति बनाए रखने के लिये संस्थान अन्तर्राष्ट्रीय मानकों के समतुल्य निरन्तर उच्चतर अवस्था तथा आधुनिकीकरण की ओर विकसित हो रहा है।

हाल के वर्षों में राष्ट्रीय महत्व की उष्ण कटिबंधीय बीमारियों जैसे– मलेरिया, फ़ाइलेरिया, लीशमैनिया और क्षय रोग के क्षेत्र में उत्कृष्टता के केन्द्र के रूप में रह चुके इस संस्थान ने बोन बायोलॉजी में भी उत्कृष्टता प्राप्त की है। 26 सितम्बर, 2012 को सीएसआईआर के 70वें स्थापना दिवस के अवसर पर एक आशाजनक नये ओस्टियोजेनिक लीड मॉलीक्यूल सीडीआर914के058 का लाइसेंस लीड को रैपिड फ्रैक्चर हीलिंग ओरल औषधि के रूप में विकसित करने के लिये केमक्स्ट्री, यूएसए, एक नॉस्ट्रम कम्पनी को दिया गया। एक अन्य लीड मॉलीक्यूल एस007–1500 (द्रुत फ्रैक्चर उपचार अभिकर्मक) को आगे के सहयोग, विकास और व्यवसायीकरण हेतु लाइसेन्स देने के लिये उद्योग सहभागियों के साथ बातचीत जारी है।

हमें आपको यह सूचित करते हुए हर्ष हो रहा है कि इस 62 वर्ष पुराने संस्थान को नये परिसर में स्थानांतरित करने का कार्य लगभग सफलतापूर्वक सम्पन्न कर लिया गया है। प्री–क्लीनिकल, बायोलॉजिकल साइंसेज़, तकनीकी सेवायें/सहायक प्रभाग/इकाइयाँ और प्रशासनिक अनुभाग नये परिसर में स्थानांतरित किये जा चुके हैं और ये अत्याधुनिक सुविधाओं से युक्त स्वस्थ्य एवं उर्जस्वी वातावरण में गतिशीलता के साथ कार्य कर रहे हैं। शेष प्रयोगशालाएं एवं सुविधाएं दो महीने में स्थानांतरित होने की आशा है। आंतरिक रूप से सुस्थापित प्रयोगशाला कॉम्प्लेक्स, बायोलॉजिकल, प्री–क्लीनिकल और केमिकल प्रयोगशालाओं की स्थापना ने संस्थान के विभिन्न विषयों के वैज्ञानिकों और शोध छात्रों को निकट ला दिया है। पूर्व कल्पना के अनुरूप अंतर्विषयों औषधि खोज एवं विकास कार्यक्रमों की सफलता को दृष्टि में रखते हुए सहयोगात्मक वातावरण को और बढ़ाने के लिए यह व्यवस्था की गयी है। भावी वर्षों में सर्व सुलभ स्वास्थ्य के लिये नवीन ज्ञान, औषधियों की खोज एवं विकास की दृष्टि से संस्थान के कार्य में क्रांतिकारी परिवर्तन देखा जा सकता है।

स्वास्थ्य एवं औषधि निर्माण अनुसंधान में अग्रणी, नवीन उपायों को शीघ्रता से अपनाने के साथ–साथ, उद्योगों, शिक्षण संस्थानों तथा भारत और विदेशों की अन्य प्रयोगशालाओं से सक्रिय सहभागिता संस्थान की मुख्य रणनीति रही है। 12वीं पंचवर्षीय योजना के अन्तर्गत संस्थान विभिन्न विज्ञान समूहों जैसे– जैविक, रसायनिक, भौतिक, इंजीनियरिंग और सूचना विकास विज्ञान में विभिन्न सीएसआईआर प्रयोगशालाओं के साथ सहभागिता में है और सीएसआईआर @80 विज़न के उद्देश्यों को प्राप्त करने के लिये वैश्विक प्रभाव के सर्वोत्तम स्थिति के क्षेत्रों में तेजी से कार्य कर रहा है। मौजूदा समय में सहयोगात्मक और संविदा अनुसंधान परियोजनाओं हेतु संस्थान विभिन्न दवा और बायोटेक कम्पनियों जैसे– इप्का लेबोरेट्री, मुंबई; केमक्स्ट्री, यू.एस.ए. व बायोकॉन से सहयोग कर रहा है।

संस्थान का ओपन सोर्स ड्रग डिस्कवरी (ओएसडीडी कार्यक्रम) में महत्वपूर्ण योगदान रहा है जो कि सीएसआईआर के महानिदेशक प्रो. एस. के. ब्रह्मचारी का स्वप्न है। संस्थान दो ओएसडीडी कार्यक्रमों नेतृत्व कर रहा है जिनके नाम हैं 1. ओएसडीडी केमिस्ट्री आउटरीच कार्यक्रम (ओएसडीडीकेम) और 2. ओएसडीडी मलेरिया (ओएसडीडीएम)। ओएसडीडीकेम कार्यक्रम भारतीय विश्वविद्यालयों और शैक्षिक संस्थानों 'MSME's के मध्य लोकप्रिय हो चुका है। पूरे देश के संस्थानों से लगभग 1600 मॉलीक्यूल्स को डेटाबेस में जोड़ने के साथ 50 से अधिक परियोजनाएं प्रस्तुत की जा चुकी है। ओएसडीडी पहल ने मलेरिया हेतु ओपन सोर्स ड्रग डिस्कवरी केन्द्रित परियोजनाएं आमंत्रित करना

प्रारम्भ कर दिया है। ओएसडीडीएम कार्य पैकेज़ के अन्तर्गत सहयोगात्मक परियोजनाएं प्रस्तुत की जा चुकी हैं और परियोजना हेतु निधि प्रदान करने का कार्य शीघ्र प्रारम्भ होगा। ओपन केमिस्ट्री प्रोग्राम से संबंधित मलेरियारोधी जांच प्रारम्भ की जा चुकी है। संस्थान के वैज्ञानिकों ने उभरते हुए क्षेत्रों जैसे बायोलॉज़िक्स, विशेष रूप से फ़ाइलेरिया और लीशमैनिया के क्षेत्र में उपयुक्त वैक्सीन कैन्डीडेट को चिह्नित करने के लिये कार्य प्रारम्भ कर दिया है। प्रारंभिक कार्य प्रभावशाली प्रतीत होता है। अनुसंधानकर्ताओं ने उल्लेखनीय ज्ञान का आधार तैयार किया है और कुछ आशाजनक वैक्सीन कैन्डीडेट को चिह्नित किया है। इसके बाद 12वीं योजना अवधि के अन्त तक संस्थान एक ट्रांसजेनिक जन्तु सुविधा स्थापित करने, रिसर्च एरिया जैसे केमिकल बायोलॉजी, न्यूरोइण्डोक्राइनोलॉजी और इनफर्टिलिटी रिसर्च की स्थापना हेतु प्रस्ताव रखेगा। आधारभूत सुविधाओं को शक्तिशाली बनाने के लिये वर्ष के दौरान 700 MHZ NMR परिष्कृत विश्लेषणात्मक उपकरण सुविधा में जोड़ा गया। इसी प्रकार आण्विक एवं संरचनात्मक जीव विज्ञान प्रभाग में स्मॉल मॉलीक्युल एक्स–रे क्रिस्टलोग्राफी सुविधा को जोड़ा गया।

विज्ञान एवं प्रौद्योगिकी, पर्यावरण एवं वन विभाग पर विभाग से संबंधित स्थायी संसदीय समिति ने हाल के अपने अध्ययन भ्रमण के दौरान सभी की पहुँच के अन्दर स्वास्थ्य की देखरेख उपलब्ध करवाने के लिये सीएसआईआर–सीडीआरआई को उसकी उपलब्धियों की सराहना की। समिति का आगमन 21–22 जनवरी 2013 को हुआ। समिति ने यह भी सिफारिश की कि सीएसआईआर–सीडीआरआई को अपनी क्षमताओं को मज़बूत बनाने के साथ ही विशेषज्ञता के आधार पर कैंसर जैसी राष्ट्रीय प्रमुखता की बीमारियों से निपटने में अपना प्रयास जारी रखना चाहिए। इस बात की सूचना देना सुखद है कि संस्थान पहले से ही इस दिशा में प्रयास कर रहा है और संस्थान में अनुसंधान के प्रमुख क्षेत्र के रूप में कैंसर बायोलॉजी को चिह्नित किया गया। उपर्युक्त क्षेत्र में कार्य कर रही अनुसंधान टीम द्वारा खोजे गये एक नवीन ल्यूकीमियारोधी कम्पाउण्ड एस007–1235 ने प्रारंभिक अध्ययनों में Imatinib और Dasatinib की अपेक्षा बेहतर सक्रियता प्रदर्शित की। उपर्युक्त क्षेत्र में कार्य कर रहे अनुसंधान ग्रुप ने 20 विभिन्न ह्यूमन कैन्सर सेल लाइन वाले 'पात्रे' कैन्सररोधी जाँच सुविधा को 10 विभिन्न प्रकार के सॉलिड ट्यूमर जैसे – ब्रेस्ट, फेफड़े, प्रॉस्टेट, पैंक्रियाज़ इत्यादि में स्थापित कर दिया। महत्वपूर्ण वैज्ञानिक मैन पावर को मजबूत करने के लिये हाल ही में आयोजित भर्ती अभियान में जैव चिकित्सा अनुसंधान के विभिन्न क्षेत्रों में उत्कृष्ट विशेषज्ञता वाले 15 नये वैज्ञानिकों को चयनित किया गया है। उनमें से पांच ने संस्थान में कार्यभार ग्रहण कर लिया है और शेष संस्थान में कार्यभार ग्रहण करने की प्रक्रिया में हैं। मैं उन सबका संस्थान में स्वागत करता हूँ और उनके उज्ज्वल एवं समृद्धशाली जीवन के लिये शुभकामनाएं देता हूँ।

नवीन परिसर में पूरी तरह व्यवस्थित होने जैसे दुष्कर कार्य के बीच संस्थान ने कार्य में प्रमाणिक प्रगति की। सीएसआईआर–सीडीआरआई द्वारा विकसित और खोजी गयी कैन्डीडेट औषधियों के आगे के अध्ययन में महत्वपूर्ण प्रगति हुई। आंतरिक आंकड़ों के अनुसार संस्थान ने औसत इम्पेक्ट फ़ैक्टर 3.208 सहित 2012 में 291 शोध पत्र प्रकाशित किये। इनमें >5 इम्पैक्ट फैक्टर के जर्नल्स में लगभग 24 प्रकाशन किये गये। वर्ष के दौरान भारत और विदेश में प्रत्येक में 6 पेटेण्ट फाइल किये गये। इनमें 5 भारतीय और 4 विदेशी पेटेण्ट स्वीकृत किये गये। 2012 के दौरान लगभग 31 नई अन्तः अभिकरण परियोजनाएं प्रारंभ की जा चुकी हैं। 12 वीं पंचवर्षीय योजना में नोडल प्रयोगशाला के रूप में सीएसआईआर–सीडीआरआई के साथ 5 और सहभागी प्रयोगशाला के रूप में 14 परियोजनाएं प्रारंभ की गयी। रिपोर्टिंग वर्ष के दौरान विभिन्न वैज्ञानिकों ने प्रतिष्ठित सम्मान एवं पुरस्कार प्राप्त किये। डॉ. मधु दीक्षित को फ़ेलो ऑफ इण्डियन नेशनल साइंस एकेडमी में निर्वाचित किया गया। डॉ. जे.के. घोष फ़ेलों ऑफ नेशनल एकेडमी ऑफ़ साइंसेज़, इण्डिया निर्वाचित हुए। डॉ. अरूण त्रिवेदी और ज़ियाउर गाइन ने क्रमशः NASI का युवा वैज्ञानिक प्लैटिनम जुबली पुरस्कार और इनोवेटिव यंग बायोटेक्नोलॉजिस्ट पुरस्कार प्राप्त किया। सीएसआईआर– सीडीआरआई के अन्य वैज्ञानिकों और छात्रों ने विभिन्न प्रतिष्ठित पुरस्कार प्राप्त किये। संस्थान ने महत्वपूर्ण प्रक्रियाओं में स्वचालित उपकरणों के प्रयोग और सभी कर्मचारियों के लिये इलेक्ट्रानिक्स वर्कस्पेस उपलब्ध कराने के लिये सीएसआईआर एन्टरप्राइज़ ट्रांसफ़ॉर्मेशन प्रोजेक्ट से संबंधित कार्यों को सक्रियतापूर्वक पूर्ण किया और सीएसआईआर@70 समारोह के अवसर पर 'सीएसआईआर सिल्वर आइकॉन अवार्ड–2012' प्राप्त किया।

मैं राष्ट्र सेवा में रत संस्थान की प्रगति में सहयोग और योगदान दे रहे स्टाफ़ और उनके परिवारों के लिये कृतज्ञ हूँ।

तुषार चक्रवर्ती

(तुषार कान्ति चक्रबर्ती)

17 फरवरी, 2013

FROM THE DIRECTOR'S DESK

CSIR-Central Drug Research Institute has set incredible benchmarks in making the health care affordable for the common man since its establishment. It has achieved several landmarks in the field of pharmaceuticals, drugs, process technologies and scientific discoveries. To retain its supremacy in this sector, Institute is evolving and modernizing incessantly at par with international standards. While remaining as a centre of excellence in the area of tropical diseases of national importance like Malaria, Filariasis, Leishmaniasis and Tuberculosis, in recent years, it has augmented as a centre of excellence in the area of Bone biology. On the occasion of 70th CSIR Foundation Day Celebrations, 26 September 2012, a promising new osteogenic lead molecule CDR914K058 was licensed to Kemxtree, USA – a Nostrum Company, for developing the lead as Rapid Fracture Healing Oral Drug. Negotiations are in the advanced stages with industry partner towards licensing of another lead molecule S007-1500 (rapid fracture healing agent) for further collaborative development and commercialization.

It is pleasing to report that we have successfully accomplished the shifting of major part of the 62 years old functional institute to its new premise. Almost all the labs of pre-clinical, biological sciences, technical Services / support divisions / units and administrative establishments have shifted to the new premise and functioning with dynamism owing to invigorating ambience and state of the art facilities. Remaining laboratories and facilities are expected to shift in couple of months. The closely knitted laboratory complex, housing the biological, pre-clinical and chemical sciences labs, has brought the interdisciplinary scientists and research scholars of the Institute to proximity. As visualized earlier, it is set to foster the collaborative environment requisite for the success of interdisciplinary drug discovery and development programs. In the coming years, one can witness radical changes in performance of the Institute in terms of new knowledge generation, discovery and development of novel drugs towards achieving the goal of innovation driven affordable healthcare for all.

To be a front runner in the area of health and pharmaceutical research, leveraging knowledge, strengthening of capabilities, foraying into newer avenues and networking with industries, academic institutes & other laboratories from India & abroad has remained as a key strategy of the Institute. Institute is currently networking with several CSIR laboratories of different clusters viz. Biological, Chemical, Physical, Engineering and Information science clusters under the 12th five year plan programs and foraying in cutting edge areas of global impact to achieve the objectives of CSIR@80 vision. Institute is currently collaborating with several pharma and biotech companies like Ipca Laboratories, Mumbai, Kemxtree, USA, Biocon for collaborative and contract research projects.

Institute is significantly contributing to the Open Source Drug Discovery (OSDD) program, a dream initiative of Prof. SK Brahmachari, DG, CSIR. Institute is leading two OSDD programs namely OSDD Chemistry Outreach Program (OSDD*chem*) and OSDD Malaria (OSDD^m). OSDD*Chem* program has already become popular amongst “MSME”s of Indian Universities and Educational Institutions. More than 50 projects have already been submitted from institutes across the country with nearly 1600 molecules added to the database. The OSDD^m initiative has begun inviting focused projects for open source drug

discovery for malaria. Collaborative projects under OSDD[m] work packages have been submitted and project funding will starts shortly. Anti-malarial screening linked to the Open Chemistry programme has been initiated. Institute scientists have also started working in the emerging areas like biologics, particularly in the area of Filariasis and Leishmaniasis, to identify suitable vaccine candidates. Initial work appears to be impressive and researchers have generated remarkable knowledgebase and identified some promising vaccine candidates. Further, Institute proposes to establish a transgenic animal facility, develop research areas like Chemical Biology, Neuroendocrinology and Infertility research by the end of 12th plan period. Towards strengthening the infrastructure facility, 700 MHz NMR has been added to the Sophisticated Analytical Instrumentation Facility during the year. Similarly, Small Molecule X-Ray Crystallography facility has been added to the Molecular & Structural Biology Division.

During a recent Study-Visit by the Department-Related Parliamentary Standing Committee on Science & Technology, Environment & Forests to Lucknow from 21-22 January, 2013, Committee appreciated the achievements of CSIR-CDRI for its significant contributions towards affordable healthcare for all. The Committee also recommended that CSIR-CDRI should continue to foray into newer disease areas of national importance like Cancer by strengthening its capabilities and expertise. It is pleasing to report that Institute has already working in this direction and identified Cancer Biology as one of the thrust areas of research in the Institute. A novel anti-leukemic compound, S007-1235, discovered by the research team working in above area, has shown better activity than the Imatinib and Dasatinib in the initial studies. Research group working in above area has established *in vitro* anti cancer screening facility having more than 20 different human cancer cell lines in 10 different types of solid tumors like breast, lung, prostate, colon, pancreas, etc. In order to strengthen the core scientific manpower, in a recently held recruitment drive, 12 new scientists with outstanding expertise in different areas of biomedical research have been selected. Five of them have joined the Institute and others are in the process of joining the institute to pursue their career in the area of biomedical research in the service of the nation. I welcome all of them to the Institute and wish a very bright and prosperous career.

In the midst of the herculean task of shifting, the Institute showed a steady measurable performance. Significant progress has been made in the further studies on new leads and candidate drugs discovered and developed by the CSIR-CDRI. As per the provisional data, Institute has published about 291 research papers with an average IF of 3.208 during 2012, of these, about 24 publications are published in journals of IF>5. During the year, 6 patents were filed each in India and abroad. Further, 5 Indian Patents and 4 Foreign Patents were granted. During 2012, about 31 new Inter Agency Projects have been initiated. Five 12th FYP Projects with CSIR-CDRI as the Nodal lab and 14 Projects as participating lab were also initiated. Several scientists received prestigious honours & awards during the reporting period. Dr. Madhu Dikshit has been elected as Fellow of the Indian National Science Academy; Dr. JK Ghosh has been elected as Fellow of the National Academy of Sciences, India. Dr. Arun Trivedi and Dr. Jiaur Gayen received NASI Young Scientist Platinum Jubilee Award and Innovative Young Biotechnologist Award respectively. Several other scientists and students from CSIR-CDRI received various reputed awards. Institute, actively completed the tasks associated with the CSIR Enterprise Transformation Project, aimed at automation of key processes and providing electronic workspace for all the staff, and bagged CSIR-Silver Icon Award 2012 on the occasion of CSIR@70 celebrations.

I am thankful to all my staff and their families who are supporting and contributing to the progress of the Institute in the service of the nation.

(Tushar Kanti Chakraborty)

17 February 2013

Performance Report


वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद, भारत
CSIR INDIA

Performance Report : Overview

During the period of report, significant progress has been made in all fronts. Shifting of Biological Science Labs, Pre-clinical Labs, Administrative Offices and Support Divisions to the new campus of the Institute is nearly completed. It is anticipated that in a couple of months, the Institute will be fully functional from its new premises. In the midst of the herculean task of shifting a 62 years' old functional laboratory, the Institute showed a steady measurable performance during reporting period. Significant progress has been made in the further studies on new leads and candidate drugs discovered and developed by the CSIR-CDRI. On the occasion of CSIR Foundation Day Celebrations, Institute licensed a promising new lead molecule CDR914K058 (osteogenic) licensed to Kemxtree, USA – a Nostrum Company for developing it as Rapid Fracture Healing Oral Drug. Negotiations are in progress towards licensing of compound S007-1500 (rapid fracture healing agent) for further collaborative development. Signing of the licensing agreement is expected shortly. A novel anti-leukemic compound - S007-1235 has been discovered which has shown better activity than the Imatinib and Dasatinib in the initial studies. Significant progress has been made in the further development of other candidate drugs and new leads in the area of malaria (Compound 97-78 & 99-411), osteoporosis (Compound 99-373, S007-1500, CDR1020F147), thrombosis (S007-867, S002-333), and diabetes (CDR267F018).

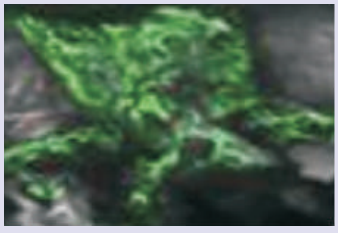
As per the provisional data, the Institute has published more than 291 papers with an average IF of 3.208 during 2012. During the year, 6 patents were filed each in India and abroad. Further, 5 Indian Patents and 4 Foreign Patents were granted. Several scientists received prestigious honours & awards. Dr. Madhu Dikshit has been elected as Fellow of the Indian National Science Academy; Dr. JK Ghosh has been elected as Fellow of the National Academy of Sciences, India. Dr. Arun Trivedi and Dr. Jiaur Gayen received the NASI Young Scientist Platinum Jubilee Award and Innovative Young Biotechnologist Award, respectively. Several other scientists and students from CSIR-CDRI received various reputed awards. During 2012, about 31 new Inter Agency Projects have been initiated. Five 12th FYP Projects with CDRI as the Nodal lab and 14 Projects with CSIR-CDRI as participating lab were also initiated.

Institute continued to augment its facilities to be at par with international standards. Anti cancer screening facility has been augmented with more than 20 different human cancer cell lines in 10 different types of solid tumors like breast, lung, prostate, colon, pancreas, etc. by following NCI drug screening mandate. Sophisticated Analytical Instrumentation Facility has been added with a new 700 MHz NMR and FTIR. Molecular & Structural Biology Division added with the small molecule x-ray diffractometer.

A brief report on significant achievements during the reporting period is presented below:

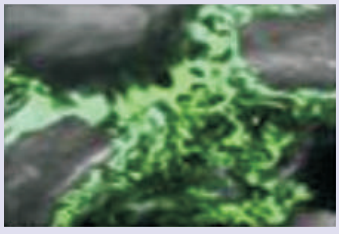
Plant Derived Single Molecule (K058) from CSIR-CDRI as Rapid Fracture Healing Oral Drug

CSIR-CDRI has isolated a novel lead molecule K058 from a plant source and found rapid bone fracture healing anabolic activity that represents a new strategy in addressing primary and secondary osteoporosis.



Placebo

After 12 Days



K058 (1 mg/kg)

CSIR-CDRI has signed a Research and licensing agreement on 28 September 2012 with M/s Kemxtree LLC, USA (a Nostrum Group company) during CSIR@70 year celebration at IGIB campus, New Delhi for further development of the molecule as a novel candidate drug for the treatment of osteoporosis and fracture healing.

Progress in the Development of Candidate Drugs and New Leads

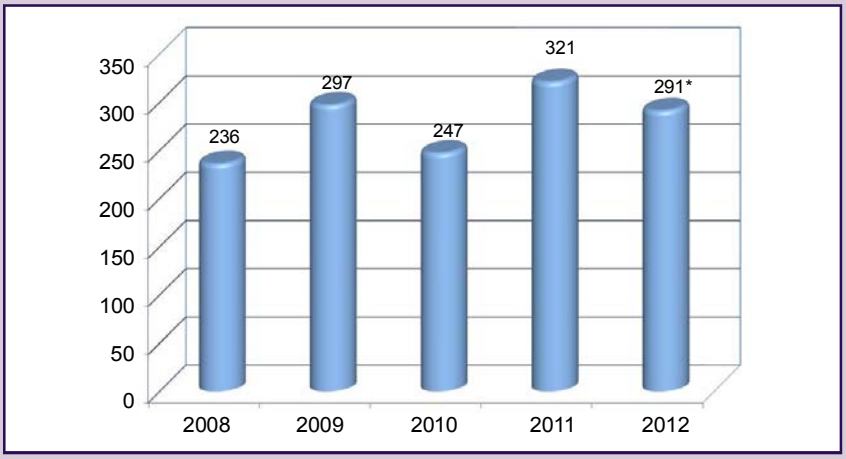
2.1 Candidate Drugs under Advance Stages of Development

Diseases / Disorders	Candidate Drugs	Clinical Status	Licensees & Collaborators
Malaria	**97-78** Antimalarial	Phase-I clinical pharmacokinetic studies have been completed in 16 healthy male volunteers at PGIMER, Chandigarh in collaboration with IPCA Labs, Mumbai. Samples analyzed & report sent to IPCA	IPCA Lab., Mumbai 2004
	99-411 Antimalarial	Pre-clinical data is under compilation for IND submission	IPCA Lab., Mumbai 2007
Diabetes & Dyslipidemia	**CDR134D123** Anti-hyperglycemic	Detailed quality monograph on the epicarp of the plant *Xylocarpus granatum* as per the specifications of DGCCRAS has been submitted. The matter is awaiting DGCCRAS clearance for inclusion in the Extra Ayurvedic Pharmacopia	TVC Sky Shop Ltd., Mumbai 2008
	CDR134F194 Anti-hyperglycemic	The preparations for the drug formulation to be used in Phase-I Single Dose and Multiple Dose Clinical Trial studies from a GMP certified company is in progress and the clinical trial would commence soon	
Osteoporosis	**99-373** Anti-osteogenic	Phase I clinical trial is to be initiated	Under negotiation
	1020F147 Anti-osteoporotic	Product is being further developed as nutraceutical and dietary supplement for optimum bone health. Submitted to NMITLI for funding of clinical trial	Natural Remedies, Bangalore 2010

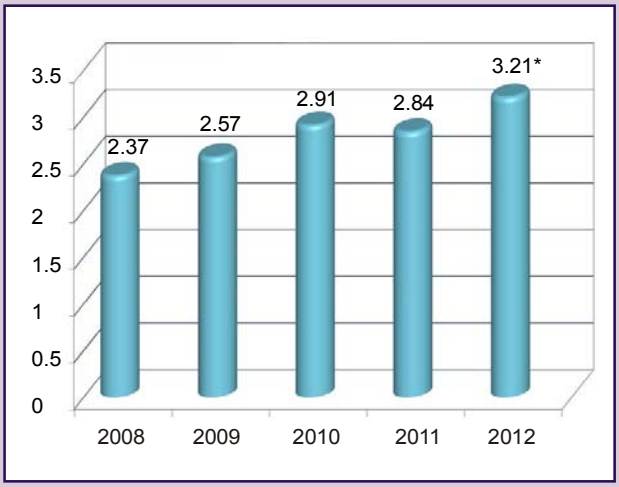
2.2 Potential New Leads

Diseases / Disorders	Lead & Efficacy	Current Status	Licensees & Collaborators
Osteoporosis	**CDR914K058** Osteogenic	Synthetic process developed by CSIR-IICT. Licensed to Kemxtree, USA for further development and commercialization	Kemxtree, USA 2012
	S007-1500 Rapid fracture healing	Compound found safe in single dose toxicity study by oral route in rat and mice and by IM route in rat. Two year stability study completed	Under negotiation
	CDR4744F004 Osteoprotective & bone anabolic	Standardized fraction found to have bone anabolic effect in osteopenic rats; Principal component analysis of bioactive markers completed. Further studies are under progress	
Cancer	**S007-1235** Anti-leukemic	IC_{50} in K562, HL-60, U937, Kasumi1, Vero, & NIH3T3 respectively: 3.61 µM, 5.99 µM, 6.78 µM, 8.12 µM, >25 µM, > 20 µM. Activity is better than Imatinib (first gen) and Dasatinib (2nd gen). Possible mode of action established. Detailed mechanism, including identification of target and *in vivo* studies are planned further	Open for licensing
Thrombosis	**S007-867** Antithrombotic	Compound found safe in single dose toxicity study by oral route in rat and mice and by IM route in rat; No adverse effect on CVS, CNS and respiratory parameters	Under negotiation
	S002-333 Antithrombotic	Compound found safe in single dose toxicity study by oral route in rat; Patent granted. There was no significant effect on CNS, CVS and respiratory system up to 1000 mg/kg, po in rats.	
Diabetes & Dyslipidemia	**CDR267F018** Antidyslipidemic	Compound found safe in 28 day repeat dose toxicity study in Rh monkey	Open for licensing
	CDR4655K09 Antidyslipidemic	Efficacy established as a new class of HMG-CoA reductase and as potential lipid lowering agent	
Contraception	**S010-1255** Spermicidal & Antitrichomonal	Potent spermicidal and anti-trichomonal (against both metronidazole susceptible and resistant strains) activity established with much higher safety index compared with Nonox-9	Open for licensing
Tuberculosis	**S006-830** Antituberculosis	Efficacy established *in vivo* in the mouse model of TB. Large scale synthesis completed. Pilot pharmacokinetic study of S006-830 in male SD rats completed and compound showed better bioavailability	Being developed under OSDD

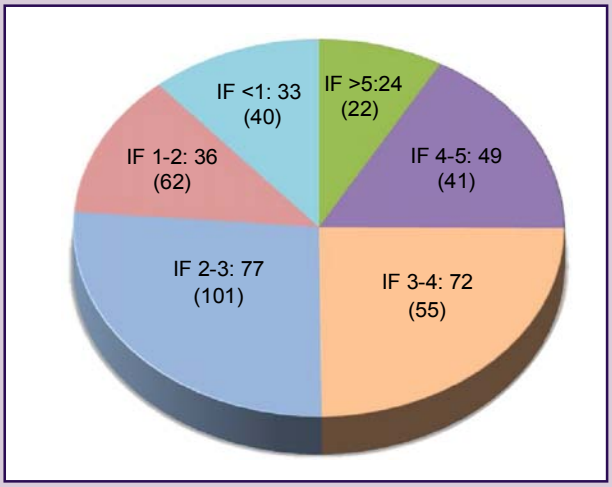
Publications



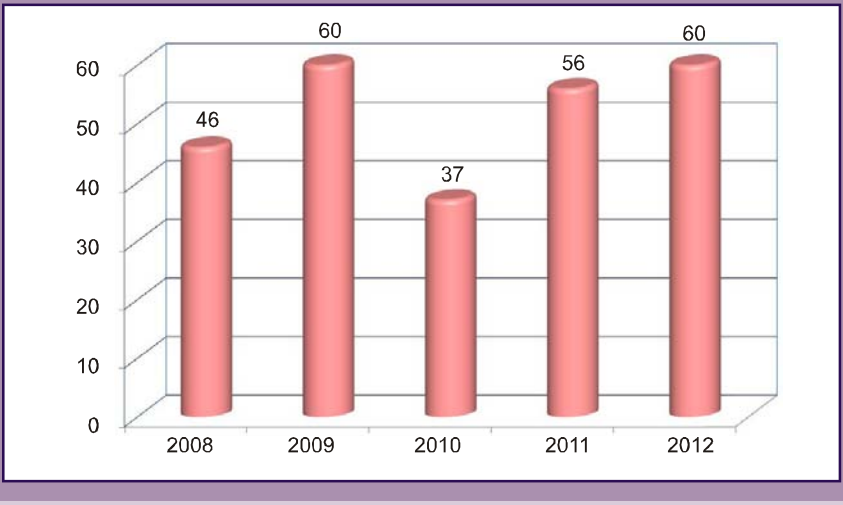
Average Impact Factor



Impact Factor-wise No. of Publications 2012*



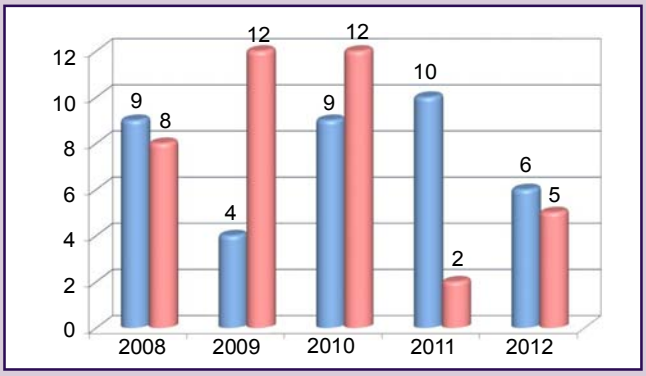
Ph.D. Thesis Submitted



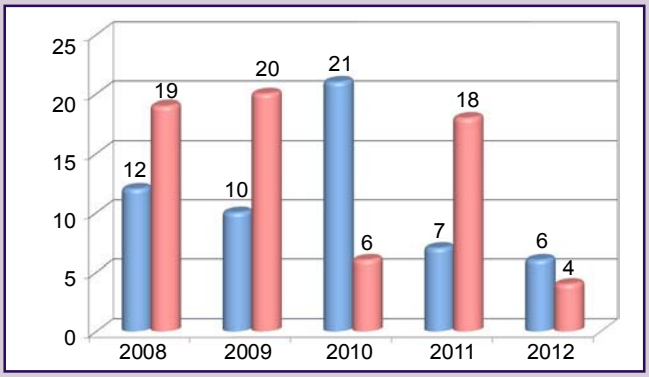
*Provisional data as on 31-01-2013, Previous year data is given in bracket

Intellectual Property

Indian Patents

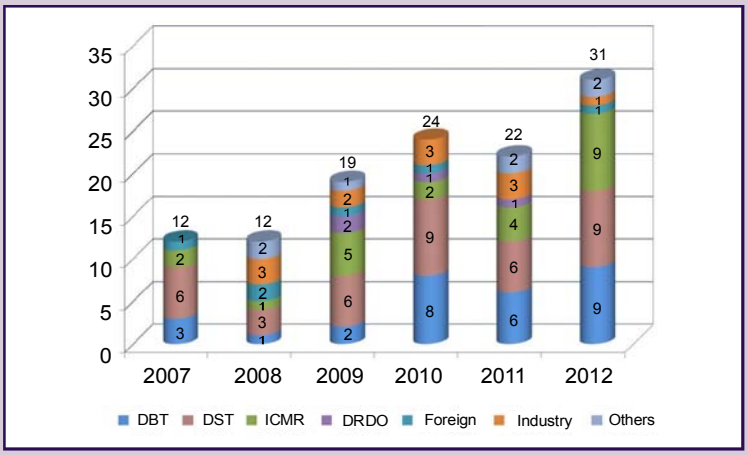


Foreign Patents



Provisional Data as on 31/01/2013

New Inter-Agency Projects Initiated

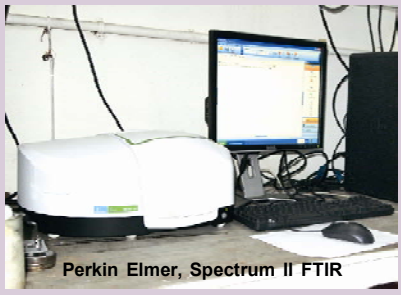


Provisional Data as on 31/01/2013

New Facilities Created

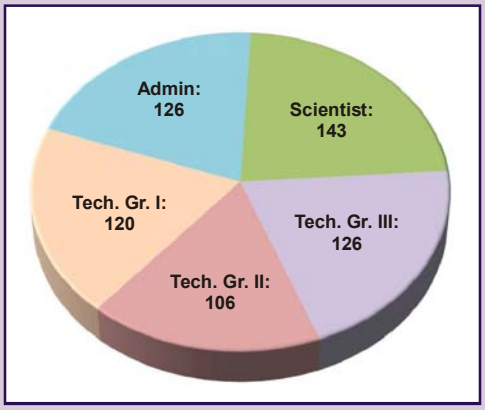

700 MHz. NMR


Small Molecule X-Ray Crystallography

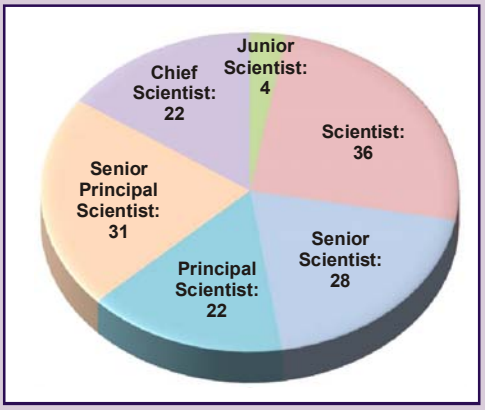

Perkin Elmer, Spectrum II FTIR

Manpower

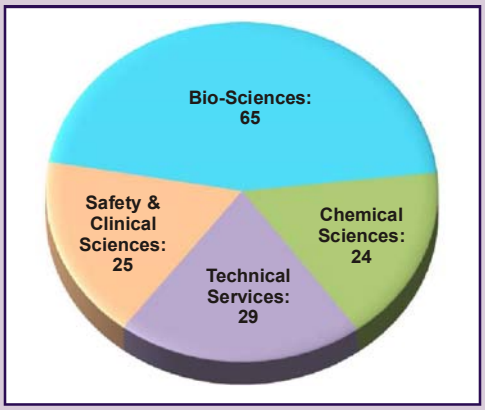
Total Staff (621)



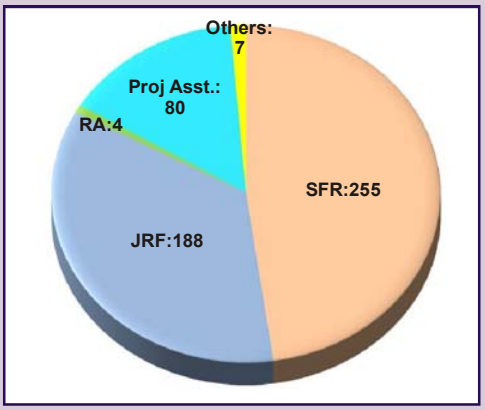
Designation-wise Number of Scientists



Area-wise Strength of Scientists



Research Fellows and Project Assistants (534)



*Data as on 31-01-2013

We Welcome Newly Recruited Scientists

Dr. Monika Sachdev
Sr. Scientist, Endocrinology Division

Dr. Susanta Kar
Scientist, Parasitology Division

Dr. Prem Narayan Yadav
Sr. Scientist, Pharmacology Division

Dr. Tejender S. Thakur
Scientist, MSB Division

Dr. Sidharth Chopra
Sr. Scientist, Microbiology Division

OSDD Chemistry Outreach Program (OSDDChem)

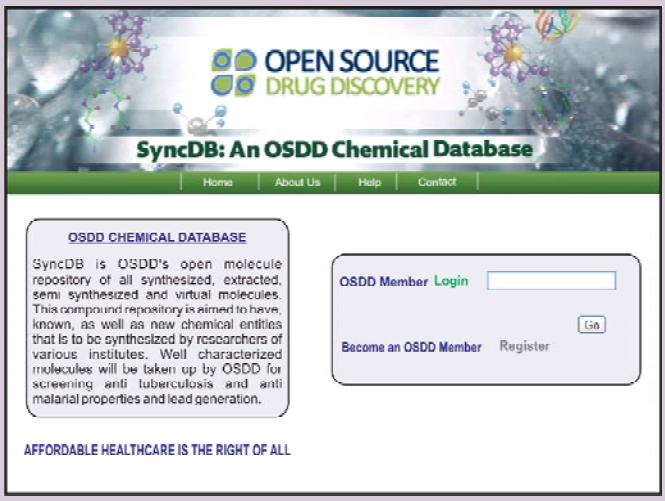
(CSIR-CDRI as Coordinating Laboratory)

On the occasion of the International Year of Chemistry 2011, CSIR, under the aegis of its OSDD initiative, has launched a Chemistry Outreach Program through CSIR-CDRI as the coordinating laboratory. The major objectives of the program are:

- To create a Chemical Library of diverse small molecules synthesized mainly by the M.Sc. and Ph.D. students working at Universities/ colleges/ institutes across the length and breadth of the country;
- To impart practical training to M.Sc. students specializing in organic chemistry towards synthesis and spectroscopic characterization of organic compounds;
- To set up OSDD Outreach Centres at different CSIR labs including CSIR-CDRI (Lucknow), CSIR-NEIST (Jorhat), CSIR-IICB (Kolkata), CSIR-NIIST (Trivandrum), CSIR-IICT (Hyderabad) and CSIR-IIIM (Jammu) where students from nearby places can carry out short duration projects;
- To investigate the bioactivity of the compounds in antitubercular and antimalarial assays;
- To archive the compounds in state of the art storage facility for other biological assays and future usage.

Incentives:

- An initial amount of Rs. 1 lakh for consumable cost, and Rs. 5 - 10 lakhs for minor equipments cost, if needed, will be transferred by cheque/bank transfer to the respective institute or laboratory by CSIR-CDRI (no funding to CSIR labs);
- Rs 3000/- to be paid for each compound (debited from the consumable grant);



For further details, please visit: http://crdd.osdd.net/osddchem or write to Dr. Sanjay Batra at s_batra@cdri.res.in

Distinct Features:

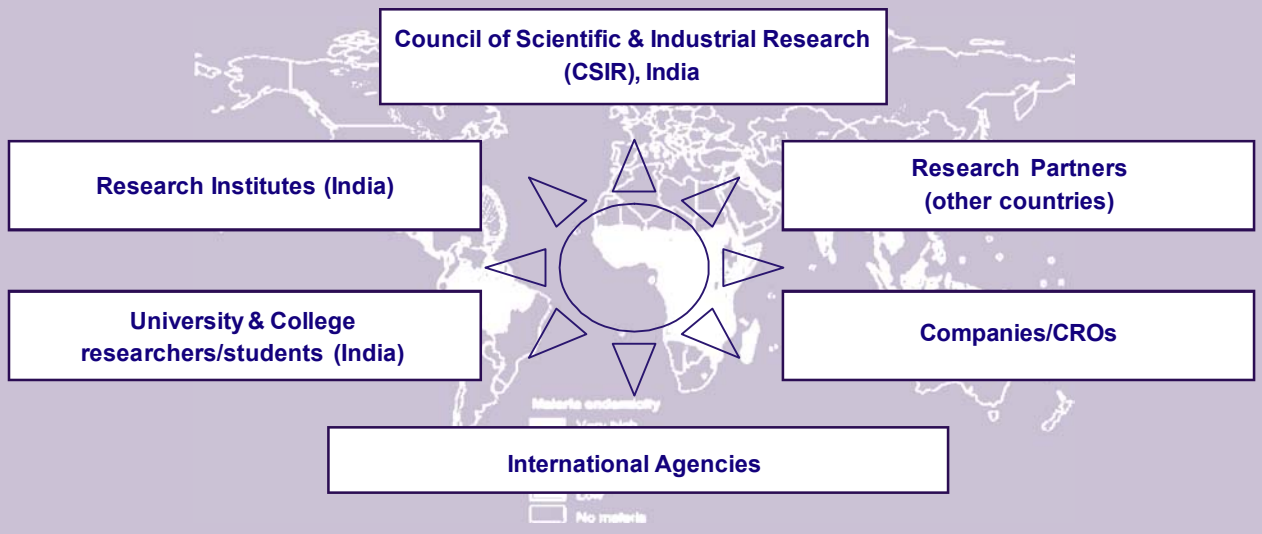
- For the first time, a project like this has been envisioned and initiated that will impart training to large number of MSc and PhD students, especially in organic, medicinal, computational chemistry, pharmacy, etc. in colleges, universities, IITs, IISERs and other academic institutes in the country that will create a large knowledge base in the country.
- OSDD OUTREACH CENTRES have been set up in many CSIR labs. Besides, university departments designated for carrying out this work can train other students from nearby colleges and universities who do not have any facility.
- The compounds generated in these projects are to be submitted to CSIR-CDRI for screening and archiving. Results will be made available to the investigators for publishing papers and OSDD will take the active molecules forward.

Progress made so far:

- Program is already becoming popular with the “MSME”s of Indian Universities/Educational Institutions.
- More than 50 projects have already been submitted from 31 institutes across the country with nearly 1600 molecules in the database. The number is increasing slowly, but steadily.

Open Source Drug Discovery For Malaria (OSDD^m)

(CSIR-CDRI as Coordinating Laboratory)



The project aims to :

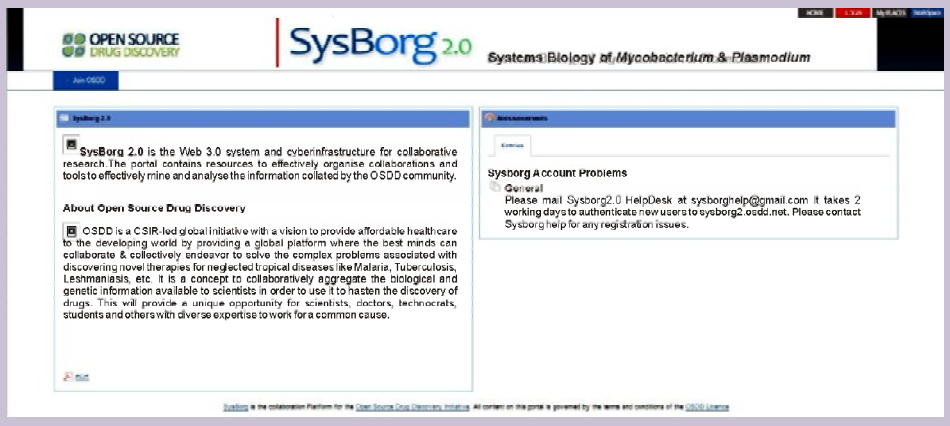
Create a pan-India Consortium with global partnership for open source drug discovery against malaria with commitment to make all data available to the consortium and to support the accessibility of all 'deliverables' at affordable cost to the patient.

Its specific objectives are to:

- Identify pathways and novel targets using bioinformatics and systems approaches.
- Identify chemical entities of interest and use open source for wide participation in chemical synthesis of compounds, lead optimization and cross validation of data.
- Set-up and validate *in vitro* and *in vivo* screening systems, evaluate drug kinetics and drug-drug interaction.
- Search for anti-malarial compounds from plants under traditional use.
- Carry forward drug development (toxicity profiling, pharmacokinetics, evaluation in *P. cynomolgi*-primate model) and take candidate drugs through Phase I and early efficacy studies.

Progress made so far:

- The OSDD^m initiative has begun inviting focused projects for open source drug discovery for malaria and collaborative projects under OSDD^m work packages have been submitted. Project funding will begin shortly.
- Anti-malarial screening linked to the Open Chemistry programme has been initiated.



Portal: http://sysborg2.osdd.net 'The Malaria community' Email: malariaosdd@gmail.com

BUDGET

₹ in Lakh

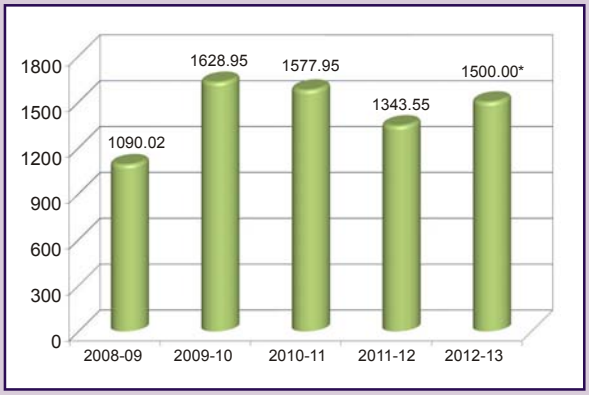
Heads		2008-09	2009-10	2010-11	2011-12	2012-13 (Anticipated)
(A)	**Recurring**					
	Pay and Allowances	2913.871	4046.092	3821.022	3926.863	5014.000
	Contingencies	210.991	256.298	393.437	409.510	700.000
	HRD	2.881	4.000	4.535	4.00	6.000
	Maintenance	159.539	178.112	248.190	283.125	540.000
	Chemical and Consumables	400.076	411.699	601.112	1041.550	1013.950
	Sub-Total	**3687.358**	**4896.201**	**5068.296**	**5665.048**	**7273.950**
(B)	**Capital**					
	Works and Services/ Electrical Installation	86.264	66.682	109.370	-1682.478	722.980
	Apparatus and Equipments/ Computer Equipments	344.112	488.779	1550.000	3466.500	3108.000
	Office Equipments, Furniture and Fittings	9.962	4.021	7.031	6.950	17.000
	Library Books and Journals	207.00	215.000	275.000	240.587	350.000
	Sub-Total	**647.338**	**774.482**	**1941.401**	**2031.559**	**4197.98**
	Total (A+B)	**4334.696**	**5670.683**	**7009.697**	**7696.605**	**11471.930**
(C)	**Special Projects SIP/NWP/IAP/HCP/ BSC/CSC**	**1218.38**	**452.48**	**1312.323**	**995.599**	**2401.489**
(D)	**CMM0015 (New CDRI)**	**3323.150**	**6669.000**	**9504.300**	**3843.710**	**700.000**
	Grand Total (A+B+C+D)	**8876.226**	**12792.163**	**17826.32**	**12535.914**	**14573.419**

*Provisional data as on 31-01-2013

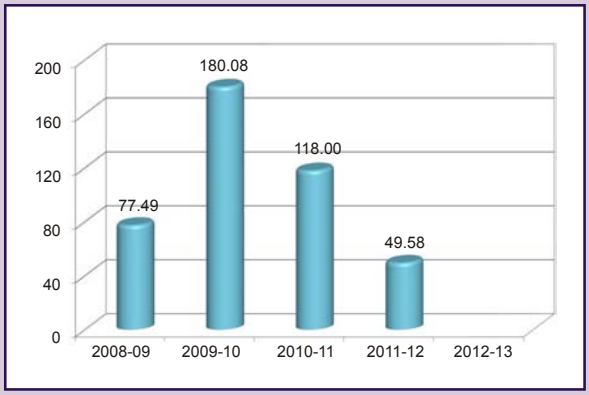
External Budgetary Resources and CSIR Grant

₹ in Lakh

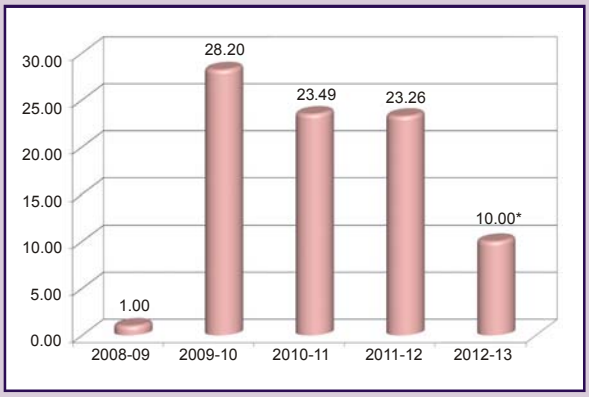
External Cash Flow from Govt Agencies



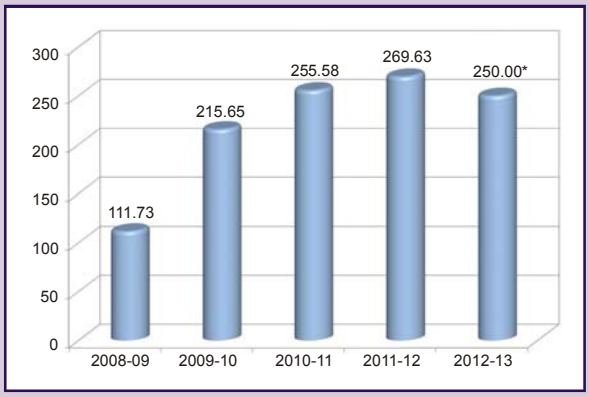
External Cash Flow from Foreign Agencies



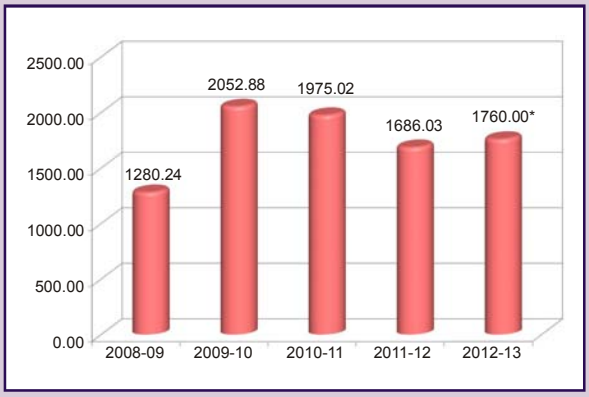
External Cash Flow from Industries



Lab Reserve Fund Generated

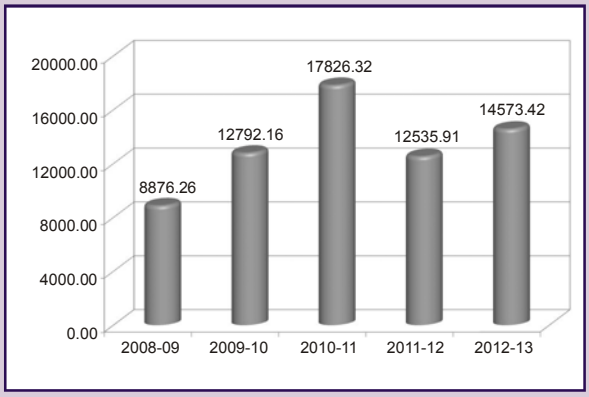


Total External Budgetary Resources#



#Includes ECF and LRF

Total Budget (CSIR-Grant)#



#Includes Regular Budget and Plan Projects (CMM/SMM/SIP/NWP/IAP/HCP/OLP/MLP) Anticipated for 2012-13

*Anticipated for 2012-13

Research Council

(April 2010 – March 2013)

Chairman

Prof. N.K. Ganguly
Former Director-General, ICMR
Distinguished Biotechnology Fellow & Advisor
Translational Health Science & Technology Institute
C/o National Institute of Immunology
Aruna Asaf Ali Marg
New Delhi – 110 067

Members

Prof. A. Surolia
Molecular Biophysics Unit
Indian Institute of Science
Bangalore - 560 012

Dr. K. Nagarajan
Corporate Advisor
Hikal Ltd., R & D Centre
Kalena Agrahara Bannerghatta Road
Bangalore – 560 076

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Director
National Centre for Cell Science
Ganeshkhind
Pune - 411 007

Prof. K.N. Ganesh
Director
Indian Institute of Science Education and Research
900, NCL Innovation Park
Dr. Homi Bhabha Road
Pune- 411 008

Dr. R. Nagaraj
Chief Scientist
CSIR-Centre for Cellular and Molecular Biology
Hyderabad- 500 007

Dr. Bhaskar Saha
Scientist
National Centre for Cell Science
Ganeshkhind
Pune- 411 007

Dr. M.D. Nair
A-11 Sagarika No. 15
3rd Seaward Road, Valmiki Nagar
Chennai - 600 041

Agency Representative

Dr. (Ms.) Deepali Mukherjee
Chief ECD
Indian Council of Medical Research
Post Box No. 4911, Ansari Nagar
New Delhi- 110 029

DG Nominee

Dr. Rajesh S. Gokhale
Director
CSIR-Institute of Genomics and Integrative Biology
University Campus, Mall Road
Delhi- 110 007

Sister Laboratory

Dr. Ram Rajsekharan
Director
CSIR-Central Food Technological Research Institute
Mysore – 570 020

Cluster Director

Prof. Siddhartha Roy
Director
CSIR-Indian Institute of Chemical Biology
4, Raja SC Mullick Road, Jadavpur
Kolkata- 700 032

Director

Dr. Tushar Kanti Chakraborty
Director
CSIR-Central Drug Research Institute
Lucknow – 226 021

Permanent Invitee

Head or his Nominee
Planning & Performance Division
Council of Scientific & Industrial Research
Anusandhan Bhawan, 2, Rafi Marg, New Delhi - 110 001

Secretary

Dr. Saman Habib
Scientist
Molecular & Structural Biology Division
CSIR-Central Drug Research Institute
Lucknow – 226 021

Management Council

(January 2012 – December 2013)

Chairman

Dr. TK Chakraborty
Director
CSIR-Central Drug Research Institute,
Lucknow – 226 021

Members

Dr. KC Gupta
Director
CSIR-Indian Institute of Toxicological Research
Lucknow - 226 001

Dr. Rajendra Prasad
Chief Scientist
Business Development Division
CSIR-Central Drug Research Institute
Lucknow - 226 021

Dr. PMS Chauhan
Senior Principal Scientist
Medicinal & Process Chemistry Division
CSIR-Central Drug Research Institute
Lucknow - 226 021

Dr. Neena Goyal
Senior Principal Scientist
Biochemistry Divisionh
CSIR-Central Drug Research Institute
Lucknow - 226 021

Dr. KV Sashidhara
Senior Scientist
Medicinal & Process Chemistry Division
CSIR-Central Drug Research Institute
Lucknow - 226 021

Dr. Dipankar Koley
Scientist
Medicinal & Process Chemistry Division
CSIR-Central Drug Research Institute
Lucknow - 226 021

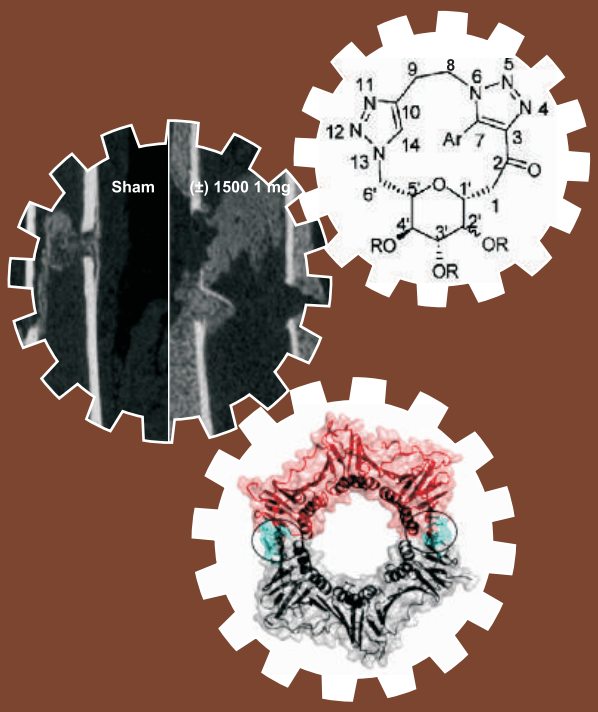
Mr. HM Guniyal
Principal Technical Officer
Sophisticated Analytical Instrument Facility
CSIR-Central Drug Research Institute
Lucknow - 226 021

Mr. AK Dwivedi
Controller of Finance & Accounts
CSIR-Central Drug Research Institute
Lucknow - 226 021

Member Secretary

Mr. LR Arya
Controller of Administration
CSIR-Central Drug Research Institute,
Lucknow – 226 021

Notes



Progress in Research Projects


वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद, भारत
CSIR INDIA

1 Malaria and other Parasitic Diseases

Area Coordinator:
Dr. Shailja Bhattacharya

Assistant Coordinator:
Dr. Saman Habib

Area Leaders:
Dr. Anuradha Dubey
Dr. Renu Tripathi

Parasitic infections cause tremendous burden of disease in tropics and subtropics as well as in more temperate climates. Malaria, Leishmaniasis and Filariasis are the three main parasitic disease areas being vigorously pursued at the institute. With prevalence in more than 100 countries and more than 4 billion people worldwide at combined risk, diseases caused by these three parasites represent a major biomedical challenge. Researchers at the institute address issues pertaining to design and development of novel drug molecules as well as optimization and preclinical development of lead molecules and combination therapy regimens, besides investigation of novel drug delivery systems. A significant basic research component of the program focuses on identification and characterization of novel drug targets, understanding mechanisms of drug action and drug resistance, investigation of aspects of parasite biology and host-parasite interaction, immunoprophylaxis and immuno-diagnosis. The contribution of host genetic factors in malaria susceptibility in Indian populations is also under investigation. The structural biology component of the program aids in molecular modeling and X-ray structure determination.

1.1 Malaria

1.1.1 Synthesis and Screening

1.1.1.1 Synthesis

Over 340 novel chemical moieties representing diverse prototypes including derivatives of quinolines, pyrroles, indoles, pyrrolopyrazole, pyrazolopyridines, aminopyrazoles, azaflavones, pyrazole-imines, phenanthrenes, phenanthridines, α-carbolines, trizoles, thiazolopyrimidines, urea derivatives, 4-quinols, aminopyrazoles, benzimidazoles, dihydrochalcones, and hybrid derivatives viz. indolo-triazines, quinoline–tetrazoles, imidazole fused 2-aryl quinolines, pyrimidazole fused chalcones, etc. were synthesized in the medicinal chemistry division to identify new leads against malaria.

1.1.1.2 Screening against *Plasmodium falciparum in vitro*

A total of 450 novel synthetic compounds, including in-house and external sources, were screened against human malaria parasite *P. falciparum* 3D7 strain *in vitro*. Several active prototypes were followed up for evaluation against chloroquine resistant *P. falciparum* K1 strain as well as cytotoxicity profile against the 'Vero' cell line. A number of molecules with IC_{50} values below 1000 nM were identified and these included novel 4-aminoquinoline derivatives, pyrroles, pyrazolopyridines, phenenthrenes, 4-quinols and imidazole fused-2-aryl-quinolines. Several of the novel 4-aminoquinoline derivatives showed IC_{50} values lower than 50 nM and these values were much lower than corresponding values for chloroquine against chloroquine resistant parasites. In addition, >200 samples of natural origin comprising extracts from marine fauna (under the MoES network programme) were screened against the *in vitro* model and activity guided fractionation of one potent extract obtained from marine fauna led to the identification of one single molecule which has also exhibited promising activity against chloroquine resistant (K1) strain. Follow up studies are ongoing.

Management of *Mycoplasma* contamination in *P. falciparum* cultures: Occurrence of contamination with *Mycoplasma* has been a major hindrance for long-term *in vitro* cultivation of *P. falciparum*. Studies have shown that trypsinization of ongoing cultures is an effective method to remove mycoplasma contamination. Presence of

Mycoplasma orale in accidentally contaminated *P. falciparum* cultures was ascertained by a species-specific PCR-based 'Mycoplasma detection kit' (TAKARA; Cat. No.6601). Trypsinization was carried out using 'Trypsin-EDTA' and growth profile of *P. falciparum* was monitored for more than three weeks post trypsinization. The studies were carried out with four different *P. falciparum* strains, various sera supplements and human erythrocytes belonging to different blood groups. It was interesting to observe that irrespective of different strains of *P. falciparum*, mycoplasma contamination could be successfully removed and the procedure did not affect the growth profile of *P. falciparum* parasites **[Research in Microbiology, PMID: 23277231].**

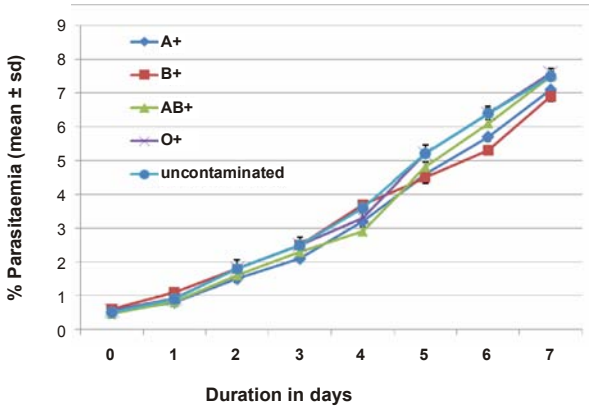


Fig. *P. falciparum* (3D7) growth profile in different blood group erythrocytes after trypsinization

1.1.1.3 Screening against *Plasmodium yoelii* (N-67)-Swiss mice model

Based on the activity profile against *in vitro* models, nearly 25 compounds from amongst the 4-aminoquinolines, tetrahydroquinolones, 4-quinols and pyrazolopyridine derivatives were screened against the chloroquine resistant *P. yoelii* (N-67 strain) – Swiss mice model. Several of these derivatives showed more than 95% parasite suppression after 4 dose treatment. One of the 4-aminoquinoline compound, S-011-1793, showed curative activity at 25 mg/kg oral dose while lower dose of 10 mg/kg also cured 80% of the treated mice. Treatment with 100 mg/kg single dose after oral administration was also curative. Detailed efficacy studies with this compound are proposed to be undertaken.

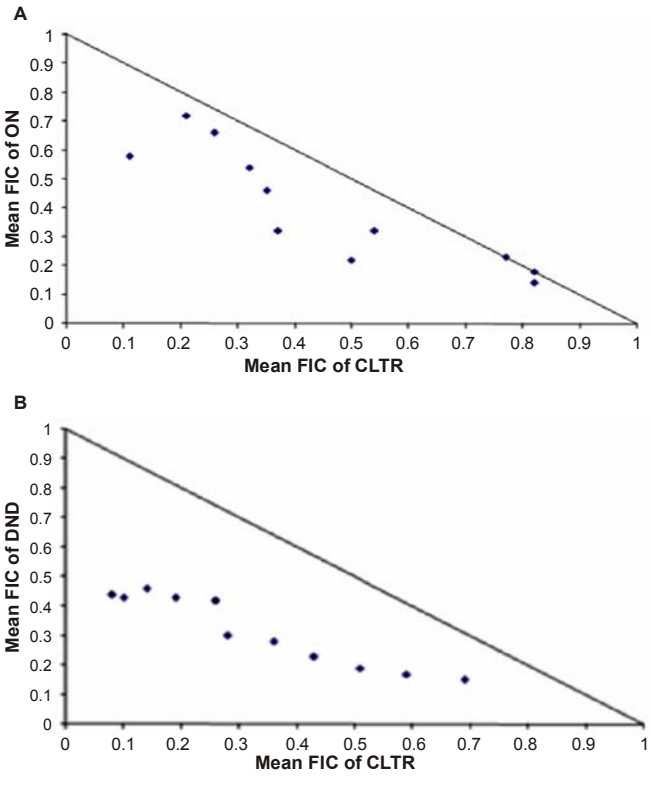
1.1.1.4 Screening against *Plasmodium yoelii* (MDR)-Swiss mice model

Compound S-011-1793 also showed curative activity against *P. yoelii* multidrug resistant parasites after oral administration of a dose of 50 mg/kg for four days while lower dose of 25 mg/kg protected 60% of the treated mice. Besides, 18 other compounds including quinazolines, urea derivatives, trizole and pyridine derivatives, were also screened against multi drug resistant *P. yoelii* parasites in the Swiss mice model. These compounds showed marked parasite inhibition on day 4, but the treated mice developed parasitaemia subsequently.

1.1.1.5 Drug combination studies

(a) Quinine/ quinidine + Clarithromycin

Effect of cytochrome P_{450} inhibitor clarithromycin on antimalarial potential of quinine (QN) and quinidine (QND), the two most affordable and classical antimalarials, was studied. The results have shown that clarithromycin (CLTR) enhances the antimalarial potential of both quinine and quinidine significantly *in vitro* against *P. falciparum* 3D7 and *in vivo* against multi drug resistant *P. yoelii nigeriensis* in Swiss mice. *In vitro* interactions of these drugs with CLTR against *P. falciparum* have shown synergistic response with mean sum fractional inhibitory concentrations (ΣFICs) of <1 (0.85±0.11 for QN+CLTR and 0.64±0.09 for QND+CLTR) for all the tested combination ratios. Analysis of this combination of QN/QND with CLTR in mouse model against *P. yoelii nigeriensis* (MDR) showed that a dose of 200 mg/kg/day for 4 days of QN or QND produces 100% curative effect with 200 mg/kg/day for 7 days and 150 mg/kg/day for 7 days CLTR respectively, while individual drugs at the same dosage showed cure rate of only up to 20% at the most. It is postulated that CLTR, a CYP3A4 inhibitor might have caused reduced CYP3A4 activity leading to increased plasma level of the QN/QND to produce enhanced antimalarial activity. Further, parasite apicoplast disruption by CLTR synergises the



antimalarial action of QN and QND **[Parasitology, PMID: 23137860].**

(b) Mefloquine + Clarithromycin

Considering the rising resistance against mefloquine monotherapy, combined effect of mefloquine and clarithromycin (Cyp 3A4 inhibitor) has been evaluated against CQ sensitive (*Pf* 3D7) as well as CQ resistant (*Pf* K1) clone of *P. falciparum* and results showed synergistic effect against both the clones of *P. falciparum*. Moreover, the findings also indicate that combination of mefloquine and clarithromycin is more synergistic in CQ resistant clone of *P. falciparum* (ΣFIC=0.56) than in the CQ sensitive clone (ΣFIC= 0.9).

1.1.2 Basic Studies

1.1.2.1 Cerebral malaria model

Human brain endothelial cell line BB19 was characterized for the cell surface expression of ICAM-1, CD36 and VCAM-1 receptors by immunofluorescence staining. The ICAM-1 receptor which is the key adhesion molecule that plays a role in cerebral malaria is expressed the most as observed by immunofluorescence staining. Furthermore, expression of these receptors was quantified through ELISA and in preliminary experiments, the expression of ICAM-1 was 5 fold higher than VCAM-1 and CD36 without TNF-α stimulation and 9 fold higher upon TNF-α stimulation.

For the standardization of *in vivo* model of cerebral malaria, C57BL6 mice were infected with *Plasmodium berghei* ANKA and the course of infection was studied. The mice were observed for the hallmark features of murine cerebral malaria i.e. paralysis, ataxia, convulsions and coma. Blood brain barrier studies using Evan's blue extravasation were performed in *P. berghei* ANKA infected Swiss mice which showed no leakage of dye while *P. berghei* ANKA infected C57BL6 mice depicted compromised BBB accompanied with dye leakage in the brain tissue.

1.1.2.2 Purine nucleoside phosphorylase

The purine nucleoside phosphorylase (PNP) is an important enzyme of the purine salvage pathway. PfPNP has a single tryptophan residue in each subunit. PfPNP was cloned, expressed in bacteria and affinity purified. The role of this tryptophan residue in catalysis was studied. Results of studies indicated that tryptophan residue is essential for catalysis and not required for substrate binding.

1.1.2.3 An FtsH protease for mitochondrial biogenesis of *Plasmodium* spp.

There is limited knowledge of molecular processes and proteins involved in organelle biogenesis in *Plasmodium*. An AAA+/FtsH protease homolog (*Pf*FtsH) has been identified that exhibits ATP- and Zn^{2+}-dependent

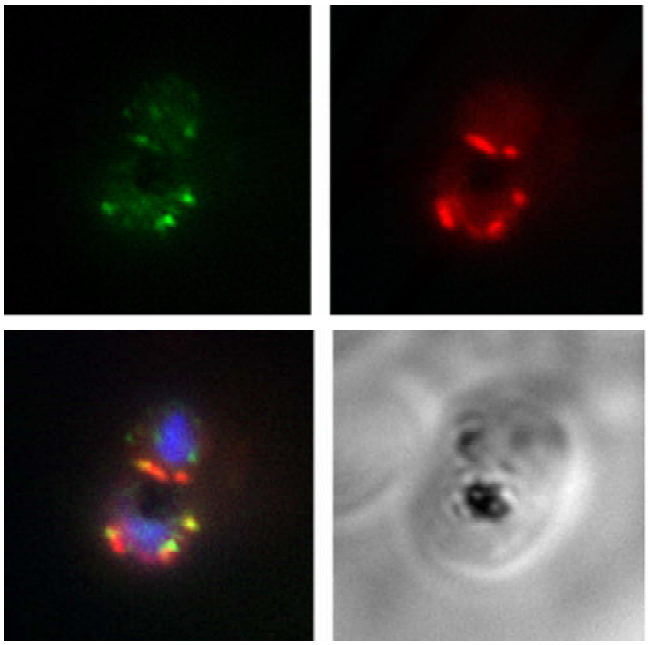


Fig. Mitochondrial localization of a *Plasmodium falciparum* FtsH

protease activity, undergoes processing, forms oligomeric assemblies, and is associated with the membrane fraction of the parasite cell. Generation of a hemagglutinin-tagged transfectant parasite line (collaborative effort with Dr. Stuart A. Ralph, Univ. of Melbourne) demonstrated that the protein localizes to *P. falciparum* mitochondria and accumulates at organellar membrane constrictions and branch points in middle and late parasite erythrocytic stages. Phylogenetic analysis and a single transmembrane domain in *Pf*FtsH suggested that it is an i-AAA like inner mitochondrial membrane protein. Observation of a division-defective filamentous phenotype in *E. coli* cells expressing *Pf*FtsH implied an agonistic effect of the *Plasmodium* factor on the bacterial homolog indicative of functional conservation with *Ec*FtsH. Thus a mitochondrial AAA+/FtsH protease has been identified as a candidate regulatory protein for organelle biogenesis in *P. falciparum.*

1.1.2.4 Molecular cloning and immunochemical characterization of *Plasmodium knowlesi* lactate dehydrogenase

For the first time, lactate dehydrogenase from *P. knowlesi,* the fifth human malaria parasite was cloned and expressed. The gene encoding *P. knowlesi* lactate dehydrogenase (PkLDH) was PCR amplified using gene specific primers and sequenced. BLAST analysis revealed an open reading frame of 316 amino acids showing 96.8% homology with *P. vivax* LDH and around 90% with LDH from other malaria parasites *(P. falciparum, P. malariae* and *P. ovale*). The fusion protein was cleaved with PreScission protease and recombinant PkLDH was affinity purified to homogeneity **[Prot. Express. Purif. PMID: 22683723].**

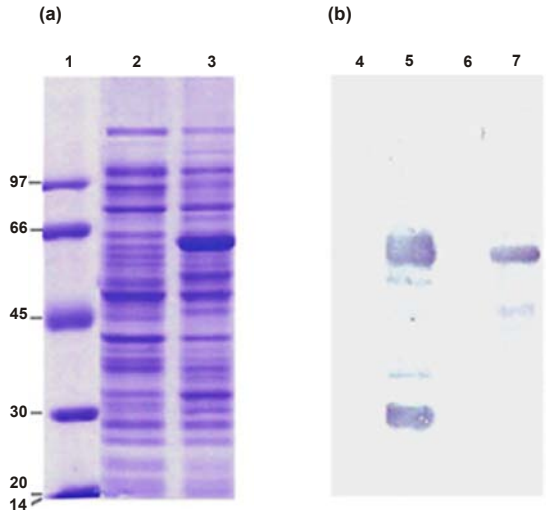


Fig. SDS-PAGE (a) and Immunoblot (b) analysis of recombinant *P. knowlesi* LDH. Lanes 1 = MW, 2,4,6 = Uninduced cells; 3,5,7 = IPTG induced cells; Lanes 4,5 = Immunoblot with rabbit anti-GST antibody; Lanes 6,7 = Immunoblot with rabbit antipLDH antibody.

The recombinant PkLDH showed high reactivity with polyclonal antibodies against *P. knowlesi* LDH and monoclonal antibodies against *P. falciparum* LDH in ELISA. The rPkLDH polyclonal antibodies exhibited significantly high reactivity with both recombinant and parasite PkLDH and did not cross-react with LDH from other sources. The polyclonal antibodies against recombinant PkLDH could detect parasite LDH in malaria blood samples by sandwich ELISA **[Proc. Immunocon-12, 39th Ann. Conf. Indian Immunol. Soc., 2012, p 11].**

Immunogencity of recombinant 42 kDa and 19 kDA fragments of *P. cynomolgi* MSP1: The *P. cynomolgi* MSP-1_{42} ($PcMSP1_{42}$) and MSP-1_{19} ($PcMSP1_{19}$) were expressed in pTriEx-4 and pGEX6P1 expression vectors. The recombinant proteins were purified and it showed high reactivity with conformation-dependent monoclonal antibodies (against *P. cynomolgi/P. vivax* MSP-1 antigen). The immunogenicity of these recombinant $PcMSP1_{42}$ and $PcMSP1_{19}$ proteins was tested by immunizing the mice and the immunized mice sera showed significantly high antibody titres. The immune monkey sera (from our earlier study) collected before challenge showed high antibody titer against PcMSP-1_{19} with reduction in parasitaemia suggesting that 19 kDa is a protective fragment of MSP-1 antigen **[Proc. 5th FIMSA Intl. Cong. Immunol., 2012, p 200].**

1.2 Leishmaniasis

1.2.1 Synthesis and screening

1.2.1.1 Synthesis

Novel synthetic moieties representing several prototypes viz. chalcones, β-carbolines, quinazolinone hybrids, perspicamide derivatives, carboxamide derivatives, azole derivatives, bis-triazines, rhodamine derivatives, quinolines, β-amido carbonyls, oxazoles, triterpenes, iridoid moiety and triazino quinoline derivatives were synthesized for bioevaluation against experimental models.

1.2.1.2 Screening against *in vitro* model

Three hundred ten synthetic compounds were evaluated against *in vitro* macrophage - amastigote model for lead identification. A total of 83 synthetic compounds showing significant activity were re-evaluated for their IC_{50} and CC_{50} responses to determine the selectivity index and 57 compounds were identified for further *in vivo* efficacy evaluation. Similarly, 70 marine extracts/ fractions were evaluated *in vitro* against extracellular promastigotes. Out of these, thirty compounds were selected for *in vitro* macrophage/ amastigote model for their IC_{50} and CC_{50} determination for lead identification. One sample out of 30 showed promising activity and its sub-fractions are under evaluation. In addition 150 synthetic compounds received under DNDi sponsored project representing four prototypes namely thizole amine, thiazole amides and ethyl pyridines were evaluated *in vitro* for lead generation. Fifteen out of 17 thiazoles and 15 out of 19 ethyl pyridines exhibited promising activity.

1.2.1.3 Screening against *in vivo* model

Thirty two synthetic compounds identified from *in vitro* screening were evaluated against *L. donovani/* hamster model. Two synthetic compound representing chalcone and bis- triazines showed 81 and 70% inhibition of parasite multiplication respectively.

After the success of DNDi-VL-2098, a nitroimidazole, another derivative of this group (Fexinidazole) was tested against *L. donovani/* hamster model. Fexinidazole is a 2-subsituted 5-nitroimidazole drug candidate rediscovered following extensive compound mining by the Drugs for Neglected Diseases *initiative* and currently is in Phase I clinical study for the treatment of human African trypanosomiasis. Fexinidazole showed more than 80% efficacy at 150 mg/kg x 5 d; p.o., and this efficacy was maintained at further higher doses.

1.2.1.4 Enhancement in therapeutic efficacy of miltefosine in combination with synthetic bacterial lipopeptide, Pam3Cys against experimental Visceral Leishmaniasis

This is the first report on combination of miltefosine at sub-curative doses with in-built immunoadjuvant Pam3Cys, against experimental VL. Co-administration of Pam3cys with sub-curative doses of miltefosine showed a better inhibitory effect than both pam3cys and miltefosine alone. The efficacy of this combination was comparable with

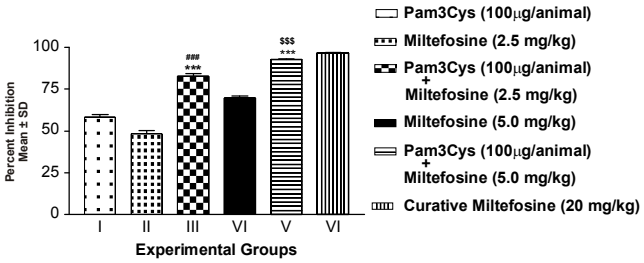


Fig. : Combination therapy of Pam3Cys with sub-curative doses of miltefosine in *L. donovani*/ mouse model

that of the curative dose of the miltefosine. It could be argued that the outcome of parasite reduction in the group treated with miltefosine-Pam3Cys combination was associated with down-regulation of IL-10 and up-regulation of IL-12, IFN-γ, TNF-α, reactive oxygen and nitrogen species. Increased phagocytosis index could also support the efficacy of combination group. Results of immunological assays suggested that Pam3Cys potentiated the cell mediated immunity, evident from significant rise in Th1 cytokines and down regulation of Th2 cytokine, IL-10 in the combination group. In biochemical assays, Pam3Cys combined with miltefosine resulted in to remarkable production of NO, ROS and H_2O_2 **[Experimental Parasitology, PMID: 22626518].**

1.2.1.5 Immunological response in *Leishmania donovani*-infected hamsters after the treatment with miltefosine - an orally effective antileishmanial

In the present study, type of immunological responses generated in miltefosine-treated *L. donovani* infected hamsters, which simulate the clinical situation of human kala-azar was investigated. By day 45 post treatment of miltefosine there was a significant increase in the mRNA expression of iNOS, IFN-γ, IL-12 and TNF-α, whereas there were significant decreases in IL-4, IL-10 and TGF-β in cured hamsters as compared with their infected counterparts. *In vitro* stimulation of lymphocytes with concanavalin A and soluble *Leishmania donovani* antigen showed a maximum LTT response and there was a gradual increase in the NO level (~7-fold compared with infected counterparts). Anti-Leishmania IgG and IgG1 levels, found to be elevated in the infected group, decreased significantly after treatment but there was a significant increase in IgG2 isotype. **[Journal of Antimicrobial Chemotherapy, PMID: 22121191].** Treatment of Leishmania-infected hamsters with miltefosine reverses the Th2-type response into a strong Th1-type immune response.

1.2.1.6 Development of axenic amastigotes of *L. donovani* cells expressing luciferase reporter gene

Luciferase tagged axenic amastigotes of *L. donovani* were developed by transforming luciferase tagged promastigotes to axenic amastigotes at a low pH and high temperature. As compared to transgenic promastigotes, the luciferase expressing axenic amastigotes exhibited more sensitivity to antileishmanial drugs, particularly to pentavalent antimony (*2.8-fold) and also to the test compounds. Hence, the developed luciferase expressing axenic amastigotes make an ideal choice as primary screening model for high throughput drug screening for antileishmanial compounds **[Current Microbiology, PMID: 22945482]**

1.2.2 Elucidation of drug resistance mechanism

1.2.2.1 Cloning and sequencing of differentially expressed drug resistance genes

Using DNA microarray expression profiling approach, a gene encoding mitogen-activated protein kinase 1 (MAPK1) for the kinetoplast protozoan *Leishmania donovani* (LdMAPK1) was identified that was consistently down-regulated in antimony-resistant field isolates. The differential expression of the gene in resistant and sensitive isolates was confirmed both at RNA and protein levels. The recombinant enzyme (LdMAPK1) exhibited kinase activity with MBP as substrate. Transfection studies further suggested its role in antimony resistance **[Antimicrobial Agents and Chemotherapy, PMID: 22064540].** Studies are in progress to reveal the mechanism of LdMAPK1 in clinical antimony resistance. Another gene which exhibited up-regulation in resistant isolates was identified as gamma subunit of TCP1 gene (TComplex Protein-1). Complete ORF was PCR amplified, cloned and sequenced. Primary sequence analysis of LdTCP1c revealed the presence of all the characteristic features of TCP1c. However, leishmanial TCP1c represents a distinct kinetoplastid group, clustered in a separate branch of the phylogenic tree. LdTCP1c exhibited differential expression in different stages of promastigotes. The nondividing stationary phase promastigotes exhibited 2.5-fold less expression of LdTCP1c as compared to rapidly dividing log phase parasites. The sub-cellular distribution of LdTCP1c was studied in log phase promastigotes by employing indirect immunofluorescence microscopy. The protein was present not only in cytoplasm but it was also localized in nucleus, peri-nuclear region, flagella, flagellar pocket and apical region **[Biophysical Biochemical Research Communications, PMID: 23137535]**.

1.2.3 Identification, characterization and validation of novel drug targets

1.2.3.1 Dipeptidycarboxypeptidase (LdDCP)

Four compounds belonging to two chemical classes were identified as the selective inhibitor of LdDCP. These compounds also inihibited multiplication of parasite both under *in vitro* and semi *in vivo* conditions **[Chem. Biol. Drug. Des., PMID: 22014034]**. One of these compounds also

exhibited promising *in vivo* antileishmanial activity in hamster model. The data suggest that these compounds provide leads to be optimized into candidates to treat these protozoan infections.

1.2.3.2 Novel S-adenosyl-L-homocysteine hydrolase

The present study describes a successful application of computational approaches to identify novel *Leishmania donovani* (Ld) AdoHcyase inhibitors utilizing the differences for Ld AdoHcyase NAD+ binding between human and Ld parasite. The development and validation of the three-dimensional (3D) structures of Ld AdoHcyase using the *L. major* AdoHcyase as template has been carried out. At the same time, cloning of the Ld AdoHcyase gene from clinical strains, its overexpression and purification have been performed. Further, the model was used in combined docking and molecular dynamics studies to validate the binding site of NAD in Ld. The hierarchical structure based virtual screening followed by synthesis of five active hits and enzyme inhibition assay has resulted in the identification of novel Ld AdoHcyase inhibitors. The most potent inhibitor, compound 5, may serve as a "lead" for developing more potent Ld AdoHcy hydrolase inhibitors as potential antileishmanial agents **[Journal of Chemical Information and Modeling, PMID: 22324915].**

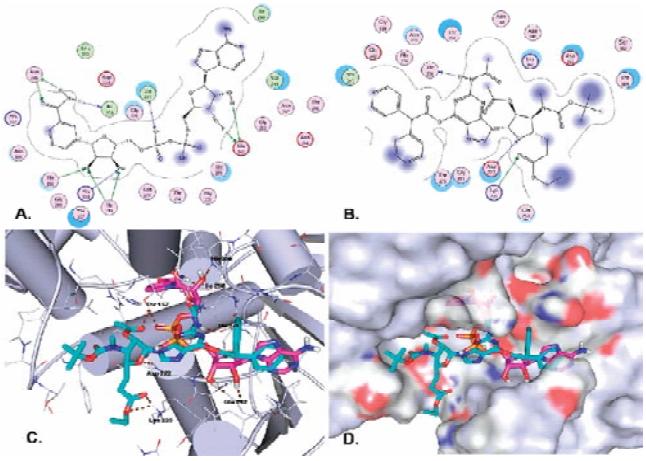


Figure. Binding pose analysis of NAD+ and compound 5 at the NAD+ binding site of Ld AdoHcyase.

(A) 2D binding pose view of NAD+. (B) 2D binding pose view of compound 5; (C) Comparative 3D binding pose view of compound 5 (cyan color) along with NAD+ (pink color). (D) Binding cavity surface view of compound 5 (cyan color) along with NAD+ (pink color).

1.2.4 Immunological studies

1.2.4.1 Follow up studies with Th1 stimulatory proteins identified through proteomics for their immunoprophylactic potential

A. Protein Disulfide Isomerase (PDI):

The molecular characterization of the LdPDI was carried out and the immunogenicity of recombinant LdPDI was assessed. A significantly higher proliferative response was observed with elevated levels of IFN-γ and IL-12 and highly down-regulated IL-10 level in response to rLdPDI. A significant increase in the level of NO production in stimulated hamster macrophages, high IgG2 and low IgG1 levels in cured patient's serum was observed indicating the Th1 stimulatory nature of this protein. In addition, the immunoprophylactic efficacy of pcDNA-LdPDI construct was also assessed. Vaccination with this construct conferred remarkably good prophylactic efficacy (~90%) and generated a robust cellular immune response with significant increases in the levels of iNOS transcript as well as TNF-α, IFN-γ and IL-12 cytokines and high level of IgG2 antibody in vaccinated animals. The *in vitro* as well as *in vivo* results indicate that LdPDI may be exploited as a potential vaccine candidate against visceral Leishmaniasis (VL) **[PLoS One, PMID: 22539989].**

B. Triose Phosphate Isomerase (TPI):

Triose phosphate isomerase (TPI) was assessed for its potential as a suitable vaccine candidate. It elicited strong lymphoproliferative response in cured patients and high nitric oxide production in cured hamsters with stimulation of remarkable Th1-type of cellular immune response (up-regulated IFN-g, IL-12 and extremely down-regulation of IL-10) in PBMCs of Leishmania-infected cured/exposed patients *in vitro*. Vaccination with LdTPI-DNA construct protected naive golden hamsters from virulent *L. donovani* challenge unambiguously (90%). The vaccinated hamsters also demonstrated a surge in IFN-γ, TNF-α and IL-12 levels but extreme down-regulation of IL-10 and IL-4 along with profound delayed type hypersensitivity and increased levels of Leishmania-specific IgG2 antibody. The findings thus suggest LdTPI to have promise as a strong candidate vaccine. **[PLoS One; PMID: 23049855]**

C. *L. donovani* p45, a partial coding region of methionine aminopeptidase:

The recombinant *L. donovani* p45 (rLdp45) induced cellular responses in cured hamsters and generated Th1-type cytokines from PBMCs of cured/endemic VL patients. Immunization with rLdp45 exerted considerable prophylactic efficacy (~85%) supported by an increase in mRNA expression of iNOS, IFN-γ, TNF-α and IL-12 and a decrease in TGF-β and IL-4, indicating its potential as a vaccine candidate against VL **[International Journal for Parasitology, PMID: 22502587].**

D. Immunostimulatory Cellular Responses of Membrane and Soluble Protein Fractions of Splenic Amastigotes of *L. donovani* in Cured Patient and Hamsters:

In the present study, splenic amastigotes of *L. donovani* were isolated and purified. These were fractionated

into five membranous and soluble subfractions each i.e MAF1-5 and SAF1-5 were subjected to assessment of their ability to induce cellular responses. Out of five sub-fractions from each of membrane and soluble fractions, only four viz. MAF2, MAF3, SAF2 and SAF3 were observed to stimulate remarkable lymphoproliferative, IFN-γ, IL-12 responses and Nitric Oxide production, in Leishmania-infected cured/ exposed patients and hamsters. Results suggest the presence of Th-1 type immunostimulatory molecules in these sub-fractions which may further be exploited for developing a successful subunit vaccine against VL from the less explored pathogenic stage **[PLoS One, PMID: 22292030].**

1.2.5 Cell biology studies

1.2.5.1 ADF/Cofilin

In continuation with previous studies, it has been recently shown that a single mutation of S4D abolishes regulatory functions of, ADF/cofilin, on actin dynamics resulting in completely non-motile cells **[Eukaryot. Cell, PMID: 22492507]**. In addition, studies on a novel actin-like protein has revealed its role in mitochondrial energy metabolism and essential functions in survival of Leishmania parasites in culture. Preliminary studies on an actin-sequestering protein, twinfilin have indicated its role in cell division process, while detailed studies are underway.

1.3 Filariasis

1.3.1 Synthesis and screening

Fifteen compounds synthesized (Coumari-thiazole Hybrids) in house were evaluated *in vitro* on adult parasites and microfilariae of the lymphatic filarial parasite, *B. malayi*. Of these, S-011-2091 and S-011-2094 were active in motility assay and caused 62 and 93%, inhibition of MTT reduction by adult parasites *in vitro*. S-011-2094 was microfilaricidal and required only ¼ of the dose found lethal against adult worms (IC50: 8.84 µg/ml). The efficacy of the compounds is being assessed in primary (jird-*B. malayi)* screening model. Two 3,6-epoxy [1,5] dioxocine compounds exhibited potent antifilarial activity both *in vitro* & *in vivo* **[Bioorganic & Medicinal Chemistry, PMID: 22284816]**. Similarly, the marine samples included 31crudes, 11 fractions which were screened *in vitro* on the adult as well as microfilarial life stages of *B. malayi*. Of these, only two crude samples (IIC-942-A001, IIC-950-A001) were found active at the cut off conc. of 15.6 µg/ml and demonstrated IC_{50} values of 3.9 and 1.9 µg/ml respectively when tested *in vitro* on adult parasites. Both these antifilarial hits showed high selectivity index (SI>10) on further cytotoxicity testing on Vero cells. The alcoholic extract from marine sponge, *Haliclona oculata* was also evaluated for *in vitro* antifilarial activity which found to be located in the methanol extract and one of its four fractions (chloroform). Further bioactivity guided fractionation of chloroform fraction led to localization of *in vitro* activity in one of its eight chromatographic fractions. Methanol extract, chloroform fraction and the active chromatographic fraction revealed IC_{50} values of 5.0, 1.8, and 1.62 µg/ml respectively for adult *B. malayi* and 1.88, 1.72 and 1.19 µg/ml respectively for microfilariae when the parasites were exposed to test samples for 72 h at 37 ^{0}C. All the three samples were found to be safe in the further cytotoxicity test on Vero cells (monkey kidney cells) demonstrating the selectivity indices (SI) to be higher than 10 and therefore further subjected to *in vivo* evaluation in animal models.

1.3.2 *In vivo* antifilarial efficacy

The extract and the active fraction of the marine sponge, *Haliclona oculata* was *in vivo* evaluated in the primary (adult *B. malayi* intraperitoneal transplanted jird) and secondary (subcutaneous infective larvae induced infection in mastomys) rodent screens. The three test samples (methanol extract; chloroform extract and active chromatographic fraction) at the dose of 100 mg/kg for five consecutive days by s.c. route in primary jird screen demonstrated macrofilaricidal (adulticidal) efficacy to the tune of 51.3%, 64% and 70.7% respectively. On further evaluation in the secondary s.c. *B. malayi* L3 infected Mastomys model, the macrofilaricidal activity ranged between 45 and 50% with moderate embryostatic effect at 500, 250 and 125 mg/kg x 5 days by oral route. The chromatographic fraction possessing highest antifilarial action was primarily found to be a mixture of four alkaloids Mimosamycin, Xestospongin-C, Xestospongin-D and Araguspongin-C in addition to few minor compounds **[Experimental Parasitology, PMID: 22306280].**

The antifilarial activity was also evaluated in some terrestrial plants. The diarylheptanoids from leaves of the plant, *Alnus nepalensis* such as; Platyphyllenone (**A**), alusenone (**B**), hirustenone (**C**), and hirsutanonol (**D**) are important biologically active diarylheptanoids present in *A. nepalensis*. *In vitro* antifilarial testing under the NWP0037 project revealed one of these compounds (**C)** to possess promising antifilarial activity both *in vitro* (LC100 of adult: 15.63 µg/ml; IC50: 5.52 µg/ml; SI: 1407) and *in vivo* (57% macrofilaricidal in *B. malayi*/jird model at 100 mg/kg, sc x 5days). A sensitive, selective and robust densitometric high-performance thin-layer chromatographic method was developed and validated for the above four biomarker compounds. The separation was performed on silica gel 60F_{254} HPTLC plates using chloroform: methanol (9:1 v/v) as mobile phase. The quantitation of marker compounds was carried out using densitometric reflection/ absorption mode at 600 nm after post-chromatographic derivatization using

vanillin–sulfuric acid reagent. The method was validated for peak purity, precision, robustness, limit of detection (LOD) and quantitation (LOQ) etc. **[Phytomedicine, PMID: 23219341].**

In another study, bioassay guided fractionation of ethanolic extract of the leaves of *Bauhinia racemosa* led to isolation of galactolipid and catechin class of the compounds from the most active n-butanol fraction (F4). Among the active galactolipids, 1 ((2S)-1, 2-di-O-linolenoyl-3-O-a-galactopyranosyl-(1/6)-O-b-galactopyranosyl glycerol) was *in vitro* active on both adult and microfilaria of *B. malayi* and emerged as the lead molecule in terms of dose and efficacy. The crude ethanolic extract (F1) caused 80% reduction in the motility of adult filarial parasite *in vitro*. On further fractionation, only n-butanol fraction (F4) showed promising adulticidal (IC50: 5.46 µg/mL) and microfilaricidal (IC50 4.89 µg/mL) activities with Minimum Inhibitory Concentration (MIC) of 15.6 mg/mL. Compound 1 appeared to be the most active compound against adult worm and compound 3 most effective on mf. The long chain fatty acid alcohol (compound 8) demonstrated ~50% adulticidal antifilarial activity in jird/*B. malayi* primary *in vivo* screen **[European Journal of Medicinal Chemistry, PMID: 22348826].**

1.3.3 Cloning and characterization of *B. malayi* proteins/enzymes as antifilarial drug/ vaccine targets

1.3.3.1 *B. malayi* ATPase RNA helicase

The DExD/H box families of RNA helicases are a multifunctional group of proteins involved in unwinding of inter- and intra-molecular base-paired regions. Successful knockdown of DEAD box RNA helicase gene (BmL3-Helicase) of *Brugia malayi* was carried out with specifically designed and chemically synthesized siRNA of <20 bp to observe the role of enzyme in parasite biology and its worth as an antifilarial drug target. Delivery of siRNA by both electroporation and soaking resulted into diminished helicase gene expression associated with decreased parasite motility, viability (97%) and release of microfilariae (81.0% reduction) from adult females *in vitro*. There was mortality of male worms and phenotypic deformities in intrauterine stages within the female worm. RT-PCR of siRNA treated worms revealed a complete knockdown of BmL3-Helicase transcription within 16 h illustrating that *B. malayi* helicase enzyme represents a possible antifilarial drug target **[Journal of Biotechnology, PMID: 22192512].**

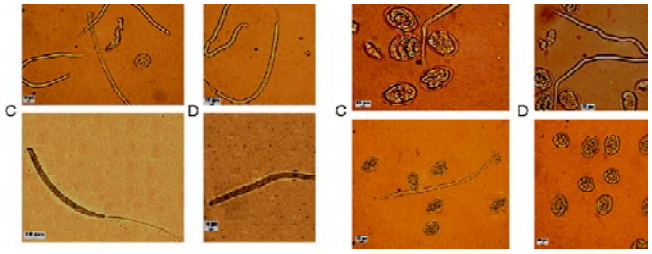


Fig. Effect on embryos and pretzel stages after siRNA induced silencing of BmL3-Helicase gene. Specific siRNA exposed group (C and D); no siRNA (a) and scrambled siRNA (b).

1.3.3.2 *B. malayi* trehalose-6-phosphate phosphatase (Bm-TPP)

In this study, cross-reactivity of recombinant Bm-TPP was investigated with the sera of human bancroftian patients belonging to different disease categories. Bm-TPP appeared highly immunogenic in *in silico* study using bioinformatics tool. BALB/c mice administered with r-Bm-TPP alone or in combination with Freund's complete adjuvant (FCA) generated a strong IgG response. The recombinant enzyme generated a mixed T helper cell response which was marginally biased towards Th1 phenotype accompanied with profound accumulation of CD4+ and CD8+ T cells in the spleen and up-regulation of activated peritoneal macrophages. r-Bm-TPP also enhanced the production of both pro-inflammatory (IL-2, IFN-γ) and anti-inflammatory (IL-4, IL-10) cytokines. Mice immunized with r-Bm-TPP alone or with FCA provided 54.5% and 67% protection respectively against *B. malayi* infective larval challenge. The findings suggest Bm-TPP to elicit protective immune response and might be a potential candidate for development of vaccine against lymphatic filarial infections **[Microbes and Infection, PMID: 22981601].**

Validation of Bm-TPP as an antifilarial drug target: The functional role of *B. malayi tpp* gene was investigated by siRNA mediated *tpp* gene silencing in adult female *B. malayi* which brought about severe phenotypic deformities in the intrauterine stages such as distortion and embryonic development arrest. The motility of the parasites was significantly reduced and the microfilarial production as well

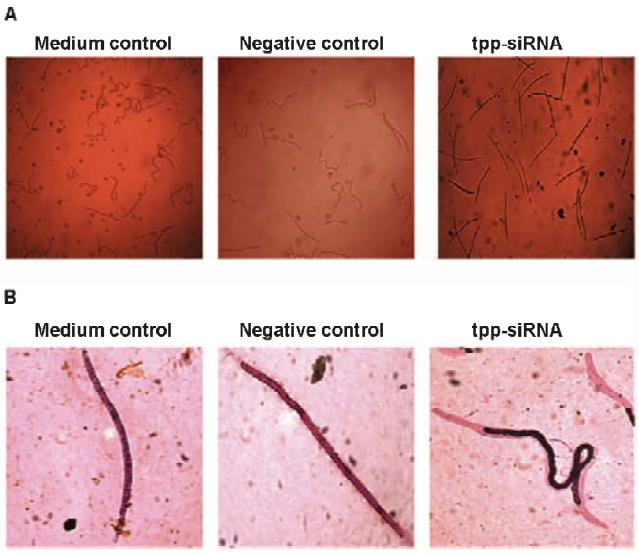


Fig. Death/phenotypic abnormalities in mf post gene silencing

as their *in vitro* release from the female worms was also drastically abridged. A majority of the microfilariae released in to the culture medium were found dead. *B. malayi* infective larvae which underwent *tpp* gene silencing, showed 84.9% reduced adult worm establishment after inoculation into the peritoneal cavity of naïve jirds. The findings suggest that *B. malayi* TPP plays an important role in the female worm embryogenesis, infectivity of the larvae and parasite viability and therefore has the potential to be exploited as an antifilarial drug target **[PloS Tropical Neglected Diseases, PMID: 22905273].**

1.3.3.3 Heat shock protein (HSP60) of *B. malayi*

The distribution of HSP60 in different life-stages of the parasite was determined in the present study using antibodies raised against recombinant mtHSP60bm (rmtHSP60bm). The 3D structure and sequence homology of the protein with *E. coli* GroEL/ES and human HSP60 was carried out *in silico*. The ATP binding pocket of human HSP60 and mtHSP60bm were analyzed and compared using *in silico* models. mtHSP60bm was present in all life-stages of the parasite except third stage infective larvae, in which it could be induced by heat-shock, and showed high degree of homology with *E. coli* GroEL/ES (Figs. 1, 2). The ATP binding pockets of HSP60 in humans, *E. coli* and *B. malayi* were also found structurally conserved (Fig. 3). This similarity between human and mtHSP60bm might be useful in understanding the host-parasite interactions. This is the first ever report on distribution, cloning, sequence homology and ATP binding sites of mtHSP60bm **[Exp. Parasitol., PMID: 22890156].**

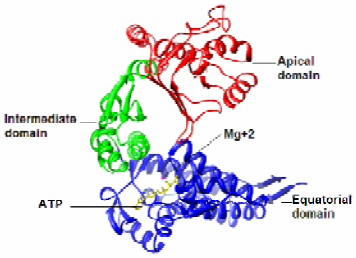


Fig. 1 : Homology model of *B. malayi* HSP60

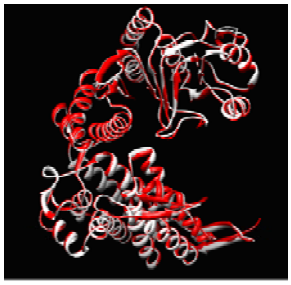


Fig. 2 : Structural super-imposition of *B. malayi* HSP60 (white) with Template (Red)

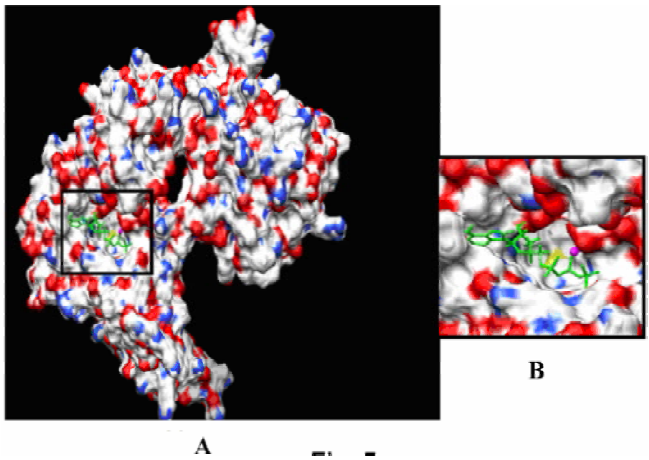


Fig. 3 : Molecular surface view of HSP60 with ATP (green) & Mg+2(magenta) bound (A). Close view of ATP binding pocket of HSP60 (B)

1.3.3.4 Filarial chitinase

In this study, chitinase (exochitinase and endochitinase) in adult and microfilariae of *Setaria cervi,* the bovine filarial parasite has been demonstrated and characterized. The chitinase activity has been detected in adult and microfilarial stages of *S. cervi* using both chromogenic and fluorescent substrates. The *S. cervi* adult stage was found to have high activity of exochitinase while microfilarial stage showed high activity of endochitinase. Native polyacrylamide gel electrophoresis, followed by staining of enzyme activity with fluorescent substrates, revealed single isoenzymic form of exochitinase in adults and endochitinase in microfilariae of *S. cervi* **[Proc. 81st Ann. Meet. SBC(I) 2012, p 142].**

1.3.4 Wolbachia proteins/ enzymes as antifilarial drug/ vaccine target

1.3.4.1 NAD+-dependent DNA ligase from *Wolbachia* endosymbiont of *B. malayi*

In this study, the cloning, expression and purification of NAD+-dependent DNA ligase of *Wolbachia* of *B. malayi* (wBm-LigA) was undertaken. wBm-LigA has all the domains that are present in nearly all the eubacterial NAD+-dependent DNA ligases such as N-terminal adenylation domain, OB fold, helix-hairpin-helix (HhH) and BRCT domain except zinc-binding tetracysteine domain. The purified recombinant protein (683-amino acid) was found to be biochemically active and was present in its native form. It was able to catalyze intramolecular strand joining on a nicked DNA as well as intermolecular joining of the cohesive ends of BstEII restricted lamda DNA in an *in vitro* assay. The enzyme was localized in the various life-stages of *B. malayi* by immunoblotting and high enzyme expression was observed in *Wolbachia* within *B. malayi* microfilariae and along the hypodermal chords in female adult parasites and in the gravid portion as observed by confocal microscopy. This is the first report on this enzyme of *Wolbachia* and these findings would

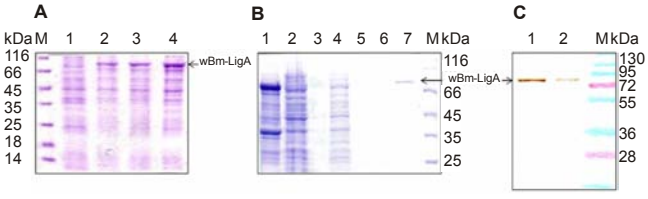


Fig. Overexpression, purification and Western blot analysis of recombinant wBm-LigA induced in presence of various conc. of IPTG (A); affinity purified (B) and localized in blot(c)

assist in validating the antifilarial drug target potential of wBm-LigA in future studies.

Analysis of the phylogenetic tree showed that wBm-LigA forms a discrete cluster A with closely related NAD+-dependent DNA ligase of all the prokaryotic bacteria which is subdivided into two branches, the first one constituting the subcluster A1 and the second one (subcluster A2) comprising wBm-LigA along with the DNA ligase of *Wolbachia* endosymbiont present in the insects and other alpha proteobacteria. All the eukaryotic DNA ligases which are ATP dependent viz. H*omo sapiens, Mus musculus, B. malayi, Plasmodium falciparum, P. knowlesi* and *Saccharomyces cerevisiae* are present in a separate cluster B indicating significant divergence between wBm-LigA and *B. malayi* or *H. sapiens.*

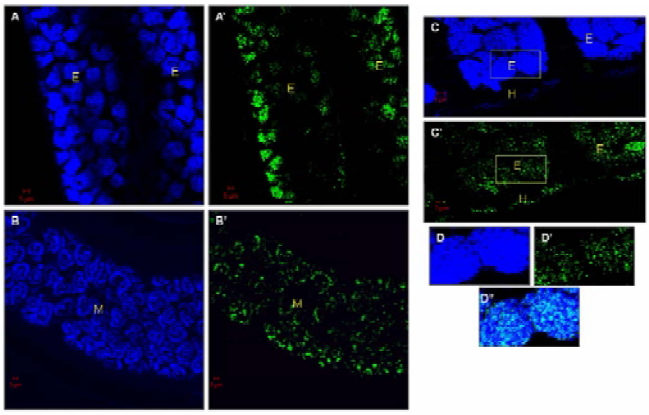


Fig. Immunolocalization of wBm-LigA in developing embryos, mf and hypodermal chords of female adult worm

The high level of endogenous expression of wBmLigA was immunolocalized within L3, microfilariae and adult filarial parasites by confocal microscopy. The overall findings indicate an imperative role of wBmLigA in the biology of filarial endosymbiont and present an attractive antifilarial drug target. The specific inhibitors of this enzyme are known and new chemical structures may be synthesized which will help in validating wBm-LigA as a candidate drug target. The expression and characterization of this protein represents a critical step towards understanding the molecular trappings underlying Wolbachia maintenance in filarial parasite thereby providing more insight into mutualistic interaction between *Wolbachia* and its host, *B. malayi* **[PLoS ONE, PMID: 22815933].**

1.3.4.2 Translation initiation factor-1 of *B. malayi Wolbachia* (Wol TI IF-1)

Wolbachia Translation initiation factor-1 (Wol TI IF-1) is one of the factors required for *Wolbachia* growth and viability. This factor was cloned, over expressed and purified. Wol TI IF-1 exhibited strong immuno-reactivity with various categories of bancroftian sera.

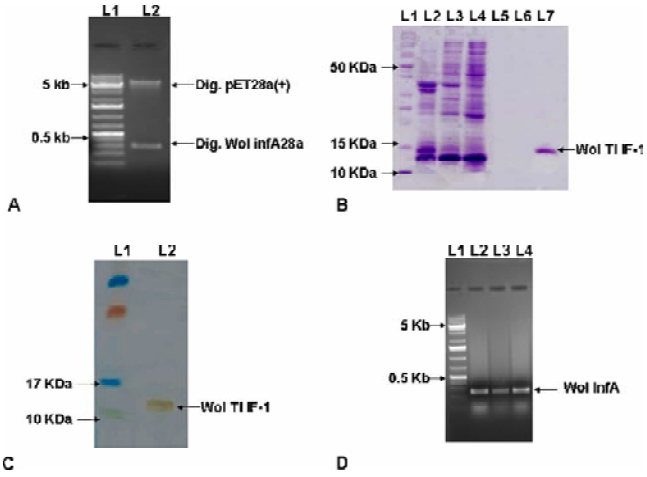


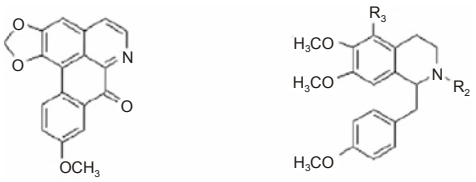
Fig. Cloning, purification, Western blot and stage specific expression of recombinant Wol TI IF-1

Immunization of the susceptible rodent host, *Mastomys coucha* with the recombinant Wol TI IF-1 followed by *B. malayi* infective larval challenge resulted into significant reduction in microfilarial density (70–72%) and adult worm establishment (61–63%). Protection offered by Wol TI IF-1 was found to be associated with the generation of strong humoral immune arm as observed by an increased antibody level with preponderance of IgE, IgM, IgG1 and IgG2a isotypes. The anti-Wol TI IF-1 antibodies promoted profound adherence of peritoneal exudates cells to the surface of microfilariae and infective larvae causing cytotoxicity and their death. The present study indicates potential of recombinant Wol TI IF-1 as a promising vaccine candidate against human lymphatic filarial infection. **[Comparative Immunology, Microbiology and Infectious Diseases, PMID: 23079772].**

1.3.5 Immunomodulatory and anti-infective efficacies of plant extracts

1.3.5.1 N-methyl-6, 7-dimethoxyisoquinolone present in *Annona squamosa* twigs is the major immune modifier in BALB/c mice

Phytochemical analysis and pharmacological investigation of the most active chloroform fraction of *A. squamosa* (AS) led to isolation and identification of a number of compounds whose structures were elucidated using 1D and 2D NMR spectroscopic analysis. Amongst the twelve pure compounds isolated, five compounds Lanuginosine (1), (+) –O– methylarmepavine (2), (+)–anomuricine (3), Isocorydine (4), and N-methyl-6, 7-dimethoxyisoquinolone (5) were evaluated *in vivo* for their immune modifier activities in BALB/c mice after oral administration at three log doses of 0.3, 1.0 and 3.0 mg/kg x 14 days. Of these, three; Lanuginosine (1), (+) –O– methylarmepavine (2) and N-methyl-6, 7-dimethoxyisoquinolone (5) demonstrated dose dependent immune stimulating activity. The uppermost activity was however noted in compound **5** at the 3.0 mg/kg



2: $R_1 = H, R_2 = CH_3$
3: $R_1 = OH, R_2 = H$

Fig. Structure of isolated compounds Lanuginosine (1), (+) -O-methylarmepavine (2), (+)- anomuricine (3), Isocorydine (4), and N-methyl-6, 7-dimethoxyisoquinolone (5)

in the form of increased splenic T and B cellular proliferation, up-regulated CD4+, CD8+ and CD19+ cell population and accentuation in the peritoneal macrophage function. The compound possibly acted via stimulation of pro-inflammatory Th1 cytokines IL-2 and IFN-γ **[Fitoterapia, PMID: 22004725]**. The findings are significant for further use of this plant as efficient immune-stimulant or immune-adjuvant against diseases associated with immunosuppression. The analogs of the compound may further be chemically synthesized to achieve desired immune modifying activity.

1.3.5.2 Chemotypical variations in *Withania somnifera* lead to differentially modulated immune response in BALB/c mice

Withania somnifera (Ashwagandha) is a plant with known ethnomedicinal properties and its use in Ayurvedic medicine in India is well documented. The immunomodulatory efficacy of aqueous-ethanol extracts of roots of three selected designated chemotypes of this plant (NMITLI 101R, 118R and 128R) was investigated in BALB/c mice. NMITLI 101R incited both humoral and cellular immune response in terms of higher number of antibody producing cells and enhanced foot pad swelling at the 10 mg dose as also dose dependent B and T cell proliferations. Levels of intracellular and secreted cytokines post-NMITLI 101R treatment illustrated generation of mixed Th1/Th2 response that remained more polarized towards Th1. This chemotype also generated maximum reactive oxygen species. NMITLI 118R provoked comparatively reduced immune response at lower doses but induced highly polarized Th1 cytokine response. In contrast, NMITLI 128R led to enhanced antibody production with minimal cellular response demonstrating marginally Th2 dominance at a lower dose. There was distinct modulation in the immune response exhibited by the three chemotypes of *Withania somnifera* and NMITLI 101R appeared to possess better immunostimulatory activity than the other chemotypes at lower doses **[Vaccine, PMID: 22182427].**

1.3.5.3 Immunoprophylactic activity of *Withania somnifera* chemotypes against *B. malayi* L3 challenge in *Mastomys coucha*

The immunoprophylactic potentials of three chemotypes (NMITLI-101, 118, 128) and pure compound,

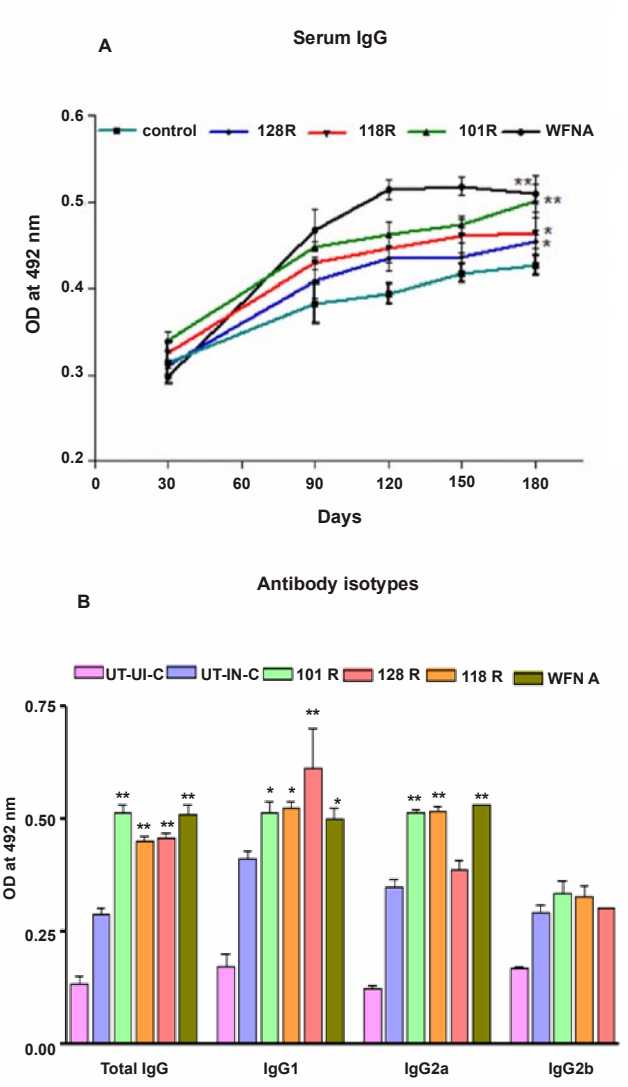


Fig. Filaria-specific serum IgG (A) and antibody isotype (B) levels by ELISA in the sera of Mastomys post-L3 challenge.

Withaferin A was evaluated against filarial pathogen (*B. malayi)* was evaluated by administering aqueous ethanol extracts at 10 mg/kg and Withaferin A at 0.3 mg/kgx7days before and after challenge with L3 of *B. malayi*. The test samples offered differential protection in *Mastomys coucha*. 101R offered best protection (53.57%) over other chemotypes. The establishment of *B. malayi* L3 was adversely affected by pretreatment with withaferin A as evidenced by 63.6% reduction in adult worm establishment. Moreover, a large percentage of the established female worms (66.2%) showed defective embryogenesis. Withaferin A and NMITLI-101 generated a mixed Th1/Th2 phenotype, 118R stimulated production of IFN-γ and 128R and increased the levels of IL-4. Taken together, the findings reveal potential immunoprophylactic properties of *W. somnifera* and further studies are needed to ascertain the benefits of this plant against other pathogens as well **[Parasite Immunology, PMID: 22394222]**.

2 Reproductive Health Research, Diabetes & Energy Metabolism

Area Coordinator:
Dr. Naibedya Chattopadhyay

Assistant Coordinators:
Dr. Gopal Gupta
Dr. S. Sanyal

Area Leader:
Dr. A.K. Srivastava

This area is broadly divided into two sections; a) Reproductive health research and b) Diabetes and energy metabolism research. Objectives followed by significant research progress made under these two sections are described subsequently.

a) Objects of Reproductive health research

Design and synthesize novel molecules/isolate from natural sources and bioevaluate them for generating new leads and to develop them as female or male contraceptives, spermicides with anti-STI properties, agents for the management of post-menopausal osteoporosis and other endocrine disorders; evaluate traditional remedies for fertility regulation and endocrine disorders; understand mode of action of promising agents and undertake basic research to generate new knowledge on female and male reproductive endocrinology relevant to fertility regulation.

b) Objects of Diabetes and energy metabolism

I) Discovering of targeted therapeutic leads in type II diabetes mellitus (T2DM) and hyperlipidemic condition for potential preclinical development and II) Understanding pharmacological basis of actions of existing and potential therapeutics in type II diabetes and hyperlipidemic condition

2.1 Reproductive health research

2.1.1 Male contraception

2.1.1.2 Designing dually active vaginal contraceptive *via* bioisosterism approach

Bioisosterism approach was used for the rational modification of a lead spermicidal compound to a safer and more clinically effective agent. With an aim to introduce trichomonacidal and fungicidal activity (while retaining the spermicidal activity) in a previously designed framework (Fig. I), it was thought worthwhile to modify the thiocarbamate group into dithiocarbamate without alteration in residual molecular framework. Consequently, 2,2'-disulfanediylbis(3-(dialkylamino)propane-2,1-diyl) bis-(dimethylcarbamodithioate) (Fig. II) were synthesized and evaluated for biological activities. Bioisosterism worked very well and the synthesized compounds displayed not only enhanced spermicidal activitiy (MEC 0.001%) but also exhibited trichomonacidal (MIC 6.25 µg/mL) and fungicidal (MIC 6.25 µg/mL) activities, *in vitro* [**Indian Patent 245815**].

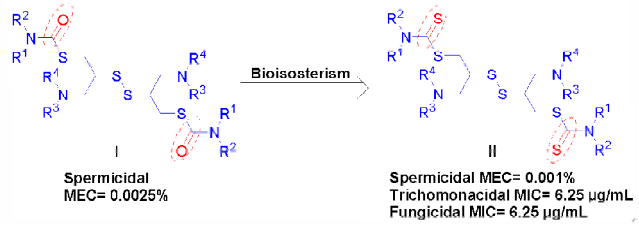


Fig. 1: Graphical depiction of evolution of our work on DTCs leading to current series via bioisosterism approach

2.1.2 Bone biology and bone anabolic agents

2.1.2.1 Positive skeletal effects of the leaves and pods of *Dalbergia sissoo* extract (butanol soluble standardized fraction, BSSF) in ovariectomized (OVx) rats, a model for postmenopausal osteopenia

In comparison to OVx rats treated with vehicle, BBSF treatment to OVx rats resulted in improved trabecular microarchitecture of the long bones, increased biomechanical strength parameters of vertebra and femur, decreased bone turn over markers (osteocalcin and CTX) and the expression of skeletal osteoclastogenic genes, and

increased new bone formation and the expressions of osteogenic genes in the femur. Overall, the osteoprotective effects of BSSF were comparable to E2. BSSF did not exhibit uterine estrogenicity. Analysis of marker compounds revealed the presence of osteogenic methoxyisoflavones including caviunin 7-O-[β-D-apiofuranosyl-(1>6)-β-D-glucopyranoside] (a novel compound), biochanin A and pratensin. Orally dosed BSSF in the preclinical setting was effective in preventing estrogen deficiency-induced bone loss by dual action of inhibition of bone resorption and stimulation of new bone formation. **[Menopause, PMID: 22850441]**.

2.1.2.2 Discovery of benzoic acid analogs as BMP-2 stimulator from osteoblasts that accelerates fracture healing

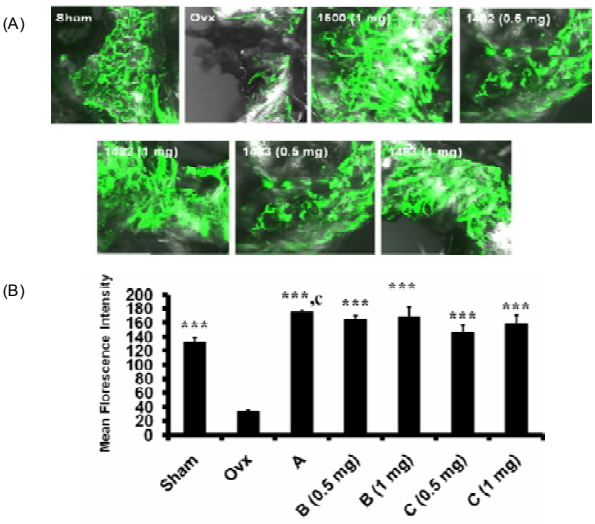
The synthesis and SAR studies of 10 new chemical entities (NCEs) which have shown BMP-2 stimulation and osteoblast differentiation are reported. Among these, compound 2-((1-(benzyl (2-hydroxy-2-phenylethyl) amino)-1-oxo-3-phenylpropan-2-yl)carbamoyl)benzoic acid **(11)** was most effective while its analogue **13** also showed good activity in inducing osteoblast BMP-2 production. The compound **11** induced osteoblast differentiation *in vitro* and this effect was abrogated by a physiological BMP-2 inhibitor, noggin**.** It also exhibited dose dependent increase in nascent bone formation (**2.16** and **3.12** folds more than the control at 1 and 5 mg/kg dose respectively) at the fracture site in rats. At the maximum osteogenic concentration, compound 11 significantly inhibited osteoblastic proteosomal activity. This compound was safe as it had no effect on BMP synthesis in cardiovascular tissue. **[J Med Chem, PMID: 22978808].**

2.1.2.3 *In vivo* efficacy studies of layer-by-layer nano-matrix bearing kaempferol for the conditions of osteoporosis: A study in ovariectomized rat model.

A prototype formulation based on layer-by-layer (LbL) nano-matrix was developed to increase bioavailability of kaempferol with improved retention in bone marrow to achieve enhanced bone formation. Single oral dose of kaempferol loaded LbL nano-matrix formulation increased bioavailability significantly compared to unformulated kaempferol. Three months of formulated kaempferol administration to osteopenic rats increased plasma and bone marrow Kaempferol levels by 2.8- and 1.75-fold, respectively, compared to free Kaempferol. Formulated Kaempferol increased bone marrow osteoprogenitor cells, osteogenic genes in femur, bone formation rate, and improved trabecular micro-architecture. Withdrawal of formulated kaempferol-in OVx rats resulted in the maintenance of bone micro-architecture up to 30days, whereas micro-architectural deterioration was readily observed in OVx rats treated with unformulated kaempferol-within 15 days of withdrawal. The developed novel formulation has enhanced anabolic effect in osteopenic rats through increased stimulatory effect in osteoblasts. Treatment post-withdrawal sustenance of formulated kaempferol could become a strategy to enhance bioavailability of flavanoids. **[Eur J Pharm Biopharma, PMID: 22926146].**

2.1.2.4 Pure enantiomeric forms of S007-1500 increase callus formation at fractured site in osteopenic rats

Fracture healing potential of (+) (S011-1482) and (-) (S011-1483) enantiomeric forms of S007-1500 was studied. Treatment with enantiomers resulted in significant increase in callus formation at the fracture site at both doses of 0.5 and 1.0 mg/kg and also led to restoration of trabecular microarchitecture with similar efficiency to S007-1500.



* With respcet to Ovx a with respect ot Sham A = S007-1500, B = 1482, C = 1483

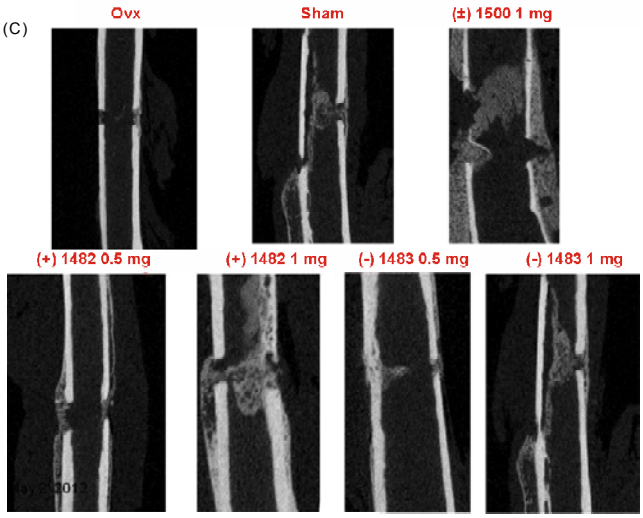


Fig. Pure enantiomers accelerate fracture healing. (A) Representative photmicrograph of sections from the fracture site showing calcein labeling, ten days after creating 0.8 mm fracture on femur. (B) Quantitation of calcein dye using a software in in OVx rats. (C) MicroCT imaging in adult ovx rats with or without treatment. Data shown as mean ± SEM; n = 6 rats/group; ***P<0.001, **P < 0.01.

(Fig. A, B, and C). These data suggest that pure enantiomers as well as the racemic mixture S007-1500 have therapeutic potential as rapid fracture healing agent **[Org Biomol Chem., PMID: 22955848].**

2.1.2.5 Bone anabolic effects of cladrin, a naturally occurring dimethoxydaidzein, in osteopenic rats that were maintained after treatment discontinuation

Here, the effects of cladrin treatment and withdrawal on the osteopenic bones has been investigated. Adult female *Sprague Dawley* rats were OVx and left untreated for 12 wk to allow for significant bone loss, at which point cladrin (1- and 10 mg/kg/day) was administered orally for another 12 wk. Half the rats were killed at the end of the treatments and the other half 4 wk after treatment withdrawal. Sham operated rats and OVx rats treated with PTH or 17β-estradiol (E2) served as various controls. Efficacy was evaluated by bone microarchitecture using microcomputed tomographic analysis and fluorescent labeling of bone. qPCR and Western blotting measured mRNA and protein levels in bone and uterus. Specific ELISA was used for measuring levels of serum PINP and urinary CTx. In osteopenic rats, cladrin treatment dose-dependently improved trabecular microarchitecture, increased lumbar vertebral compression strength, bone formation rate, cortical thickness, serum PINP levels, expression of osteogenic genes in bones, and reduced expression of bone osteoclastogenic genes and urinary CTx levels. Cladrin had no uterine estrogenicity. Cladrin at 10 mg/kg maintained acquired skeletal gains 4 wk after withdrawal. Cladrin had osteogenic effects in osteopenic rats that were maintained after treatment withdrawal **[Osteoporos Int., PMID: 22932734].**

2.1.3 Agents against endocrine cancer

2.1.3.1 Bioactive dietary supplements reactivate ER expression in ER-negative human breast cancer cells by active chromatin modifications

Combination of bioactive dietary supplements such as green tea polyphenols (GTPs) and sulforaphane (SFN) have shown to reactive ERα expression in ER-negative MDA-MB-231 human breast cancer cells. The combination of 20 µg/mL GTPs and 5 µM SFN was found to be the optimal dose of ERα-reactivation at 3 days in MDA-MB-231 cells. The reactivation of ERα expression was consistently correlated with *ERα* promoter hypomethylation and hyperacetylation. Chromatin immunoprecipitation (ChIP) analysis of the *ERα* promoter revealed that GTPs and SFN altered the binding of ERα-transcriptional co-repressor complex thereby contributing to *ERα*-reactivation. As shown in Fig 1, GTPs and SFN can considerably lower the binding of transcriptional repressor multi-molecular complexes to the *ERα* promoter and this effect was significant when

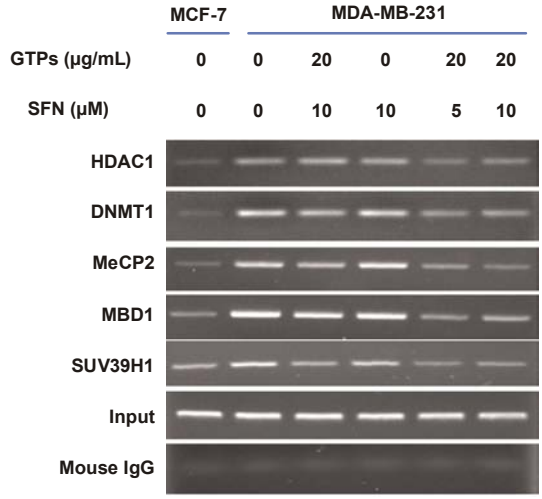


Fig 1. GTPs and SFN altered binding of transcriptional factors to the ERα promoter in ERα-negative human breast cancer cells

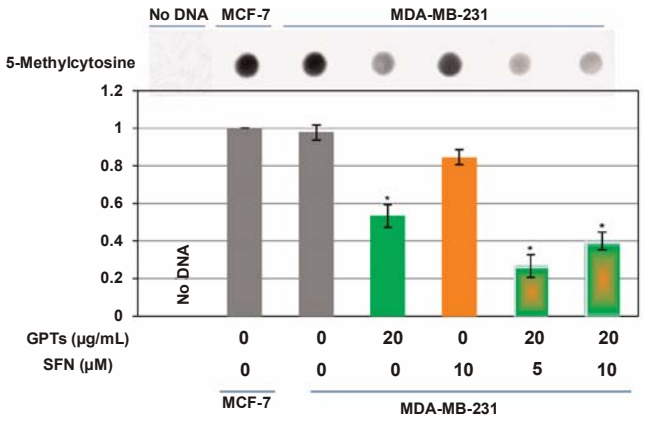
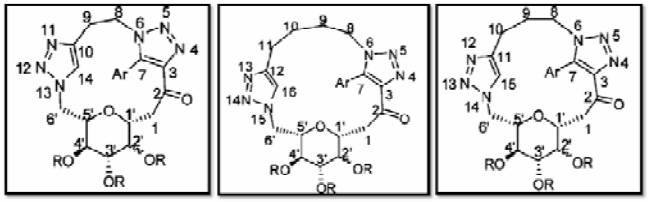


Fig 2. GTPs and SFN induced global hypomethylation in ERα-negative human breast cancer cells

treated with GTPs and SFN in combinations. Further, GTPs and SFN combination treatment also significantly disrupted binding of methyl-CpG binding domain (MBD) proteins, MeCP2 and MBD1, to the *ERα* promoter, might be due to the hypomethylation induced by GTPs and SFN at the *ERα* promoter as well as induction of global hypomethylation as shown in Fig 2. Collectively, these data suggest that the binding alterations of transcriptional repressor complex to the *ERα* promoter contributed to the reactivation of ERα by the combination of dietary DNA methyltransferases (DNMTs) and histone deacetylases (HDACs) inhibitors, GTPs and SFN, respectively. In addition, treatment with tamoxifen in combination with GTPs and SFN significantly increased both cell death and inhibition of cellular proliferation in MDA-MB-231 cells in comparison to treatment with tamoxifen alone. Collectively, our findings suggest that a novel combination of bioactive-HDAC inhibitors with bioactive-demethylating agents is a promising strategy for the effective treatment of hormonal refractory breast cancer with available anti-estrogens **[PLoS One, PMID: 22662208].**

2.1.3.2 New pyran-based macrocycle with anti-breast cancer activity

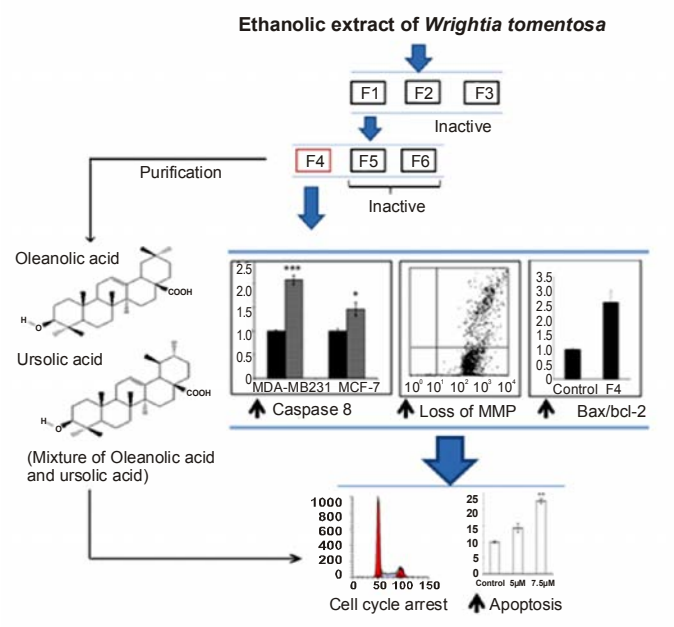
A homologous series of 14-, 15-, and 16-membered drug-like, macrocyclic glycoconjugates were synthesized and evaluated for anti-breast cancer activity.



Few of the compounds were found to have moderate activity with IC_{50} values of 11.22 to 23.15 µM. However, the exact mechanism of action of their anti-cancer property is yet to be described **[Org Lett., PMID: 22931313].**

2.1.3.3 Olenolic and urosolic acid: Constituent molecule responsible for anti-breast cancer activity of *Wrightia tomentosa*

The ethanolic extract, subsequent hexane fractions and fraction F-4 of *W. tomentosa* inhibited the proliferation of human breast cancer cell lines, MCF-7 and MDA-MB-231. The fraction F-4 obtained from hexane fraction inhibited proliferation of MCF-7 and MDA-MB-231cells in concentration and time dependent manner with IC_{50} of 50 mg/ml and 30 mg/ml for 24h, 28 mg/ml and 22 mg/ml for 48h and 25 mg/ml and 20 mg/ml for 72h respectively. The fraction F-4 induced G1 cell cycle arrest, Reactive Oxygen Species (ROS) generation, loss of mitochondrial membrane potential and subsequent apoptosis. Apoptosis is indicated in terms of increased Bax/Bcl-2 ratio, enhanced Annexin-V positivity, caspase 8 activation and DNA fragmentation. The active molecule isolated from fraction F-4, oleanolic acid and urosolic acid inhibited cell proliferation of MCF-7 and MDA-MB-231 cells at IC_{50} value of 7.5 mM and 7.0 mM respectively, whereas there is devoid of significant cell inhibiting activity in non-cancer originated cells, HEK-293. In both MCF-7 and MDA-MB-231, oleanolic acid and urosolic acid induced cell cycle arrest and apoptosis as indicated by significant increase in Annexin-V positive apoptotic cell counts. Thus, the results suggest that *W. tomentosa* extracts has significant anti-cancer activity against breast cancer cells due to induction of apoptosis pathway. Olenolic and urosolic acid are important constituent molecules in the extract responsible for anti-cancer activity of *W. tomentosa* **[J Ethnopharmacol., PMID: 22855944].**



2.1.3.4 Chemotherapeutic potential of 2-[piperidinoethoxyphenyl]-3-phenyl-2H-benzo(b)pyran in ER- negative breast cancer cells: Action via prevention of EGFR signalling

In this study, the anti-breast cancer properties of benzopyran compound namely, 2-[piperidinoethoxyphenyl]-3-phenyl-2H-benzo(b)pyran (CDRI-85/287) in ER- negative and EGFR- overexpressing breast cancer cells have been investigated. The benzopyran compound selectively inhibited the EGF-induced growth of MDA-MB231 cells and ER-negative primary breast cancer cell culture. The compound significantly reduced tumor growth in xenograft of MDA-MB231 cells in nude mice. The compound displayed better binding affinity than EGFR inhibitor AG1478 as demonstrated by molecular docking studies. CDRI-85/287 significantly inhibited the activation of EGFR and downstream effectors MEK/ Erk and PI-3-K/Akt. Subsequent inhibition of AP-1 promoter activity resulted in decreased transcription activation and expression of c-fos and c-jun. Dephosphorylation of downstream effectors FOXO and NFκB led to increased expression of p27 and decreased expression of cyclin D1 which was responsible for decreased phosphorylation of Rb and prevented the transcription of E2F- dependent genes involved in cell cycle progression from G1/S phase. The compound induced apoptosis via mitochondrial pathway and it also inhibited

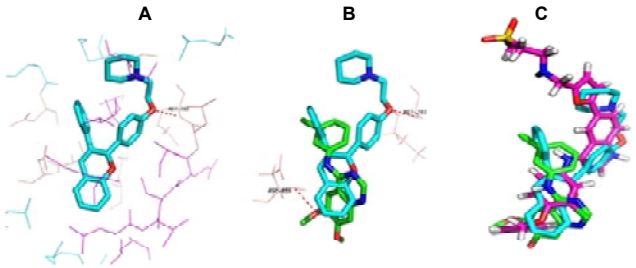


Fig. (A) Docked conformation of CDRI 85/287 analogue with EGFR protein (PDB ID 1XKK). (B) Superimposition of AG 1478 & CDRI 85/287 in a same protein binding pocket shows H-bond interaction with ASP855 & MET793 residues respectively. (C) Superimposition of Lapatinib (magenta), AG 1478 (green) and CDRI 85/287 derivative (Cyan).

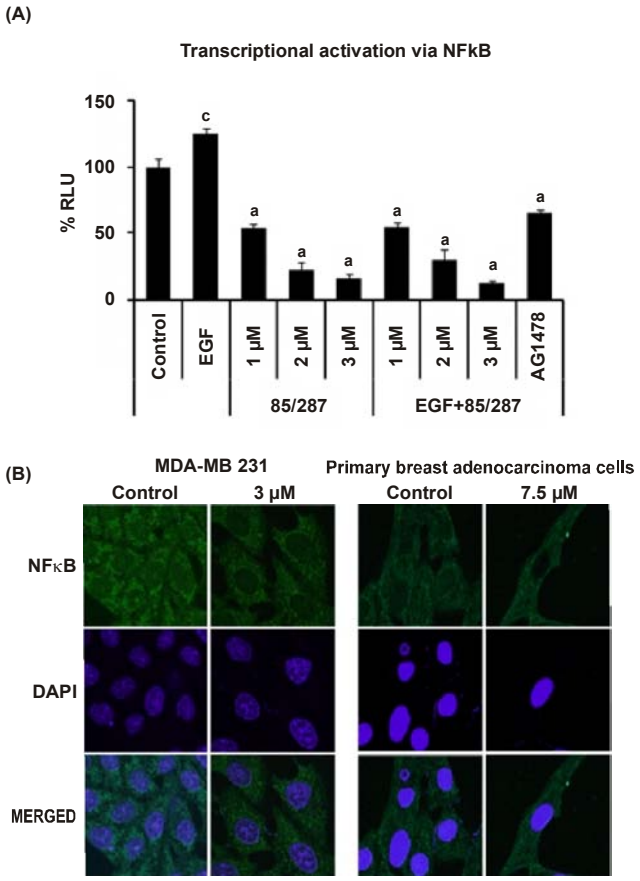


Fig. (A) NF-kB promoter activity in transiently transfected MDA-MB231cells; (B) Effect of compound on localization pattern of NFκB (p65).

EGF-induced invasion of MDA-MB231 cells as evidenced by decreased activity of MMP-9 and expression of CTGF. The study provided experimental evidence to show that the benzopyran derivative targets EGFR. Hence the study assumes clinical importance for effectiveness against breast tumor types which do not express ER and are unresponsive to endocrine therapy. The dual targeting (ER and EGFR) by such compounds may also be beneficial for cases where tamoxifen resistance is developed due to crosstalk mechanisms **[Mol Cell Endocrinol., PMID: 21878365].**

2.2 Diabetes and energy metabolism

2.2.1 Proteomic analysis of Rosiglitazone and Guggulsterone treated 3T3-L1 preadipocytes

In this study the 3T3-L1 preadipocytes were treated

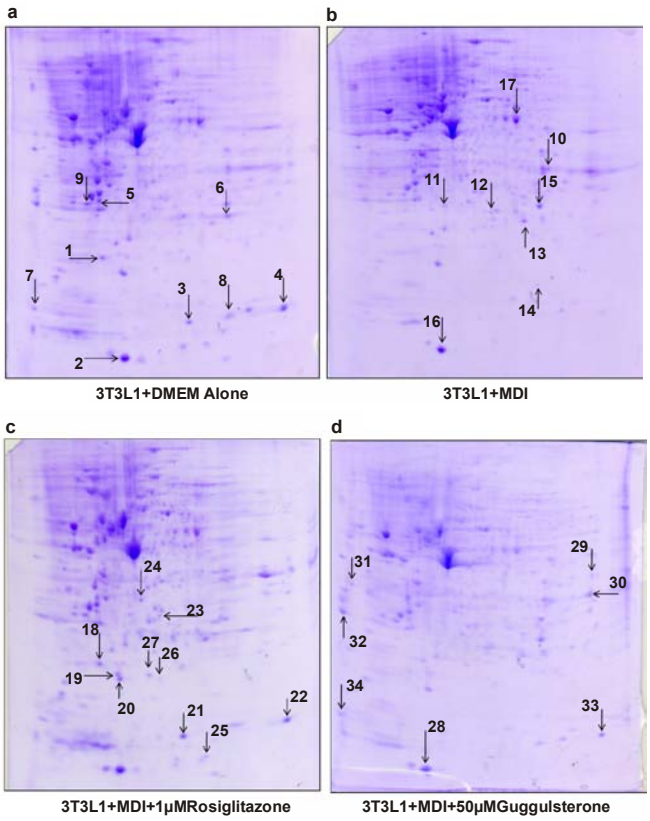


Fig a-d: Differentially expressed protein spots marked in 2D gel were excised and identified by Mass spectrometry (MALDI-TOF/TOF) analysis.

with Rosiglitazone and Guggulsterone and assessed the protein expression profile using 2D gel electrophoresis-based proteomics to find out differential target proteins of these drugs. The proteins that were identified upon Rosiglitazone treatment generally regulate cell proliferation and/or exhibit anti-inflammatory effect which strengthens its differentiation- inducing property. Guggulsterone treatment resulted in the identification of the apoptosis- inducing proteins to be up regulated which rightly is in agreement with the apoptosis- inducing property of Guggulsterone in 3T3-L1 cells. Some of the proteins identified in our proteomic screen such as Galectin1, AnnexinA2 & TCTP were further confirmed by Real Time qPCR. Thus, the present study provides a better outlook of proteins being differentially regulated/expressed upon treatment with Rosiglitazone and Guggulsterone. The detailed study of the differentially expressed proteins identified in this proteomic screen may further provide the better molecular insight into the mode of action of these anti-diabetic drugs Rosiglitazone and Guggulsterone **[Mol Cell Biochem., PMID: 23275126].**

3 Tuberculosis and Microbial Infections

Area Coordinator:
Dr. K.K. Srivastava

Assistant Coordinator:
Dr. B.N. Singh

Area Leader:
Dr. Sudhir Sinha

Aims and objectives of the research area Microbial Infections focus on Tuberculosis, Fungal and Viral infections. Using different screening formats *viz*. *in vitro*, *ex vivo*, *in vivo* and BACTEC, we screen natural products and synthetic compounds for antitubercular, antifungal, antibacterial and antiviral activities and work towards the identification and validation of novel drug targets, developing rationale based screen system, resolving the structure of candidate mycobacterial proteins, analysing host-pathogen kinase interaction and sigma factors regulon to understand the molecular mechanisms of mycobacterial pathogenesis.

3.1 Drug Screening

3.1.1 Antitubercular evaluation of compounds

Over 350 samples, including molecules synthesized in-house or fractions extracted from terrestrial or marine flora and fauna were screened for anti-TB activity using *M. tuberculosis* (H37Ra and H37Rv). In the *in vitro* assays, 14 synthetic molecules, showing an MIC of = 6.25 µM against *M. tuberculosis* H37Rv, were considered as 'active'. Ten of the actives showed no cytotoxicity towards VERO cells or mouse bone-marrow derived macrophages.

3.1.2 Antifungal and antibacterial evaluation of compounds

A total of 908 (synthetic 699 marine 208, and plants 1) compounds/extracts were evaluated for *in vitro* antifungal and antibacterial activity by microbroth dilution method (as per guide lines of CLSI) against six pathogenic bacteria and six pathogenic fungi. Synthetic compounds S011-1340, -1341, -1342, and -1527, S011-0115, -0116, -0117- 0121, and - 0122, and S012-0992 exhibited antibacterial activity (MIC in the range of 0.39-6.25 mg/ml) against *Staphyloccus aureus* (ATCC 25923), *S. aureus* (ATCC 700699 MRSA), *S. aureus* (ATCC 29213 Meth. Vanco. Resistant), *S. aureus* (ATCC 33592 Meth. and Gentamycin resistant). Whereas the compounds S011-1996, -2023, -2025, 2026, 1979, S009-1176, -1180 exhibited antifungal activity in the range of (MIC range 0.78-12.5 mg/ml). Three marine extract FWB-016-A001, 017-A001, 018-A001 were also found to be active (MIC 15.6mg/ml) against *C. neoformans* and *C. parapsilosis* in preliminary antimicrobial screening.

3.1.3 *In vitro* evaluation of anti-HIV-1 RT activity

More than 66 compounds from natural and synthetic origin were secreened against anti HIV-RT activity during the year.

3.1.4 Anti-TB molecules targeting mycobacterial ATP synthase

Eighteen in-house compounds belonging to the 2-methyl-4-substituted amino-7-chloroquinolines class were screened against mycobacterial ATP synthase (target of TMC207). Six compounds with IC_{50} values ranging between 0.36 and 1.83 mM showed minimum inhibitory concentrations (MICs) of 3.12 mg/mL (S-009-1588 and -1591) or 6.25 mg/mL (S-009-1587, -1589, S-010-643 and S-010-1233) against *M. tuberculosis* H37Rv. Three compounds (S-009-1588,-1591 and S-010-1233) caused >2 $\log_{10}$ reduction of non-replicating H37Rv in hypoxic culture in 4 days at concentrations of 16x or 32x their MICs, compared with a 0.2 $\log_{10}$ reduction by isoniazid at 100´ MIC. All six compounds caused a greater reduction in total cellular ATP of the bacilli with in 18 h compared to isoniazid and rifampicin. The compounds at 100 mM caused only 5–35% inhibition of mouse liver mitochondrial ATP synthase **[Int. J. Antimicrob. Agents., PMID: 23141113].**

3.1.5 Targeting FAS-II and PKnG

Nearly hundred compounds were also screened against mycobacterial FAS-II pathway and against *M. tuberculosis* serine threonine protein kinases (STPKs) but none were considered active as per our screening parameters **[Bioorg Med Chem., PMID: 22854194]**.

3.1.6 Vehicles for oral administration

Preclinical evaluation of drug-like molecules requires their oral administration to experimental animals using suitable vehicles. In the present study, the effect of oral dosing with corn oil, carboxymethyl cellulose, dimethyl sulphoxide and Polysorbate-80, on the progression of *Mycobacterium tuberculosis* infection in mice was evaluated. As compared with water, corn oil significantly improved both the parameters whereas the other vehicles affected only physical parameters **[Antimicrobial Agents Chemotherapy, PMID: 22926571].**

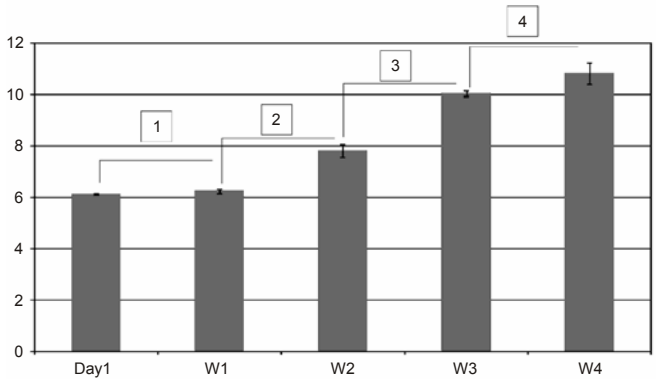


Fig. Progression of *M. tuberculosis* infection in Swiss mice infected with 2 x 10^7 bacilli/mouse without any oral dosing. Each bar represents log10 CFUs (mean ± SD) in lungs of three mice each on day 1 and at weekly interval, up to four weeks (W 4) post infection.Statistical significance, P values, 1= .073, 2=.0006, 3=.0001 and 4=.035.

3.1.7 Progress on the TB lead molecule S006-830

CDRI-830 kills *Mtb* within mouse and in human macrophages in a manner comparable with isoniazid (INH) and rifampicin (RMP). It kills *Mtb* in the lungs of infected mice in a manner comparable with ethambutol (EMB) and pyraziname (PZA). It is also effective against MDR-*Mtb* and its action is bactericidal. Its salt forms- tartarate, fumerate and citrate are equally effective against Mtb, *in vitro* as well as *ex vivo*. It shows synergy (*in vitro* and *ex vivo*) with the 'first-line' TB drugs INH and RMP and appears to work partly through inhibition of protein synthesis.

The compound was assessed for its estrogenic activity according to the protocol recommended by OECD. In the uterotrophic bioassay, groups of ovariectomised female rats were orally administered 3 incremental doses of the compound (20, 100 and 500 mg/kg body weight) for 3 consecutive days. 17α-ethinyl estradiol (1µg/rat) was administered as positive control and vehicle alone (corn oil) was the negative control. 24 h after the last dose, weights of the dissected uteri were recorded. Compared with the negative control, no significant increase in the uterine weight was noted at any dose of S006-830, suggesting a lack of estrogenic activity in the compound.

Preliminary PK studies show good bioavailability of S006-830 after oral administration in rats. Tartarate salt of the compound was administered as an aqueous formulation for both oral and intravenous studies in rats. After oral dosing the compound showed fast absorption, as evident from early T_{max} at 1h with maximum concentration (C_{max}) 4.0 µg/ml. Its elimination half-life was found to be 14.43 h after oral administration while it was 15.20 h after intravenous administration. The systemic bioavailability of the compound was 49.0% after oral administration.

3.1.8 Pharmacokinetic study of antituberculosis molecules

Method Development: A LC-MS/MS method for the quantification of S006-830 in rat plasma was developed and validated. The method was found to be sensitive, selective, accurate and precise over the range 0.78 – 400 ng/ml. The method was applied in the analysis of PK samples obtained after oral and intravenous dose administration of the compound in rats.

Pilot Pharmacokinetics Study: Tartrate salt of S006-830 was administered as an aqueous formulation for both oral (100 mg/kg) and intravenous (25 mg/kg) studies in rats. After oral dose, compound S006-830 showed fast absorption evident from early T_{max} at 1h with maximum concentration (C_{max}) 4.0 µg/ml. Its elimination half-life was found to be 14.43 hrs after oral administration while it was 15.20 h after intravenous dose administration. The MRT value obtained about 45 h after an intravenous dose and 12.37 h after oral dose indicates that S006-830 is retained in the system for longer periods of time due to slow elimination from the body. The compound shows low volume of distribution (122.14 L) that suggests poor distribution outside vascular compartment. The systemic bioavailability of the compound was 49.0% after oral administration.

3.2 Post-translational modifications

3.2.1 Serine threonine kinase regulates the rate of inhibition of mycobacteria by isoniazid through FabD

The mycobacterial FAS-II multienzyme complex has been identified to be the target of Ser/Thr protein kinases (STPKs) of *Mycobacterium tuberculosis* (MTB), with substrates, including the malonyl-CoA:ACP transacylase (FabD) and the β-ketoacyl-ACP synthases KasA and KasB. These proteins are phosphorylated by various kinases *in*

vitro. FabD protein of FasII pathway has been identified as a substrate of PknK, a serine/threonine protein kinase of mycobacteria. The purified PknK phosphorylates itself by an autocatalytic mechanism and is capable of phosphorylating exogenous substrates. The phospho-Thr antibody has been used to check the phosphorylation status of FabD in *Mycobacterium bovis* BCG culture where PknK expression was reduced by administrating antisense copy of *pknK* gene. The decreased levels of phosphorylation of FabD in these cultures were observed. Thus PknK protein phosphorylates FabD enzyme both *in vitro* as well as *in vivo* conditions. Surprisingly, it was also observed that the expression level of FabD decreases with a decrease in the level of PknK. To test the effect on mycolic acid synthesis through level of FabD, Isoniazid (INH), a well known first line anti-tubercular drug which inhibits FASII pathway of mycolic acid synthesis, was employed. Wild type *M. bovis* BCG and *pknK* silenced cultures (low level of FabD expression and phosphorylation) were subjected to drug susceptibility assay by INH. It was observed that the inhibitory effect of INH was significantly got enhanced in the *pknK* knockdown culture where the expression and phosphorylation level of FabD was low, suggesting a direct effect of PknK on mycobacterial mycolic acid biosynthesis via FabD.

The study linked the correlation of FASII pathway with serine threonine protein kinase of MTB. In the preliminary finding, it has been shown that mycobacterial protein Rv3080c phosphorylates FabD and the knockdown of PknK protein in mycobacteria down regulates FabD expression. This event leads to the differential inhibition of mycobacteria in presence of INH, as the inhibition of growth of mycobacteria in presence of INH is enhanced in PknK deficient mycobacteria **[Mol. Cellular Biochem., PMID: 23180244; Mol Cell Biochem., PMID: 22740025].**

3.3 Infection and immunity

3.3.1 Human Beta casein fragment (54–59) modulates *M. bovis* BCG survival and Basic transcription factor 3 (BTF3) expression in THP-1 cell line

In present study, it was found that Human β-casein fragment (54–59) increases the clearance of *M. bovis* BCG from THP-1 cell line *in vitro*. The key biomolecules, involved in the clearance of BCG from macrophage like, nitric oxide, proinflammatory cytokines and chemokines, were not found to be significantly altered after peptide treatment in comparison to the untreated control. Using proteomic approach it was found that BTF3a, an isoform of the Basic Transcription Factor, BTF3, was down regulated in THP-1 cell line after peptide treatment. This was reconfirmed by real time RT-PCR and Western Blotting. It is being reported that the BTF3a as a novel target of this hexapeptide. Based on the earlier findings and the results from the present studies, it is suggested that the down regulation of BTF3a following the peptide treatment may augment the *M. bovis* BCG mediated apoptosis resulting in enhanced clearance of *M. bovis* BCG from THP-1 cell line **[PLoS One, PMID: 23029305].**

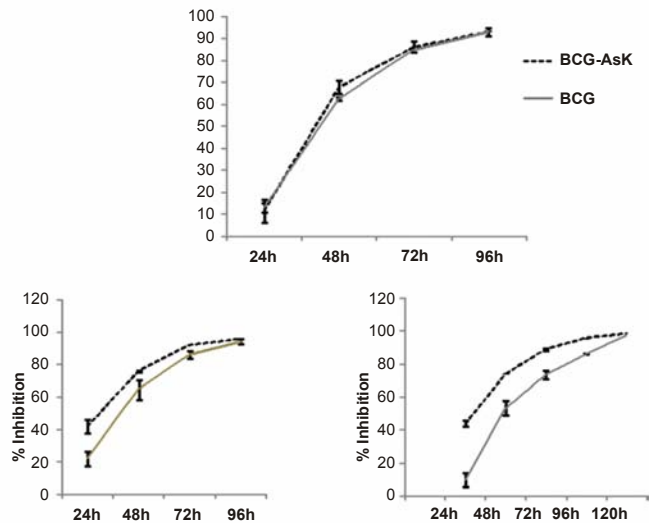


Fig. Effect of INH in BCG and BCG-AsK growth. The growth indices of BCG and BCG-AsK were measured in BACTEC system for three and four days with three concentrations 1200 µg/ml (a), 800 µg/ml (b), 200 µg/ml (c) of INH. At 200 µg/ml INH concentration BCG-AsK culture got inhibited more as compared to BCG

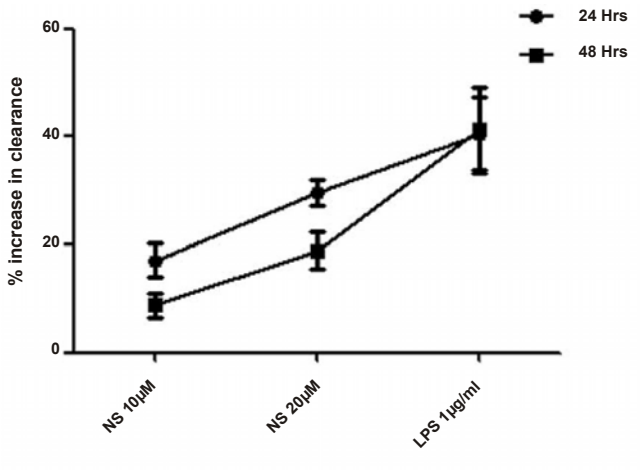


Fig.1. Clearance of *M. bovis* BCG from THP-1. PMA differentiated THP-1 cells were treated with NS at 10 mM and 20 mM and infected with bioluminescent recombinant BCG. RLU was measured at 0, 24 and 48 hrs time point of infection. The percent decrease in RLU after 24 hrs and 48 hrs of infection was considered as percent clearance of bacilli from THP-1 over this time period of infection. Percent increase in clearance in treated cells was calculated in reference to control cells. LPS was taken as positive control for the study. The values and error bars represent average and standard deviations of three independent set of experiments.

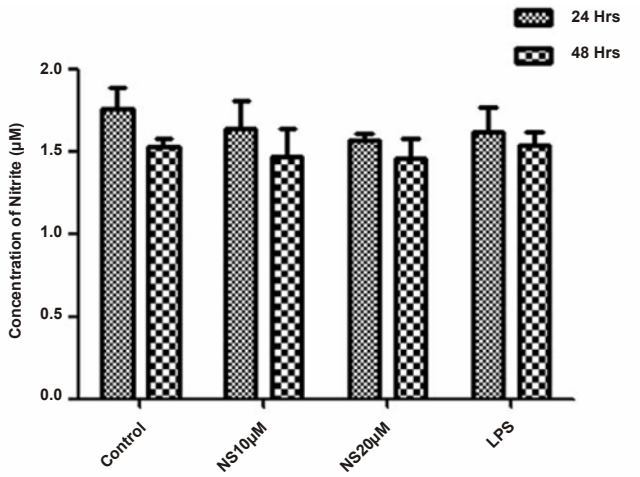


Fig. 2. Nitric oxide production from THP-1 after *M. bovis* BCG infection. PMA differentiated THP-1 cells pretreated with NS at 10 mM and 20 mM were infected with recombinant BCG. Infection was continued in the presence of peptide for 24 and 48 hrs. Nitric oxide produced in cell culture after 24 and 48 hrs of infection was measured as described in materials and methods. LPS was taken as a positive control. The values and error bars represent average and standard deviations of three independent set of experiments.

3.3.2 Protective and survival efficacies of Rv0160c protein in murine model of *Mycobacterium tuberculosis*

The proline-glutamic acid (PE) and proline-proline-glutamic acid (PPE) multi-gene families code for approximately 10% of the *Mycobacterium tuberculosis* (Mtb) genome. These proteins are thought to be virulence factors that participate in impounding the host immune responses. While some members have been studied, the functions of most PE/PPE proteins are yet to be explored. The studies have specifically characterized the roles of one of the PE proteins of Mtb, Rv0160c (PE4), in mycobacterial persistence and in prophylactic efficacy. Rv0160c was expressed in a non-pathogenic fast growing *Mycobacterium smegmatis* strain and demonstrated that the protein improves the survival of mycobacteria in macrophages and in mice. The protein has also shown its effect under physiological stress of bacteria, as evidenced by elevated expression in acidic and in hypoxic conditions. In mice, the level of Rv0160c was noticeably high during the chronic stage of tuberculosis. The seroreactivity of the protein against different categories of tuberculosis patients revealed a strong B-cell humoral response in freshly infected pulmonary tuberculosis patients. In mice, it exhibited increased IL-2, TNF, and IL-6 production. The antigenic properties of the protein directed towards the protective efficacy against the Mtb challenge. All together, our findings have identified Rv0160c as an *in vivo* expressed immunodominant antigen which plays a crucial role in the pathogenesis of mycobacterial disease and could prove to be a good preventive antigen for tuberculosis **[Appl Microbiol Biotechnol., PMID: 23104642].**

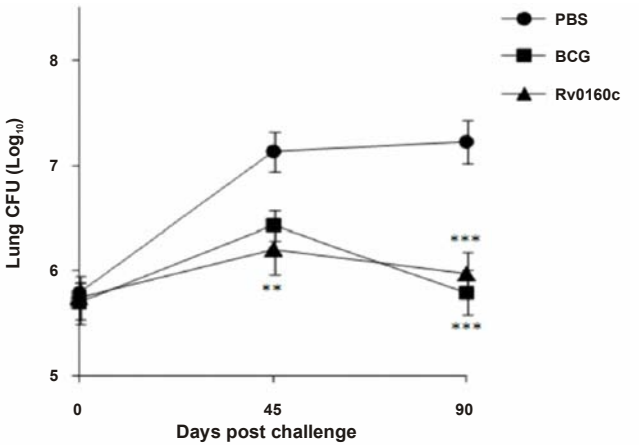


Fig. Protective potential against Mtb in Rv0160c immunized mice. Mtb H37Rv CFU in lungs of PBS, BCG and Rv0160c immunized, BALB/c mice (n = 5 per group at each time point), 45 and 90 days p.c. Results are shown as the mean (±SEM) log_{10} CFU. Data are generated from three independent experiments.

3.3.3 Characterization of 18 kDa immunodominant protein of *Aspergillus fumigatus* exhibiting purine specific ribonuclease activity

In this study, an immunodominant 18 kDa secretory protein from culture filtrate of *A. fumigatus* was purified by conventional chromatography, checked for its purity and identified as Aspf1 (Ribonuclease) from *A. fumigatus* using MALDI TOF/TOF. This protein (enzyme) exhibited specific cleavage action when incubated with rabbit reticulocyte lysate which resulted in production of 400 nucleotide long fragment from cleavage of large 28S RNA. Further substrate specificity and binding affinty study from ITC experiment demonstrated that this enzyme prefers purine bases as substrate during catalysis. Docking experiments revealed that the landing platform of enzyme involved in specific interaction with bulged-G motif and GAGA tetraloop of SRL RNA was made-up of loop 4 and loop 2 **[Nat. Product Res. PMID: 21809953. Bioorg. Med. Chem. Letters, PMID: 21930375].**

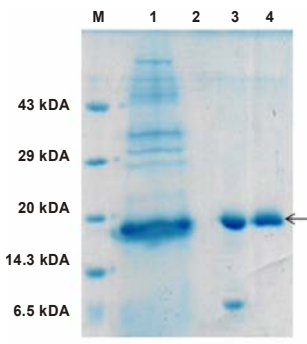


Fig. Purification of Ribonuclease;

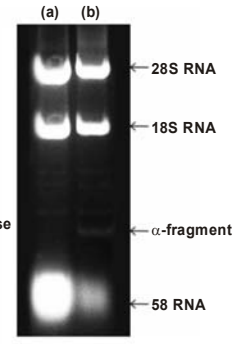


Fig. Specific ribonucleolytic activity of Aspf1

Fig: Docking of SRL RNA in the major active site (in between L2 and L4 loop) of Aspf1.

3.4 Structure function analysis

3.4.1 Crystal structure of the Mtbβ-clamp and its interactions with co-proteins

The sliding β-clamp, an important component of the DNA replication and repair machinery, is drawing increasing attention as a therapeutic target. The crystal structure of the *M. tuberculosis* β-clamp (Mtbβ-clamp) to 3.0 Å resolution is being reported here. The protein crystallized in the space group $C222_1$ with cell-dimensions *a*=72.7, *b*=234.9 & *c*=125.1 Å respectively. Mtbβ-clamp is a dimer, and exhibits head-to-tail association similar to other bacterial clamps. Each monomer folds into three domains with similar structures respectively and associates with its dimeric partner through 6 salt-bridges and about 21 polar interactions. Affinity experiments involving a blunt DNA duplex, primed-DNA and nicked DNA respectively show that Mtbβ-clamp binds specifically to primed DNA about 1.8 times stronger compared to the other two substrates and with an apparent K_d of 300nM. In bacteria like *E. coli*, the β-clamp is known to interact with subunits of the clamp loader, NAD^+ - dependent DNA ligase (LigA) and other partners. We tested the interactions of the Mtbβ-clamp with MtbLigA and the β-clamp loader subunit through radioactive gel shift assays, size exclusion chromatography, yeast-two hybrid experiments and also functionally. While Mtbβ-clamp interacts *in vitro* with the β-clamp loader, it does not interact with MtbLigA unlike in bacteria like *E. coli* where it does. Modeling studies involving earlier peptide complexes reveal that the peptide-binding site is largely conserved despite lower sequence identity between bacterial clamps. Overall the results suggest that other as-yet-unidentified factors may mediate interactions between the clamp, LigA and DNA in mycobacteria **[PLoS One., PMID: 22545130].**

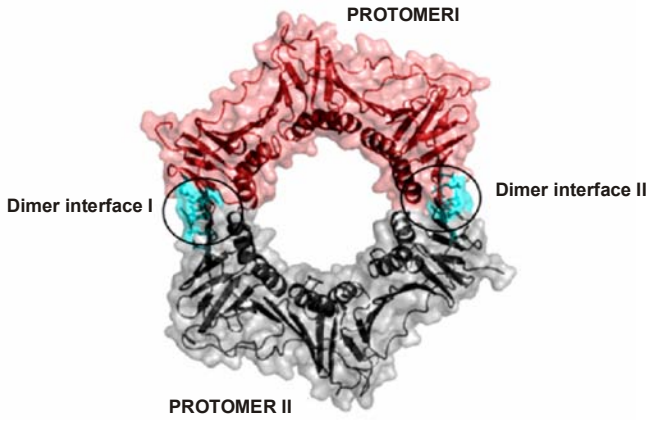


Fig. Interactions at the dimeric interface in the Mtbβ-Clamp. The two protomers of the protein are distinctly colored for clarity with the *van der Waals* surface overlaid on the cartoon representation. The respective interfaces are depicted in *cyan*.

3.4.2 Crystal structure of the Hexachloro-cyclohexane dehydrochlorinase (LinA-type2): Mutational analysis, thermostability & enantioselectivity

The 3.5 Å crystal structure of a thermostable LinA-type2 protein, obtained from a soil metagenome, in the hexagonal space group $P6_322$ with unit cell parameters *a*=*b*=162.5, *c*=186.3 Å, respectively is being reported here. The structure was solved by molecular replacement using the co-ordinates of the LinA-type1 that exhibits mesophile-like properties. Though the asymmetric unit contains 7 protein chains, the protein was found to be a trimer, and which was also supported by size-exclusion chromatography. A structural comparison of the -type2 and -type1 proteins suggests that the thermostability of LinA-type2 might partly arise from a combination of higher number of ionic interactions and 4% increase in the intersubunit buried surface area respectively. Mutational analysis involving the differing residues between the type1 and type2 proteins, circular dichroism experiments and functional assays suggest that Q20 and G23 are determinants of stability for LinA-type2. It was earlier reported that the type1 protein exhibits enantioselectivity for the (-) enantiomer of α-HCH. Contrastingly, we identified that LinA-type2 prefers the (+) enantiomer of α-HCH. Structural analysis and molecular docking experiments suggest that changes of the residues K20Q, L96C & A131G of the active site are probably responsible for the altered enantioselectivity of LinA-type2. **[PLoS One., PMID: 23209726].**

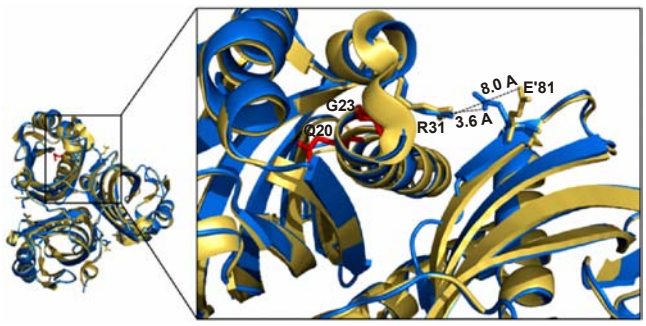


Fig. Trimeric association of LinA –type2. A close-up of an inter-subunit salt-bridge in LinA type1 and –type2 proteins

3.4.3 Structure-Function studies of antimicrobial peptides, bacterial toxin and ion channel protein and design of biologically active novel peptides: Consequences of alteration in Leucine Zipper Sequence of Melittin in Its anti-endotoxin properties

To determine the importance of the leucine zipper sequence of melittin in its neutralization of LPS-induced inflammatory responses in macrophages and interaction

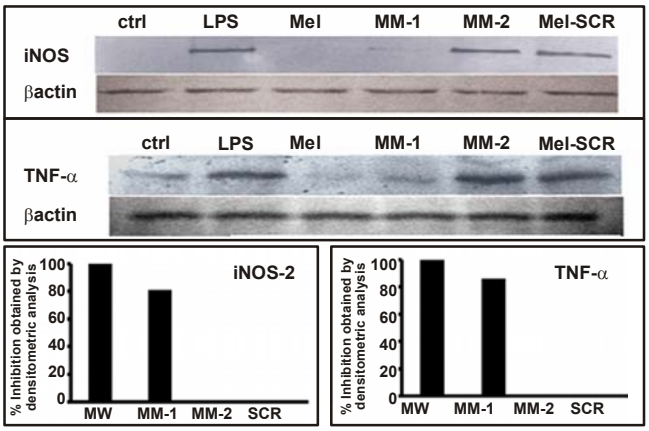


Fig: Western blot analysis presenting the effect of treatments of melittin and its analogues on the expression level of iNOS (NOS-2) and TNF-α in LPS-stimulated RAW 264.7 cells in 24 hrs. β-actin used as internal control. The blots were subjected to densitometry analysis and the results are shown with respect to percentage inhibition of the expression of these proteins in the presence of different peptides.

with LPS, anti-inflammatory properties of melittin and its three analogues and their interactions with LPS were studied in detail. Two of these analogues, namely melittin Mut-1 (MM-1) and melittin Mut-2 (MM-2), possess leucine to alanine substitutions in the single and double heptadic leucine residue(s) of melittin, respectively, whereas the third analogue is a scrambled peptide (Mel-SCR) that contains the amino acid composition of melittin with minor rearrangement in its leucine zipper sequence. Although MM-1 partly inhibited the production of proinflammatory cytokines in RAW 264.7 and rat primary macrophage cells in the presence of LPS, MM-2 and Mel-SCR were negligibly active. A progressive decrease in interaction of melittin with LPS, aggregation in LPS, and dissociation of LPS aggregates with alteration in the leucine zipper sequence of melittin was observed. Furthermore, with alteration in the leucine zipper sequence of melittin, these analogues failed to exhibit cellular responses associated with neutralization of LPS-induced inflammatory responses in macrophage cells by melittin. The data indicated a probable important role of the leucine zipper sequence of melittin in neutralizing LPS-induced proinflammatory responses in macrophage cells as well as in its interaction with LPS **[J. Biol. Chem., PMID: 22128186]**.

4 CVS, CNS and Related Disorders

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Dr. Madhu Dikshit

Assistant Coordinator:
Dr. K.V. Sashidhara

Area Leaders:
Dr. Rakesh Shukla
Dr. Manoj K Barthwal

The research activities in CVS-CNS and related disorders pertain to the design, synthesis and development of new drugs from synthetic, plant or marine sources to treat pathologies related to:

- **Cardiovascular system** *(Hypertension, Pulmonary hypertension, Dyslipidemia, Atherosclerosis, Thrombosis and Myocardial Infarction)*
- **Central nervous system** *(Psychopharmacology, Neurodegeneration, Dementia and Stroke)*
- **Other disorders** *(Stress, Gastric ulcers and Inflammation)*

In addition characterization of rabbit atherosclerosis progression, isolated neuronal culture and adipocytes cell lines were standardized during the reporting period. Effect of curcuma oil was evaluated for lipid lowering and anti-inflammatory activity in the models introduced earlier at CSIR-CDRI. Molecular mechanisms involved in the pathologies of the above mentioned disorders were explored to understand the disease process and also the mechanism(s) of action of the test drugs.

4.1 Discovery and development of NCE's

A total 316 compound/extracts were screened during the reporting period. These compounds (synthetic compounds-140; plant derived-29; marine extracts/fractions-92, and 55 compounds from outside of CSIR-CDRI) were tested for various bio-activities (Anti-histaminic activity, Anti-inflammatory Anti-hypertensive, Vasoreactivity, Anti-ulcer Anti-psychotic/Anti-anxiety, Anti-thrombotic/Anti-platelet, Neuroprotective and Gross Behaviour). Most of them did not exhibit any potential effect. During the reporting period, five synthetic compounds exhibited better or aspirin like anti-thrombotic effect, however none was better than the existing active CDRI compounds.

4.1.1. Inhibition of adipocyte differentiation by a natural product PL-K09, isolated from Ashoka tree

Molecules are being identified, which inhibit adipocyte differentiation from stem cells and preadipocyte, adipocyte maturation and their development to hypertrophied adipocytes. Six molecules have been identified so far and the studies are in progress to explore their mechanism of action. One of the molecule has shown to act in early phase of adipocyte differentiation. Molecule causes S-phase arrest in mitotic clonal expansion and affect other transcription factors such as C/EBP-α and PPAR-γ, thus leads to adipocyte differentiation and maturation.

4.1.2. Antithrombotic activity of a coumarin derivative 3-(5-Hydroxy-2,2-dimethylchroman-6-yl)-N-{2-[3-(5-hydroxy-2,2-dimethyl-chroman-6-yl)-propionylamino]-ethyl}-propionamide(C3).

Various seselin derivatives were evaluated against murine pulmonary thromboembolism, bleeding time, platelet activation and thrombosis in animal models. Administration of C3 (16 mg/kg) offered 70% protection against collagen-epinephrine induced pulmonary thromboembolism and 30% protection against arachidonic acid induced death in mice, without adversely affecting bleeding time. No significant difference was observed by C3 in ferric chloride induced arterial thrombosis in rats. Significant reduction in

thrombus weight was however observed in arterio-venous shunt model. In rat PRP, C3 reduced ADP and collagen induced platelet aggregation. Administration of C3, in chronic hamster model of dyslipidemia, (16 mg/kg, p.o. for 90 days) had no effect on plasma lipids, vasoreactivity and platelet adhesion. C3 fed hamsters, however, exhibited reduced whole blood aggregation response to ADP and collagen compared to HC fed hamsters. In addition, C3 augmented thrombin time; however time to occlusion was not increased. These results convincingly demonstrated that C3 seems to be a novel molecule that reduces the risk of thrombosis and alleviates prothrombotic state associated with hyperlipidemia without any adverse effect on bleeding time **[Chemical Biology and Drug Design, PMID: 22788683].**

4.1.3. Synthesis and anti-thrombotic activity of benzocoumarin amide derivatives

A series of novel benzocoumarin amide derivatives were synthesized and evaluated for their anti-thrombotic activity. Amongst these, compounds 5, 7 and 8 exhibited promising anti-thrombotic profile in an established model of mouse thrombosis. Hence, comprehensive profiling on platelet aggregation and coagulation parameters was carried out to assess its potential as a lead candidate. *In vitro* treatment of these compounds in mice plasma resulted into significant reduction in ADP and collagen induced platelet aggregation. Moreover, Compounds 5, 7 and 8 also significantly increased thrombin time. Thus, benzocoumarin amide derivatives exhibited anti-thrombotic profile via both anti-platelet as well as anti-coagulant action **[Bioorg Med Chem Lett., PMID: 22483393].**

4.1.4. L-Arginine analogs as potential inhibitors of acetylcholine-induced relaxation in rat thoracic aortic rings

Vascular endothelium is capable of modulating vascular smooth muscle tone suiting it well for its role as an important regulator of a number of diverse biological processes. Endothelial dysfunction is an early manifestation of atherothrombosis and a consequence of the established disease. Although several arginine derivatives, alkylated at one of the guanidino nitrogen were found to inhibit vasorelaxation induced by acetylcholine, activity of the corresponding arginine esters is however not reported. A study was therefore designed to synthesize and evaluate series of novel arginine derivatives to obtain further insight into structure-activity relationship in this series of compounds. Activity of these compounds was assessed on the vascular tone of rat thoracic aorta in comparison with L-arginine analog, that is, L-nitro-arginine methyl ester (L-NAME). Results obtained showed that full reversal of phenylephrine-mediated contraction was achieved by cumulative applications of acetylcholine (3nm-300ìm), which were abolished when the aortic rings were pretreated with L-NAME or with arginine esters synthesized CDRI. It was thus demonstrated that these arginine derivatives cause significant yet reversible reduction in acetylcholine-mediated relaxation, similar to that of L-NAME **[Chem Biol Drugs Des, PMID: 22145586]**.

4.1.5. Amino acid derived CCK-2R antagonists as potential antiulcer agent

To understand the essential structure requirement as well as variation of binding mode among conformational isomers of small molecule CCK-2R antagonists, combined with docking and simulation studies utilizing the substructure of a well-known CCK-2R antagonist benzotript have been performed and synthesis of each configurational isomer of these molecules was carried out and evaluated for their *in vitro* activity followed by *in vivo* screening in the antiulcer rat model. The biological screening of these compounds has not only validated the developed homology model of CCK-2R but also led to the identification of a potent CCK-2R antagonist as an orally active and safe candidate molecule having better antiulcer properties than the well-known drug benzotript **[J Chem inf Models., PMID: 23240656].**

4.1.6. Curcuma oil ameliorates hyperlipidemia and associated deleterious effects in golden syrian hamsters

The current study was aimed to investigate the disease modifying potential of curcuma oil (C.oil), a lipophilic component from *Curcuma longa* L., in hyperlipidemic hamsters. Male golden Syrian hamsters were fed chow or high cholesterol (HC) and fat rich diet with or without C.oil (30, 100 & 300 mg/kg) for 28 days. In HC fed hamsters, *C.oil* significantly reduced plasma total cholesterol, LDL cholesterol, triglycerides and increased HDL cholesterol when compared to HC group. Similar group comparisons showed that C.oil treatment reduced hepatic cholesterol, oxidative stress and improved liver function. The hyperlipidemia induced platelet activation, vascular dysfunction and repressed eNOS mRNA expression were restored with C.oil treatment. Furthermore, aortic cholesterol accumulation and CD68 expression was also reduced in C.oil treated group. Effect of C.oil at 300 mg/kg was comparable to standard drug, ezetimibe. Delving into the probable anti-hyperlipidemic mechanism at the transcript level, C.oil treated chow and HC fed groups were compared with chow fed group. C.oil treatment significantly increased hepatic expression of PPARα, LXRα, CYP7A1, ABCA1, ABCG5, ABCG8 and LPL accompanied with reduced SREBP-2 and HMGCR expression (Fig). C.oil also enhanced ABCA1, ABCG5 and ABCG8 expression and suppressed NPC1L1 expression in the jejunum. The study on C.oil thus demonstrated anti-hyperlipidemic effect and reduced lipid

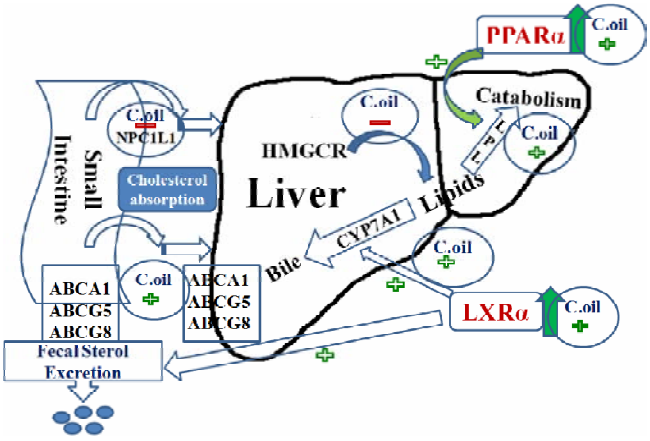

Fig. C. oil regulates in expression of various enterohepatic genes involved in cholesterol sysnthesis, metabolism and efflux.

induced oxidative stress, platelet activation and vascular dysfunction. The anti-hyperlipidemic effect offered by C.oil seems to be mediated *via* modulation of PPARα, LXRα and associated genes (fig) involved in lipid metabolism and transport [**British J. of Nutrition** in press].

4.1.7. Curcumin oil and its fraction protect endothelial cell induced inflammatory processes in post myocardial ischemia

To assess the anti-inflammatory effect of C. oil on myocardial endothelial cells, a study was undertaken to analyze its effect on endothelial inflammatory response and MI/RP injury. Pre-and post-treatment with C.oil or Non Carbonyl (N.C.) fraction was given to all animals by oral (*p.o.*) route for 6 days (Fig). Acetylcholine induced endothelial function was improved with the treatment of C.oil and N.C. Mechanistically, C.oil treatment significantly reduced the

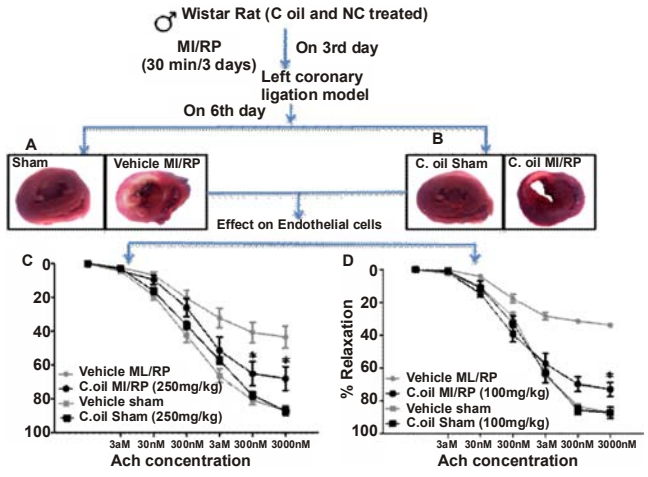

Fig. Effect of C.oil & N.C. in MI/RP rats. (A, B) Reduced infarct size upon C.oil treatment. (C, D) Improved endothelial function in C.oil & N.C. treated MI/RP rats.

expression of pro-inflammatory genes vWF, PDGF and Annexin-V on the myocardial endothelial cells, these results were further substantiated with C.oil and N.C. treatment on EAHy926 endothelial cells, which significant reduction in the expression of various pro-inflammatory genes vWF, E-selectin, and ICAM-1. Interestingly in the present regimen of treatment with C.oil or N.C., significantly reduced the infarct size, as determined by 2, 3, 5-triphenyltetrazolium chloride (TTC) staining was evident. Results obtained thus indicated that treatment of C.oil and N.C. reduced the pro-inflammatory factors expressed on endothelial cells and exhibited decrease in the infarct size and improved healing ensuing MI/RP.

4.1.8. Protective effect of *Withania somnifera* in pulmonary hypertension in rats

A preventive and therapeutic treatment with *Withania somnifera* (WS) suppressed monocrotaline (MCT) induced pulmonary hypertension (PH) by attenuating right ventricle (RV) pressure and RV hypertrophy, dose dependently in Sprague Dawley rats. Furthermore, WS decreased the expression of HIF-1α, oxidative stress, pro-inflammatory cytokine TNFα and increased anti-inflammatory cytokine IL-10 in lungs. WS treatment also improved the pulmonary endothelial dysfunction and induced eNOS expression. WS inhibited pulmonary arterial remodelling by inducing apoptosis and increasing expression of pro-caspase 3 and TUNEL positive cells. WS might therefore serve as a potential preventive and therapeutic agent for pulmonary hypertension.

4.2 Experimental models

4.2.1. Primary neuronal culture model system for screening novel drug candidates

A new model system (Fig) has been optimized and established for screening the novel drug candidate for the treatment of neuropathic pain and neuroinflammatory diseases. This is one of the most relevant and useful model systems being used for drug screening against GPCRs and neurotrophin receptors that are implicated in neuropathic conditions.

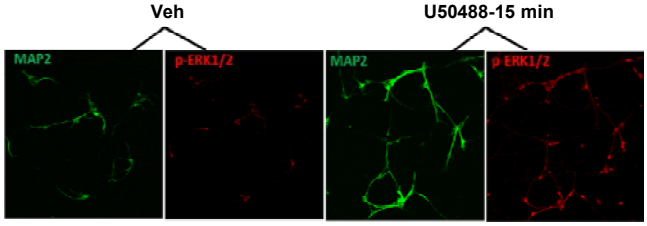

Fig. Cortical neurons were prepared from neonatal (P 1) mice and treated with or without U50488, for 15 min. After fixation, neurons were stained with MAP2 and Phopho-ERK1/2. This shows that primary cortical neurons are healthy and responsive, which can be used for screening.

4.2.3. Adipocyte Insulin resistance model

Four models of *in vitro* adipocyte insulin resistance were developed and introduced during the reporting period for early identification of molecules which may inhibit insulin resistance or reverse insulin resistance partially or fully. Various biological insults including exposure of TNF-α (Inflammatory cytokine), Hyperinsulinemia, Dexamethosone (Glucocortiocoids) and oxidative stress developed insulin resistance. Number of biological molecules were screened for inhibition and/or reversal of insulin resistance development in adipocyte. One of series of molecules were selected for further development and detailed biology on one of the molecule has been taken for further studies to identify its mechanism of action as well as *in vivo* activity profiling.

4.2.2. Atherosclerosis progression in New Zealand white rabbits

A time dependent atherosclerosis progression in Male New Zealand White rabbits was established. Briefly the animals were kept on high cholesterol high fat diet consisting of cholesterol and peanut oil. After seven days, anesthetized animals were subjected to balloon angioplasty injury using Fogarty embolectomy catheter in the iliac artery. These rabbits were maintained on the high cholesterol diet for the next 8 weeks (Day 56). Acetaminophen and ampicillin were given for 3 to 5 days. The animals were euthanized at various time intervals to assess lesion progression (Day 8, 10, 15, 21, 35 & 56). Plaque composition was assessed (Fig) by movat pentachrome, HE and oil red O staining. Immunostaining studies was done characterize the lipid laden macrophages and MMP-9. Progressive increase in extracellular matrix production, lesion lipid, macrophage derived foam cells and matrix metalloprotease 9 was observed till 8 weeks of study period.

This model is useful to predict the efficacy of hypolipidemic, anti-inflammatory, antiproliferative as well as for the identification of antithrombotic molecules useful for threapy in atherosclerosis.

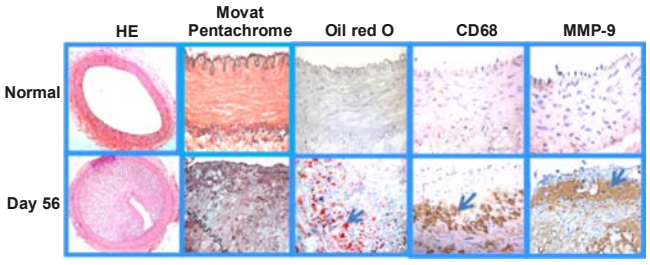

Fig. Photomicrographs of histology and immunohistochemistry of rabbit iliac artery at 8 weeks of study period during atherosclerosis progression. Blue arrows indicate immune-positive cells.

4.3 Basic Studies

4.3.1. Reactive oxygen species-induced activation of ERK and p38 MAPK mediates PMA- induced NETs release from human neutrophils

Neutrophils/ polymorphonuclear leukocytes (PMNs), an important component of innate immune system, release extracellular traps (NETs) to eliminate invaded pathogens; however role of signaling molecules/proteins need to be elucidated. A study was therefore undertaken to study the role of p38 MAPK and extracellular signal regulated kinase (ERK) against PMA (Phorbol 12-myristate 13-acetate) induced reactive oxygen species (ROS) generation and NETs formation has been investigated. Human neutrophils were treated with PMA to induce free radical generation and NETs release, which were monitored by NBT reduction and elastase/DNA release respectively. PMA treatment led to the time dependent phosphorylation of p38 MAPK and ERK in PMNs. Pretreatment of PMNs with SB202190 or U0126 did not significantly reduce PMA induce free radical generation, but prevented NETs release. Pretreatment of PMNs with NADPH oxidase inhibitor [diphenyleneiodonium chloride (DPI)] significantly reduced free radical generation, p38 MAPK and ERK phosphorylation as well as NETs release, suggesting that p38 MAPK and ERK activation was downstream to free radical generation. The results obtained thus demonstrated that ROS dependent activation of ERK and p38 MAPK, mediated PMA induced NETs release from human neutrophils **[J Cell Biochem, PMID: 22961925].**

4.3.2. Neutrophil extracellular traps formation in systemic inflammatory response syndrome disease condition

Neutrophils (PMNs) and cytokines have a critical role to play in host defense and systemic inflammatory response syndrome (SIRS). Neutrophil extracellular traps (NETs) have been shown to extracellularly kill pathogens, and inflammatory potential of NETs has been shown. Microbial killing inside the phagosomes or by NETs is mediated by reactive oxygen and nitrogen species (ROS/RNS). The study was therefore undertaken to assess circulating NETs contents and frequency of NETs generation by isolated PMNs from SIRS patients. These patients displayed significant augmentation in the circulating myeloperoxidase (MPO) activity and DNA content, while PMA stimulated PMNs from these patients, generated more free radicals and NETs. Plasma obtained from SIRS patients, if added to the PMNs isolated from healthy subjects, enhanced NETs release and free radical formation. Expressions of inflammatory cytokines (IL-1β, TNFα and IL-8) in the PMNs as well as their circulating levels were significantly augmented in SIRS subjects. Treatment of neutrophils from healthy subjects with TNFα, IL-1β, or IL-8 enhanced free radicals generation and NETs

formation, which was mediated through the activation of NADPH oxidase and MPO. Pre-incubation of plasma from SIRS with TNFα, IL-1β, or IL-8 antibodies reduced the NETs release. Role of IL-1β, TNFα and IL-8 thus seems to be involved in the enhanced release of NETs in SIRS subjects **[PLoS One, PMID : 23110185].**

4.3.3. Circulating NO and TNFα levels in progression of septic shock

Active nitrogen molecules, formed as a result of cell nitric oxid (NO) metabolism, are considered essential for cell metabolism. However, these nitrogen molecules when produced in excess play an important role in vascular instability of septic shock. This study was planned to detect the role of active nitrogen molecules in the progression of septic shock. Blood samples were collected from 118 critically ill patients admitted in ICU and from 95 healthy relatives accompanying the patients. Patients were categorized into three groups: systemic inflammatory response syndrome, sepsis and septic shock. Plasma total nitrite (nitrites and nitrates), cytokines like tumour necrosis factor-α (TNF-α) and plasma lactate were measured to assess inflammatory activity and severity of septic shock. Plasma nitrite / nitrate and TNF-α levels were high in patients with sepsis and septic shock, which increased with severity of sepsis **[Acta Anaesthesiol Scand, PMID: 22192332].**

4.3.4. Studies on extrinsic epigenetic interventions carried out in Parkinson's disease model of *C. elegans*

This study was carried out to explor the role of six groups of pesticides viz botanicals, herbicides, fungicides, organophosphates, carbamates and pyrethroids on PD and and associated neurotoxic effects. These pesticides were studied using transgenic *Caenorhabditis elegans* model expressing human alpha synuclein protein tagged with yellow fluorescent protein [NL5901; (P_{unc-54}::alphasynuclein::YFP+unc-119)] in the body wall muscle. Amongst all the classes of pesticides examined, botanical rotenone showed severe effects on PD pathogenesis. It significantly increased alpha synuclein aggregation and oxidative stress. Furthermore, it reduced mitochondrial and lipid content in the worms. Pesticides from other classes were observed to exert marginal effects as compared to rotenone thus suggesting that there is a class or structure specific effect of environmental chemicals vis-à-vis Parkinsonism. Hence it may be deduced that all classes of toxicants do not induce similar effects on neurodegeneration and associated events **[CNS Neurol Disorders – Drug Targets, PMID:23244436].**

4.3.5. Antipsychotic potential *Panax quinquefolium* on ketamine induced mouse psychosis model

The search for novel pharmacotherapy from medicinal plants for psychiatric illnesses has progressed significantly from the past few decades and their therapeutic potential has been assessed in a variety of animal models. This study evaluated *Panax quinquefolium* (PQ), and assessed its antipsychotic potential. A graded dose study with PQ at 12.5-200 mg/kg, p. o. showed differential effects against the ketamine induced hyperactivity in the Digiscan animal activity monitor. Nevertheless at 100 mg/kg, p.o., PQ blocked ketamine induced memory impairment in the passive avoidance paradigm. In the chronic studies, PQ reduced the ketamine induced enhanced immobility in the forced swim test and did not show extra-pyramidal side effects in bar test and wood block test of catalepsy. These behavioural effects were compared with standard drugs haloperidol and clozapine. Further PQ reduced DA and 5-HT content after chronic treatment, but not after acute administration. In addition, PQ extract reduced acetylcholinesterase activity and nitrate levels, however increased glutamate levels in hippocampus. Results obtained suggest that PQ possess antipsychotic like properties, which may particularly be beneficial in predominant negative and cognitive symptoms of schizophrenia **[Neurochem Res, PMID: 22189635].**

4.3.6 Role of central renin-angiotensin system in memory

Preclinical and clinical studies indicated involvement of renin angiotensin system (RAS) in memory functions. However, exact role of RAS in cognition is still ambiguous. Therefore, the role of Angiotensin converting enzyme (ACE) was investigated in models of STZ and scopolamine induced impairment of learning and memory. Inhibition of ACE by Perindopril ameliorated STZ and scopolamine induced amnesia. Further, perindopril prevented elevation of AChE and reduced oxidative stress, and significantly increased cerebral blood flow (CBF) and ACh level in perindopril treated mice. The STZ and scopolamine impaired brain energy metabolism by reducing ATP level which was reversed by perindopril. Perindopril also significantly decreased ACE activity in brain. These results suggested that ACE playsa pivotal role in memory. Similarly inhibition of AT1 receptor by candesartan improved memory functions, CBF and ATP level in brain and reduced level of AChE and oxidative stress. These effects of candesartan were blunted by AT2 receptor antagonist PD123,319, suggesting that AT2 receptors also seem to contribute in the beneficial effect of AT1 receptors blockade **[Behav Brain Res, PMID: 22460064; Psychopharmacology PMID: 22362194]**.

4.3.7. Insulin modulates neuroinflammation and oxidative stress in astroglial cells

Neuroprotective effect of insulin on Streptozotocin induced neuroinflammation in astroglial cells has been

evaluated. The C6 cell line was stimulated with STZ (100 µM) alone and in combinations with different concentrations of insulin for 24 h of incubation. STZ treatment enhanced translocation of nuclear factor–kappa B (NF-kB), glial fibrillary acidic protein (GFAP) and stimulated nitric oxide (NO), reactive oxygen species (ROS) level. Treatment with insulin reversed these STZ induced changes in astroglial cells, suggesting that insulin modulates neuroinflammation by decreasing NF-kB activation (Fig) and oxidative stress [**Annals of Neuroscience: Vol.19; Supp Oct 2012 pp69**].

4.3.8. Modulation of Nuclear factor erythroid-2-related factor-2 (Nrf2) in memory impairment

Nuclear factor erythroid-2-related factor-2 (Nrf2) modulates various cytoprotective enzymes essential for protection against oxidative stress and inflammatory processes. Streptozotocin (STZ) produced a significant memory deficit, as assessed by Morris water maze test, along with significant reduction in mRNA expression of Nrf2 and its cytoprotective enzymes (HO-1 and GCLC) in cerebral cortex and hippocampus of rat brain. Treatment with Donepezil, Ibuprofen and *Bacopa monniera* significantly improved memory dysfunction and restored mRNA levels of Nrf2 and attenuated neuroinflammation, cholinergic dysfunction and apoptotic cell death in STZ treated rats. Thus, the study demonstrated beneficial effects of these drugs due to modulation of Nrf2 and its cytoprotective enzymes in STZ induced memory impairment in rats **[Annals of Neuroscience: Vol. 19; Supp Oct 2012 pp79]**.

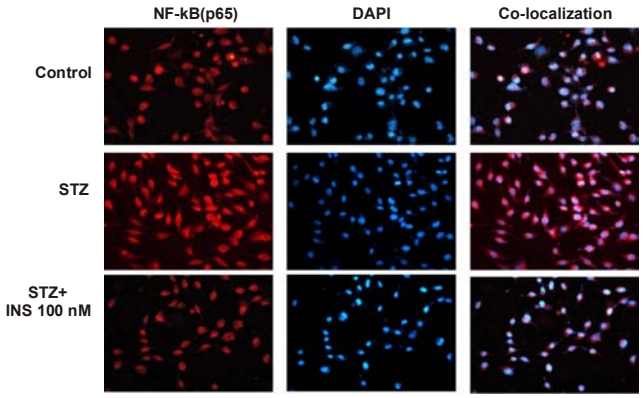

Fig. Effect of Insulin on STZ induced NF-kB translocation in astroglial cells.

4.3.9. Glial activation and post-synaptic neurotoxicity in Streptozotocin (ICV) induced memory impaired rats

The involvement of glial activation and post synaptic toxicity have been explored in Streptozotocin (STZ ICV) induced memory impairment in rats. STZ caused increased expression of GFAP and CD11b indicating glial activation. STZ also significantly increased the level of nitrite, Ca2+, ROS and Caspase-3 activity in brain region. Study on synaptic markers in STZ treatment showed decrease expression of CaMKIIα and PSD-95 (post synaptic markers). However, no change was observed in expression of synaptophysin and SNAP-25 (pre synaptic markers) indicating selective synaptic neurotoxicity. Treatment with Memantine and Ibuprofen attenuated STZ induced glial activation, apoptotic cell death and post synaptic neurotoxicity in rat brain suggested that glial activation and free radical induced apoptotic cell death and post synaptic neurotoxicity are the key event in STZ induced memory impaired rats **[Annals of Neuroscience:Vol.19;Supp Oct 2012 pp76].**

4.3.10. A study on neuroinflammation and NMDA receptor function in STZ (ICV) induced memory impaired rats

The present study investigated the status of neuroinflammation and NMDA receptor function in STZ (ICV) induced memory impaired rats. STZ produced significant increase in proinflammatory cytokines (TNF-α and IL-1β), ROS, nitrite and mRNA and protein expression of iNOS and nNOS indicating a state of neuroinflammation in rat brain which was significantly prevented by Memantine and Ibuprofen treatment. STZ also significantly altered NMDA subunits, NR2A and NR2B protein and mRNA expression which were re- stored by Memantine only. The results suggest that neuroinflammatory markers might be involved in memory impairment via modulating the NMDA receptor in STZ induced memory impaired rats **[J Neuroimmunol., PMID: 23021418].**

5 Cancer and Related Areas

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Area Leader:
Dr. Rakesh Maurya

Established in 2009, the cancer biology program at the CSIR-CDRI includes an interdisciplinary group of researchers involved in collaborative research projects. During these past 3 years, understanding of cancer has increased dramatically with the novel discovery of mechanisms involving oncogenes, tumor suppressors, pathways of DNA damage and repair, cell cycle regulation, angiogenesis and hypoxia and the molecular basis of metastasis. In addition, methods of parallel analysis including gene expression arrays, protein arrays and yeast based screening systems have begun to refine and redefine the molecular basis of carcinogenesis and cancer diagnosis. CSIR-CDRI presents a unique environment to pursue interdisciplinary cancer research because of the wide variety of expertise and state of the art facilities.

The goals of the cancer biology program is to 1) provide a multidisciplinary collaborative research platform for scientists 2) to explore novel aspects the molecular basis of carcinogenesis 3) to explore anticancer effects of novel synthetic and naturally derived molecules and 4) to provide our students with education and training that will enable them to make significant contributions to the expansion of knowledge base in the field.

5.1 Screening for anti-cancer activity

An *in-vitro* anti cancer screening program was recently established in the lab having more than 20 different human cancer cell lines in 10 different types of solid tumors by following NCI drug screening mandate. For synthetic compounds, first perform single dose (10 µM) anticancer (primary screening) activity in 6 different solid tumor cell lines by SRB assay. Similarly, for natural extracts, follow the same protocol for 100 µg of extracts. Then, determine the IC_{50} of selected active compounds in 5 serial dilutions (1/2 log). During the reporting period, tested 255 synthetic compounds and 36 natural plant extracts for their anti cancer activity. Altogether, nine (9) compounds and extracts have shown potential anti-proliferative effects. Compounds S011-1135/37 have shown IC_{50} values of less than 3uM in multiple solid tumor cell lines including breast cancer and it is under active *in-vivo* investigation in syngenic breast tumor model. Other compounds like S011-1990/91, S010-2001 have also shown significant anti-cancer activities and are under the pipeline of *in-vivo* testing for their efficacy and toxicity.

5.2 Basic research

5.2.1 Proteomic identification of E6AP as a molecular target of Tamoxifen in MCF7 cells

Tamoxifen (Tam) is most widely used selective estrogen receptor modulator (SERM) for the treatment of hormone responsive breast cancer. Despite being regularly used in clinical therapy for breast cancer since 1971, the mechanism of Tam action remains largely unclear. In order to gain insights into Tam mediated anti-breast cancer actions, applied 2D gel electrophoresis (2DE) and mass spectrometry based proteomics approach to identify target proteins of Tam. Identified E6AP (*UBE3A*) among others to be regulated by Tam which otherwise is upregulated in breast tumors. Confirmed 2DE finding by immunoblotting and further showed that Tam leads to inhibition of E6AP expression presumably by promoting its autoubiquitination which is coupled with nuclear export and subsequent proteasome mediated degradation. Furthermore, showed that Tam and siE6AP mediated inhibition of E6AP leads to enhanced G0-G1 growth arrest and apoptosis, which is also

evident from significant up regulation of cytochrome-c, Bax, p21 and PARP cleavage. Taken together, these findings suggest that Tam targeted E6AP inhibition (as depicted in hypothetical model) is in fact required for Tam mediated anti-breast cancer actions. Thus, E6AP may be a therapeutic target in breast cancer **[Proteomics., PMID: 22589186].**

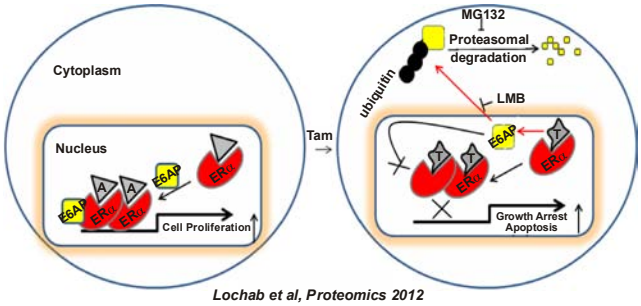
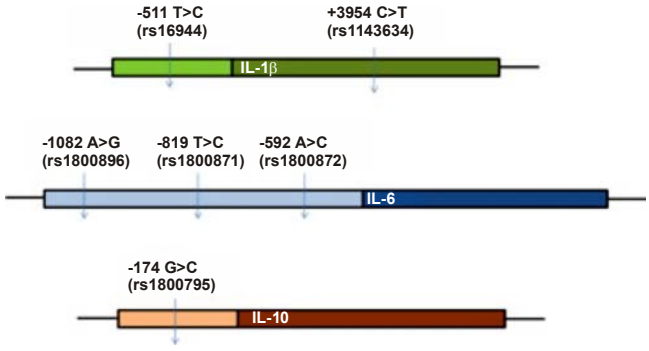


Fig. A hypothetical model demonstrates the Tam induced inhibition and proteasomal degradation of E6AP leading different functional biology.

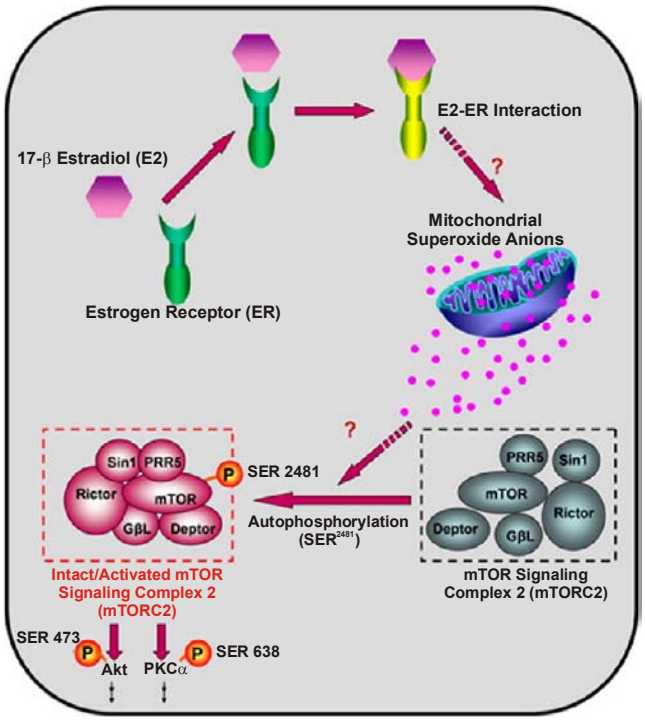
5.2.2 Cytokine gene polymorphism in breast cancer

Cytokines are important regulators of the entire gamut of breast cancer from initiation, invasion and metastasis. There is a possibility that different sets of polymorphic variants of cytokines may influence risk of breast cancer in Indian population. Therefore, possible association of cytokine gene polymorphism with breast cancer risk was evaluated. In this phase of study, conducted studies on polymorphisms in interleukin genes, IL-1β [-511 T>C (rs16944) and +3954 C>T (rs1143634)], IL-10 [-1082 A>G (rs1800896),-819 T>C (rs1800871) and -592 A>C (rs1800872)]. It was observed that IL-1b [-511 C>T] polymorphism is not associated with breast cancer like majority of other subject population around the world. Association of mutant allele and genotype at IL-1β [+3954 C>T] site with increased breast cancer risk in our population was observed. None of the three IL-10 polymorphisms were found to be associated with risk of breast cancer. However, there was significant association of mutant allele and genotypes of IL- 10 [-1082 A>G (rs1800896)] with postmenopausal breast cancer patients. In addition to the analysis of genetic polymorphisms, also compared peripheral level of these cytokines and did not observe any difference between cases and controls. It is assumed that ethnicity may have strong role on these varied association of genetic polymorphisms with breast cancer across the world. Further studies on other populations would finally develop a consensus about the interleukin gene polymorphisms as risk factor for breast cancer **[Cytokine, PMID: 22818022].**



5.2.3 Estrogen receptor potentiates mTORC2 signaling in breast cancer cells by upregulating superoxide anions

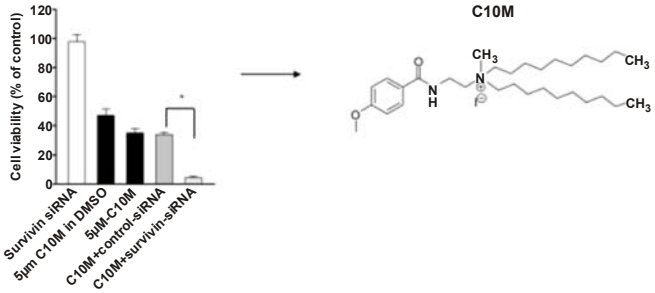
The estrogen receptor (ER) plays a cardinal role in estrogen-responsive breast carcinogenesis. It is, however, unclear as to how estrogen–ER interaction potentiates breast cancer progression. Compelling evidence supports estrogen-induced redox alterations, such as augmented reactive oxygen species (ROS) levels, as having a crucial role in breast carcinogenesis. Despite ER being a biological mediator of the majority of estrogen-induced cellular responses; its role in estrogen-induced tissue-specific ROS generation remains largely debatable. Examined a panel of human breast cancer specimens and found that ER-positive breast cancer specimens exhibited a higher incidence of augmented $O_2^{\bullet-}$ levels compared to matched normal tissue. ROS are known to function as signal transducers and ROS-mediated signaling remains a key complementary mechanism that drives carcinogenesis by activating redox-sensitive oncogenic pathways. Additional studies revealed that augmented $O_2^{\bullet-}$ levels in breast cancer specimens coincided with mammalian target of rapamycin complex 2 (mTORC2) hyperactivation. Detailed investigations using *in vitro* experiments established that 17β-estradiol (E2)-stimulated breast cancer cells exhibited transiently upregulated $O_2^{\bullet-}$ levels, with the presence of ER being a



crucial determinant for the phenomenon to take place. Gene expression, ER transactivation, and confocal studies revealed that the E2-induced transient $O_2^{\bullet-}$ upregulation was effected by ER through a nongenomic pathway possibly involving mitochondria. Furthermore, E2 treatment activated mTORC2 in breast cancer cells in a characteristically ER-dependent manner. Interestingly, altering $O_2^{\bullet-}$ anion levels through chemical/genetic methods caused significant modulation of the mTORC2 signaling cascade. Taken together, our findings unravel a novel nongenomic pathway unique to estrogen-responsive breast cancer cells wherein, upon stimulation by E2, ER may regulate mTORC2 activity in a redox-dependent manner by transiently modulating $O_2^{\bullet-}$ levels particularly within mitochondria. The findings suggest that therapies aimed at counteracting these redox alterations and/or resultant signaling cascades may complement conventional treatments for estrogen-responsive breast cancer. **[Free Radic Biol Med., PMID: 23000059]**

5.2.4 Anticancer siRNA delivery by new anticancer molecule: A novel combination strategy for cancer cell killing

The present report describes development of a novel, bifunctional molecule possessing both selective antiproliferative activity and siRNA transfection ability. Synthesized a series of cationic lipo-benzamides and screened for *in vitro* anticancer activities against a panel of cancer and non-cancer cells. The molecule with a ten carbon chain-length (C10M) significantly inhibited proliferation of cancer cells via arresting the cell cycle predominantly in the G1 phase; but did not affect non-cancerous cells. C10M effectively mediated siRNA delivery *in vitro*. The combined anticancer effect of the delivery of C10M together with its survivin-targeting siRNA cargo was significantly ($p < 0.05$) superior to that of agent alone. To our knowledge, this is the first report of a dual-purpose molecule with intrinsic anticancer activity and suitability for use in siRNA delivery **[Eur J Med Chem., PMID: 22926227].**



5.2.5 Epigenetics of obesity associated breast cancer: Mechanisms and prevention by novel dietary phytochemicals

In the present study, it was observed that treatment of hormonal refractory breast cancer cells with GTPs and SFN alone or in combination leads to the reactivation of key tumor suppressor genes such as *p53*, *p21* $^{WAF/CIP1}$, *p16*^{INK4a} and *Klotho* and inhibits epithelial-to- mesenchymal transition (EMT) which is a hallmark of breast cancer metastasis. Found that GTPs and SFN significantly inhibit cellular proliferation at 20 µg/mL and 10 µM, respectively when treated separately for 24 h. The combination of 20 µg/mL GTPs and 5 µM SFN was found to be the optimal dose for reactivations of key tumor suppressor genes and inducing cell cycle arrest at G0/G1 phase in MDA-MB-231 human breast cancer cells. The reactivation of tumor suppressor genes was found to be correlated with the inhibition of histone deacetylase and DNA methyltransferase activities and its expressions. Cell migration and invasion are the hallmarks of EMT. It was found that GTPs and SFN inhibit human breast cancer cell invasion and migration dose dependently at sub IC_{50} doses. Collectively, our findings suggest that combination of bioactive demethylating agents, GTPs, and bioactive deacetylating agent, SFN, inhibit EMT and reactivates key tumor suppressor genes, at least in part, through epigenetic modulation. Further studies are under progress in these directions. **[PLoS One, PMID: 22662208]**

5.2.6 Studies on the chemopreventive effects of Polyphenols in myeloid leukemia cells

The natural polyphenolic alkanone 6-Gingerol displays anti-inflammatory and anti-tumoral properties of potential pharmacological interest. However its mechanism of action in myeloid leukemia cells is unclear.Myeloid leukemia cells abnormally proliferate and escape growth arrest and apoptosis. Herein, the effects and mechanisms of action of 6-Gingerol were investigated in myeloid leukemic cell lines and primary leukemic cells cultured *ex vivo*.6-Gingerol inhibited in a time- and concentration-dependent manner the growth of myeloid leukemic cell lines (U937 and K-562) by inducing apoptosis as evidenced by accumulation of sub-G1 population, phosphatidylserine externalization and DNA fragmentation. 6-Gingerol also induced apoptosis in primary myeloid leukemia cells, whereas normal blood cells were not affected. The apoptotic process in these cells was accompanied by ROS accumulation,GSH depletion and activation of Mir27b. Further the activation of Mir27b mediated DNA damage and G2/M cell cycle arrest and caspase activation. These data implicate mir27b mediated DNA damage as an important mechanism in 6-Gingerol -induced growth arrest and apoptosis in both myeloid leukemic cell lines and patient-derived cells.Our data provide new evidence that 6-Gingerol s pro-apoptotic effect in myeloid leukemia cells involved oxidative stress, activation of mir27b mediated DNA damage and G2/M cell cycle arrest. Combined induction of oxidative stress and cell cycle arrest by 6-Gingerol may have implications for myeloid leukemia treatment **[Cell Div, PMID: 23268747].**

6 Safety and Clinical Development

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The major objective of this area is to conduct regulatory studies of candidate drugs for clinical development. The studies include:

Pharmaceutical Information	:	Active ingredients, physio-chemical data validations, stability, formulation
Pharmacokinetics	:	Absorption, distribution, metabolism, excretion
Safety Pharmacology	:	Essential safety pharmacology studies
Toxicity Studies	:	Systemic toxicity, special toxicity studies
Clinical Studies	:	Clinical trials

6.1 Pharmaceutics

6.1.1 Quality control and stability studies

New HPLC method for CSIR-CDRI compounds 99-288, S007-1261, S007-1263, S009-074, S009-1482, S009-1483, S009-2021, S010-1992 and S011-2001 with proper resolution of the starting materials has been developed. Stability studies on CDR134F194, Ormeloxifene-HCL, Saheli, Herbal Medicament (HM) and compounds S007-867, 99/411, S002-333, S001-469, S007-1500 are continuing. d- and l-Ormeloxifene were separated and a validated HPLC method was developed for their estimation.

6.1.2 Inhalable particles containing anti-tuberculosis agents

A draft investigator's brochure and clinical plan is ready for release and a meeting of clinicians is being planned to initiate Phase I clinical trials. An Investigational New Drug Application is under preparation for submission to the Drug Controller General of India to seek permission to conduct such trials. Clinicians from the National Institute of Research in Tuberculosis (formerly, Tuberculosis Research Centre), Chennai, and the Department of Pulmonary Medicine, King George's Medical University, Lucknow, have expressed interest in conducting the proposed trials, having evaluated data on pharmacokinetics and biodistribution in monkeys **[Mol Pharmaceutics, PMID: 22397370]**. A grant application for developing inhalable microparticles containing the second-line drug clofazimine has been submitted, in collaboration with an international team comprising eight groups and including eminent researchers such as Denis Mitchison, Bernard Fourie, Anthony Hickey, and Edward Nardell.

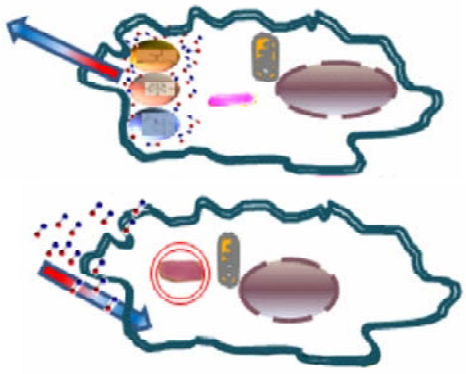
6.1.3 Novel payloads for inhalable particles against tuberculosis

Some drugs used in unrelated conditions might prove beneficial in the management of pulmonary tuberculosis. It has been observed that nitric oxide donors, such as those used against angina (e.g. isosorbide mononitrate) have anti-TB properties, especially if delivered to the cytosol of infected macrophages, without exhibiting toxicity **[Mol Pharmaceutics PMID: 22978290]**. It is deduced that NO exerts non-specific cidal and static effects on the bacterium, and also activates the infected macrophage if delivered to the intracellular compartment (Fig.).

Similarly, rapamycin, an agent used in some types of cancers, kills tuberculosis bacteria if delivered to the cytosol of infected macrophage. Further, RNA interference against host molecules implicated in allowing the TB bacterium

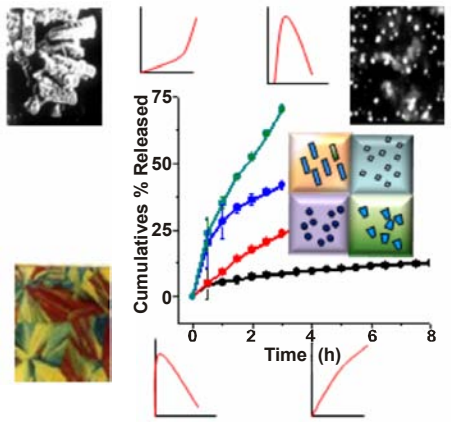
sanctuary within the alveolar macrophage is also under investigation.

Particles bearing NO donors kill intracellular bacteria more efficiently and safely than molecular NO



6.1.4 Pulsatile transdermal drug delivery

It has been demonstrated that the transdermal formulations can be prepared such that they generate chronopharmacologically relevant pharmacokinetics. Working with testosterone, it was showed that controlling particle size to achieve different rates of dissolution and diffusion, three pulses of the drug to rats can be delivered. Utility of this approach as a method of male contraception and hormone replacement would be demonstrated.



Drug sequestered in matrix

6.1.5 Nanocapsules bearing doxorubicin for intervention in visceral leishmaniasis

The present investigation provides evidence that the prototype formulation may be used for efficient treatment of leishmaniasis via Phosphatidylserine specific ligand-anchored NCs bearing doxorubicin. We report that PS-NCs provide an 'eat me' signal for specialized phagocytes because recognition of PS involves multiple receptors present on the phagocyte and causes enhanced internalization of the bioactive molecule into cells. Enhanced uptake directly reduces the dosage of the formulation, which is highly desirable for optimizing the therapeutic effect and reducing the side effects of doxorubicin.

6.1.6 Layer-by-layer nano-matrix bearing kaempferol for the conditions of osteoporosis

A prototype formulation based on layer-by-layer (LbL) nano-matrix was developed to increase bioavailability of kaempferol with improved retention in bone marrow to achieve enhanced bone formation. Single oral dose of kaempferol loaded LbL nanomatrix formulation increased bioavailability significantly compared to unformulated kaempferol. Three months of formulated kaempferol administration to osteopenic rats increased plasma and bone marrow Kaempferol levels by 2.8- and 1.75-fold, respectively, compared to free Kaempferol. Formulated Kaempferol increased bone marrow osteoprogenitor cells, osteogenic genes in femur, bone formation rate, and improved trabecular micro-architecture. Withdrawal of Formulated kaempferol-in ovariectomized (OVx) rats resulted in the maintenance of bone micro-architecture up to 30 days, whereas micro-architectural deterioration was readily observed in OVx rats treated with unformulated kaempferol-within 15 days of withdrawal. The developed novel formulation has enhanced anabolic effect in osteopenic rats through increased stimulatory effect in osteoblasts. Treatment post-withdrawal sustenance of formulated kaempferol could become a strategy to enhance bioavailability of flavanoids **[Nanomedicine, PMID: 23311987].**

6.1.7 Design of Amphotericin B encapsulated nano-emulsion template based chitosan nanocapsules

Nanometric amphotericin B (AmB) encapsulated chitosan-nanocapsules (CNC-AmB) were formulated using polymer deposition technique mediated by nano-emulsion template fabrication. CNC-AmB exhibited good steric stability *in vitro* where chitosan content was found to be efficient in preventing their destabilization in the presence of protein and Ca2+. Experimental results of *in vitro* (macrophage-amastigote system, IC50 = 0.19±0.04 µg AmB/ml) and *in vivo* (*Leishmania donovani* infected hamsters, 86.1±2.08% parasite inhibition) in conjunction with effective internalization by macrophages illustrated the efficacy of CNC-AmB to augment antileishmanial property. Quantitative mRNA analysis by RT-PCR showed that improved effect was synergized with up regulated Tumor Necrosis Factor-α (TNF-α), Interleukin-12 (IL-12) and inducible nitric oxide synthase, and down regulated Transforming Growth Factor-β (TGF- β), IL-10 and IL-4.

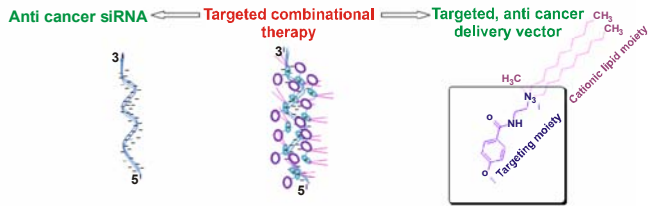
6.1.8 Formulation of nanoemulsion incorporating docetaxel

A project on preparation and evaluation of nanoemulsion bearing chemotherapeutic agent docetaxel has also been carried out. Nanoemulsion formulations

prepared using Pluronic f68 and lecithin and evaluated for various attributes including size, shape, zeta potential, entrapment, *in vitro* release, cell uptake, MTT assay and tissue toxicity.

6.1.9 RNA interference (RNAi) for clinical development of nucleic acid therapeutics

The delivery vector is crucial for clinical success of therapeutic RNAi. Developing a selective antiproliferative agent which can deliver siRNA is challenging but has great potential towards the development of siRNA mediated therapeutic intervention in cancer. Towards this a novel, bifunctional molecules possessing both selective antiproliferative activity and siRNA transfection ability that includes cationic lipo-benzamides and lipo-cordiarimides has been developed.



6.2 Pharmacokinetics and metabolism

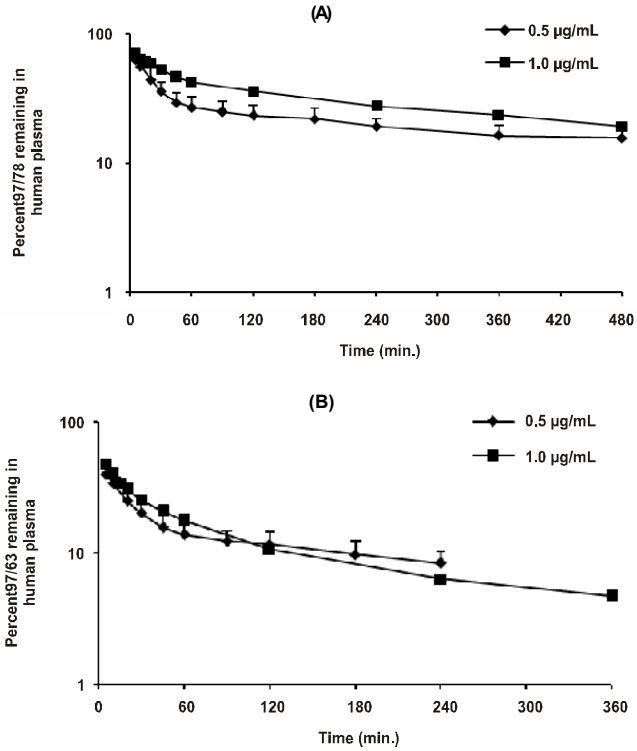
6.2.1 Method development, protein binding and pharmacokinetic study of 97/78, CDRI novel antimalarial molecules in human

6.2.1.1 LC-MS/MS assay for quantification of 97/78 and 97/63 in human plasma

The developed and validated LC-MS/MS assay for the quantification of 97/78 and its active metabolite 97/63 in human plasma was sensitive, selective, accurate and precise over the range 1.56-200 ng/ml. No matrix effect was observed and the matrix suppression was less than 8%. The recovery of 97/78 and metabolite 97/63 was more than 90% at concentrations of 1.56, 50 and 200 ng/ml, respectively. The Compound was found to be stable during Freeze-Thaw cycle, Bench top, Autosampler stability and Long term conditions. Moreover 97/78 was found to be stable for 4 h after incubating at 37 ºC in shaker water bath with recovery of more than 92.8%. This stability of 97/78 was checked in human plasma because at the same condition 97/78 is converted to 97/63 in rat plasma. The method was applied in the analysis of protein binding and clinical phase-I pharmacokinetic samples.

6.2.1.2 *In-vitro* plasma protein binding of 97/78 and 97/63 in human plasma

Protein binding study (charcoal adsorption method): Samples were analysed by validated assay for 97/78 and its



metabolite 97/63 at two concentrations (N=3). The assay is based on charcoal adsorption kinetics and operates under non-equilibrium conditions. The study was performed to evaluate the plasma protein binding for 97/78 and 97/63 at 0.5 and 1 µg/ml concentration levels. Compound 97/78 and its metabolite 97/63 showed plasma protein binding 85.25 ± 7.63% and 54.22±9.43% respectively at concentration of 0.5 µg/ml and 73.90±3.66% and 56.57 ± 2.05% respectively at 1µg/ml.

6.2.1.3 Clinical Phase-I Pharmacokinetics (PK) Study of Anti-malarial compound- 97/78

Oral PK data of 97/63 were best fitted in non-compartmental model to determine various PK parameters following oral administration of 97/78 at 200mg in 16 healthy

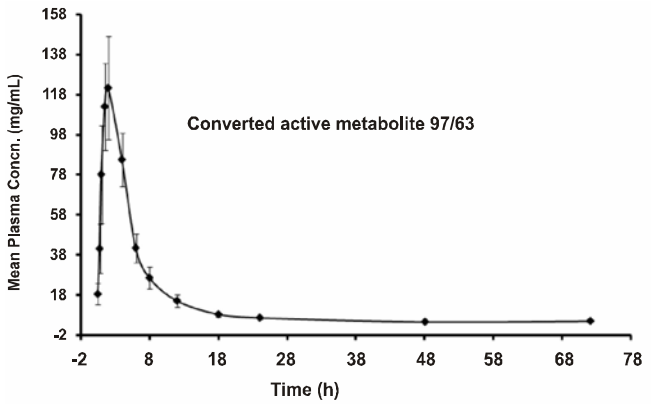
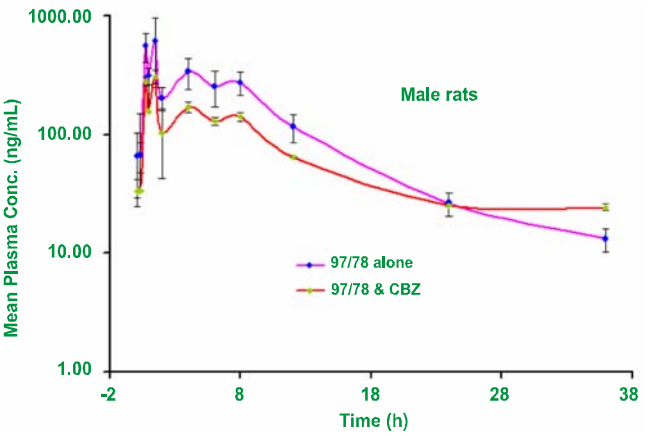


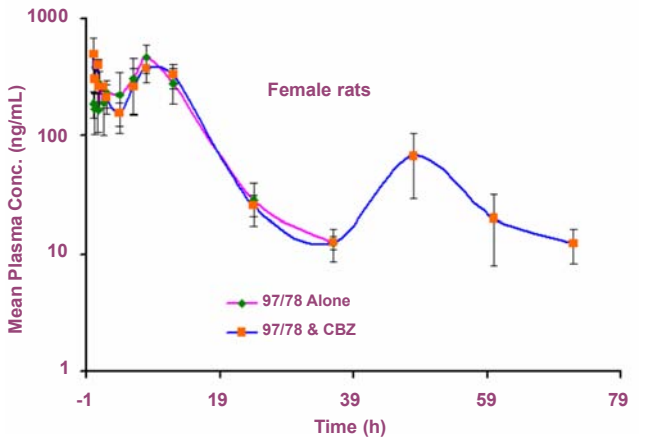
Fig. Percent decline of 97/78 (A) and 97/63 (B) during charcoal adsorption assay in human plasma.

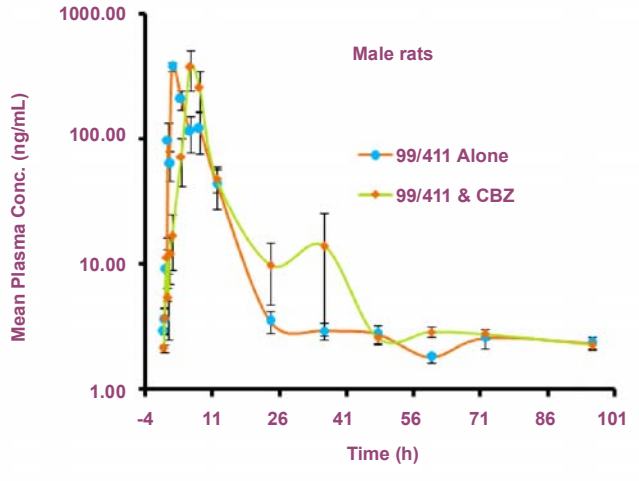
human volunteers. Compound 97/78 was rapidly absorbed and gets immediately converted into active metabolite 97/63 as well as eliminates from the systemic circulation within 48 h except two volunteers (72 h), as observed from plasma concentration-time profile shown in Fig. The Time to reach maximum plasma concentration of active metabolite 97/63 was found to be 2.28 ± 0.27 h with maximum concentration of 143.93 ± 28.32 ng/ml. The mean terminal elimination half-life of 97/63 was 11.85±1.94 h while mean residence time was 13.77±2.05 h.

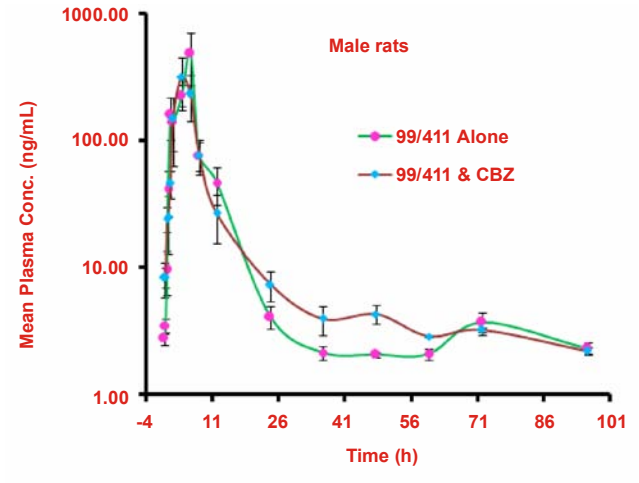
6.2.2 Drug interaction studies: Effect of carbamazepine, an anti-epileptic drug on 97/78 and 99/411, novel trioxane antimalarial molecules

Co-administration of carbamazepine (42 mg/kg) with 97/78 (40 mg/kg) and 99/411 (12 mg/kg), respectively did not significantly alter the Tmax and Cmax of 97/63, *in-vivo* active metabolite of 97/78 and 99/411 in intersex rats. Other PK parameters were also similar in male and female rats. No significant drug interaction was observed in these studies.









6.2.3 Pharmacokinetic study of CDRI compounds

6.2.3.1 Anti-leukemial compound S007-1235

The pharmacokinetic study of S007-1235 after oral and intravenous administration in rats exhibited that the compound was quickly absorbed, distributed and exhibited multiple peak phenomenon. It exhibited a high volume of distribution, moderate clearance, long half life and low absolute bioavailability.

6.2.3.2 Anti-tuberculosis compound (S009-1588)

The pharmacokinetic study of S009-1588 after oral and intravenous administration in rats showed that the compound was quickly absorbed, distributed and slowly eliminated. It exhibited a high volume of distribution, moderate clearance, long half life and low absolute bioavailability.

6.2.3.3 Anti-leishmanial compounds (S010-265 and S010-269)

The intravenous and oral pharmacokinetic study of S010-265 and S010-269 in the male Sprague Dawley rats

revealed that the compounds were quickly absorbed, distributed and eliminated from the serum and had only limited (≥ 6%) oral bioavailability. However, AUC and MRT of S010-269 were 2.2- and 2.8-fold higher and clearance was 5-fold lower than those of S010-265 after a single oral dose of 10 mg/kg in rats indicating that S010-269 could be a promising drug candidate.

6.2.3.4 Anti-tuberculosis compounds (S008-1167, S008-1635, S009-895 and S010-0399) in rats

The pharmacokinetics and tissues uptake of S008-1167, S008-1635, S009-895 and S010-0399 was studied after 10 mg/kg oral dose in male Sprague Dawley rats. The compounds were quickly absorbed, distributed and eliminated from the serum. S010-0399 was stable in SGF, SIF, and serum. S009-0895 exhibited higher levels in serum, lungs (target tissues for main effects), liver (target tissues for side effects) and spleen (target tissue in extra hepatic tuberculosis) than S008-1167, S008-1635 and S010-0399.

6.2.3.5 Anti-malarial compounds (S010-0719 and S010-0725)

The oral pharmacokinetic study of S011-0719 and S011-0725 in the male Sprague Dawley rats revealed that the compounds were quickly absorbed, distributed and slowly eliminated from the serum with long elimination half-life. Both compounds exhibited multiple peak phenomenon, high extra-vascular distribution and extra-hepatic elimination. However, AUC and MRT of S011-0725 were 1.9- and 3.3-fold higher and clearance was 19-fold lower than those of S011-0719 after a single oral dose of 10 mg/kg in rats indicating that S011-0725 could be a better drug candidate than S011-0719.

6.2.3.6 PK studies of Withanolide-A

HPLC-PDA method was developed and validated for quantitative determination of Withanolide-A. The best separation, peak symmetry and reproducibility were obtained with C18 column (4.6 × 250 mm, 5.0 µm) using mobile phase Methanol and Ammonium acetate (10 mM, pH 5.0) in the ratio 60:40 v/v. The retention time was around 15.7 minutes. Eight-point linearity was constructed for each analyte over the concentration range of 1.56-50 µg/ml. The LOD was found to be 0.39 µg/ml and LOQ was 1.56 µg/ml. Inter-day and intra-day precision and accuracy was within limits for each quality control concentration. Stability studies were investigated at two concentration levels i.e. QC low and QC high using four replicates at each concentration levels. Withanolide-A was found to be stable in blank perfusion sample for 6 hr at room temperature (BT), for 18 hr in auto-sampler (AS) and at repeated freeze-thaw (FT) conditions (three cycles).

6.2.3.7 PK studies of antithrombotic lead candidate S002-333 and isomers S004-1032 & S007-1558

Six CYP enzymes have been found to be involved in the metabolism of S002-333 and its isomers S004-1032, S007-1558. Among them CYP 2C19 and CYP 3A4 have significant role in the metabolism of these lead candidates. This information is crucial for drug development of this antithrombotic lead molecule with respect to drug-drug interaction with probable co-medication because 2C19 and 3A4 are found to be involved in the metabolism of 75% of drugs available in the market.

6.2.3.8 DMPK study of anti-thrombotic agent : S007-867

CYP phenotyping of S007-867 in rat liver microsome were evaluated using CYP and suicidal non-CYP specific inhibitors. The mechanism metabolism of S007-867 was mediated by NADPH dependent CYP pathway. The metabolism of S007-867 was not mediated by enzyme CYP2C9, CYP2C11, CYP2C19, CYP2E1, CYP1A2, CYP3A4 and CYP2D6.

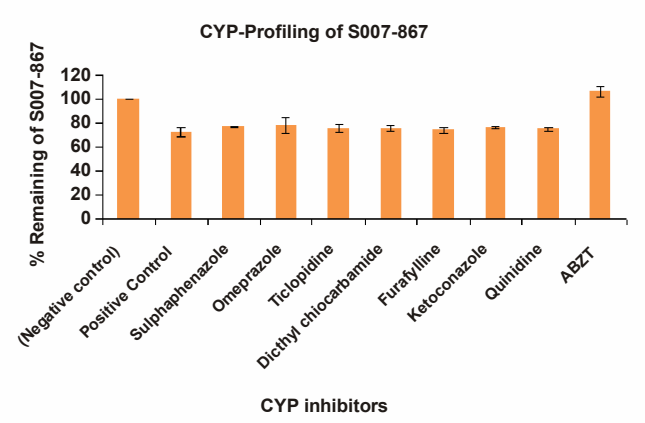


Fig.1. The percentage of S007-867 remaining in presence and absence of CYP inhibitor.

6.2.3.9 Anti-hyperlipidemic agent: S010-1870

Oral pharmacokinetic of S010-1870 at 100 mg/kg was evaluated in SD rat. The compound was extensively metabolized to carboxy acid metabolite (M1). Bioanalytical HPLC-UV method for estimation of metabolite with calibration range of 0.625–16 µg/ml was developed and validated. The S010-1870 was not detected in the plasma and pharmacokinetic estimates were derived based on M1 plasma concentration time profile. The Cmax (ng/ml), Tmax, $AUC_{(0-)}$ (hr.ng/ml) were 17.7 ± 5.21 ng/ml, 5.33 1.15 h, 248.20 ± 20.36 hr.ng/ml respectively. The metabolite was observed for a prolong period (48 h).

6.2.3.10 Anti-leshmanial agent: 99/288

Bioanalytical method for estimation of 99/288 in hamster plasma was developed and validated. Preliminary

oral pharmacokinetic study shows low plasma level. The compound was found to be less stable in simulated intestinal fluid. PK study is in progress.

6.2.4 Development of selective and sensitive bioanalytical method for estimation of amphotericin B in rabbit and human plasma: Application of pharmacokinetic evaluation.

Amphotericin B has been a therapeutic agent in fungal and leishmania infection. The bioanalytical method was successfully applied for estimation of intravenous pharmacokinetics parameters in *NZ* rabbit. The method was applicable for estimation of amphotericin B in human plasma.

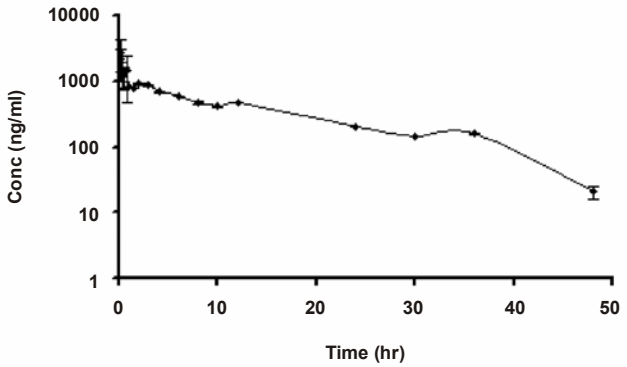


Fig. Plasma concentration-time profile of amphotericin B in rabbit plasma (n=3).

6.2.5 Prediction of human absorption of a trioxane antimalarial molecule (CDRI 99/411) using an in-house validated in situ single-pass intestinal perfusion model

Considering the high correlation of rat P_{eff} values with those of human reported values, the effective permeability coefficients (P_{eff}) in anaesthetized rats were determined for marker compounds and the antimalarial trioxane derivative 99/411. Subsequently the human permeability and fraction dose absorbed in human were predicted for 99/411 using the obtained rat permeability value and established correlations (Fig.). From predicted results, 99/411was found to have high permeability and possibly complete absorption in human.

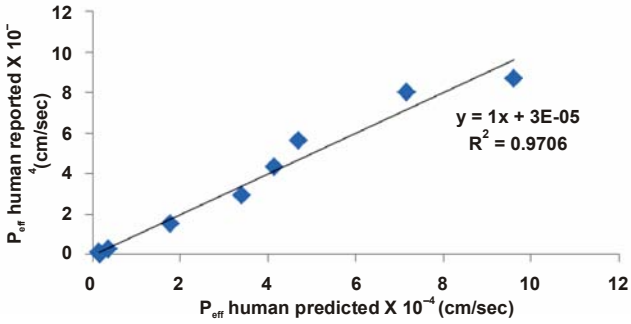
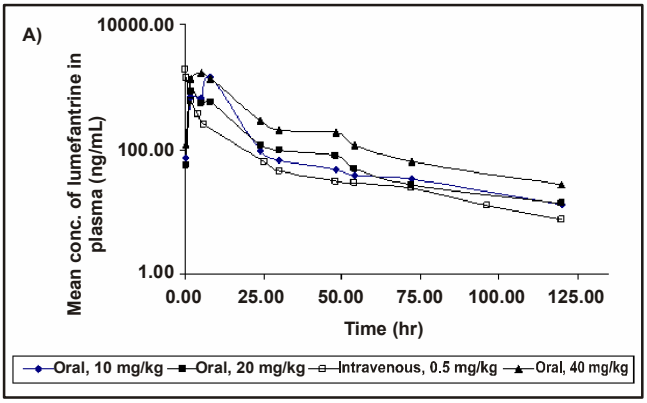


Fig.: Plot of reported human effective permeability coefficient (Peff (human)) versus in-house predicted human effective permeability coefficient (Peff (human))

6.2.6 Preclinical pharmacokinetics of lumefantrine

6.2.6.1 Intravenous pharmacokinetics, oral bioavailability, dose proportionality and in situ permeability in rats

A single dose of 10, 20 or 40 mg/kg of lumefantrine was given orally to male rats and a single i.v. bolus dose of 0.5 mg/kg of lumefantrine was given to rats. Lumefantrine displayed similar pharmacokinetics in the rat as in humans, with multiphasic disposition, low clearance, and a large volume of distribution resulting in a long terminal elimination half-life. The absolute oral bioavailability, C_{max} and $AUC_{0-\infty}$ of lumefantrine was found to be dose dependent. C_{max} and $AUC_{0-\infty}$ of desbutyl-lumefantrine are also concentration dependent. Absolute oral bioavailability of lumefantrine across the tested doses ranged between 4.97% and 11.98% (Fig.).



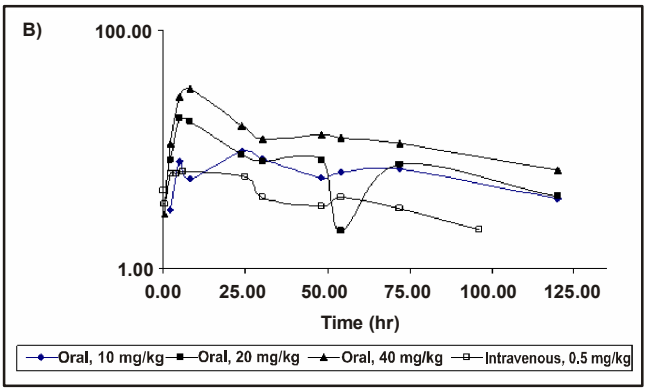


Fig.: Plasma concentration versus time profiles of lumefantrine (A) and desbutyl lumefantrine (B) after oral and intravenous administration in rats (N=5). All concentrations are on the logarithmic scale

6.2.6.2 Gender differences in pharmacokinetics

The pharmacokinetics of lumefantrine and its active metabolite DLF were evaluated after intravenous (0.5mg/

kg) and oral (20mg/kg) administration of lumefantrine to male and female Sprague–Dawley rats (Fig.). The bioavailability (%F) of lumefantrine was 1.66 times higher in male rats than that in female rats.

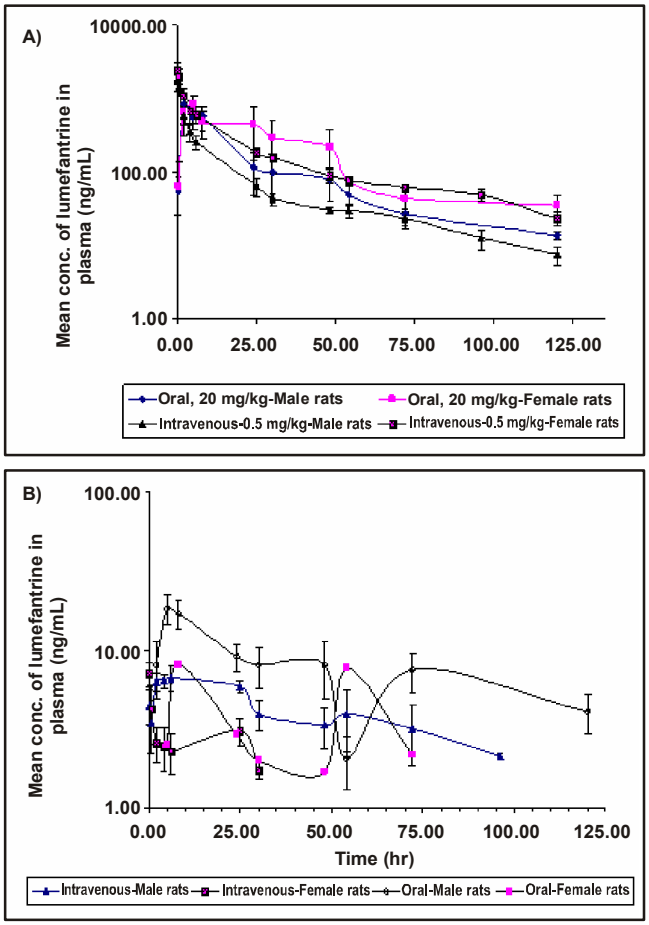


Fig.: Plasma concentration versus time profiles of lumefantrine (A) and desbutyl-lumefantrine (B) after oral and intravenous administration of lumefantrine in rats. All concentrations are on the logarithmic scale

6.2.6.3 Investigation of functional role of P-glycoprotein in limiting the oral bioavailability of Lumefantrine

In quest to explore the reason for its low and variable bioavailability, the possible role of P-gp in lumefantrine intestinal absorption was investigated. An *in situ* single pass intestinal perfusion rat model was used to study the jejunal and ileal absorption of lumefantrine with and without P-gp inhibitors verapamil/quinidine. Lumefantrine was found to be a substrate of P-gp. To confirm these findings, an *in vivo* pharmacokinetic study was performed in rats. Verapamil co-administration with lumefantrine significantly enhanced lumefantrine bioavailability by 79.62%. The stimulating results provide a reasonable approach for further development of clinically useful synergistic antimalarial combinations.

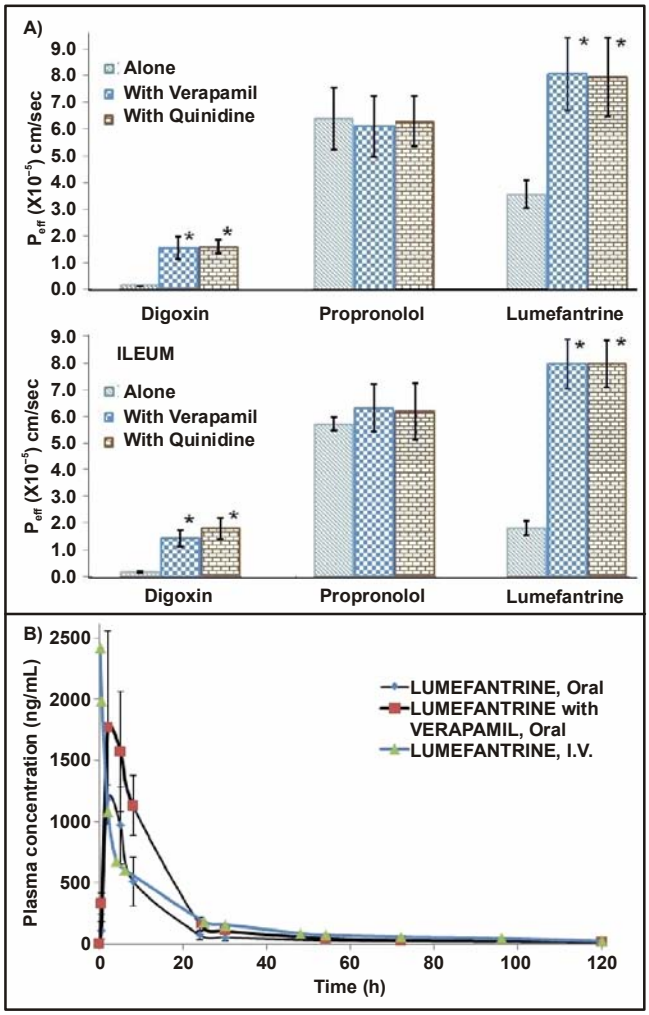


Fig.: (A) Effect of P-gp inhibitor verapamil and quinidine on P-gp mediated efflux and intestinal permeability of digoxin, lumefantrine and propranolol in rat jejunum and ileum. Values represents mean ± S.D. (n = 5). *P < 0.01, in comparison to P_{eff} control (without P-gp inhibitor). (B) The mean plasma concentration-time profiles of lumefantrine after intravenous bolus injection at 0.5 mg/kg; oral administration at 10 mg/kg alone and with co-administration of verapamil at 10 mg/kg (n=5 per group).

6.3 Safety pharmacology

Essential safety pharmacology study of candidate drugs S002-333 (antithrombotic) and CPL-2009-0031 (anti-diabetic) as per schedule 'Y' have been completed. No adverse effects on CNS profile (Gross behavioral activity, neuromuscular co-ordination, body temperature, motor activity and nociceptive response), CVS profile (ECG, heart rate, blood pressure) and respiratory profile were observed after oral administration upto 10 times of ED_{50} doses.

Essential safety pharmacology study of candidate drug NMITLI-118R has also been completed. Data analysis and report preparation are in progress.

6.4 Regulatory toxicity

6.4.1 Toxicity studies of external compounds

6.4.1.1 Lycopodium (A homeopathic preparation of Ayush Project):

Single Dose Study in Rat by oral route completed. The compound was administered as follows Lycopodium MT, Lycopodium 30c, Lycopodium 200c, Lycopodium 1M. All the doses were found safe. 28-Day Toxicity Study of Lycopodium MT in Rat by Oral Route is completed.

6.4.1.2. Mercurius solibilies (A homeopathic preparation of Ayush Project):

Single Dose Study in Rat by oral route completed. The compound was administered as follows. Mercurius solibilies 6x, Mercurius solibilies 30c, Mercurius solibilies 200c, Mercurius solibilies 1M. All the doses were found safe. 28-Day Toxicity Study of Mercurius solibilies 6x in Rat by Oral Route is completed.

6.4.1.3. Ferocept (Male antifertility agent acting on vas deference, IIT Kharagpur):

14-Day Systemic Toxicity Study (local instillation: 1 mg each vas deferens) in Male Rats is completed.

6.4.1.4. RISUG adv (Male antifertility agent acting on vas deference, IIT Kharagpur):

14-Day Systemic Toxicity Study (local instillation: 1 mg each vas deferens) in Male Rats is completed.

6.4.1.5. CPL-2009-31 (Cadila-CSIR NMITLI antidabetic):

Dominant Lethal test: The study completed. The compound CPL-2009-31 was found safe.

Male fertility study: The compound CPL2009-0031 was studied to explore its potential effect on the fertility of male rats to provide information on the potential hazards upon the male reproductive organs, functions and fertility which may arise from the compound when administered to the male rats by oral route respectively at dose levels 0, 33.75, 67.5 and 135 mg/kg B.wt./rat/day for 28 consecutive days. At 33.75, 67.5 and 135 mg/kg B.wt./rat/day dose levels the compound CPL2009-0031 has not shown significant effect on male reproductive organs, functions and fertility under the study conditions.

6.4.2 Experimental toxicology (basic studies)

6.4.2.1. Studies on rotenone induced neurotoxicity

Role of calcium in rotenone-induced apoptosis in Neuro-2a cells: Rotenone decreased mitochondrial dehydrogenase enzyme activity and generated ROS, superoxide, and nitrite. Rotenone treatment impaired cell

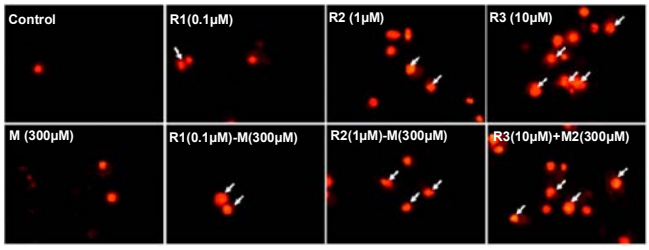


Fig. Images depicting PI uptake by cells

intactness and nuclear morphology as depicted by PI uptake and chromosomal condensation of Neuro-2a cells, respectively. In addition, rotenone resulted in increased intracellular Ca^{+2} level, caspase-3, and CaMKIIa expression. Furthermore, co-exposure of melatonin (300 ìM), an antioxidant to cell culture, significantly suppressed the rotenone-induced decreased mitochondrial dehydrogenase enzyme activity, elevated ROS and RNS. However, melatonin

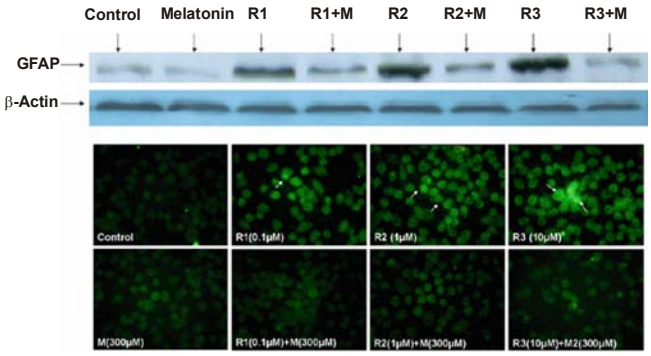


Fig. Images showing the increased expression of GFAP

was found ineffective to counteract rotenone-induced increased PI uptake, altered morphological changes, DNA damage, elevated Ca^{+2}, and increased expression of caspase-3 and CaMKIIa. The study indicates that intracellular calcium rather than oxidative stress is a major factor for rotenone induced apoptosis in neuronal cells **[Arch Toxicol PMID: 22526376]**.

Rotenone causes activation and oxidative apoptotic death of astrocytes: The treatment with rotenone resulted in decreased cell survival and increased free radical generation. Altered nuclear morphology and DNA damage were evident following rotenone treatment by Hoechst staining and Comet assay. Rotenone elevated expression of GFAP and caspase-3 that indicates astrocytes activation and apoptosis, respectively. Co-incubation of antioxidant melatonin (300 ìM) significantly suppressed rotenone induced above-mentioned effects in C6 cells. Inhibitory effects of melatonin suggest that free radicals play a major role in rotenone induced astrocyte activation and cellular toxicity leading to apoptosis of astroglial cells **[Neurochem Res, PMID: 22846965]**.

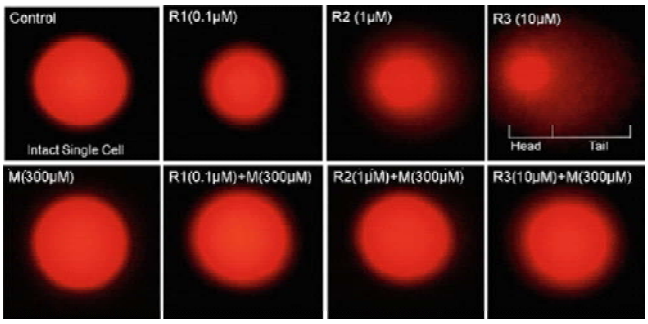


Fig: Rotenone induce DNA damage in astrocytes (COMET assay)

6.4.2.2 Role of ER receptor on breast cancer progression

Study was aimed to identify ER mediated redox signaling cascade that might potentiate breast carcinogenesis. In this context, findings unravel a novel nongenomic pathway unique to estrogen responsive breast cancer cells wherein upon stimulation by E2, ER may regulate mTORC2 activity in a redox dependent manner by transiently modulating O_2.- levels particularly with in mitochondria. The findings suggest that therapies aimed at counteracting these redox alterations and/or resultant signaling cascades may complement conventional treatments for estrogen responsive breast cancer.

6.4.2.3 Nitrate induced toxicity on some hematological parameters in CF Rat

Cf rats were treated with water mixed with nitrate at concentrations of 45 mg/L, 90 mg/L1 and 135 mgL/ for 14 days .The haematological parameters such as T-RBC count, Hct and Hb showed increas while TLC and blood platelets showed decrease. Differential leucocytes count was also affected. Nitrate contaminated water found to affect blood profile of CF Rats **[Journal of Recent Advances in Applied Sciences, 2012; 28, 96-99]**

6.4.2.4 Cyclooxygenase 2 gene polymorphisms and chronic periodontitis in a North Indian population

The present study evaluates the association of two single nucleotide polymorphisms in COX2 gene (-1195G>A and 8473C>T) with chronic periodontitis in North Indians. Both SNPs and their haplotypes were used to explore the associations between COX2 polymorphisms and chronic periodontitis in 56 patients and 60 controls. By the individual genotype analysis, mutant genotypes (GA and AA) of COX2 -1195 showed more than a two-fold risk (odds ratio [OR]>2) and COX2 8473 (TC and CC) showed a reduced risk for the disease, but the findings were not statistically significant. Haplotype analysis showed that the frequency of the haplotype AT was higher in the case group and a significant association was found for haplotype AT (OR, 1.79; 95% confidence interval, 1.03 to 3.11; P=0.0370) indicating an association between the AT haplotype of COX2 gene SNPs and chronic periodontitis.Individual genotypes of both the SNPs were not associated while haplotype AT was found to be associated with chronic periodontitis in North Indians. **[J Periodontal Implant Sci, PMID: 23185695].**

6.4.2.5 Human Beta Casein Fragment (54–59) modulates *M. bovis* BCG survival and Basic Transcription Factor 3 (BTF3) expression in THP-1 cell line

In present study, it is found that Human β-casein fragment (54–59) increases the clearance of *M. bovis* BCG from THP-1 cell line *in vitro*. The key biomolecules, involved in the clearance of BCG from macrophage like, nitric oxide, proinflammatory cytokines and chemokines, were not found to be significantly altered after peptide treatment in comparison to the untreated control. Using proteomic approach we found that BTF3a, an isoform of the Basic Transcription Factor, BTF3, was down regulated in THP-1 cell line after peptide treatment. This was reconfirmed by real time RT-PCR and western blotting. It is to report the BTF3a as a novel target of this hexapeptide. Based on the earlier findings and the results from the present studies, it is suggested that the down regulation of BTF3a following the peptide treatment may augment the *M. bovis* BCG mediated apoptosis resulting in enhanced clearance of *M. bovis* BCG from THP-1 cell line **[PLoS ONE, PMID: 23029305].**

6.4.2.6 Various toxicants studied for their role in initiation/ progression of Parkinsonism:

Environmental toxicants are known to modulate the outcome of neurodegenerative disease conditions. Various pesticide classes were studied for their effect on stress responsive genes employing a transgenic *C. elegans* model that expresses human alpha synuclein (NL5901 strain; Punc-54 :: alphasynuclein :: YFP+unc-119). Representative pesticides from Botanicals, Herbicides, Pesticides, Organophosphates, Carbamates and Pyretheroids were studied for their effect on the expression of stress responsive genes viz *sod-1, sod-2, sod-3, hsp-70, hsp-60,* and *hsp-16.2*. Our findings demonstrate that the expression of stress related genes does not follow a generalized pattern to different toxicants; rather each pesticide class has a specific expression signature **[CNS Neurol. Disorders – Drug Targets, PMID: 23244415].**

6.5 Clinical trials

6.5.1. Compound 99/373 (Anti-osteoporotic agent)

Negotiations with Medanta Duke Research Institute (MDRI) – Medanta, The Medicity, Gurgoan and HLL Lifecare Ltd. Mumbai were undertaken for identifying collaborating partners for Phase I/POC Trials. CDA was signed with MDRI and thereafter Investigators Brochure (IB) and Plan & Protocol sent to MDRI. Budget for undertaking Phase I trial at MDRI received which was forwarded to HLL Lifecare Ltd. Mumbai. HLL initially agreed in principle to be part of CDRI – HLL – Medanta tripartite joint project to conduct Phase I Clinical Trial of Comp. 99/373, however, the top management of HLL decided not to invest in this project, but to develop Ormeloxifene for anti- osteoporosis usage.

6.5.2 Picroliv (Hepatoprotective agent)

Phase III Clinical Trial in patients of Tuberculosis on Multi Drug Therapy (MDT) has been completed at two centers. Clinical Trial Reports of both centers compiled i.e. 260 patients at CSM Medical University, Lucknow and 113 patients at Seth G. S. Medical College and KEM Hospitals, Mumbai. Correspondences with Duphar India Ltd. (DIL) Mumbai ongoing for deciding future course of action. DIL has agreed to take-up further discussion after clarification regarding patents and trademark status especially in relation to Indian, US and European patents and the validity of Picroliv trademark in India and abroad.

6.5.3. Herbal Medicament (Anti-stroke agent)

IND document being prepared by Themis Medicare Ltd. Mumbai in collaboration with Safety and Clinical Development Group, CDRI. Draft IND, prepared by Themis, has been reviewed by respective Divisions of CDRI and comments forwarded to Themis for preparation of final IND application. Response from Themis Medicare Ltd. Mumbai is awaited.

6.5.4. CDRI compound 97/78 (Anti-malarial agent)

Single dose Pharmacokinetic Study in healthy volunteers as per revised protocol approved by DCG(I) was completed at PGIMER, Chandigarh. A total of 16 volunteers completed the trial. The blood samples were analysed in the Pharmacokinetics & Metabolism Division and the final report on single dose pharmacokinetic study submitted to IPCA, Mumbai.

6.5.5 CDRI compound 99/411 (Anti-malarial agent)

The preclinical data is under compilation for IND submission in collaboration with IPCA, Mumbai.

6.5.6 CDR134D123 (Anti-diabetic compound)

The Clinical trial data of CDR134D123 compiled and submitted to AYUSH and has been referred to Extra Ayurvedic Pharmacopia Committee for inclusion. The Committee in May 2011 requested for a Quality Monograph to be prepared as per Ayurvedic Pharmacopia of India specifications including TLC and HPLC Fingerprinting using Phyto-chemical Reference Standards (PRS). The Quality Monograph. The Quality Monograph of the Plant *Xylocarpus granatum* was prepared as per Ayurvedic Pharmacopia of India specifications including TLC and HPLC Fingerprinting using Phyto-chemical Reference Standards (PRS) and submitted to DGCCRAS. Subsequently as per the DGCCRAS requirements an Additional Quality Monograph of the plant *Xylocarpus granatum* and detailed Quality Monograph on the Epicarp of the plant *Xylocarpus granatum* was again compiled and submitted incorporating all freshly generated data of Epicarp. The matter is awaiting DGCCRAS clearance for inclusion in the Extra Ayurvedic Pharmacopia.

6.5.7 CDR 134-F194 (Anti-hyperglycaemic agent)

The Permission for Phase-I Clinical Trial studies of CDR134 F194 was accorded by Drugs Controller General of India on 18th May, 2011. The efforts are on to get the formulation prepared by the Certified GMP Pharmaceutical Company for Phase-I Single Dose and Multiple Dose Clinical trial. The trials are likely to commence soon.

6.5.8 Effect of sulphadoxin–pyrimethmine co-administration on pharmacokinetics of α-β Arteether, an anti malarial agent, in healthy male volunteers

Study is ongoing. Recruitment of volunteers completed (19 volunteers recruited in the trial). Report on clinical parameters prepared and bioanalysis is in progress.

Notes

Technical Services & Facilities


वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद, भारत
CSIR INDIA

Technical Services & Facilities

1 Business Development

The institute continued to explore the business development opportunities for new leads by collaborating with industries, academia, government organizations, funding agencies and foreign bodies in order to have more public-private partnership at an early stage of the development. The major new contract/assignment signed/undertaken by the CSIR-CDRI during reporting period is as follows:

	Title	Institute / Industry	Signing Date
License Agreement			
1.	A rapid bone fracture healing anabolic agent	Kemxtree LLC, USA	28.09.2012
Memorandum of Understanding for joint R&D			
1.	Significance of promoter polymorphism of interleukin-6, interleukin-8, interleukin-10 and interleukin-18 gene and their circulating levels in risk of ovarian carcinoma in Indian population	C.S.M. Medical University, Lucknow	16.01.2012
2.	To work on chemical fingerprinting of rare Piper and other species	Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Palode, Thiruvanthapuram	16.02.2012
3.	Screening of anti-filarial activity of compounds	Banaras Hindu University, Varanasi	23.02.2012
4.	Identification of urinary biomarkers for diagnosis, prognosis and follow up of patients with SLE nephritis	SGPGI, Lucknow; JIPMER, Pondicherry; NIMS, Hyderabad	23.02.2012
5.	Identification and characterization of uterine-specific blood biomarkers for monitoring uterine receptivity	CSIR-CDRI and C.S.M. Medical University, Lucknow	09.04.2012
6.	Nitrous oxide and Cu toxicity	SGPGI, Lucknow	21.05.2012
7.	Development of lymphatic targeted nanoparticulate drug delivery system as novel anti-wolbachial combination chemotherapy for the treatment of lymphatic filariasis	Jamia Hamdard, New Delhi	25.07.2012
8.	Exploration of methylene tetrahydro folate reductase (MTHFR) gene polymorphism as a marker in children afflicted with cerebral palsy in India	Nelson Hospital , Lucknow	31.07.2012
9.	Genomic study of leukemic cancer patients in India and prevention by plant products	Mahavir Cancer Sansthan & Research Centre, Patna	25.08.2012
10.	Evaluation of CSIR-CDRI lead compounds for their role in samples from leukemia patients	C.S.M. Medical University, Lucknow	31.08.2012
11.	Creating an enabling framework for technological interventions in MSME clusters	Alathur Pharmaceutical Manufacturers Association, Alathur, Kancheepuram	11.10.2012
12.	*In vitro* cytotoxicity evaluation of anti-cancer activity of new natural molecules	C.S.M. Medical University, Lucknow	21.11.2012
13.	To explore avenues for possible collaboration between CSIR-CDRI and ICT	Institute of Chemical Technology, Mumbai	24.11.2012
14	Association of single nucleotide polymorphisms in SERPINE I gene in patients with chronic periodontitis	Babu Banarasi Das College of Dental Sciences, Lucknow	30.11.2012
Memorandum of Agreement			
1.	Regulation of pancreastatin: A novel approach to control diabetes	DBT, New Delhi	29.06.2012
Evaluation Agreement			
1.	A preliminary evaluation of the potential efficacy and market potential of formulations containing the compounds for use in the field of crop protection, seed treatment, horticulture and forestry, turf and/or ornamentals	Syngenta Crop Protection AG, Switzerland	08.10.2012
Secrecy Agreement			
1.	CSIR-CDRI compound 99-373 and Centchroman against breast cancer	Medanta Duke Research Institute, Gurgaon, Haryana	12.03.2012
2.	Synthetic compound S002-333 and S007-867 (Antithrombotic agents)	Alkem Laboratories Limited, Mumbai	26.04.2012
3.	Synthetic oral rapid fracture healing agent S007-1500 (Pteroheal)	Alkem Laboratories Limited, Mumbai	16.05.2012

4.	A phyto extract from plant A-4744/F004 which has shown osteoprotective activity by non-estrogenic osteogenic mode	ITC Limited, Kolkata	11.09.2012
Material Transfer Agreement			
1.	MDCK-MDRI cell line	Laboratory of Cell Biology, National Cancer Institute, USA	30.01.2012
2.	Purified Rv3868 protein samples	Stichting Het Nederlands Kanker Plesmanlaan, Amsterdam, Netherlands	02.02.2012
3.	MLO-Y4 osteocytic cell lines	University of Texas Health Science Center, San Antonio, USA	15.02.2012
4.	13018: pcDNA3-TLR4-YFP; 13643: pcDNA3-TLR10-YFP; 12243 : PLOX-gfp-iresTK; 31208 : pLenti6/V5-DEST-HMGBI; 1774 : PBaBe-neo-hTERT; 14753 : HA GSK3 beta wt pcDNA3; 14754 : HA GSK3 beta S9A pcDNA3	Addgene ,USA	10.04.2012
5.	17413: pENTR1A-FKBP12DD C-term (w350-2); 17415:pENTR4-FKBP12DD N-term B (w385-4)	Addgene ,USA	11.04.2012
6.	pLX304	Addgene ,USA	29.06.2012
7.	Four (4) male and four female Chromogranin A conditional KO mice and sixteen (16) control mice	University of California, San Diego, USA	12.07.2012
8.	Plasmids pET303-hpold1 and pCOLA-hpold234	The University of Washington, Seattle, Washington, USA	12.07.2012
9.	Plasmid 13331: pBMM42; Plasmid 13332: pDR119	Addgene, USA	12.07.2012
10.	Pig kidney cells (LLC-PK1) expressing human P-glycoprotein	RIKEN BRC, Japan	09.08.2012
11.	P2NIL, pGOAL17, pGOAL19, pMN234, pMN252, pML597 and pCHARGE3	Addgene, USA	08.11.2012
12.	psPAX2, pMD2.G, Scramble shRNA, pLOX-CW-CRE, pLVTHM, pLKO.1-TRC, pLVUT-tTR-KRAB, pcDNA3.2/v5-DEST hGlut4, pSM1-1-1	Addgene, USA	08.11.2012
13.	GFP-p53, HA Ubiquitin	Addgene, USA	29.11.2012
14.	1884: Cdk2-HA; 1888: Cdc2-HA	Addgene, USA	05.12.2012
15.	*Mycobacterial tuberculosis* H37Rv and single drug resistant strains	ATCC, USA	14.01.2013

2. S&T Management Activities

The Division of S&T Management was involved in multifarious activities viz.:

PME Activities

- Preparation of 12th Five Year Plan Projects;
- Planning, monitoring and reporting of budget for in-house, network and external projects;
- Organised quarterly/six monthly/annual project monitoring meetings for network and in-house project areas;
- Centralised Management of all kind of project folders;
- Processing of indents and its display every month on CDRI's Intranet;
- ERPS;
- Preparation of Monthly Reports.

IPR Management

- Protection of innovations;
- Coordination for filing and grant of Indian and foreign applications/patents;
- Recommendations for renewal of patents/ commercialization status;
- Maintenance of information on IP system/surveillance;
- Respond to queries on IP related issues
- Conduct IPR courses at NIPER-Rae Bareli, JNU-CI & AcSIR.

HR Activities

- Processing of Project Fellows application and their joining to various labs
- Processing of staff nominations for honours & awards, fellowships and training programs;
- Processing of requests of staff and research fellows for participation in various fora
- Coordinate visits
- Organizes programmes
- CSIR-70

Institutional Publications

- CSIR-CDRI Annual Report 2011-12;
- CSIR-CDRI Newsletters (two issues).
- CSIR-CDRI Monthly Reports
- CSIR-CDRI Advertisements
- CSIR@70 celbrations brocheures & posters
- Inputs for CSIR News and CSIR Annual Report

ISTAG

- Coordination of Institute scientists' deputation abroad under different programs;
- Coordination of distinguished foreign visitors to CDRI.
- Intl. fellowships OSDD Projects Management.

Database Management

- CDRI chemical library, synthetic compounds and natural products, Biological activity screening;
- Projects, patents, staff, research fellows, budget, ECF, projects, awards, conferences/symposia/seminar/ workshops etc.

Dissemination of Technical Information

- Technical and non-technical information on institute's programs and activities;
- Responding to parliament queries;
- Respond to queries from various corners (Govt./non-Govt. agencies);
- Biological screening services provided to the external users.

RTI

- Respond to queries on scientific and technical matters.

3. Sophisticated Analytical Instrument Facility

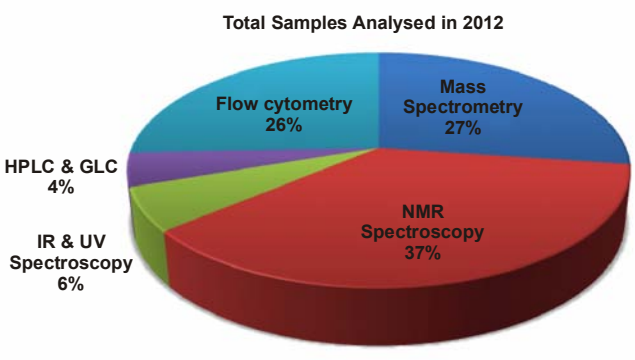
Objective of the facility /services

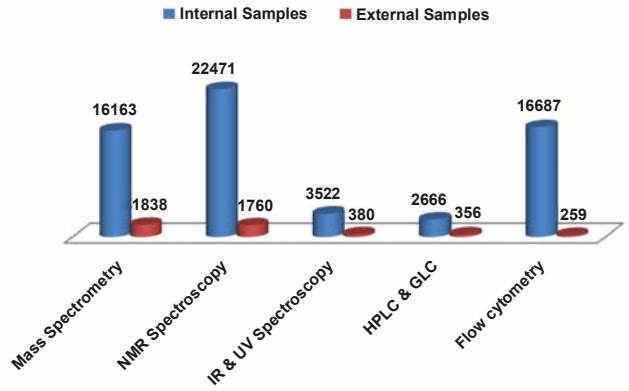
Sophisticated Analytical Instrument facility at CSIR-Central Drug Research Institute, Lucknow is more than 30 years old and is one of the first four such facilities set up by the Department of Science & Technology (DST), Government of India with following objectives.

- Provide facilities of sophisticated analytical instruments to scientists and other users from academic institutes, R&D laboratories and industries to enable them to carry out measurements for R&D work;
- Acquire and develop capability for preventive maintenance and repair of sophisticated instruments;
- Organize short term courses/workshops on the use and application of various instruments and analytical techniques;
- Train technicians for maintenance and operation of sophisticated instruments;
- Development of new measurement/analytical techniques: Apart from providing routine analytical techniques/methods of analysis available on the instruments, efforts are made by the SAIF to develop new techniques/methods of analysis to put the instruments to their full use and offer them to the scientists for exploring new dimensions in research in various areas of science and technology.

S&T services provided during reporting period

During the period (Apr, 2011 to Nov 2012) the centre carried out analyses of 4593 external and 61509 internal samples. Users were from University/Colleges, National Labs./Govt. Organizations and industries.





4. Electron Microscopy

Electron microscopy unit is equipped with scanning and transmission electron microscopes and confocal microscope. Analytical services provided during the year of report are as follows:

Instrument	Internal samples	External samples	Total No.
Electron Microscopy	126	47	173
Confocal Microscopy	826	0	826

5. National Laboratory Animal Centre

The National Laboratory Animal Centre at the institute undertakes breeding, propagation and maintenance of various laboratory animal species for scientific usage in biomedical research and drug evaluation programmes. During the period, the centre ensured regular and timely supply of healthy and defined animals to different in-house and sponsored research projects. It also maintained the experimental *rhesus macaques* obtained from government recognized animal supplier. These *macaques* were duly quarantined and tested for any microbial or parasitic infections prior to experimentation. The centre also harbour an eco-friendly run for post experimental rehabilitation of monkeys based on the prescribed guidelines. The animals in this rehabilitation unit were periodically checked for their health and wellbeing and provided enriched food items on regular basis and veterinary aid whenever required. In addition, the centre extended supply of tissue, organ, blood and sera samples of laboratory animals for research purposes. The qualified and experienced staff also completed proper health monitoring of all laboratory animals through microbiological, parasitological, pathological screening, radiological monitoring of monkeys, nutritional monitoring of laboratory animal feed, feed trial studies, production of special research diets like high sucrose, fat and/or cholesterol diets for more precise studies. The animal facility was also involved in HRD programme in laboratory animal science through conducting various training courses including care, breeding and management, health monitoring and quality control, nutritional monitoring, diagnosis and management of laboratory animal diseases.

a) Breeding and maintenance of following laboratory animals (9 species and their >25 strains)

Species & Strains	Status
Mouse	
Swiss	Out-bred
Park's strain (PS)	Out-bred
BALB/C	Inbred
AKR	Inbred
NZB	Inbred
AJ	Inbred
C57BL/6	Inbred
NOD	Inbred
db/db	Inbred
Apo e	Inbred
DBA/1J	Inbred
Rat	
Sprague Dowley (SD)	Out-bred
Druckrey (DR)	Out-bred
Charles Foster (CF)	Out-bred
Wistar	Inbred
SHR	Inbred
F344	Inbred
Hamster	
Golden hamster	Both, Out-bred & In-bred
White hamster (Mutant of Golden Hamster)	Inbred
Golden hamster	Inbred
Gerbil	
Mongolian strain	Out-bred
Mastomys Rat	
Coucha strain	Out-bred
Guinea Pig	
English albino	Out-bred
Rabbit	
New Zealand White	Out-bred
Belgian	Out-bred
Sheep	
Indian breed	Farm-bred
Monkey	
Rhesus & Langur species	Wild caught

b) Supply of experimental animals for research purposes

A total of 43780 animals were supplied for research studies, out of which 7838 animals costing Rs 24,56,150/- were supplied to CPCSEA registered outside research and academic institutions including pharmaceutical companies. Break-up is as under.

Services Details	Total Numbers
Supply of research animals to CDRI in-house projects	18927
Supply of animals to Extramural projects in CDRI	17023
Supply of animals to CPCSEA registered institution	
Government sector	5041
Private sector	2797
Total	**43780**

C) Other technical services rendered

- Microbiological, haematological and biochemical screening : 1316
- Parasitological screening : 2590
- Nonhuman primates purchased : 15
- Nonhuman primate in rehabilitation : 16
- Tuberculin testing of monkeys performed : 228
- Chest radiography of monkeys undertaken : 54
- Pathological Monitoring including PM cases : 61

6. Tissue & Cell Culture Unit

Major objective of the unit is development & upkeep of central tissue culture facility including maintenance, propagation, cryopreservation & revival of cell lines as listed in the table.

a. List of cell lines under maintenance (Name of cell lines)

- MCF-7 Human Breast Cancer ER +ve
- MDA MB 231 Human Breast Cancer ER -ve
- L 929 Mouse Connective tissue fibroblasts
- HEK 293 Human Embryo Kidney
- H9c2 Rat myoblasts
- Hep G2 Human Liver carcinoma
- Hep 3B Human Liver carcinoma
- 3T3 L1 Mouse Embryo fibroblasts
- J774 A.1 Mouse Macrophage
- Vero C 1008 African Green Monkey Kidney fibroblasts
- C 6 Rat Glioma
- L 6 Rat Muscle
- SHSY 5Y Human Neuroblastoma
- hGF Human Gingival fibroblast- Primary culture
- Neuro-2A Mouse Neuroblastoma

b. New Cell lines added to the repository : BV-2 Mouse Microglial Cell Line. During the reporting period, T-25 Cell Culture Flasks numbering 98 of various cell lines were made available to the user scientists including outside user e.g. Eastern Medikit Ltd., Gurgaon, Haryana also on payment basis.

7. S&T Knowledge Resource Centre

The S&T Knowledge Resource Centre (KRC) has been established with an objective to provide biomedical information services for the scientists in the era of information boom. The centre also caters to the need of the pharmaceutical industry, entrepenures, and researchers involved in biomedical research. The center is computerized and conforms to the norms of e-governance.

KRC continued to provide information services to its users and a total of about 1000 outside users (Students of M. Pharm, Biotechnology, Biomedical Sciences) utilized these services during the year. Its present collection comprises of 22700 books and 76100 bound volumes of journals. Centre also provides access to various e journals, open source resources and bibliographic databases viz- Scifinder, Web of Science, R&D Insight etc. The centre also manages, maintains and updates the institute website and institutional repository. The centre published a monthly periodical 'Drugs & Pharmaceuticals Industry Highlights'.

In addition centre provides services to the scientists of institute and other scientific organizations in photography, power point presentations, exhibitions, display panels, posters, designing of covers and layouts for institutional publications.

8. Biometry & Statistics

The division has an objective of assisting the scientists in planning and designing of experiments, analysing data and drawing inferences. It also has the responsibility of Biostatistics teaching to research fellows Biostatisitics cource was also taught to M.Pharma students at NIPER, RaeBareli and AcSIR Ph.D. students as part of

compulsory course at CSIR-CDRI. During the year, laboratory data obtained from various R&D divisions were analysed within stipulated time using SYSTAT 12.0 and STATISTICA 7.0 software. Project fellow was trained for system modeling of insulin models.

9. Information Technology Services

Computer Division provided following services during the reporting period:

- Creation of Repository Database for CSIR-CDRI candidate drugs.
- Implemented and maintained through MoES database application software for online transaction.
- Setting up of a state-of-art LAN/WAN infrastructure for the New CSIR-CDRI Campus, Sitapur Road, Lucknow.
- Projects leveraging NKN (National Knowledge Network) infrastructure and services.
- Comprehensive ERP implementation and maintenance.
- Designing complete layout on internet cabling system using fiber optic and UTP cables.
- Implemented antivirus software and firewall to avoid any virus threat to our Network.
- Development of R&D databases and portals.
- Implementation and maintenance of GLP Computers.
- Complete video-conferencing and audio-visual coverage in different national and international seminars, conferences and workshops.
- In-house maintenance of Online Stores & Purchase Software.
- Following new software applications developed:
  a. Online Application for Ph.D. registration (For Academic Affairs Unit).
  b. SAIF Web Application (For online management of SAIF division work).
  c. Online Survey application for CSIR-CDRI employees.
  d. Online slot reservation application for UID generation (For CSIR-CDRI Staff Club).
  e. Online Student Management System (For Academic Affairs Unit, CSIR-CDRI)
  f. Online Scheduler for CSIR-CDRI RC-Meeting

10. Instrumentation

Instrumentation Division continued to provide efficient, economical and effective, repair, maintenance, upkeep of sophisticated analytical, biomedical, electronics and laboratory equipments. Division maintained uninterrupted power supplies. In case of non-availability of imported components, alternate indigenous substitutes were installed to ensure the smooth functioning of equipments. Specifications and technical evaluations were prepared for the procurement of state of the art new equipments.

Certified standards for weight, temperature, time, volume, pH and rpm were maintained. Laboratory equipments of different divisions of Institute were calibrated as per GLP guidelines.

11. Academic Affairs

The unit serves as a centre for the management of research students (PAs/JRFs/SRFs/RAs) working in different divisions of the institute. The activities carried out during the period include:

- Completion of pre-Ph.D. course work (Ist and IInd semester) for AcSIR/JNU students (~100) for the session Jan 2012.
- Guidelines were prepared for carrying out academic activities in the institute.
- Coordinated centralized admission of JRFs/SRFs for registration under AcSIR for Pre-Ph.D program through interview for the batches commencing fall 2012 and spring 2013.
- Coordinated centralized admission of junior research fellows under JNU for Pre-Ph.D program through interview for the batch commencing spring 2013.
- Coordinated centralized admission of GATE-JRFs for the session commencing July 2013.
- Formation of doctoral advisory committee for AcSIR students.
- Formation of comprehensive examination committee (CEC) for AcSIR students.
- Comprehensive exams of 14 AcSIR (Jan 2011 batch) students were held.
- Liaised with AcSIR-HQ for the registration of students working at CSIR-CDRI.
- Liaised with Jawaharlal Nehru University, New Delhi for timely registration, synopsis approval, thesis submission, Ph.D. viva at CSIR-CDRI etc.
- Two meetings of CSIR-CDRI-JNU academic council were organized at CSIR-CDRI and at JNU, New Delhi.
- Coordinated and regularized recruitment of project assistants under externally funded projects by holding interviews on 29th of every month. Online software was designed for the purpose of receiving and screening applications.
- Screening and endorsement of post-doctoral application forms being submitted by Ph.D. students from outside CSIR-CDRI to Indian funding agencies.
- Policy was formulated and implemented for the extension of Ph. D. students completing five years and requiring six months extension with/without stipend.
- Coordinated screening and approval of Ph.D. applications received from CDRI staff.
- Designed and implemented new “Human Resource Management System” software dealing with the online registration of research students (JRFs/SRFs/PAs/RAs) with the help of our Computer division.
- New Pre-PhD course work for Chemical Sciences was drafted in accordance with guideline from AcSIR.
- A policy for internal transfer of JRFs was formulated and implemented.
- Nomination of students for MM Dhar memorial award/Elily award/PM Fellowship 2012-2013.

12. Laboratory Engineering Services

The Lab Engineering Services division continued to provide Engineering Services to the Institute to maintain the Infrastructure for R&D work. The major works carried out during reporting period are as follows:

- Progress monitoring & co-ordination of the New CDRI campus being setup at Sitapur Road, Lucknow.
- Facilitate the shifting process to New CDRI campus.

Notes

Research Output


वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद, भारत
CSIR INDIA

1 Publications

2011

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14. Singh DN, Verma N and Kulshreshtha DK. Sulfur containing Bis-Iridoid Glucoside from *Saprosma Fragrans*. **Indian Journal of Heterocyclic Chemistry 21(1)**, **5-8**

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282. Upadhyay HC, Dwivedi GR, Darokar MP, Chaturvedi V, Srivastava SK. Bioenhancing and antimycobacterial agents from *Ammannia multiflora*. **Planta Medica 78(1)**, **79-81**

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284. Varshney K, Gupta S, Rahuja N, Rawat AK, Singh N, Tamarkar AK, Srivastava AK and Saxena AK. Synthesis, structure-activity relationship and docking studies of substituted Aryl thiazolyl phenylsulfonamides as potential protein tyrosine phosphatase 1B inhibitors. **Chem Med Chem. 7(7), 1185-90**

285. Verma AK, Singh H, Satyanarayana M, Srivastava SP, Tiwari P, Singh AB, Dwivedi AK, Singh SK, Srivastava M, Nath C, Raghubir R, Srivastava AK and PR. Flavone-based novel antidiabetic and antidyslipidemic agents. **Journal of Medicinal Chemistry 55(10)**, **4551-4567**

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287. Verma RK, Mukker JK, Singh RSP, Kumar K, Verma PRP and Misra A. Partial biodistribution and pharmacokinetics of isoniazid and rifabutin following pulmonary delivery of inhalable microparticles to rhesus macaques. **Molecular pharmaceutics 9(4)**, **1011-1016**

288. Verma RK, Singh AK, Mohan M, Agrawal AK, Verma PR, Gupta A and Misra A. Inhalable microparticles containing nitric oxide donors: Saying NO to intracellular *Mycobacterium tuberculosis*. **Molecular Pharmaceutics 9(11)**, **3183-89**

289. Wahajuddin and Arora S. Superparamagnetic iron oxide nanoparticles: Magnetic nanoplatforms as drug carriers. **International Journal of Nanomedicine 7, 3445-3471**

290. Wahajuddin, Singh SP and Jain GK. Gender differences in pharmacokinetics of lumefantrine and its metabolite desbutyl-lumefantrine in rats. **Biopharmaceutics and Drug Disposition 33(4)**, **229-234**

291. Wahajuddin, Singh SP, Raju KS, Nafis A and Jain GK. Simultaneous determination of nine model compounds in permeability samples using RP-HPLC: Application to prove the cassette administration principle in single pass intestinal perfusion sudy in rats. **J Pharm Biomed Anal 67(68)**, **71-6**

Monograph

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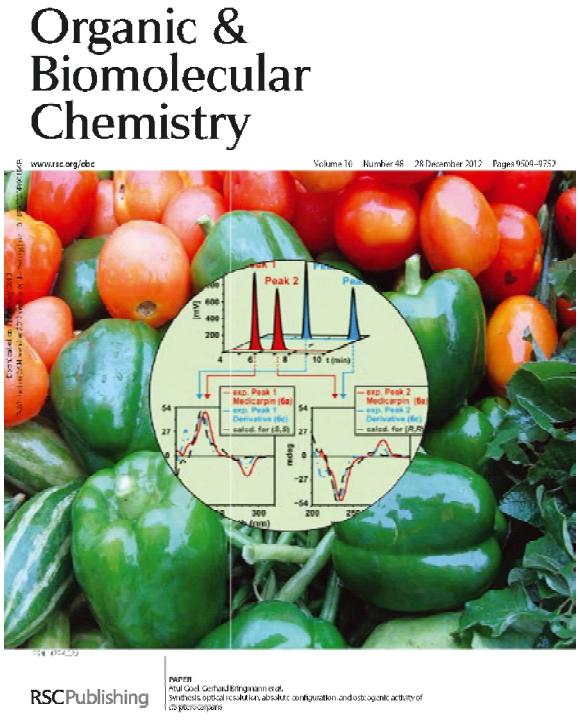


2 Patents

Patents Granted Abroad

2012

1. **Title**: A novel use of herbal extracts of *Salicornia* species active against tuberculosis and process for the preparation thereof
South African Patent No. 2006/02576 **Date of Grant:** 30.05.2012
Inventors: Meena Rajnikanth Rathod, Bhupendra Dhanvantrai Shethia, Jayant Batukrai Pandya, Pushpito Kumar Ghosh, Prakash Jagjivanbhai Dodia, Brahm Shanker Srivastava, Ranjana Srivastava, Anil Srivastava, Chittar Mal Gupta & Vinita Chaturvedi

2. **Title**: Pharmaceutical composition useful as acetycholinesterase inhibitors
US Patent No. 8188143 **Date of Grant:** 29.05.2012
Inventors: Janaswamy Madhusudana Rao, Bhimapaka Chinaraju, Pullela Venkata Srinivas, Katragadda Suresh Babu, Jhillu Singh Yadav, Kondapuram Vijaya Raghavan, Hemant Kumar Singh & Chandiswar Nath

3. **Title**: Novel donor-acceptor flurene scaffolds: A process and uses thereof
Korean Patent No. 1006060 **Date of Grant:** 09.05.2012
Inventors: Atul Goel, Sumit Chaurasia, Vijay Kumar, Sundar Manoharan & Raghubir Singh Anand

4. **Title**: Oxy substituted flavones/chalcones as antihyperglycemic and antidyslipidemic agents
Japanese Patent No. 4640141 **Date of Grant:** 02.03.2012
Inventors: Ram Pratap, Mavurapu Satyanarayana, Chandishwar Nath, Ram Raghubir, Anju Puri, Ramesh Chander, Priti Tiwari & Brajendra K. Tripathi
Supporting Staff: Ashok Kumar Khanna

2010-11 (Not included in earlier Annual Reports)

5. **Title**: Herbal medicaments for treatment of neurocerebrovascular disorders
Canadian Patent No. 2473874 **Date of Grant:** 22.11.2011
Inventors: Madhur Ray, Raghwendra Pal, Satyawan Singh & Nandoo Mal Khanna
Supporting Staff: Jharna Arun & Madhuri Chaudhari

6. **Title**: A process for heterologous expression and large scale production of functionally active enzyme trypanothione reductase of *Leishmania donovani* in prokaryotic system
Maxican Patent No. 292322 **Date of Grant:** 17.11.2011
Inventors: Neena Goyal & Mukul Kumar Mittal

7. **Title**: Substituted 1,2,4-trioxanes useful as antimalarial agents and a process for the preparation thereof
Vietnam Patent No. 9483 **Date of Grant:** 27.09.2011
Inventors: Chandan Singh, Pallvi Tiwari & Sunil Kumar Puri
Supporting Staff: Shashi Rastogi & Akhilesh Kumar Srivastava

8. **Title**: Herbal extracts of *Salicornia* species, process of preparation thereof, use thereof against tuberculosis
African Patent No. AP2250 **Date of Grant:** 29.07.2011
Inventors: Meena Rajnikanth Rathod, Bhupendra Dhanvantrai Shethia, Jayant Batukrai Pandya, Pushpito Kumar Ghosh, Prakash Jagjivanbhai Dodia, Brahm Shanker Srivastava, Ranjana Srivastava, Anil Srivastava, Chittar Mal Gupta & Vinita Chaturvedi

9. **Title**: Mercapto-phenyl-naphthyl-methane derivatives and preparation thereof
German Patent No. 1692101 **Date of Grant:** 06.07.2011
Inventors: Sangita, Atul Kumar, Man Mohan Singh, Girish Kumar Jain, Puvvada Sri Ramanchandra Murthy & Suprabhat Ray
Supporting Staff: Vasi Ahmad, A.H. Ansari, Mohini Chhabra & Govind Keshri

10. **Title**: Mercapto-phenyl-naphthyl-methane derivatives and preparation thereof
French Patent No. 1692101 **Date of Grant:** 06.07.2011
Inventors: Sangita, Atul Kumar, Man Mohan Singh, Girish Kumar Jain, Puvvada Sri Ramanchandra Murthy & Suprabhat Ray
Supporting Staff: Vasi Ahmad, A.H. Ansari, Mohini Chhabra & Govind Keshri

11. **Title**: Mercapto-phenyl-naphthyl-methane derivatives and preparation thereof
European Patent No. 1692101 **Date of Grant:** 06.07.2011
Inventors: Sangita, Atul Kumar, Man Mohan Singh, Girish Kumar Jain, Puvvada Sri Ramanchandra Murthy & Suprabhat Ray
Supporting Staff: Vasi Ahmad, A.H. Ansari, Mohini Chhabra & Govind Keshri

12. **Title**: Mercapto-phenyl-naphthyl-methane derivatives and preparation thereof
British Patent No. 1692101 **Date of Grant:** 06.07.2011
Inventors: Sangita, Atul Kumar, Man Mohan Singh, Girish Kumar Jain, Puvvada Sri Ramanchandra Murthy & Suprabhat Ray
Supporting Staff: Vasi Ahmad, A.H. Ansari, Mohini Chhabra & Govind Keshri

13. **Title**: Herbal medicaments for treatment of neurocerebrovascular disorders
Estonian Patent No. 05374 **Date of Grant:** 15.02.2011
Inventors: Madhur Ray, Raghwendra Pal, Satyawan Singh & Nandoo Mal Khanna
Supporting Staff: Jharna Arun & Madhuri Chaudhari

14. **Title**: Substituted 1,2,4-trioxanes useful as antimalarial agents and a process for the preparation thereof
Mexican Patent No. 278119 **Date of Grant:** 13.08.2010
Inventors: Chandan Singh, Pallvi Tiwari & Sunil Kumar Puri
Supporting Staff: Shashi Rastogi & Akhilesh Kumar Srivastava

15. **Title**: Herbal medicaments for treatment of neurocerebrovascular disorders
Indonesian Patent No. 0026228 **Date of Grant:** 23.07.2010
Inventors: Madhur Ray, Raghwendra Pal, Satyawan Singh & Nandoo Mal Khanna
Supporting Staff: Jharna Arun & Madhuri Chaudhari

16. **Title**: Herbal medicaments for treatment of neurocerebrovascular disorders
Sri Lankan Patent No. 13379 **Date of Grant:** 03.06.2010
Inventors: Madhur Ray, Raghwendra Pal, Satyawan Singh & Nandoo Mal Khanna
Supporting Staff: Jharna Arun & Madhuri Chaudhari

Patents Granted in India

2012

1 **Title**: Herbal 5-[2-(2,6,6-trimethyl-cyclohex-2-enyl)-ethenyl]-isoxaazole
Patent No. 254367 **Date of Grant:** 29.10.2012
Inventors: Shivaji Narayanrao Suryawanshi, Suman Gupta, Ramesh & Naveen Chandra
Supporting Staff: Manju & Shiveram

2. **Title**: Novel glycosyl-d-fructoses as antihyperlipidemic agents
Patent No. 253810 **Date of Grant**: 27.08.2012
Inventors: Anup Kumar Misra, Pallavi Tiwari, Anju Puri, Ramesh Chander & Geetika Bhatia

3. **Title**: A process for the preparation of novel 1-[(4- diphenylmetyl)-piperazin-1-yl]-3-aryloxypropan-2-ol
Patent No. 253738 **Date of Grant**: 22.08.2012
Inventors: Kalpana Bhandari & Ram Raghubir
Supporting Staff: Anoop Kumar Srivastava & Tarun Lata Seth

4. **Title**: Novel ester derivatives of dihydroartemisinin
Patent No. 253045 **Date of Grant**: 20.06.2012
Inventors: Chandan Singh, Sandeep Chaudhary & Sunil Kumar Puri
Supporting Staff: Shashi Rastogi, Akhilesh Kumar Srivastava & Kamlesh Kumar Singh

5. **Title**: Oxy substituted chalcones as antihyperglycemic and antidyslipidemic agents
Patent No. 252167 **Date of Grant**: 30.04.2012
Inventors: Ram Pratap, Mavurapu Satyanarayana, Chandishwar Nath, Ram Raghubir, Anju Puri, Ramesh Chander, Priti Tiwari, Brajendra Kumar Tripathi & Arvind Kumar Srivastava

Patents Filed Abroad

2012

1 **Title**: n-(3-((diethylamino) methyl)-4-hydroxyphenyl)-n-(quinolin-4-yl) sulfonamide derivatives for the treatment of tuberculosis
PCT Application No. PCT/IN2013/000006 **Date of Filing**: 03.01.2013
Inventors: Supriya Singh, Kuldeep Kumar Roy, Saheb Raj Khan, Vivek Kumar Kashyap, Sandeep Kumar Sharma, Manju Yasoda Krishnan, Vinita Chaturvedi, Sudhir Sinha, Ranjana Srivastava & Anil Kumar Saxena

2 **Title**: Pharmaceutical compositions useful as acetycholinesterase inhibitors
US Application No. 13/460472 **Date of Filing**: 30.04.2012
Inventors: Janaswamy Madhusudana Rao, Bhimapaka Chinaraju, Pullela Venkata Srinivas, Katragadda Suresh Babu, Jhillu Singh Yadav, Kondapuram Vijaya Raghavan, Hemant Kumar Singh & Chandiswar Nath

3 **Title**: *Dalbergia sissoo* derived extract and compounds for the prevention of osteo-health related disorders designated as 'Osteonaturalcare'
PCT Application No. PCT/IN2012/000301 **Date of Filing**: 25.04.2012
Inventors: Rakesh Maurya, Preety Dixit, Ritu Trivedi, Vikram Khedgikar, Jyoti Gautam, Avinash Kumar, Divya Singh, Sheelendra Pratap Singh, Wahajuddin, Girish Kumar Jain & Naibedya Chattopadhyay
Supporting Staff: Satish Chandra Tiwari, Bendangla Chagkija, Priyanka Kushwaha

4 **Title**: Substituted 4-arylthiazol-2-hydrazones for the treatment of tuberculosis
PCT Application No. PCT/IN2012/000145 **Date of Filing**: 01.03.2012
Inventors: Supriya Singh, Kuldeep Kumar Roy, Sandeep Kumar Sharma, Ranjana Srivastava, Vinita Chaturvedi & Anil Kumar Saxena
Supporting Staff: Zahid Ali & Arimardan Singh Kushwaha

5 **Title**: Substituted 1, 2, 3, 4-tetrahydroquinolin-7-yl carbamates, their preparation, and use thereof as acetylcholinesterase (AChE) inhibitors for the treatment of Alzheimer's and other neurodegenerative disease
PCT Application No. PCT/IN2012/000053 **Date of Filing**: 24.01.2012
Inventors: Kuldeep Kumar Roy, Santosh Kumar Tota, Chandishwar Nath, Rakesh Shukla & Anil Kumar Saxena

6 **Title**: Novel dolastatin mimics as anticancer agents
PCT Application No. PCT/IN2012/000051 **Date of Filing**: 23.01.2012
Inventors: Tushar Kanti Chakraborty, Gajula Praveen Kumar, Dulal Panda & Jayant Asthana

7 **Title**: Chiral 3-aminomethylpiperidine derivative as inhibitors of collagen induced platelet activation and adhesion
PCT Application No. PCT/IN2012/000032 **Date of Filing**: 12.01.2012
Inventors: Dinesh Kumar Dikshit, Madhu Dikshit, Tanveer Irshad Siddiqui, Anil Kumar, Rabi Sankar Bhatta, Girish Kumar Jain, Manoj Kumar Barthwal, Ankita Misra, Vivek Khanna, Prem Prakash, Manish Jain, Vishal Singh, Varsha Gupta & Anil Kumar Dwivedy

2010 (Not included in the earlier Annual Report)

1. **Title**: Novel coumarin-chalcone hybrids as anti-cancer agents
PCT Application No. PCT/IN2011/000515 **Date of Filing**: 05.08.2010
Inventors: Koneni Venkata Sashidhara, Abdhesh Kumar, Manoj Kumar, Jayanta Sarkar & Sudhir Kumar Sinha

Patents Filed in India

1. **Title**: N-(3-((Diethylamino methyl)-4-hydroxyphenyl)-N-(quinolin-4-yl) sulfonamide derivatives for the treatment of tuberculosis
Patent App. No. 0014DEL2012 **Date of Filing**: 03.01.2012
Inventors: Supriya Singh, Kuldeep Kumar Roy, Saheb Raj Khan, Vivek Kumar Kashyap, Sandeep Kumar Sharma, Manju Yasoda Krishnan, Vinita Chaturvedi, Sudhir Sinha, Ranjana Srivastava & Anil Kumar Saxena

2. **Title**: Novel substituted 2h-benzo[e]indazole-9-carboxylates for the treatment of diabetes and related metabolic disorders
Patent App. No. 0262DEL2012 **Date of Filing**: 31.01.2012
Inventors: Atul Goel, Gaurav Taneja, Neha Rahuja, Arun Kumar Rawat, Natasha Jaiswal, Akhilesh Kumar Tamrakar & Arvind Kumar Srivastava

3. **Title** : Preparation and antimalarial activity of novel quinoline derivatives
Patent App. No: 0263DEL2012 **Date of Filing**: 31.01.2012
Inventors : Seturam Bandhacharya Katti, Wahajul Haq, Kumkum Srivastava, Sunil Kumar Puri, Manish Sinha, Awakash Soni & Rajeev Kumar Srivastava
Supporting staff: Kamlesh Kumar Singh

4. **Title**: NEF-ASKI interaction inhibitor as novel anti HIV therapeutics
Patent App. No. 0594DEL 2012 **Date of Filing**: 02.03.2012
Inventors: Raj Kamal Tripathi, Balwant Kumar, Ravishankar Ramachandran, Jitendra Kumar Tripathi, Smrati Bhadauria & Jimut Kanti Ghosh

5. **Title**: Short antimicrobial peptides with high therapeutic value and antileishmania activity
Patent App. No. 1312DEL2012 **Date of Filing**: 30.04.2012
Inventors: Jimut Kanti Ghosh, Sarfuddin, Praveen Kumar Shukla, Nirpendra Nath Mishra, Sandhya Rani Dungdung, Aparna Gomes, Syamal Roy, Prasanta Ghosh & Shamik Bhattacharya

6. **Title**: Isoxazole containing heteroretinoid schiff bases and process for preparation thereof
Patent App. No. 2848DEL2012 **Date of Filing**: 12.09.2012
Inventors: Shivaji Narayan Suryawanshi, Suman Gupta, Santosh Kumar, Rahul Shivhare & Shagun Shankar

7. **Title**: Improved process for preparation of cyclic peptides
Patent App. No. 0020DEL2013 **Date of Filing**: 03.01.2013
Inventors: Wahajul Haq, Shyam Raj Yadav, Raghavendra Murugula, Madhu Dikshit & Smriti

3 Papers Presented in Scientific Conventions

2011

Challenges in Drug Discovery and Development (CDDD), CDRI, Lucknow (9-10 December)

1. *In vitro* antileishmanial activity of synthetic tetrazole tethered β-carbolines, Suman Gupta, Rahul Shivahare, Shahnawaz Khan, Vikas Tyagi and Prem M. S. Chauhan.

2012

IBS-2012, Chennai (19 - 21 January)

2. Dynamics study of LdCof and TgADF and its comparison, Anupam Jain, Vaibhav K. Shukla, Sarita Tripathi, Ashok kumar, Rahul Yadav, Prem Prakash Pathak and Ashish Arora.

3. Solution structure and Dynamics of ADF from *Toxoplasma gondii,* Rahul yadav, Vaibhav K. Shukla, Sarita Tripathi, Anupam Jain, Prem Prakash Pathak, SVSR Krishna Pulavarti, Simren Mehta, David Sibley and Ashish Arora.

17th International Conference on Expanding Horizons in Chemical and Biological Sciences: Innovations Crossroads, Solapur University, Solapur (21 – 24 January)

4. Copper (I) catalysed coupling of quinoline carboxamide with styryl halide: Synthesis and biological evaluation of perspicamide analogues as antileishmanial agent, Anand Kumar Pandey, Shahnawaz Khan, Kuldeep Chauhan, Rahul Shivahare, Suman Gupta and PMS Chauhan.

5. Designing and Synthesis of β-carboline-quinazoline hybrid molecules as antileishmanial agents, Shikha S. Chauhan, Rahul Shivahare, Suman Gupta and PMS Chauhan.

6. Cyanuric chloride catalyzed mild protocol for synthesis of biologically active dihydro/spiro quinazolinones, and quinazolinone-glycoconjugates, Moni Sharma, Shashi Pandey, Kuldeep Chauhan, Deepty Sharma, Brijesh Kumar and PMS Chauhan.

7. Synthesis and biological evaluation of bistriazine as a potential Antileishmanial agent, Kuldeep Chauhan, Moni Sharma, Anand Kumar Pandey, Rahul Shivhare, Suman Gupta and PMS Chauhan.

8. Organic acid catalyzed synthesis of 2,3-dihydroquinazolin-4(1H)-ones derivatives via MCR, Rashmi Sharma, PMS Chauhan.

International Symposium on Recent Trends in Macromolecular Crystallography, Chennai (23-25 January)

9. Dominance of leucine zipper Motif over mean hydrophobicity in determining cytotoxicity of antimicrobial peptides, Saurabh Srivastava, Brijesh Kumar Pandey, Aqeel Ahmad, Neeta Asthana, Sarfuddin Azmi and Jimut Kanti Ghosh.

18th International Conference (Post ISCBC) Perspective and Challenges in Chemical and Biological Sciences: Innovation Crossroads, Guwahati (28-30 January)

10. Translation initiation factor-1 of *Wolbachia*, the endosymbiont of *Brugia malayi*: Molecular characterization, Jeetendra Kumar Nag, Nidhi Shrivastava, Jyoti Gupta and Shailja-Misra Bhattacharya.

11. Chemo taxonomical studies of *Berberis petiolaris* plant parts using DARTMS and Q-TOF LCMS (HRMS) instruments and their PCA analysis, Awantika Singh, Vikas Bajpai, Mukesh Srivastava, KR Arya and Brijesh Kumar.

Symposium on New Developments in NMR and Conference of the National Magnetic Resonance Society (NMRS-2012), Bangalore (05-08 February)

12. Robust Turn Structures in a3β cyclic Tetrapeptides Induced and Controlled by Carbo β3 Amino Acid, Shrikant Sharma, Anindra Sharma, Rama P. Tripathi and Ravi Sankar Ampapathi.

13. Structural Insights into putative molybdenum cofactor biosynthesis protein C Moac2 from M. tuberculosis H37Rv, Vijay Kumar Srivastava, Shubhra Srivastava, Ashish Arora and J V Pratap.

14. NMR Assignment of UNC-60A: Divergence with conventional ADF/cofilin family, Vaibhav K. Shukla, Rahul Yadav, Ashish Kabra, Anupam Jain, Sarita Tripathi, Dinesh Kumar, Shoichiro Ono and Ashish Arora.

International conference on Reproductive Health with Emphasis on Strategies for Family Planning and 22nd Annual Meeting of the Indian Society for the Study of Reproductive and Fertility (ISSRF) "ICMR Centenary Celebration" AIIMS, New Delhi (19- 21 February)

15. Design and synthesis of novel piperazine derivatives as potent antispermatogenic Agents; Santosh Jangir, Veenu Bala, Lalit Kumar, Amit Saraswat, Nandlal, Gopal Gupta, and Vishnu L Sharma.

16. Development of convenient woman controlled contraceptives; Veenu Bala, Santosh Jangir, Vishnu L Sharma and Gopal Gupta.

Molecular Approaches to Malaria (MAM 2012) Lorne, Australia (20-23 February)

17. Translation factors for protein synthesis in *Plasmodium* organelles, Ankit Gupta, Snober S. Mir, Katherine Putnam, Afreen Haider, Suniti Vaish, Subir Biswas, Erin E. Lim, Stuart A. Ralph and Saman Habib.

NANOBIO–2012, Amrita Centre for nanomedicines and molecular medicine, Amrita Institute of Medical Sciences and Research Centre, Kochi, Kerala, India (21-23 February)

18. Formulation and evaluation of centchroman transdermal patches based on ethyl cellulose matrices, Kiran Khandelwal, Shakti Deep Pachauri, Swati Singh, Madhumita Srivarstava, Varsha Gupta and Anil Kumar Dwivedi.

19. Preparation and evaluation of depot injectable microspheres of centchroman, Shakti Deep Pachauri, Kiran Khandelwal, Swati Singh, Varsha Gupta, Anil Kumar Dwivedi and Kalyan Mitra.

National Conference on Omics for Biotechnology, Ajmer, Rajasthan (22-23 February)

20. Recombinant trehalose-6-phosphate Phosphatase of *Brugia malayi* Cross Reacts With The Human Bancroftian Antibodies and engenders a Robust Protective immune Outcome in Balb/c mice, Jyoti Gupta, Susheela Kushwaha, Prashant Kumar Singh, Vishal Kumar Soni and Shailja Misra-Bhattacharya.

21. *Withania somnifera* chemotypes NMITLI 101R, NMITLI 118R, NMITLI 128R and Withaferin A protect *Mastomys coucha* from *Brugia malayi* infection, Vishal Kumar Soni Susheela Kushwaha, Prashant Kumar Singh, Nasreen Bano, Anil Kumar, Rajendra Singh Sangwan, and Shailja-Misra Bhattacharya.

22. *Brugia malayi* infective larvae induce Treg cells to modulate proinflammatory response of rWSP in BALB/c Mouse, Manisha Pathak, Meenakshi Verma, Mrigank Srivastava and Shailja Misra- Bhattacharya.

23. Trehalose-6-phosphate phosphatase of *Brugia malayi* elicits differential protection in presence of different adjuvants against homologous infection, Susheela Kushwaha, Prashant K. Singh, Meenakshi Verma and Shailja Misra Bhattacharya.

24. Validation of *Brugia malayi* independent phosphoglycerate mutase (Bm-iPGM) as vital antifilarial drug target by RNA interference (RNAi), Prashant Kumar Singh, Susheela Kushwaha, Mohd. Shahab and Shailja Misra- Bhattacharya.

25. Immune characterization of UDP-N-acetylglucosamine enolpyruvyl transferase of bacterial endosymbiont *Wolbachia* of human lymphatic filarial parasite *Brugia malayi,* Mohd Shahab, Prashant K. Singh, Susheela Kushwaha and Shailja Misra-Bhattacharya.

4th NIPER (RBL) – CDRI Symposium on Medicinal Chemistry and Pharmaceutical Sciences, CSIR-CDRI, Lucknow (23 – 25 February)

26. Synthesis of dithiocarbamate derivatives containing disulfide linkage via ring opening of cyclic trithiocarbonate with amine under solvent-catalyst free condition, Karthik Nandikonda, Nand Lal, Amit Sarswat and Vishnu L Sharma.

27. Synthesis, optical resolution and osteogenic activity of medicarpin, Govind Tiwari, Ashutosh Raghuvanshi, Amit Kumar, Divya Singh, N Chattopadhyay and Atul Goel.

28. New pyranone-derived donor-acceptor organic fluorescent molecules for biological probes and organic electronics, Ashutosh Sharma, Vijay Kumar and Atul Goel

5th Congress of the Federation of Immunological Societies of Asia Oceania (FIMSA) New Delhi, (14-17 March)

29. Molecular cloning and immunochemical characterization of lactate dehydrogenase of *Plasmodium knowlesi,* V Singh, DC Kaushal, S Rathaur, N Kumar and NA Kaushal.

30. Antibody titers against recombinant 19 Kda fragment of *P. cynomolgi* MSP-1 antigen in vaccinated monkey sera correlate with protection, N A Kaushal, D C Kaushal, V Singh and SK Puri.

31. Inhibition of CC Chemokine receptor 9 prolongs survival in a murine models of acute Graft versus Host Disease, Mrigank Srivastava

International Conference on Advances in Biological Sciences, Kannur University, Kerala (15-17 March)

32. Cloning and characterization of translationally controlled tumour protein homologue of *P. vinckei* -a stress related protein, Anuj Tripathi and S K Puri.

33. Molecular characterization of purine nucleoside phophorylase from *P. vinckei* to elucidate its role in resistance to artemether, Santosh Kumar, Awakash Soni, Kirtika Prakash and S K Puri.

34. Relative efficacy of Neem Oil versus Tamoxifen on MCF-7 Human Breast Cancer Cells, R Sharma, N Singh, H Shyam and Anil K Balapure.

3rd World Congress on Bioavailability & Bioequivalence: Pharmaceutical R & D Summit, Hyderabad (26-28 March)

35. HPLC method development for naringenin and its glycoside in rat serum and their bioavailability studies, Varsha Gupta, Anil Kumar Dwivedi and Rakesh Maurya.

One day seminar on Natural Product and Organic Synthesis (NPOS-2012), Lucknow University, Lucknow (28 March)

36. Synthesis of carboxamide as antitubercular agents and their bioevaluation as PKnG inhibitors, Munna Prasad Gupt, Anindra Sharma and RP Tripathi.

37. Synthesis and bioevaluation of aryl hydroxamates distinghuishing between NAD and ATP dependent DNA ligases, Ajay Arya, V Kushal, M Mishra, T Khanam, R Sharma, D Dube, D Chopra, R Ravishankar and R P Tripathi.

38. Application of click chemistry an efficient synthesis of 1H-1,2,3-triazolylglycohybrids as enzyme inhibitors, Namrata Anand, N Jaiswal, S K Pandey, A K Srivastava and R P Tripathi.

3rd World Congress on Biotechnology, HICC, Hyderabad (13-15 September)

39. Chemotherapy in the treatment of experimental visceral leishmaniasis caused by *Leishmania donovani* using chromenochalcones, Rahul Shivahare, Preeti Vishwakarma, Venkateswarlu Korthikunta, Tanvir Khaliq, Tadigoppula Narender and Suman Gupta.

40. Chemotaxonomy of Tinospora cordifolia male and female type plant/part using HRMS technique their biological activity and identification of markers for gender distinction, Brijesh Kumar, Vikas Bajpai, Mukesh Srivaastva, Nikhil kumar and Shailja Bhattacharya.

5th TCS Meeting and 13th INDO-US Workshop, Kolkata (12-13 October)

41. Chemotherapy adjunct efficacy of *Withania somnifera* chemotype 118R against *Leishmania donovani* infection in golden hamsters, Chandra Dev Pati Tripathi, Shailja Misra-Bhattacharya and Anuradha Dube

VIth National Conference of the Indian Academy of Tropical Parasitology (Tropacon -2012) SAIMS, Indore (12 -14 October)

42. *In vitro* activity of synthetic pentamidine based scaffolds against *Leishmania donovani,* Khushboo Srivastava, Rahul Shivahare, Vikas Tyagi, Shahnawaz Khan, Suman Gupta and P M S Chauhan

XXX Annual meeting of Indian Academy of Neurosciences, Guru Nanak Dev University, Amritsar, Punjab (27-30 October)

43. Involvement of Angiotensin converting enzyme (ACE) in LPS induced memory impairment in rats; Ruby Goel.

44. Insulin modulates neuroinflammation and oxidative stress in Streptozotocin stimulated astroglial cells; Rajasekar N.

45. Antidementic drugs affects nuclear factor erythroid-2related factor (Nrf2) in Streptozotocin induced memory impaired rats, Subhash Dwivedi.

46. 3-phenylcoumarin derivatives as novel antidepressant agent: behavioural and biochemical study; Seema Singh.

4th Indo-Japanese International Symposium on Overcoming Intractable Infectious Diseases, Tokyo, Japan (29-30 October)

47. Individual variations in macrophage responses to infection with *Mycobacterium tuberculosis* and treatment with inhalable microparticles, Amit Kumar Singh, Rajiv Garg and Amit Misra.

81st Annual Meeting of Society of Biological Chemists (India), Science City, Kolkata (8-11 November)

48. Detection and characterization of chitinase in *Setaria cervi*, a bovine filarial parasite, P Dravid, DC Kaushal, NA Kaushal.

39th Annual conference of Indian Immunology Society (Immunocon-2012) Banaras Hindu University, Varanasi (9-11 November)

49. Combination therapy with CpG-ODN 2006 and Miltefosine triggers Th1-cell activation and nitric oxide generation to cure experimental visceral leishmaniasis, Rahul Shivahare, Preeti Vishwakarma, Susanta Kar, Wahajul Haq and Suman Gupta.

50. Cross reactive molecules of filariid *Brugia malayi* inhibit progression of *Leishmania donovani* infection in hamsters through Th1 associated cytokines and nitric oxide release, Richa Verma, Sujith K Joseph, Preeti Viswakarma, Vikas Kushwaha, Suman Gupta and P Kalpana Murthy.

51. Cloning, over-expression, purification of disorganized muscle protein-1 of *Brugia malayi* and its effects on the filarial infection, Vikas Kushwaha, Richa Verma, and P Kalpana Murthy.

52. Antibodies against recombinant *Plasmodium knowlesi* lactate dehydrogenase for malaria diagnosis, V Singh, DC Kaushal, S Rathaur and NA Kaushal.

International Interdisciplinary Science Conference-2012 on 'Protein Folding & Diseases', New Delhi (08-10 December)

53. Analysis of a protein putatively involved in *Plasmodium falciparum* organellar segregation Aiman Tanveer , Stacey M. Allen, Katherine E. Jackson, Stuart A. Ralph and Saman Habib.

54. Biophysical characterization of Guanylate kinase, a NMP kinase in filarial parasite *Brugia malayi*; Smita Gupta, Sunita Yadav and Jitendra K. Saxena.

55. Role of molecular chaperones calreticulin in development and pathogenesis of *Brugia malayi* an intracellular parasite of human, Sunita Yadav, Smita Gupta and Jitendra K. Saxena.

International Conference on Chemistry and Materials: Prospects & Perspectives-2012, Babasaheb Bhimrao Ambedkar University, Lucknow (14-16 December)

56. ICT based fluorescent partially reduced naphthonaphthyridines as tunable and Zn^{2+} selective ON-OFF Chemosensors, Shahida Umar, Pankaj Nag and Atul Goel.

57. Chemiselective synthesis of polyfunctional aminophenyl-2-oxobut-3-enyl- and quinoline-methyl-C-glycopyranosides from nitrophenyl-2-oxobut-3-enyl- C-glycosides under ultrasonic vibration, K K G Ramakrishan, A Arya, A Sharma and R P Tripathi.

58. Synthesis and anti Breast cancer activity of biphenyl based chalcones; Munna Prasad Gupt, A Sharma, B Chakravorti, J A Siddiqui, R Konwar and R P Tripathi.

59. Synthesis and bioevaluation of small libraries of triazolylmethoxy chalcones, flavanones and 2-aminopyrimidines as inhibitors of mycobacterial FAS-II and PKnG, Namrata Anand, P Singh, S Tiwari, V Singh, D K Singh, K K Sriwastava, B N Singh and R P Tripathi.

60. Accesing a small library of pluripotent 1,4,5-trisubstituted 1H-1,2,3 triazoles via diversity oriented synthesis, N Devender, A Arya, M P Gupt and R P Tripathi.

61. Diversity Oriented Synthesis of pyran based polyfunctional stereogenic macrocycles and their conformational studies, Ajay Arya, S Sharma, M P Gupt, V Bajpai, Hamidullah, Brijesh Kumar, M P Kaushik, R Kanwar, A Ravishankar and R P Tripathi

62. Cyclopropyl methanone/methanols: Impressive lead in tuberculosis drug discovery, Chaitanya Katiki, A Ajay and RP Tripathi.

63. A strategy to acess C-C fused triazoloquinoline and related nucleoside analogues, Kapil Upadhyaya, A Ajay, R Mahar, R Pandey, Brijesh Kumar, SK Shukla and RP Tripathi.

4 Inter-Agency Linkages

Title of the Project	Principal Investigator
Ministry of Earth Sciences, Government of India	
National project on development of potential drugs from the ocean	Director
Biological evaluations, discovery of novel bioactive compounds of the MoES Project "Drugs from sea"	Dr. Madhu Dikshit
Design and synthesis of novel dolastatins, azumamides and microsporin A analogs ; a quest for anti cancer drugs	Dr. Dipankar Koley
Department of Health Research, Government of India	
Anti-fertility research program	Director
Drug for Neglected Diseases initiative, Geneva	
Lead identification for anti-leishmanial compounds	Dr. S.K. Puri
World Health Organization, Geneva, Switzerland	
Development of new macrofilaricidal and /or embryostatic agents	Dr. S. Bhattacharya
European Commission, Belgium	
Targeting protein synthesis in the apicoplast and cytoplasm of Plasmodium (MEPHITIS)	Dr. Saman Habib
INDO-SPAIN	
Protein translation in organelles of *plasmodium falciparum*	Dr. Saman Habib
Kemxtree, LLC, USA	
To study pharmacology role & identification of molecular target, reconfirmation of drug action with synthetic K058/QCG made at Kemxtree and validation of biomarkers in support of clinical trials.	Dr. N. Chattopadhyay
Department of Science & Technology, Government of India	
Sophisticated Analytical Instrument Facility (SAIF)	Director
J.C. Bose Fellowship	Dr. T.K. Chakraborty
Electronic structure theory based investigation of conformational behavior and secondary structures of substituted β-proline based peptides" conformational studies and biological evaluation.	Dr. T.K. Chakraborty Dr. R.S. Ampapathi
Identification and characterization of protein(s) from arteether sensitive and arteether resistant rodent malaria parasites for elucidation of mechanism of resistance	Dr. S.K. Puri
Design, synthesis and biological evaluation of SIRT-1 activators for the treatment of type-II diabetes	Dr. Bijoy Kundu
Design and synthesis of flexible model based on Pyrazolo[3,4-d] pyrimidine for better understanding of arene interactions at molecular & supramolecular level	Dr. Kamlakar Awasthi
Chiron approach synthesis of natural products and natural product like molecules from carbohydrate based building blocks	Dr. A.K. Shaw
Characterization of natural antimony resistance related gene(s) of *Leishmania donovani*	Dr. Neena Goyal
Proteomic analysis of drug resistance in *Leishmania donovani* clinical isolates.	Dr. Neeloo Singh
Antimalarial principles from plants belonging to the genus Veronia endemic to the Western ghats	Dr. Kumkum Srivastava
Application of Baylis-Hillman chemistry for the synthesis of natural products and their mimics	Dr. Sanjay Batra

Title of the Project	Principal Investigator
Amino acids as chiral synthons: Development of new synthetic protocols for creating natural products and related diversity in quest for anticancer agent	Dr. Gautam Panda
Design, synthesis and development of novel antileishmanial agents.	Dr. T. Narender
Structural characterization of gamma-glutamylcysteine synthetase and glutathione synthetase from *Leishmania spp*.	Dr. J.V. Pratap
Effect of cancer chemotherapeutic drugs on spermatogonial stem cell niche, chromatin remodeling and epigenetic programming in male germ cells	Dr. D.P. Mishra
Investigation on immunomodulation mediated by *Mycobacterium tuberculosis* during persistent infection	Dr. Y.K. Manju
Expression, intracellular localization and functional characterization of actin related proteins of *Leishmania*.	Dr. A.A. Sahasrabuddhe
Osteogenic actions of a naturally derived NP-1 pure compound on bone	Dr. Divya Singh
To study immunoprotective roles of methoxyisoflavones in estrogen-deficiency induced bone loss	Dr. Divya Singh
Polymeric nano-matrix -associated *in vivo* delivery of Kaempferol in rats for bone anabolic action	Dr. Ritu Trivedi
A systematic RNAi screen for identification of genetic modulators of HIV-NEF induced pathogenesis in a novel *Caenorhabditis elegans* model	Dr. Aamir Nazir
Evaluation of TGF-Beta activation mechanism and signaling during uterine tissue remodeling	Dr. R.K. Jha
Human cytochrome P4501B1 : Implications in centchroman treated harmone mediated MCF-7 tumor cell metabolism as a novel target for therapeutic intervention	Dr. Neetu Singh
Evaluation of weak dipole-dipole interactions in molecular solids by means of experimental charge density studies and computational methods.	Dr.T.S.Thakur
Exploration of potency, efficacy and mode of action of *Ulmus wallichiana* against hypertension.	Dr. J.R. Gayen
Understanding the mechanism of anticarcinogenic effect of alfa-solanine	Dr. Jayanta Sarkar
Novel geneytic and epigenetic targets for breast cancer prevention and thearpy: A mechanistic approach with bioactive dietary supplements.	Dr. S. Musthapa
Pharmacokinetics,metabolic and biopharmaceutics assessment of antimalaarial lumefantrine and its active and more potent metabolite	Dr. Wahajuddin
Isolation and characterization of antifungal peptides from natural sources	Dr. Vineeta Singh
Role of innate immune components in inflammation induced insulin resistance	Dr. A. Tamrakar
Department of Biotechnology, Government of India	
Schizophrenia: Developing animal models, translational markers and a possible treatment strategy	Dr. Gautam Palit
Cloning and overexpression of Th1 stimulatory polyproteins identified through proteomics for their prophylactic potential against experimental visceral lieshmaniasis	Dr. Anuradha Dube
Protective immunogenicity of Centrin KO live attenuated leshmania parasite in the animal models and in the human cells	Dr. Anuradha Dube
Post translational modifications induced by nitroxidative stress as biomarkers of vascular damage in diabetes	Dr. Madhu Dikshit
Design and development of database and analytical tools for microarray data on *Leishmania donovani* parasite	Dr. Neeloo Singh

Title of the Project	Principal Investigator
Crystallographic and biochemical studies on Feast/Famine regulatory proteins from *Mycobacteria*	Dr. Ravishankar R.
Structural analysis of bacterial peptidyl-t RNA hydrolase enzymes and design of high affinity binders.	Dr. Ashish Arora
Generation and characterization of *Mycobacterium smegmatis* sigF mutant and studies on the sigF-mediated gene expression by microarray analysis	Dr. B.N. Singh
Understanding mechanism of action of the anti-osteoporotic activity of CDRI compounds K095 1709	Dr. S. Sanyal
Investigation on involvement of adipose tissue in persistence of pathogenic *mycobacteria*	Dr. Y.K. Manju
Isolation, identification, characterization and bioactivity assay of antidiabetic drug leads from few selected medicinal plants of north east India: Voyage for cure of diabetes	Dr. A.N. Gaikwad
Functional characterization of CRN 12 In *leishmania* parasites	Dr. A.A. Sahasrabuddhe
Investigation of effect of polysaccharide in modifying leishmanicidal potential of nanoparticulate system bearing chemotherapeutics agent	Dr. M.K. Chourasia
Identification of ER alpha interacting proteins from tamoxifen induced and uninduced MCF7 cells: A mass spectrometry based proteomics approach	Dr. A.K. Trivedi
Expression profiling of major testis specific genes in human semen/spermatozoa for identification of the biological role of these genes, their diagnostic utility and identification of novel targets for infertility treatment/male contraception	Dr. Rajender Singh
Regulation of Pancreastatin : A novel approach to control diabetes	Dr. J.R. Gayen
Solution structure and dynamics of Unc-60 ADF/Cofilin proteins of *Caenorhabditis elegans*.	Dr. Ashish Arora
Drugs against central body fatness and insulin resistance (High peri/post-menopausal prevalence)	Dr. J.R. Gayen
Validation of the cancer testis biomarker CABYR in cervical squamous cell carcinomas	Dr. Monika Sachdev
Antioxidant capacity of astrocytes and neurotrophic factors in aging: Age and gender based analysis(National initiative on glial cell researchin health and disease)	Dr. Sarika Singh
Identification of urinary biomarkers for diagnosis, prognosis and follow up of patients with SLE nephritis	Dr. S.K.Sinha
Enhancing functional repertoire of RNAPII in normal and cancer cell	Dr. Sohail Akhtar
To study the activation of glial cells in chronic hypertension.	Dr. Kashif Hanif
Study of brain insulin/insulin receptor in glial cell during neuroinflammation (National initiative on glial cell research in health and disease)	Dr. Rakesh Shukla
Indian Council of Medical Research, Government of India	
Design, synthesis and biological evaluation of HIV-1 RT inhibitors-4- thiazolidinone compounds	Dr. S.B. Katti
Impact of adipokine and chemokine gene polymorphism and its protein expression in metabolic syndrome	Dr. Ashim Ghatak Dr. Rituraj Konwar
Nucleosomal histone proteins of *leishmania donovani* : Molecular & Immunobiochemical characterization for its potential as vacceine target against visceral Leishmaniasis	Dr. Anuradha Dube
Development of bone anabolic agents from an Indian medicinal plant	Dr. N. Chattopadhyay
Effect of 2,3-diaryl-2H-1-benzopyran derivative on estrogen induced endometrical cell proliferations and uterine hyperplasis formation	Dr. Anila Dwivedi
Preclinical development of DSE-37[S,S"-{disulfanediylbi (pyrrolidino-propane-2,1-diyl)} bis(piperidinothiocarbamate) as a vaginal contraceptive	Dr. Gopal Gupta
Design, synthesis and bioequivalence of new analogues of fluconazole for antifungal activity	Dr. P.K. Shukla
Design, synthesis and bioevaluation of novel hybrid compounds for antimalarial activity	Dr. Sanjay Batra

Title of the Project	Principal Investigator
Delivery system for the management of septic shock; rational approach towards lipopolysaccharide (LPS), neutralization and detoxification	Dr. P.R. Mishra
Design, synthesis and evaluation of new chemical entities against a typical *Mycobacterium-2-fortuitum*	Dr. Gautam Panda
Evaluation of Ply-ADP-Ribose Polymerase-2 (PARP-2) and caspaces-8 signaling mechanism role during uterine tissue remodelling	Dr. Rajesh Kumar Jha
Designed synthesis an biological evalution of novel agents for managements design prostatic hyperplasia	V.L. Sharma
Development of antidyslipidemic agents from *Aegle Marmelos* (BAEL) and *Trigonella Feonum Graeucum* (METHI)	Dr. T. Narender
Natural modulators of GLUT-4 translocation for the treatment of insulin resistance	Dr. A.K. Tamrakar
Elucidation of inflammatory pathways involved in septic shock	Dr. M. Dikshit
Identification and characterization of cross-reactive molecules of filarial and leishmanial parasites and their possible prophylactic potential against either infection	Dr. P.K. Murthy
Nanoreservoirs carrying *Brugia malayi* recombinant proteins as potential vaccine against experimental lymphatic filariasis	Dr. S. Bhattacharya
Neuroinflammation and memory impairment in hypertension: Role of the central rennin angiotensin system	Dr. Rakesh Shukla
Defense Research & Development Organization	
Synthesis of biologically active molecules from carbohydrates based ligands for potential applications in Defence	Dr. R.P. Tripathi
NMITLI(CSIR)	
Lead based drug development and genetic improvement of Ashwagandha *Withania somnifera*	Dr. S. Bhattacharya
UPCST	
Production of microbial heparinases to produce low molecular weight heparins used as antithrombotic agents	Dr. C.K.M. Tripathi
Central Council of Research in Homeopathy	
Pharmacological screening of homeopathic medicine under drug standardization programme of CCRH	Dr. Rakesh Shukla

5 Human Resource Development

1 Ph.D. Theses submitted

S.No	Student	Thesis Title	Supervisor
Jawaharlal Nehru University, New Delhi			
1	Prashant Kumar Singh	Molecular cloning and characterization of functional protein(s) of human lymphatic filariid *Brugia malayi*	Dr. Shailja Bhattacharya
2	Amit K Singh	Influence of genetic background on human monocyte derived macrophage (MDM) gene expression in response to infection with *Mycobacterium tuberculosis* H37Rv and treatment with inhalable microparticles containing anti-TB drugs	Dr. Amit Misra
3	Saurabh Srivastava	Investigation on biological activities and mode of action of some naturally occurring antimicrobial peptides and their novel analogs	Dr. J.K. Ghosh
4	Vijay Kumar Srivastava	Structural and functional studies on MoaC2 from *Mycobacterium tuberculosis* and Coronin from *Leishmania donovani*	Dr. J.V. Pratap
5	Saurabh Pratap Singh	Structural and functional characterization and evaluation of suitable drug targets of Leishmania spp.	Dr. J.V. Pratap
6	Sudhanshu Yadav	Characterization and functional aspects of a gene involved in mitotic checkpoint in *S. pombe*	Dr. Shakil Ahmed
7	Sumit Kumar Verma	Characterization of conditional synthetic lethal mutant with CHK1 Kinase protein and its role in cell cycle checkpoints in *S. pombe*	Dr. Shakil Ahmed
8	Pratibha Singh	Elucidation of the role of Melatonin in experimentally induced reflux esophagis in rats.	Dr. G Palit
9	Ankita Misra	Molecular mechanism involved in collagen mediated platelet activation and their modulation by antiplatelet compounds	Dr. Madhu Dikshit
10	Manish Sinha	Design and Synthesis of 4-Aminoquinolinederivetives as novel anti malarial agents.	Dr. S B Katti
11	Sarfuddin	Design of novel cell- selective antimicrobial peptides and modulation of toxicity of naturally occurring antimicrobial peptides	Dr. J K Ghosh
12	Siddharth Sharma	Design and synthesis of novel heterocycles with potential for drug development	Dr. Atul Kumar
13	Anindra Sharma	Synthetic studies in phenolics and glycoconjugates as potential biodynamic agents	Dr. R P Tripathi
14	Smriti Mishra	Metabolic investigation of biologically active 1, 2, 4 Trioxane(s).	Dr. G K Jain
15	Ranjani Maurya	Isolation of bioactive natural products from medicinal plants and synthesis of novel 1, 2, 4 Trioxanes as anti malarial.	Dr. Rakesh Maurya
16	Vineet Kumar Maurya	Identification drug targets in *Mycobacterium Tuberculosis* using proteomics based approaches	Dr. Sudhir K Sinha
17	Shailendra Kumar Dhar Dwivedi	Therapeutics and mechanist dissection of cell survival and apoptosis in cancer model.	Dr. N Chattopadhyay
18	Susheela Kushwaha	Molecular cloning and characterization of functional protein(s) of human lymphatic filariid *Brugia malayi* and their evaluation as drug/vaccine targets	Dr. S Bhattacharya
19	Sushmita Kumari	Demonstration of the putative role of PE3 & PE4 proteins of mycobacterium tuberculosis in intra cellular survival and in immune modulation	Dr. K K Srivastava
20	Sanjit Kumar Das	α - Amino Acid based stereo selective synthesis of biologically important natural products and natural product like molecules	Dr. Gautam Panda
21	Pooja Pal	*In vitro* screening of natural synthesis compounds for their potential to induced differentiation and/or apoptosis in myeloid leukemia cells understanding differentiation pathway in myeloid cell development	Dr. A K Trivedi
22	Ritesh Singh	Quest for hetercycles therapeutic agents	Dr. Gautam Panda

S.No	Student	Thesis Title	Supervisor
23	Nand Lal	Design and synthesis of novel dual action non-detergent spermcides and anti-spermatogenic agents	Dr. V L Sharma
24	Manoj Kumar	biodynamic agents	Dr. K V Sashidhara
25	Anuj Tripathi	Comparative analysis of protein(s) expression profile in arteether sensitive and arteether resistant *Plasmodium Venckei*	Dr. S K Puri
26	Vishwa Deepak Tripathi	Natural product inspired design and synthesis of medically active heterocycles	Dr. Atul Kumar
27	Dharamsheela	To study the mechanism of immunomodulation caused by peptides at cellular and molecular level	Dr. R K Tripathi
28	Rahul Yadav	Characterization of Actin Depolymerizing Factor (ADF) from *Toxoplasma gondii*	Dr. Ashish Arora
29	Santosh Kumar	Studies on differentially expressed protein(s) from arteether sensitive and arteether resistant strains of *Plasmodium vinckei* a rodent malaria parasite	Dr. S K Puri
30	Ajay Kumar Rana	Cloning, expression and functional characterization of RSMD rRNA methyltransferase from wolbachia endosymbiont of Brujia Malayi	Dr. Shailja Bhattacharyaya
31	Ashok Kumar	Structural studies of bacterial reptidyl RNA hydrolyase	Dr. Ashish Arora
32	Gaurav Madhur	Isolation, chemical transformation and synthesis of natural products of biological importance	Dr. T Narender
33	Maneesh Kumar Gupta	Design and synthesis of novel nuclear receptor modulator as pharmaceutical agents	Dr. Atul Kumar
34	Ruchi Saxena	Mechanism of anti-proliferative action of 2-[Piperidinoethoxyphynyl]-3-Phenyl-2H-Benzo(B) Pyran in estrogen receptor positive and estrogen receptor negative Human Breast Cancer Cell Lines	Dr. Anila Dwivedi
Banaras Hindu University, Varanasi			
35	Samiran Hutait	Design and synthesis of heterocycle-basesd novel hybrid compounds as possible antimalarial agents	Dr. Sanjay Batra
36	Suman Srivastava	Design and synthesis of novel ferrocene substituted heterocycles as therapeutic agents	Dr. Atul Kumar
37	Garima Gupta	Design and synthesis of novel heterocycles as therapeutic agents	Dr. Atul Kumar
38	Amar Kumar	Design and synthesis of diaryal (Nitrogenous heterocycles) Alkanes for their structural and biological studies	Dr.Kamlakar Avasthi
Chhatrapati Shahu Ji Maharaj University, Kanpur			
39	Reema Gupta	Cloning and over-expression of TH1 stimulatory Poly-proteins for their prophylactic potential against experimental visceral leishmaniasis	Dr. Anuradha Dube
Jamia Hamdard, New Delhi			
40	Vishal Kumar Soni	Evaluation of some medicinal plants for immunomodulatory and antifilarial activity in rodent model	Dr. Shailja Bhattacharya
41	Deepak Singodia	Engineered Nano-vesicular constructs for improved delivery of chemo-therapeutic agents.	Dr. P R Mishra
42	Pradeep Kumar Kamat	Neuropharmacological and molecular characterization of Okaidic Acid induced neuro degeneration in rat	Dr. C. Nath
43	Santosh K Tota	Study on the role of central rennin angiotensin system	Dr. C Nath
44	Supriya Swarnkar	Cellular and molecular studies on the Rotenone induced neurotoxicity.	Dr. C Nath
Lucknow University, Lucknow			
45	Sarika Yadav	Biochemical studies on Adenosine deaminase of *Plasmodium yoelii*.	Dr. J.K. Saxena
46	Ruchir Kant	X-Ray crystallographic studies of molecules of biological and structural interest	Dr. P R Maulik
47	Ravindra Singh	Studies on biological parameters of albino rat (Sprague Dawley rat) under the influence of commercial and in-house feed formulations	Dr. D.S. Upadhyay
48	Vijay Kumar Marurapu	Design and synthesis of potential anti Leishmanial agents.	Dr. K Bhandari,
49	Rajesh Kumar Biswas	Identification and characterization of the factor(s) that regulate the expression of *Mycobacterium tuberculosis* H37Rv kas opron	Dr. B N Singh

S.No	Student	Thesis Title	Supervisor
50	Salil Pratap Singh	Synthesis of lactone-derived aromatic scaffolds of synthetic and therapeutic importance	Dr. Atul Goel
51	Preety Dixit	Chemical investigation of Indian medicinal plants in search of bioactive-compounds	Dr. Rakesh Maurya
Birla Institute of Technology & Science, Ranchi			
52	Rahul Kumar Verma	Pulmonary delivery of microparticles containing nitric oxide donors as mediators of macrophage activation in tuberculosis	Dr. Amit Misra
Banasthali University, Banasthali, Rajasthan			
53	Varsha Gupta	Formulation development and evaluation of some new anti-osteoporotic agents	Dr. A. K. Dwivedi
Dr. Ram Manohar Lohia Avadh University, Faizabad			
54	Mohd. Faheem Khan	Phytochemical investigation of Indian medicinal plants in search of bio-active natural compounds	Dr. Rakesh Maurya
55	Anil Kumar	Design and synthesis of differentially substituted chiral amino methyl potential antithrombotics	Dr. D K Dikshit
Jadhavpur Univesity, Kolkata			
56	Partha Ghoshal	Synthesis of carbohydrate derived by biologically active compounds	Dr. A K Shaw
Gautam Buddha Technical University, Lucknow			
57	Prem Prakash	Effect of anti-thrombotic agents on various experimental models of thrombosis and to elucidate their mechanism of action.	Dr. Madhu Dikshit
58	Vikas Mishra	Analysis of Excitotoxicity and acidotoxicity mediated by NMDAR and ASIC following Cerebral Ischemia/ Reperfusion Injury.	Dr. Ram Raghubir
59	V Muruge San	Rational design and synthesis of THIAZOLIDIN-4-ONE as HIV-1 reverse transcriptase inhibitors	Dr. S B Katti
Integral University, Lucknow			
60	Neetu Singh	Exploration of the biochemical and molecular mechanism of anti-ulcer action of novel natural products.	Dr. G Palit

2 Sponsored training provided to external aspirants

Under the above program, the institute imparted training to the post-graduate students, fellows from foreign countries and aspirants from academia and industries across the India in the area of drug & pharmaceutical research, techniques in laboratory animals, tissue & cell culture, instrumentation, sophisticated analytical instruments and other laboratory techniques as given below:

2.1 Training to Post Graduate Students

During the calendar year, a total of 140 Post-graduate students from 51 Colleges/Universities and their affiliated colleges from all over the country were selected on merit basis and were imparted training in various disciplines of drugs and pharmaceutical research for 4-10 months duration.

2.2 Training to Post Graduate Students

CSIR-CDRI being a mentor institute for the NIPER Raebareli, imparted one year project training in biomedical research to 30 M.S. (Pharm) Pharmaceutics & Medicinal Chemistry specialization students.

2.3 Training under cooperation with INSA & NASI

Under the programme, 07 INSA & NASI fellows from different institutes were provided training in different aspects of biomedical research.

2.4 International training under bilateral cooperation

Long-term/short term training was provided to the following trainees from abroad:

Name and Address of Trainee	Fellowship/Programme	Supervisor	Duration
Dr. Samuel Adetunji Onasanwo, Department of Physiology, Faculty of Basic Medical Sciences, College of Medicine, University of Ibadan, Ibadan, Nigeria	Postdoctoral Research under RTFDCS Fellowship	Dr Gautam Palit, Chief Scientist, Pharmacology Division	03.11.2011 to 30.06.2012

Name and Address of Trainee	Fellowship/Programme	Supervisor	Duration
Prof. Emmanuel Chenidum Ibezim, Department of Pharmaceutics University of Nigeria, Nsukka, Nigeria	C.V. Raman International Fellowship for African Researcher for Senior Fellowship sponsored by FICCI, New Delhi	Dr. Amit Misra, Principal Scientist Pharmaceutics Division	01.04.2012 to 30.04.2012
Dr. Edwin Ogechukwu Omeje, Dept. of Pharmaceutical & Medicinal Chemistry Faculty of Pharmaceutical Sciences, University of Nigeria, Nigeria	C.V. Raman International Fellowship for African Researcher for Post Doctoral Fellowship sponsored by FICCI, New Delhi	Dr. N. Chattopadhyay Sr. Principal Scientist, Endocrinology Division	02.04.2012 to 01.10.2012
Dr. Paul Dzeufiet, Lecturer, University of Yaounde 1, Cameroon	C.V. Raman International Fellowship for African Researcher for Post Doctoral Fellowship sponsored by FICCI, New Delhi	Dr. Sabyasachi Sanyal, Scientist, DTDD Division	19.04.2012 to 18.10.2012
Dr. Bilanda Danielle Claude Associate Lecturer, Laboratory of Pharmacology & Toxicology, Dept. of Biochemistry, Faculty of Science, Univ. of Yaounde 1, Cameroon	C.V. Raman International Fellowship for African Researcher for Post Doctoral Fellowship sponsored by FICCI, New Delhi	Dr. N. Chattopadhyay Sr. Principal Scientist, Endocrinology Division	19.04.2012 to 18.10.2012
Prof. Lawrence Onyango Arot Manguro, Chemistry Department, Maseno University, Maseno, Kenya	C.V. Raman International Fellowship for African Researcher for samid Fellowship sponsored by FICCI, New Delhi	Dr. Prem Prakash Yadav, Scientist, Medicinal & Process Chemistry Division	11.05.2012 to 10.08.2012
Dr. FJ Sanchez, Centro de Biologia Molecular Severo Ochoa, Madrid, Spain	Training programme on "Post-translational modifications induced by nitroxidative stress as biomarkers of vascular damage in diabetes." (DBT-INDIGO)	Dr Madhu Dikshit, Chief Scientist, Pharmacology Division	19.02.2012 to 03.03.2012
Dr. (Ms.) CE Diez, Centro de Biologia Molecular Severo Ochoa, Madrid, Spain	Training programme on "Post-translational modifications induced by nitroxidative stress as biomarkers of vascular damage in diabetes." (DBT-INDIGO)	Dr Madhu Dikshit, Chief Scientist, Pharmacology Division	19.02.2012 to 03.03.2012
Ms. Marta Fiero, Centro de Biologia Molecular Severo Ochoa, Madrid, Spain Prof. Sautigo Lawas	Training programme on "Post-translational modifications induced by nitroxidative stress as biomarkers of vascular damage in diabetes." (DBT-INDIGO)	Dr Madhu Dikshit, Chief Scientist, Pharmacology Division	07.12.2012 to 17.12.2012
Ms. Rosa Brenton, Centro de Biologia Molecular Severo Ochoa, Madrid, Spain	Training programme on "Post-translational modifications induced by nitroxidative stress as biomarkers of vascular damage in diabetes." (DBT-INDIGO)	Dr Madhu Dikshit, Chief Scientist, Pharmacology Division	07.12.2012 to 17.12.2012

3 Training program attended by CSIR-CDRI staff

In the reporting year many scientist from CSIR-CDRI attended various training programs and workshops for updating their knowledge and expertise in different disciplines. Besides scientists, some technical assistants also attended various training programmes.

6 Honours and Awards

Dr. Madhu Dikshit

- Elected Fellow of Indian National Science Academy for the year 2013

Dr. KV Sashidhara

- INDO-US research fellowship, 2012 by Indo-US Science and Technology Forum (IUSSTF) and DS

Dr. JK Ghosh

- Elected Fellow of National Academy of Sciences, India for the year 2013

Dr. DS Upadhyay

- Bursary Award by the Laboratory Animal Limited, London

Dr. Arun Trivedi

- NASI Young Scientist Platinum Jubilee Award 2012

Dr. Poonam Singh,

- Prof. K.R. Laumas Memorial Oration Award at the Annual meeting of Society of Andrology India.

Dr. Jiaur R Gayen

- Innovative Young Biotechnologist Award 2011

Mr. Vijay Kumar (student of Dr. Atul Goel)

- Eli-Lilly Outstanding Thesis Awards - 2012 (I prize)

Mr. Wahajuddin

- Young Pharmaceutical Analyst Award, 2012 of Indian Drug Manufacturer Association
- DBT-CREST Award for the year, 2011-12

Mr. Piyush Agarwal (student of Dr. Bijoy Kundu)

- Eli-Lilly Outstanding Thesis Awards - 2012 (II prize)

Dr AK Shaw

- Prof DP Chakraborty 60th Birth Anniversary Commemoration Award of the Indian Chemical Society for the year 2010

Ms Amita Mishra (student of Dr. Sanjay Batra)

- MM Dhar Memorial Award, 2012 – Chemical Sciences)

Mr Ravi Shankar Keshari (student of Dr. Madhu Dikshit)

- MM Dhar Memorial Award, 2012 – Biological Sciences

Mr. Govind Tiwari (Student of Dr. Atul Goel)

- Best Poster Award in 4th NIPER (RBL)-CDRI Symposium 2012,Lucknow

Ms. Shalini Asthana (Student of Dr. Manish K. Chourasiya)

- Second Best Poster Award at the NANOBIO 2012, Kochi

Mrs. Ojo Olajumoke Omalara (Student of Dr. S.K. Rath)

- Best Poster Award in 32nd Annual Conference of txicology 2012,Lucknow

Mr. Vikas Kushwaha (Student of Dr. Kalpana Murthy)

- Second Best Oral Presentation Award, Immunocon 2012, Varanasi

Mr. Nikunj Sethi (Student of Dr. Neeraj Sinha)

- Best Oral Presentation Award in National Seminar on Emerging Trends in Spectroscopy

Mr. Amit Kumar Gupta (Student of Dr. A.K. Saxena)

- Second Prize winner of 9th TLEP Program conducted by HRDG-CSIR

- On the occasion of CSIR@70 celebrations CSIR-CDRI is awarded the CSIR-ERPS Silver Icon Award

CSIR-Central Drug Research Institute, Lucknow

Other Activities

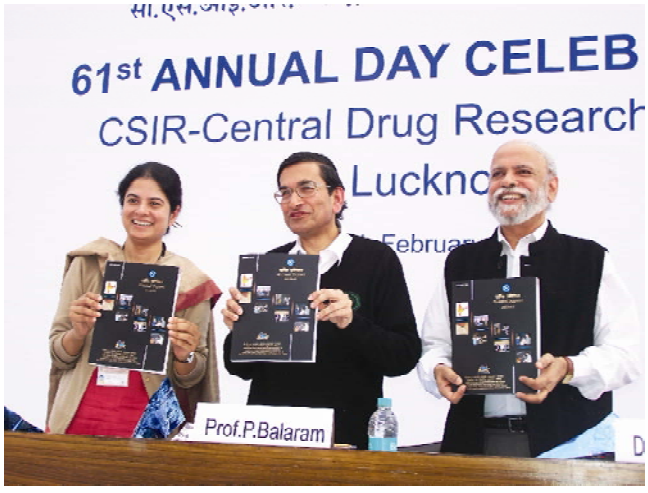

वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद, भारत
CSIR INDIA

1 Major Events Organized

CSIR-CDRI Annual Day Celebrations

Institute celebrated its 61st Annual Day on February 17, 2012. On previous day, Annual Day Prize distribution function of CDRI Club was organized President, Dr. T.K. Chakraborty presided over the function and presented prizes to the winners of different sport and field events, organized at the institute during a month long sport activities. In the evening, cultural programs were organized by the staff club, which was participated by the institute staff along with their family members.

The main function was organized on Annual Day at New CSIR-CDRI campus, Janakipuram Extension, Lucknow Prof. P. Balaram, Director, Indian Institute of Science, Bangalore was the chief guest. Dr. T.K. Chakraborty, Director, welcomed guests and presented a detailed account of the achievements made by the Institute during the reporting period. In an impressive presentation, he informed audience about year's publications which have indicated good performance, both qualitatively and quantitatively. During the event, CSIR-CDRI Award for Excellence in Drug Research – 2012 was announced. Padmashri Dr. Niyanand was felicitated for his contribution to science. Prof. P Balaram stressed upon the need to redefine the role of CSIR laboratories in the context of "emerging India". Later, the Annual Report 2011-12 was released by the dignitaries.



Sixteen Appreciation Awards – 2012 were given to different scientists for publishing research papers in high impact factor journals in the year 2011. Besides, 3 patents were selected for the Patents Grant Award – 2011. Recipients of Dr. M.M. Dhar Memorial Award for the best thesis – 2012 were given to two research fellows. The award is sponsored by Dr. Suman Rakhit, President, MRC Research Inc., Canada. The employees completing 25 years of their service were also felicitated on the occasion. Event ended with vote of thanks by Dr. Saman Habib, Principal Scientist and Head, MSB Division.

CSIR-CDRI-NIPER (RBL) Symposium on Medicinal Chemistry and Pharmaceutical Sciences

The 4th CSIR-CDRI-NIPER (RBL) Symposium on Medicinal Chemistry and Pharmaceutical Sciences was organized during 23-25 February, 2012 at CSIR-Central Drug Research Institute, Lucknow. This symposium aimed to augment knowledge base in the focused area of Medicinal Chemistry & Pharmaceutics and marks our efforts to provide a glimpse of current state of the art research being conducted in the area of drug discovery and development. More than 150 participants attended the symposium. The inaugural keynote address "Post genomics drug discovery: Challenges & opportunities" was delivered by Prof. Prabhat Arya, ILS, Hyderabad. The inaugural function was presided over by Dr. V.P. Kamboj, Former Director, CDRI, Lucknow. Prof. Devendra K. Gupta, VC, CSMMU, Lucknow inaugurated the symposium. Symposium focused on state of the art lectures by internationally renowned Indian scientists from academia and industry with the

idea to give exposure to future generation of Indian researchers/ scientists. Eminent speakers from pharma-industry and academia delivered twenty three lectures during two days of scientific deli erations. The other major attraction of the scientific program was its poster session wherein addition to the original research work based presentations, M. Pharm students were encouraged to display their project based presentations and awards were given away to best poster presentations.

India-Africa Science & Technology Ministers Conference and Tech Expo 2012

The first India-Africa Science & Technology Ministers Conference and Tech Expo was held on 1-2 March 2012 at Vigyan Bhawan New Delhi. The conference was inaugurated by Shri Vilasrao Deshmukh, Hon'ble Minster for Science & Technology and Earth Sciences. The expo showcased the relevant Indian technologies and innovative products both at grass root and advanced levels across the sectoral spread. The participating institutions were drawn from CSIR, DST, FICCI and the National Innovation Foundation. The exhibition was attended by S&T Ministers from across the African continent along with Senior Officials from various African countries, Heads of African country missions based in Delhi, officials from the African Union Commission and the representatives of the eight Regional African Economic Forums. The CSIR-CDRI drugs like Saheli as Contraceptive, Novex DS for the management of Dysfunctional Uterine Bleeding, E-Mal for the treatment of cerebral and chloroquine resistant malaria, Larither in Cerebral Malaria, Memory Sure for the improvement of memory were showcased under affordable healthcare theme of CSIR technologies for transfer to African Nations.

Scientific and Technical Awareness Programme on Animal Experimentation

The Division of Laboratory Animals, at CSIR-Central Drug Research Institute, Lucknow organized the 2nd Scientific and Technical Awareness Program on Animal Experimentation" from March 26-30, 2012, as a part of human resource development programme of institute. The event was aimed at providing a preliminary knowledge on application of humane methods of experimental animal care, handling, restraint and related animal techniques to the scientific and technical staff of institute including research fellows and project assistants engaged in animal research in various biological disciplines enabling them to follow welfare issues during course of animal experiments. Programme was an important pre-requisite to obtain uniform and reliable research findings to be generated on experimental animals.

Practical Training Course on 2D Gel Electrophoresis

A practical training course on 2D gel electrophoresis was held from 27-28 March 2012 at Proteomics and Cancer Biology Lab of Dr. Arun Kumar Trivedi, Scientist DTDD Division, CSIR-CDRI . During this training course both theoretical as well as hands on training for the 1D and 2D gel electrophoresis were given. These included preparing samples for 2D gel electrophoresis, separating them on 1st and 2nd dimension gel electrophoresis followed by staining the gel with coomassie blue staining to visualize the electrophoresed protein spots. In this course 19 students from different divisions of CSIR-CDRI and CSIR–CIMAP participated.

National Technology Day Celebration

CSIR-CDRI celebrated the National Technology Day by organizing a distinguished lecture by Prof. Animesh Chakravorty, Emeritus Professor and Ramanna Fellow, Department of Inorganic Chemistry, Indian Association for the Cultivation of Science, Kolkata and President of Chemical Research Society of India. Professor Chakravorty shed the light on "A chemist's Bit of Historical Reflectios on Technology Day." He mentioned that chemistry is the mother of all technological developments. All historical reflection of technology is based on the progress of the chemistry since the ancient era to the modern era. On this occasion, Chief Guest Prof Animesh Chakravorty and Dr T.K. Chakraborty, Director, CSIR-CDRI released the Vol 3, Issue 2 of CSIR-CDRI Newsletter. The program was concluded with the vote of thanks proposed by Shri Vinay Tripathi, Head Division of S&T Management.

Demonstration cum Training on Scopus

Scopus has emerged as a possibly viable substitute of web of Science's citation analysis tool. Elsevier has provided trial access of Scopus till May 31, 2012. A one day training program was organized for a demo on Scopus and training about using analytical tools and calculating Citation indexes and H-graph etc on May 22, 2012.

National Workshop of the CPCSEA on Animal Welfare & Ethics for CPCSEA Nominees and IAEC Members"

A one-day workshop sponsored by the Ministry of Environment and Forests, Govt. of India was organized on July 13, 2012. The aim of Workshop was to sensitizing the research and academic institutions engaged in performing animal experiments for the benefit of mankind and scientific pursuit. Sensitization of institutions will take place through the members of respective institutional animal ethics committees and CPCSEA nominees who are discharging the duties of reviewing and approval of animal experiment protocols. About 40 participants from 20 different Institutions/ Universities attended the workshop.

Workshop on Web of Science and other Life Science Related Information Solutions of Thomson-Reuters"

A one-day workshop was organized in CSIR-CDRI on July 24, 2012 in association with Thomson-Reuters. The aim of workshop was to get acquainted the researchers with Web based information solutions related to Life Sciences research.

Workshop on Flowcytometry Applications

CSIR-CDRI-BD Centre of Excellence in Flow Cytometry has organized a three day hands on workshop from July 30-August 1, 2012. The workshop was aimed to give the exposure to research fellows on Flowcytometry related techniques. Experimental hands on was covered on the topics related to Cell cycle analysis, Apoptosis experiment using Annexin V/PI staining and Sorting of cell. Dr. Madhu Dikshit, Chief Scientist, CSIR-CDRI, delivered a talk on "Flow cytometry based Apoptosis Assays" during the workshop.

Sadbhawana Diwas

"Sadbhawana Diwas" was celebrated in the institute on August 17, 2012 with a theme to promote national integration and communal harmony among people of all religions, languages and regions. The idea behind *CSIR-Central Drug Research Institute, Lucknow* observance of Sadbhawna Diwas is to avoid violence and to promote goodwill among the people. All the employees of CSIR-CDRI participated in this occasion and took the "Pledge of Sadbhawana" that they will work for the emotional oneness and harmony of all the people of India regardless of caste, region, religion or language.

Symposium on "Sophisticated Instruments & their Role in Drug Discovery"

A symposium was organised on "Sophisticated Instruments & their role in Drug Discovery" on August 31, 2012. Chief Guest, Padmasri Dr. Nitya Anand delivered a lecture on "Some re-collections & reflections of CDRI". Prof. Raja Roy, CBMR, Lucknow talked about "Metal ions as cofactors for aggregation of therapeutic peptide, salmon Calcitonin". Dr. Manoj Barthwal, CSIR-CDRI discussed on "Biological studies on CSIR-CDRI compound-S007-867". Dr. Ravi S. Ampapathi, CSIR-CDRI, lucknow delivered a lecture on "Advancements of Instrumentation & their impact on Drug Discovery" and Dr. Sanjeev Kanojiya, CSIR-CDRI delvered a detaled talk on "Mass Spectrometry & Its applications in Drug Discovery".

CSIR Foundation Day Celebrations

CSIR-CDRI Celebrated the 70th CSIR Foundation Day on September 25, 2012. During the day, CSIR-CDRI Award Function was also organised. Prof. B. Jayaram, Department of Organic Chemistry, Indian Institute of Technology, Delhi graced the occasion as Chief Guest and addressed his distinguished work entitled "Genomes to Hits: The Emerging Assembly Line". The talk dealt on development of indigenous software such as Chemgenomes, Bhageerath & Sanjeevini, which are freely accessible to students and scientific community. CSIR-CDRI Award 2012 under Chemical Sciences was conferred to Dr. Rajkumar Banerjee, IICT, Hyderabad. Dr. Banerjee delivered award oration entitled "Nuclear Hormone Receptors and Lipids: An unusual concoction for designing anticancer therapeutics". CSIR-CDRI Award 2012 under Biological Sciences category was conferred to Prof. Subramanian Ganesh, IIT, Kanpur on his work "Molecular pathology of Lafora disease". Further, Scientists from CSIR-CDRI – Dr. Shailja Bhattacharya, Dr. Ashish Arora, Dr. Rajender Singh, Dr. Arun Kumar Trivedi, Dr. Jiaur R Gayen for receveing prestigious national awards during 2011-12. Prof. B Jayaram also released CSIR-CDRI Newsletter (Vol.4 No.1 April to September, 2012) and felicitated employees of CSIR-CDRI who retired during Sept. 2011 – August 12, followed with the felicitation of employees who have completed 25 years of their services at CSIR-CDRI by Dr. TK Chakraborty, Director, CSIR-CDRI. Prizes were also awarded to the children of CSIR-CDRI employees who secured more than 90% marks in Science subjects during intermediate board exams, by distinguished guest Dr. (Mrs.) Susmita Chakraborty.

CSIR-CDRI received Silver Icon Award during CSIR@70 Celebrations, New Delhi

CSIR acknowledged the efforts of Team CSIR-Central Drug Research Institute with immense appreciation, for their exemplary work and commitment demonstrated in the preparatory realm of population of the data bases and priming the ERP Application with the configuration of data, for the commencement of seamless integrated online operations under the CSIR Transformation & ICT intervention Project. In recognition of such outstanding work as trail blazing forerunners in the transformation to an arena of digital collaborative workplace, for the progressive strides the Team CSIR-CDRI have cultured and to the cause of green growth, CSIR-CDRI is awarded the Silver Icon Award on 25 September 2012, on the occasion of the 70th CSIR Foundation Day 2012 in New Delhi.

XVIII Annual Congress of Society of Andrology India (SAI): on Global Perspective of Reproductive Biomedicine

Society of Andrology (SAI), India, organized a three day seminar and workshop from 22 -24 December 2012. During this K.R. Laumas Memorial Oration and Workshop on Grantmanship was organized. SAI meetings offer excellent opportunities to present discuss and learn about latest discoveries and clinical techniques. SAI evaluates techniques and methods used in the study of Andrology. Topics discussed in this meeting was mainly on male contraception such as prostatitis and prostate cancer, STDs, male reproductive toxicity, Male Infertility and dysfunction, Mechanism of infertility, drug and environmental toxicology and HIV-AIDS.

CSIR-CDRI participated in Lucknow Mahotsava 2012

For the first time,CSIR-CDRI participated in Lucknow Mahotsava-2012 with other Lucknow based CSIR Labs from 26th Nov'12- 9th Dec'12 and showcased various products (Saheli, Novex and Novex-DX) in the area of women health care, antimalarials (E-Mal, Larither) under communicable disease area, improvement of memory (Memory Sure) towards Lifestyle related disorders through bilingual posters. CSIR-CDRI also projected some of the potential new lead molecules for the treatment of bone disorders and also highlighted the development of a collagen antagonits as a promising approach to prevent heart attack or stroke without much bleeding,

A large number of visitors from all walks of life including students interacted during the exhibition and shown their keen interest.

CSIR-CDRI Participated in The Pride of India Expo at Indian Science Congress, 2013 at Kolkata

The 100th Indian Science Congress was held from January 3-7, 2013 at University of Kolkata, inaugurated by the Chief Guest & Hon'ble President of India, Sri Pranab Mukherjee. Hon'ble Prime Minister of India Dr. Manmohan Singh, His Excellency the Governor of West Bengal Sri. M.K. Narayanan, Hon'ble Chief Minister of West Bengal Ms. Mamata Banerji, along with various science leaders, Nobel laureates and distinguished speakers from India and abroad participated in the event. The Pride of India Expo was inaugurated by Shri Sudini Jaipal Reddy, Hon'ble Minister for Science & Technology, Ministry of Earth Sciences and Vice President, CSIR. The Expo was an integrated attraction of the Science Congress and was a confluence of new ideas, innovations and products covering the entire canvas of scientific world.

CSIR-CDRI participated in the Pride of India Expo and showcased posters and product samples presently in the market i.e. Saheli (Female oral non steroidal contraceptive pill), Novex DS (For management of dysfunctional uterine bleeding), Memory Sure (For the memory improvement in ADHD children and AAMI subjects), E-Mal and Larither (for the treatment of cerebral malaria) during the exhibition.Prof. Samir K. Brahmachari, Director General-CSIR, Dr.R.A.Mashelkar, Former DG, CSIR and other eminent scientists, academician, and students visited the stall and interacted during the exhibition.

Study-visit of the Department-related Parliamentary Standing Committee on Science & Technology, Environment & Forests during 21-22 January, 2013 at Lucknow

The study visit of the Department-related Parliamentary Standing Committee on Science & Technology, Environment & Forests during 21-22 January, 2013 at Lucknow was conducted and CSIR-CDRI was the nodal agency to coordinate the visit. The said visit was under the Chairmanship of Shri Dr. T. Subbarami Reddy along with other members Shri. Rabinarayan Mohapatra, Prof. Ranjan Prasad Yadav, Shri Pradeep Tamta, Shri Ramakant Yadav, Shri Alok Tewari, Shri. Manoj Paul Pandian and the officers from Rajya Sabha Secretariat, Central Pollution Control Board etc.

The Director CSIR-CDRI received the Members and accompanied to the designated accommodation. A dinner was hosted in honor of the Members and secretariat staff at Clarks Avadh Hotel on 21st January, 2013. Senior scientists from CSIR-CDRI, officials from various departments under U.P. State Govt. interacted with the Members.

On 22nd January, 2013, a visit of delegation was organized by the officials of U.P. State Govt. to the River Bank for the 'on the spot study of River Gomti' followed by the discussion with Shri Javed Usmani, Chief Secretary, and Principal Secretaries of Departments of Environment, Energy, Irrigation, Transport, Urban Development, and authorities from Pollution Control Boards of State Govt., UPSIDC, Municipal Corporation etc. The emphasis of the meeting was especially on the mitigation measures taken to keep the River Gomti clean. Shri Lalji Tandon, MP, Lok Sabha also attended the meeting.

The delegation of MPs was accompanied to the Chief Minister of U.P.'s residence for interaction with Shri Akhilesh Yadav and his senior officials followed by lunch.The delegation later interacted with the Director CSIR-CDRI and other senior scientists and was appraised with the contributions made by the institute towards the discovery and development of affordable drugs.

The committee appreciated the efforts made by the institute for its significant achievements over the years in pursuit of fulfilling its mission to provide new drugs and technologies for affordable healthcare for all and generation of knowledge base and nurturing future leaders for healthcare sectors and further asked to submit proposals so that the committee can endorse with a recommendation to the Planning Commission for funding. Later, in the evening the delegates were formally sent off.

A practical training course on "Isolation and separation of proteins and their detection by immunoblotting"

A practical training course on "Isolation and separation of proteins and their detection by immunoblotting" was held from 28th-29th Jan 2013 at Proteomics and Cancer biology Lab, DTDD Division. CSIR-CDRI conducted by Dr. Arun Kumar Trivedi in collaboration with Merck Millipore. Workshop included hands on training on isolation of proteins from mammalian cells, separation of isolated proteins on 1D SDS-PAGE and their detection using specific antibody after immunoblotting by conventional as well as SNAP-i.D. methods. In addition, visualization of protein bands by coomassie blue staining and colloidal coomassie staining was also demonstrated. This workshop also included a lecture by Dr. Trivedi on kinds of lysis buffer, ingredients of buffer and their role, principal of immunoblotting and troubleshooting. This workshop was attended by PhD aspirants from various intuitions viz. Dr. Ram Manohar Lohia Institute of Medical Sciences (RMLIMS), King George`s Medical University (KGMU), Amity University and different divisions of CSIR-CDRI of Lucknow.

38th Sir Edward Mellanby Memorial Oration

In memory of Sir Edward Mellanby, Founder Director, CSIR-CDRI, the 38th Mellanby Memorial Lecture was organized on 11 February 2013. The lecture was delivered by Dr.V. Craig Jordan, Professor of Oncology and Pharmacology, Lombardi Comprehensive Cancer Center, Georgetown University, USA. The topic of his presentation was Four decades of discovery for the treatment and prevention of breast cancer: The SERM story. The SERM story has produced a remarkable insight not only for the treatment of multiple diseases in women, but also provided explanations for the mystery of oestrogen-induced apoptosis.

2 Distinguished Visitors and Lectures

Distinguished Visitors

	Name and Address	Topic	Date
	**Prof. Viresh Rawal** Department of Chemistry, University of Chicago, USA	A unified strategy for the total synthesis of the Welwitindolinone alkaloids	12.01.2012
	**Prof. Rajiv R. Mohan** Mason Eye Institute, School of Medicine, University of Missouri-Columbia, USA	Vision restoration: Gene therapy using AAV and Nanotechnologydelivery systems	14.02.2012
	**Dr. Anil Chauhan** Department of Internal medicine, University of Iowa, USA	Role of anti-thrombotic enzyme ADAMTS13 in vascular inflammatory diseases	21.03.2012
	**Professor Debi P Sarkar** Delhi University, Delhi	Targeted gene delivery to liver cells using engineered Sendai viral envelopes: From basic science to a preclinical experience	26.04.2012
	**Prof. Animesh Chakravorty** Emeritus Professor and Ramanna Fellow, Department of Inorganic Chemistry, Indian Association for the Cultivation of Science, Kolkata	A chemist's bit of historical reflections on Technology Day	11.05.2012
	**Prof. SK Shankar** National Institute of Mental Health and Neurosciences, Bangalore	A peep into the biology of a few common infections we see	15.06.2012
	**Prof. Yoshinori Yamamoto** Prof. Emeritus, Executive Research Coordinator, WPI Advanced Institute for Materials Research Tohoku University, Japan	Total synthesis of Gambierol and Brevetoxin B and computational study	01.08.2012
	**Prof. William Kerr** Empire Scholar & Murphy Family Professor of Childrens Oncology Research, Microbiology, Immunology & Pediatrics, SUNY Upstate Medical University, New York, USA	Role of SHIP in cancer, inflammation and stem cell biology	20.09.2012

	**Prof. Gautam R. Desiraju** Indian Institute of Science, Bangalore	Solid State and Structural Chemistry	06.11.2012
	**Prof. Santiago Lamas** Centro Mixto CSIC-UAM de Biologia Molecular Severo Ochoa Nicolas Cabrera 1, Spanish Research Council, Madrid, Spain	Redox-mediated signaling in endothelial cells	11.12. 2012

Other Special Visitors

	Name and Address	Topic	Date
1.	**Dr. Anand Srivastava,** Institut National de Transfusion Sanguine, Paris, France	Malaria: Insight into the mechanism of Cytoadherance	05.01.2012
2.	**Dr. Ruchi Gupta,** Rockefeller University, New York, USA	Halting the Amyloid March: How a novel Ca2+ binding protein, NUCB1, prevents the formation of amyloid fibrils.	05.01.2012
3.	**Dr. Subhrajit Biswas,** Dept. of Medicine, PRB 548 Vanderbilt University, Medical Centre, USA	Role of Bcl-2 family members in apoptotic checkpoint and therapeutic aspects in T cell Leukemia	02.02.2012
4.	**Dr. Anu Puri,** National Cancer Institute at Fredrick National Institutes of Health, Fredrick, MD, U.S.A.	Lipid-based nanotechnology platforms for drug delivery	02.03.2012
5.	**Dr. B L Tekwani,** National Center for Natural Product research, School of Pharmacy, Mississippi University, Mississippi, USA	Pathways to discovery of safer antimalarial drugs	05.03.2012
6.	**Dr. Biplab Banerjee,** Department of Medicinal Chemistry and Molecular Pharmacology, Purdue University, USA	Exploring new methods: From bioactive natural products to small molecule therapeutics	26.03.2012
7.	**Dr. Dinesh C Joshi,** Department of Neuroscience, Univ. of Wisconsin Madison, USA	Mitochondrial functions and dynamics: Therapeutic targets in eurodegeneration	03.04.2012
8.	**Dr. Akash Kumar Jain,** Department of Organic Chemistry Indian Institute of Science, Bangalore, India	Design and development of new anticancer drugs and other therapeutic agents targeting various DNA structures	10.04.2012
9.	**Dr. Paolo Soldati,** Technical Director, Silicon Biosciences, Italy	Sorting and recovery of rare cells by DEPArray: A unique automated platform to enable isolation of single 100% pure circulating tumor cells and other biomedical research relevant applications	18.04.2012
10.	**Dr. Mukesh Samant,** Research Centre in Infectious Disease, Department of Microbiology and Immunology, Univ Laval, Quebec (QC) Canada	Developmental regulation of the translation initiation factor eI2alpha of *Leishmania* by a novel mechanism involving Nterminal methionine excision	30.04.2012
11.	**Dr. Syamal Roy,** Department of Infectious Diseases & Immunology Division, Indian Institute of Chemical Biology, Kolkata	Poor stability of peptide-MHC complex may specify defective cellular immunity in leishmaniasis	24.05.2012
12.	**Dr. Amit Sengupta,** General Secretary, All India Peoples Science Network	GOOD AND BAD MEDICINE: The genesis of intellectual property rights and their effects on healthcare and innovation	15.06.2012

	Name and Address	Topic	Date
13.	**Dr. Royle Fernadopulle,** Discoverx Corp. Fremont, CA, USA	Innovative kinase assays for inhibitor discovery and selectivity profiling	21.06.2012
14.	**Dr. Supriya Shivakumar,** Global Manager for the Functional Genomics, Sigma Life Sciences, St. Louis, USA	Innovative technologies for gene regulation	25.06.2012
15.	**Mr. Vineet Gopal,** Executive Director, Gentech Marketing and Distribution (P) Ltd, New Delhi	Comprehensive laboratory animal monitoring system (CLAMS)	05.07.2012
16.	**Dr. Shikhar Mehrotra,** Dept. of Surgery, Microbiology & Immunology, Medical Univ., of South Carolina, USA	Targeting tyrosinase in anti-tumor and anti-self immunity	16.07.2012
17.	**Dr. Chaitanya Saxena,** CEO, Shantani Biotech	Advanced chemical proteomics approaches for deconvoluting drug targets from intact biological systems	17.08.2012
18.	**Dr. Seeta Ramanjaneyulu Gundimeda** Department of Molecular & Cellular Biology Baylor College of Medicine Houston, Texas	Endogenous lipid antigens	5.09.2012
19.	**Prof. D Balasubramanian** Director of Research L V Prasad Eye Institute, Hyderabad	Stem cell biology and therapy- the LV Prasad experience	16.10.2012
20.	**Dr. Prashant Sharma** Staff Scientist, National Cancer Institute, National Institutes of Health (NIH) USA	Small ubiquitin-like modifier (SUMO) post-translational modification in embryonic development and cancer.	17.10.2012
21.	**Dr. R. John MacLeod,** Canada Research Chair in Cell Physiology, Queens University, Kingston, Ontario, Canada	New roles of the calcium-sensing receptor in the prevention of colon cancer, wnt/beta catenine signaling, and mesothelioma	25.10.2012
22.	**Prof. Takeaki Ozawa,** Department of Chemistry University fo Tokyo, Japan	Opto-bianalysis for imaging and control of biological functions in live cells.	23.11.2012
23.	**Dr. Stuart A. Ralph,** University of Melbourne, Australia	Prioritising and characterising drug targets for malaria	27.11.2012
24.	**Dr. Mark McDowall,** Waters Pvt. Ltd.	Recent trends in mass spectrometry & its applications in the field of proteomics and metabolomics	27.11.2012
25.	**Dr. Gianfranco Bocchinfuso,** University of Rome, Tor Vergata, Italy	Different mechanisms of action of antimicrobial peptides: Insights from fluorescence spectroscopy experiments and molecular dynamics simulations	29.11.2012
26.	**Dr. Teruya Tamaru,** Department of Physiology, Toho University School of Medicine, Japan	Critical stress between life and death resets circadian rhythm via circadian phosphorylation signal	29.11.2012
27.	**Dr. Yasuharu Ninomiya,** National Institute of Radiological Sciences, Chiba, Japan	Overview of the National Institute of Radiological Sciences Chiba, Japan	29.11.2012
28.	**Prof. Santiago Lamas,** Director, The Centro Mixto CSIC-UAM de Biologia Molecular Severo Ochoa Nicolas Cabrera 1, Spanish Research Council, Madrid, Spain	MicroRNAs, oxidative stress and fibrosis	13.12. 2012
29.	**Dr. Omkar P Kulkarni,** Clinical Biochemistry, LMU, Germany	Autoimmune tissue injury : Regulation of inflammation and repair	19.12. 2012
30.	**Dr. Syed Raza Ali,** Cellular & Molecular Medicine University of California,USA	Novel treatments for bacterial infections	21.12.2012

3 Invited Lectures Delivered by Institute Scientists

Dr. T.K. Chakraborty

- Drug Discovery in India – Some Tips to Survive and Meet the Future Challenges, Department of Biological Sciences & Bioengineering, IIT, Kanpur, 29 September 2012
- Cyclic Cationic Antimicrobial Peptides (CAPs) as Potent Antimicrobial Agents, NOST Symposium, Agra, Oct 2012
- Drug Discovery in India – How to Meet the Future Challenges, DDIDC 2013, Mumbai, 16 January 2013
- Challenges in drug discovery – from natural products to designer molecules, ISMOC13, 6 February 2013

Dr. S.K. Puri

- Drug discovery for malaria : Challenges and opportunities, 4th Niper (RBL) Symposium, CSIR-CDRI, Lucknow, 25 February, 2012

Dr. C. Nath

- Protective effect of silibinin against Streptozotocin (ICV) induced memory impairment in mice, CSM Medical University, Lucknow 22 February, 2012
- Neurobics: A new hope for patients of Alzheimer's disease, Guru Nanak Dev University, Amritsar, 30 October, 2012

Dr. Madhu Dikshit

- Neutrophils derived nitric oxide: role in inflammatory conditions. International conference on Angiogenesis: Basics and Applications, Anna University, Chennai, 3 March, 2012
- Flow cytometry based Apoptosis Assays, CSIR-CDRI, Lucknow, 12 July, 2012
- Rac2 regulates iNOS derived free radical and nitration through interaction that facilitates its translocation to membrane: iNOS molecular characteristics and distribution in neutrophils, University of Kolkata, 12 October, 2012

Dr. Anil Kumar Dwivedi

- HPLC: Basic concepts to trouble shooting, PSIT, Kanpur, 28 January, 2012
- My experiences with anti malarial compounds, Rajkot University, Rajkot, 16 March, 2012

Dr J.K. Saxena

- Metabolic and chemotherapeutic approaches to eradicate Parasitic infections, Lucknow University, Lucknow, 31 January, 2012

Dr. Anuradha Dube

- Fluorescent *Leishmania donovani* and its application for drug discovery, Kolkata University, 12 October, 2012

Dr. Rakesh Shukla

- Involvement of NMDA receptor in Okadaic acid induced Neurotoxicity and Tau phosphorylation in rat brain, Guru Nanak Dev University, Amritsar, 29 October, 2012.

Dr. R.P. Tripathi

- Design and synthesis of new generation of antitubercular agents, 28 March, 2012
- Application of chemistry to control tuberculosis, 27 April, 2012
- Molecular design of sugars: Development of new molecules for human health, CSIR- Central Food Technological Research Institute, Mysore, Karnataka,13 December, 2012

Dr. Neeraj Sinha

- A novel approach for testing teratogenic potential of a new chemical Entity, IASST, Guwahati, 29 January, 2012

Dr. P.M.S. Chauhan

- Design and synthesis of nitrogen Heterocycles as novel therapeutic agents, Solapur University, Solapur, 21 January, 2012
- Perspectives and challenges in drug research: Design and synthesis of nitrogen heterocycles as novel therapeutic agents, IASST, Guwahati, Assam, 28 January 2012
- Perspectives and challenges in drug research: Nitrogen heterocycles and their combinatorial, Saurashtra University, Saurashtra, 16 March, 2012
- Design and synthesis of bioactive nitrogen heterocyclic and their combinatorial chemistry, Banaras Hindu University, 29 March, 2012
- Challenges in drug research : Role of combinatorial chemistry in drug development, Banaras Hindu University, 30 March, 2012

Dr. R. Ravishankar

- Structural biology and its applications to Drug discovery, Professional Bioinformatics Training Programme, Biotech Park, Lucknow, 19 November, 2012

Dr. J. Venkatesh Pratap

- X-ray Crystallography: An introduction, MMV, BHU, Varanasi, March, 2012

Dr. Brijesh Kumar

- Mass spectrometry tools for identification, characterization and authentication of Indian medicinal plants/parts for quality control, Lucknow Christian College, Lucknow, 24 March, 2012
- Chemotaxonomy of Indian medicinal plants using high resolution mass spectrometry techniques DARTMS & LC-MS/MS, GRKIS&T, Pharmacy, Jabalpur, 15 April, 2012
- Qualitative and Quantitative analysis of bioactive alkaloids in *Berberis* and *Mahonia* plant parts and use of PCA for marker identification, India Lab Automation, Renaissance Mumbai Convention Centre Hotel, Mumbai, India, 30th Nov. 2012

Dr. Renu Tripathi

- New approaches for the management of resistant malaria, Lucknow University, Lucknow, 30 December, 2011.

Dr. Saman Habib

- Targeting malaria by Open Source science, IIT-Kanpur, 13 January, 2012
- CSIR's OSDD^m initiative, Open Source Drug Discovery Meeting for Malaria, Sydney, Australia, 24 February, 2012
- CDRI-MMV: Building on strengths, MMV (Medicines for Malaria Venture) Stakeholders Meeting, New Delhi, 6 November, 2012

Dr. S.K. Rath

- Indian Genome Variation Consortium: Development and Role in Oral Cancer, KGMU, Lucknow, 4 February, 2012
- Toxicity of Antimalarials, XXXII Annual STOX Meeting at IITR, Lucknow, 7 February, 2012
- Emerging techniques in molecular Biology, Lucknow University, Lucknow, 27 February, 2012
- Alternative to Animal Models: our initiatives, World Laboratory Animal day, 25 April, 2012

Dr. Amit Misra

- Inhalable microparticles containing isoniazid and Rifabutin, National Institute of research in tuberculosis, Chennai, 09 November, 2012

Dr. Sanjay Batra

- Drug Discovery efforts for Anti-infectives: Paradigm shift towards Open Source Model, IIT Kanpur, 13 January, 2012
- Approaches to aza-heterocycles using substituted Allylamines, Baldeo PG College Varanasi, 23 January, 2012
- Syntheses of aza-heterocycles via Cascade reactions, IITM, Chennai,12 February, 2012
- Reinvention, Repositioning and Open Science: Present paradigms for discovery of drugs for Anti-infectious Diseases, NIIST, Trivandrum, 2 March, 2012
- Adventures with synthesis of Natural Product like scaffolds, Lucknow University, 28 March, 2012
- Synthesis of natural product inspired chemical libraries, 3 July, 2012

Dr. Atul Goel

- Pyranone derived fluorescent molecules for drug development and organic light emitting diodes, University of Delhi, Delhi 22 January, 2012
- Diversity oriented synthesis of small organic fluorescent molecules and their applications, CSIR-CDRI, Lucknow 25 February, 2012
- New donor-Acceptor small organic fluorescent molecules and their applications in biological and material sciences 2012 Mid-Year Meeting of the Chemical Research Society of India, Lucknow, 21 July, 2012

Dr. A.K. Shaw

- Professor D.P. Chakraborty 60th Birth Anniversary Commemoration Award lecture, National Institute of Technical Teachers' Training and Research, Bhopal, 12 December, 2012

Dr. Manish K. Chourasia

- Improved transdermal drug delivery through lipid vesicles having ethanol as integral component, 3rd World Congress on Biotechnology, Hyderabad, 15 September, 2012

Dr. M. Imran Siddiqi

- Introduction to Bioinformatics: From Protein-ligand interaction to computer aided drug design, Workshop on Bioinformatics: principles, techniques and applications, SGPGI, Lucknow, 20 January, 2012
- Computer-aided molecular modeling, DBT Workshop on "Chemo-informatics and computational drug design, Biotech Park, Lucknow, 28 February, 2012
- Computer-assisted drug design: Application in rational identification and design of potent anti-tubercular agents, National Symposium on Biomolecular interaction and drug discovery. AMU, Aligarh, 21 March, 2012
- Molecular modeling and drug design: Training workshop on interface between natural sciences and biosciences, 25 March, 2012
- Computational Approaches for Drug Design, DBT Workshop on "Drug Discovery: Design Methods and Applications". Biotech Park, Lucknow, 12 September, 2012
- Computer-aided drug design, DBT Workshop on "Recent trends in structural bioinformatics and drug designing", MMV, BHU, 12 October, 2012.
- Computer-aided drug design, "Professional Bioinformatics Training Programme, Biotech Park, Lucknow, 23 November, 2012

Dr. Ashish Arora

- NMR Solution Structure of Eukaryotic ADF/Cofilins, IISc. Bangalore, 07 February, 2012
- Understandings the soft skill of proteins using NMR spectroscopy, Dr. B. R. Ambedkar University, Lucknow, 14 December, 2012

Dr. Bathula Surendar Reddy

- Targeted cancer therapies: a chemical pharmaceutics approach, 3rd World Congress on Biotechnology, Hyderabad, 14 September, 2012

Dr. Manoj Barthwal

- Biological studies on CDRI compound-S007-867, CDRI, Lucknow, 31st August, 2012

Dr. Sripathi Rao Kulkarni

- Current Practices in Protection of Intangible Assets, CSIR-CDRI, Lucknow 25th February, 2012

Dr. Sanjeev Kanojiya

- Analytical Phytochemistry, Einstein College of Engineering, Sir C.V. Raman Nagar, Tirunelveli, 20 January, 2012
- Mass Spectrometry and its Application in Drug Discovery, CSIR-CDRI Lucknow, 31 August, 2012

Dr. Sarika Singh

- "Neurodegeneration and neuroprotection: Role of glial cells", XXX Annual Meeting of Indian Academy of Neurosciences, at Amritsar 30 October, 2012

4 Visits Abroad

(January - December 2012)

Name of the Scientist	Country	Purpose of Visit (Period of Deputation)
Dr. A K Saxena	Malaysia	To participate & deliver a plenary lecture in a workshop (12-14 June 2012)
	Singapore	To participate in workshop (15-17 June 2012)
Dr. Bijoy Kundu	USA	Regarding Automated Compound Storage and Retrieval System at M/S Brooks Automation (20-24 August 2012)
Dr. Naibedya Chattopadhyay	Austria	To participate in Symposium (28 November-01December 2012)
Dr. A K Shaw	Scotland	Under INSA, International Collaboration / Exchange Programme (01-28 March 2012)
Dr. Brijesh Kumar	Hungary	Under INSA, International Collaboration / Exchange Programme (31 July -27 August 2012)
Dr. Neena Goel	Germany	Under INSA-DFG Bilateral Exchange Programme (28 December 2012 to 26 January 2013)
Dr. Saman Habib	Australia	To attend the conference (19-24 February 2012)
Dr. Amit Misra	Japan	To attend a Symposium (28-29 February 2012)
	Japan	To attend the International Symposium (29-30 October 2012)
Mr. Pradeep Kumar	Nepal	To attend a Workshop cum Training (14-20 June 2012)
	Turkey	To attend the conference (12-21 October 2012)
	Australia	To attend the conference (22-25 October 2012)
Dr. Sanjay Batra	USA	Regarding Automated Compound Storage and Retrieval System at M/S Brooks Automation (20-24 August 2012)
Dr. Koneni V Sashidhara	USA	Under Indo-US Research Fellowship (IUSSTF & DST) (27 July 2012 – 26 July 2013)
Dr. J Venkatesh Pratap	France	For research purpose (16-22 November 2012)
Dr. Atul Kumar	USA	To attend the Scifinder advisory meeting (03-04 December 2012)
Dr. D P Mishra	Japan	Visited under collaborative project (08-20 March 2012)
Dr. Ritu Trivedi	Malaysia	To attend the Meeting (13-16 December 2012)
Dr. Anil Gaikwad	USA	For training on Fluorescence Activated Cell Sorter (16-20 January 2012)
Dr. Rajender Singh	USA	To participate in the Annual Meeting of the American Society of Human Genetics (06-10 November 2012)

5 Membership of Distinguished Committees / Boards

Dr. Tushar K. Chakraborty

- **Member**, American Chemical Society, USA;
- **Life Member**, (1) Chemical Research Society of India, (2) Indian Chemical Society, (3) Indian Peptide Society.
- **Member,** (1) Senior Science Committee, OSDD; (2) Chemical Sciences Sectional Committee, Indian Academy of Sciences; (3) Sectional Committee III in Chemical Sciences, The Indian National Science Academy (4) Program Advisory Committee (Organic Chemistry), DST; (5) Steering Committee, National Bio-resource Development Board, DBT; (6) Sub-committee of Sponsored Schemes Research Committee, CSIR; (7) Expert Committee, Drugs and Pharmaceuticals Research Programme, DST; (8) Drugs Technical Advisory Board, Ministry of Health & Family Welfare (9) Technical Advisory Committee, Technology Development and Utilization Programme for Women, DSIR; (10) High Powered Committee, NMITLI Projects, CSIR
- **Member Editorial Board**, (1) Indian Journal of Chemistry, B; (2) Indian Journal of Biochemistry & Biophysics; (3) The Natural Products Journal

Dr. A.K. Saxena

- **Member**, American Chemical Society, USA
- **Member**, (1) Expert Committee, Ministry of Chemicals & Fertilizers, Department of Pharmaceuticals (India) (2) IND Committee, Directorate General of Health Services, Office of Drugs Controller General (India), (3) REACH INDIA TASK FORCE, Department of Chemical and Petrochemicals, Govt. of India (4) Board of International Charitable Foundations' (Scientific Partnership) Coordinating Board, Russia, (5) Board of Directors, American Bibliography Inc. USA
- **UGC Nominee**, Advisory Committee, Special Assistance Programme, (1) Department of Chemistry, Saurashtra University, Rajkot, (2) Department of Chemistry, A. P. S University, Rewa
- **Secretary**, QSAR Society of India
- **Life Member**, (1) Indian Chemical Society, (2) Indian Association of Medicinal Chemists

Dr. C. Nath

- **Life Member**, (1) International Brain Research Organization; (2) National Academy of Medical Sciences; (3) Indian Pharmacological Society; (4) Indian Academy of Neurosciences; (5) Society of Toxicology, India
- **Member**, (1) Research Council (DG nominee), CSIR-Indian Institute of Toxicological Research (IITR), (2) Research Committee, UP Rural Institute of Medical Science & Research, (UP Govt), Safai, Etawah, (3) Academic Council JNU, New Delhi, (4) Advisory Committee for IND permission, Drug Controller General of India,
- **Chairperson,** Departmental Academic Advisory Committee [MS (Pharm.) Pharmaceutics], NIPER, Rae Barelli

Dr. A.K. Dwivedi

- **Life Member**, (1) Indian Pharmaceutical Association
- **Member**, Drugs Panel for New Drugs Manufacturing Licenses, Directorate of Medical & Health Services, Uttar Pradesh
- **Joint Secretary**, Indian Society of Chemists and Biologists, Lucknow

Dr. Madhu Dikshit

- **President**, Cytometry Society of India
- **Member**, (1) DBT (RCGM) Committee, (2) DST-WOS (A) Committee, (3) Member - CSIR (Organic & Med Chemistry and Chemical Tech, RC) Committee, (4) ICMR-PRC Committee,
- **Member, Editorial Board,** (1) Indian J. Pharmacology, (2) Proceedings of the National Academy Sciences India (Sec B)

Dr. Anuradha Dube

- **Member**, **Editorial Board**, (1) Journal of Biomedical Research; (2) BioMed Central, Infectious Diseases (Open Access)

Dr. J.K. Saxena

- **Secretary**, Indian Society for Parasitology
- **Vice President**, Society of Biologists and Chemists
- **Member Editorial Board**, Asian Pacific Journal of Tropical Medicine
- **Member,** Expert committee for Chemical and Pharmaceutical Sciences, UPCST, Lucknow
- **Life Member**, Indian Society for Parasitology; (2) Society of Biological Chemists (India); (3) Indian Immunological Society; (4) International Society of Applied Biology; (5) Indian National Science Congress Association; (6) Indian Society of Chemists and Biologists

Dr. Neeraj Sinha

- **Life Member**, (1) National Academy of Sciences, Allahabad, (2) Indian Society of Cell Biology, New Delhi, (3) Society of Toxicologists of India, Izatnagar, (4) Indian Science Congress Association, Kolkata, (5) Association of Biotechnology and Pharmacy, India.

Dr. R.P. Tripathi

- **Editorial Board Member,** (1) ARKIVOC (2) Journal of Organic Biological Chemistry

Mr. Vinay Tripathi

- **Member**, (1) Department of Health Research, Indian Council of Medical Research

Dr. D.S. Upadhyay

- **Member**, (1) CPCSEA sub-committee for rehabilitation of laboratory animals, (2) Live Stock Feed, Equipments and System, Sectional Committee, FAD 5, Bureau of Indian Standards, New Delhi, (3) Veterinary Council of India; (4) U.P Veterinary Council, Lucknow

- **CSIR Nominee**, National Institute of Animal Welfare, MoEF, Govt. of India

Dr. Anila Dwivedi

- **Life Member,** (1) Society of Reproductive Biology and Comparative Endocrinology, India; (2) Indian Society for Study of Reproduction and Fertility; Endocrine Society of India

Dr. V.L. Sharma

- **Life member,** (1) Chemical Research Society of India, Bangalore

Dr. Renu Tripathi

- **Life Member**, Zoological Society of India, Bodh Gaya

Dr. D.N. Upadhyay

- **Life Member**, Society for Advancement of Electrochemical Science & Technology

Dr. M.N. Srivastava

- **Member**, Board of panel for PSC on R&D of Central Sector Scheme for Conservation Development and Sustainable Management of Medicinal Plants, National Medicinal Plants Board, (AYUSH), Ministry of Health & Family Welfare, Government of India

Dr. A.K. Srivastava

- **Life Member**, Indian Society of Parasitology

Dr. Saman Habib

- **Member**, (1) Animal Sciences Review Committee, CSIR, New Delhi (2) Selection Committee for CSIR Nehru Post-doctoral Fellows (Life Sciences)

Dr. R. Ravishankar

- **Life member,** (1) Indian Crystallographic Association, (2) Indian Society of Cell Biology,
- **Member,** Working group on new TB drugs (WGND),

Dr. Y.S. Prabhakar

- **Editor,** Journal of Chemistry, Hindawi Publishers

Dr. Srikanta Kumar Rath

- **Joint Secretary-Elected**, Indian Society for Cell Biology (2011-13);
- **Life member**, (1) Indian Society of Cell Biology; (2) Society of Toxicology, India; (3) Environmental Mutagen Society of India; (4) Genome Foundation, India
- **Member**, **Editorial Board**, Toxicology International

Dr. Amit Misra

- **Life Member**, Indian Pharmaceutical Association

Dr. Sanjay Batra

- **Member**, (1) Council of NOST, India (2011-2014); (2) Governing Council, Chemical Research Society of India, Bangalore (3) Project Advisory Committee for Chemical Sciences committee Fast Track, DST SERB

Dr. Atul Goel

- **Life member,** (1) Chemical Research Society of India, Bangalore; (2) Indian Chemical Society

Dr. M. Imran Siddiqi

- **Member,** Advisory Committee for Biotechnology, (2012-2015) Council of Science and Technology, (CST) UP

Dr. R.K. Tripathi

- **Life Member**, (1) Society of Toxicology, India; (2) Indian Society of Cell Biology

Dr. P.R. Mishra

- **Member**, **Editorial Board**, (1) Recent Patents in Drug Delivery and Formulations, (2) Journal of Pharmaceutical and Biomedical Sciences; (2) Journal of Pharmaceutical and Biomedical Sciences
- **Founder Member**, Indian Nanoscience Society
- **Life Member**, Indian Pharmaceutical Association

Dr. Manish K. Chourasia

- **Life Member**, Indian Pharmacy Graduate Association

Dr. Amogh Sahasrabuddhe

- **Life member,** Indian Society of Cell Biology

Dr. Prem Prakash Yadav

- **Life member,** Chemical Research Society of India, Bangalore

Dr. Kalyan Mitra

- **Life Member**, Electron Microscopy Society of India (EMSI)

Dr. Aamir Nazir

- **Life Member**, Indian Society of Cell Biology

Dr. Poonam Singh

- **Life Member**, Society of Toxicology, India

Mr. Ranveer Singh

- **Life member**, Indian Institute of Chemical Engineer

Mr. Wahajuddin

- **Member**, **Editorial Board**, (1) Journal of Bioequivalence & Bioavailability; (2) Analytica Pharmaceutica Acta; (3) Pharmaceutical Regulatory Affairs
- **Life Member**, (1) Indian Society for Mass Spectrometry; (2) Indian Pharmacological Society; (3) Indian Science Congress Association; (4) Laboratory Animal Science Association of India; (5) Biotechnology Research Society of India; (6) Indian Society of Analytical Scientists; (7) Association of Biotechnology and Pharmacy; (8) Society of Biological Chemists, India; (9) IDMA- Association of Pharmaceutical Analysts (APA)

Dr. Sripathi Rao Kulkarni

- **Life Member**, (1) Association of Microbiologists of India; (2) Society for Information Science, India

Dr. J.R. Gayen

- **Life Member**, (1) The Society of Biological Chemists (India), Bangalore, India; (2) Association of Biotechnology and Pharmacy (ABAP), India; (3) Indian Society for Mass Spectrometry (ISMAS), Mumbai, India
- **Fellow** of Association of Biotechnology and Pharmacy, Guntur

Dr. Sanjeev Yadav

- **Life Member**, (1) Indian Science Congress Association, Kolkata; (2) Society for Science & Environment, India

Notes

अनुसंधान उपलब्धियाँ


वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद, भारत
CSIR INDIA

1 पेटेण्ट्स

विदेशों में स्वीकृत पेटेण्ट

2012

1. **शीर्षक:** ए नॉवेल यूज़ ऑफ हर्बल एक्स्ट्रेक्ट्स ऑफ *सालिकोर्निया* स्पिसीज एक्टिव अगेन्स्ट ट्यूबरकुलोसिस एण्ड प्रॉसेस फॉर द प्रिपेरेशन देअरऑफ
साउथ अफ्रीकन पेटेण्ट नं.: 2006/02576 **आवंटन की तिथि:** 30.05.2012
अन्वेषक: मीना रजनीकांत राठौड़, भूपेन्द्र धनवन्तरि सेठिया, जयन्त बटुकराय पाण्ड्या, पुष्पितो कुमार घोष, प्रकाश जगजीवनभाई डोडिया, ब्रह्म शंकर श्रीवास्तव, रंजना श्रीवास्तव, अनिल श्रीवास्तव, छित्तर मल गुप्ता और विनीता चतुर्वेदी

2. **शीर्षक:** फार्मास्युटिकल कंपोजिशन यूजफुल एज एसिटाइलकोलिन एस्टरेज इन्हिबिटर
यूएस पेटेण्ट नं.: 8188143 **आवंटन की तिथि:** 29.05.2012
अन्वेषक: जनास्वामी मधुसूदना राव, भीमाप्का चीनाराजू, पुलेला व्यकटा श्रीनिवास, कटरागड्डा सुरेशबाबू, झिलु सिंह यादव, कोण्डापुरम विजय राघवन, हेमन्त कुमार सिंह और चण्डीश्वर नाथ

3. **शीर्षक:** नॉवेल डोनर–एक्सेप्टर फ्लूरीन स्काफ्फोल्डस: ए प्रॉसेस एण्ड यूज़ेज देअरऑफ
कोरियन पेटेण्ट नं.: 1006060 **आवंटन की तिथि:** 09.05.2012
अन्वेषक: अतुल गोयल, सुमित चौरसिया, विजय कुमार, सुन्दर मनोहरन और रघुबीर सिंह आनन्द

4. **शीर्षक:** ऑक्सी सब्स्टीट्यूटेड फ्लावोन्स/चाल्कोन्स एज़ एण्टीहाईपरग्लाइसेमिक एण्ड ऐण्टीडाइसलिपिडिमिक एजेण्ट्स
जापानीज़ पेटेण्ट नं 4640141 **आवंटन की तिथि:** 02.03.2012
अन्वेषक: राम प्रताप, मावुरपु सत्यनारायना, चण्डीश्वर नाथ, राम रघुबीर, अंजु पुरी, रमेश चन्द्र, प्रीति तिवारी और बृजेन्द्र के त्रिपाठी
सहायक सदस्य: अशोक कुमार खन्ना

2010–11 (पूर्व वार्षिक प्रतिवेदनों में सम्मिलित नहीं)

5. **शीर्षक:** हर्बल मेडिकामेन्ट्स फॉर ट्रीटमेन्ट्स ऑफ न्यूरोसेरेब्रोवॉस्क्युलर डिस्आर्डर्स
कैनेडीयन पेटेण्ट नं.: 2473874 **आवंटन की तिथि:** 22.11.2011
अन्वेषक: मधुर रे, राघवेन्द्र पाल, सत्यवान सिंह और नन्दू मल खन्ना
सहायक सदस्य: झरना अरूण और माधुरी चौधरी

6. **शीर्षक:** ए प्रॉसेस फॉर हेट्रोलॉगस एक्सप्रेशन एण्ड लॉर्ज स्केल प्रोडक्शन ऑफ फंक्शनली एक्टिव एंज़ायम ट्रायपैनोथियोन रेडेक्टेज ऑफ *लीशमैनिया डोनोवनी* इन प्रोकैरियोटिक सिस्टम
मैक्सिकन पेटेण्ट नं.: 292322 **आवंटन की तिथि:** 17.11.2011
अन्वेषक: नीना गोयल और मुकुल कुमार मित्तल

7. **शीर्षक:** सब्स्टीट्यूटेड1,2,4–ट्राइओक्जन्स यूज़फुल एज़ एण्टीमलेरिया एजेण्ट्स एण्ड ए प्रॉसेस फॉर द प्रिपेरेशन देअरऑफ
वियतनाम पेटेण्ट नं.: 9483 **आवंटन की तिथि:** 27.09.2011
अन्वेषक: चन्दन सिंह, पल्लवी तिवारी और सुनील कुमार पुरी
सहायक सदस्य: शशि रस्तोगी और अखिलेश कुमार श्रीवास्तव

8. **शीर्षक:** हर्बल एक्स्ट्रेक्ट्स ऑफ *सलिकोर्निया* स्पेसिज़, प्रॉसेस ऑफ प्रिपेरेशन देअरऑफ, यूज़ देअरऑफ अगेन्स्ट ट्यूबरकुलोसिस
अफ्रीकन पेटेण्ट नं.: एपी 2250 **आवंटन की तिथि:** 29.07.2011
अन्वेषक: मीना रजनीकांत राठौड़, भूपेन्द्र धन्वंतरि सेथिया, जयंन्त बटुकराय पाण्ड्या, पुष्पितो कुमार घोष, प्रकाश जगजीवनभाई डोडिया, ब्रह्म शंकर श्रीवास्तव, रंजन श्रीवास्तव, अनिल श्रीवास्तव, छित्तर मल गुप्ता और विनीता चतुर्वेदी

9. **शीर्षक:** मर्केप्टो–फ़िनायल–नेप्थाइल–मीथेन डेरीइवेटिव्स एण्ड प्रिपेरेशन देअरऑफ
जर्मन पेटेण्ट नं.: 1692101 **आवंटन की तिथि:** 06.07.2011
अन्वेषक: संगीता, अतुल कुमार, मनमोहन सिंह, गिरीश कुमार जैन, पुव्वाडा श्री रामचन्द्र मूर्ति और सुप्रभात रे
सहायक सदस्य : वसी अहमद, ए.एच. अंसारी, मोहिनी छाबड़ा और गोबिन्द केसरी

10. **शीर्षक:** मर्केप्टो–फ़िनायल–नेप्थाइल–मीथेन डेरीइवेटिव्स एण्ड प्रिपेरेशन देअरऑफ
फ्रेन्च पेटेण्ट नं.: 1692101 **आवंटन की तिथि:** 06.07.2011
अन्वेषक: संगीता, अतुल कुमार, मनमोहन सिंह, गिरीश कुमार जैन, पुव्वाडा श्री रामचन्द्र मूर्ति और सुप्रभात रे
सहायक सदस्य : वसी अहमद, ए.एच. अंसारी, मोहिनी छाबड़ा और गोबिन्द केसरी

11. **शीर्षक:** मर्केप्टो–फ़िनायल–नेप्थाइल–मीथेन डेरीइवेटिव्स एण्ड प्रिपेरेशन देअरऑफ
यूरोपियन पेटेण्ट नं.: 1692101 **आवंटन की तिथि:** 06.07.2011
अन्वेषक: संगीता, अतुल कुमार, मनमोहन सिंह, गिरीश कुमार जैन, पुव्वाडा श्री रामचन्द्र मूर्ति और सुप्रभात रे
सहायक सदस्य : वसी अहमद, ए.एच. अंसारी, मोहिनी छाबड़ा और गोबिन्द केसरी

12. **शीर्षक:** मर्केप्टो–फ़िनायल–नेप्थाइल–मीथेन डेरीइवेटिव्स एण्ड प्रिपेरेशन देअरऑफ
ब्रिटिश पेटेण्ट नं.: 1692101 **आवंटन की तिथि:** 06.07.2011
अन्वेषक: संगीता, अतुल कुमार, मनमोहन सिंह, गिरीश कुमार जैन, पुव्वाडा श्री रामचन्द्र मूर्ति और सुप्रभात रे
सहायक सदस्य : वसी अहमद, ए.एच. अंसारी, मोहिनी छाबड़ा और गोबिन्द केसरी

13. **शीर्षक:** हर्बल मेडिकामेन्ट्स फॉर ट्रीटमेन्ट ऑफ न्यूरोसेरेब्रोवास्क्युलर डिस्आर्डर्स
इस्टोनियन पेटेण्ट नं.: 05374 **आवंटन की तिथि:** 16.02.2011
अन्वेषक: मधुर रे, राघवेन्द्र पाल, सत्यवान सिंह और नन्दू मल खन्ना
सहायक सदस्य: झरना अरूण और माधुरी चौधरी

14. **शीर्षक:** सब्स्टीट्यूटेड1,2,4–ट्राइओक्जन्स यूज़फुल एज़ एण्टीमलेरिया एजेण्ट्स एण्ड ए प्रॉसेस फॉर द प्रिपेरेशन देअरऑफ
मैक्सिकन पेटेण्ट नं.: 278119 **आवंटन की तिथि:** 13.08.2010
अन्वेषक: चन्दन सिंह, पल्लवी तिवारी और सुनील कुमार पुरी
सहायक सदस्य: शशि रस्तोगी और अखिलेश कुमार श्रीवास्तव

15. **शीर्षक:** हर्बल मेडिकामेन्ट्स फॉर ट्रीटमेन्ट ऑफ न्यूरोसेरेब्रोवास्क्युलर डिस्आर्डर्स
इण्डोनेशियन पेटेण्ट नं.: 0026228 **आवंटन की तिथि:** 23.07.2010
अन्वेषक: मधुर रे, राघवेन्द्र पाल, सत्यवान सिंह और नन्दू मल खन्ना
सहायक सदस्य: झरना अरूण और माधुरी चौधरी

16. **शीर्षक:** हर्बल मेडिकमेन्ट्स फॉर ट्रीटमेन्ट ऑफ न्यूरोसेरेब्रोवास्क्युलर डिस्आर्डर्स
श्रीलंकन पेटेण्ट नं.: 13379 **आवंटन की तिथि:** 03.06.2010
अन्वेषक: मधुर रे, राघवेन्द्र पाल, सत्यवान सिंह और नन्दू मल खन्ना
सहायक सदस्य: झरना अरूण और माधुरी चौधरी

भारत में स्वीकृत पेटेण्ट्स

2012

1. **शीर्षक:** हर्बल 5-[2-(2,6,6-ट्राईमिथाइल–सायक्लोहेक्स-2-इनायल)-इथेनायल]-आईसोक्साजोल
पेटेण्ट नं.: 254367 **आवंटन की तिथि:** 29.10.2012
अन्वेषक: शिवाजी नारायण सूर्यवंशी, सुमन गुप्ता, रामेश और नवीन चन्द्रा
सहायक सदस्य: मंजू और शिवराम

2. **शीर्षक:** नॉवेल ग्लाइकोसाइल–डी–फ्रूक्टोज़ एज़ एण्टीहाईपरलिपिडेमिक एजेण्ट्स
पेटेण्ट नं.: 253810 **आवंटन की तिथि:** 27.08.2012
अन्वेषक: अनुप कुमार मिश्रा, पल्लवी तिवारी, अंजू पुरी, रमेश चन्द्र और गीतिका भाटिया

3. **शीर्षक:** ए प्रॉसेस फॉर द प्रिपेरेशन ऑफ नॉवेल 1-[(4-डाइफिनायलमिटइल)-पाइपेराज़िन-1-इल]-3-अरइलऑक्सीप्रोपेन-2-ओल
पेटेण्ट नं.: 253738 **आवंटन की तिथि:** 22.08.2012
अन्वेषक: कल्पना भण्डारी और राम रघुबीर
सहायक सदस्य: अनुप कुमार श्रीवास्तव और तरूण लता सेठ

4. **शीर्षक:** नॉवेल ईस्टर डेरीवेटिव्स ऑफ डाइहाइड्रोआर्टिमिसिनिन
पेटेण्ट नं. 253045 **आवंटन की तिथि:** 20.06.2012
अन्वेषक: चंदन सिंह, संदीप चौघरी और सुनील कुमार पुरी
सहायक सदस्य: शशि रस्तोगी, अखिलेश कुमार श्रीवास्तव और कमलेश कुमार सिंह

5. **शीर्षक:** ऑक्सी सब्स्टीट्यूटेड चाल्कोन्स एज एण्टीहाइपरग्लाइसेमिक एण्ड एण्टीडिसलिपिडेमिक एजेण्ट्स
पेटेण्ट नं. 252167 **आवंटन की तिथि:** 30.04.2012
अन्वेषक: राम प्रताप, मावुरपु सत्यानारायन, चण्डीश्वर नाथ, राम रघुबीर, अंजु पुरी, रमेश चन्दर, प्रीति तिवारी, बृजेन्द्र कुमार त्रिपाठी और अरविन्द कुमार श्रीवास्तव

विदेशों में आवेदित पेटेण्ट्स

2012

1. **शीर्षक:** एन–(3–((डाइथाइलएमिनो) मिथायल)–4–हाईड्रोक्सीफिनायल)–एन–(क्युनोलिन–4–यल) स्लफोनोमाइड डेरीवेटिव्स फॉर द ट्रीटमेन्ट ऑफ ट्यूबरकुलोसिस
पीसीटी एप्लीकेशन नं.: पीसीटी/आईएन2013/000006 **आवेदन की की तिथि:** 03.01.2013
अन्वेषक: सुप्रिया सिंह, कुलदीप कुमार राय, साहेब राज खान, विवेक कुमार कश्यप, संदीप कुमार शर्मा, मंजू यशोदा कृष्णन्, विनीता चतुर्वेदी, सुधीर सिन्हा, रंजना श्रीवास्तव और अनिल कुमार सक्सेना

2. **शीर्षक:** फार्मास्यूटिकल कम्पोजिशन्स यूज़फुल एज़ एसिटाइलकोलिन एस्टरेज इनहिबिटर्स
यू एस पेटेण्ट एप्लीकेशन नं. 13/460472 **आवेदन की तिथि:** 30.04.2012
अन्वेषक: जनास्वामी मधुसूदन राव, भीमाप्का चिनाराजू, पुलेला वेंकटा श्रीनिवास, कट्रागड्डा सुरेश बाबू, झीलू सिंह यादव, कोण्डापुरम विजया राघवन, हेमन्त कुमार सिंह और चण्डीश्वर नाथ

3. **शीर्षक:** *डलबर्जिया सिस्सो* डिराइव्ड एक्स्ट्रेक्ट एण्ड कम्पाउण्ड्स फॉर द प्रिवेन्शन ऑफ अस्टियो–हेल्थ रिलेटेड डिस्आर्डर्स डिज़ेनेटेड एज़ ओस्टियोनैचुरलकेयर
पीसीटी पेटेण्ट एप्लीकेशन नं. पीसीटी/आईएन2012/000301 **आवेदन की तिथि:** 25.04.2012
अन्वेषक: राकेश मौर्या, प्रीति दीक्षित, रितु त्रिवेदी, विक्रम खेद्गिकर, ज्योति गौतम, अविनाश कुमार, दिव्या सिंह, शीलेन्द्र प्रताप सिंह, वहाजुद्दीन, गिरीश कुमार जैन और नैवेद्य चट्टोपाध्याय
सहायक सदस्य: सतीश चन्द्र तिवारी, बेंदांग्ला चाग्किजा और प्रियंका कुशवाहा

4. **शीर्षक:** सब्स्टीट्युटेड 4–एरिलथियाजॉल–2–हाईड्राजोन्स फॉर द ट्रीटमेंट ऑफ ट्युबरकुलोसिस
पीसीटी पेटेण्ट एप्लीकेशन नं. पीसीटी/आईएन2012/000145 **आवेदन की तिथि:** 01.03.2012
अन्वेषक: सुप्रिया सिंह, कुलदीप कुमार राय, संदीप कुमार शर्मा, रंजना श्रीवास्तव, विनीता चतुर्वेदी, अनिल कुमार सक्सेना
सहायक सदस्य: ज़ाहिद अली, अरिमर्दन सिंह कुशवाहा

5. **शीर्षक:** सब्स्टीट्यूटेड 1, 2, 3, 4–टेट्राहाइड्रोक्विनोलिन–7 यिल कार्बामेट्स, देअर प्रिपेरेशन एण्ड यूज देयरऑफ ऐज़ ऐसिटाइलकोलीन एस्टरेज (AChE) इनहिबिटर्स फॉर द ट्रीटमेंट ऑफ अलजाइमर्स एण्ड अदर न्यूरोडिजेनरेटिव डिजीज़
पीसीटी पेटेण्ट ऐप्लीकेशन नं. पीसीटी/आईएन2012/000053 **आवेदन की तिथि:** 24.01.2012
अन्वेषक: कुलदीप कुमार राय, संतोष कुमार टोटा, चण्डीश्वर नाथ, राकेश शुक्ला और अनिल कुमार सक्सेना

6. **शीर्षक:** नॉवेल डोलास्टेटिन मिमिक्स एज़ एण्टीकैंसर एजेण्ट्स
पीसीटी पेटेण्ट एप्लीकेशन नं: पीसीटी/आईएन2012/000051 **आवेदन की तिथि:** 23.01.2012
अन्वेषक: तुषार कान्ति चक्रवर्ती, गजुला प्रवीन कुमार, दुलाल पांडा और जयन्त अस्थाना

7. **शीर्षक:** काइरल 3–अमीनोमिथाइलपाइपेरिडीन डेरिवेटिव एज़ इनहिबिटर्स ऑफ कोलेज़न इन्ड्यूज्ड प्लेटलेट ऐक्टिवेशन एण्ड अधेशन
पीसीटी पेटेण्ट एप्लीकेशन नं.: पीसीटी/आईएन2011/000032 **आवेदन की तिथि:** 12.01.2012
अन्वेषक: दिनेश कमुार दीक्षित, मधु दीक्षित, तनवीर इरशाद सिद्दीकी, अनिल कुमार, मनोज कुमार, रवि शकंर भटट्ा, गिरीश कुमार जैन, मनोज कुमार बर्थवाल, अंकिता मिश्रा, विवेक खन्ना, प्रेम प्रकाश, मनीश जैन, विशाल सिंह, वर्षा गुप्ता और अनिल कुमार द्विवेदी

2010 (पूर्व वार्षिक प्रतिवेदनों में सम्मिलित नहीं)

1. **शीर्षक:** नॉवेल कॉउमैरिन–चाल्कोन हाइब्रिडस एज़ एण्टी–कैंसर एजेण्ट्स
पीसीटी पेटेण्ट एप्लीकेशन नं.: पीसीटी/आईएन2011/000515 **आवेदन की तिथि:** 05.08.2010
अन्वेषक: कोनेनि वेंकटा शशिधरा, अबधेश कुमार, मनोज कुमार, जयन्त सरकार और सुधीर कुमार सिन्हा

भारत में आवेदित पेटेण्ट्स

1. **शीर्षक:** एन–(3–डाइथाइलऐमिनो मिथाइल)–4–हाइड्रोक्सीफिनाइल)–एन–(क्विनोलिन–4–इल) सल्फोनैमाइड डेरीवेटिव्स फॉर द ट्रीटमेन्ट ऑफ ट्युबरकुलोसिस
पेटेण्ट एप्लीकेशन नं: 0014डीईएल2012 **आवेदन की तिथि:** 03.01.2012
अन्वेषक: सुप्रिया सिंह, कुलदीप कुमार रॉय, साहेब राज खान, विवेक कुमार कश्यप, संदीप कुमार शर्मा, यशोदा मंजु कृष्णन, विनीता चतुर्वेदी, सुधीर सिन्हा, रंजना श्रीवास्तव और अनिल कुमार सक्सेना

2. **शीर्षक:** नॉवेल सब्स्टीटयुटेड 2एच–बेन्जो(ई)इन्डाज़ोल–9–कार्बोक्सिलेट्स फॉर द ट्रीटमेन्ट ऑफ डायबिटीज़ एण्ड रिलेटेड मेटाबोलिक डिस्ऑर्डर्स
पेटेण्ट एप्लीकेशन नं.: 0262डीईएल2012 **आवेदन की तिथि:** 31.01.2012
अन्वेषक: अतुल गोयल, गौरव तनेजा, नेहा राहुजा, अरूण कुमार रावत, नताशा जायसवाल, अखिलेश कुमार ताम्रकार और अरविन्द कुमार श्रीवास्तव

3. **शीर्षक:** प्रिपेरेशन एण्ड एण्टीमलेरियल ऐक्टिविटी ऑफ नॉवेल क्विनोलिन डेरीवेटिव्स
पेटेण्ट एप्लीकेशन नं.: 0263डीईएल2012 **आवेदन की तिथि:** 31.01.2012
अन्वेषक: सेतुराम बंधाचार्या कट्टी, वहाजुल हक, कमुकुम श्रीवास्तव, सुनील कुमार पुरी, मनीष सिन्हा, अवकाश सोनी आरै राजीव कुमार श्रीवास्तव
सहायक सदस्य: कमलेश कुमार सिंह

4. **शीर्षक:** एनईएफ़–एएसकेआई इण्टेरैक्शन इनहिबिटर एज़ नॉवेल एण्टी एचआईवी थेराप्यूटिक्स
पेटेण्ट एप्लीकेशन नं.: 0594डीईएल2012 **आवेदन की तिथि:** 02.03.2012
अन्वेषक: राज कमल त्रिपाठी, बलवन्त कुमार, रविशंकर रामचन्द्रन, जितेन्द्र कुमार त्रिपाठी, स्मृति भदौरिया, जिमुत कान्ति घोष

5. **शीर्षक:** शॉर्ट एण्टीमाइक्रोबियल पेप्टाइड्स विथ हाई थेराप्यूटिक वैल्यू एण्ड एण्टीलीशमैनिया एक्टिविटी
पेटेण्ट एप्लीकेशन नं.: 1312डीईएल2012 **आवेदन की तिथि:** 30.04.2012
अन्वेषक: जिमुत कान्ति घोष, सर्फुद्दीन, प्रवीण कुमार शुक्ला, नृपेन्द्र नाथ मिश्रा, संध्या रानी डुंगडुंग, अपर्णा गोम्स, श्यामल राय, प्रशांता घोष और शमिक भट्टाचार्या

6. **शीर्षक:** आइसोएक्साजोल कन्टेनिंग हेट्रोरेटिनोइड शिफ़ बेसेज़ एण्ड प्रॉसेस फॉर प्रिपेरेशन देअरऑफ
पेटेण्ट एप्लीकेशन नं.: 2848डीईएल2012 **आवेदन की तिथि:** 12.09.2012
अन्वेषक: शिवाजी नारायण सूर्यवंशी, सुमन गुप्ता, संतोष कुमार, राहुल शिवहरे और शगुन शंकर

7. **शीर्षक:** इम्प्रूव्ड प्रॉसेस फॉर प्रिपेरेशन ऑफ साइक्लिक पेप्टाइड्स
पेटेण्ट एप्लीकेशन नं.: 0020डीईएल2013 **आवेदन की तिथि:** 03.01.2013
अन्वेषक: वहाजुल हक, श्याम राज यादव, राघवेन्द्र मुरूगुला, मधु दीक्षित और स्मृति

2 वैज्ञानिक सम्मेलनों में प्रस्तुत शोध पत्र

2011

औषधि खोज एवं विकास में चुनौतियाँ (सीडीडीडी), सीडीआरआई, लखनऊ (09 – 10 दिसम्बर)

1. *इन विट्रो* एण्टीलीशमैनियल ऐक्टिविटी ऑफ सिन्थेटिक टेट्राज़ोल टीथर्ड बीटा–कार्बोलिन्स; सुमन गुप्ता, राहुल शिवहरे, शाहनवाज़ खान, विकास त्यागी और प्रेम एम.एस. चौहान

2012

आईबीएस–2012, चेन्नई (19 – 21 जनवरी)

2. डायनमिक्स स्टडी ऑफ एलडीसीओएफ (LdCof) एंड टीजीएडीएफ (TgADF) एण्ड इट्स कम्पैरिज़न; अनुपम जैन, वैभव के. शुक्ला, सरिता त्रिपाठी, अशोक कुमार, राहुल यादव, प्रेम प्रकाश पाठक और आशीष अरोड़ा
3. सोल्यूशन स्ट्रक्चर एण्ड डायनमिक्स ऑफ एडीएफ फ्रॉम *टॉक्सोप्लाज़्मा गॉनडिइ*; राहुल यादव, वैभव के. शुक्ला, सरिता त्रिपाठी, अनुपम जैन, प्रेम प्रकाश पाठक, एसवीएसआर कृष्णा पुलावर्ती, सिमरन मेहता, डेविड सिबले और आशीष अरोड़ा

केमिकल तथा बायोलॉजिकल साइंसेज में विस्तार पर 17वाँ अन्तर्राष्ट्रीय सम्मेलन, शोलापुर विश्वविद्यालय, शोलापुर (21 – 24 जनवरी)

4. कॉपर (1) कैटलाइज़्ड कपलिंग ऑफ क्विनोलीन कार्बोक्जामाइड विद स्टाइरिल हैलाइडः सिन्थिसिज़ एण्ड बायोलॉजिकल इवैल्युएशन ऑफ पर्सपिकैमाइड ऐनालॉग्स एज़ एण्टी लीशमैनियल एजेण्ट; आनन्द कुमार पाण्डे, शाहनवाज़ खान, कुलदीप चौहान, राहुल शिवहरे, सुमन गुप्ता और प्रेम एम.एस. चौहान
5. सिन्थिसिज एण्ड बायोलॉजिकल इवैल्युएशन ऑफ बिस्ट्राएज़ीन ऐज़ ए पोटेन्शियल ऐण्टीलीशमैनियल एजेण्ट्स; कुलदीप चौहान, मोनी शर्मा, आनन्द के. पाण्डे, सुमन गुप्ता और प्रेम एम.एस. चौहान
6. डिज़ाइनिंग एण्ड सिन्थिसिज ऑफ बीटा–कार्बोलिन–क्विनाज़ोलीन हाइब्रिड मॉलीक्यूल्स ऐज़ ऐण्टीलीशमैनियल एजेण्ट्स; शिखा एस. चौहान, राहुल शिवहरे, सुमन गुप्ता और प्रेम एम.एस. चौहान
7. सायन्यूरिक क्लोराइड कैटेलाइज़्ड माइल्ड प्रोटोकॉल फॉर सिन्थसिज़ ऑफ बायोलॉजिकली ऐक्टिव डाइहाइड्रो/स्पाइरो क्विनाजोलिनोन्स एण्ड क्विनाज़ोलिनोन–ग्लाइकॉन्जुगेट्स; मोनी शर्मा, शशि पाण्डे, कुलदीप चौहान, दीप्ति शर्मा, बृजेश कुमार और पी.एम.एस. चौहान
8. ऑर्गैनिक एसिड कैटेलाइज़्ड सिंथिसिज़ ऑफ 2,3–डिहाइड्रोक्विनाज़ोलीन–4 (1एच)–ओन्स डेरिवटिव्स वाया एमसीआर; रश्मि शर्मा और प्रेम एम.एस. चौहान

मैक्रोमॉलीक्युलर क्रिस्टलोग्राफी में वर्तमान ट्रेण्ड पर अन्तर्राष्ट्रीय संगोष्ठी, चेन्नई (23 – 25 जनवरी)

9. डोमिनैन्स ऑफ ल्युसिन ज़िपर मोटिफ ओवर मीन हाइड्रोफोबिसिटी इन डिट्रमाइनिंग साइटोटॉक्सिसिटी ऑफ एण्टी माइक्रोबियल पेप्टाइड्स; सौरभ श्रीवास्तव, बृजेश कुमार पाण्डे, अकील अहमद, नीता अस्थाना, सर्फुद्दीन आज़मी और जिमुत कान्ति घोष

18वॉ अन्तर्राष्ट्रीय सम्मेलन पर्सपेक्टिव एण्ड चैलेन्जेज़ इन केमिकल एण्ड बायोलॉजिकल साइंसेजः इनोवेशन क्रॉसरोड्स, गुवाहाटी (पोस्ट आईएससीबीसी) (28 – 30 जनवरी)

10. ट्रांसलेशलन इनीशिएशन फैक्टर–1 ऑफ *वॉल्बाशिया*, द एन्डोसिम्बायन्ट ऑफ *ब्रूज़िया मैलाई* मॉलीक्युलर कैरक्टराइजेशन; जितेन्द्र कुमार नाग, निधि श्रीवास्तव, ज्योति गुप्ता और शैलजा भट्टाचार्य
11. केमो टैक्सोनॉमिकल स्ट्डीज ऑफ *बर्बेरिस पीटियोलैरिस* प्लाण्ट पार्ट्स यूजिंग डीएआरटीएमएस और क्यू–टीओएफ एलसीएमएस (एचआरएमएस) इन्स्ट्रूमेन्ट्स एण्ड देयर पीसीए एनॉलिसिस; अवन्तिका सिंह, विकास बाजपेई, मुकेश श्रीवास्तव, के.आर. आर्या और बृजेश कुमार

एनएमआर में नई खोजों पर संगोष्ठी और नेशनल मैग्नेटिक रेज़ोनेन्स सोसाइटी (एनएमआरएस–2012) का सम्मेलन, बंगलुरू (05 – 08 फरवरी)

12. रोबस्ट टर्न स्ट्रक्चर्स इन α3β साइक्लिक टेट्रापेप्टाइड्स इन्ड्यूज्ड एण्ड कन्ट्रोल्ड बाई कार्बो β3 ऐमिनों एसिड; श्रीकान्त शर्मा, अनीन्द्र शर्मा, रमा पी. त्रिपाठी और रवि शंकर अम्पापति
13. स्ट्रक्चरल इनसाइट्स इनटु प्युटेटिव मॉलिब्डेनम कोफ़ैक्टर बायोसिन्थिसिज़ प्रोटीन CMoac2 फ्रॉम *एम.ट्युबरकुलोसिस* एच37आरवी, विजय कुमार श्रीवास्तव, शुभ्रा श्रीवास्तव, आशीष अरोड़ा और जे.वी. प्रताप

14. एनएमआर असाइनमेन्ट ऑफ UNC-60A: डायवर्जेन्स विथ कंवेन्शनल ADF/cofilin फेमिली; वैभव के. शुक्ला, राहुल यादव, आशीष काबरा, अनुपम जैन, सरिता त्रिपाठी, दिनेश कुमार, शोइचिरो ओनो और आशीष अरोरा

इण्टरनेशनल कांफ्रेंस ऑन रिप्रोडक्टिव हेल्थ विद एम्फ़ेसिस ऑन स्ट्रैटजीज फॉर फैमिली प्लानिंग एण्ड 22वीं एन्युअल मीटिंग ऑफ दि इंडियन सोसायटी फॉर दि स्टडी ऑफ रिप्रोडक्टिव एण्ड फर्टिलिटी (आईएसएस आरएफ) 'आईसीएमआर सेंटीनरी सेलीब्रेशन', ऐम्स, नई दिल्ली (19 – 21 फरवरी)

15. डिज़ाइन एण्ड सिंथिसिज़ ऑफ नॉवेल पाइपेराज़ीन, डेरिवेटिव्स एज़ पोटेन्ट एण्टीस्परमैटोज़ेनिक एजेण्ट्स; संतोष जांगीड़, वीनू बाला, ललित कुमार, अमित सारस्वत, नन्द लाल, गोपाल गुप्ता और विष्णु एल. शर्मा

16. डेवलपमेन्ट ऑफ कन्वीनिएंट वुमन कन्ट्रोल्ड कॉन्ट्रासेप्टिव्स; वीनू बाला, संतोष जांगीड़, विष्णु एल. शर्मा और गोपाल गुप्ता

मलेरिया हेतु आण्विक अप्रोच (एमएएम2012) लोर्न, आस्ट्रेलिया (20 – 23 फरवरी)

17. ट्रांसलेशन फैक्टर्स फॉर प्रोटीन सिन्थिसिज इन *प्लाज़मोडियम ऑरगैनिल्ज़*; अंकित गुप्ता, स्नोबर एस. मीर, कैथरीन पुटनम, आफ़रीन हैदर, सुनीति वैश्य, सुबीर विस्वास, एरिन ई. लिम, स्टुअर्ट ए. रैल्फ और समन हबीब

नेनोबायो–2012, अमृता सेन्टर फॉर नैनोमेडिसिन एण्ड मॉलीक्युलर मेडिसिन, अमृता इंस्टीट्यूट ऑफ मेडिकल साइंसेज एण्ड रिसर्च सेन्टर, कोच्चि, केरल, भारत (21 – 23 फरवरी)

18. फॉरम्युलेशन एण्ड इवैल्युएशन ऑफ सेन्टक्रोमान ट्रान्सडर्मल पैचेज़ बेस्ड ऑन एथिलसेल्युलोज़ मैट्रिसेज़, किरन खण्डेलवाल, शक्तिदीप पचौरी, स्वाति सिंह, मधुमिता श्रीवास्तव, वर्षा गुप्ता और अनिल कुमार द्विवेदी

19. प्रिपरेशन एण्ड इवैल्युएशन ऑफ डिपो इंजेक्टेबल माइक्रोस्फेयर्स ऑफ सेन्टक्रोमान; शक्तिदीप पचौरी, किरन खण्डेलवाल, स्वाति सिंह, वर्षा गुप्ता, अनिल कुमार द्विवेदी और कल्याण मित्रा

नेशनल कांफ्रेस ऑन ओमिक्स फॉर बायोटेक्नोलॉजी, अज़मेर, राजस्थान (22 – 23 फरवरी)

20. रिकॉम्बीनेन्ट ट्रिहैलोज़–6–फॉस्फेट ऑफ *ब्रूज़िया मैलाई* क्रॉस रिऐक्ट्स विद द ह्यूमन बैंक्रोप्टियन एण्टीबॉडीज़ एण्ड एनजेण्डर्स ए रोबस्ट प्रोटेक्टिव इम्यून आउटकम इन बॉल्ब/सी माइस; ज्योति गुप्ता, सुशीला कुशवाहा, प्रशान्त कुमार सिंह, विशाल कुमार सोनी और शैलजा मिश्रा–भट्टाचार्या

21. *विथैनिया सोमनीफेरा* केमोटाइप्स एनएमआईटीएलआई101आर, एनएमआईटीएलआई118आर, एनएमआईटीएलआई128आर एण्ड विदाफेरिन ए प्रोटेक्ट *मैस्टोमिज़ काउचा* फ्रॉम *ब्रूज़िया मैलाई* इन्फेक्शन; विशाल कुमार सोनी, सुशीला कुशवाहा, प्रशांत कुमार सिंह, नसरीन बानो, अनिल कुमार, राजेन्द्र सिंह संगवान और शैलेजा मिश्रा–भट्टाचार्या

22. *ब्रूज़िया मैलाई* इनफेक्टिव लार्वा इन्ड्यूस ट्रेग (Treg) सेल्स दु मॉड्यूलेट प्रोइन्फ्लेमेटरी रिसपॉन्स ऑफ rWSP इन बाल्ब/सी माउस; मनीषा पाठक, मीनाक्षी वर्मा, मृगांक श्रीवास्तव और शैलेजा मिश्रा–भट्टाचार्या

23. ट्रिहैलोज़–6 फॉस्फेट फॉस्फेटेज ऑफ *ब्रूज़िया मैलाई* इलिसिट्स डिफ़रेंशियल प्रोटेक्शन इन प्रेजेन्स ऑफ डिफ़रेन्ट एड्जुवेन्ट्स अगेन्स्ट होमोलोगस इन्फेक्शन; सुशीला कुशवाहा, प्रशांत के. सिंह, मीनाक्षी वर्मा और शैलेजा मिश्रा–भट्टाचार्या

24. वैलिडेशन ऑफ *ब्रूज़िया मैलाई* इन्डिपेन्डेन्ट फॉस्फोग्लिसरेट म्यूटेज़ (Bm-iPGM) एज़ वाइटल एण्टी फाइलेरियल ड्रग टारगेट बाई आरएनए इन्टरफ़िरेन्स (RNAi), प्रशांत कुमार सिंह, सुशीला कुशवाहा, मो. शहाब और शैलेजा मिश्रा–भट्टाचार्या

25. इम्यून कैरेक्टराइजेशन ऑफ यूडीपी–एन–एसिटिलग्लूकोसामाइन इनोलपाइरूविल ट्रांसफरेज ऑफ बैक्टीरियल एन्डोसिम्बॉएण्ट *वॉलबैशिया* ऑफ ह्यूमन लिम्फैटिक फाइलेरियल पैरासाइट *ब्रूज़िया मैलाई*; मो. शहाब, प्रशान्त के. सिंह, सुशीला कुशवाहा और शैलेजा मिश्रा–भट्टाचार्या

चिकित्सा रसायन और औषधि निर्माण विज्ञान में चतुर्थ नाइपर (रायबरेली)–सीडीआरआई संगोष्ठी (23 – 25 फरवरी)

26. सिंथिसिज़ ऑफ डाइथायोकार्बामेट डेरीवेटिव्स कन्टेनिंग डायसल्फाइड लिंकेज वाया रिंग ओपनिंग ऑफ साइक्लिक ट्राइथायोकार्बोनेट विद एमाइन अण्डर सॉल्वेन्ट–कैटालिस्ट फ्री कन्डीशन; कार्तिक नन्दी कोंडा, नन्द लाल, अमित सारस्वत और विष्णु एल. शर्मा

27. सिंथिसिज़, ऑप्टिकल रेज़ोल्यूशन एण्ड ओस्टियोजेनिक एक्टिविटी ऑफ मेडीकार्पिन; गोविन्द तिवारी, आशुतोष रघुवंशी, अमित कुमार, दिव्या सिंह, एन. चट्टोपाध्याय और अतुल गोयल

28. न्यू पायरैनोन–डिराइव्ड डोनर–एक्सेप्टर ऑर्गेनिक फ्लोरेसेन्ट मॉलीक्युल्स फॉर बायोलॉजिकल प्रोब्स एण्ड ऑर्गेनिक इलेक्ट्रॉनिक्स; आशुतोष शर्मा, विजय कुमार और अतुल गोयल

फेडरेशन ऑफ इम्यूनोलॉजिकल सोसायटीज़ ऑफ एशिया ओशियानिया (एफआईएमएसए) की पांचवीं कांग्रेस, नई दिल्ली (14 – 17 मार्च)

29. मॉलिक्युलर क्लोनिंग एण्ड इम्यूनोकेमिकल कैरेक्टराइजेशन ऑफ लैक्टेट डिहाइड्रोज़िनेज़ ऑफ *प्लाज़मोडियम नॉलेसी*; वी. सिंह, डी.सी. कौशल, एस. राठौर, एन. कुमार और एन.ए. कौशल

30. एण्टीबॉडी टाइटर्स अगेन्स्ट रिकॉम्बीनेन्ट 19 केडीए फ्रैग्मेन्ट ऑफ *पी. साइनोमोल्गी* एमएसपी–1 एण्टीजन इन वैक्सीनेटेड मंकी सेरा कोरिलेट विद प्रोटेक्शन; एन.ए. कौशल, डी.सी. कौशल, वी. सिंह और एस.के. पुरी

31. इनहिबिशन ऑफ सीसी केमोकाइन रिसेप्टर 9 प्रोलॉन्स सरवाइवल इन ए म्यूरिन मॉडल्स ऑफ ऐक्यूट ग्राफ्ट वर्सज़ होस्ट डिज़ीज; मृगांक श्रीवास्तव

एडवांसेज इन बायोलॉजिकल साइंसेज पर अन्तर्राष्ट्रीय सम्मेलन, कन्नूर, केरल (15 – 17 मार्च)

32. क्लोनिंग एण्ड कैरेकटराइजेशन ऑफ ट्रांसलेशनली कन्ट्रोल्ड ट्यूमर प्रोटीन होमोलॉग ऑफ *पी. विन्केइ* – ए स्ट्रेस रिलेटेड प्रोटीन; अनुज त्रिपाठी और एस.के. पुरी

33. मॉलीक्युलर कैरेक्टराइजेशन ऑफ प्यूरिन न्यूक्लिओसाइड फॉस्फोरिलेज़ फ्रॉम *पी. विन्केइ* टु इल्यूसिडेट इट्स रोल इन रेजिस्टेन्स टु आर्टीमीथर; संतोष कुमार, अवकाश सोनी, कार्तिका प्रकाश और एस.के. पुरी

34. रिलेटिव एफ़िकेसी ऑफ नीम ऑयल वर्सेज़ टैमोक्जीफेन ऑन एमसीएफ–7 ह्यूमन ब्रैस्ट कैंसर सेल्स; आर. शर्मा, एन. सिंह, एच. श्याम और अनिल के. बालापुरे

जैव उपलब्धता और जैव संतुलन पर तीसरी अंतर्राष्ट्रीय कांग्रेस, औषधीय अनुसंधान एवं विकास शीर्ष सम्मेलन, हैदराबाद (26 – 28 मार्च)

35. एचपीएलसी मेथड डिवेलपमेन्ट फॉर नैरिन्जेनिन एण्ड इट्स ग्लाइकोसाइड इन रैट सीरम एण्ड देयर बायोअवेलेबिलिटी स्टडीज; वर्षा गुप्ता, अनिल कुमार द्विवेदी और राकेश मौर्या

नैचुरल प्रॉडक्ट और ऑर्गेनिक सिंथिसिज़ पर (एनपीओएस–2012) एक दिवसीय सेमिनार, लखनऊ विश्वविद्यालय (28 मार्च)

36. सिंथिसिज़ ऑफ कार्बोक्ज़ैमाइड एज़ एण्टी–ट्युबरक्युलर एजेण्ट्स एण्ड देयर बायोइवैल्युएशन एज़ PKnG इनहिबिटर्स; मुन्ना प्रसाद गुप्त, अनीन्द्र शर्मा और आर.पी. त्रिपाठी

37. सिंथिसिज़ एण्ड बायोइवैल्युशन आफ ऐरिल हाइड्रोक्जैमेट्स डिस्टिंग्विशिंग बिटवीन NAD एण्ड ATP डिपेन्डेट DNA लाइगेसेज़; अजय आर्या, वी. कुशल, एम. मिश्रा, टी. ख़ानम, आर. शर्मा, डी. दुबे, डी. चोपड़ा, आर. रविशंकर और आर.पी. त्रिपाठी

38. एप्लिकेशन ऑफ क्लिक केमिस्ट्री एन एफ़िशिएन्ट सिंथिसिज़ ऑफ 1एच–1,2,3–ट्रायज़ोलिलग्लाइको हाइब्रिड एज़ एन्ज़ाइम इनहिबिटर्स; नम्रता आनंद, एन. जायसवाल, एस.के. पाण्डे, ए. के. श्रीवास्तव और आर.पी. त्रिपाठी

बायोटेक्नोलॉजी पर तृतीय वर्ल्ड कांग्रेस, एचआईसीसी, हैदराबाद (13 – 15 सितम्बर)

39. कीमोथेरेपी इन द ट्रीटमेन्ट ऑफ एक्सपेरीमेन्टल विसरल लीशमैनियासिस कॉज्ड बाई *लीशमैनिया डोनोवनी* यूजिंग क्रोमेनोचाल्कॉन्स; राहुल शिवहरे, प्रीति विश्वकर्मा, वेंकटेश्वरलु कोरथीकुन्टा, तनवीर खालिक, ताडीगोप्पुला नरेन्दर और सुमन गुप्ता

40. केमोटैक्सॉनॉमी ऑफ टाइनोस्पोरा कॉर्डिफ़ोलिया मेल ऐण्ड फीमेल टाइप प्लाण्ट/पार्ट यूजिंग एचआरएमएस टेक्नीक देयर बायलॉजिकल एक्टिविटी एण्ड आइडेण्टीफ़िकेशन ऑफ मार्कर्स फॉर जेण्डर डिस्टिंक्शन; बृजेश कुमार, विकास वाजपेई, मुकेश श्रीवास्तव, निखिल कुमार और शैलेजा भट्टाचार्या

पांचवीं टीसीएस बैठक और 13वीं इण्डो–यूएस कार्यशाला, कोलकाता (12 – 13 अक्टूबर)

41. केमोथेरेपी एडजंक्ट एफिकेसी ऑफ *विथैनिया सोम्नीफेरा* केमोटाइप 118आर अगेन्स्ट *लीशमैनिया डोनोवनी* इनफ़ेक्शन इन गोल्डेन हैम्स्टर्स, चन्द्रदेवपति त्रिपाठी, शैलेजा मिश्रा–भट्टाचार्य और अनुराधा दुबे

इण्डियन एकैडमी ऑफ पैरासिटालॉजी का छठा राष्ट्रीय सम्मेलन (ट्रॉपैकॉन–2012) एसएआईएमएस, इन्दौर (12 – 14 अक्टूबर)

42. *इन विट्रो* ऐक्टिविटी ऑफ सिंथेटिक पेन्टामिडीन बेस्ड स्कैफोल्ड्स अगेन्स्ट *लीशमैनिया डोनोवनी*; खुशबू श्रीवास्तव, राहुल शिवहरे, विकास त्यागी, शाहनवाज़ खान, सुमन गुप्ता और पी.एम.एस. चौहान

इण्डियन एकेडमी ऑफ न्यूरोसाइंस की 30वीं वार्षिक बैठक, गुरू नानक देव विश्वविद्यालय, अमृतसर, पंजाब (27 – 30 अक्टूबर)

43. इनवॉल्वमेन्ट ऑफ एन्जियोटेन्जिन कनवर्टिंग एन्ज़ाइम (एसीई) इन एलपीएस इन्ड्यूज्ड मेमोरी इम्पेयरमेन्ट इन रैट्स; रूबी गोयल

44. इन्स्युलिन मॉड्युलेट्स न्यूरोइन्फ्लेमेशन एण्ड ऑक्सीडेटिव स्ट्रेस इन स्ट्रेप्टोजोटोसिन स्टिम्युलेटेड ऐस्ट्रोग्लायल सेल्स; एन. राजाशेखर

45. एण्टीडिमेन्टिक ड्रग्स अफेक्ट्स न्यूक्लियर फैक्टर एरिथ्रॉएड–2रिलेटेड फैक्टर (एनआरएफ2) इन स्ट्रेप्टोज़ोटोसिन इन्ड्यूज्ड मेमोरी इम्पेयर्ड रैट्स; सुभाष द्विवेदी

46. 3–फेनिलकुमैरिन डेरीवेटिव्स एज़ नॉवेल एण्टीडिप्रेसेन्ट एजेण्ट: बिहेवियरल एण्ड बायोकेमिकल स्टडी; सीमा सिंह

ओवरकमिंग इन्ट्रैक्टेबल इनफेक्शियस डिज़ीज़ेज़ पर चतुर्थ इण्डो–जैपनीज़ अन्तर्राष्ट्रीय संगोष्ठी (29 – 30 अक्टूबर)

47. इन्डिविजुअल वैरिएशंस इन मैक्रोफेज रिस्पॉन्सेज़ टु इन्फेक्शन विद *माइकोबैक्टीरियम ट्युबरकुलोसिस* एण्ड ट्रीटमेन्ट विद इन्हेलेबल माइक्रोपार्टिकल्स; अमित कुमार सिंह, राजीव गर्ग और अमित मिश्रा

सोसायटी ऑफ बायोलॉजिकल केमिस्ट्स (भारत) की 81वीं वार्षिक बैठक, साइंस सिटी, कोलकाता (8 – 11 नवम्बर)

48. डिटेक्शन एण्ड कैरेक्टराइजेशन ऑफ काइटिनेज़ इन *सेटेरिया सर्वी*, ए बोविन फाइलेरियल पैरासाइट; पी. द्रविड, डी.सी. कौशल और एन.ए. कौशल

इण्डियन इम्यूनोलॉजी सोसायटी का 39वां वार्षिक सम्मेलन (इम्यूनोकॉन–2012) बनारस हिन्दू विश्वविद्यालय, वाराणसी (9 – 11 नवम्बर)

49. कॉम्बीनेशन थेरेपी विद CpG-ODN 2006 एण्ड मिल्टफोसिन ट्रिगर्स टीएच1–सेल ऐक्टिवेशन एण्ड नाइट्रिक ऑक्साइड जेनरेशन टु क्योर एक्सपेरीमेन्टल विसरल लीशमैनियासिस; राहुल शिवहरे, प्रीति विश्वकर्मा, सुशांत कर, वहाजुल हक और सुमन गुप्ता

50. क्रॉस रिऐक्टिव मॉलीक्यूल्स ऑफ फाइलेरियाइड *ब्रूज़िया मैलाई* इनहिबिट प्रोग्रेशन ऑफ *लीशमैनिया डोनोवनी* इन्फेक्शन इन हैम्स्टर्स थ्रू टीएच1 एसोशिएटेड साइटोकाइन्स एण्ड नाइट्रिक ऑक्साइड रिलीज़; रिचा वर्मा, सुजीत के. जीसेफ, प्रीति विश्वकर्मा, विकास कुशवाहा, सुमन गुप्ता और पी. कल्पना मूर्ति

51. क्लोनिंग, ओवर एक्सप्रेशन, प्योरिफिकेशन ऑफ डिस ऑर्गनाइज़्ड मसल प्रोटीन–1 ऑफ *ब्रूज़िया मैलाई* एण्ड इट्स इफेक्ट्स ऑन द फ़ाइलेरियल इनफेक्शन; विकास कुशवाहा, रिचा वर्मा और पी. कल्पना मूर्ति

52. एण्टीबॉडीज अगेन्स्ट रिकॉम्बीनेन्ट *प्लाज़्मोडियम नोलेसी* लैक्टेट डिहाइड्रोजिनेस फॉर मलेरिया डायग्नॉसिस; वी. सिंग, डी.सी. कौशल, एस. राठौर और एन.ए. कौशल

प्रोटीन फोल्डिंग एण्ड डिज़ीजेज पर अन्तर्राष्ट्रीय अन्तर्विषयी विज्ञान सम्मेलन–2012, नई दिल्ली (08 – 10 दिसम्बर)

53. एनालिसिस ऑफ ए प्रोटीन प्यूटेटिवली इनवॉल्व्ड इन *प्लाज़्मोडियम फैल्सीपेरम* ऑर्गेनेलर सेग्रीगेशन; ऐमन तनवीर, स्टैसी एम. ऐलन, कैथरीन ई. जैक्सन, स्टुअर्ट ए. रैल्फ और समन हबीब

54. बायोफिज़कल कैरेक्टराइजेशन ऑफ ग्वानिलेट काइनेज़ ए एनएमपी काइनेज़ इन फाइलेरियल पैरासाइट *ब्रूज़िया मैलाई*; स्मिता गुप्ता, सुनीता यादव और जितेन्द्र के. सक्सेना

55. रोल ऑफ मॉलीक्युलर चेपरॉन्स कैलरेटिक्युलिन इन डिवेलपमेन्ट एण्ड पैथॉजेनेसिस ऑफ *ब्रूज़िया मैलाई* एन इन्ट्रासेल्युलर पैरासाइट ऑफ ह्यूमन; सुनीता यादव, स्मिता गुप्ता और जितेन्द्र के. सक्सेना

इण्टरनेशनल कांफ्रेंस ऑन केमिस्ट्री एण्ड मैटीरियल्सः प्रोस्पेक्ट्स एण्ड पर्सपेक्टिव्स–2012, बाबा साहब भीमराव अम्बेडकर विश्वविद्यालय, लखनऊ (14 – 16 दिसम्बर)

56. आईसीटी बेस्ड फ्लोरेसेन्ट पर्शियलि रिड्यूज्ड नैफ्थोनैफ्थिराइडीन्स ऐज़ ट्यूनेबल एण्ड Zn^{2+} सेलेक्टिव ऑन–ऑफ कीमोसेन्सर्स; शाहिदा उमर, पंकज नाग और अतुल गोयल

57. केमीसेलेक्टिव सिंथिसिज़ ऑफ पॉलीफंक्शनल ऐमिनोफ़िनाइल–2 ऑक्ज़ोवट–3 एनाइल एण्ड क्यूनौलिन–मेथाइल–सी–ग्लाइको –पाइरानोसाइड्स फ्रॉम नाइट्रोफेनाइल–2–ऑक्सीब्युट–3–इनाइल–सी–ग्लाइकोसाइड्स अण्डर अल्ट्रासोनिक वाइब्रेशन; के.के.जी. रामकृष्णन, ए. आर्या, ए. शर्मा और आर.पी. त्रिपाठी

58. सिंथिसिज़ एण्ड एण्टी ब्रेस्ट कैंसर ऐक्टिविटी ऑफ बाई–फ़िनाइल बेस्ड चाल्कोन्स; मुन्ना प्रसाद गुप्त, ए. शर्मा, बी. चक्रवर्ती, जे. ए. सिद्दीकी, आर. कोनवर और आर.पी. त्रिपाठी

59. सिंथिसिज़ एण्ड बायोइवैल्युएशन ऑफ स्मॉल लाइब्रेरीज ऑफ ट्रायजोलिलमेथॉक्सी चालकोन्स, फ़्लेवानोन्स एण्ड 2–ऐमिनोपिरीमिडीन्स ऐज़ इनहिबिटर्स ऑफ माइकोबैक्टीरियल एफएएस–।। एण्ड पीकेएनजी; नम्रता आनन्द, पी. सिंह, एस. तिवारी, वी. सिंह, डी.के. सिंह, के.के. श्रीवास्तव, बी.एन. सिंह और आर.पी. त्रिपाठी

60. एक्सेसिंग ए स्मॉल लाइब्रेरी ऑफ प्लूरीपोटेण्ट 1,4,5–ट्राइसब्स्टीट्यूटेड 1एच–1,2,3 ट्रायज़ोल्स वाया डायवर्सिटी ओरिएंटैड सिंथिसिज़; एन. देवेन्दर, ए. आर्या, एम.पी. गुप्त और आर.पी. त्रिपाठी

61. डायवर्सिटी ओरिएंटेड सिंथिसिंज़ ऑफ पायरॉन बेस्ड पॉलीफंक्शनल स्टीरियोंजेनिक मैक्रोसाइकल्स एण्ड देयर कन्फरमेशनल स्टड्रीज़; अजय आर्या, एस. शर्मा, एम.पी. गुप्त, वी. वाजपेयी, हमीदुल्ला, बृजेश कुमार, एम.पी. कौशिक, आर. कोनवर, ए. रविशंकर और आर.पी. त्रिपाठी

62. साइक्लोप्रॉपिल मिथेनॉन/मिथेनॉल्सः इम्प्रेसिव लीड इन ट्युबरकुलोसिस ड्रग डिस्कवरी; चैतन्य काटिकी, ए. अजय और आर.पी. त्रिपाठी

63. ए स्ट्रैटजी टु ऐक्सेस सी–सी फ्यूज्ड ट्रायाज़ोलोक्विनोलिन एण्ड रिलेटेड न्यूक्लिओसाइड एनालॉग्स; कपिल उपाध्याय, ए. अजय, आर. मेहर, आर पाण्डे, बृजेश कुमार, एस.के. शुक्ला और आर.पी. त्रिपाठी

3 अन्तःअभिकरण संबद्धता

परियोजना का शीर्षक	प्रधान अन्वेषक
पृथ्वी विज्ञान मंत्रालय, भारत सरकार	
नेशनल प्रोजेक्ट ऑन डेवलपमेण्ट ऑफ पोटेन्शियल ड्रग्स फ्रॉम द ओशियन	निदेशक
जैविक मूल्यांकन, एमओईएस परियोजना ''ड्रग्स फ्रॉम सी'' के नवीन जैव सक्रिय यौगिकों का अन्वेषण	डॉ. मधु दीक्षित
डोलैस्टैटिन की अभिकल्पना और संश्लेषण, ऐज़्यूमैमाइड्स और माइक्रोस्पोरिन ए ऐनालॉग्स; कैंसररोधी औषधि हेतु एक खोज	डॉ. दीपांकर कोले
स्वास्थ्य एवं परिवार कल्याण मंत्रालय, भारत सरकार	
एण्टीफर्टिलिटी रिसर्च प्रोग्राम	निदेशक
ड्रग फॉर नेगलेक्टेड डिज़ीज़ेज इनीशिएटिव, जेनेवा (DNDi, Geneva)	
लीड आईडेण्टीफिकेशन फॉर एण्टी–लीशमैनियल कम्पाउण्डस	डॉ. एस.के. पुरी
विश्व स्वास्थ्य संगठन, जेनेवा, स्विट्जरलैण्ड	
डेवलपमेण्ट ऑफ न्यू मैक्रोफ़ाइलेरिसाइडल एण्ड/ऑर एम्ब्रियोस्टेटिक एजेण्ट्स	डॉ. शैलजा भट्टाचार्या
यूरोपियन कमीशन, बेल्ज़ियम	
टारगेटिंग प्रोटीन सिंथेसिस इन दि एपिकोप्लास्ट एण्ड सायटोप्लाज्म ऑफ प्लाज्मोडियम (MEPHITIS)	डॉ. समन हबीब
इण्डो–स्पेन	
प्रोटीन ट्रान्सलेशन इन ऑर्गेनेल्स ऑफ *प्लाज्मोडियम फाल्सिपेरम*	डॉ. समन हबीब
केमेक्सट्री, एलएलसी, यूएसए	
टू स्टडी फार्माकोलोजी रोल एण्ड आइडेण्टिफिकेशन ऑफ मॉलिक्युलर टार्गेट, रिकन्फर्मेशन ऑफ ड्रग एक्शन विथ सिन्थेटिक K058/QCG मेड एट केमेक्सट्री एण्ड वेलिडेशन ऑफ बायोमार्कर्स इन सपोर्ट ऑफ क्लिनिकल ट्रायल्स	डॉ. एन. चट्टोपाध्याय
विज्ञान एवं प्रौद्योगिकी विभाग, भारत सरकार	
परिष्कृत विश्लेषणात्मक उपकरण सुविधा (सैफ़)	निदेशक
जे.सी. बोस फेलोशिप	डॉ. टी.के. चक्रवर्ती
इलेक्ट्रानिक स्ट्रक्चर थ्योरी बेस्ड इन्वेस्टीगेशन ऑफ कन्फर्मेशनल बिहेवियर एण्ड सेकेण्डरी स्ट्रक्चर्स ऑफ सब्स्टीट्यूटेड बीटा–प्रोलीन बेस्ड पेप्टाइड्स कनफर्मेशनल स्ट्डीज़ एण्ड बायोलॉजिकल इवैल्युएशन	डॉ. टी.के. चक्रवती डॉ. आर.एस. अम्पापति
आइडेण्टीफिकेशन एण्ड कैरेक्टराइज़ेशन ऑफ प्रोटीन्स फ्रॉम आर्टीथर सेन्सिटिव एण्ड आर्टीथर रेजिस्टेन्ट रोडेन्ट मलेरिया पैरासाइट्स फॉर इल्युसिडेशन ऑफ मेकैनिज़्म ऑफ रेज़िस्टेन्स	डॉ. एस.के. पुरी
डिज़ाइन, सिन्थेसिस् एण्ड बायोलॉजिकल इवैल्युएशन ऑफ SIRT-1 ऐक्टिवेटर्स फॉर द ट्रीटमेन्ट ऑफ टाइप–।। डायबिटीज़	डॉ. बिजोय कुण्डू
डिज़ाइन एण्ड सिन्थेसिस् ऑफ फ्लेक्सिबल मॉडल बेस्ड ऑन पाइराजोलो [3,4–डी] पिरीमिडीन फॉर बेटर अंडरस्टैडिंग ऑफ ऐरीन इन्टरैक्शन्स ऐट मॉलीक्युलर एण्ड सुप्रामॉलीक्युलर लेवल	डॉ. कमलाकर अवस्थी
काइरॉन ऐप्रोच सिन्थेसिस् ऑफ नैचुरल प्रॉडक्ट्स एण्ड नैचुरल प्रॉडक्ट लाइक मॉलीक्युल्स फ्रॉम कार्बोहाइड्रेट बेस्ड बिल्डिंग ब्लॉक्स	डॉ. ए.के. शॉ
कैरेक्टराइजेशन ऑफ नैचुरल एण्टीमनी रेज़िस्टेन्स रिलेटेड जीन्स ऑफ *लीशमैनिया डोनोवनी*	डॉ. नीना गोयल
प्रोटियोमिक एनालिसिस ऑफ ड्रग रेज़िस्टेन्स इन *लीशमैनिया डोनोवनी* क्लीनिकल आइसोलेट्स	डॉ. नीलू सिंह
एण्टीमलेरियल प्रिंसिपल फ्रॉम प्लान्ट्स बिलांगिंग टु द जीनस *बेरोनिया* एनडेमिक टु द वेस्टर्न घाट्स	डॉ. कुमकुम श्रीवास्तव
एप्लीकेशन ऑफ बेलिस–हिलमेन कैमिस्ट्री फॉर द सिन्थेसिस् ऑफ नैचुरल प्रॉडक्ट्स एण्ड देयर मिमिक्स	डॉ. संजय बत्रा

परियोजना का शीर्षक	प्रधान अन्वेषक
अमीनो ऐसिड्स एज़ काइरल सिन्थॉन्सः डेवलपमेन्ट ऑफ न्यू सिन्थेटिक प्रोटोकॉल्स फॉर क्रिएटिंग नैचुरल प्रॉडक्ट्स एण्ड रिलेटेड डायवर्सिटी इन क्वेस्ट फॉर एण्टीकैंसर एजेण्ट	डॉ. गौतम पाण्डा
डिज़ाइन, सिन्थेसिस् एण्ड डेवलपमेण्ट ऑफ नॉवेल एण्टीलीशमैनियल एजेण्ट्स	डॉ. टी. नरेन्द्र
स्ट्रक्चर कैरेक्टराइज़ेशन ऑफ गामा–ग्लूटमाइलसिस्टीन सिन्थटेज़ एण्ड ग्लूटाथिऑन सिन्थटेज़ फ्रॉम *लीशमैनिया स्पिशीज*	डॉ. जे.वी. प्रताप
इफेक्ट ऑफ कैंसर कीमोथेरेप्यूटिक ड्रग्स ऑन स्पर्मेटागोनियल स्टेम सेल निशे, क्रोमैटिन रिमॉडलिंग एण्ड इपीजेनेटिक प्रोग्रामिंग इन मेल जर्म सेल्स	डॉ. डी.पी. मिश्रा
इन्वेस्टीगेशन ऑन इम्यूनोमॉडुलेशन मीडिएटेड बाइ *माइकोबैक्टीरियम ट्यूबरकुलोसिस* ड्युरिंग परसिस्टेन्ट इन्फेक्शन	डॉ. वाई.के. मंजू
एक्सप्रेशन, इन्ट्रासेल्युलर लोकलाइज़ेशन एण्ड फंक्शनल कैरेक्टराइज़ेशन ऑफ ऐक्टिन रिलेटेड प्रोटीन्स ऑफ *लीशमैनिया*	डॉ. ए.ए. सहस्त्रबुद्धे
ओस्टियोजेनिक एक्शन्स ऑफ ए नैचुरली डिराइव्ड एनपी–1 प्योर कम्पाउण्ड ऑन बोन	डॉ. दिव्या सिंह
टू स्टडी इम्यूनोप्रोटेक्टिव रोल्स ऑफ मिथॉक्सीआइसोफ्लोवॉन्स इन एस्ट्रोजेन–डिफीशिएन्सी इन्ड्यूज्ड बोन लॉस	डॉ. दिव्या सिंह
पॉलीमेरिक नैनो–मैट्रिक्स–एसोशिएटेड *इन वीवो* डिलीवरी ऑफ कैम्पफेरॉल इन रैट्स फॉर बोन एनाबोलिक एक्शन	डॉ. रितु त्रिवेदी
ए सिस्टमैटिक आरएनएआई (RNAi) स्क्रीन फॉर आइडेण्टीफिकेशन ऑफ जेनेटिक माड्युलेट्र्स ऑफ एचआईवी–एनईएफ इन्ड्यूज्ड पैथोजेनेसिस इन ए नॉवेल *सीनॉरहैब्डाइटिस एलिगैन्स* मॉडल	डॉ. आमिर नाज़िर
इवैल्युएशन ऑफ टीजीएफ–बीटा एक्टिवेशन मेकैनिज़म एण्ड सिंग्नलिंग ड्यूरिंग यूटीराइन टिश्यू रिमॉडलिंग	डॉ. राजेश कुमार झा
ह्यूमन साइटोक्रोम पी4501बी1: इम्प्लिकेशन्स इन सेन्टक्रोमान ट्रीटेड हार्मोन मीडिएटेड एमसीएफ–7 ट्यूमर सेल मेटाबोलिज़्म एज ए नॉवेल टारगेट फॉर थेराप्यूटिक इन्टरवेन्शन	डॉ. नीतू सिंह
एक्सपेरीमेन्टल चार्ज डेन्सिटी अध्ययन और कम्प्यूटेशनल विधियों द्वारा मॉलीक्युलर सॉलिड में कमज़ोर डायपोल–डायपोल पारस्परिक क्रिया का मूल्यांकन	डॉ. टी.एस. ठाकुर
हाइपर टेंशन के विरूद्ध अल्मस वॉलिचियाना की क्षमता, प्रभावोत्पादकता और क्रियाविधि	डॉ. जे.आर. गाइन
अल्फा–सोलानिन के कार्सिनोजेनिक प्रभाव की क्रियाविधि को समझना	डॉ. जयन्त सरकार
ब्रेस्ट कैंसर के बचाव तथा उपचार के नवीन जेनेटिक और इपीजेनेटिक लक्ष्यः जैव सक्रिय आहार अनुपूरकों सहित एक यांत्रिक दृष्टिकोण	डॉ. एस. मुस्तफा
मलेरियारोधी ल्यूमिफ्रैन्ट्राइन और उसके सक्रिय और अधिक शक्तिशाली चयापचयक (मेटाबोलाइट) का औषधि गतिक, उपापचयी एवं जैव औषधीय मूल्याकंन	श्री वहाजुद्दीन
प्राकृतिक स्रोतों के फफूँदरोधी पेप्टाइड का पृथक्करण और लक्षणांकन	डॉ. विनीता सिंह
इन्फ्लेमेशन उत्प्रेरित इन्स्युलिन प्रतिरोध में प्रतिरक्षा घटकों की भूमिका	डॉ. ए. ताम्रकार
जैव प्रौद्योगिकी विभाग, भारत सरकार	
शाइज़ोफ्रेनियाः डेवेलपिंग एनीमल–मॉडल्स, ट्रांसलेशनल मारकर्स एण्ड ए पॉसिबल ट्रीटमेन्ट स्ट्रैट्जी	डॉ. गौतम पालित
क्लोनिंग एण्ड ओवरएक्सप्रेशन ऑफ टीएच1 स्टिम्युलेटरी पॉलीप्रोटीन्स आइडेन्टीफाइड थ्रू प्रॉटियामिक्स फॉर दियर प्रोफाइलैक्टिक पोटेन्शियल अगेन्स्ट एक्सपेरीमेन्टल विसरल लीशमैनिआसिस	डॉ. अनुराधा दुबे
प्रोटेक्टिव इम्यूनोजेनिसिटी ऑफ सेन्ट्रिन केओ (KO) लाइव एटिन्युएटेड लीशमैनिया पैरासाइट इन द ऐनिमल मॉडल्स एण्ड इन द ह्यूमन सेल्स	डॉ. अनुराधा दुबे
पोस्ट ट्रांसलेशनल मॉडिफ़िकेशन्स इन्ड्यूज्ड बाइ नाइट्रोआक्सीडेटिव स्ट्रेस एज़ बायोमार्कस ऑफ वैस्कुलर डैमेज इन डायबिटीज़	डॉ. मधु दीक्षित
डिज़ाइन एण्ड डेवलपमेन्ट ऑफ डाटाबेस् एण्ड एनालिटिकल टूल्स फॉर माइक्रोऐरे डेटा ऑन *लीशमैनिया डोनोवनी* पैरासाइट	डॉ. नीलू सिंह
क्रिस्टलोग्रैफिक एण्ड बायोकेमिकल स्ट्डीज ऑन फ़ीस्ट/फैमाइन रेगुलेटरी प्रोटीन्स फ्रॉम मायकोबैक्टीरिया	डॉ. रविशंकर आर.

परियोजना का शीर्षक	प्रधान अन्वेषक
स्ट्रक्चरल एनालिसिस ऑफ बैक्टीरियल पेप्टाइडिल–टी आरएनए हाइड्रोलेज़ एन्जाइम्स एण्ड डिज़ाइन ऑफ हाई ऐफिनिटी बाइन्डर्स	डॉ. आशीष अरोड़ा
जेनरेशन एण्ड कैरेक्टराइजेशन ऑफ *मायकोबैक्टीरिया स्मेगमैटिस* सिगएफ (sigF) म्यूटेन्ट एण्ड स्ट्डीज़ ऑफ द सिगएफ–मीडिएटेड ज़ीन एक्सप्रेशन बाई माइक्रोऐरे एनालिसिस	डॉ. बी.एन. सिंह
अन्डरस्टैडिंग मेकैनिज़्म ऑफ ऐक्शन ऑफ द एण्टी–ओस्टियोपोरोटिक एक्टिविटी ऑफ सीडीआरआई कम्पाउण्ड्स के095 1709	डॉ. एस. सान्याल
इन्वेस्टीगेशन ऑन इन्वॉल्वमेन्ट ऑफ ऐडिपोज टिश्यू इन परसिस्टेन्स ऑफ पैथोजेनिक माइकोबैक्टीरिया	डॉ. वाई.के. मंजू
टाइसोलेशन, आइडेन्टीफिकेशन, करैक्टराइज़ेशन एण्ड बायोएक्टिविटी ऐस्से ऑफ एण्टीडायबिटिक ड्रग लीड्स फ्रॉम फ्यू सिलेक्टेड मेडिसिनल प्लान्ट्स ऑफ नॉर्थ ईस्ट इण्डियाः वॉऐज फॉर क्योर ऑफ डिजीज़	डॉ. ए.एन. गायकवाड़
फंक्शनल कैरेक्टराइजेशन ऑफ सीआरएन 12 इन *लीशमैनिया* पैरासाइट	डॉ. ए.एच. सहस्रबुद्धे
इन्वेस्टीगेशन ऑफ इफेक्ट ऑफ पॉलीसैक्राइड इन मॉडीफाइंग लीशमैनिसाइडल पोटेन्शियल ऑफ नैनोपार्टिकुलेट सिस्टम बियरिंग कीमोथेराप्यूटिक्स एजेण्ट	डॉ. एम.के. चौरसिया
आईडेण्टीफिकेशन ऑफ इआर अल्फा इन्टरैक्टिंग प्रोटीन्स फ्रॉम टैमोक्सीफेन इन्डयूज्ड एण्ड अनइन्ड्यूज्ड एमसीएफ7 सेल्सः ए मास स्पेक्ट्रोमीट्री बेस्ड प्रोटियॉमिक्स ऐप्रोच	डॉ. ए.के. त्रिवेदी
एक्सप्रेशन प्रोफ़ाइलिंग ऑफ मेजर टेस्टिस स्पेसिफिक जीन्स इन ह्यूमन सीमेन/स्पर्मेटोजोआ फॉर आइडेण्टीफिकेशन ऑफ द बायोलॉजिक रोल ऑफ दीज़ जीन्स, देयर डायग्नोस्टिक यूटिलिटी एण्ड आइडेण्टीफिकेशन ऑफ नॉवेल टारगेटस फॉर इन्फर्टिलिटी ट्रीटमेन्ट/मेल कॉन्ट्रासेप्शन	डॉ. राजेन्द्र सिंह
पैंक्रियास्टैटिन का नियंत्रणः मधुमेह को नियंत्रित करने का नवीन दृष्टिकोण	डॉ. जे.आर. गाइन
सीनॉरहैब्डाइटिस एलिगैन्स केयूएनसी–60 एडीएफ/कॉफिलिन प्रोटीन का सोल्यूशन स्ट्रक्चर और डायनामिक्स	डॉ. आशीष अरोड़ा
सेन्ट्रल बॉडी फ़ैटनेस और इन्स्युलिन रेज़िस्टेन्स के उपचार हेतु औषधियाँ (हाई पेरी/पोस्ट–मेनोपॉजल प्रिवैलेन्स)–आरजीवाईआई स्कीम	डॉ. जे.आर. गाइन
सर्विकल स्क्वामोज सेल कार्सिनोमा में कैंसर स्टेसिस बायोमार्कर सीएबीवाईआर का वैधीकरण	डॉ. मोनिका सचदेवा
बढ़ती आयु में ऐस्ट्रोसाइट्स और न्यूरोट्रॉफिक फैक्टर्स की ऐन्टीऑक्सीडेन्ट क्षमताः आयु और लिंग आधारित विश्लेषण (स्वास्थ्य एवं बीमारियों में ग्लियल सेल रिसर्च पर राष्ट्रीय पहल)	डॉ. सारिका सिंह
एसएलई नेफ्राइटिस के रेगियों में रोग निदान, पूर्व लक्षणों और अनुवर्ती कार्रवाई हेतु यूरिनरी जैव चिह्नों की पहचान	डॉ. एस.के. सिन्हा
सामान्य और कैंसर कोशिकाओं में आरएनएपी11 की कार्यात्मक रिपोर्ट की अभिवृद्धि	डॉ. सुहेल अख्तर
क्रॉनिक हाइपरटेंशन में ग्लियल कोशिकाओं की सक्रियता का अध्ययन	डॉ. कासिफ हनीफ़
न्यूरोइन्फ्लमेशन के दौरान ग्लियल सेल में ब्रेन इन्स्युलिन/इन्स्युलिन रिसेप्टर का अध्ययन (स्वास्थ्य एवं रोग में ग्लियल सेल रसर्च पर राष्ट्रीय पहल)	डॉ. राकेश शुक्ला
भारतीय चिकित्सा अनुसंधान परिषद, भारत सरकार	
डिज़ाइन, सिन्थेसिस एण्ड बायोलॉजिकल इवैल्युएशन ऑफ एचआईवी–1 आरटी इनहिबिटर्स–4 थायजोलिडिनॉन कम्पाउण्ड्स	डॉ. एस.बी. कट्टी
इम्पैक्ट ऑफ ऐडिपोकाइन एण्ड केमोकाइन जीन पॉलीमॉरफिज़्म एण्ड इट्स प्रोटीन एक्सप्रेशन इन मेटाबोलिक सिन्ड्रोम	डॉ. असीम घटक डॉ. रितुराज कोनवर
न्यूक्लिओज़ोमल हिस्टोन प्रोटीन्स ऑफ *लीशमैनिया डोनोवनी*: मॉलीक्युलर एण्ड इम्यूनोबायोकैमिकल कैरेक्टराइजेशन फॉर इट्स पोटेन्शियल एज़ वैक्सीन टारगेट अगेन्स्ट विसरल लीशमेनिआसिस	डॉ. अनुराधा दुबे
डेवलपमेन्ट ऑफ बोन एनाबोलिक एजेण्ट्स फ्रॉम एन इण्डियन मेडिसनल प्लांट	डॉ. एन. चट्टोपाध्याय
इफेक्ट ऑफ 2,3–डायएरिल–2एच–1–बेनजोपाइरन डेरिवेटिव ऑन एस्ट्रोजेन इन्ड्यूस्ड एन्डोमीट्रिकल सेल प्रॉलीफ़रेशन्स एण्ड यूटराइन हाइपरप्लासिस फॉरमेशन	डॉ. अनिला द्विवेदी
प्रीक्लिनिकल डेवलपमेन्ट ऑफ डीएसई–37[एस,एस"-{डाइसल्फ़ेनडायल्बी (पाइरोलिडिनो–प्रोपेन–2,1 –डाइल)] बिस(पिपरीडिनोथियोकार्बामेट) एज़ ए वेज़ाइनल कान्ट्रासेप्टिव	डॉ. गोपाल गुप्ता

परियोजना का शीर्षक	प्रधान अन्वेषक
डिज़ाइन, सिन्थिसिस एण्ड बायोइक्विवैलेन्स ऑफ न्यू एनालॉग्स ऑफ फ्लूकोनाजोल फॉर एण्टीफंगल एक्टिविटी	डॉ. पी.के. शुक्ला
डिज़ाइन, सिन्थिसिस एण्ड बायोइवैल्युएशन ऑफ नॉवेल हाइब्रिड कम्पाउण्ड्स फॉर एण्टीमलेरियल एक्टिविटी	डॉ. संजय बत्रा
डिलीवरी सिस्टम फॉर द मैनेजमेण्ट ऑफ सेप्टिक शॉकः रैशनल एप्रोच टुवर्डस लाइपोपॉलीसैक्राइड (एलपीएस), न्यूट्रलाइज़ेशन एण्ड डिटॉक्सीफिकेशन	डॉ. पी.आर. मिश्रा
डिज़ाइन, सिन्थिसिस एण्ड इवैल्युएशन ऑफ न्यू कैमिकल एन्टिटीज़ अगेन्स्ट टिपिकल माइक्रोबैक्टीरियम –2–फॉरच्युटम	डॉ. गौतम पाण्डा
पीएलई–एडीपी–रिबोज़ पॉलीमरेज़–2 (पीएआरपी–2) का मूल्यांकन और यूटीराइन टिश्यू रीमॉडलिंग के दौरान कैसपेस–8 सिग्नलिंग मेकैनिज़्म	डॉ. राजेश कुमार झा
अभिकल्पित संश्लेषण और मैनेजमेन्ट डिज़ाइन प्रॉस्टैटिक हाइपरप्लेज़िया हेतु नवीन अभिकर्मकों के जैविक मूल्यांकन	डॉ. वी.एल. शर्मा
डेवलपमेंट ऑफ एन्टीडिसलिपिडेमिक एजेण्ट्स फ्रॉम *एज़ल मार्मेलॉस* (बेल) एंड *ट्राइगोनेला फिओनम ग्रेइकम* (मेथी)	डॉ. टी. नरेन्द्र
इन्स्युलिन प्रतिरोधकता के उपचार हेतु जीएलयूटी–4 ट्रांसलोकेशन के नैचुरल मॉड्युलेटर्स	डॉ. एम.के. ताम्रकार
सेप्टिक शॉक में सम्मिलित इनफ्लेमेटरी मार्ग की व्याख्या	डॉ. एम. दीक्षित
फाइलेरिया और लीशमैनिया परजीवियों के क्रास रिएक्टिव अणुओं को चिह्नित करना और उनका लक्षणांकन और किसी भी संक्रमण के विरूद्ध उनकी संभावित रोग निरोधक क्षमता	डॉ. पी. कल्पना मूर्ति
एक्सपेरीमेन्टल लिम्फैटिक फाइलेरिया के विरूद्ध शक्तिशाली वैक्सीन के रूप में *ब्रूज़िया मैलाइ* रीकॉम्बीनेन्ट प्रोटीन युक्त नैनोरिज़वॉयर	डॉ. शैलजा भट्टाचार्य
हाइपरटेंशन में न्यूराइनफ्लेमेशन और स्मृति इम्पेयरमेन्टः सेन्ट्रल रेनिन ऐन्जियोटेन्सिन सिस्टम की भूमिका	डॉ. राकेश शुक्ला
डिफेन्स रिसर्च एण्ड डेवलपमेन्ट ऑर्गनाइज़ेशन	
सिन्थिसिस ऑफ बायोलॉज़िकली एक्टिव मॉलीक्युल्स फ्रॉम कार्बोहाइड्रेट्स बेस्ड लिगैण्ड्स फॉर पोटेन्शियल एप्लीकेशन्स इन डिफेन्स	डॉ. आर.पी. त्रिपाठी
एनएमआईटीएलआई (सीएसआईआर)	
लीड बेस्ड ड्रग डेवलपमेन्ट एण्ड जेनेटिक इम्प्रूवमेन्ट ऑफ अश्वगंधा *विथानिया सोमनीफेरा*	डॉ. एस. भट्टाचार्या
यूपीसीएसटी	
प्रोडक्शन ऑफ माइक्रोबियल हेपारीनेजेज़ टु प्रोड्यूज़ लो मॉलीक्युलर वेट हेपारिन्स यूज्ड एज़ एण्टीथ्रॉम्बोटिक एजेण्ट्स	डॉ. सी.के.एम. त्रिपाठी
सेन्ट्रल काउंसिल ऑफ रिसर्च इन होम्योपैथी	
फार्माकोलॉजिकल स्क्रीनिंग ऑफ होम्योपैथिक मेडिसिन अण्डर ड्रग स्टैण्डर्डाइज़ेशन प्रोग्राम ऑफ सीसीआरएच	डॉ. राकेश शुक्ला

4 मानव संसाधन विकास

1 प्रस्तुत शोध प्रबन्ध (पीएचडी) (2012)

	शोधकर्ता का नाम	शोध प्रबन्ध (थीसिस) का शीर्षक	सुपरवाइजर
जवाहरलाल नेहरू विश्वविद्यालय, नई दिल्ली			
1	प्रशांत कुमार सिंह	मॉलीक्युलर क्लोनिंग एण्ड कैरेक्टराइजेशन ऑफ फंक्शनल प्रोटीन(स) ऑफ ह्यूमन लिम्पैथिक फाइलेरियड *ब्रुज़िया मैलई*	डॉ. शैलजा भट्टाचार्या
2	अमित कुमार सिंह	इंफ्ल्यून्स ऑफ जेनेटिक बैकग्राउण्ड ऑन ह्यूमन मोनोसाइट डिराइव्ड मैक्रोफेज़ (एमडीएम) जीन एक्सप्रेशन इन रिस्पॉन्स टू इंफक्शन विथ *माइकोबैक्टीरियम ट्यूबरकोलिसस* H37Rv एण्ड ट्रीटमेन्ट विथ इन्हेलेबल माइक्रोपार्टिकल्स कॉन्टेनिंग एण्डी–टीबी ड्रग्स	डॉ. अमित मिश्रा
3	सौरभ श्रीवास्तव	इन्वेस्टीगेशन ऑन बायोलॉजिकल एक्टीविटिज़ एण्ड मोड ऑफ एक्शन ऑफ सम नैच्युरली अक्करिंग एण्टीमाइक्रोबियल पेप्टाइड्स एण्ड दिअर नॉवेल एनालॉग्स	डॉ. जे.के. घोष
4	विजय कुमार श्रीवास्तव	स्ट्रक्चरल एण्ड फंक्शनल स्ट्डीज ऑन MoaC2 फ्रॉम *माइकोबैक्टीरियम ट्यूबरक्युलोसिस* एण्ड क्रोनिन फ्रॉम *लीश्मैनिया डोनोवनी*	डॉ. जे.वी. प्रताप
5	सौरभ प्रताप सिंह	स्ट्रक्चरल एण्ड फंक्शनल कैरेक्टराइजेशन एण्ड एवैल्यूशन ऑफ सूटेबल ड्रग्स टारगेट्स ऑफ *लीश्मैनिया स्पीसीज*	डॉ. जे.वी. प्रताप
6	सुधांशु यादव	कैरेक्टराइजेशन एण्ड फंक्शनल एस्पेक्ट्स ऑफ ए ज़ीन इन्वॉल्व्ड इन माइटोटिक चेकप्वाइंट इन *एस. पोम्बे*	डॉ. शकील अहमद
7	सुमित कुमार वर्मा	कैरेक्राइजेशन ऑफ कण्डीशनल सिंथेटिक लिथल म्यूटेन्ट विथ CHK1 काईनेज प्रोटीन एण्ड इट्स रोल इन सेल साइक्ल चेकप्वाइंट इन *एस. पोम्बे*	डॉ. शकील अहमद
8	प्रतिभा सिंह	इलूसिडेशन ऑफ दि रोल ऑफ मेलाटोनिन इन एक्सपेरीमेन्टली इन्ड्यूस्ड रिफ्लेक्स इसोफेगस इन रैट्स	डॉ. जी. पालित
9	अंकिता मिश्रा	मॉलीक्युलर मैकेनिज्म इन्वॉल्वड इन कोलेजन मीडिऐटेड प्लेटलेट एक्टीवेशन एण्ड दिअर मॉड्युलेशन बाय एण्टीप्लेटलेट कम्पाउण्ड्स	डॉ. मधु दीक्षित
10	मनीष सिन्हा	डिज़ायन एण्ड सिंथेसिस ऑफ 4–अमिनोक्वाइनोलाइन डेरिवेटिव्स एज़ नॉवेल एण्टी मलेरियल एजेण्ट्स	डॉ. एस.बी. कट्टी
11	सर्फुद्दीन	डिज़ाइन ऑफ नॉवेल सेल–सेलेक्टिव एण्टीमाइक्रोबियल पेप्टाइड्स एण्ड मॉड्यूलेशन ऑफ टॉक्सीसिटी ऑफ नैच्युरली अक्करिंग एण्टीमाइक्रोबियल पेप्टाइड्स	डॉ. जे.के. घोष
12	सिद्धार्थ शर्मा	डिज़ाइन एण्ड सिंथेसिस ऑफ नॉवेल हेट्रोसाइक्लस विथ पोटेन्शियल फार ड्रग डेवेल्पमेन्ट	डॉ. अतुल कुमार
13	अनीन्द्र शर्मा	सिंथेटिक स्ट्डीज इन फिनोलिक्स एण्ड ग्लाईकोकान्जुगेट्स एज़ पोटेंशियल बायोडायनेमिक एजेण्ट्स	डॉ. आर.पी. त्रिपाठी
14	स्मृति मिश्रा	मेटाबोलिक इन्वेस्टिगेशन ऑफ बायोलॉजिकल एक्टिव 1,2,4 ट्राइओक्जन्स (स).	डॉ. जी. के. जैन
15	रंजनी मौर्या	आइसोलेशन ऑफ बायोऐक्टिव नेच्युरल प्रोडक्ट्स फ्रॉम मेडिसिनल प्लाण्ट्स एण्ड सिन्थेसिस ऑफ नॉवेल 1,2, 4 ट्राइओक्ज़ेन्स एज़ एण्टीमलेरियल	डॉ. राकेश मौर्या

16	विनीत कुमार मौर्या	आइडेण्टीफिकेशन ड्रग टारगेट्स इन *माइकोबैक्टीरियम ट्युबरकुलोसिस* यूजिंग प्रोटियोमिक्स बेस्ड अप्रोचेस	डॉ सुधीर कुमार सिन्हा
17	शैलेन्द्र कुमार धर द्विवेदी	थेराप्यूटिक्स एण्ड मेकेनिस्ट डिस्कशन ऑफ सेल सर्वाइवल एण्ड अपोप्टोसिस इन कैंसर मॉडल	डॉ. एन. चट्टोपाध्याय
18	सुशीला कुशवाहा	मॉलीक्युलर क्लोनिंग एण्ड कैरेक्टराइजेशन ऑफ फंक्शनल प्रोटीन(स) ऑफ ह्यूमन लिम्फेटिक फाइलिएरिड *ब्रुजिया मैलाई* एण्ड देअर इवॉल्युशन एज ड्रग/वेक्सीन टारगेट्स	डॉ. शैलजा भट्टाचार्या
19	सुष्मिता कुमारी	डिमॉस्ट्रेशन ऑफ दि प्युटेटिव रोल ऑफ पीई3 एण्ड पीई4 प्रोटीन्स ऑफ *माइकोबैक्टेरिअम ट्युबरकुलोसिस* इन इन्ट्रा सेल्युलर सर्वाइवल एण्ड इन इम्यून मॉड्यूलेशन	डॉ. के.के. श्रीवास्तव
20	संजीत कुमार दास	अल्फा–अमिनो एसिड बेस्ड स्टिरियो सेलेक्टिव सिंथेसिस ऑफ बायोलॉजिकली इम्पोर्टेन्ट नैच्युरल प्रोडक्ट्स एण्ड नैच्युरल प्रोडक्टस लाइक मालिक्युल्स	डॉ. गौतम पाण्डा
21	पूजा पाल	*इन विट्रो* स्क्रीनिंग ऑफ नैचुअरल सिंथेसिस कम्पाउण्ड्स फॉर दिअर पोटेन्शियल टू इन्ड्यूज़्ड डिफ्फरेन्टिएशन एण्ड/ऑर अपोप्टोसिस इन माइलोइड ल्यूकिमिया सेल्स अण्डरस्टेडिंग डिफ्फरेन्शिऐशन पाथवे इन माइलोइड सेल डेवल्पमेन्ट	डॉ. ए.के. त्रिवेदी
22	रितेश सिंह	क्वेस्ट फॉर हेट्रासाइकल्स थेराप्यूटिक एजेण्ट्स	डॉ. गौतम पाण्डा
23	नन्द लाल	डिज़ाइन एण्ड सिंथेसिस ऑफ नॉवेल ड्युअल एक्शन नॉन–डिटर्जेन्ट स्पर्मिसाइड्स एण्ड एण्टी–स्पर्मेटाजेनिक एजेण्ट्स	डॉ. वी.एल. शर्मा
24	मनोज कुमार	बायोडायनेमिक एजेण्ट्स	डॉ. के.वी. शशिधरा
25	अनुज त्रिपाठी	कम्पैरेटिव एनॉलासिस ऑफ प्रोटीन(स) एक्सप्रेशन प्रोफाइल इन अर्टीइथर सेन्सटिव एण्ड अर्टीइथर रिसस्टेन्ट *प्लाज़मोडियम विन्केई*	डॉ. एस.के. पुरी
26	विश्व दीपक त्रिपाठी	नैच्युरल प्रोडक्ट इंस्पायरड डिज़ाइन एण्ड सिंथेसिस ऑफ मेडिकली एक्टिव हेटरोसाइकल्स	डॉ. अतुल कुमार
27	धर्मशिला	टू स्टडी दि मैक्निज़्म ऑफ इम्मयूनोमॉड्यूलेशन काज्ड बाय पेप्टाइड्स एट सेल्युलर एण्ड मॉलीक्युलर लेवल	डॉ. आर.के. त्रिपाठी
28	राहुल यादव	कैरेक्टराइजेशन ऑफ एक्टिन डिपॉलिमेराइजिंग फेक्टर (एडीएफ) फ्रॉम *टाक्सोप्लाज़्मा गोन्डई*	डॉ. आशीष अरोड़ा
29	संतोष कुमार	स्ट्डीज ऑफ डिफ्फरेन्शियली एक्सप्रेस्ड प्रोटीन(स) फ्रॉम अर्टीथर सेन्सटिव एण्ड अर्टीइथर रिसस्टेन्ट स्ट्रेन्स ऑफ *प्लाज़्मोडियम विन्केई* ए रोडेन्ट मलेरिया पैरासाइट	डॉ. एस.के. पुरी
30	अजय कुमार राणा	क्लोनिंग, एक्सप्रेशन एण्ड फंक्शनल कैरेक्टराइजेशन ऑफ आरएसएमडी rRNA मिथाइलट्रांसफेरेज फ्रॉम *वल्वेचिया* इण्डोसिमबियोन्ट ऑफ *ब्रुज़िया मैलाई*	डॉ. एस. भट्टाचार्या
31	अशोक कुमार	स्ट्रक्चरल स्ट्डीज ऑफ बैक्टीरियल रेप्टाइडायल आरएनए हाइड्रोलेज़	डॉ. अशीष अरोड़ा
32	गौरव मधुर	आइसोलेशन, केमिकल ट्रांसफार्मेशन एण्ड सिंथेसिस ऑफ नैच्युरल प्रोडक्ट्स आफ बायोलॉजिकल इम्पोर्टेन्स	डॉ. टी. नरेन्दर
33	मनीष कुमार गुप्ता	डिज़ाइन एण्ड सिंथेसिस ऑफ नॉवेल न्यूकिलयर रिसेप्टर मॉड्यूलेटर एज़ फार्मास्यूटिक्ल एजेण्ट्स	डॉ. अतुल कुमार
34	रूचि सक्सेना	मैकेनिज्म ऑफ एण्टी–प्रोलाइफ्रेटिव एक्शन ऑफ 2–[पाइपेरिडीनो–ईथोक्सीफिनायल]–3–फिनायल–2एच–बेन्जो(बी)पायरन इन ऐस्ट्रोजन रिसेप्टर पॉजिटिव एण्ड ऐस्ट्रोजन रिसेप्टर निगेटिव ह्यूमन ब्रीस्ट कैंसर सेल लाइन्स	डॉ. अनीला द्विवेदी

बनारस हिन्दु विश्वविद्यालय, वाराणसी			
35	समिरन हुतैत	डिज़ायन एण्ड सिंथेसिस ऑफ हेट्रोसाइकल–बेस्ड नॉवेल हाइब्रिड कम्पाउण्ड्स एज़ पॉसिबल एण्टीमलेरियल एजेण्ट्स	डॉ. संजय बत्रा
36	सुमन श्रीवास्तव	डिज़ाइन एण्ड सिंथेसिस ऑफ नॉवेल फेरोसिन सब्सिट्यूटेड हेट्रोसाइकल्स एज़ थेराप्यूटिक एजेण्ट्स	डॉ. अतुल कुमार
37	गरिमा गुप्ता	डिज़ाइन एण्ड सिंथेसिस ऑफ नॉवेल हेट्रोसाइकल्स एज़ थेराप्यूटिक एजेण्ट्स	डॉ. अतुल कुमार
38	अमर कुमार	डिज़ाइन एण्ड सिंथेसिस ऑफ डायरियल (नाइट्रोजिनयस हेट्रोसाइकल्स) एल्केन्स फॉर दिअर स्ट्रक्चरल एण्ड बायोलॉजिकल स्ट्डीज	डॉ. कमलाकर अवस्थी
छत्रपति शाहूजी महाराज यूनिवर्सिटी, कानपुर			
39	रीमा गुप्ता	क्लोनिंग एण्ड ओवर एक्सप्रेशन ऑफ TH1 स्टिम्युलेटरी पॉली–प्रोटीन्स फॉर दिअर प्रोफाइलेक्टिक पोटेन्शियल अगेन्स्ट एक्सपेरीमेन्टल विस्सरल लीश्मैनीयासिस	डॉ. अनुराधा दुबे
ज़ामिया हमदर्द, नई दिल्ली			
40	विशाल कुमार सोनी	इवैल्यूएशन ऑफ सम मेडिसिनल प्लाण्ट्स फॉर इम्मयूनोमॉड्यूलेटरी एण्ड एण्टीफाइलेरियल एक्टिविटी इन रोडेन्ट मॉडल	डॉ. शैलेजा भट्टाचार्या
41	दीपक सिंगोदिया	इंजीनियर्ड नैनो–वैसीक्युलर कांस्ट्रक्ट्स फॉर इम्प्रूव्ड डिलीवरी ऑफ कीमो–थेराप्यूटिक एजेण्ट्स	डॉ. पी.आर. मिश्रा
42	प्रदीप कुमार कामत	न्यूरोफार्माकोलॉजिकल एण्ड मॉलीक्युलर कैरेक्टराइजेशन ऑफ ओकाइडिक एसिड इन्ड्यूस्ड न्यूरो डिजनरेशन इन रैट	डॉ. सी. नाथ
43	संतोष कुमार टोटा	स्ट्डी ऑन दि रोल ऑफ सेन्ट्रल रेनिन एन्जियोटेन्सिन सिस्टम	डॉ. सी. नाथ
44	सुप्रिया स्वर्णकार	सेल्युलर एण्ड मॉलीक्युलर स्ट्डीज ऑन दि रोटेन वन इन्ड्यूज़ न्यूरोटॉक्सीसिटी	डॉ. सी. नाथ
लखनऊ विश्वविद्यालय, लखनऊ			
45	सारिका यादव	बायोकेमिकल स्ट्डीज ऑन अडिनोसाइन डिएमिनेज़ आफ *प्लाज़्मोडियम योली*	डॉ. जे.के. सक्सेना
46	रूचिर कान्त	एक्स–रे क्रिस्टलोग्राफिक स्ट्डीज ऑफ मालिक्युल्स ऑफ बायोलॉजिकल एण्ड स्ट्रक्चरल इन्ट्रेस्ट	डॉ. पी.आर. मौलिक
47	रविन्द्र सिंह	स्टडीज ऑन बायोलोजिकल पैरामीटर ऑफ एल्बिनो रैट (स्प्राग्ए डावले रैट) अन्डर द इन्फलूएन्स ऑफ कमर्शियल एण्ड इन–हाउस फीड फार्मुलेशन्स	डॉ. डी.एस. उपाध्याय
48	विजय कुमार मर्रापु	डिज़ाइन एण्ड सिंथेसिस ऑफ पोटेन्शियल एण्टी लीशमैनियल एजेण्ट्स	डॉ. के. भण्डारी
49	राजेश कुमार बिस्वास	आइडेण्टीफिकेशन एण्ड कैरेकटराइजेशन ऑफ दि फेक्टर(स) दैट रेग्युलेट द एक्सप्रेशन ऑफ माइकोबैक्टीरियम ट्युबरकुलोसिस H37Rv कास ओपरोन	डॉ. बी.एन. सिंह
50	सलिल प्रताप सिंह	सिंथेसिस ऑफ लेक्टोन–डिराइव्ड एरोमेटिक स्काफोल्डस ऑफ सिंथेटिक एण्ड थेराप्यूटिक इम्पॉर्टेन्स	डॉ. अतुल गोयल
51	प्रीति दीक्षित	केमिकल इन्वेस्टीगेशन ऑफ इण्डियन मेडिसिनल प्लाण्ट्स इन सर्च ऑफ बायोएक्टिवकम्पाउण्ड्स	डॉ. राकेश मौर्या
बिरला इंस्टीट्यूट ऑफ साइंस एण्ड टेक्नोलॉजी, रांची			
52	राहुल कुमार वर्मा	पॉल्मोनरी डिलीवरी ऑफ माइक्रोपार्टिकल्स कॉन्टेनिंग नाइट्रिक आक्साइड डोनर्स एज़ मीडिएटर्स ऑफ मैक्रोफेज़ एक्टीवेशन इन ट्यूबरकुलोसिस	डॉ. अमित मिश्रा
बनस्थली यूनिवर्सिटी, बनस्थली, राजस्थान			
53	वर्षा गुप्ता	फॉर्मयुलेशन डेवलपमेन्ट एण्ड इवैल्युएशन ऑफ सम न्यू एण्टी ओस्टियोपोरोटिक एजेण्ट्स	डॉ. ए.के. द्विवेदी

डॉ. राम मनोहर लोहिया अवध विश्वविद्यालय, फैजाबाद			
54	मो. फहीम खान	फायटोकैमिकल इन्वेस्टीगेशन ऑफ इण्डियन मेडिसिनल प्लाण्ट्स इन सर्च ऑफ बायो–एक्टिव नेच्युरल कम्पाउण्ड्स	डॉ. राकेश मौर्या
55	अनिल कुमार	डिज़ायन एण्ड सिंथेसिस ऑफ डिफ्फरेन्शियली सब्सिट्यूटेड चिराल अमिनो मिथाइल पोटेन्शियल एण्टीथ्राम्बोटिक्स	डॉ. डी.के. दीक्षित
जाधवपुर विश्वविद्यालय, कोलकाता			
56	पार्था घोषाल	सिंथेसिस ऑफ कार्बोहाइड्रेट डिराइव्ड बाय बायोलॉजिकली एक्टिव कम्पाउण्ड्स	डॉ. ए.के. शॉ
गौतम बुद्ध तकनीकी विश्वविद्यालय			
57	प्रेम प्रकाश	इफेक्ट ऑफ एण्टी–थ्रोम्बोटिक एजेण्ट्स ऑन वैरिअस एक्सपैरीमेन्टल मॉडल्स ऑफ थ्रॉम्बोसिस एण्ड टू एलूसिडेट दिअर मैकेनिज़्म ऑफ एक्शन	डॉ. मधु दीक्षित
58	विकास मिश्रा	एनालेसिस ऑफ एक्साइटोटॉक्सीसिटी एण्ड एसिडोटॉक्सीसिटी मीडिएटेड बाय एनएमडीएआर एण्ड एएसआईसी फॉलोंइंग सेरेब्रल इश्चिमक / रिपरफ्यूजन इंज्युरी	डॉ. राम रघुबीर
59	वी. मुरुग्सेन	रेशनल डिज़ायन एण्ड सिंथेसिस ऑफ थायजोलिडिन–4–ओन एज़ एचआईवी–1 रिवर्स ट्रांसक्रिप्टेज इन्हिबिटर्स	डॉ. एस.बी. कट्टी
इन्टिग्रल यूनिवर्सिटी, लखनऊ			
60	नीतू सिंह	एक्सपोलेरेशन आफ द बायोकैमिकल एण्ड मॉलीक्युलर मैकेनिज़्म ऑफ एण्टी–अल्सर एक्शन ऑफ नॉवेल नैच्युरल प्रोडक्ट्स	डॉ. जी. पालित

2 वाह्य अभ्यर्थियों को प्रदान किया गया प्रायोजित प्रशिक्षण

उपर्युक्त कार्यक्रम के अन्तर्गत औषधि एवं औषधि निर्माण अनुसंधान, प्रयोगशाला जन्तु तकनीक, टिश्यू एवं सेल कल्चर, इन्स्ट्रूमेन्टेशन, परिष्कृत विश्लेषणात्मक उपकरणों एवं अन्य प्रयोगशाला, तकनीक के क्षेत्र में संस्थान द्वारा स्नातकोत्तर छात्रों, विदेशों के शोध छात्रों तथा संपूर्ण देश के शैक्षिक तथा उद्योग जगत के प्रतिभागियों को प्रशिक्षण प्रदान किया गया।

2.1 स्नातकोत्तर छात्रों को प्रशिक्षण

कैलेण्डर वर्ष के दौरान देश भर से 51 कॉलेजों / विश्वविद्यालयों और संबद्ध कॉलेजों से कुल 140 स्नातकोत्तर छात्रों का योग्यता के आधार पर चयन किया गया और औषधि तथा औषधि निर्माण अनुसंधान के विभिन्न विषयों में 4–10 महीनों का प्रशिक्षण दिया गया।

2.2 नाइपर रायबरेली के स्नातकोत्तर छात्रों को प्रशिक्षण

सीडीआरआई में, नाइपर, रायबरेली के लिए एक संरक्षक संस्थान के रूप में 30 एम. फार्मा. छात्रों को जैव चिकित्सा अनुसंधान में एक वर्ष की परियोजना प्रशिक्षण प्रदान किया।

2.3 इन्सा (INSA) और नासी (NASI) के सहयोग के अन्तर्गत प्रशिक्षण

इस कार्यक्रम के अन्तर्गत विभिन्न संस्थानों के 07 INSA एवं NASI फेलोज को बायोमेडिकल रिसर्च के विभिन्न पहलुओं पर प्रशिक्षण प्रदान किया गया।

2.4 द्विपक्षीय सहयोग के अन्तर्गत अन्तर्राष्ट्रीय प्रशिक्षण

निम्नलिखित विदेशी प्रशिक्षुओं को संस्थान में दीर्घ अवधि / लघु अवधि का प्रशिक्षण प्रदान किया गया।

प्रशिक्षु का नाम एवं पता	फेलोशिप / कार्यक्रम	सुपरवाइज़र	अवधि
डॉ. सैमुअल ऐडिटट्युन्जि ऑनेसैन्वो निर्माण डिपार्टमेंट ऑफ फिजियोलॉजी, फैकल्टी ऑफ बेसिक मेडिकल साइन्सेज, यूनिवर्सिटी ऑफ इबादान, नाइज़ीरिया	फॉर पोस्ट डॉक्ट्रल रिसर्च अण्डर आरटीएफडीसीएस फेलोशिप	**डॉ. गौतम पालित** मुख्य वैज्ञानिक, औषधि प्रभाव विज्ञान प्रभाग	03.11.2011 से 30.06.2012
प्रो. इमैनुअल चेनिडम इबेज़िम औशधि निर्माण विभाग, यूनिवर्सिटी ऑफ नाइज़ीरिया	सी.वी. रमन इण्टरनेशनल फेलोशिप फॉर अफ्रीकन रिसर्चर फॉर सीनियर फेलोशिप स्पॉन्सर्ड बाय फिक्की, नई दिल्ली	**डॉ. अमित मिश्रा** प्रधान वैज्ञानिक, औषधि निर्माण विभाग	01.04.2012 से 30.04.2012

प्रशिक्षु का नाम एवं पता	फेलोशिप/कार्यक्रम	सुपरवाइज़र	अवधि
डॉ. एडविन ओगेचुकवू ओमेज़ डिपार्टमेंट ऑफ फार्मास्युटिकल एण्ड मेडिसिनल केमिस्ट्री, फेकल्टी ऑफ फार्मास्युटिकल साइंसेज, यूनिवर्सिटी ऑफ नाइजीरिया, नाइजीरिया	सी.वी. रमन इण्टरनेशनल फेलोशिप फॉर अफ्रीकन रिसर्चर फॉर पोस्ट डॉक्ट्रल फेलोशिप स्पॉन्सर्ड बाय फिक्की, नई दिल्ली	**डॉ. एन. चट्टोपाध्याय** वरिष्ठ प्रधान वैज्ञानिक, अन्तःस्रावी विज्ञान प्रभाग	02.04.2012 से 01.10.2012
डॉ. पॉल ज़्यूफिएट लेक्चरार, यूनिवर्सिटी ऑफ याउन्दे कैमरून	सी.वी. रमन इण्टरनेषनल फेलोशिप फॉर अफ्रीकन रिसर्चर फॉर डॉक्ट्रल फेलोशिप स्पॉन्सर्ड बाय फिक्की, नई दिल्ली	**डॉ. सव्यसाची सान्याल** वैज्ञानिक, डीटीडीडी प्रभाग	19.04.2012 से 18.10.2012
डॉ. बिलाण्डा डैनियलि क्लॉडे एसोशिएट लेक्चरार, लेबोरेटरी ऑफ फार्माकोलॉजी एण्ड टॉक्सीकोलॉजी, डिपा. ऑफ बायोकेमिस्ट्री, फैकल्टी ऑफ साइंस, यूनिवर्सिटी ऑफ याउन्दे, कैमरून	सी.वी. रमन इण्टरनेशनल फेलोशिप फॉर अफ्रीकन रिसर्चर फॉर डॉक्ट्रल फेलोशिप स्पॉन्सर्ड बाय फिक्की, नई दिल्ली	**डॉ. एन. चट्टोपाध्याय** वरिष्ठ प्रधान वैज्ञानिक, अन्तःस्रावी विज्ञान प्रभाग	19.04.2012 से 18.10.2012
प्रो. लॉरेन्स ऑनयैंगो ऐरॉट मैंगुरो केमिस्ट्री डिपार्टमेन्ट मैसनों यूनिवर्सिटी, मैसनो, कैन्या	सी.वी. रमन इण्टरनेशनल फेलोशिप फॉर अफ्रीकन रिसर्चर फॉर डॉक्ट्रल फेलोशिप स्पॉन्सर्ड बाय फिक्की, नई दिल्ली	**डॉ. प्रेम प्रकाश यादव** वैज्ञानिक, औषधि एवं रसायन विज्ञान प्रभाग	11.05.2012 से 10.08.2012
डॉ. एफ.जे. सांचेज सेन्ट्रो डि बायोलॉजिया मॉलीक्युलर सेवेरो ओकोआ, मैड्रिड, स्पेन	ट्रेनिंग प्रोग्राम ऑन पोस्ट ट्रांसलेशनल मॉडीफ़िकेशन्स इन्ड्यूज्ड बाय नाइट्रोक्सीडेटिव स्ट्रेस एंज़ बायोमॉकर्स ऑफ वैस्कुलर डैमेज इन डायबिटीज़	**डॉ. मधु दीक्षित** मुख्य वैज्ञानिक, औषधि प्रभाव विज्ञान प्रभाग	19.02.2012 से 03.03.2012
डॉ. (सुश्री) सी.ई.डायज़ सेन्ट्रो डि बायोलॉजिया मॉलीक्युलर सेवेरो ओकोआ, मैड्रिड, स्पेन	ट्रेनिंग प्रोग्राम ऑन पोस्ट ट्रांसलेशनल मॉडीफ़िकेशन्स इन्ड्यूज्ड बाय नाइट्रोक्सीडेटिव स्ट्रेस एंज़ बायोमॉकर्स ऑफ वैस्कुलर डैमेज इन डायबिटीज़	**डॉ. मधु दीक्षित** मुख्य वैज्ञानिक, औषधि प्रभाव विज्ञान प्रभाग	19.02.2012 से 03.03.2012
सुश्री मार्टा फ़िएरो सेन्ट्रो डि बायोलॉजिया मॉलीक्युलर सेवेरो ओकोआ, मैड्रिड, स्पेन	ट्रेनिंग प्रोग्राम ऑन पोस्ट ट्रांसलेशनल मॉडीफ़िकेशन्स इन्ड्यूज्ड बाय नाइट्रोक्सीडेटिव स्ट्रेस ऐज़ बायोमॉकर्स ऑफ वैस्कुलर डैमेज इन डायबिटीज़	**डॉ. मधु दीक्षित** मुख्य वैज्ञानिक, औषधि प्रभाव विज्ञान प्रभाग	07.02.2012 से 17.12.2012
सुश्री रोज़ा ब्रेन्टन सेन्ट्रो डि बायोलॉजिया मॉलीक्युलर सेवेरो ओकोआ, मैड्रिड, स्पेन	ट्रेनिंग प्रोग्राम ऑन पोस्ट ट्रांसलेशनल मॉडीफ़िकेशन्स इन्ड्यूज्ड बाय नाइट्रोक्सीडेटिव स्ट्रेस ऐज़ बायोमॉकर्स ऑफ वैस्कुलर डैमेज इन डायबिटीज़	**डॉ. मधु दीक्षित** मुख्य वैज्ञानिक, औषधि प्रभाव विज्ञान प्रभाग	07.02.2012 से 17.12.2012

3. प्रशिक्षण कार्यक्रमों में सीडीआरआई कर्मचारियों की प्रतिभागिता

प्रस्तुत वर्ष में सीएसआरआई–सीडीआरआई के विभिन्न कर्मचारियों नें अनेक प्रशिक्षण कार्यक्रमों एवं कार्यशालाओं में विभिन्न विधाओं में अपने ज्ञान व अनुभवों को बढाने हेतु प्रतिभागिता की। वैज्ञानिकों के अतिरिक्त अन्य तकनीकि सहायकों ने भी अनेक प्रशिक्षण कार्यक्रमों एवं कार्यशालाओं में भाग लिया।

5 पुरस्कार एवं सम्मान

डॉ. मधु दीक्षित

- साइटोमीट्री सोसाइटी ऑफ इण्डिया की प्रेसीडेण्ट चुनी गई

डॉ. के.वी. शशिधरा

- इण्डो–यूएस अनुसंधान फेलोशिप 2012, भारत–अमेरिका विज्ञान और प्रौद्योगिकी फोरम (आईयूएसएसटीएफ) और डीएसटी, भारत सरकार द्वारा

डॉ. जे.के. घोष

- वर्ष 2013 के लिए नेशनल एकेडेमी ऑफ साइन्सेज, इण्डिया के फेलो चुने गए

डॉ. डी.एस. उपाध्याय

- लेबोरेटरी एनिमल लिमिटेड, लंदन द्वारा बर्सरी अवार्ड

डॉ अरूण त्रिवेदी

- एनएएसआई युवा वैज्ञानिक प्लेटिनम जुबली अवार्ड 2012

डॉ. पूनम सिंह

- सोसाइटी ऑफ एण्ड्रोलॉजी इण्डिया की वार्षिक बैठक में प्रोफेसर के आर लुमास मेमोरियल ओरेशन अवार्ड

डॉ. जियाउर आर. गाइन

- इन्नोवेटिव यंग बायोटेकनोलॉजिस्ट अवार्ड–2011 से सम्मानित

श्री विजय कुमार (डॉ. अतुल गोयल के छात्र)

- इली–लिली एण्ड कम्पनी एशिया आउटस्टैंडिंग थीसिस अवार्ड–2012 (प्रथम पुरस्कार)

डॉ वहाजुद्दीन

- इंडियन ड्रग मेन्युफेक्चरर एसोसिएशन का वर्ष 2012 का यंग फार्मास्युटिकल एनालिस्ट अवार्ड।
- वर्ष 2011–12 के लिए

श्री पीयुष अग्रवाल (डॉ. बिजोय कुण्डु के छात्र)

- इली–लिली एण्ड कम्पनी एशिया आउटस्टैंडिंग थीसिस अवार्ड–2012 (द्वितीय पुरस्कार)

डॉ ए.के. शॉ

- भारतीय केमिकल सोसायटी का वर्ष 2010 का प्रोफे डी पी चक्रवर्ती, 60वीं जयंती स्मरणोत्सव पुरस्कार

सुश्री अमिता मिश्रा (डॉ. संजय बत्रा की छात्रा)

- डॉ. एम.एम. धर स्मृति पुरस्कार, 2012 (केमिकल साइंसेज)

श्री रवि शंकर केशरी (डॉ. मधु दीक्षित के छात्र)

- डॉ. एम.एम. धर स्मृति पुरस्कार, 2012 (बायोलॉजिकल साइंसेज)

श्री गोविन्द तिवारी (डॉ. अतुल गोयल के छात्र)

- चतुर्थ नाइपर (रायबरेली) सीडीआरआई सिम्पोजियम 2012, लखनऊ में बेस्ट पोस्टर अवार्ड

सुश्री शालिनी अस्थाना (डॉ. मनीष कुमार चौरसिया की छात्रा)

- नेनोबायो 2012 कोच्चि में द्वितीय सर्वश्रेष्ठ पोस्टर पुरस्कार

सुश्री ओजो ओलाजुमोके ओमालारा (डॉ. एस के रथ की छात्रा)

- 32वीं एन्युअल कान्फ्रेंस ऑफ टॉक्सिकोलॉजी 2012, लखनऊ में बेस्ट पोस्टर अवार्ड

श्री विकास कुशवाहा (डॉ. कल्पना मूर्ति के छात्र)

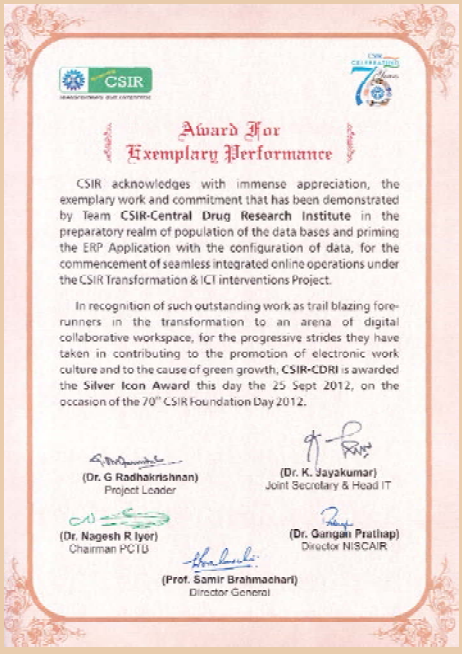
- इम्यूनोकॉन 2012 वाराणसी में द्वितीय सर्वश्रेष्ठ ओरल प्रेजेन्टेशन अवार्ड

श्री निकुंज सेठी (डॉ. नीरज सिन्हा के छात्र)

- नेशनल सेमिनार ऑन इमर्जिंग ट्रेण्ड्स इन स्पेक्ट्रोस्कोपी में बेस्ट ओरल प्रेजेन्टेशन अवार्ड

श्री अमित कुमार गुप्ता (डॉ. ए के सक्सेना के छात्र)

- HRDG-CSIR द्वारा आयोजित 9जी TLEP कार्यक्रम में द्वितीय पुरस्कार


CSIR

Award For
Exemplary Performance

CSIR acknowledges with immense appreciation, the exemplary work and commitment that has been demonstrated by Team **CSIR-Central Drug Research Institute** in the preparatory realm of population of the data bases and priming the ERP Application with the configuration of data, for the commencement of seamless integrated online operations under the CSIR Transformation & ICT interventions Project.

In recognition of such outstanding work as trail blazing forerunners in the transformation to an arena of digital collaborative workspace, for the progressive strides they have taken in contributing to the promotion of electronic work culture and to the cause of green growth, **CSIR-CDRI** is awarded the **Silver Icon Award** this day the 25 Sept 2012, on the occasion of the 70th CSIR Foundation Day 2012.

(Dr. G Radhakrishnan)
Project Leader

(Dr. K. Jayakumar)
Joint Secretary & Head IT

(Dr. Nagesh R Iyer)
Chairman PCTD

(Dr. Ganguli Prathap)
Director NISCAIR

(Prof. Samir Brahmachari)
Director General

- सीएसआईआर@70 समारोह में सीडीआरआई को सीएसआईआर ईआरपी अवार्ड 2012 का सिल्वर ऑइकन अवार्ड

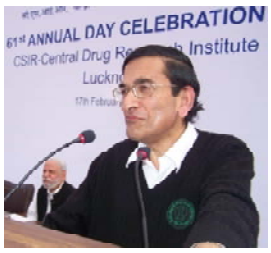
Notes

अन्य गतिविधियाँ

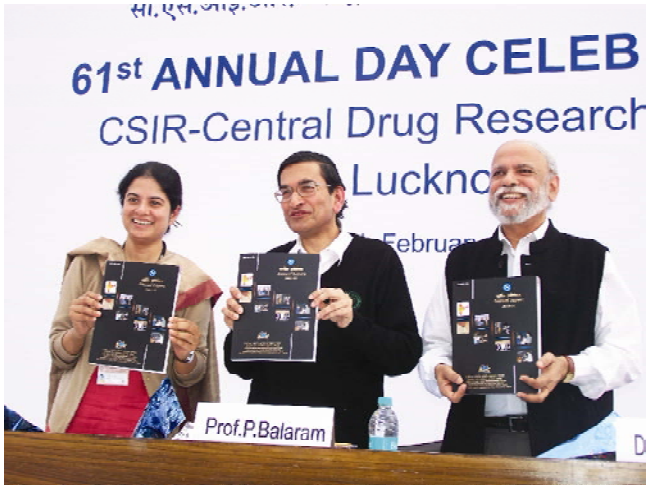

वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद, भारत
CSIR INDIA

1 प्रमुख आयोजित कार्यक्रम

सीएसआईआर–सीडीआरआई वार्षिक दिवस



17 फरवरी, 2012 को संस्थान का 61वां वार्षिक दिवस मनाया गया। एक दिन पूर्व 16 फरवरी, 2012 को सीडीआरआई क्लब के वार्षिक पुरस्कार वितरण समारोह का आयोजन किया गया जिसकी अध्यक्षता डॉ. टी.के. चक्रवर्ती ने की। डॉ. श्रीमती सुष्मिता चक्रवर्ती ने मुख्य अतिथि के रूप में कार्यक्रम की गरिमा बढ़ाई। उन्होंने संस्थान में आयोजित एक माह तक चलने वाले खेलकूद क्रियाकलापों में विभिन्न प्रतियोगिताओं के विजेताओं को पुरस्कार प्रदान किये। संध्याकाल में स्टाफ क्लब द्वारा सांस्कृतिक कार्यक्रमों का आयोजन किया गया जिसमें संस्थान के स्टाफ ने अपने परिवारों के साथ भाग लिया।



मुख्य कार्यक्रम नये सीएसआईआर–सीडीआरआई प्रांगण, जानकीपुरम विस्तार, लखनऊ में आयोजित किया गया। इसमें इण्डियन इन्स्टीट्यूट ऑफ साइंस, बंगलुरु के निदेशक प्रो. पी. बलराम मुख्य अतिथि थे। डॉ. टी.के. चक्रवर्ती, निदेशक ने अतिथियों का स्वागत किया और प्रतिवेदन अवधि में सीएसआईआर–सीडीआरआई की उपलब्धियों का विस्तृत विवरण प्रस्तुत किया। अपनी प्रभावशाली प्रस्तुति में उन्होंने श्रोताओं को इस वर्ष के प्रकाशनों के विषय में बताया जिससे गुणात्मक और संख्यात्मक दोनों ही प्रकार से अच्छे कार्य निष्पादन का संकेत मिलता है। औषधि अनुसंधान में उत्कृष्टता हेतु वर्ष 2012 के सीडीआरआई पुरस्कार की घोषणा की गयी। प्रो. पी. बलराम ने ''उभरते भारत'' के सदंर्भ में सीएसआईआर प्रयोगशालाओं की भूमिका की पुर्नव्याख्या की आवश्यकता पर ज़ोर दिया। इसके पश्चात् गणमान्य व्यक्तियों द्वारा वार्षिक प्रतिवेदन 2011–12 का विमोचन किया गया।

वर्ष 2012 के प्रोत्साहन पुरस्कार–2012 उन विभिन्न 16 वैज्ञानिकों को दिये गये जिनके अनुसंधानपत्र 2011 में हाई इम्पैक्ट फैक्टर (आईएफ) जर्नल्स में प्रकाशित हुए। इस वर्ष 6 पेपर्स जीव विज्ञान ग्रुप (आईएफ > 5) और 10 पेपर्स रसायन (आईएफ > 5) विज्ञान ग्रुप में पुरस्कृत हुए। इसके अतिरिक्त 3 पेटेण्ट, पेटेण्ट ग्रांट अवार्ड–2012 हेतु चयनित हुए। सर्वोत्तम थीसिस–2012 हेतु डॉ. एम.एम.धर स्मृति पुरस्कार दो शोध छात्रों को प्रदान किया गया। यह पुरस्कार डॉ. सुमन रेखित, अध्यक्ष, एमआरसी रिसर्च इन्कार्पोरेशन, कनाडा द्वारा प्रायोजित हैं। केमिकल साइंसेज़ में सुश्री अमिता मिश्रा ने और बायोलॉजिकल साइंसेज में श्री रविशंकर केशरी ने पुरस्कार प्राप्त किया। सेवा के 25 वर्ष पूर्ण करने वाले कर्मचारियों को भी इस अवसर पर सम्मानित किया गया। सर्वोत्तम थीसिस–2012 के लिये तीन शोध छात्रों को निदेशक प्रोत्साहन पुरस्कार प्रदान किया गया। समारोह का समापन एमएसबी डिवीजन की प्रधान वैज्ञानिक और प्रभागाध्यक्ष डॉ. समन हबीब के धन्यवाद प्रस्ताव से हुआ।

चिकित्सा रसायन और औषधि निर्माण विज्ञान पर चतुर्थ सीडीआरआई–नाईपर (रायबरेली) संगोष्ठी

चिकित्सा रसायन और औषधि निर्माण विज्ञान पर चतुर्थ सीएसआईआर –सीडीआरआई–नाईपर, (रायबरेली) संगोष्ठी का आयोजन दिनांक 23–25 फरवरी, 2012 को सीएसआईआर–सीडीआरआई, लखनऊ में किया गया। संगोष्ठी का लक्ष्य चिकित्सा रसायन और औषधि निर्माण विज्ञान के क्षेत्रों में आधारित ज्ञान की वृद्धि करना तथा औषधि खोज एवं विकास के क्षेत्र में

किये जा रहे हमारे अत्याधुनिक अनुसंधान के प्रयासों की झलक प्रदान करना था। 150 से अधिक सहभागियों ने संगोष्ठी में भाग लिया। आईएलएस, हैदराबाद के प्रो. प्रभात आर्या ने मुख्य व्याख्यान दिया जिसका शीर्षक था पोस्ट जेनॉमिक्स ड्रग डिस्कवरी: चैलेन्जेज़ एण्ड ऑपरच्युनिटीज़। उद्घाटन समारोह की अध्यक्षता सीएसआईआर–सीडीआरआई, लखनऊ के भूतपूर्व निदेशक डॉ. वी.पी. कम्बोज ने की। छत्रपति शाहूजी महाराज चिकित्सा विश्वविद्यालय, लखनऊ के कलुपति प्रो. देवेन्द्र के. गुप्ता ने संगोष्ठी का उद्घाटन किया। संगोष्ठी अनुसंधानकर्ताओं/वैज्ञानिकों की भविष्य की पीढ़ी को कुछ सीखने और करने का अवसर प्रदान करने के लिये शिक्षा जगत और उद्योगों के अन्तर्राष्ट्रीय ख्याति प्राप्त भारतीय वैज्ञानिकों के व्याख्यानों पर केन्द्रित थी। इस दो दिवसीय वैज्ञानिक विचार–विमर्श के दौरान औषधि उद्योग और शिक्षा जगत के प्रख्यात वक्ताओं द्वारा 23 व्याख्यान दिये गये। इस वैज्ञानिक कार्यक्रम का दूसरा बड़ा आकर्षण इसका पोस्टर सत्र था जहाँ मौलिक अनुसंधान कार्य आधारित प्रस्तुतीकरण के अतिरिक्त एम.फार्मा के छात्रों को उनके परियोजना आधारित प्रस्तुतीकरण को प्रदर्शित करने के लिये प्रोत्साहित किया गया और सर्वोत्तम पोस्टर को पुरस्कार प्रदान किये गये।

भारत–अफ्रीका विज्ञान एवं प्रौद्योगिकी मंत्रियों का सम्मेलन तथा टेक एक्सपो 2012

भारत–अफ्रीका विज्ञान एवं प्रौद्योगिकी मंत्रियों का प्रथम सम्मेलन एवं टेक एक्सपो का आयोजन दिनांक 01से 02 मार्च, 2012 को विज्ञान भवन, नई दिल्ली में किया गया। सम्मेलन का उद्घाटन विज्ञान एवं प्रौद्योगिकी तथा पृथ्वी मंत्राालय के माननीय मंत्री श्री विलासराव देशमुख ने किया। 01–02 मार्च, 2012 तक की प्रदर्शनी में उपयोगी भारतीय प्रौद्योगिकियाँ और नवीन उत्पादों को निचले स्तर से लेकर उन्नत स्तर तक प्रदर्शित किया गया। भाग लेने वाले संस्थान सीएसआईआर, डीएसटी, फिक्की और नेशनल इनोवेशन फाउण्डेशन से चुने गये थे। प्रदर्शनी में अफ्रीका महाद्वीप के विभिन्न विज्ञान एवं प्रौद्योगिकी मंत्री अपने अफ्रीकी वरिष्ठ अधिकारियों के साथ उपस्थित थे। साथ ही अफ्रीकी देशों के मिशन के दिल्ली आधारित अधिकारी, अफ्रीकी यूनियन कमीशन के अधिकारी, और आठ रीजनल अफ्रीकी इकनॉमिक फोरम के प्रतिनिधि भी उपस्थित थे। आर्थिक पहुँच के भीतर स्वास्थ्य की देखरेख विषय के अन्तर्गत सीएसआईआर– सीडीआरआई औषधियों जैसे गर्भ निरोधक के रूप में सहेली डिस्फंकशनल, यूटरिन ब्लीडिंग के प्रबंधन हेतु नोवेक्स डीएक्स प्रमस्तिष्कीय उपचार हेतु ई–मॉल और मलेरिया हेतु क्लोरोक्विन, सेरेब्रल मलेरिया हेतु लॉरीथर, स्मृति सुधार के लिये मेमोरी श्योर का प्रदर्शन अफ्रीकी देशों को प्रौद्योगिकी हस्तान्तरण हेतु किया गया।

जन्तु प्रयोग पर वैज्ञानिक और तकनीकी जागरूकता कार्यक्रम

सीएसआईआर–सीडीआरआई, लखनऊ में प्रयोगशाला जन्तु प्रभाग द्वारा दिनांक 26–30 मार्च, 2012 को संस्थान के मानव संसाधन विकास कार्यक्रम के एक भाग के रूप में 'ऐनिमल एक्सपेरीमेंटेशन' पर द्वितीय वैज्ञानिक एवं तकनीकी जागरूकता कार्यक्रम का आयोजन किया गया। कार्यक्रम का उद्देश्य विभिन्न जैविक विषयों में जन्तु शोध में आबद्ध प्रोजेक्ट असिस्टेन्ट्स और शोध छात्रों सहित संस्थान के वैज्ञानिक और टेक्निकल स्टाफ़ को प्रयोग किये जाने वाले जन्तुओं की मानवोचित देखभाल, संभाल, नियंत्रण के तरीके और संबंधित जन्तु तकनीकी पर प्रारंभिक जानकारी देना और जन्तु प्रयोगों के दौरान जन्तु कल्याण के नियमों का पालन करने के विषय में बताना था। यह कार्यक्रम प्रयोग किये जाने वाले जन्तुओं से एक समान और विश्वसनीय अनुसंधान परिणाम प्राप्त करने हेतु पूर्व अपेक्षित माना जा रहा था।

2डी जेल इलेक्ट्रोफोरेसिस पर व्यवहारिक प्रशिक्षण

2डी जेल इलेक्ट्रोफोरेसिस पर व्यवहारिक प्रशिक्षण कार्यक्रम का आयोजन 27–28 मार्च 2012 को सीएसआईआर–सीडीआरआई के डीटीडीडी प्रभाग के वैज्ञानिक डॉ. अरूण कुमार द्विवेदी की प्रोटियॉमिक्स और कैन्सर बायोलाजी प्रयोगशाला में किया गया। इस प्रशिक्षण पाठ्यक्रम के दौरान 1डी और 2डी जेल इलेक्ट्रोफोरेसिस हेतु सैद्धांतिक एवं व्यवहारिक दोनों ही प्रशिक्षण प्रदान किये गये। इनमें 2डी जेल इलेक्ट्रोफोरेसिस हेतु नमूने तैयार करना, उनको प्रथम एवं द्वितीय डायमेन्शन जेल इलेक्ट्रोफोरेसिस से अलग करना, तत्पश्चात् इलेक्ट्रोफोरेस्ड प्रोटीन स्पॉट को देखने हेतु कुमास्सी ब्लू द्वारा जेल स्टेनिंग करना सिखाया गया। इस पाठ्यक्रम में सीएसआईआर–सीडीआरआई और सीएसआईआर–सीमैप के विभिन्न प्रभागों के 19 छात्रों ने भाग लिया।

राष्ट्रीय प्रौद्योगिकी दिवस समारोह

सीएसआईआर– सीडीआरआई ने एमेरिटस प्रोफेसर और रमन्ना फेलो, इनऑर्गेनिक केमिस्ट्री विभाग, इण्डियन एसोसिएशन फॉर द कल्टिवेशन ऑफ साइंस, कोलकाता और केमिकल रिसर्च सोसायटी ऑफ इण्डिया के अध्यक्ष प्रो. अनिमेष चक्रवती के विशेष व्याख्यान का आयोजन करके राष्ट्रीय प्रौद्योगिकी दिवस समारोह का आयोजन किया। प्रो. चक्रवर्ती नें "ए केमिस्ट्स बिट ऑफ हिस्टॉरिकल रिफ्लेक्शन्स ऑन टेक्नोलॉजी डे" पर प्रकाश डाला। अपने व्याख्यान के दौरान उन्होंने उल्लेख किया कि रसायन विज्ञान सभी प्रकार की प्रौद्योगिकी विकास का जननी है। प्राचीन काल से लेकर आधुनिक काल तक प्रौद्योगिकी के सभी विचार रसायन विज्ञान की उन्नति पर आधारित है। इस अवसर पर मुख्य अतिथि प्रो अनिमेष चक्रवर्ती और सीएसआईआर–सीडीआरआई के निदेशक डॉ. टी.के. चक्रवर्ती ने सीएसआईआर–सीडीआरआई न्यूज़ लेटर के वॉल्यूम–3, अंक–2 का विमोचन भी किया। कार्यक्रम का समापन विज्ञान एवं प्रौद्योगिकी प्रभाग के प्रभागाध्यक्ष श्री विनय त्रिपाठी के धन्यवाद ज्ञापन से हुआ।

स्कोपस पर कार्यविधि का प्रदर्शन सह प्रशिक्षण

स्कोपस, साइंस साइटेशन एनालिसिस टूल के वेब के संभावित व्यवहारिक विकल्प के रूप में प्रकट हुआ है। एल्ज़ीवियर ने 31 मई, 2012 तक सीएसआईआर–सीडीआरआई में ट्रायल एक्सेस उपलब्ध कराया था। 22 मई, 2012 को स्कोपस पर एक क्रियाविधि प्रदर्शन और एनॉलिटिकल टूल्स और कैलकुलेटिंग साइटेशन इन्डेक्सेज़ और एच–ग्राफ आदि के प्रयोग के विषय में एक दिवसीय प्रशिक्षण कार्यक्रम का आयोजन किया गया।

सीपीसीएसईए नामितों और आईएईसी सदस्यों हेतु जन्तु कल्याण और नीतिशास्त्र पर सीपीसीएसईए की राष्ट्रीय कार्यशाला

पर्यावरण और वन मंत्रालय, भारत सरकार द्वारा अनुमोदित और प्रायोजित एक दिवसीय कार्यशाला का आयोजन 13 जुलाई, 2012 को

किया गया। कार्यशाला का उद्देश्य मानवता के कल्याण और वैज्ञानिक गतिविधियों एवं लक्ष्यों की पूर्ति के लिये जन्तु प्रयोगों से जुड़े हुए अनुसंधान एवं शैक्षिक संस्थानों को संवेदनशील बनाना था। कार्यशाला के दौरान विभिन्न संस्थानों की संस्थागत जन्तु आचार शास्त्र समितियों (आईएईसीएस) के सदस्यों और सीपीसीएसईए के नामित व्यक्तियों, जो जन्तु प्रयोग प्रोटोकॉल की समीक्षा और अनुमोदन प्रक्रिया को पूर्ण करते हैं, कि जन्तु कल्याण और आचार शास्त्र के मूल सिद्धांतों के प्रति जागरूक किया गया। विभिन्न संस्थानों/ विश्वविद्यालयों के लगभग 40 सहभागियों ने कार्यशाला में भाग लिया।

थॉमसन–रायटर्स की विज्ञान वेब और अन्य लाइफ साइंसेज़ से संबंधित सूचना समाधानों की कार्यशाला

सीएसआईआर–सीडीआरआई ने थॉमसन–रायटर्स के साथ मिलकर संस्थान में 24 जुलाई, 2012 को एक दिवसीय कार्यशाला का आयोजन किया। कार्यशाला का उद्देश्य लाइफ साइंसेज़ अनुसंधान से संबंधित वेब आधारित सूचना तथा इन सूचनाओं से संबंधित समाधानों से अनुसंधानकर्ताओं को परिचित करवाना था।

'रिसर्च एप्लिकेशन्स ऑफ फ्लो साइटोमेट्री' पर एक प्रशिक्षण कार्यक्रम

30 जुलाई, 2012 से 01 अगस्त, 2012 की अवधि में सीएसआईआर–सीडीआरआई–बीडी सेंटर ऑफ एक्सीलेंस ने फ्लो साइटोमेट्री संबंधित एप्लिकेशन्स पर एक त्रिदिवसीय व्यवहारिक

कार्यशाला का आयोजन किया। सेल सायकिल एनालिसिस, एनेक्सिन वी/पीआई स्टेनिंग का प्रयोग करते हुए एपोप्टोसिस के एवं सेल सॉर्टिंग आदि विषयों पर व्यवहारिक प्रशिक्षण दिया गया। कार्यशाला के दौरान, कार्यक्रम की संयोजक सीएसीआईआर–सीडीआरआई की डॉ. मधु दीक्षित ने "फ्लो साइटोमेट्री बेस्ड एपोप्टोसिस एस्से" विषय पर व्याख्यान दिया।

सद्भावना दिवस समारोह

स्वर्गीय प्रधानमंत्री श्री राजीव गाँधी की स्मृति में संस्थान में 17 अगस्त, 2012 को ''सद्भावना दिवस'' मनाया गया। सद्भावना की मूल विषयवस्तु सभी धर्मों, भाषाओं और क्षेत्रों के लोगों में राष्ट्रीय एकता और साम्प्रदायिक सामंजस्य को बढ़ाना है। सद्भावना दिवस को मनाने का कारण हिंसा से दूर रहना और लोगों में सद्भावना को प्रोत्साहन देना है। सीएसआईआर–सीडीआरआई में इस अवसर पर उपस्थित होकर सभी नें सद्भावना की शपथ ली कि वे बगैर किसी जाति, क्षेत्र, धर्म या भाषा के भेदभाव के भारत के सभी लोगों की भावनात्मक एकता और मेल–जोल के लिये काम करेंगे।

परिष्कृत उपकरण तथा औषधि खोज में उनकी भूमिका पर संगोष्ठी

''परिष्कृत उपकरण और औषधि खोज में उनकी भूमिका'' पर एक संगोष्ठी का आयोजन 31 अगस्त, 2012 को किया गया। मुख्य अतिथि पद्मश्री डॉ. नित्य आनन्द ने ''सम रिकलेक्शन्स एण्ड रिफ्लेक्शन्स ऑफ सीडीआरआई'' पर एक व्याख्यान दिया। सीबीएमआर, लखनऊ के प्रो. राजा रॉय ने ''मेटल आयन्स एज़ कोफैक्टर्स फॉर ऐग्रीगेशन ऑफ थेराप्यूटिक पेप्टाइड, साल्मन कैल्सिटोनिन'' पर व्याख्यान प्रस्तुत किया। सीएसआईआर–सीडीआरआई, लखनऊ के डॉ. मनोज बर्थवाल ने ''बायोलॉजिकल स्ट्डीज़ ऑन सीडीआरआई कम्पाउण्ड–एस007–867'' पर परिचर्चा की। सीएसआईआर– सीडीआरआई के डॉ. रवि एस अम्पापति ने ''एडवांसमेन्ट ऑफ इन्स्ट्रुमेन्टेशन एण्ड देयर इम्पैक्ट ऑन ड्रग डिस्कवरी'' पर एक व्याख्यान प्रस्तुत किया और सीएसआईआर–सीडीआरआई के ही डॉ. संजीव कनौजिया ने ''मास स्पेक्ट्रोमेट्री एण्ड इटस् एप्लीकेशन्स इन ड्रग डिस्कवरी'' पर विस्तृत विचार प्रस्तुत किये।

सीएसआईआर स्थापना दिवस समारोह

सीएसआईआर–सीडीआरआई ने 25 सितम्बर, 2012 को सीएसआईआर स्थापना दिवस मनाया। इस दिन सीएसआईआर–सीडीआरआई पुरस्कार समारोह का भी आयोजन किया गया। भारतीय प्रौद्योगिकी संस्थान, दिल्ली के ऑर्गैनिक केमिस्ट्री विभाग के प्रो. बी. जयराम ने मुख्य अतिथि के रूप में कार्यक्रम की शोभा बढ़ाई और अपने विशिष्ट कार्य ''जीनोम्स टु हिट्सः द एमर्जिंग असेम्बली लाइन'' पर व्याख्यान दिया। व्याख्यान स्वदेशी सॉफ्टवेयर जैसे केमजीनोम्स,

भगीरथ और संजीवनी के विकास से संबंधित था और ये सॉफ्टवेयर वैज्ञानिक बिरादरी और छात्रों की आसान पहुँच में है। केमिकल साइंसेज में 'सीएसआईआर–सीडीआरआई पुरस्कार–2012' आईआईसीटी हैदराबाद के डॉ. राजकुमार बैनर्जी को दिया गया। डॉ. बैनर्जी ने ''न्यूक्लियर हॉर्मोन रिसेप्टर्स ऐण्ड लिपिड्सः ऐन अनयूजुअल कॉनकॉक्शन फॉर डिज़ाइनिंग ऐण्टीकैंसर थेराप्यूटिक्स'' शीर्षक के अन्तर्गत अपना व्याख्यान दिया। बायोलॉजिकल साइंसेज के अन्तर्गत 'सीएसआईआर–सीडीआरआई पुरस्कार–2012' आईआईटी, कानपुर के प्रो. सुब्रमनियन गणेश को उनके कार्य ''मॉलीक्युलर पैथालॉजी ऑफ लैफौरा डिज़ीज़'' के लिये दिया गया। इसके पश्चात् सीएसआईआर– सीडीआरआई के वैज्ञानिक डॉ. शैलज़ा भट्टाचार्य, डॉ. आशीष अरोड़ा, डॉ. राजेन्द्र सिंह, डॉ. अरूण कुमार त्रिवेदी, डॉ. जियाउर आर गाइन, जिन्होंने वर्ष 2011–12 में प्रतिष्ठित राष्ट्रीय पुरस्कार प्राप्त किये थे, को भी सम्मानित किया गया। प्रो. बी. जयराम ने सीएसआईआर– सीडीआरआई न्यूज़लेटर (खण्ड4 अंक1) अप्रैल–सितम्बर, 2012 का विमोचन किया और सीएसआईआर– सीडीआरआई के सितम्बर 2011–अगस्त 2012 को सेवानिवृत्त होने वाले कर्मचारियों को सम्मानित किया गया। इसके पश्चात् सीएसआईआर–सीडीआरआई के निदेशक डॉ. टी.के. चक्रवर्ती ने उन कर्मचारियों को सम्मानित किया जिन्होंने सीडीआरआई में अपनी सेवा के 25 वर्ष पूरे कर लिये। सीएसआईआर कर्मचारियों के उन बच्चों को भी विशिष्ट अतिथि डॉ.(श्रीमती) सुष्मिता चक्रवर्ती द्वारा सम्मानित किया गया, जिन्होंने विज्ञान विषयों में इण्टरमीडिएट बोर्ड परीक्षाओं में 90 प्रतिशत से अधिक अंक प्राप्त किये।

सीएसआईआर–सीडीआरआई ने सीएसआईआर@70 समारोह–नई दिल्ली में सिल्वर आइकॉन पुरस्कार प्राप्त किया

सीएसआईआर ने सीएसआईआर–सीडीआरआई टीम के प्रति उनके उन सराहनीय कार्यों एवं वचनबद्धता हेतु असीम कृतज्ञता प्रकट की जो सीएसआईआर ट्रांसफॉर्मेशन एण्ड आईसीटी इण्टरवेशन प्रोजेक्ट के अंतर्गत निरन्तर एकीकृत ऑन लाइन ऑपरेशन के प्रारंभ हेतु डेटा बेसेज़ के समूह के प्रारंभिक क्षेत्र में और डेटा के कन्फ़िगरेशन सहित ईआरपी ऐप्लिकेशन की प्राइमिंग में प्रदर्शित किया गया। एक डिज़िटल सहयोगात्मक कार्यस्थल में रूपांतरण हेतु प्रगतिशील कदम बढ़ाने के लिये नेतृत्व द्वारा राह दिखाने हेतु सीएसआईआर–सीडीआरआई को सीएसआईआर के 70वें स्थापना दिवस के अवसर पर

25 सितम्बर 2012 को नई दिल्ली में सिल्वर आईकॉन पुरस्कार से सम्मानित किया गया।

प्रजनन जैव औषधि के वैश्विक परिप्रेक्ष्य पर सोसाइटी ऑफ ऐन्ड्रॉलॉजी, इण्डिया की अट्ठारहवीं कांग्रेस

22–24 दिसम्बर, 2012 को सोसाइटी ऑफ ऐन्ड्राालॉजी (एसएआई) द्वारा तीन दिवसीय सेमिनार और कार्यशाला का आयोजन किया गया। इस दौरान ग्रांटमैनशिप पर के.आर. लॉमस मेमोरियल ओरेशन और वर्कशॉप का आयोजन किया गया। एसएआई मीटिंग आधुनिकतम खोजों और क्लीनिकल तकनीक के विषय में प्रस्तुतिकरण, विचार–विमर्श और सीखने का उत्कृष्ट अवसर प्रदान करती है। एसएआई ऐन्ड्राालॉजी के अध्ययन में प्रयोग की गयी तकनीक और विधियों का मूल्यांकन करती है। इस बैठक में जिन विषयों पर विचार–विमर्श किया गया उनमें पुरुष गर्भनिरोध, प्रोस्टैटाइटिस और प्रॉस्टैट कैंसर, एसटीडी,

पुरुष प्रजनन विषालुता, पुरुष–बंध्यता और दुष्क्रिया, बंध्यता की प्रक्रिया, औषधि और पर्यावरणीय विष विज्ञान और एचआईवी–एड्स मुख्य थे।

सीएसआईआर–सीडीआरआई की लखनऊ महोत्सव 2012 में प्रतिभागिता

सीएसआईआर–सीडीआरआई ने पहली बार लखनऊ स्थित अन्य सीएसआईआर प्रयोगशालाओं के साथ मिलकर 26 नवम्बर, 2012 से 09 दिसम्बर, 2012 तक 'लखनऊ महोत्सव–2012' में भाग लिया और स्वास्थ्य संबंधी के विभिन्न उत्पाद (सहेली, नोवेक्स और नोवेक्स–डीएक्स), मलेरियारोधी (ई–मॉल, लारिथर), संक्रामक बीमारियों के क्षेत्र में, स्मृति सुधार (मेमोरी श्योर), जीवनशैली से संबंधित विकृतियां, द्विभाषी पोस्टर्स के माध्यम से प्रदर्षित की। सीडीआरआई ने अस्थि विकृतियों के उपचार हेतु कुछ शक्तिशाली नए लीड अणुओं का उल्लेख किया और हार्ट अटैक अथवा स्ट्रोक से बचाव हेतु आशाजनक मार्ग के रूप में कोलेजन एण्टागोनिट्स के विकास पर भी जोर दिया।

सीएसआईआर–सीडीआरआई की इण्डियन साइंस कांग्रेस–2013, कोलकाता के 'प्राइड ऑफ इण्डिया एक्सपो' में प्रतिभागिता

100वीं भारतीय विज्ञान कांग्रेस का आयोजन 3–7 जनवरी, 2013 को कोलकाता विश्वविद्यालय में किया गया। इसका उद्घाटन मुख्य अतिथि तथा महामहिम भारत के राष्ट्रपति श्री प्रणव मुखर्जी ने किया। माननीय प्रधानमंत्री डॉ. मनमोहन सिंह, महामहिम पं. बंगाल के राज्यपाल श्री एम.के. नारायणन, माननीय पं. बंगाल की मुख्यमंत्री सुश्री ममता बैनर्जी के साथ विभिन्न विज्ञान नेतृत्वकर्ताओं नोबेल पुरस्कार विजेताओं तथा भारत और विदेशों के अति विशिष्ट वक्ताओं ने इस आयोजन में भाग लिया। 'प्राइड ऑफ इण्डिया एक्सपो' का उद्घाटन विज्ञान एवं प्रौद्योगिकी मंत्री, पृथ्वी विज्ञान मंत्रालय और सीएसआईआर के उपाध्यक्ष श्री सुदिनि जयपाल रेड्डी द्वारा किया गया। 'एक्सपो' विज्ञान कांग्रेस में आकर्षण का विषय थी और विज्ञान

जगत के संपूर्ण कैनवस को नवीन विचारों और उत्पादों ने परिपूर्ण कर रखा था। सीएसआईआर–सीडीआरआई ने 'प्राइड ऑफ इण्डिया एक्सपो' में भाग लेते हुए वर्तमान समय में बाजार में आ रहे विभिन्न उत्पादों को पोस्टर्स और नमूनों के माध्यम से प्रदर्शित किया, उदाहरणार्थ– सहेली (महिलाओं के लिये मुख से ली जाने वाली नॉन स्टेरॉयड गर्भनिरोधक गोली), नोवक्स डीएस (डिस्फ़क्शनल यूटरिन ब्लीडिंग के उपचार हेतु), मेमोरी श्योर (स्मृतिवर्धक), ई–मॉल और लैरिथर (सेरेब्रल मलेरिया के उपचार)। सीएसआईआर के महानिदेशक प्रो. समीर के ब्रह्मचारी, सीएसआईआर के भूतपूर्व महानिदेशक डॉ. आर.ए. मशेलकर, अन्य प्रख्यात वैज्ञानिकों, शिक्षाशास्त्रियों और छात्रों ने स्टॉल देखे और प्रदर्शनी के दौरान उन पर चर्चा की।

पर्यावरण एवं वन, विज्ञान एवं प्रौद्योगिकी की स्थायी संसदीय समिति का लखनऊ में विभाग से संबंधित भ्रमण अध्ययन

पर्यावरण एवं वन, विज्ञान एवं प्रौद्योगिकी की स्थायी संसदीय समिति का 21–22 जनवरी, 2013 के दौरान लखनऊ में भ्रमण अध्ययन आयोजित किया गया। सीएसआईआर–सीडीआरआई भ्रमण के समन्वयक के लिये नोडल एजेंसी थी। यह भ्रमण डॉ. टी. सुब्बाराव रेड्डी की अध्यक्षता में आयोजित थी। समिति के अन्य सदसयों में श्री रविनारायण मोहापात्र, प्रो. रंजन प्रसाद यादव, श्री प्रदीप टमटा, श्री रामकांत यादव, श्री आलोक तिवारी, श्री मनोज पॉल पान्डियन, राज्य सभा सचिवालय और केन्द्रीय प्रदूषण नियंत्रण बोर्ड के अधिकारी सम्मिलित थे।

सीएसआईआर–सीडीआरआई के निदेशक ने समिति सदस्यों का स्वागत किया। 21 जनवरी, 2013 को सदस्यों और सेक्रेटेरियट स्टाफ़ के सदस्यों के सम्मान में एक रात्रि भोज का आयोजन होटल क्लार्क्स अवध में किया गया। सीएसआईआर–सीडीआरआई के वरिष्ठ वैज्ञानिकों, उ.प्र. सरकार के विभिन्न विभागों के अधिकारियों के सदस्यों से वार्तालाप किया। 22 जनवरी, 2013 को उ.प्र. सरकार के अधिकारियों द्वारा गोमती नदी के अध्ययन हेतु नदी के किनारे प्रतिनिधिमण्डल के भ्रमण का आयोजन किया गया। इसके पश्चात् उ.प्र. सरकार के मुख्य सचिव श्री ज़ावेद उस्मानी, मुख्य सचिव और पर्यावरण, ऊर्जा, सिंचाई, ट्रांसपोर्ट, शहरी विकास मंत्रालय के प्रधान सचिवों, उ.प्र. सरकार के पर्यावरण नियंत्रण बोर्ड, यूपीएसआईडीसी, म्युनिस्पल कॉर्पोरेशन आदि के अधिकारियों के साथ वार्तालाप का आयोजन किया गया। मीटिंग में गोमती नदी को साफ रखने के उपायों पर मुख्य रूप से जोर दिया गया। लखनऊ से लोकसभा सदस्य श्री लालजी टण्डन भी बैठक में उपस्थित थे।

सांसदों के प्रतिनिधिमण्डल से उ.प्र. के मुख्यमंत्री श्री अखिलेश यादव और उनके साथ वरिष्ठ अधिकारियों ने उनके आवास पर मुलाकात और बातचीत की। उसके पश्चात् दोपहर का भोजन आयोजित था। प्रतिनिधिमण्डल ने सीएसआईआर–सीडीआरआई के निदेशक और अन्य वरिष्ठ वैज्ञानिकों से बातचीत की, उनको सुलभ औषधियों की खोज के संबंध में संस्थान के योगदान से परिचित कराया गया।

समिति ने सबकी पहुँच के अन्दर स्वास्थ्य सुविधा प्रदान करने हेतु संस्थान द्वारा नई औषधियाँ और प्रौद्योगिकियाँ प्रदान करने के अपने मिशन को पूर्ण करने और ज्ञान का आधार तैयार करने और स्वास्थ्य के क्षेत्र में भविष्य के नेतृत्वकर्ताओं को तैयार करने की महत्वपूर्ण उपलब्धियों हेतु संस्थान द्वारा किये गये प्रयासों की सराहना की और इस संबंध में प्रस्ताव प्रस्तुत करने के लिये कहा जिससे समिति उसे योजना आयोग को पृष्ठांकित कर सके।

आइसोलेशन और सेपरेशन ऑफ प्रोटीन एण्ड देयर डिटेक्शन बाइ इम्यूनोब्लॉटिंग पर एक प्रयोगात्मक प्रशिक्षण पाठ्यक्रम

आइसोलेशन और सेपरेशन ऑफ प्रोटीन एण्ड देयर डिटेक्शन बाइ इम्यूनोब्लॉटिंग पर एक प्रयोगात्मक प्रशिक्षण पाठ्यक्रम का आयोजन 28–29 जनवरी, 2013 को प्रोटियॉमिक्स और कैंसर बायोलॉजी प्रयोगशाला, डीटीडीडी प्रभाग में किया गया। इसका आयोजन सीएसआईआर–सीडीआरआई के डॉ. अरूण कुमार त्रिवेदी द्वारा मर्क मिलीपोर के सहयोग से किया गया। कार्यशाला में मैमेलियन कोशिकाओं से प्रोटीन को अलग करने, आइसोलेटेड प्रोटीन का 1डी एसडीएस–एफ पेज पर सेपरेशन और पारंपरिक विधि के साथ–साथ SNAP-iD विधियों द्वारा इम्यूनोब्लॉटिंग के पश्चात् विशिष्ट एण्टीबॉडी का प्रयोग करेक उनकी खोज करना। इसके अतिरिक्त कुमॉसी ब्लू स्टेनिंग और कोलॉइडल कुमॉसी स्टेनिंग द्वारा प्रोटीन बैन्ड्स के विज़ुअलाइज़ेशन को भी प्रदर्शित किया गया। इस प्रयोगशाला में लाइसिस बफर के प्रकार पर डॉ. त्रिवेदी का व्याख्यान, बफर के तत्व और उनकी भूमिका, इम्यूनोब्लॉटिंग का सिद्धांत और उनकी भूमिका को भी सम्मिलित किया गया। इस कार्यशाला में विभिन्न संस्थानों जैसे डॉ. राममनोहर लोहिया आयुर्विज्ञान संस्थान, किंग जॉर्ज मेडिकल विश्वविद्यालय, ऐमिटी विश्वविद्यालय और सीएसआईआर– सीडीआरआई के पीएच.डी. अभ्यर्थियों ने भाग लिया।

38वाँ सर मेलानबी स्मृति व्याख्यान

सीएसआईआर–सीडीआरआई के संस्थापक निदेशक सर एडवर्ड मेलानबी की स्मृति में ''38वें मेलानबी स्मृति व्याख्यान'' का आयोजन 11 फरवरी 2013 को किया गया। इस अवसर पर लोम्बार्डी कम्प्रिहेन्सिव कैन्सर सेन्टर, जॉर्जटाउन यूनिवर्सिटी, यूएसए के ऑन्कोलॉजी एवं फार्माकोलॉजी के प्रोफेसर डॉ. वी. क्रैग जॉर्डन ने व्याख्यान दिया। उनके व्याख्यान का विषय था, ''फोर डिकेड्स ऑफ डिस्कवरी फॉर द ट्रीटमेण्ट एण्ड प्रिवेन्शन ऑफ ब्रेस्ट कैन्सरः द एसइआमएम स्टोरी''। प्रोफेसर जॉर्डन ने बताया कि एसईआरएम स्टोरी न सिर्फ महिलाओं की विभिन्न बीमारियों के उपचार पर प्रकाश डालती है अपितु एस्ट्रोजन–इन्ड्यूज्ड एपोप्टोसिस के रहस्य की भी व्याख्या करती है।

2 अति विशिष्ट आगुन्तक एवं व्याख्यानों का विवरण

प्रतिष्ठित अतिथि

	प्रतिष्ठित अतिथि	शीर्षक	दिनांक
	**प्रोफे. वीरेश रावल** डिपार्टमेंट ऑफ केमिस्ट्री, शिकागो विश्वविद्यालय, शिकागो, यू.एस.ए.	ए यूनीफाइड स्ट्रैटजी फॉर द टोटल सिंथिसिज ऑफ द वेलविटिंडॉलिनॉन अल्कालॉएड्स	12.01.2012
	**प्रोफे. राजीव आर. मोहन** मैसन आई इंन्स्टीट्यूट, स्कूल ऑफ मेडिसिन, यूनिवर्सिटी ऑफ मिसौरी, कोलंबिया, यूएसए	विज़न रेस्टोरेशनः जीनथैरेपी यूजिंग एएवी एण्ड नैनोटेक्नोलॉजी डिलीवरी सिस्टम्स	14.02.2012
	**डॉ. अनिल चौहान** डिर्पाटमेंट ऑफ इन्टर्नल मेडिसिन आयोवा विश्वविद्यालय, यूएसए	रोल ऑफ एण्टीथ्रॉम्बोटिक एन्ज़ाइम इन ADAMTS13 वैस्कुलर इन्लेमेटरी डिज़ीज़ेज	21.03.2012
	**प्रोफे. देवी पी. सरकार** दिल्ली विश्वविद्यालय, दिल्ली	टारगेटेड जीन डिलीवरी टु लीवर सेल्स यूज़िंग इंजीनियर्ड सेन्डई वायरल एन्वलप्सः फ्रॉम बेसिक साइंस टु ए प्रिक्लीनिकल एक्सपीरियन्स	26.04.2012
	**प्रोफे. अनिमेष चक्रवर्ती** एमेरिटस प्रोफे व रामन्ना फेलो, डिपार्टमेंट ऑफ इनआर्गेनिक कैमेस्ट्री, इण्डियन एसोशिएषन फॉर द कल्टीवेशन ऑफ साइंस, कोलकाता	ए कैमिस्ट्स बिट ऑफ हिस्टोरिकल रिलेक्शन ऑन टेक्नोलॉजी डे	11.05.2012
	**प्रोफे. एस.के. शंकर** नेशनल इंस्टीट्यूट ऑफ मेन्टल हेल्थ एण्ड न्यूरोसाइंस, बंगलौर	ए पीप इनटू द बायोलॉजी ऑफ ए फ्यू कॉमन इन्फेक्शन्स वी सी	15.06.2012
	**प्रोफे. योशिनोरी यामामोटो** प्रोफे एमेरिटस, एक्जीक्यूटिव रिसर्च कोआर्डिनेटर, डब्ल्यूपीआई एडवांस्ड इंस्टीट्यूट फॉर मटैरियल्स रिसर्च, टोहोकु यूनिवर्सिटी, जापान	टोटल सिंथेसिस ऑफ गैम्बाइरल एण्ड ब्रेवेटॉक्सिन बी एण्ड कमप्यूटेशनल स्ट्डी	01.08.2012
	**प्रोफे. विलियम केर** एम्पायर स्कॉलर एवं मर्फी फेमिली प्रोफेसर ऑफ चिल्ड्रन्स ऑन्कोलॉजी रिसर्च, माइक्रोबायोलॉजी, इम्युनोलॉजी एण्ड पीडियाट्रिक्स, सनी अपस्टेट मेडिकल यूनिवर्सिटी, यूएसए	रोल ऑफ एसएचआईपी (SHIP) इन कैंसर, इन्फलेमेशन एण्ड स्टेम सेल बायोलॉजी	20.09.2012

	**प्रोफे गौतम आर देसीराजु** इंडियन इंस्टीट्यूट ऑफ साइंस, बंगलुरू	सोलिड स्टेट एण्ड स्ट्रक्चरल केमिस्ट्री	06.11.2012
	**प्रोफे सेंटियागो लमास** सेंट्रो मिक्सतो सीएसआइसी–यूएएम दि बाायोलोजिया मॉलिक्युलर सेवेरो ओकोआ निकोलस केब्रेरा, मेड्रिड, स्पेन	रीडोक्स मीडिएटेड सिग्नलिंग इन इन्डोथीलियल सेल्स	11.12. 2012

अन्य विशिष्ट अतिथि

	नाम और पता	व्याख्यान का विषय	दिनांक
1.	**डॉ. आनन्द श्रीवास्तव** इन्स्टीट्यूट नेशनल डि ट्रांसफ्यूजन, सेनग्युइन, पेरिस, फ्रांस	मलेरियाः इनसाइट इन टू द मेकैनिज़्म ऑफ साइटोअधेरेन्स	05.01.2012
2.	**डॉ. रूचि गुप्ता** रॉकफ़ेलर यूनिविर्सिटी, न्ययार्क, यू.एसए	हाल्टिंग द एमिलॉइड मार्चः हाउ ए नॉवेल Ca^{2+} बाइन्डिंग प्रोटीन एनयूसीबी1, प्रिवेन्ट्स द फ़ार्मेशन ऑफ एमिलॉइड फाइब्रिल्स	05.01.2012
3.	**डॉ. सुभ्राजीत बिस्वास** डिपार्टमेंट ऑफ मेडिसीन, वन्डरबिल्ट यूनिवर्सिटी मेडिकल सेन्टर, यूएसए	रोल ऑफ Bcl-2 फैमिली मेम्बर्स इन अपोप्टोटिक चेकप्वाइंट एण्ड थेराप्युटिक आसपेक्ट्स इन टी सेल ल्युकिमिया	02.02.2012
4.	**डॉ. अनु पुरी** नैशनल कैंसर इंस्टीट्यूट एट फ्रेड्रिक, नेशनल इंस्टीट्यूट ऑफ हैल्थ, यूएसए	लिपिड बेस्ड नैनोटैक्नोलॉजी प्लेटफार्म फॉर ड्रग डिलीवरी	02.03.2012
5.	**डॉ. बी.एल. टेकवानी** नेशनल सेन्टर फॉर नेच्युरल प्रोडक्ट रिसर्च, स्कूल ऑफ फार्मेसी, मिसीसिपी यूनिवर्सिटी, यूएसए	पाथवेज़ टू डिस्कवरी ऑफ सेफ़र एण्टीमलेरियल ड्रग्स	05.03.2012
6.	**डॉ. बिप्लब बेनर्जी** डिपार्टमेंट ऑफ मेडिसिनल कैमिस्ट्री एण्ड मॉलीक्युलर फार्माकोलॉजी, परड्यू यूनिवर्सिटी, यूएसए	एक्सप्लोरिंग न्यू मेथेड्सः फ्रॉम बायोएक्टिव नेच्युरल प्रोडक्ट्स टू स्माल मॉलीक्यूल थेराप्यूटिक्स	26.03.2012
7.	**डॉ दिनेश सी जोशी** डिपार्टमेंट ऑफ न्यूरोसाइंस, यूनिवर्सिटी ऑफ विस्कॉनसिन मेडिसन, यूएसए	माइटोकॉन्ड्रियल फंक्शन्स एण्ड डायनेमिक्सः थेराप्यूटिक टारगेट्स इन न्यूरोडीजेनेरेशन	03.04.2012
8.	**डॉ आकाश कुमार जैन** डिपार्टमेंट ऑफ आर्गेनिक कैमिस्ट्री, इण्डियन इंस्टीटयूट ऑफ साइंस, बंगलुरु	डिज़ाइन एण्ड डेवलपमेन्ट ऑफ न्यू एण्टीकैंसर ड्रग्स एण्ड अदर थेराप्यूटिक एजेण्ट्स टारगेटिंग वैरिअस डीएनए स्ट्रक्चस	10.04.2012
9.	**डॉ पॉवलो सोलदती** तकनीकी निदेशक, सिलिकॉन बायोसाइंसेज, इटली	सॉर्टिंग एण्ड रिकवरी ऑफ रेयर सेल्स बाय डीईपीएर्ट : ए यूनिक आटोमैटेड प्लेटफार्म टु इनेबल आइसोलेशन ऑफ सिंगल 100% प्योर सर्क्युलेटिंग ट्युमर सेल्स एण्ड अदर बायोमेडिकल रिसर्च–रिलेवेन्ट एप्लिकेशन्स	18.04.2012

10.	**डॉ. मुकेश सामंत** रिसर्च सेण्टर इन इन्फेक्शियस डिजीज़ डिपार्टमेंट ऑफ माइक्रोबायोलॉजी, यूनिवर्सिटी ऑफ लावाल, क्यूबेक, कनाडा	डेवलपमेटल रेग्युलेशन ऑफ द ट्रांसलेशन इनिशिएशन फैक्टर ईएल2अल्फा ऑफ *लीशमैनिया* बाय ए नॉवेल मैकेनिज़्म इन्वॉलविंग एन–टर्मिनल मिथियोनाइन एक्सिजन	30.04.2012
11.	**डॉ. श्यामल रॉय** डिपार्टमेंट ऑफ इन्फेक्शियस डिजीजेज एण्ड इम्यूनोलॉजी डिवीज़न, इण्डियन इन्स्टीट्यूट ऑफ केमिकल बायोलॉजी, कोलकाता	पूअर स्टेबिलटी ऑफ पेप्टाइड–एमएचसी कॉम्पेलक्स मे स्पेसीफाई डिफेक्टिव सेल्युलर इम्युनिटी इन लीशमैनिएसिस	24.05.2012
12.	**डॉ. अमित सेन गुप्ता** जनरल सेक्रेटरी, आल इण्डिया पीपुल्स साइंस नेटवर्क	गुड एण्ड बैड मेडिसिनः द जेनेसिस ऑफ इन्टेलेक्चुअल प्रॉपर्टी राइट्स एण्ड दिअर इफेक्ट्स ऑन हेल्थकेयर एण्ड इन्नोवेशन	15.06.2012
13.	**डॉ रॉयले फर्नाडोप्युले** डिस्कवरेक्स कार्पो फ्रिमॉण्ट, सीए, यूएसए	इन्नोवेटिव कायनेज़ एसेज़ फॉर इनहिबिटर डिस्कवरी एण्ड सेलेक्टिव प्रोफाईलिंग	21.06.2012
14.	**डॉ. सुप्रिया शिवाकुमार** ग्लोबल मैनेजर फॉर द फंक्शनल जीनोमिक्स, सिग्मा लाइफ साइंसेज, सेंट लुइस, यूएसए	इन्नोवेटिव टेक्नोलॉजीज़ फॉर जीन रेग्युलेशन	25.06.2012
15.	**श्री विनीत गोपाल** एक्जिक्युटिव निदेशक, जेनटेक मार्केटिंग एण्ड डिस्ट्रीब्यूशन(पी.) लि, नई दिल्ली	कम्प्रीहेन्सिव लेब्रोटरी एनीमल मॉनिटरिंग सिस्टम (सीएलएएमएस)	05.07.2012
16.	**डॉ. शिखर मेहरोत्रा,** डिपार्टमेन्ट ऑफ सर्जरी, माइक्रोबायोलॉजी एण्ड इम्युनोलॉजी, मेडिकल यूनिवर्सिटी ऑफ साउथ कैरोलिना, यूएसए	टार्गेटिंग टाइरोसिनेज़ इन एण्टी–ट्युमर एण्ड एण्टी–सेल्फ इम्युनिटी	16.07.2012
17.	**डॉ. चैतन्य सक्सेना** सीईओ, शान्तनी बायोटेक	एडवांस्ड केमिकल प्रोटियोमिक्स अप्रोचेज़ फॉर डिकन्वोल्युटिंग ड्रग टारगेट्स फ्रॉम इन्टैक्ट बायोलॉजिकल सिस्टम्स	17.08.212
18.	**डॉ सीता रामनजानेलु गुण्डीमेडा** डिपार्टमेंट ऑफ मालीक्यूलर एंड सेल्युलर बॉयोलॉजी बायलर कालेज ऑफ मेडिसिन ह्युस्टन, टेक्सास	एन्डोजिनस लिपिड एन्टीजेन्स	5.09.2012
19.	**प्रो. डी बालासुब्रामनियन** डाइरेक्टर ऑफ रिसर्च एल.वी. प्रसाद आई इंस्टीट्यूट हैदराबाद	स्टेम सेल बायोलॉजी एंड थेरेपी–द एल.वी. प्रसाद एक्सपीरियंस	16.10.2012
20.	**डॉ प्रशान्त शर्मा** स्टाफ साइन्टिस्ट नेशनल कैंसर इंस्टीट्यूट नेशनल इंस्टीट्यूट ऑफ हेल्थ यू.एस.ए.	स्मॉल यूबिकिटिन लाइक मॉडीफायर पोस्ट ट्रांसलेसनल मॉडीफिकेशन इन इम्ब्रयोनिक डेवलपमेंट एन्ड कैंसर	17.10.2012
21.	**डॉ जॉन मैक्लॉड** कनाडा रिसर्च चेयर इन सेल फिसियोलॉजी, क्वीन्स युनिवर्सिटी, किंग्सटन, ओन्टारियो, कनाडा	न्यु रोल्स आफ कैल्शियम सेंसिंग रिसेप्टन इन द प्रिवेंसन ऑफ कोलन कैंसर wnt/β कैटेनाइन सिगनलिंग एंड मीसोथैलिओमा	25.10.2012
22.	**प्रो. ताकिआकि ओजावा** डिपार्टमेण्ट ऑफ केमिस्ट्रि, युनिवर्सिटी ऑफ टोकियो, जापान	ओप्टो–बायोएनालिसिस फॉर इमेजिंग एण्ड कन्ट्रोल ऑफ बायोलॉजिकल फंक्शन इन लाइव सेल्स	23.11.2012

23.	**डॉ स्टुअर्ट ए. रॉल्फ** युनिवर्सिटी ऑफ मेलबर्न, आस्ट्रेलिया	प्रायोरिटाइसिंग एंड कैरेक्टराइसिंग ड्रग टारगेट्स फॉर मलेरिया	27.11.2012
24.	**डॉ मार्क मैक्डावल** वाटर्स प्राइवेट लिमिटेड	रीसेंट ट्रेंड्स इन मास स्पेक्ट्रोमेंट्री एंड इट्स एप्लीकेशनस इन द फील्ड ऑफ प्रोटियॉमिक्स एंड मेटाबोलॉमिक्स	27.11.2012
25.	**डॉ जिआनफ्रैंको बॉशिनफ्यूसो** युनिवर्सिटी ऑफ रोम, टॉर वरगाटा	डिफरेंट मकेनिज्म ऑफ एक्शन ऑफ एंटीमाइक्रोबियल पेप्टाइड्सः इनसाइट्स फ्रॉफ फ्लोरेसेंस स्पेक्ट्रोमेट्री एक्सपेरिमेंट्स एंड मालीक्यूलर डाइनेमिक्स सिमुलेशन्स	29.11.2012
26.	**डॉ. तेरुया तमारु** डिपार्टमेण्ट ऑफ फिजियोलॉजी, टोहो युनिवर्सिटी स्कूल ऑफ मेडिसिन जापान	क्रिटिकल स्ट्रेस विटवीन लाइफ एण्ड डेथ रिसेट्स सर्केडियन रिदम वाया सर्केडियन फास्फोराइलेशन सिग्नल	29.11.2012
27.	**डॉ यासुहारु निनोमिया** नेशनल इस्टीटॅयूट ऑफ रेडियोलॉजिकल साइन्स चिबा, जापान	ओवर व्यू ऑफ द नेशनल इस्टीटॅयूट ऑफ रेडियोलॉजिकल साइन्स चिबा, जापान	29.11.2012
28.	**प्रो. सैंन्टिआगो लामास** डाइरेक्टर, सेंट्रों मिक्सटो सीएसआइएस. यूएएमडी बायोलॉजिआ मालिक्यूलर सेवेरो ओकोआ निकोलस काब्रेरा–1, स्पेनिश रिसर्च काउन्सिल, मैड्रिड, स्पेन	माइक्रो आरएनऐ ऑक्सीडेटिव स्ट्रेस एंड फाइब्रोसिस	13.12.2012
29.	**डॉ ओमकार पी. कुलकर्णी** क्लिनिकल बायोकेमेस्ट्री एल.एम.यू. जर्मनी	ऑटोइम्यून टिश्यू इंजरीः ऐमुलेशन ऑफ इनफ्लामेशन एंड रिपेयर	19.12. 2012
30.	**डॉ सय्यद रज़ा अली** सेल्युलर एंड मालीक्यूलर मेडिसिन, युनिवर्सिटी ऑफ कैलिफोर्निया, यू.एस.ए.	नॉवेल ट्रीटमेंट ऑफ बैक्टीरियल इंफेक्सन्स	21.12.2012

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4 विदेश यात्राएँ

(जनवरी से दिसम्बर 2012)

वैज्ञानिक का नाम	देश	यात्रा का उद्देश्य (प्रतिनियुक्ति की अवधि)
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	सिंगापुर	कार्यशाला में भाग लेने के लिए (15 से 17 जून, 2012)
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डॉ. एन. चट्टोपाध्याय	अस्ट्रिया	बैठक में भाग लेने के लिए (28 नवम्बर, 2012 से 01 दिसम्बर, 2012)
डॉ. ए.के. शॉ	स्कॉटलेण्ड	आईएनएसए अंतर्राष्ट्रीय/सहयोग विनिमय कार्यक्रम के अन्तर्गत (01 से 27 मार्च, 2012)
डॉ. बृजेश कुमार	हंगरी	आईएनएसए अंतर्राष्ट्रीय/सहयोग विनिमय कार्यक्रम के अन्तर्गत (31 जुलाई से 27 अगस्त, 2012)
डॉ. नीना गोयल	जर्मनी	आईएनएसए–डीएफजी द्विपक्षीय विनिमय कार्यक्रम के अन्तर्गत (28 दिसम्बर से 26 जनवरी, 2012)
डॉ. समन हबीब	आस्ट्रेलिया	सम्मेलन में भाग लेने के लिए (19 से 24 फरवरी, 2012)
डॉ. अमित मिश्रा	जापान	आयोजित कार्यशाला में भाग लेने के लिए (28 से 29 फरवरी, 2012)
	जापान	आयोजित कार्यशाला में भाग लेने के लिए (29 से 30 अक्टूबर, 2012)
श्री प्रदीप कुमार	नेपाल	कार्यशाला सह प्रशिक्षण में भाग लेने के लिए (14 से 20 जून, 2012)
	टर्की	कार्यशाला में भाग लेने के लिए (12 से 21 अक्टूबर, 2012)
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डॉ. संजय बत्रा	यूएसए	मेसर्स ब्रुक्स आटोमेशन में यौगिक भंडारण और फैक्टरी स्वीकृति पुनः प्राप्ति प्रणाली परीक्षण के लिए दौरा (20 से 24 अगस्त, 2012)
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डॉ. जे.वी. प्रताप	फ्रांस	शोधकार्य करने के लिए (16 से 22 नवम्बर, 2012)
डॉ. अतुल कुमार	यूएसए	बैठक में भाग लेने के लिए (03 से 04 दिसम्बर, 2012)
डॉ. डी.पी. मिश्रा	जापान	अनुबंध परियोजना के अन्तर्गत यात्रा (08 से 20 मार्च, 2012)
डॉ. रितु त्रिवेदी	मलेशिया	बैठक में भाग लेने के लिए (13 से 16 दिसम्बर, 2012)
डॉ. अनिल गायकवाड़	यूएसए	फ्लोरेसेन्स एक्टिवेटेड सेल सॉर्टर पर प्रशिक्षण प्राप्त करने हेतु (16 से 20 जनवरी, 2012)
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- **सदस्यः** अमेरिकन केमिकल सोसाइटी, यू.एस.ए.
- **आजीवन सदस्य** : (1) कैमिकल रिसर्च सोसाईटी ऑफ इण्डिया; (2) इण्डियन केमिकल सोसाइटी; (3) इण्डियन पेप्टाइड सोसाइटी
- **सदस्यः** (1) सीनियर साइंस कमेटी, ओएसडीडी; (2) केमिकल साइंसेज सेक्शनल कमेटी, इण्डियन अकादमी ऑफ साइंसेज; (3) सेक्शनल कमेटी III इन केमिकल साइंसेज, द इण्डियन नेशनल साइंस अकादमी (4) प्रोग्राम एडवाइज़री कमेटी (ऑगेनिक केमेस्ट्री) डीएसटी; (5) स्टियरिंग कमेटी, नेशनल बायो–रिर्सोस डेवलपमेंट बोर्ड, डीबीटी; (6) सब–कमेटी ऑफ स्पॉन्सर्ड स्कीम्स रिसर्च कमेटी, सीएसआईआर; (7) एक्सपर्ट कमेटी, ड्रग्स एण्ड फार्मास्यूटिकल्स रिसर्च प्रोग्राम, डीएसटी; (8) ड्रग्स टेक्निकल एडवाइज़री बोर्ड, मिनिस्ट्री ऑफ हेल्थ एंड फैमिली वेलफेयर; (9) टेक्निकल एडवाइज़री कमेटी, टेक्नोलॉजी डेवलपमेण्ट एण्ड यूटीलाईजेशन प्रोग्राम फॉर वूमेन, डीएसआईआर; (10) हाई पॉवर्ड कमेटी, एनएमआईटीएलआई प्रोजेक्ट्स, सीएसआईआर;
- **सदस्य, संपादक मंडलः** (1) इण्डियन जर्नल ऑफ केमेस्ट्री, बी; (2) इण्डियन जर्नल ऑफ बायोकेमेस्ट्री एण्ड बायोफिजिक्स; (3) दि नेचुरल प्रोडक्ट्स जर्नल

डॉ ए.के. सक्सेना

- **सदस्यः** अमेरिकन केमिकल सोसाइटी, यू.एस.ए.
- **सदस्यः** (1) एक्सपर्ट कमेटी, मिनिस्टरी ऑफ केमिकल एंड फर्टीलाइजर, डिपार्टमेन्ट ऑफ फार्मस्यूटिकल्स इंडिया); (2) आइएनडी, डायरेक्टरेट जनरल ऑफ हेल्थ सर्विसेज, ऑफिस ऑफ ड्रग्स कन्ट्रोलर जनरल (इंडिया); (3) रीच इंडिया टास्क फोर्स, डिपार्टमेन्ट ऑफ केमिकल एंड पैट्रोकेमिकल्स, गवर्नमेन्ट ऑफ इंडिया; (4) बोर्ड ऑफ इन्टरनेशनल चैरिटेबल फाउन्डेशन्स (साइन्टिफिक पार्टनरशिप) कोऑर्डिनेटिंग बोर्ड, रशिया; (5) बोर्ड ऑफ डायरेक्टर्स, अमेरिकन बिब्लियोग्राफी इंक. यूएसए
- **यूजीसी नॉमिनीः** एडवाइजरी कमेटी, स्पेशल असिस्टेन्स प्रोगाम; (1) डिपार्टमेन्ट ऑफ केमिस्ट्री, सौराष्ट्र युनिवर्सिटी, राजकोट; (2) डिपार्टमेन्ट ऑफ केमिस्ट्री, एपीएस युनिवर्सिटी, रीवा
- **सचिवः** क्यूएसएआर सोसाइटी ऑफ इंडिया
- **आजीवन सदस्यः** (1) इण्डियन केमिकल सोसाइटी; (2) इण्डियन एसोशिएसन ऑफ मेडिसिनल केमिस्ट

डॉ. सी. नाथ

- **आजीवन सदस्यः** (1) इण्टरनेशनल ब्रेन रिसर्च ऑर्गेनाइजेशन; (2) नेशनल अकादमी ऑफ मेडिकल साइंसेज; (3) इण्डियन फार्माकोलॉजिकल सोसाइटी; (4) इण्डियन अकादमी ऑफ न्यूरोसाइंसेज; (5) सोसाइटी ऑफ टॉक्सीकोलॉजी, इण्डिया
- **सदस्यः** (1) रिसर्च काउंसिल (डीजी द्वारा नामित), सीएसआईआर–इण्डियन इंस्टीट्यूट ऑफ टॉक्सीलॉजिकल रिसर्च (आईटीटीआर), (2) रिसर्च कमेटी, यूपी रूरल इंस्टीट्यूट ऑफ मेडिकल साइंस एण्ड रिसर्च, (उ.प्र. सरकार), सैफई, इटावा, (3) अकादमिक काउंसिल जे.एन.यू., नई दिल्ली, (4) एडवाइज़री कमेटी फॉर आईएनडी प्रमिशन, ड्रग कंट्रोलर जनरल ऑफ इण्डिया
- **अध्यक्षः** डिपार्टमेन्टल अकादमिक एडवाइज़री कमेटी [एमएस(फार्मा) फार्मास्यूटिक्स], नाईपर, रायबरेली

डॉ. ए.के. द्विवेदी

- **आजीवन सदस्यः** (1) इण्डियन फार्मास्यूटिकल एसोसिएशन, (2) यू.पी. एसोसिएशन फॉर एडवांसमेन्ट ऑफ साइंस एण्ड टेक्नोलॉजी
- **सदस्यः** (1) ड्रग्स पैनल न्यू ड्रग्स मनुफैक्चरिंग लाइसेंसोज़, डाइरेक्ट्रेट ऑफ मेडिकल एण्ड हेल्थ सर्विसेज़, यू.पी.
- **संयुक्त सचिवः** (1) इण्डियन सोसाइटी ऑफ केमिस्ट्स एण्ड बायोलॉजिस्ट, लखनऊ

डॉ. मधु दीक्षित

- **प्रेसीडेंटः** द साइटोमीट्री सोसायटी, इण्डिया।
- **सदस्यः** (1) डीबीटी (आरसीजीएम) कमेटी, (2) डीएसटी–डब्ल्यूओएस (ए) कमेटी, (3) सीएसआईआर (ऑर्गेनिक एण्ड मेडि. केमिस्ट एण्ड केमिकल टेक्नो. आरसी) कमेटी, (4) आईसीएमआर–पीआरसी कमेटी, (5) ऐडिटोरियल बोर्ड–प्रोसिडिंग्स ऑफ द नेशनल अकादमी साइंसेज इण्डिया (सेक बी)
- **सदस्य एडिटोरियल बोर्डः** (1) इण्डियन जर्नल फार्माकोलॉजी (2) प्रोसिडिंग्स ऑफ द नेशनल एकेडेमी साइन्सेस इंडिया (सेक्शन बी)

डॉ. अनुराधा दुबे

- **सदस्य, एडिटोरियल बोर्ड:** (1) जर्नल ऑफ बायोमेडिकल रिसर्च; (2) बायोमेड सेन्ट्रल, इन्फेक्शस डिजीज़ज (ओपन एक्सेज़)

डॉ. जे.के. सक्सेना

- **सचिव:** द इण्डियन सोसायटी ऑफ पैरासिटालॉजी
- **उपाध्यक्ष:** सोसायटी ऑफ बायोलॉजिस्ट एण्ड केमिस्ट्स
- **सदस्य एडिटोरियल बोर्ड:** एशियन पैसिफिक जर्नल ऑफ ट्रॉपीकल मेडिसिन
- **सदस्य:** एक्सपर्ट कमेटी फॉर केमिकल एण्ड फार्मास्यूटिकल साइंसेज़, यूपीसीएसटी, लखनऊ
- **आजीवन सदस्य:** (1) इंडियन सोसाइटी फॉर पैरासिटोलॉजी; (2) सोसाइटी ऑफ बायोलॉजिकल केमिस्ट्स (इंडिया); (3) इंडियन इम्युनोलोजीकल सोसाइटी; (4) इन्टरनेशनल सोसाइटी ऑफ एप्लाइड बायोलॉजी; (5) इंडियन नेशनल साइंस कांग्रेस एसोशिऐसन; (6) इंडियन सोसाइटी ऑफ केमिस्टस एंड बायोलॉजिस्टस

डॉ. नीरज सिन्हा

- **आजीवन सदस्य:** (1) नेशनल अकादमी ऑफ साइंसेज इलाहाबाद; (2) इण्डियन सोसाइटी ऑफ सेल बायोलॉजी, नई दिल्ली; (3) सोसाइटी ऑफ टॉक्सीलॉजिस्ट ऑफ इण्डिया, इज्जतनगर; (4) इण्डियन साइंस कांग्रेस एसोसिएशन, कोलकाता; (5) एसोसिएशन ऑफ बायोटेक्नोलॉजी एण्ड फार्मेसी, इण्डिया

डॉ. आर.पी. त्रिपाठी

- **एडिटोरियल बोर्ड मेम्बर:** (1) एआरकेआईवीओसी, (2) जर्नल ऑफ ऑर्गेनिक बाइलॉजिकल केमिस्ट्री।

श्री विनय त्रिपाठी

- **सदस्य:** (1) डिपार्टमेन्ट ऑफ हेल्थ रिसर्च, इण्डियन काउन्सिल ऑफ मेडिकल रिसर्च

डॉ. डी.एस. उपाध्याय

- **सदस्य:** (1) सीपीसीएसईए सब–कमेटी फॉर रिहैबिलिटेशन ऑफ लेबोरेटरी एनीमल्स; (2) लाइव स्टॉक फीड, इक्विपमेन्ट्स एण्ड सिस्टम, सेक्शनल कमेटी, एफएडी 5, ब्यूरो ऑफ इण्डियन स्टैन्डर्ड, नई दिल्ली; (3) वेटेनरी कांउसिल ऑफ इण्डिया; (4) यूपी वेटेनरी कॉन्सिल, लखनऊ
- **सीएसआईआर नामिनी:** नेशनल इंस्टीट्यूट ऑफ एनीमल वेलफेयर एमओइएफ, गवर्नमेन्ट ऑफ इंडिया

डॉ. अनिला द्विवेदी

- **आजीवन सदस्य:** (1) सोसाइटी ऑफ रीप्रोडक्टीव बायोलॉजी एंड कम्पैरटिव इन्डोक्राइनोलॉजी, (2) इंडियन सोसाइटी फॉर स्टडी ऑफ रिप्रोडक्शन एंड फर्टिलिटी, इन्डोक्राइन सोसाइटी ऑफ इंडिया

डॉ. वी.एल. शर्मा

- **आजीवन सदस्य:** केमिकल रिसर्च सोसाइटी ऑफ इंडिया, बैंगलुरु

डॉ. रेणु त्रिपाठी

- **आजीवन सदस्य:** जूलोजिकल सोसाइटी ऑफ इंडिया, बोध गया

डॉ. डी.एन. उपाध्याय

- **आजीवन सदस्य:** सोसाइटी फॉर एडवान्समेन्ट ऑफ इलेक्ट्रोकेमिकल साइंस एंड टेक्नोलॉजी

डॉ. एम. एन. श्रीवास्तव

- **सदस्य:** बोर्ड ऑफ पैनल फॉर पीएससी ऑन आर एंड डी ऑफ सेन्ट्रल सेक्टर स्कीम फॉर कन्सर्वेशन डेवलपमेन्ट एंड सस्टेनेबल मैनेजमेन्ट ऑफ मेडिसिनल प्लाट्स, नेशनल मेडिकनल प्लाटंस बोर्ड, (आयुष), मिनिस्ट्री ऑफ हेल्थ एंड फैमिली वेलफेयर, गवर्नमेन्ट ऑफ इंडिया

डॉ. ए.के. श्रीवास्तव

- **आजीवन सदस्य:** इण्डियन सोसाइटी ऑफ पैरासीटालॉजी

डॉ. समन हबीब

- **सदस्य:** (1) एनीमल साइंसेज़ रिव्यू कमेटी, सीएसआईआर, नई दिल्ली, (2) सेलेक्शन कमेटी फॉर सीएसआईआर नेहरू पोस्ट डॉक्टरल फेलोज़(लाईफ साइंसेज़)

डॉ. आर. रविशंकर

- **आजीवन सदस्य:** (1) इण्डियन क्रिस्टलोग्राफी एसोसिएशन, (2) इण्डियन सोसायटी ऑफ सेल बायोलॉजी
- **सदस्य:** वर्किंग ग्रुप ऑन न्यू टीबी ड्रग्स (डब्ल्यूजीएनडी)

डॉ. वाई.एस. प्रभाकर

- **एडिटर:** (1) जर्नल ऑफ केमिस्ट्री, हिन्दावी पब्लिशर्स

डॉ. श्रीकांत कुमार रथ

- **ज्वांइट सेक्रेटरी–इलेक्टेड:** इण्डियन सोसाइटी फॉर सेल बायोलॉजी (2011–13)

- **आजीवन सदस्यः** (1) इण्डियन सोसाइटी ऑफ सेल बायोलॉजी; (2) सोसाइटी ऑफ टोक्सीकोलोजी, इंडिया; (3) एनवायरमेन्टल म्यूटाजन सोसाइटी ऑफ इंडिया; (4) जीनोम फाउण्डेशन, इंडिया
- **सदस्य एडिटोरियल बोर्डः** टोक्सीकोलोजी इन्टरनेशनल

डॉ. अमित मिश्रा

- **आजीवन सदस्यः** इण्डियन फार्मास्यूटिकल एसोसिएशन

डॉ. संजय बत्रा

- **सदस्यः** (1) काउंन्सिल ऑफ एनओएसटी, इंडिया (2011–2014); (2) गवर्निंग काउंन्सिल, केमिकल रिसर्च सोसाइटी ऑफ इंडिया, बैंगलुरू (3) प्रोजेक्ट एडवाइज़री कमेटी फॉर केमिकल साइंसेज़ कमेटी फास्ट ट्रैक, डीएसटी एसईआरबी

डॉ. अतुल गोयल

- **आजीवन सदस्यः** (1) केमिकल रिसर्च सोसाइटी ऑफ इंडिया, बैंगलुरु; (2) इंडियन केमिकल सोसाइटी

डॉ. मो. इमरान सिद्दीकी

- **सदस्यः** (1) एडवाइज़री कमेटी फॉर बायोटेक्नोलॉजी, (2012–2015) काउंसिल ऑफ साइंस एण्ड टेक्नोलॉजी, (सीएसटी) यूपी

डॉ. आर के. त्रिपाठी

- **आजीवन सदस्यः** (1) सोसाइटी ऑफ टॉक्सिकोलॉजी, इंडिया (2) इंडियन सोसाइटी ऑफ सेल बायोलॉजी

डॉ. पी.आर. मिश्रा

- **सदस्य एडिटोरियल बोर्डः** (1) रिसेन्ट पेटेण्ट्स इन ड्रग डिलीवरी एण्ड फार्म्यूलेशन (बेन्थम साइंसेज़), (2) जर्नल ऑफ फार्मास्यूटिकल एण्ड बायोमेडिकल साइंसेज़
- **संस्थापक सदस्यः** (1) इण्डियन नैनो–साइंस सोसायटी
- **आजीवन सदस्यः** (1) इण्डियन फार्मास्यूटिकल एसोसिएशन

डॉ. मनीष कुमार चौरसिया

- **आजीवन सदस्यः** इण्डियन फार्मेसी ग्रेजुएट एसोसिएशन

डॉ. अमोघ सहस्त्रबुद्धे

- **आजीवन सदस्यः** इण्डियन सोसायटी ऑफ सेल बायोलॉजी

डॉ. प्रेम प्रकाश यादव

- **आजीवन सदस्यः** केमिकल रिसर्च सोसाइटी ऑफ इंडिया, बैंगलुरु

डॉ. कल्याण मित्रा

- **आजीवन सदस्यः** इलेक्ट्रॉन माइक्रोस्कोपी सोसाइटी ऑफ इण्डिया (इएमएसआई)

डॉ. आमिर नाज़िर

- **आजीवन सदस्यः** इण्डियन सोसाइटी ऑफ सेल बायोलॉजी

डॉ. पूनम सिंह

- **आजीवन सदस्यः** सोसाइटी ऑफ टॉक्सीकोलॉजी, इण्डिया

श्री रनवीर सिंह

- **आजीवन सदस्यः** बीएफएमयू इन्सटीट्यूट ऑफ केमिकल इंजीनियर

डॉ. वहाजुद्दीन

- **सदस्य, एडिटोरियल बोर्डः** (1) जर्नल ऑफ बायोइक्विवैलेन्स एण्ड बायोअवैलेबिलिटी; (2) एनालिटिकल फार्मास्यूटिक एक्टा; (3) फार्मास्यूटिकल रेगुलेटरी अफेयर्स
- **आजीवन सदस्यः** (1) इंडियन सोसाइटी फॉर मास स्पेक्ट्रोमेट्री; (2) इंडियन फार्माकोलॉजिकल सोसाइटी; (3) बीएफएमयू साइंस कांग्रेस एसोसिएशन; (4) लेबोरेट्री एनिमल साइंस एसोसिएशन ऑफ इंडिया; (5) बायोटेक्नोलॉजी रिसर्च सोसाइटी ऑफ इंडिया; (6) बीएफएमयू सोसाइटी ऑफ एनालिटिकल सांइटिस्ट्स; (7) एसोसिएशन ऑफ बायोटेक्नोलॉजी एंड फार्मेसी; (8) सोसाइटी ऑफ बायोलॉजिकल केमिस्टस, इंडिया; (9) आईडीएमए–एसोसिएशन ऑफ फार्मास्युटिकल ऐनालिस्ट्स (एपीए)

डॉ. श्रीपति राव कुलकर्णी

- **आजीवन सदस्यः** (1) एसोएिशन ऑफ माइक्रोबायोलाजिस्ट ऑफ इण्डिया; (2) सोसाइटी फॉर इनफारमेशन साइंस, इण्डिया

डॉ. जे. आर. गायेन

- **आजीवन सदस्यः** (1) द सोसाइटी ऑफ बायोलॉजिकल केमिस्टस (इंडिया), बैंगलुरु; (2) एसोसिएशन ऑफ बायोटेक्नोलॉजी एंड फार्मेसी (एबीएपी), इंडिया; (3) बीएफएमयू सोसाइटी फॉर मॉस स्पेक्ट्रोमेटरी (आइएसएमएएस), मुम्बई
- **फेलोः** एसोसिएशन ऑफ बायोटेक्नोलॉजी एंड फार्मेसी, गुन्टूर

डॉ. संजीव यादव

- **आजीवन सदस्यः** (1) इण्डियन साइंस कॉंग्रेस एसोसिएशन, कोलकाता; (2) सोसायटी फॉर साइंस एण्ड इनवाइरनमेन्ट, इण्डिया

Notes

Sr. Technician (1)
Narendra Kumar

Sr. Steno
Nandita Pandey

Technician (1)
Akhilesh Kumar

Lab. Assistant
Shiv Lal

Lab. Attendants (1)
Ram Bhajan Shukla
Ram Sunder Lal
Chandramani

PHARMACOLOGY

Chief Scientists
Madhu Dikshit, M.Sc., Ph.D., FNASc.,FASc., *In-Charge*
G. Palit, M.B.B.S., M.D., (Retired on 31/08/2012)
Rakesh Shukla, M.Sc., Ph.D.

Principal Scientist
Amar Nath, M.Sc. (Retired on 29/02/2012)

Sr. Scientists
Prem N Yadav, M.Sc., Ph.D.
Manoj K. Barthwal, M.Sc., Ph.D.
Anil Gaikwad, M.Sc., Pharma, Ph.D.

Ramalingaswamy Fellow
Kumaravelu Jagavelu, M.Sc., Ph.D.

Scientists
Kashif Hanif, M.Sc., Ph.D.
Shubha Shukla, M.Sc., Ph.D.

Sr. Technical Officers (3)
S. Sengupta, B.Sc.
T.L. Seth, B.Sc.
Jharna Arun, B.Sc.
V.S. Nigam, B.Sc.
M.L. Bhatnagar, B.Sc. (Retired on 31/01/2012)

Sr. Technical Officer (2)
C.P. Pandey, M.Sc.

Technical Officer
Sultana Jawaid, B.Sc (Retired on 31/10/2012)

Technical Assistants
Sheeba Saji Samuel, M.Sc.
Sachi Bharti, M.Sc.
Smriti, M.Sc.
Pankaj Kumar Shukla, B.Sc., P.G.D.B.T.
Divya Mohan, M.Sc.
Deep Mala, M.Sc.

Sr. Technicians (2)
H.C. Verma, B.A.
Bharti Bhushan, B.Sc.

Sr. Technicians (1)
Shailendra Mohan, M.Sc., PGDCA
Ramesh Chandra, M.Sc.
Anil Kumar Verma, B.Sc.

Sr. Stenographer
Varun Kumar Pathak

Technician (1)
Surendra Singh, M.Sc., Ph.D.

Lab. Attendants (1)
Pankaj Sengupta
Hari Joshi
K.P. Mishra

TOXICOLOGY

Sr. Principal Scientist
Neeraj Sinha, M.Sc., Ph.D., D.Sc., *In-Charge*

Chief Scientist
C. Nath, M.B.B.S., M.D.,

Sr. Principal Scientist
R.K. Singh, M.Sc., Ph.D., D.Sc.,

Principal Scientists
Sharad Sharma, M.B.B.S., M.D.
S.K. Rath, M.Sc., Ph.D.

Sr. Scientist
R.K. Tripathi, M.Sc., Ph.D.

Scientists
Aamir Nazir, M.Sc., Ph.D.
Smrati Bhadauria, M.Sc., Ph.D.
Sarika Singh, M.Sc., Ph.D.
Poonam Singh, M.Sc., Ph.D.

Sr. Technical Officers (3)
P.K. Agnihotri, M.Sc., Ph.D.
S.M. Verma, B.Sc.
Sadan Kumar, M.Sc.

Technical Assistants
Neeti Sagar, M.Sc.
Anurag Kumar Srivastava, B.Sc.
Anil Kumar Meena, M.Sc.
Navodayam Kalleti, M.Sc.
Sudhakar Yadav, M.Sc.

Sr. Technician (1)
Anupma, B.Sc.

Lab. Assistants
Mahabir
V.K. Samant
Shree Krishan
R.K. Sarkar (Expired on dated 22-06-2012)

Lab. Attendants (1)
Ram Kumar
Nand Pal Yadav
Ganesh Prasad

CLINICAL PHARMACOLOGY UNIT (CDRI), SETH G.S. MEDICAL COLLEGE, MUMBAI

Sr. Technicians (2)
P.S. Acharya
Vijal J. Ashar, M.Sc.

Lab. Assistant
R.B. Pawar

TECHNICAL INFRASTRUCTURE DIVISIONS / UNITS

BIOMETRY AND STATISTICS

Chief Scientist
M. Abbas, M.Sc., Ph.D., *In-Charge*

Sr. Technical Officer (3)
Mukesh Srivastava, M.Sc., Ph.D.

Sr. Technician (2)
M.P.S. Negi

Lab. Attendant (1)
Savitri Devi

COMPUTER DIVISION

Chief Scientist
A.K. Srivastava, B.E., *In-Charge*

Sr. Principal Scientist
Kural, B.E.

Trainee Scientist
Abhishek Kumar, M.C.A.

Sr. Technical Officer (3)
J.A. Zaidi, M.Sc., M.L.I.Sc.

Technical Assistants
Ajay Kumar Maurya, M.C.A.
Arbind Kumar, B.C.A, PGDCA
Farah khan, B.C.A (Director Secretariat)

TISSUE AND CELL CULTURE UNIT

Senior Principal Scientist
A.K. Balapure, M.Sc., Ph.D., *Unit In-Charge*

Sr. Technical Officer (3)
Ramesh Sharma, M.Sc., Ph.D.

DIVISION OF LABORATORY ANIMALS

Sr. Principal Scientist
D.S. Upadhyay, M.V.Sc., Ph.D., *In-Charge*
A.K. Srivastava, M.Sc., Ph.D.

Sr. Scientist
Dhananjoy Hansda, M.V.Sc.

Trainee Scientist
H.K. Bora, M.V.Sc

Sr. Technical Officers (3)
S.N.A. Rizvi, M.Sc.
A.K. Bhargava, B.Sc.

Sr. Technical Officer (2)
Karunesh Rai, M.Sc.

Technical Assistants
Shikha Mishra, M.Sc.
Chandra Shekhar Yadav, M.Sc.

Sr. Technicians (2)
A.K. Dubey, B.A.
Ravinder Singh, M.Sc.
Ram Avatar
S.R. Yadav, B.A.

Sr. Technicians (1)
Ravi Kumar Shukla
Sanjeev Kumar Saxena, B.Sc.
Narendra Kumar, B.A.
Dinesh Kumar, B.A.
Pradeep Tirkey

Technician (1)
Arun Sharma, B.Sc.

Sr. Steno (H)
Raj Kumar, B.A.

Lab. Assistants
Vikram Singh
Wazahtullah
Gaffar Ali
M.D. Kushwaha
V.B.L. Srivastava
T.B. Thapa
S.K. Verma
Shiv Pal Singh
P.B. Thapa
O.P. Verma, B.A.
Mohd. Saleem
R.P. Maurya
G.K. Sharma
Dilip Kumar

Lab. Attendants (1)
Changa Lal
Jameel Beg
Najbullah

DIVISION OF S & T MANAGEMENT

Senior Principal Scientists
Vinay Tripathi, M.Sc., M.B.A., P.G. Dip., *In-Charge*

N.S. Rana, M.Sc.
D.N. Upadhyay, M.Sc., Ph.D.

Principal Scientist
Prem Prakash, M.Pharm.

Scientists
Anand P. Kulkarni, M.Sc., Ph.D.
Sripathi Rao S. Kulkarni, M.Sc., Ph.D., P.G. Dip.

Jr. Scientist
Sanjeev Yadav, M.Sc., Ph.D.

Principal Technical Officer
Shri Ram, B.Sc., L.L.B.
(Vol retired on 30-06-2012)

Sr. Technical Officer (2)
Ravindranath S. Londhe, GD Art (Comm.), Art Teachers Dip.

Technical Assistants
Manish Singh, M.Sc.
M. Muruganantham, MBA

Sr. Technicians (2)
Krishna Prasad, B.Sc.
Chandrika Singh, B.Sc., L.L.B.

Sr. Hindi Officer
Neelam Srivastava, M.A., B.Ed., L.L.B.

Technicians (1)
Susheel Lohani
Preeti Agarwal, M.C.A.
Abhishek Ramnani, MBA
(*Resigned on 31-05-2012*)

Sr. Steno (ACP)
Manoshi Chatterjee, B.A., B.L.I.Sc.

Sr. Steno (H)
Jitendra Patel, M.A.

Lab. Assistant
Kishori Kumari

Lab. Attendant (1)
Pradeep Kumar Srivastava

INSTRUMENTATION

Principal Scientist
N.K. Agarwal, M.Sc., *In-Charge*

Chief Scientist
Ravinder Singh, B.E., *(Retired on 30/04/2012)*

Principal Technical Officer
Usha Kapil, Diploma *(Retired on 31/05/2012)*

Sr. Technical Officer
Ram Karan Harijan, AMIE

Technical Officer
Sanjay Kumar, Diploma

Sr. Technicians (2)
Kamal Singh
Laxmi Narain

S&T KNOWLEDGE RESOURCE CENTRE

Senior Principal Scientist
S.K. Mallik, M.A., M.L.I.Sc., *In-Charge*

Principal Technical Officers
Ali Kausar, B.F.A.
Seema Mehrotra, M.Sc.

Sr. Technical Officers (3)
Sanjay Kumar, M.L.I.Sc
G.C. Gupta, B.Sc.
W.F. Rahman, M.A., M.L.I.Sc.
A.K. Verma, M.A., M.L.I.Sc.
R.M. Pathak, B.F.A.

Technical Officer
Ramesh Chandra Gupta, M.L.I.Sc.

Jr. Steno
Himanshu Upadhyay

Sr. Technicians (2)
B.K. Sethi
Nazir Akbar
Y.C. Pandey

Lab. Assistant
S. Islam

SOPHISTICATED ANALYTICAL INSTRUMENT FACILITY

Chief Scientists
B. Kundu, M.Sc., Ph.D., *In-charge*
D.K. Dikshit, M.Sc., Ph.D., *(Retired on 31/08/2012)*

Sr. Principal Scientist
Brijesh Kumar, M.Sc., Ph.D.

Senior Scientists
Ravi Sankar Ampapathi, M.Sc., Ph.D.
Jagadeshwar Reddy Thota, M.Sc., Ph.D

Scientists
Sanjeev Kumar Shukla, M.Sc., Ph.D.
Sanjeev Kanojiya, M.Sc., Ph.D.

Principal Technical Officers
H.M. Gauniyal, M.Sc.
A.L. Vishwakarma, M.Sc.
Rakesh Khanna, B.Sc., A.I.C.

Sr. Technical Officers (3)
A.K. Sinha, M.Sc.
A.K. Sircar, B.Sc., B.A.
Sunil Kumar, B.Sc.

Sr. Technical Officers (2)
Pramod Kumar, M.Sc.
R.K. Purshottam, B.Sc.

Technical Assistants
Binod Kumar Saw, M.Sc.
Pooja Soni, M.Sc.
Toofan K.Rout, M.Sc.
S. Mehzabeem, M.Sc.
Talathori Sandeep Kumar, M.Sc.

Sr. Technicians (2)
Ashok Pandey, B.Sc.
Sandeep Sengupta, B.Sc.
Abdul Haleem *(Expired on 31/3/2012)*
Radhey Krishna, B.Sc., L.T., C.Lib.Sc.
Vashundhara Madhwar, B.A.
V.K. Maurya
A.K. Srivastava, M.Sc.

Sr. Technicians (1)
Madhu Chaturvedi
S.A. Singh, B.Sc., PGDCA
O.P. Gupta

Asst. (G) Grade I
V.K. Kanal

Lab. Attendants (1)
Mansoor Ali
J.S. Singh

ACADEMIC AFFAIRS UNIT

Chief Scientist
Alka Singh, M.Sc., Ph.D. (Retired on 31/07/2012)

Principal Scientist
Anju Puri, M.Sc., Ph.D.

Sr. Steno (ACP)
Renuka Musraan

Sr. Technician (2)
A.K. Pandey

BUSINESS DEVELOPMENT DIVISION

Chief Scientist
Rajendra Prasad, M.Sc., Ph.D., *In-Charge*

Scientist
Naseem Ahmed Siddiqui, M.B.A.

Technical Assistant
Neelima Srivastava

ELECTRON MICROSCOPY UNIT

Scientist
Kalyan Mitra, M.Sc., Ph.D.

Principal Technical Officer
Abha Arya, B.Sc., B.Ed. (Retired on 31/01/2013)

Technical Officer
Kavita Singh, M.Sc. Ph.D.

Technical Assistant
Garima Pant

Sr. Technician (2)
Madhuli Srivastava

DIVISION OF ENGINEERING SERVICES

Sr. Superintending Engineer Group III (7)
Parvez Mahmood, B.Sc., *In-Charge*

Superintending Engineers Group III (6)
Manoj Kumar, B.Sc. *(Resigned on 30/04/2012)*
Kamal Jain, B.E., M.B.A.

Technical Officers
Mohit Kumar Shukla
Jai Prakash
Sidho Hembrom
D.K. Vishwakarma

Technical Assistants
Madhukar Saroj
Ajay Kumar

Sr. Technicians (2)
A.K. Tewari *(Retired on 30/11/2012)*
B.P. Sunwar
Khan Abdul Jabbar
Radhey Lal
Radhey Shyam
A.K. Sonkar
K.K. Kaul
Mahindra Singh
S.K. Kar
Pradhan Basudev
M.S. Verma
Naseem Mohammad
Harish Kumar
Vijay Kumar

Sr. Technicians (1)
Arun Kumar Srivastava
Verma Kamal Kishore
Ramesh Kunwar
G.C. Roy
Swapan Karmi
Ram Karan Ram
Rajesh Chand Dwivedi

Asstt. (G) Grade I
B.K. Shukla

Technicians (1)
Bhagwan Singh Pokhariya
R.A. Prajapati

Lab. Assistants
Raju (Retired on 29/02/2012)
R.K. Yadav

Hussain Taqui
Ram Anjore
Kandhai Lal
N.K. Mudgal
Shiv Giri (Retired on 30/9/2012)
Ramanuj
Rama
Phool Chand
Popinder Singh
T.P. Pathak
S.K. Yadav
Bishan Singh
A.K. Misra
Om Prakash
Iftikhar Ahmad
Shankar Roy
S.K. Bhattacharya
Z.U. Beg

Lab Attendants (2)
Ramesh Chandra
Tara Chand (Retired on 23/04/2012)

Lab. Attendants (1)
Mohd. Irfan
Dhirendra Misra
Raju Vishwakarma
Ram Autar
Sandeep Roy
Hari Om Garg
Darshan Lal
Vishwanath Nigam
Satyajeet Roy
Ram Samujh
Bindeswari Prasad
Suresh Kumar
Pradeep Kumar (Expired on 10/4/2012)
Ram Bilas
Gaya Prasad
Ram Asre

AUDIO-VISUAL SECTION

Sr. Technical Officer (1)
A. Dayal, Diploma

Sr. Technicians (2)
V.K. Mishra
S.K. Biswas

Sr. Technician (1)
S.S. Bhakuni

Lab. Assistant
Raju

GENERAL ADMINISTRATION AND FACILITIES

ADMINISTRATION

Controller of Administration
L.R. Arya

Administrative Officer
K.P. Sharma

Private Secretary
G.M. Dayal

Asstt. (G) Grade I
Kamla Kandpal

Lab. Assistants
Maiku Lal
Sohan Lal

DIRECTOR'S OFFICE

Private Secretary
Sumit Srivastava, B.Com.
Sunita Chopra, B.A.

Lab. Attendant (1)
Nand Kishore

Helper Group D
Ramswarth Prasad Rai

ESTABLISHMENT I

Section Officers (G)
Sunil Kumar
Nitu Kumari

Asstt. (G) Grade I
Vibhash Kumar
Jagdish Kumar

Asstt. (G) Grade II
Smriti Srivastava
Saju P. Nair
Reena Bisaria

Jr. Steno
Deepak Dhawan

Lab. Assistant
Vinod Kumar

Helper Gp-'C' Cdr-D
Manju Yadav

ESTABLISHMENT II

Section Officer (G)
Biranchi Sarang

Asstt. (G) Grade I
Rashmi Srivastava
Dilip Kumr Sen
Tej Singh
Lata Bhatia (Vol Retired on 5/12/2012)
Gangadin Yadav
Javed Sayed Khan
Md. Rijwan
Durgesh Kanchan (Resigned on 29/6/2012)
Riti Chaudhari
Neena Raizada

Sr. Steno
Vinod Kumar Yadav

Asstt. (G) Grade II
Aparna Bajpai

Lab. Assistant
Bhagwanti Devi

Helper Group D
Ram Kumar

GENERAL SECTION

Section Officer (G)
C.S. Rao

Asstt. (G) Grade I
Kailash Chandra

Sr. Steno
Seema Rani Srivastava

Asstt. (G) Grade II
Rajendra Prasad
Ajay Shukla
Rani
Mohd. Irfan

Sr. Technicians (1)
K.K. Kashyap
Shakeel Ahmad Khan
Drivers
Prem Chand
Daya Shankar Singh
Helpers Group D
Kalpanath Sharma
Mohd. Saleem

BILL SECTION

Section Officer (G)
Madhuranjan Pandey

Asstt. (G) Grade I
H.K. Jauhar
Valsala G. Nair
Hem Chandra
Rama Dhawan
Harsh Bahadur *(Retired on dated 30-11-2012)*
Vivek Bajpai
Dilip Kumar (Cash)

Asstt. (G) Grade II
Naseem Imam

Lab. Attendant (1)
Vinod Kumar Sharma
Lalji Prasad

Group 'D'
Sachin

VIGILANCE

Section Officer
Krishna Raj Singh
Ramesh Singh *(Retired on dated 31/7/2012)*

Asstt. (G) Grade I
C.P. Nawani
Chandra Kant Kaushik *(Transferred to NEERI Nagpur to Section Officer Post through DTQ)*

Lab. Assistant
Shanti Devi

RECORDS

Asstt. (G) Grade I
Birendra Singh

Lab. Assistant
Ved Prakash Misra

HINDI SECTION

Senior Hindi Officer
V.N. Tiwari, M.A., Ph.D.

Sr. Steno (Hindi)
Anil Kumar

Lab. Assistant
Ghanshyam

SECURITY

Senior Security Officer
R.S. Deswal, B.Sc., L.L.B.

Security Guard Group D
Chakrasen Singh (Knowledge Resource Centre)

FINANCE & ACCOUNTS

Controller of Finance & Accounts
A.K. Dwivedi

Finance & Accounts Officer
Mr. IB Dixit

Section Officers (F&A)
Kanak Lata Mishra
Kailash Singh
Ram Rishi Raman
R.P. Tripathi

Private Secretary
V.P. Singh

Asstt. (F&A) Grade I
S.L. Gupta
Viresh *(Retired on dated 29/02/2012)*

Mahesh Babu
R.C. Bisht
Ajitha Nair (*Retired on 31/3/2012*)
Rekha Tripathi
Ajay Kumar
Sashidharan Radha
U.K. Tewari

Asstt. (F&A) Grade II
D.K. Khare
Mahendra Kumar
Sanjay Kumar
Tahseen Talat
Chandrashekhar
S.A. Siddiqui

Lab. Attendants (1)
Vikramaditya
Angad Prasad

Helper Group D
Mohd. Firoz

STORES & PURCHASE

Stores & Purchase Officer
S.K. Singh

Section Officers (Stores & Purchase)
Shekhar Sarcar
Praphul Kumar
Prasenjeet Mitra

Asstt. (S&P) Grade I
P.S. Chauhan
Arun Wadhera
A.K. Misra
A.K. Govil
H.B. Neolia

Asstt. (S&P) Grade II (ACP)
K.K. Mishra

Asstt. (S&P) Grade II
R.C. Dwivedi
M.C. Verma
Srikant Mishra

Asstt. (S&P) Grade III
Kanchan Bala
Vandana Parwani
G.P. Tripathi

Private Secretary
K.P. Ballaney

Lab. Assistants
Kishan Kumar
Rama Shukla
Kamlesh

Attendant
Hardwari

CSIR DISPENSARY

Medical Officers Group III (7)
D.K. Bhateja, M.B.B.S., M.D. *In-Charge*
Asha Negi, M.B.B.S., M.D.

Medical Officer Group III (4)
N.K. Srivastava, M.B.B.S., M.D.

Sr. Technician (2)
Nandita Dhar
H.U. Khan

Technician (1)
Shraddha
Shabana

Lab. Assistant
S.K. Paswan

Lab Attendant
Shubendra Kumar

Gp-'C' Cdr-D
Sundari (Retired on 31/1/2013)

CANTEEN

Manager Gr. II (ACP)
J.P. Satti

Asstt. Manager & Store Keeper (ACP)
R.S. Tewari

Count Clerk (ACP)
Ram Jiyawan Tewari
Y.K. Singh

Cook (ACP)
Man Bahadur

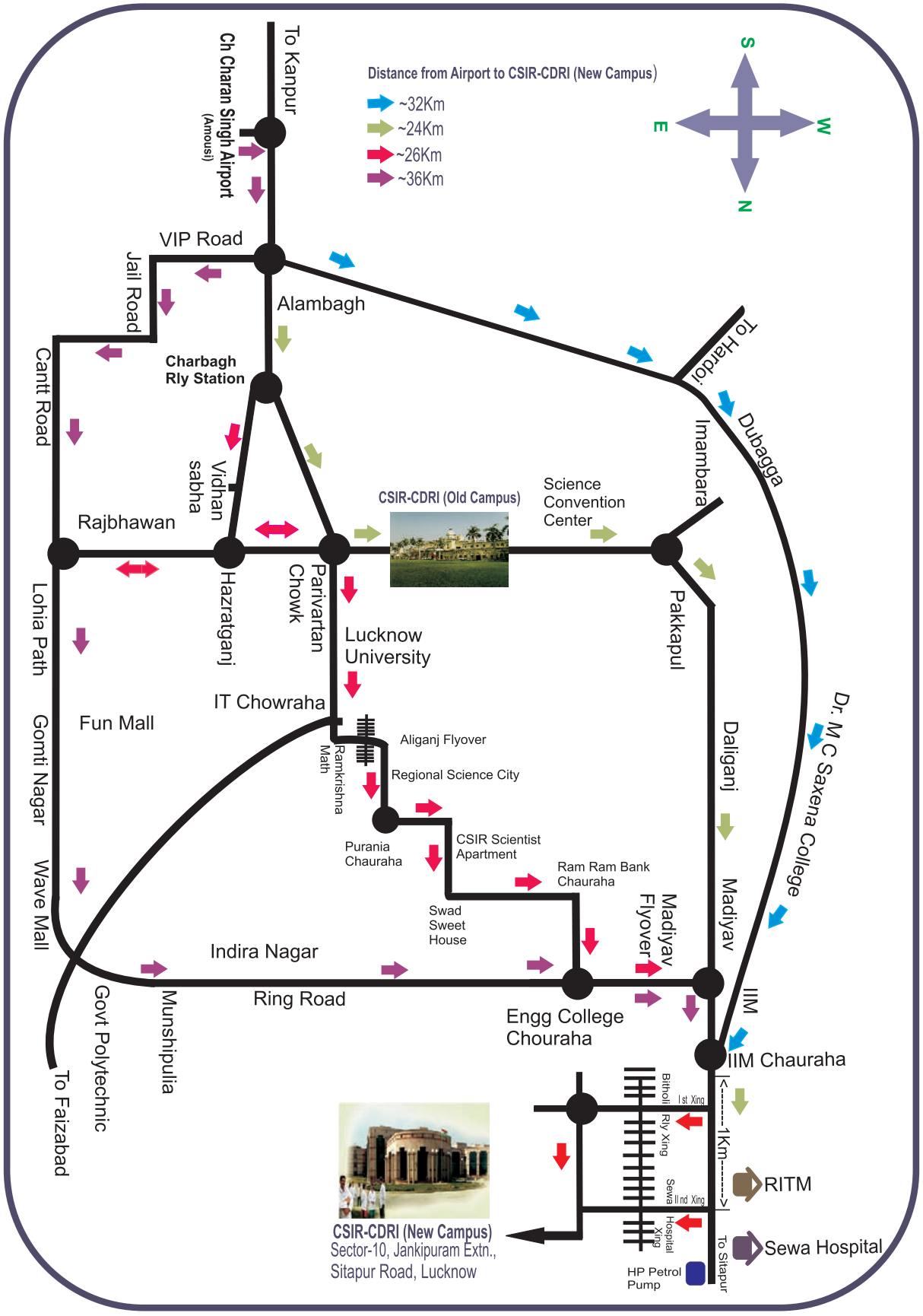
Asstt. Halwai
Uma Shanker Tewari

Bearers
Dil Bahadur (Vol. Retired on 2/4/2012)
Ganga Ram
Rajender
Kripa Shanker
Sukhdev Prasad

S/Man
Raj Kumar

Wash Boys
Ram Murat
Dinesh Pal Singh

Way to CSIR-CDRI (New Campus)



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