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CSIR - CDRI Newsletter

Council of Scientific & Industrial Research
www.csir.res.in

CSIR-Central Drug Research Institute
www.cdriindia.org

From the Director's Desk

It's a great pride and pleasure to present the current issue of CSIR-CDRI Newsletter which highlights the significant accomplishments of the Institute during last six months. Before proceeding further, I whole heartedly appreciate the tremendous efforts and cooperation put in by all the Scientists and staff of the Institute in completing the herculean task of shifting to new campus bearing all the disruption in their research activities albeit for a short period and making their work-benches in the new campus functional in a record time.

With the new beginning in new world class campus, the leadership of project areas has been restructured in order to give responsibility to the young teams to ensure that the real future stakeholders are empowered to shape institute's future and get ample time in their career in the institute to accomplish the same. New team of coordinators for each area consists of three young faculties - two from Biological Sciences and one from Medicinal Chemistry area. Further, a new team, comprising of scientists from multidisciplinary areas including regulatory areas, has been constituted to lead the Translational Research activities of the Institute. I hope these new vibrant teams will make cohesive plan for a way forward to take the Institute successfully to a newer height in the service of mankind. Further, for faster and more transparent services, several new IT enabled software applications have been developed including Real time budget monitoring tool, Online Compound Submission for Sophisticated Analytical Instrument Facility, Compound data of Drugs from Sea project of MoES, Human Resource Management Software, IT Help Desk, etc. In addition, Institute is poised for complete transition from conventional paper/file based system to online operations through One CSIR - ERPS application developed by CSIR. Data entry is nearing completion. Action towards implementing the ERPS in the Institute in a phased manner has been initiated.

Institute is making strident progress in its research programs. Quality of research, as measured in terms of Impact Factor of publications, has increased significantly. In 2013, so far, CDRI has published > 218 research papers with average Impact Factor 3.60, which includes 23 publications with IF>5 and 29 publications with IF 4-5. It gives me immense pleasure to inform that two papers have been published in the journal Chemical Reviews having IF 41.30. Another paper has been published in prestigious journal Angew Chem (IF: 13.73). With these publications, a new bench mark has been set. Further, during the same period, 10 Indian and 4 foreign patents have been filed and received grant for 1 Indian and 3 foreign patents. Thirty four research fellows submitted their Ph.D. thesis. Several of CDRI scientists received prestigious honours and awards including Fellowship of Indian National Science Academy, National Women Bio scientists Award (Young category), Young Scientist Awards instituted by CSIR and INSA. I wish for more and more accomplishments and accolade for the institute in the coming years.

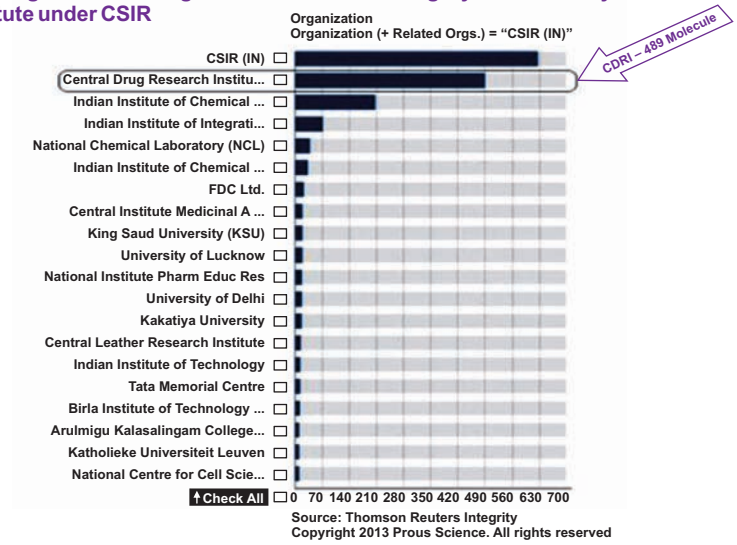
With best wishes

T. K. Chakraborty

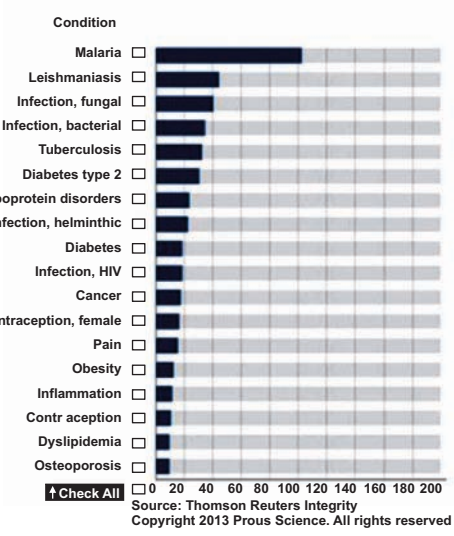
(Tushar Kanti Chakraborty)

CSIR-CDRI stands at Number ONE position in the entire CSIR on discovery research in various therapeutic areas - Thomson Reuters Integrity

Report generated using Thomson Reuters Integrity on discovery research in various therapeutic area under CSIR and contribution of each institute under CSIR



Drug R&D contribution by each organization in CSIR.



Drug R&D activity by CDRI into various conditions / therapeutic area

A Newsletter from

CSIR-CENTRAL DRUG RESEARCH INSTITUTE
COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH
Sector 10, Jankipuram Extension, Sitapur Road, Lucknow-226 031
Phone: 91 522 - 2772450, 2772550 (PABX)
Fax : 91 522 2771941, Website: www.cdriindia.org

Contributions to Science & Technology

Candidate Drugs under Advance Stages of Development

Diseases / Disorders	Candidate Drugs & Efficacy	Clinical Status	Licensees & Collaborators
Malaria	**97-78** (Antimalarial)	The Phase-I Clinical Trial Multiple doses studies at PGIMER-Chandigarh to commence soon	IPCA Labs., Mumbai 2004
Diabetes & Dyslipidemia	**CDR134D123** (Antihyperglycemic)	All data *Xylocarpus granatum* including a detailed quality monograph on the Epicarp of the plant *Xylocarpus granatum* was again generated, compiled and submitted to DGCCRAS. The matter is awaiting DGCCRAS New Expert committee reorganization and its clearance for inclusion in the Extra Ayurvedic Pharmacopia.	TVC Sky Shop Ltd., Mumbai 2008
	CDR134F194 (Antihyperglycemic)	The process of formulation of CDR134F194 in a GMP certified company is in progress. The Phase- I Clinical trial will be initiated soon at KEM Hospital & Seth GS Medical College.	TVC Sky Shop Ltd., Mumbai 2008

Potential New Leads

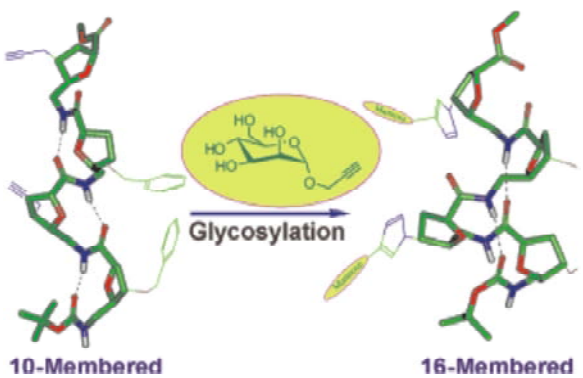
Diseases / Disorders	Lead Product & Efficacy	Status	Licensees & Collaborators
Osteoporosis	**CDR914K058** (Osteogenic)	Licensed to Kemxtree, USA for further development and commercialization. Synthetic process is being developed.	Kemxtree, USA 2012
	S007-1500 (Rapid fracture healing)	Mechanism of action studies show that S007-1700 stimulates osteoblast differentiation by activating ER/BMP2 signaling pathway. PK studies are in progress.	Open for licensing
Cancer	**S007-1235** (Anti-leukemic)	Compound found Cytotoxic to CD133+ colon cancer stem cells, with higher efficacy than salinomycin. Target identified as PTX sensitive GPCRs Confirmation of target ongoing.	Open for licensing
	S-009-131 (Anticancer)	In the MoA studies, the molecule inhibited proliferation of cervical cancer cells (HeLa and C33A) by inducing apoptosis and arresting cell cycle at G2/M phase. Apoptosis was induced through induction of caspase-dependent intrinsic pathway and alterations in the cellular levels of Bcl-2 family proteins. Tumour suppressor protein p53 and its transcriptional target PUMA were also up regulated suggesting their role in mediating the cell death.	Being developed under IAP0001 project of CSIR

Thrombosis	**S007-867** (Antithrombotic)	*In vitro* Pharmacology Studies conducted at CEREP for assessing binding to GPCRs – No significant effect observed. **Single Dose Toxicity Studies - completed** MTD in rats (po) - 640 mg/kg, > 50 times; MTD in rats (im) - 120 mg/kg; MTD in mice (po) - 1300 mg/kg;	Under negotiation
	S002-333 (Antithrombotic)	*In vitro* Pharmacology Studies conducted at CEREP for assessing binding to GPCRs – No significant effect observed. No binding to Herg channel. **Single Dose Toxicity Study** MTD in rats (po)- 600 mg/kg, > 50 times	Under negotiation
Diabetes & Dyslipidemia	**CDR267F018** (Antidyslipidemic)	Data discussed with expert group (constituted by SCM) - Experiments suggested to confirm vasoprotective effect. Recommended for IND filling.	Open for licensing
	CDR914K058 (Initially identified for osteogenic activity)	Compound showed protection against dex-induced insulin resistance. In db/db mice K058 induced robust glucose clearance, drastically improved lipid profile, eliminated hepatic steatosis, protected pancreatic beta cells against diabetes-induced apoptosis and induced browning in white adipose tissue. Detailed mechanistic analysis revealed that K058 is the first in class orally active small molecule adiponectin mimetic. A patent has been filed.	Open for licensing
Anti-stroke	**NMITLI 118R(T+)**	Possesses anti-stroke potential in rat ischemic model. At 50 mg/kg, oral, in a single dose, it demonstrates preventive (1h) as well as therapeutic effects up to 6 hours. Compound found stable in one year stability and force degradation studies and safe in single dose toxicity studies and safety pharmacology studies. PK studies in progress.	Being developed under NMITLI
Contraception	**S010-1255** (Spermicidal & Antitrichomonal)	The scale-up process for synthesis of 5.0 g of compound has been developed with >99% purity as determined by HPLC. The in vivo contraceptive efficacy studies in repeat groups of animals (rabbits) at different vaginal doses are underway. Up to 85% inhibition of pregnancy was achieved in preliminary *in vivo* experiments.	Open for licensing
Tuberculosis	**S006-830** (Antituberculosis)	In the ongoing safety studies, the compound did not show genotoxicity (Ames test). It did not show non-specific antimicrobial activity (against G+/G- bacteria and fungi). It did also not show appreciable binding to the human kinome (456 kinases). However, it showed mild inhibition of hERG channel and CYP2D6; and moderate inhibition of 5 out of 22 GPCRs. Evaluation of pure enantiomers may lead to selection of a safer and more potent molecular species. An HPLC method for separation of the two enantiomers has been developed and procurement of a large batch is in progress.	Being developed under OSDD

Research Highlights

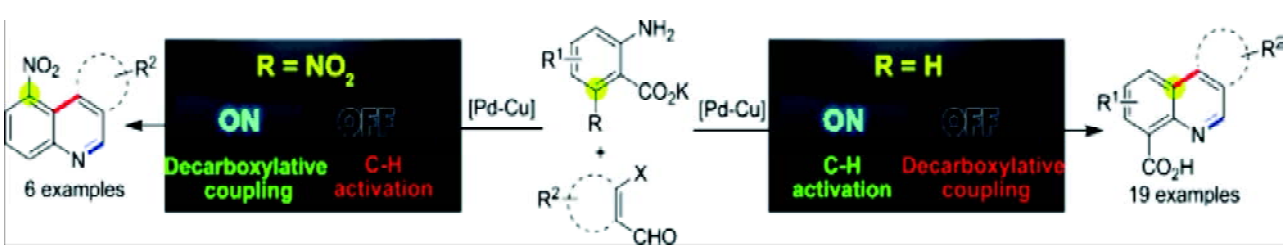
1. **Sugar-modified foldamers as conformationally defined and biologically distinct glycopeptide mimics.** (Siriwardena A, Pulukuri KK, Kandiyal PS, Roy S, Bande O, Ghosh S, Garcia Fernández JM, Ariel Martin F, Ghigo JM, Beloin C, Ito K, Woods RJ, Ampapathi RS, Chakraborty TK, ***Angew Chem Int Ed Engl.*** 2013; 52, 10221-10226, **IF:13.73**)

To fold or not to fold? It is shown that attached sugars play a defining role in the conformations adopted by a pair of novel SAA-derived foldamers in water and that these differences are reflected in the contrasting interactions of these glycofoldamers with various biological targets. C green, O red, N blue, H gray; green oval=mannose.



2. **Substituent-guided switch between C-H activation and decarboxylative cross-coupling during Palladium/ Copper-catalyzed cascade reactions of 2-Aminobenzoates with 2-Haloarylaldehydes.** (Bhowmik S, Pandey G, Batra S, ***Chemistry -A European Journal***, 2013 19(32):10487-91, **IF: 5.83**)

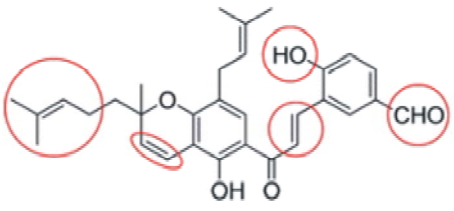
Cascade switch: Phenanthridines, pyrazole[4,3-c]quinolines and isocryptolepine were prepared in one step from the Pd/Cu-catalyzed reaction between potassium 2-aminobenzoates and 2-haloarylaldehydes. Although the reactions of 2-aminobenzoates proceeded via a cascade imination/C-H functionalization, the reactions of 6-nitro-2-aminobenzoates ensued via a tandem imination/decarboxylative cross-coupling.



3. **Synthesis and Insight into the structure-activity relationships of Chalcones as antimalarial agents.** (Narender Tadigoppula, Venkateswarlu Korthikunta, Shweta Gupta, Papireddy Kancharla, Tanvir Khaliq, Awakash Soni, Rajeev Kumar Srivastava, Kumkum Srivastava, Sunil Kumar Puri, Kanumuri Siva Rama Raju, Puran Singh Sijwali, Vikash Kumar and Imran Siddiqi Mohammad, ***J. Med. Chem.***, 2013, 56 (1), 31–45, **IF: 5.61**)

Licochalcone A (I), isolated from the roots of Chinese licorice, is the most promising antimalarial compound reported so far. In continuation of our drug discovery program, we isolated two similar chalcones,

medicagenin (II) and munchiwarin (III), from Crotalaria medicagenia, which exhibited antimalarial activity against Plasmodium falciparum. A library of 88 chalcones were synthesized and evaluated for their in vitro antimalarial activity. Among these, 67, 68, 74, 77 and 78 exhibited good in vitro antimalarial activity against P. falciparum strains 3D7 and K1 with low cytotoxicity. These chalcones also showed reduction in parasitemia and increased survival time of Swiss mice infected with *Plasmodium yoelii* (strain N-67). Pharmacokinetic studies indicated that low oral bioavailability due to poor ADME properties. Molecular docking studies revealed the binding orientation of these inhibitors in active sites of falcipain-2 (FP-2) enzyme. Compounds 67, 68 and 78 showed modest inhibitory activity against the major hemoglobin degrading cysteine protease FP-2.



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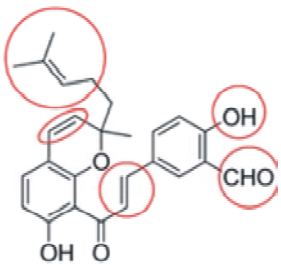
IC_{50} = 73.25 nM against 3D7 (CQ^S)
IC_{50} = 366.25 nM against K1 (CQ^R)



77

IC_{50} = 94.73 nM against 3D7 (CQ^S)
IC_{50} = 84.21 nM against K1 (CQ^R)

4. Interaction of inducible nitric oxide synthase with Rac2 regulates reactive oxygen and nitrogen species generation in the human neutrophil phagosomes: Implication in microbial killing. (Jyoti A, Singh A, Dubey M, Kumar S, Saluja R, Keshari RS, Verma A, Chandra T, Kumar A, Bajpai VK, Barthwal MK, Dikshit M, ***Antioxid Redox Signal*** PMID: 23875749 **IF: 7.19**)

Present study explores importance of iNOS and its interaction with Rac2 in ROS/RNS generation, protein-nitration, and in microbial killing by neutrophils. The iNOS transcript and protein were constitutively present in human as well as in mice neutrophils. iNOS protein was found in cytosol, granules containing elastase and gelatinase, and in other subcellular organelles in resting human neutrophils. Following phagocytosis of BSA coated beads, both human and mice neutrophils showed significant elevation in superoxide radicals, NO, ROS/RNS and consequent BSA nitration. These responses were significantly reduced in presence of iNOS, NOX, MPO or Rac inhibitors as well as in iNOS, NOX2 and Rac2 silenced human or iNOS-/- mice neutrophils. Complex formed on interaction of iNOS with Rac2 co-precipitated with anti-Rac2, predominantly in cytosol in resting human neutrophils, while iNOS-Rac2 complex translocated to phagosomes following phagocytosis. This was accompanied by generation of superoxide radicals, NO, ROS/RNS and consequent BSA-nitration. Importance of Rac2 in iNOS mediated NO formation and microbial killing was confirmed by pre-treatment of mice with Rac inhibitor, NSC23766 that significantly abrogated NO release and microbial killing *in vivo*. Present study highlights previously undefined role of Rac2-iNOS interaction, in translocation of iNOS to phagosomal compartment, and consequent NO, superoxide radicals, ROS/RNS generation, BSA nitration and microbial killing. Altogether results obtained demonstrate the role of iNOS in NO and ROS/RNS generation, following phagocytosis of coated latex beads by human PMNs. These studies imply functional importance of iNOS and its interaction with Rac2 in pathogen killing by the neutrophils.

5. E6AP, an E3 ubiquitin ligase, negatively regulates granulopoiesis by targeting transcription factor C/EBPα for ubiquitin-mediated proteasome degradation. (P Pal, S Lochab, J K Kanaujiya, I Kapoor, S Sanyal, G Behre and A K Trivedi, ***Cell Death & Disease***, 2013, 4(4), E590. **IF: 6.04**)

CCAAT/enhancer-binding protein alpha (C/EBPα) is an important transcription factor involved in granulocytic differentiation. Here, for the first time it is demonstrated that E6-associated protein (E6AP), an E3 ubiquitin ligase targets C/EBPα for ubiquitin-mediated proteasome degradation and thereby negatively modulates its functions. Wild-type E6AP promotes ubiquitin dependent proteasome degradation of C/EBPα, while catalytically inactive E6-associated protein having cysteine replaced with alanine at

amino-acid position 843 (E6AP-C843A) rather stabilizes it. Further, these two proteins physically associate both in non-myeloid (overexpressed human embryonic kidney epithelium) and myeloid cells. We show that E6AP-mediated degradation of C/EBPα protein expression curtails its transactivation potential on its target genes. Noticeably, E6AP degrades both wild-type 42 kDa CCAAT-enhancer-binding protein alpha (p42C/EBPα) and mutant isoform 30kDa CCAAT-enhancer-binding protein alpha (p30C/EBPα), this may explain perturbed p42C/EBPα/p30C/EBPα ratio often observed in acute myeloid leukemia (AML). We show that overexpression of catalytically inactive E6AP-C843A in C/EBPα inducible K562- p42C/EBPα-estrogen receptor (ER) cells inhibits β-estradiol (E2)-induced C/EBPα degradation leading to enhanced granulocytic differentiation. This enhanced granulocytic differentiation upon E2-induced activation of C/EBPα in C/EBPα stably transfected cells (β-estradiol inducible K562 cells stably expressing p42C/EBPα-ER (K562-C/EBPα-p42-ER)) was further substantiated by siE6AP-mediated knockdown of E6AP in both K562-C/EBPα-p42-ER and 32dcl3 (32D clone 3, a cell line widely used model for *in vitro* study of hematopoietic cell proliferation, differentiation, and apoptosis) cells. Taken together, data suggest that E6AP targeted C/EBPα protein degradation may provide a possible explanation for both loss of expression and/or functional inactivation of C/EBPα often experienced in myeloid leukemia.

6. Withaferin A: A proteasomal inhibitor promotes healing after injury and exerts anabolic effect on osteoporotic bone. (Khedgikar V, Kushwaha P, Gautam J, Verma A, Changkija B, Kumar A, Sharma S, Nagar GK, Singh D, Trivedi PK, Sangwan NS, Mishra PR, Trivedi R. ***Cell Death & Disease*****,** 2013, 22(4), E778. **IF: 6.04**)

Withania somnifera or Ashwagandha is a medicinal herb of Ayurveda. Though the extract and purified molecules, withanolides, from this plant have been shown to have different pharmacological activities, their effect on bone formation has not been studied. This study shows that one of the withanolide, withaferin A (WFA) acts as a proteasomal inhibitor (PI) and binds to specific catalytic β subunit of the 20S proteasome. It exerts positive effect on osteoblast by increasing osteoblast proliferation and differentiation. WFA increased expression of osteoblast-specific transcription factor and mineralizing genes, promoted osteoblast survival and suppressed inflammatory cytokines. In osteoclast, WFA treatment decreased osteoclast number directly by decreasing expression of tartarate-resistant acid phosphatase and receptor activator of nuclear factor kappa-B (RANK) and indirectly by decreasing osteoprotegrin/RANK ligand ratio. Our data show that *in vitro* treatment of WFA to calvarial osteoblast cells decreased expression of E3 ubiquitin ligase, Smad ubiquitin regulatory factor 2 (Smurf2), preventing degradation of Runt-related transcription factor 2 (RunX2) and relevant Smad proteins, which are phosphorylated by bone morphogenetic protein 2. Increased Smurf2 expression due to exogenous treatment of tumor necrosis factor α (TNFα) to primary osteoblast cells was decreased by WFA treatment. This was corroborated by using small interfering RNA against Smurf2. Further, WFA also blocked nuclear factor kappa-B (NF-kB) signaling as assessed by tumor necrosis factor stimulated nuclear translocation of p65-subunit of NF-kB. Overall data show that *in vitro* proteasome inhibition by WFA simultaneously promoted osteoblastogenesis by stabilizing RunX2 and suppressed osteoclast differentiation, by inhibiting osteoclastogenesis. Oral administration of WFA to osteopenic ovariectomized mice increased osteoprogenitor cells in the bone marrow and increased expression of osteogenic genes. WFA supplementation improved trabecular micro-architecture of the long bones, increased biomechanical strength parameters of the vertebra and femur, decreased bone turnover markers (osteocalcin and TNFα) and expression of skeletal osteoclastogenic genes. It also increased new bone formation and expression of osteogenic genes in the femur bone as compared with vehicle groups (Sham) and ovariectomy (OVx), Bortezomib (known PI), injectible parathyroid hormone and alendronate (FDA approved drugs). WFA promoted the process of cortical bone regeneration at drill-holes site in the femur mid-diaphysis region and cortical gap was bridged with woven bone within 11 days of both estrogen sufficient and deficient (ovariectomized, Ovx) mice. Together our data suggest that WFA stimulates bone formation by abrogating proteasomal machinery and provides knowledge base for its clinical evaluation as a bone anabolic agent.

New Teams of Coordinators for the Project Areas

The leadership of project areas has been restructured in order to give responsibility to the young team to ensure that the real future stakeholders are empowered to shape institute's future and get ample time in their career in the institute to accomplish the same. Team of Coordinators for each area consists of three young faculties - two from Biological Sciences and one from Medicinal Chemistry area.

Thrust Area of Research		Area Coordinators
Malaria & other Parasitic Diseases	:	**Dr. Saman Habib**, Mol & Str. Biology **Dr. Neena Goyal**, Biochemistry **Dr. Sanjay Batra**, Medicinal Chemistry
Reproductive Health Research, Diabetes & Energy Metabolism	:	**Dr. Gopal Gupta**, Endocrinology **Dr. Sabyasachi Sanyal**, Biochemistry **Dr. Atul Goel**, Medicinal Chemistry
Tuberculosis and Microbial Infections	:	**Dr. KK Srivastava**, Microbiology **Dr. BN Singh,** Microbiology **Dr. Gautam Panda**, Medicinal Chemistry
CVS, CNS and Related Disorders	:	**Dr. Manoj Barthwal**, Pharmacology **Dr. Prem N Yadav**, Pharmacology **Dr. MS Reddy**, Medicinal Chemistry
Cancer and Related Areas	:	**Dr. Dipak Datta**, Biochemistry **Dr. Arun Trivedi**, Biochemistry **Dr. Atul Kumar**, Medicinal Chemistry

Translational Research Team

Chairman

- **Dr. Madhu Dikshit,** Chief Scientist, Pharmacology Division

Members

- **Dr. Ashim Ghatak,** Chief Scientist & Head, Clinical & Experimental Medicine
- **Dr. AK Dwivedi,** Chief Scientist, Pharmaceutics
- **Dr. Sudhir Sinha,** Chief Scientist, Biochemistry
- **Dr. SK Singh,** Sr. Principal Scientist & Head, Pharmacokinetics & Metabolism
- **Dr. SK Rath,** Principal Scientist, Toxicology
- **Dr. Amit Misra**, Principal Scientist & Head, Pharmaceutics
- **Head,** Medicinal & Process Chemistry
- **Dr. Sripathi Rao Kulkarni,** Scientist, IPR Unit, S&T Management
- **Mr. Naseem Siddiqui,** Scientist, Business Development Division

Mandate

- Formulation of guidelines as per the mandatory requirement of Schedule Y and DCGI for the selection of synthetic molecules, natural products or formulations
- Action plan for the pre-clinical and clinical studies
- Monitoring progress and reviewing the data of above studies
- Coordination with the Disease Area Coordinators

Some Important Publications

Chemical Sciences

Authors	Title	Journal, Vol., Issue, Page No.	Impact Factor (2012)
Goel, A; Kumar, A; Raghuvanshi, A	Synthesis, stereochemistry, structural classification, and chemical reactivity of natural pterocarpans	**Chemical Reviews** 113(3),1614-1640	**41.30**
Reddy, LVR; Kumar, V; Sagar, R; Shaw, AK	Glycal-derived delta-Hydroxy alpha,beta-unsaturated aldehydes (Perlin Aldehydes): Versatile building blocks in organic synthesis	**Chemical Reviews** 113(5),3605-3631	**41.30**
Siriwardena, A; Pulukuri, KK; Kandiyal, PS; Roy, S; Bande, O; Ghosh, S; Garcia Fernández, JM; Ariel Martin, F; Ghigo, JM; Beloin, C; Ito, K; Woods, RJ; Ampapathi, RS; Chakraborty, TK	Sugar-Modified foldamers as conformationally defined and biologically distinct glycopeptide mimics.	**Angew Chem Int Engl.** 52, 10221-10226	**13.73**
Wahajuddin; Raju, KSR; Taneja, I	Bioanalysis of antimalarials using liquid chromatography	**Trac-Trends In Analytical Chemistry** 42, 186-204	**6.35**
Bhowmik, S; Pandey, G; Batra, S	Substituent-guided switch between C-H activation and decarboxylative cross-coupling during Palladium/ Copper-catalyzed cascade reactions of 2-Aminobenzoates with 2-Haloarylaldehydes.	**Chemistry -A European Journal** 19(32),10487-91	**5.83**
Azmi, S; Srivastava, S; Mishra, NN; Tripathi, JK; Shukla, PK; Ghosh, JK	Characterization of antimicrobial, cytotoxic, and antiendotoxin properties of short peptides with different hydrophobic amino acids at "a" and "d" positions of a heptad repeat sequence	**Journal of Medicinal Chemistry** 56(3),924-939	**5.61**
Gajula, PK; Asthana, J; Panda, D; Chakraborty, TK	A synthetic Dolastatin 10 analogue suppresses microtubule dynamics, inhibits cell proliferation, and induces apoptotic cell death	**Journal of Medicinal Chemistry** **56(6), 2235-2245**	**5.61**
Sharma, M; Chauhan, K; Shivahare, R; Vishwakarma, P; Suthar, MK; Sharma, A; Gupta, S; Saxena, JK; Lal, J; Chandra, P; Kumar, B; Chauhan, PMS	Discovery of a new class of natural product-inspired quinazolinone hybrid as potent antileishmanial agents	**Journal of Medicinal Chemistry** 56(11), 4374-4392	**5.61**
Sharma, S; Khan, IA; Saxena, AK	Room tempreture Pd-Catalyzed decarboxylative Acyl/Arylation using [Fe(III) (EDTA) (2-02)] 3 as oxidant at biological pH	**Adv. Synthesis and Catalysis** 355(4), 673-678	**5.54**

Biological Sciences

Authors	Title	Journal, Vol., Issue, Page No.	Impact Factor (2012)
Singh, DK; Krishna, S; Chandra, S; Shameem, M; Deshmukh, AL; Banerjee, D	Human DNA Ligases: A comprehensive new look for cancer therapy	**Med Res Rev** PMID: 23959747	**9.58**
Singh, AK; Arya, RK; Trivedi, AK; Sanyal, S; Baral, R; Dormond, O; Briscoe, DM; Datta, D	Chemokine receptor trio: CXCR3, CXCR4 and CXCR7 crosstalk via CXCL11 and CXCL12	**Cytokine Growth Factor Rev** 24(1), 41-49	**8.83**
Jyoti, A; Singh, A; Dubey, M; Kumar, S; Saluja, R; Keshari, RS; Verma, A; Chandra, T; Kumar, A; Bajpai, VK; Barthwal, MK; Dikshit, M	Interaction of inducible nitric oxide synthase with Rac2 regulates reactive oxygen and nitrogen species generation in the human neutrophil phagosomes: implication in microbial killing.	**Antioxid RedoxSignal** PMID: 23875749	**7.19**
Pal, P; Lochab, S; Kanaujiya, JK; Kapoor, I; Sanyal, S; Behre, G; Trivedi, AK	E6AP, an E3 ubiquitin ligase negatively regulates granulopoiesis by targeting transcription factor C/EBP alpha for ubiquitin-mediated proteasome degradation	**Cell Death & Disease** 4(4), E590	**6.04**
Khedgikar, V; Kushwaha, P; Gautam, J; Verma, A; Changkija, B; Kumar, A; Sharma, S; Nagar, GK; Singh, D; Trivedi, PK; Sangwan, NS; Mishra, PR; Trivedi, R	Withaferin A: A proteasomal inhibitor promotes healing after injury and exerts anabolic effect on osteoporotic bone.	**Cell Death & Disease** 22(4), E778	**6.04**
Kaur, J; Dutta, S; Chang, KP; Singh, N	A member of the Ras oncogene family, RAP1A, mediates antileishmanial activity of monastrol	**Journal of Antimicrobial Chemotherapy** 68 (5),1071-1080	**5.34**
Kumar, K; Chopra, S	New drugs for methicillin-resistant *Staphylococcus aureus*: An update	**Journal of Antimicrobial Chemotherapy** 68 (7),1465-1470	**5.34**
Gupta, GK; Kumar, A; Khedgikar, V; Kushwaha, P; Gautam, J; Nagar, GK; Gupta, V; Verma, A; Dwivedi, AK; Misra, A; Trivedi, R; Mishra, PR	Osteogenic efficacy enhancement of kaempferol through an engineered layer-by-layer matrix: A study in ovariectomized rats	**Nanomedicine** 8 (5),757-771	**5.26**
Sharma, M; Malik, R; Verma, A; Dwivedi, P; Banoth, GS; Pandey, N; Sarkar, J; Mishra, PR; Dwivedi, AK	Folic acid conjugated guar gum nanoparticles for targeting methotrexate to colon cancer	**Journal of Biomedical Nanotechnology** 9 (1), 96-106	**5.26**
Gupta, A; Asthana, S; Konwar, R; Chourasia, MK	An insight into potential of nanoparticles-assisted chemotherapy of cancer using gemcitabine and its fatty acid prodrug: A comparative study	**Journal of Biomedical Nanotechnology** 9 (5), 915-925	**5.26**

New Projects Undertaken

1. Biotechnological intervention for pharmaceutically valuable compounds from forest resins

PI: Dr. Rakesh Shukla,
Chief Scientist & Head
Pharmacology Division
Funding Agency: DST
Approved Budget: ₹ 27.55 Lakh

Project proposes to develop protocols for rapid and efficient extraction of biologically active compounds from forest resins. It also aims the chemical transformations of the major active compounds for the possible development of new therapeutic agents by chemical profiling and structure elucidation of the major and minor constituents of these resins

2. Approaches towards identification and synthesis of antigenic epitopes of potential *L.donovani* Th1 stimulatory proteins for the development of synthetic vaccine against Visceral Leishmanisis

PI: Dr. Anuradha Dubey,
Chief Scientist,
Parasitology Division
Funding agency: DBT
Approved budget: ₹ 63.25 lakh

The project aims identification and synthesis of antigenic epitopes of potential *L.donovani* Th1 stimulatory proteins for the development of synthetic vaccine against Visceral Leishmaniasis. It also proposes to establish the safety of the vaccine candidate by checking the immune response in human cells.

3. Development of antimicrobial, anti-inflammatory and anticancer agents from the marine-organism and micro-organisms

PI: Dr. T. Narender,
Sr. Scientist, Medicinal & Process Chemistry Division
Funding agency: MOES
Approved budget: ₹ 25.00 lakh

The project aims to screen marine flora and fauna including microbial flora collected from Southeast and Southwest coast of India for antimicrobial, anti-inflammatory and antiviral activities. The study also proposes to isolate and characterize small molecular bioactive secondary metabolites from target organisms using chromatographic and spectroscopic techniques coupled with evaluation of biological activities so as to make a repository of potential bioactive molecules for use as leads for drug development in future.

4. Role of miRNAs responsible for bone mass reversal at the time of weaning

PI: Dr. Ritu Trivedi,
Scientist
Endocrinology Division
Funding agency: DBT
Approved budget: ₹ 46.47 lakh

The project aims identification and validation of differentially accumulating miRNAs at the time of peak lactation during weaning when the calcium metabolism is positively reversed. Project proposes to identify potential miRNA candidates involved in bone resorption and formation and provide clues to understand regulatory mechanisms involved at the time of bone formation at small RNA level.

5. Studies on effect of different herbal preparation on wound healing and angiogenesis

PI: Dr. Syed Musthapa M.,
Sr. Scientist,
Endocrinology Division
Funding agency: DBT (NE)
Approved budget: ₹ 42.75 lakh

The project proposes an extensive survey to identify potential indigenous technical knowledge of herbal plants for wound healing properties in the state of Mizoram and Uttar Pradesh. The study also aims to evaluate pharmacological potency and efficacy of these ITKs in *in vivo* models of wound healing and angiogenesis.

6. Search for novel antimicrobial and anticancer metabolites from marine bacteria

PI: Dr. Prem Prakash Yadav, Scientist, Medicinal & Process Chemistry Division

Funding agency: MOES

Approved budget: ₹ 25.00 lakh

The project proposes collection, identification and preservation of marine samples and isolation of marine bacteria by using standard protocols. The study also aims for Identification of promising novel antimicrobial and anticancer metabolites which may provide leads for further optimization and development of candidate drugs using Medicinal Chemistry.

7. Molecular characterization and epidemiological modeling of antimicrobial resistance at the interface of animal-human-plant pathogen continuum

PI: Dr. Rabi Sankar Bhatta, Scientist,

Pharmacokinetics and Metabolism Division

Funding agency: DBT (NE)

Approved budget: ₹ 33.95 lakh

Project proposes to study the resistance profile of selected human, animal and plant pathogens against various antimicrobials. It also aims to build up isolates from various sources and the MIC values for antimicrobials corresponding to individual isolates. It will also quantitate the relative expression levels of various resistance genes among isolates and their Gene distribution.

8. Identification and characterization of small molecule inhibitors of human DNA ligases as potential anti-cancer agents

PI: Dr. Dibyendu Banerjee, Scientist, Molecular & Structural Biology

Funding agency: DST (SERB)

Approved budget: ₹ 21.60 lakh

The project proposes to screen, identify and characterize small molecule inhibitors of human DNA ligases as potential anti-cancer agents by using Computer Aided Drug Designing (CADD) against the DNA binding domain of human DNA ligase I. It also aims to determine the effects of inhibitors specific for human DNA ligase I on DNA replication, cell proliferation and cell viability. Study will also check the specificity of the active compounds for human DNA ligases I, III and IV.

9. Characterization of the role of Human DNA ligase I in Lagging strand DNA synthesis and DNA Replication

PI: Dr. Dibyendu Banerjee, Scientist, Molecular & Structural Biology

Funding agency: DBT

Approved budget: ₹ 37.38 lakh

The project proposes to characterize the role of Human DNA ligase I in Lagging strand DNA synthesis and DNA replication. The study also aims to elucidate the functional consequences of the interaction between Human DNA ligase I and other replication proteins like PCNA, RFC and Pol δ.

10. Molecular dissection of signal transduction events involved in host defence against experimental visceral leishmaniasis

PI: Dr. Susanta Kar, Scientist,

Parasitology Division

Funding agency: DST

Approved budget: ₹ 24.15 lakh

The project proposes to study the expression status and role of various negative regulatory proteins of different signaling pathways in host following *L. donovani* infection. It also aims to study the role of various negative regulatory proteins in modulating activity or the protein-protein integrity of different signaling molecules at various steps as well as inhibition of downstream transcription factors. The study will also evaluate the safety index and therapeutic efficacy of small molecule inhibitors against *in vitro* macrophage-amastigote model and *in vivo* murine/hamster model of experimental visceral leishmaniasis

11. Elucidating the role of P53 and DNA damage response pathway in anti-cancer activity of a novel coumarin-chalcone hybrid

PI: Dr. Jayanta Sarkar, Scientist,

Biochemistry

Funding agency: DBT

Approved budget: ₹ 33.30 lakh

The study aims to investigate detailed mechanism of action of chalcone-coumarin hybrid with an objective to identify cellular targets for its anti-cancer activity.The project also proposes to study the DNA damage response pathways activated by the novel coumarin-chalcone hybrid by producing excessive DNA lesions in treated cells.

PATENTS

Patents Granted Abroad

1.	**Patent No.**	**Canada 2541971**	**Date of Grant: 23.04.2013**
	Title	Herbal extracts of *Salicornia* species, process of preparation thereof, use thereof against tuberculosis	
	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.	**Patent No.**	**Europe 2001463**	**Date of Grant: 30.07.2013**
	Title	Naturally occurring coumarins and their precursors as acetycholine esterase inhibitors	
	Inventors	Janaswamy Madhusudhana Rao, B. Chinaraju, P.V. Srinivas, K.S. Babu, Jhillu Singh Yadav, K. V. Raghavan, H. K. Singh, & Chandishwar Nath	
3.	**Patent No.**	**US 8496964**	**Date of Grant: 30.07.2013**
	Title	Controlled release micro-capsule for osteogenic action	
	Inventors	Prabhat Ranjan Mishra, Ritu Trivedi, Girish Kumar Gupta, Avinash Kumar, Varsha Gupta, Srikanta Kumar Rath, Kamini Srivastava, Naibedya Chattopadhyay & Anil Kumar Dwivedi	

Patents Granted in India

1.	**Patent No.**	**256382**	**Date of Grant: 08.06.2013**
	Title	A process for the preparation of 11,12-dehydro deoxy artemisinin	
	Inventors	Chandan Singh & Pallvi Tiwari	

Patents Filed Abroad

1.	**Patent App. No.**	**Europe 11770879.2**	**Filing Date: 05.02.2013**
	Title	Novel coumarin-chalcone hybrids as anticancer agents	
	Inventors	Koneni Venkata Sashidhara, Abdhesh Kumar, Manoj Kumar, Jayanta Sarkar & Sudhir Kumar Sinha	
2.	**Patent App. No.**	**US 13/814401**	**Filing Date: 02.02.2013**
	Title	Novel coumarin-chalcone hybrids as anticancer agents	
	Inventors	Koneni Venkata Sashidhara, Abdhesh Kumar, Manoj Kumar, Jayanta Sarkar & Sudhir Kumar Sinha	
	Supporting Staff	Satish Chandra Tiwari, Bendangla Chagkija & Priyanka Kushwaha	
3.	**Patent App. No.**	**US 13/995336**	**Filing Date: 18.06.2013**
	Title	Chiral 3-aminomethylpiperidine derivative as inhibitors of collagen induced platelet activation and adhesion	
	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	
4	**Patent App. No.**	**Europe 12705463.3**	**Filing Date: 23.07.2013**
	Title	Chiral 3-aminomethylpiperidine derivative as inhibitors of collagen induced platelet activation and adhesion	
	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	

Patents Filed in India

1.	**Patent App. No.**	**0263DEL2012**	**Date of filing: 30.01.2013**
	Title	Preparation and antimalarial activity of novel quinoline derivatives	
	Inventors	Seturam Bandhacharya Katti, Wahajul Haq, Kumkum Srivastava, Sunil Kumar Puri, Manish Sinha, Awakash Soni & Rajeev Kumar Srivastava	
2.	**Patent App. No.**	**0262DEL2012**	**Date of filing: 31.01.2013**
	Title	Novel substituted 2H-Benzo[e]indazole-9-carboxylates for the treatment of diabetes and related metabolic disorders	
	Inventors	Atul goel, Gaurav Taneja, Neha Rahuja, Arun Kumar Rawat, Natasha Jaiswal, Akhilesh Kumar Tamrakar & Arvind Kumar Srivastava	
3	**Patent App. No.**.	**0594DEL2012**	**Date of filing: 04.03.2013**
	Title	NEF-ASK1 interaction inhibitor as novel antiHIV therapeutics	
	Inventors	Raj Kamal Tripathi, Balwant kumar, Ravishankar Ramachandran, Jitendra Kumar Tripathi, Smrati Bhadauria & Jimut Kanti Ghosh	
4	**Patent App. No.**	**0807DEL2013**	**Date of filing: 19.03.2013** (Provisional)
	Title	Substituted fluoranthene-7-carbonitriles/esters as fluorescent dyes for cell imaging applications	
	Inventors	Goel Atul, Sharma Ashutosh, Mitra Kalyan, Bhattacharjee Arindam & Kathuria Manoj	
5	**Patent App. No.**	**2145DEL2013**	**Date of filing: 17.07.2013** (Provisional)
	Title	Proteasomal inhibitors useful for osteogenic activity and pharmaceutical composition thereof[osteoheal]	
	Inventors	Ritu Trivedi, PR Mishra, NS Sangwan, P. Trivedi, Divya Singh, RS Sangwan, Priyanka Kushwaha, V. Khedgikar, Sulekha Adhikari, Dharmendra Choudhary, Jyoti Swarup, Avinash Kumar, Anirudha Karvande, Ashwni Verma & Shweta Sharma	
6	**Patent App. No.**	**2244DEL2013**	**Date of filing: 29.07.2013**
	Title	Phenyl Pyrazole containing heteroretonoid schiff bases and process for preparation thereof	
	Inventors	Shivaji Narayan Rao Suryawanshi, Suman Gupta, Santosh Kumar, Rahul Shivhare & Preeti Vishwakarma	
7	**Patent App. No.**	**2291DEL2013**	**Date of filing: 31.07.2013**
	Title	Chiral 4-Amino-quinolines as orally active antimalarial agents	
	Inventors	Seturam Bandhacharya Katti, Wahajul Haq, Kumkum Srivastava, Sunil Kumar Puri, Vasantha Rao Dola, Awakash Soni & Rajeev Kumar Srivastava	
8	**Patent App. No.**	**2326DEL2013**	**Date of filing: 02.08.2013** (Provisional)
	Title	Ulmoside-A-derived compound from *Ulmus wallichiana* Planchon useful for prevention or cure of metabolic diseases	
	Inventors	Sabyasachi Sanyal, N Chattopadhyay, Rakesh Maurya, Jiaur Rahaman Gayen, Smrati Bhadauria, AK Trivedi, Abhishek Kumar Singh, Jay Sharan Mishra, Rashmi Kumari, Kunal Sharan, Parvez Mohammad Khan, Kainat Khan, Nidhi Singh, Shailendra Kumar Dwivedi, Manisha Yadav, Preety Dixit, Devendra Pratap Mishra, Sharad Sharma & KR Arya	
9	**Patent App. No.**	**2567DEL2013**	**Date of filing: 30.08.2013** (Provisional)
	Title	Novel Aryl Naphthyl methanone oxime derivatives for the treatment of Hematological Malignancies and solid tumors	
	Inventors	Sabyasachi Sanyal, Atul Kumar, Naibedya Chattopadhyay, Jawahar Lal, Arun Kumar Trivedi, Dipak Datta, Srikanta Kumar Rath, Tahseen Akhtar, Shailendra Kumar Dhar Dwivedi, Manisha Yadav, Bandana Chakravarti, Abhishek Kumar Singh, Jay Sharan Mishra, Nidhi Singh & Anil Kumar Tripathi	
10	**Patent App. No.**	**2145DEL2013**	**Date of filing: 17.07.2013** (Provisional)
	Title	Proteasomal inhibitors useful for osteogenic activity and Pharmaceutical composition thereof [osteo-HEAL]	
	Inventors	Prabhat Ranjan Mishra, Ritu Trivedi, Divya Singh, Priyanka Kushwaha, Vikram Khedgikar, Sulekha Adhikari, Dharmendra Choudhary, Jyoti Swarup, Avinash Kumar, Anirudha Karvande, Ashwni Verma, Shweta Sharma, Prabodh Trivedi, Neelam S Sangwan, Rajendra S Sangwan	

Major Events Organized

SciFinder Training Programme

CSIR-CDRI have subscribed to the unlimited simultaneous user access to the SciFinder. Thus, the users can now have access to SciFinder from any system attached to its campus IPs. SciFinder has also added few new features for easy and comprehensive search. So to make maximum use of this costly resource, a training session was organized on 15th April 2013 in both campus (Old & New) to provide a glimpse of the new applications and search facilities

World Laboratory Animal Day celebration

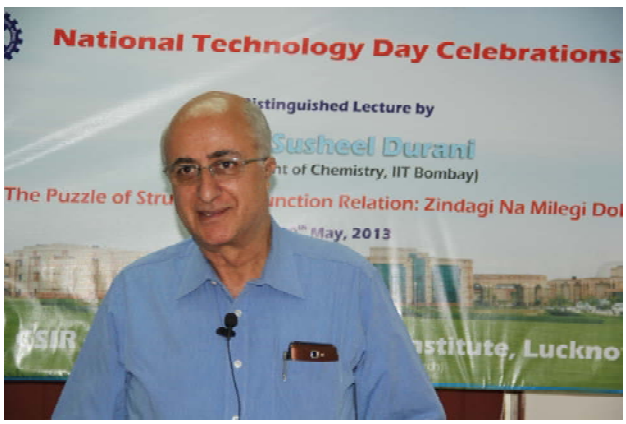
The National Laboratory Animal Centre of CSIR-Central Drug Research Institute, Lucknow in collaboration with Laboratory Animal Science Association of India (LASAI) celebrated the World Laboratory Animal Day on 24th April 2013 to commemorate the great sacrifices of the laboratory animal lives for the cause of mankind. The various lectures were delivered on Ethics, Welfare, Care & Use of laboratory animals for the education and Research, Science & Technology for human as well as animal welfare.

CSIR-CDRI-BD Centre of Excellence Flow Cytometry Workshop on Multicolour Immunophenotyping

A hands-on workshop was organized by CSIR-Central Drug Research Institute-BD Centre of Excellence in Flow Cytometry on 29th April 2013 to 1st May 2013. This workshop was organized with special emphasis on Multicolour Immunophenotyping. Six selected participants from various Institutes of India attended this advance training. The workshop modules were divided into lecture and hands on practical sessions over a three day period. The lecture session covered all aspects of basic flow cytometry as well as advanced concepts in this field. All applicants performed hands on training and learnt the basics of multicolour Immunophenotyping like sample preparation, experimental execution, data analysis etc. The workshop was conducted by Dr. Amitava Mohanty (BD India Pvt. Ltd), Dr. Mrigank Srivastava (Parasitology Div, CSIR-CDRI), Dr. Anil Gaikwad and Dr. Madhu Dikshit (Pharmacology Div, CSIR-CDRI). The practical sessions in the workshop were conducted by Mr. A L Vishwakarma and Mrs. Madhu Chaturvedi (SAIF- CSIR-CDRI). On the third day of workshop, certificates for successful completion of the training were distributed by Dr. Bijoy Kundu (SAIF-CSIR-CDRI) alongwith protocol manual to all participants.

National Technology Day Celebration

CSIR-CDRI celebrated National Technology Day on 10 May 2013. On this occasion Prof Susheel Durani from IIT-Bombay delivered a motivational talk on “The puzzle of Structure-to-function Relation: Zindagi Na Milegi Dobara”. In his presidential address Dr. TK Chakraborty, Director CSIR-CDRI, motivated the young research scholars for work hard for development of new technologies in the field of Drug research. Programme was concluded with the vote of thanks by Sh Vinay Tripathi, Head DSTM.



12th Dr. B Mukerji Memorial Lecture

Dr. B Mukerji Memorial Lecture, in the series, is sponsored by Sachin and Sikta Pradhan Foundation, Bethesda, USA. It is held in the memory of Late Dr. Bishnupada Mukerji, the second Director of CSIR-CDRI. CSIR-CDRI Organized 12th B Mukerji Lecture on May 22, 2013. Dr TK Chakraborty welcomed the guest and Padma Shree Dr. Nitya Anand discussed the fond memories of Dr. B. Mukerji. On this occasion Padma Bhushan Prof SukhDev was the chief guest and delivered the lecture on “A chemists Journey in India’s Biodiversity”. He said science has improved the human life along with financial impact. Chemistry has played a vital role in solving the problems associated with agriculture, health and other areas. After lecture the CSIR-CDRI Newsletter was released. Dr. Chakraborty honored the guest by presenting the mementos. Programme was concluded with the vote of thanks by Sh Vinay Tripathi, Head DSTM.

Flow Cytometry workshop for internal Ph.D. Students

Under CSIR-CDRI-Becton Dickinson "Centre of Excellence in Flow cytometry" program, a hands on workshop was organized from July 15-17th, 2013. In this workshop, training was provided for 10 Research Fellows (who are in first 2 years of their Ph.D./CDRI). The selection of candidate was performed based on need of Flow Cytometry in their research problem statement.

Workshop on "Protein Identification by Mass Spectrometry"

A workshop was conducted on "Protein Identification by Mass Spectrometry" from 24-26 July, 2013 at Sophisticated Analytical Instrument Facility (SAIF) of CSIR-CDRI Lucknow. The objective of the workshop was to provide hands on experience in sample preparation for MS analysis and data processing. This specialized training was provided to newly joined research scholars depending on their requirement of MS analysis for their research.

Initiation of Tree- Adoption movement in CSIR-CDRI

On the occasion of world environment day, the scientist and staff member of CSIR-CDRI initiated a Tree-Adoption movement in their new premises showing their sprit and concern to the environment. In the first phase of movement about 120 scientist and staff member adopted the trees in the memory of their beloved one by contributing Rs.750/- for a tree for its annual maintenance and showed that they are not only involved in R&D activities of institute but they are aware of their social and environmental duties and dedicated to fulfill them. On 5th July 2013 Director, CSIR-CDRI planted a tree and initiated the movement. On the occasion he said that the success of every work depends on the proper guidance and spirit of coordination. He appreciated the efforts made by Mr. Vinay Tripathi, coordinator, Tree- Adoption movement and Dr MN Srivastav, Chief Executive Officer, Tree-Adoption movement.

Brain Awareness Day Celebration

The Brain Awareness Campaign is a countrywide celebration for recognizing impact of neuroscience research and its dissemination across the community that brings together scientists, teacher and students. It also aims to increase community awareness on the potential for improving the long-term health of the brain through lifestyle changes and risk-reduction strategies.

In this context, to educate and excite pupils about the progress and benefits of brain research, CSIR-Central Drug Research Institute, Lucknow organized a "Brain Awareness Day" on 14th August 2013 from 9.00 AM to 5.00 PM at CSIR-CDRI Campus at Jankipuram Extension, Sitapur Road in collaboration with National Brain Research Centre, Manesar. As part of above, a one day interactive Seminar on "Recent Advances in CNS Disorders Research" and a Quiz competition on "Brain functions and its Diseases" were organized. About 100 Intermediate students of science stream from 09 Lucknow based schools/ colleges participated in this programme and interacted with leading Neuroscience researchers/scientists.

The seminar was started with the welcome address by Dr. TK Chakraborty, Director, CSIR-CDRI. During the seminar, Dr Rakesh Shukla from KGMU, Lucknow, Dr UK Mishra from SGPGIMS, Lucknow and Dr. Pankaj Seth from National Brain Research Centre, Manesar, discussed about the Recent Advances in CNS Disorders Research. The seminar was chaired by Dr. PK Seth, Dr Ram Raghubir and Dr Gautam Palit and was concluded with the concluding remark by Dr BN Dhawan, Ex-Director, CSIR-CDRI.

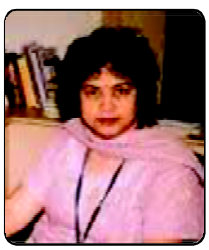
Team of City Montessori School, Aliganj was the winner of Quiz competition. Team of La Martiniere Girs' College, Lucknow got second price and team of Kendriya Vidyalaya, Aliganj got the third price. DPS Jankipuram Vistar got the fourth consolation prize. All participants were given a certificate of participation for this Brain awareness programme. Programme was concluded with the vote of thanks by Dr PN Yadav, Senior Scientist and Organizing secretary, Brain Awareness Day celebration.

Communal Harmony Day (Sadbhawana Diwas) Celebration

"Sadbhawana Diwas" was celebrated in the institute on August 20, 2013 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.

Distinguished Lectures & Visitors

Distinguish Lecture



Dr. Sharmila Mande,
Bio Sciences R&D, TCS' Innovation Labs Tata Consultancy Service Ltd., Pune

Topic : Microbiome and human health : Insights from metagenomics studies

Date : 17.06.2013

Prof. Dipankar Chatterji,
Molecular Biology Unit, Indian Institute of Science, Bangalore

Topic : Structural basis for nucleic acid-protein recognition

Date :06.08.2013

Other Visitors and Lectures Delivered

Speaker & Address	Title of Lecture	Date
Dr. Shahid Jameel, Chief Executive Officer, Wellcome Trust/DBT India Alliance	Fellowship for Biomedical Research in India	07.06.2013
Dr. Jayant Karajgi, President, R & D, Aurobindo Pharma,	Generic Drug Development – An Industry-walla speaks to Academicians!	18.06.2013
Dr. S. Pramanick, Director, R&D (Formulation), Emcure Pharmaceuticals Limited	QbD with special focus on lyophilization	28.06.2013
Dr. Peter Kuckenberg, Product Specialist Macherey Nagel, Germany	Endotoxins and Transfection - How Different Plasmid Prep Technologies can affect Transfection Efficiencies.The world of RNA - new ways to get your RNA for drug discovery / screening	04.07.2013
Dr. Prosenjit Mondal Johns Hopkins University, Baltimore, USA	The molecular switch for the secretion of Insulin	10.07.2013
Dr. Arun K Shukla, Duke University Medical Center Durham	Structural basis of p-arrestin dependent regulation and signaling of G Protein Coupled Receptors	22.07.2013
Dr. Ashutosh Srivastava Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA	Inhibition of HIV-1 via modulation of novel cytoskeletal elements	19.08.2013
Dr. Radha K Shandil Dept. of Drug Metabolism, Pharmacokinetics & Animal Sciences; AstraZeneca India	Challenges in discovery of new anti TB agents	20.08.2013

BUSINESS DEVELOPMENT ACTIVITIES

The Institute sustained to explore the business development opportunities by establishing liaison with national and international organizations and industries in order to have more public–private partnership at early stage of the development and to have collaborations for new leads. The major new contracts/assignments signed/undertaken by the Institute during reporting period are as follows:

Details	Client/Collaborator	Date of Signing the Agreement
Patent Assignment Agreement		
Compound 80/53	Piramal Enterprises Ltd, Mumbai	23.04.2013
Memorandum of Understanding		
Development and characterization of novel drug delivery systems for controlled and targeted drug delivery with special reference to leishmaniasis and cancer	Amity Institute of Pharmacy, Lucknow	03.04.2013
Characterization of Novel CTA Markers	Dr. R. M. L. Institute of Medical Sciences, Lucknow & KGMU, Lucknow	09.04.2013
An open label, Single-centre, Two Period, crossover, Drug interaction study to Assess the Effect of Multiple Oral Administration of Cap Memory Sure (150 mg BD) on the Pharmacokinetics, Safety and tolerability of antidiabetic drugs Gliclazide 80mg and Metformin 500mg in Indian patients with Type 2 Diabetes.	KGMU, Lucknow	14.06.2013
Discovery and Development of Novel bone Anabolic agents for Accelerated Fracture Healing	Enem Nostrum Remedies Pvt.Ltd., Mumbai	21.06.2013
Screening of a series of 4-amino quinoline derivatives for identifying more potent and/or functionally altered ligands	Tufts Medical centre Bostan,MA	28.06.2013
Design, Synthesis and Development of Aromatic, Hetero aromatic and Glyco-conjugates as Anti therapeutic Agents and Cholinesterase Reactivators	Defence R&D Establishment and Pt. Ravishankar Shukla University, Raipur	24.06.2013
Structure-function characterization of ADF/cofilin proteins using NMR spectroscopy	Centre of Bio-Medical Research Lucknow	03.07.2013
Collaborative Research & Development	Panacea Biotech Ltd., New Delhi.	25.07.2013
To impart training as per CPCSEA and other regulatory authorities for laboratory professionals	National Institute of Animal Welfare, Haryana	06.08.2013
Memorandum of Agreement		
To investigate the ability of the specified CSIR-CDRI compounds to Inhibit the interaction of human platelets with the collagen receptor GPVI.	The University of Cambridge of The Old Schools, University of Cambridge, Cambridge	17.04.2013
Centchroman INN: Ormeloxifene for the treatment of breast cancer	HLL Lifecare Limited, Thiruvanthpuram	16.05.2013
Secrecy Agreement		
Evaluation of Antithrombotic compounds S002-333and S-007-867	NEOMED, Canada	31.07.2013

Honours & Awards

Dr. Saman Habib
DBT, National Young Woman Bioscientists Award-2012

Dr. Anil Balapure
Elected Vice-President of The Indian Pharmacological Society

Dr. Arun K Trivedi
INSA Medal for Young Scientists- 2013

Dr. Wahajuddin
Dr. P.D. Sethi Annual Award – 2012 for the best research Paper in Pharmaceutical Analysis sponsored by The Pharma Review

Dr. Susanta Kar
INSA Medal for Young Scientists- 2013
Young Scientist Award from the Indian Society for Parasitology (ISP-2012), India

Dr. Aamir Nazir
Elected Fellow of Society for Applied Biotechnology, FSAB - 2012

Dr. Madhu Dikshit
Darshan Ranganathan Memorial Lecture Award (2013) of the Indian National Science Academy, New Delhi

Dr. Atul Kumar
Global Advisory Council Member of SciFinder, Chemical Abstracts Services (CAS), Divison of American Chemical Society (ACS) Columbus, OH, USA

Dr. Renu Tripathi
Platinum Jubilee Lecture Award-2013 of the 100th Indian Science Congress, Kolkata

Dr. Sarika
Raman Research Fellowship Award-2013
Indo-US Fellowship Award - 2013

Dr. P K Murthy
Dr. B.N. Singh Memorial Oration Award - 2011 of the Indian Society for Parasitology

Ms. Rachana Trivedi,
(Student of Dr. D P Mishra, Endocrinology Division)
DAAD Fellowship

Ms. Savita Lochab (Student of Dr. Arun K Trivedi)
Dr. Swarna Nityanand Award for the best women research scholar-2013
Best poster presentation Award at "International conference on stem cells and cancer ICSCC-2012", New Delhi

Ms. Ankita Mishra (Student of Dr. Madhu Dikshit)
Director's Appreciation Award for Best Thesis

Mr Nand Lal (Stedent of Dr. VL Sharma)
MM Dhar Memorial Award, 2013 – Chemical Sciences

Ms. Pooja Jadiya (Student of Dr. Aamir Nazir)
First Prize in Poster Presentation at Lucknow Science Congress - 2013

Mr Saurabh Srivastava (Stedent of Dr. JK Ghosh)
MM Dhar Memorial Award, 2013 – Biological Sciences

Ms. Aiman Tanveer (student of Dr. Saman Habib)
Best Poster Award at CTDDR 2013

DEPUTATIONS ABROAD

Name of Scientist	Country of Visit	Purpose of Visit	Period of Deputation
Dr. J S Srivastava	USA	To attend Annual Meeting as a part of the Society for Clinical Trials	19–22 May 2013
Dr. Naibedya Chattopadhyay	Korea	Invited speaker to deliver the lecture in "The 8th International Congress on Traditional Asian Medicine" (ICTAM) - 2013	09-13 September 2013
Dr. Atul Kumar	USA	Invited by Chemical Abstracts Services (CAS) a division of American Chemical Society(ACS) for Advisory Council meeting	22 April 2013
Dr. Neeloo Singh	Sri Lanka	To attend a Workshop	25-28 March 2013
	Brazil	To attend the World Congress on Leishmaniasis-WORLDLEISH 5	13-17 May 2013
Mr. Pradeep Kumar	Portugal	To attend International Conference	22–26 July 2013
	Germany	To deliver an invited lecture	26–31 July 2013
	Sweden	To deliver an invited lecture	31July - 4 August 2013
Dr. Amit Misra	Hong Kong	To attend Inhalation Asia 2013	26-28 June 2013
Dr. Jawahar Lal	Germany	To attend practical training on PK/PD modelling using NONMEM	26 August- 20 September 2013
Dr. Ravi Shankar Ampapathi	Switzerland	For NMR training course at M/S Bruker Bip Spin AG	18-22 March 2013
Dr. Aamir Nazir	France	To attend International Conference	10-12 September 2013
Dr. Rajesh Kumar Jha	USA	To attend International Conference (Proteomics-2013)	15-17 July 2013
Mr. Harsh Mohan Gauniyal	Switzerland	For NMR training course at M/S Bruker Bip Spin AG	18-22 March 2013

Staff News

New Scientist In-charge of Divisions

- **Dr. Shailja Bhattacharya,** Chief Scientist, Parasitology Division
- **Dr. Rakesh Shukla,** Chief Scientist, Pharmacology Division
- **Dr. Ashim Ghatak,** Chief Scientist, Clinical & Experimental Medicine Division
- **Dr. A. K. Srivastava,** Senior Principal Scientist, Biochemistry Division
- **Dr. Anila Dwivedi,** Senior Principal Scientist, Endocrinology Division
- **Dr. S. K. Rath,** Principal Scientist, Academic Affairs Unit
- **Dr. Amit Misra**, Principal Scientist, Pharmaceutics

New Joinings

- **Dr. Kumaravelu Jagavelu,** Sr. Scientist, Pharmacology Division
- **Dr. Kishore Mohanan,** Sr. Scientist, Med. & Proc. Chem Division
- **Dr. Pintu Kumar Mandol,** Sr. Scientist, Med. & Proc. Chem Division
- **Dr. Mukesh Pasupuleti,** Sr. Scientist, Microbiology DIvision
- **Dr. Satish Mishra,** Sr. Scientist, Parasitology Division
- **Dr. Niti Kumar,** Scientist, Mol. Structure Biology Division

Promotions

Senior Principal Scientist to Chief Scientist

- **Dr. A. K. Balapure,** Tissue and Cell Culture Unit
- **Dr. Gitika Bhatia,** Biochemistry Division
- **Dr. Naibedya Chattopadhyay,** Endocrinology Division
- **Dr. R. P. Tripathi**, Med. & Proc. Chem Division
- **Dr. Suman Gupta**, Parasitology
- **Shri S. K. Mallik,** Knowledge Resource Centre

Internal Transfers

- **Dr. Raja Kumar Sethu**, Senior Scientist from Parasitology to Lab. Animal Division
- **Mrs. Nitu Kumari,** Section officer (G), Establishment I to Establishment II
- **Mr. R.N. Lal,** STO-2 from Parasitology to Hostel & Guest House
- **Mrs. Reema Roy Sarkar**, Tech. Officer from Biochemistry to MSB Division
- **Mr. Bikram Benerjee,** STO-3 from Fermentation Division to Microbiology Division
- **Mr. Kishan Singh,** Sr. Tech-2 from Fermentation Division to Microbiology Division
- **Mr. Vineet Kumar Pandey**, Jr. Steno, Biochemistry to Vigilance Section
- **Mr. R A Prajapati**, Technician (1), Engineering Services Division to Computer Division
- **Mrs. Shikha Mishra**, Technical Assistant, Laboratory Animal Division to Parasitology
- **Mr. Lakshmi Prasad**, Lab Assistant from Fermentation Division to Microbiology Division

External Transfers

- **Dr. Arun Kumar Sinha**, Chief Scientist, CSIR-IHBT, Palampur to CSIR-CDRI, Med. & Proc. Chem Division
- **Mr Abhishek Kumar,** Jr. Scientist, CSIR-CDRI to CSIR HQ, New Delhi

- **Mrs Neeti Sagar Jolli,** Tech. Asstt. CSIR-CDRI to HRDC, Ghaziabad
- **Mrs Preeti,** Tech. Asstt. CSIR-CDRI to HRDC, Ghaziabad
- **Mrs Rama Dhawan,** Asstt. (G) Grade I CSIR-CDRI to CSIR HQ, New Delhi

Superannuation

- **Dr. C.K.M. Tripathi**, Chief Scientist, Fermentation Technology Division
- **Dr. Suman Gupta, Chief Scientist,** Parasitology Division
- **Mr. P. N. Rai,** STO-3, MPC Division
- **Mrs. Madhuri Chaudhry**, STO-3, Pharmaceutics
- **Mr. W. F. Rahman**, STO-3, KRC
- **Mr. B. K. Sethi,** Sr. Technician, KRC
- **Mr. Y. C. Pandey,** Sr. Technician, KRC
- **Mr. S. K. Biswas,** Sr. Technician, Audio Visual
- **Mr. Ram Karan Ram**, Sr. Technician-1 Division of Engineering Services
- **Mr. M. D. Kushwaha,** Lab. Assistant, Division of Lab. Animals
- **Mr. Vikram Singh,** Lab. Assistant, Division of Lab. Animals
- **Mr. K. K. Yadav,** Lab. Assistant, Botany
- **Mr. N. K. Mudgal,** Lab. Assistant, Division of Engineering Services
- **Mr Ram Sanehi**, Lab. Assistant, MPC Division
- **Mr. Ram Anjore**, Lab. Assistant, Division of Engineering Services

OBITUARY

Mr. Shyam Manohar Verma, STO-3 Toxicology Division
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CSIR-CDRI Family conveys heartfelt condolences to the bereaved families

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