



वार्षिक प्रतिवेदन/Annual Report 2014-15

राष्ट्रीय औषधीय शिक्षा एवं अनुसंधान संस्थान (नाईपर)
National Institute of Pharmaceutical Education and Research (NIPER)

वार्षिक प्रतिवेदन/*Annual Report 2014-15*



एस.ए.एस. नगर

राष्ट्रीय औषधीय शिक्षा एवं अनुसंधान संस्थान (नार्वेपर)
National Institute of Pharmaceutical Education and Research (NIPER)

Patron

Prof. K. K. Bhutani
Director (Officiating), NIPER, S.A.S. Nagar

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FROM THE DIRECTOR'S DESK



I am happy to present to you the activities of NIPER, S.A.S. Nagar, and highlight our performance over the past year, in the form of Annual Report 2014-15. As an acknowledged brand name in the pharmaceutical sciences education and research sector in the country, the responsibilities of the Institute have multiplied manifold. Our efforts to build upon our strength to fulfil the country's expectations and aspirations have continued. We are also making a conscious attempt to identify and overcome our weaknesses. The achievements of our faculty members and students, at national as well as international stages, provide us with impetus to continue with our work despite various hurdles. The recognition of the expertise of our faculty members validates our structure. I convey my hearty wishes to all the graduating students for all the success, in both professional and personal lives.

The faculty members and students continued to be recognized with various honours and awards for their academic as well as research achievements. Close to 170 papers were published during this period. We were also successful in licensing out technology developed in-house to a pharmaceutical industry in the SME sector. Fourteen candidates received their doctoral degrees. 320 postgraduate students completed their respective courses this year. I feel proud to report that Nature Publishing Index (Asia Pacific) has placed NIPER, S.A.S. Nagar at the 270th position among research institutes in 2014-15, which is above many national and international laboratories of older standing. The Institute was also featured among the top one hundred degree-awarding institutes within the country, at the thirteenth position, in a survey conducted by Career360 magazine (Outlook group). The performance was rated as AAAA+.

I am thankful to the Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers, Govt. of India, for their continued support. I express my gratitude to our present Board of Governors, whose tenure ended during this term, for providing valuable leadership and showing the path to implement policies of the Institute. I also acknowledge, with thanks, the financial support provided by various funding agencies who continued to sustain the research work being carried out at the Institute. I am especially thankful to members of our faculty and staff as well as students, who have provided their wholehearted support to the overall development of the Institute. I invite you to read these pages which provide an idea of the various activities being undertaken by the Institute.

(K. K. Bhutani)

OBJECTIVES AND MANDATE

- Provide leadership in pharmaceutical sciences
- Advanced research in new and emerging areas
- National/International collaborative research
- Human resource development
- Media and curriculum development
- Establishment of National Centres
- Sponsored projects
- Promotion of community and institutional pharmacy
- Study of sociological aspects of drug use

MILESTONES

- 1992 Registered as a Society
- 1994 First Director and Core Faculty joined
- 1996 Initiation of research activities
- 1998 Institute of National Importance: NIPER Act
- 1998 Admission of first Batch of Masters' and Ph.D. students
- 1999 Graduation of 1st Batch of Masters' students
- 2000 Dedication of NIPER to the Nation
- 2001 First Convocation held
- 2002 Graduation of 1st Batch of Ph.D. students
- 2003 Statutes proclaimed by the Board of Governors with the prior approval of the Visitor
Second Convocation held: HE Dr A.P.J. Abdul Kalam,
President of India and Visitor as the Chief Guest
- 2004 Establishment of National Bioavailability Centre
- 2004 'A Decade of NIPER' completed
- 2005 Ordinance regulating the degrees of Masters' and Doctor of Philosophy
Third Convocation held
- 2006 Visit of Prince Charles
- 2007 Amendment of NIPER Act to establish six new NIPERs
- 2008 Fourth Convocation held
- 2009 Establishment of SMPIC
- 2010 Amendment of Ordinance regulating the courses of study and procedures thereof
Establishment of Patent Facilitation Cell
- 2011 Fifth Convocation held
- 2012 Sixth Convocation held
- 2013 Seventh Convocation held
- 2014 Amendment of Ordinance regulating the courses of study and procedures thereof

ADMISSION OF STUDENTS IN 2014-2015

The Institute admits postgraduate students [M. Pharm., M. S. (Pharm.), M. Tech. (Pharm.)] through all India NIPER Joint Entrance Examination (NIPER JEE) held each year; students of MBA (Pharm.) are admitted through NIPER JEE, group discussion and interview; students of Ph.D. are admitted through NIPER Ph.D. Joint Admission Test and interview. Candidates should have a minimum CGPA of 6.75 (or 60% marks) for General, 6.25 (or 55% marks) for SC/ST, 5.75 (or 50% marks) for physically handicapped candidates on a 10 point scale in the qualifying examination and also have GPAT/GATE/NET qualification. 5% of total numbers of seats are available for officially sponsored candidates from Govt. Department/PSU/R&D organisations with minimum of 2 years experience with the sponsoring employer. Details of eligibility criteria are available at the Institute website.

DISCIPLINE	Admitted (2014-2015)		Proposed admission (2015-16)
	MASTERS	Ph.D.	
Medicinal Chemistry	37	07	The Institute proposes to admit 227 Masters', 44 MBA (Pharm.) and 27 Ph.D. students in the next academic year.
Natural Products	16	03	
Traditional Medicine	04	Not offered	
Pharmaceutical Analysis	08	-	
Pharmacology & Toxicology	21	04	
Regulatory Toxicology	08	Not offered	
Pharmaceutical Technology			
Biotechnology	09	-	
Formulations	07	-	
Process Chemistry	13	04	
Pharmaceutics	13	02	
Biotechnology	28	03	
Pharmacy Practice	07	-	
Clinical Research	07	Not offered	
Pharmacoinformatics	17	04	
Pharmaceutical Management	39	Not offered	

GRADUATION OF STUDENTS

256 Masters' students and 64 MBA (Pharm.) students graduated in the current academic year. 18 Ph.D. theses were accepted for award of Ph.D. degree this year. All the MBA (Pharm.) students have been placed with reputed pharmaceutical companies. Among the graduating Masters' students, placement is divided equally between those who opted for employment in pharmaceutical companies and those who opted for higher studies (Ph.D.). Graduating Ph.D. students have either been absorbed by pharmaceutical companies or have found post-doctoral positions in academia in India as well as abroad.

Ph.D. THESIS APPROVED FOR AWARD OF DEGREE IN 2014-2015

Name	Discipline	Title
Amit Mahindra	Medicinal Chemistry	Design and Synthesis of Antimicrobial and Antiplasmodial Peptides
Baviskar Ashish Triambak	Pharmaceutical Technology (Biotechnology)	Synthesis, Biological Evaluation and Preformulation Studies of N-Fused Imidazole Derivatives as Topoisomerase II Inhibitors
Baljinder Kaur Grewal	Pharmacoinformatics	Molecular Modeling Studies for the Rational Design of Protein Kinase C β II Inhibitors
Nikhil Taxak	Medicinal Chemistry	Quantum Chemical Studies on the Toxicity Originating from Reactive Metabolites
Nitin Kumar Swarnakar	Pharmaceutics	Liquid Crystalline Nanoparticles for Enhancing Oral Bioavailability and Anticancer Efficacy of Drug(s): Development, Evaluation and Comparison with Polymeric Nanoparticles
Amit Kumar Mittal	Pharmaceutical Technology (Biotechnology)	Synthesis of Silver and Selenium Nanoparticles using Various Plant Extracts and their Therapeutic Applications
Priyanka Bajaj	Biotechnology	Characterization of Variants of Recombinant Human Paraoxonase 1 (PON 1)
N Mallikarjun	Pharmaceutical Analysis	Study of Degradation Chemistry of Selected Angiotensin-Converting Enzyme (ACE) Inhibitor Drugs by using Hyphenated Techniques
Mohit Tyagi	Medicinal Chemistry	Design and Synthesis of Carbohydrate-based Triazole-linked Self-assembling Materials (CTSAMs) of Potential Biological Importance
Khomane Kailas Shivaji	Pharmaceutics	Structure, Property and Process Relationship of Compaction Behaviour of Pharmaceutical Powders
Vaibhav Jain	Pharmacoinformatics	Pharmacoinformatic Studies on Dendrimeric Nanoparticles and their Complexes with Drug Molecules

Ratnesh Sharma	Medicinal Chemistry	Ligand- and Metal-mediated Functionalization of π -electron Rich Systems and Asymmetric Induction
Nankar Sunil Ashok	Biotechnology	Characterization of Novel Anti-Inflammatory Peptides
Devendra K Dhaked	Medicinal Chemistry	Theoretical Studies on the Conformational, Tautomeric and Zwitterionic Preferences of Some Medicinally Important Molecules

CURRENTLY ENROLLED Ph.D. STUDENTS

Udai Chand Agrihari	Rameshwar Prajapati	Priyanka Mangal
Pradeep Jadhavar	Satya Prakash Tripathi	Rakesh Dilip Nimbalkar
Minhajul Arfeen	Sheenu Abbat	Sunil Kumar Surapaneni
Kuppala Ramakrishna	Chaitanyakumar Jaladanki	Bhanu Prakash Arakareddy
Sunil Bansal	Kapil Kumar	Bharat Prasad Dwivedee
Lunagariya Nitin Amarshibhai	Krishna Kumar Sharma	Neeraj Singh Thakur
Ram Jee Sharma	Neha Hura	Gopal Patel
Shivani Mahajan	Priyank Purohit	Varun Kushwah
Sandeep Kumar	Rajesh Gour	Moolchand Kurmi
Pawar Prasad Vilas	Sandeep Goyal	Mahendra Singh
Tarate Bapurao Pandurang	Puneet Khurana	Jethava Krupal Prabhubhai
Neeradi Dinesh	Shiv Gupta	Anjana Barola
Boradia Vishant Mahendra	Krishna Prahlad Maremanda	Dhameliya Tejas Manjibhai
Preet Kamal Kaur	Yogesh Kumar Bulani	Shweta Bhagat
Geetika Aggarwal	Sumit Arora	Deepika Kathuria
Ankan Kumar Bhadra	Patel Kinjal Ashokbhai	Shailendra Sisodiya
Rajan Kumar Tripathy	Shivcharan Prasad	Mungalpara Maulik Arsinhbbhai
Vivek Kumar	Sunil Kumar Jena	Vaja Maulikkumar Dineshbhai
Babita Tanwar	Chander Parkash	Meenu Saini
Garima Priyadarshani	K S Satyanarayana T	Sanjay Kumar
Kashmir Prasad Sethi	Neetu Dayal	Shweta Tiwari
Kitika Shenmar	Rohani Prrasad Burman	Ravi Kumar Mittal
Mukesh Gangar	Kiran Dashrath Bhilare	Shahbaz Eqbal
Alka Choudhary	Patil Mahesh Daga	Sujit Ratnakar Tangadpalliwar
Jagdeep Grover	Suyog Madhav Amrutkar	Vishnu Kumar Sharma
Jagtap Sneha	Mahesh Sharma	Kanhaya Lal
Kharatmal Shivsharan Balbhim	Neha Trivedi	Kahkashan Resham
Nihar Ranjan Das	Shaikh Naeem	Umashanker
Sabbir Khan	Vijay Premsing Rathod	Gujjari Lohitha
Venkateswara Rao Amara	G Kapil	Piyush
Kaushik Thanki	Rajiv Ahlawat	Surbhi Soni
Modi Sameer Ramanlal	Asim Kumar	Seema Kirar
Shete Ganesh Bhaskarao	Neha Patel	Vinay Kumar
Dharam Pal	Nitin Bagra	Katiyar Sameer Sarvesh
Neelagiri Soumya	Narender Yadav	Sharma Jagadish
Ratnika Sethi	Sumit Sunil Chourasiya	Shubhra Sharma
Charan Singh	Santosh Kumar Giri	Bhimpuria Rohan Ajaybhai
Pawar Harish Shankar	Pipaliya Bhavin Vitthlbhai	Dinesh Kumar Tanwar
Bihade Umesh Ratanakar	Shah Purvi Ajaykumar	Patel Ketulbhai Vijaybhai
Saptarshi Ghosh	Isha Saraf	

MASTERS' STUDENTS GRADUATED IN JUNE 2014

Discipline	Name	Title of thesis
Medicinal Chemistry	Swagat Hasmukhbhai Sharma	Synthesis of <i>N</i> -arylated Peptides
Medicinal Chemistry	S Venkataramesh	Synthesis of Thyrotropin-releasing Hormone (TRH) Analogues Containing Modified Residues
Medicinal Chemistry	Preeti Pal	Synthesis of Side-chain Modified 8-Aminoquinolines
Medicinal Chemistry	Dhananjaybhai Ishwarbhai Patel	Synthesis of <i>N</i> -alkylated Peptides
Medicinal Chemistry	Pratima Rajpoot	Synthesis of Modified Proline Residue Containing Thyrotropin-releasing Hormone (TRH) Analogues
Medicinal Chemistry	Kishorbhai Labubhai Gohil	Synthesis of Thyrotropin-releasing Hormone (TRH) Analogues Containing N-1 Benzylated Histidine Residue
Medicinal Chemistry	Borra Laxmi Narsaiah	Synthesis of 4-Arylquinoline-2-carboxamide/carbothioamides as Potential Anti-tuberculosis Agents
Medicinal Chemistry	Adarsh Sahu	Click Chemistry as a Tool for Making Biologically Important Smart Materials
Medicinal Chemistry	Amit Chaudhari	Design and Synthesis of Novel Proteasome Inhibitors
Medicinal Chemistry	Ramprasad Pawar	Aza-Michael Reaction using Sialic Acid as a Substrate
Medicinal Chemistry	Ch Rajesh	Synthesis of Sugar Substrates for Aza-Michael and Ferrier Reactions
Medicinal Chemistry	V Sirisha	Synthesis of Glycopolymers with Biological Potential
Medicinal Chemistry	Patel Minoli	Synthesis of Sugar-based Triazole-linked Biologically Important Self-assembling Materials
Medicinal Chemistry	Hina Gupta	Structural Elucidation of Carbohydrates Extracted from <i>Costus igneus</i> Rhizome
Medicinal Chemistry	Jazib Shaikh	C-10 Derivatives of artemisinin with potentially enhanced bioavailability
Medicinal Chemistry	Wasnik Ashik Ramdas	Total Synthesis of Oxynolignans and Dihydrobenzofuran Lignans
Medicinal Chemistry	Vikram T	Total Synthesis of Oxynolignan Derivatives Using Diastereoselective Glycolate Aldol Reaction
Medicinal Chemistry	M R Suswara	Synthesis of Sprio-oxindole Derivatives
Medicinal Chemistry	Naresh Kashyap	Auxiliary Mediated Aldol Reaction and Michael Addition, and their Applications in the Synthesis of Pyrroloindole Alkaloids and (<i>R</i>)-Baclofen
Medicinal Chemistry	Yeswanth S	Synthesis of 4-Halophenyl (4-methy-1 <i>H</i> -pyrrolo-3-yl)methanone Derivatives

Medicinal Chemistry	Sagar Ravso Mudshinge	Synthesis of Nitrogen Containing Heterocyclic Compounds with Special Reference to β -Lactams and Quinoxaline Derivatives
Medicinal Chemistry	Julekha Siddique	Lewis Acid Catalysed Synthesis of Spirooxindole Derivatives using Isatin based Dienophiles via [4+2]Cycloaddition Approach
Medicinal Chemistry	Patel Bhautik	Total Synthesis of Ezetimibe by Chiral Auxiliary Approach
Medicinal Chemistry	Anamika Thakur	Titanium Tetrachloride Mediated Stereoselective Synthesis of β -Lactam Derivatives
Medicinal Chemistry	Anil Shamraj Bhoier	Synthesis of 4,5-Diaryl Substituted 2-Aminoimidazoles as a Potential β -Tubulin Polymerization Inhibitors
Medicinal Chemistry	Hiral Gandhi	Synthesis of N-Fused Imidazole Amines as Potential CYP450 1A1 Substrates
Medicinal Chemistry	Kaushal Kishore	Synthesis of N-Fusedimidazolylphenethylurea as Potential Topoisomerase II Inhibitors
Medicinal Chemistry	Kodam Ramakrishna	Synthesis of Flavone-3-amine Derivatives as a Potent Leishmanial Topoisomerase II Inhibitors
Medicinal Chemistry	Pooja Jagani	Synthesis of 8-Aminoquinoline-phenylamidines as Potential Antileishmanial Agents
Medicinal Chemistry	Vijay A Rana	Towards the Synthesis of Indole-based Heterocycles: Reaction of Indole in Oxidative C-H Activation
Medicinal Chemistry	Revoju Sravanthi	Development of A ³ -coupling-cyclization -Approach towards Synthesis of N-Fused Imidazoles
Medicinal Chemistry	Naiya Mohinder	Synthesis of Calothrixin A and B, a Class of Topoisomerase -I Inhibitor
Medicinal Chemistry	Vaja Maulikkumar Dineshbhai	Design and Synthesis of Novel B/C Ring Fused Oxazolidinones as Potential Anti-TB Agents
Medicinal Chemistry	Udaya Bhaskar Goda	Design and Synthesis of Novel Oxazolidinones as Potential Anti-TB Agents
Medicinal Chemistry	Dhameliya Tejas Manjibhai	Design and Synthesis of Novel Benzothiazoles as Potential Anti-tubercular Agents
Medicinal Chemistry	Bandoo Chatale Chhagan	Development of Novel Anti-Inflammatory Agents Targeting Cyclooxygenase Enzyme
Medicinal Chemistry	Abhishek Gautam	Design and Synthesis of Novel COX/LOX Dual Inhibitors
Medicinal Chemistry	Shikha Jain	Design and Synthesis of Substituted Heteroaryl and Biaryl Derivatives as Potential PTP-1B Inhibitors
Medicinal Chemistry	Shah Hardik Vijaykumar	Design, Synthesis and Biological Evaluation of Structurally Diverse Heterocyclic Scaffolds as Phosphodiesterase IV Inhibitors

Medicinal Chemistry	Shweta Mishra	Design and Synthesis of Phosphonate Derivatives of Curcumin Type Analogue as Antileishmanial Agents
Medicinal Chemistry	Deepika Kathuria	Exploring the divalent N (1) Compounds using Experimental and Theoretical Procedure
Medicinal Chemistry	Surendra Jathav	Quantum Medicinal Chemistry Studies on Quinoneimine as Reactive Metabolite
Medicinal Chemistry	Tejender Singh	Computer aided Design and Synthesis of Potential <i>PDHFR</i> Inhibitors
Medicinal Chemistry	Priyanka Jain	Designing Divalent N(1) compounds carrying “ A Novel Remote Carbene”
Medicinal Chemistry	Charan Kumar C	QSAR Studies of H2 Receptor Antagonist using Quantum Chemical Receptors
Medicinal Chemistry	Umesh Pandey	Design and Synthesis of Heterocyclic Compounds as Glycogen Synthesis Kinases–3 Inhibitors
Medicinal Chemistry	Jitendra Gour	Design of Novel GSK-3 β Inhibitor using <i>in silico</i> Fragment–based Drug Design
Medicinal Chemistry	Kamal Kishore Ahirwar	Mechanism based Inhibition of Cytochrome P450: A Computational Insight into Metabolic Pathway of Furofylline
Natural Products	Godasu Suresh Kumar	Isolation and Characterization of Chemical Constituents from <i>Fumaria indica</i> and its Potential against Release of Pro-inflammatory Mediators <i>in vitro</i>
Natural Products	Irfan Mudassir	Phytochemical Investigation of <i>Pterocarpus marsupium</i> and <i>Capparis decidua</i> for the Evaluation of Antiobesity Activity
Natural Products	Jotva Ramisha Hamirbhai	Synthesis of 1,2,3-Triazole Derivatives as mPGES-1 Inhibitors
Natural Products	Kagithala Vamsi Priya	Phytochemical Investigation of <i>Alpinia calcarata</i> for Bacterial Efflux Pump Inhibitory Activity
Natural Products	Sindhuja Galipalli	Investigation on <i>Carissa carandas</i> Linn. Roots for Anti-inflammatory Constituents
Natural Products	Kommineni Haritha Chowdary	Synthesis of Substituted Quinolines as anti-HIV Lead Molecules
Natural Products	Lata Choudhary	Phytochemical Investigation of <i>Curcuma amada</i> for Bacterial Efflux Pump Inhibitory Activity
Natural Products	Manoj Kumar Sharma	Synthesis of Sulphated Flavonoid-O-glucosides
Natural Products	Bamaniya Ravindrakumar	Phytochemical investigation of <i>Albizia lebbek</i> for anti-inflammatory activity.
Natural Products	Dhavan Nanasaheb Prabhakar Rao	Synthesis of <i>N</i> -Acetyl-L-Tryptophan- <i>N</i> -Glucoside and its Analogues
Natural Products	Parikh Mayurkumar Nanjibhai	Isolation of Marker Compounds from Selective Medicinal Plants
Natural Products	Pawara Sandip Premising	Phytochemical Investigation of <i>Pueraria tuberosa</i> for Anti-inflammatory Activity
Natural Products	Anukatala Sandhya	Phytochemical Study of <i>Tylophora indica</i> and <i>Pinus roxburghii</i> and their Evaluation for Release of Pro-inflammatory Mediators in LPS Stimulated Cell Lines

Natural Products	Bhatt Nirav Chhaganlal	Synthesis of 1,3,4-Oxadiazole Derivatives for COX-Inhibitory Activity
Natural Products	Deshmukh Balaji Digambarrao	Synthesis of Beta-carboline Derivatives and their Evaluation for Biological Activity
Natural Products	Naik Dharav Hitendrabhai	Design and Synthesis of Quinoline Derivatives as Antileishmanial and Anti-HIV Agents
Natural Products	Ramandeep	Isolation and Characterization of Anti-inflammatory Principles from <i>Ipomea fistulosa</i> Leaves
Natural Products	Shweta Tiwari	Synthesis of Halfordinol Derivatives for Anti-adipogenesis Activity
Traditional Medicine	Monika	Tablet Formulation, Standardization and Monograph Development of <i>Shukramatrika vati</i>
Traditional Medicine	Seema Soni	Development and Standardization of Oral Solid Dosage Form (Tablets) of <i>Phaltrikadikwatha</i>
Traditional Medicine	Mandala Archana	Development of Phytosome Formulation of <i>Arjunic Acid</i>
Traditional Medicine	Shashi Prakash Dubey	Abhayavati: Its Tablet Formulation, Standardization and Monograph Development
Traditional Medicine	O Harika Supraja	Standardization and Monograph Development of <i>Sothaghna lepa (Dosaghna lepa)</i>
Traditional Medicine	Roohi Mohi Ud Din	Development and Standardization of Liquid Dosage Form (Syrup) of <i>Phaltrikadikwatha</i>
Pharmaceutical Analysis	Banothu Kranthi Kumar	Forced Degradation Studies on Selected Drugs and Characterization of their Degradation Products using HPLC, LC-MS/TOF and LC-MS ⁿ
Pharmaceutical Analysis	Darshak Gadara	Met ID Studies on Selected Drugs
Pharmaceutical Analysis	Kaleem Ahmed Anees Ahmed	Exploration of New Trapping Agents for Determination of Reactive Metabolites
Pharmaceutical Analysis	Navindra Chakradhari	Stress Degradation Studies and Application of DoE in Drug-excipient Interaction Study
Pharmaceutical Analysis	Parmar Keyur Raman	<i>In silico, in vitro</i> and <i>in vivo</i> Met ID Studies on Selected Drugs
Pharmaceutical Analysis	Patel Jinendra Kumar Hasmukhbhai	Part I: Quality Evaluation of Anti-TB FDCs Part II: Screening of Selected Herbal Formulations for Adulteration of Synthetic PDE-5 Inhibitors using LC-MS ⁿ
Pharmaceutical Analysis	Sandeep Thakkar	Comparative Metabolite Profiling of Antifungal Drugs in Hepatic and Extrahepatic Tissues
Pharmaceutical Analysis	Shah Kinalkumar Pravinchandra	Part I: Forced Degradation Studies on Lafutidine using GC, GC-MS, LC-MS ⁿ and LC-MS/TOF Part II: Application of DOE to USP/EP Method for Residual Solvent Analysis using Headspace GC
Pharmaceutical Analysis	Sreeram Tejaswee	Design of Experiments in Stress Testing and HPLC Method Development for Selected Drugs
Pharmaceutical Analysis	Suprapuraju Pavankumarraju	Part I: Validated Stability-indicating Method for Alendronate Sodium Employing Zwitterionic Hydrophilic Interaction Chromatography Coupled with Charged Aerosol Detection Part II: Degradation Chemistry of Pimozide

Pharmacology & Toxicology	Akhil Kalia	To Investigate the Effects Narigenin and Hesperetin on High Glucose Induced Changes in Neuroza Cells
Pharmacology & Toxicology	Amit Khurana	Molecular Mechanisms of Novel NFAT Blocker (THPB) in <i>in vitro</i> and <i>in vivo</i> Breast Cancer Model
Pharmacology & Toxicology	Arun Kumar Undrasapu	Effect of Sodium Butyrate and Intermittent Fasting on Thiocetamide Induced Hepatic Fibrosis
Pharmacology & Toxicology	Ekta Sharma	Effect of Metformin on Metabolic Memory in HFD Induced Renal Dysfunction
Pharmacology & Toxicology	Gajbe Sagar Wasudeo	NIPER Compounds NP-2705, NP-2709 and NP-2713: Blood-schizonticidal Activity Studies in <i>P. berghei</i> -infected Mice
Pharmacology & Toxicology	Ganesh Yadaigiri	To Determine the Effect of Curcumin on <i>Plasmodium berghei</i> Antigen-induced Elaboration of Colony-stimulating Factors by Macrophages, <i>in vitro</i>
Pharmacology & Toxicology	Geeta Kumari	To Determine the Effect of Chloroquine on the <i>P. berghei</i> Antigens-induced Elaboration of Colony-stimulating Factors by Macrophages, <i>in vitro</i>
Pharmacology & Toxicology	Gujjari Lohitha	To Study the Effects of TRH Analogue in Cognitive Impairment Models
Pharmacology & Toxicology	Hina Lateef Nizami	Effect of Imatinib Mesylate, a Tyrosine Kinase Inhibitor in Experimental Model of Global Cerebral Ischaemia
Pharmacology & Toxicology	Jawale Akshay Dilip	An Investigation on the Role of TRPA ₁ in Diabetic Induced Cognitive Deficits
Pharmacology & Toxicology	K Gayathri	Intervention of Sodium Butyrate in L-Arginine Induced Chronic Pancreatitis in Rat
Pharmacology & Toxicology	Kumar Sambhav	Effects of Nanocrystalline Solid Dispersion Formulation of Hesperetin in Diabetes Induced Cardiomyopathy
Pharmacology & Toxicology	Malek Vajirbhai Maheebubhai	Effect of NFAT Blocker on Cardiac Hyper-trophy Induced by High Fructose Diet
Pharmacology & Toxicology	Malvika Sharma	Pharmacological Evaluation of Nanocrystalline Solid Dispersion Formulation of Naringenin in Experimental Diabetic Neuropathy
Pharmacology & Toxicology	Mangala Singh	To Determine the Blood-schizonticidal Activity of a Combination of Linolenic Acid and Linoleic Acid in <i>P. berghei</i> -infected Swiss Mice
Pharmacology & Toxicology	Manjeet Singh	To Determine the Blood-schizonticidal Activity of a Combination of 5-Fluoroorotate and Pyrimethamine against <i>P. yoelii nigeriensis</i> -infection in Swiss Mice
Pharmacology & Toxicology	Meera Shah	To Study the Molecular Mechanisms of Astemizole-noscapine Antitumor Activity in Different Cancer Cell Lines
Pharmacology & Toxicology	Mudita Jain	To Study the Effect of Chloroquine-selenium Nanoparticles on Triple Negative Breast Cancer Cell Lines
Pharmacology & Toxicology	Nadeem Akhtar	Evaluation of Pharmacological Effects of Nanocrystalline Solid Dispersion Formulation of Hesperetin in Diabetic Neuropathy
Pharmacology & Toxicology	Naveen Kumar Sharma	To Evaluate Molecular Mechanisms of Anandamide and Anandamide Loaded PCL Nanoparticles in breast Cancer Cell Lines
Pharmacology & Toxicology	Pamulapati Himani	Alteration in Metabolic Memory in High Fat Diet Induced Cardiac Dysfunction

Pharmacology & Toxicology	Patel Arjun Jagdish Kumar	To Study the Pharmacological Effects of Centhaquin Citrate in Neuropathic Pain Model
Pharmacology & Toxicology	Piyush	Intervention of Sodium Butyrate in STZ-induced Cardiomyopathy in SD Rats
Pharmacology & Toxicology	Prem Kishore Babu T	To Determine the Effect of Artesunate on the Phagocytosis of <i>P. berghei</i> -infected Erythrocytes by Macrophages, <i>in vitro</i>
Pharmacology & Toxicology	Randheer Kumar	NIPER Compounds NP-2119, NP-2120, NP-2122 and NP-2123: Blood Schizonticidal Activity Studies against <i>Plasmodium yoelii nigeriensis</i> -infection in Mice
Pharmacology & Toxicology	Sanjeev Kallapari	Elucidation of the Role of TRPA ₁ in Diabetic Neuropathy
Pharmacology & Toxicology	Sedmaki Kavitha	Determination of the Role of IL-18 in the Pathogenesis of Rodent Malaria
Pharmacology & Toxicology	Shailendra Singh Dhakad	<i>Plasmodium berghei</i> Infection in Mice: Determination of Dapsone Dose Reduction Potential of Probenecid
Pharmacology & Toxicology	Sheth Vaibhav Girishkumar	Effect of Serum Zinc Chelation on Urinary Bladder: A Pharmacological Interaction Study with DTPA
Pharmacology & Toxicology	Umashankar	Effect of Serum Zinc Chelation on Liver and Kidney: A Pharmacological Interaction Study with DTPA
Regulatory Toxicology	Arya Priyanka	Cisplatin-induced Nephrotoxicity in Swiss Mice: Intervention of PARP-1 inhibitor, 3-Aminobenzamide
Regulatory Toxicology	Dhavale Vaibhav Shrirang	<i>In vivo</i> Efficacy and Safety Profile of Novel Angiotensin Converting Enzyme 2 (ACE2) Activator (Diaminazer Acetate) in Asthma Model
Regulatory Toxicology	Kiranmai Gorre	Peripheral Blood Lymphocyte DNA Damage and Cytotoxicity as a Biomarker for Chemical Induced Risk Assessment.
Regulatory Toxicology	Namoju Navya	Evaluating the Molecular Mechanism of Disulfiram Nanoparticles in Different Cancer Cell Lines
Regulatory Toxicology	Prashant Gupta	Effect of Nicotine on Male Fertility: Intervention with Vitamin
Regulatory Toxicology	Ramlakhan Patel	Comparison of Toxicity End-points with Acute and Fractionated Dosing
Regulatory Toxicology	Sanghavi Maitri Sharadbhai	Evaluate the Effect of NFAT Inhibitor (Tributyl hexadecyl phosphonium bromide) in High Fat Diet Induced Renal Dysfunction
Pharmaceutics	Sekhar R	Compaction Behaviour of Clarithromycin Polymorphs
Pharmaceutics	Ellanki Anudeepa	Degradation Behaviour of Indomethacin in Amorphous Solid Dispersion and Nanocrystalline Solid Dispersion
Pharmaceutics	Patel Krupaliben Rameshchandra	Effect of Cyclophosphamide on the on the Solid Form of Mannitol during Lyophilization
Pharmaceutics	Payal Sharma	Co-processing as a Tool to Improve Dispersion Behaviour of Hydrophilic Polymers
Pharmaceutics	Deeksha Punj	Generation of Nanocrystalline Solid Dispersion of Curcumin and Stearic Acid using Fluidized Bed Processor
Pharmaceutics	Parmar Prashant	Comparison of <i>in vitro</i> and <i>in vivo</i> Performance of Amorphous Solid Dispersion and Nanocrystalline Solid Dispersion of a Selected Drug
Pharmaceutics	Pandi Nagesh Kumar	Design of Estradiol Functionalized CNTs as Nano Carrier System for Efficient Gene Delivery

Pharmaceutics	Kiran Kumar Gindam	Methotrexate Functionalized Stealth Liposomes for Tumor Drug Targeting
Pharmaceutics	Prajapat Hiteshkumar Kantibhai	Development and Evaluation of Aspirin Nano Crystalline Solid Dispersion for IV Administration
Pharmaceutics	Kasukurthi Chinna Babu	Self Emulsifying Drug Delivery System (SEDDS) of Lipid Doxorubicin Conjugate for Oral Bioavailability Enhancement
Pharmaceutics	Rahul Soni	Methotrexate Functionalized Stealth Polymeric Nanoparticles for Targeted Delivery of Paclitaxel
Pharmaceutics	Jain Hemantkumar Vimalchandra	Compaction Behavior of Aspirin-Paracetamol Eutectic System
Pharmaceutics	Priya Akotiya	Pharmaceutical Development of Nanocrystalline Solid Dispersion of Celecoxib Mannitol
Pharmaceutics	Chavan Rahul Baburao	Impact of Properties of Solid Carriers on Drug Release Profile from Solid SEDDS
Pharmaceutics	Dileep Urimi	Poly (Glutamic Acid)functionalized Stable Chitosan Nanoformulation for Oral Delivery of Insulin
Pharmaceutics	Kale Dnyaneshwar Prakashrao	Preparation and Evaluation of Topical Modified Liposomal Gel containing Benzoyl Peroxide and Adapalene Combination for Effective Treatment of Acne
Pharmaceutics	Shailja Tripathi	Antioxidants Loaded Self Emulsifying Drug Delivery System for Oral Bioavailability Enhancement
Pharmaceutics	Tanya Garg	Self Emulsifying Drug Delivery System as Bioavailability Enhancement Tool for Combinatorial Antioxidant Therapy
Pharmaceutics	Uma Gohiya	Topical Nanoemulsion Loaded Gel Containing Adapalene and Benzoyl Peroxide for Effective Acne Therapy
Pharmaceutics	Patel Kamleshbhai Manubhai	Preparation and Characterization of Nanocrystals of Olmesartan Medoxomil for Oral Bioavailability Enhancement
Pharmaceutics	K Rajesh	Development of Antigen Loaded Liquid Crystalline a Nanoparticles for Oral Immunization
Pharmaceutics	Yadav Balwant	Development and Characterization of Lipid Drug Conjugate Loaded Layersomes for Improved Oral Delivery of Amphotericin-B
Pharmaceutics	Chamala Sivakumar Reddy	Bile Salt Stabilized Chitosan Nanoparticles for Oral Delivery of Amphotericin B
Pharmaceutics	Harale Vitthal	Poly-Amino Acid Based Vesicular Nano Assemblies for Brain Targeting
Pharmaceutics	Poonam Singh Thakur	Development of Self Emulsifying Drug Delivery System for Raloxifene using Bioenhancer
Pharmaceutics	Narinder Singh	Understanding the Effect of Bioenhancers on Pharmacokinetic Profile of Uridinyl Diphosphate Glucuronosyl Transferases (UGT) Substrate Drug
Pharmaceutics	Bhatt Varun	Formulation Development of Celecoxib – Mannitol Nanocrystalline Solid Dispersion using Fluidized Bed Processor
Pharmaceutics	Gangadia Khushbu Anilbhai	Bile Salt Conjugated Liposomes for Oral Insulin Delivery
Pharmaceutics	Siddhapura Krupaben Chandubhai	Comparison of Immunostimulatory Effect of Antigen Loaded Chitosan Nanoparticle after Per-oral and Microneedles Assisted Cutaneous Immunization

Pharmaceutics	Swati Jain	Understanding the Molecular Relaxation in Amorphous Solid Dispersion of Etoricoxib using Enthalpy Relaxation and Dielectric Relaxation
Pharmaceutics	Sneha Sheokand	Quantification of Amorphous Content in a Crystalline API using Dynamic Vapour Sorption (DVS)
Pharmaceutics	E Naveen	Belayered Tablet of Aspirin and Clopidogrel Bisulphate by using QBD to Overcome Incompatibilities in Fixed Dose Combinations
Pharmaceutics	Venkata Appa Reddy	Oral Bioavailability Enhancement of Candesartan Cilexetil by Nano Crystal Approach
Pharmaceutics	K Satish	Optimization of Layersomes using Design of Experiment Approach
Pharmaceutics	Y Madhavi Latha	Pre-formulation Profiling of Novel TRH Analog NP-2376
Pharmaceutics	Sonu	Role of API-polymer Miscibility on Physical Stability of Irbesartan Amorphous Solid Dispersion
Biotechnology	Eshita Das	Effect of <i>TOR1</i> on the Aggregation of Mutant Huntingtin Protein
Biotechnology	Garima Diwan	Role of Hsp104 and RNQ1 in Aggregation Pattern of Huntingtin Protein
Biotechnology	Hinal Patel	Effect of Caffeine Metabolites on Aggregation of Alpha-synuclein in <i>Saccharomyces cerevisiae</i>
Biotechnology	Kamalpreet Kaur	Effect of Nucleic Acid Aptamers on the Aggregation of Mutant Huntingtin Protein in <i>Saccharomyces cerevisiae</i>
Biotechnology	Milan Patel	Effect of Aptamers on the Function of Mutant Huntingtin Protein
Biotechnology	Radha Joshi	Role of RNA Aptamers in Stabilization of Mutant Huntingtin Protein <i>in vitro</i>
Biotechnology	Ramanjeet Kaur	Effect of Nicotinamide and Nicotinic Acid on Aggregation of Alpha Synuclein
Biotechnology	Vidhi Guha	Studies on Interaction between Nucleic Acid Aptamers and Tetanus Toxoid under Stress Conditions
Biotechnology	Parikh Harsh D	Site-specific PEGylation of SsoPox
Biotechnology	C Mounica	An Attempt to Refold rhIL-6 from Inclusion Bodies
Biotechnology	Seth Chintan P	Effect of Tandem-peptide Derived from Human apoE on Binding and Uptake of LDL
Biotechnology	Sravani Ganga Ch	Modification of OPH by Random PEGylation
Biotechnology	Tejasree Chellubonia	Refolding of Bacterially Produced rhIFN- γ
Biotechnology	A R Satvik Iyengar	Purification and Stabilization Studies of OPH
Biotechnology	Beladiya Chiragkumar	Immobilization of AiiA on Magnetic Nanoparticles
Biotechnology	Chandak Gaurav	Stabilization studies of SsoPox
Biotechnology	Kalpesh Kumar Rajwadi	Bioinformatic Analysis, Cloning and Expression of Mycobacterial Enolase (Rv1023)

Biotechnology	Rupendra Motghare	Monitoring the Expression of <i>M. tb</i> GAPDH-mCherry using -44 and -201 Promoter Constructs
Biotechnology	Makwana Bhavin Kanji	Monitoring the Expression of <i>M. tb</i> GAPDH-mCherry using -44 and -617 Promoter Constructs
Biotechnology	Anirudh Nema	Creation of a Mycobacterial Strain Expressing Fluorescently Tagged FtsZ
Biotechnology	Rajdeep Dalal	Creation of Two Pyruvate Kinase M2-fluorescent protein (PKM2-FP) Constructs for Retroviral Transfection
Biotechnology	Kayala Kambagiri Swamy	Study of Localization of <i>Leishmania donovani</i> Acetyl CoA Synthetase by Subcellular Fractionation
Biotechnology	Landage Nitin Gorakh	Analysis of Time Dependent Expression of Acetyl-CoA Synthetase in <i>Leishmania donovani</i>
Biotechnology	Desale Jayesh Namdeo	Site Directed Mutagenesis of <i>Leishmania donovani</i> Ribose 5-phosphate Isomerase B
Biotechnology	S ShivaPrasad	Site-directed Mutagenesis of <i>Leishmania donovani</i> Acetyl CoA Synthetase
Biotechnology	B Shamiulla	Evaluation of the Effect of Inhibitors on <i>Leishmania donovani</i> Recombinant 3-Hydroxy-3-methyl glutaryl-CoA Reductase (<i>Ld</i> HMGR) Enzyme
Biotechnology	S Sirisha	Effect of pH on Structure and Function of Ribose 5-Phosphate Isomerase B in <i>Leishmania donovani</i>
Biotechnology	Alok Kumar Soni	Standardization of Colorimetric Method for the Estimation of Ketoses
Pharmaceutical Technology (Formulations)	Dharmendra Kumar Yadav	Mechanistic Understanding in Optimization of Novel Nano-dispersion of Docetaxel
Pharmaceutical Technology (Formulations)	Bhupesh Kumar	Wet Milling as an Impending Particle Engineering Tool for the Development of Nanocrystals of Febuxostat by QbD Approach
Pharmaceutical Technology (Formulations)	Devasari Naresh	Development and Optimization of Erlotinib Hydrochloride Cyclodextrin Complex by using DOE
Pharmaceutical Technology (Formulations)	L V Sheshu Kumar Kodari	Quality by Design (QbD) Approach for the Development and Characterization of Rifampicin Loaded Chitosan Microparticles for Effective Management of T.B
Pharmaceutical Technology (Formulations)	Paidi Sharan Kumar	Quality by Design (QbD) Approach in Optimization of Spray Dried Ternary Solid Dispersion of Atorvastatin Calcium
Pharmaceutical Technology (Formulations)	Amisha Patel	Development and Characterization of Amorphous Solid Dispersion of Telmisartan
Pharmaceutical Technology (Formulations)	Prajeet Bansod	Quality by Design (QbD) Approach for Development and Optimization of Novel Curcumin Gel
Pharmaceutical Technology (Formulations)	Surbhi Bagri	Development and Evaluation of Eprosartan Nanocrystals

Pharmaceutical Technology (Formulations)	Shrikant Wankhade	Design and Development of Co-formulation of Docetaxel and Curcumin in PLGA Nanoparticles
Pharmaceutical Technology (Formulations)	Yogesh Chandra	Development of oro Dispersible Tablet of Antimalarial Drugs by QbD Approach
Pharmaceutical Technology (Process Chemistry)	Bhaskar Singh Rathore	1,3-Dipolar Cycloaddition of Porphyrins for the Synthesis of New Photosensitizers
Pharmaceutical Technology (Process Chemistry)	Gitanjali	Synthesis of Bioconjugatable Photosensitizers for Photodynamic Therapy (PDT) of Cancer
Pharmaceutical Technology (Process Chemistry)	Lekshmi Vijay	Rational Synthesis of Various Building Blocks towards the Development of Porphyrinic Photosensitizers
Pharmaceutical Technology (Process Chemistry)	Anuja Jain	Transition Metal-catalyzed Decarboxylative Benzylation of Aromatic Carboxylic Acids
Pharmaceutical Technology (Process Chemistry)	Balat Kartavya Nagjibhai	Decarboxylative benzylation of α -Oxo Carboxylic Acids by Palladium-catalyzed Cross-coupling Reactions
Pharmaceutical Technology (Process Chemistry)	Patel Ketulbhai Vijaybhai	Direct ortho-Benzylation of Heteroaryl Amides
Pharmaceutical Technology (Process Chemistry)	Dasari Manikanta	Regioselective Ring Opening of Aspartic Acid Cyclic Anhydride with Nucleophiles
Pharmaceutical Technology (Process Chemistry)	K Lakshmi Narayana	Synthesis of Novel Drug Lipid Conjugates
Pharmaceutical Technology (Process Chemistry)	Raghavender Reddy B	Synthesis of Sildenafil – fluoxetine Hybrid Molecule
Pharmaceutical Technology (Process Chemistry)	Kadam Manoj Popat	Palladium-catalyzed Direct ortho-Benzylation of Primary Benzamides using Benzylic Halides
Pharmaceutical Technology (Process Chemistry)	Kumaraswamy Musku	Synthesis of Novel Indole Derivatives
Pharmaceutical Technology (Process Chemistry)	Nandini Sarviya	Process Development of Propafenone Synthesis and its Analogues for MDR
Pharmaceutical Technology (Process Chemistry)	Nishtha	A Novel and Efficient Approach towards the Synthesis of Potent Insulinotropic 4-Hydroxyisulucine
Pharmaceutical Technology (Process Chemistry)	Roli Jain	Alpha Arylation of Ketones Present in N-Heterocycles
Pharmaceutical Technology (Process Chemistry)	Sumant Kumar Bhaskar	Metal-catalyzed N-Arylation of Electron-deficient (hetero)aryl Amines
Pharmaceutical Technology (Process Chemistry)	Pasumarthi Sravan Kumar	Synthesis of Noscopine Ascorbic Acid Conjugates
Pharmaceutical Technology (Process Chemistry)	Patel Nikunj Kumar Vishnubhai	Process Research and Development of Anticancer Drug Vismodegib
Pharmaceutical Technology (Biotechnology)	A Pavan Kumar	Development of Theranostic Nanoagents through Biosynthesis
Pharmaceutical Technology (Biotechnology)	Thaware Manisha Maruti	Stereo-inversion of Racemic Alcohols to Enantiopure Alcohols Using Microbes for the Treatment of Various Diseases

Pharmaceutical Technology (Biotechnology)	Salunkhe Satyajeet Sunil	Exploring Novel Biocatalysts using <i>de novo</i> Protein Synthesis Approach
Pharmaceutical Technology (Biotechnology)	Amit Ghanghoria	Derivatization of Theranostic Nanoagents for the Treatment of Cancer and Microbial Infection
Pharmaceutical Technology (Biotechnology)	Kela Nikhil Kamalkishor	Chemoenzymatic Synthesis of Dropropizine as an Antitussive Agent
Pharmaceutical Technology (Biotechnology)	Amrutkar Rohit Prakash	Chemoenzymatic Synthesis of Lubeluzole as NMDA Antagonist Used as Anesthetics
Pharmaceutical Technology (Biotechnology)	Irfan Ahmed Ahanger	Synthesis of Selenium Nanoconstructs as Selective Targeting Strategy in Pancreatic Ductal Adenocarcinoma
Pharmaceutical Technology (Biotechnology)	Sawant Ganesh Maruti	Chemoenzymatic Synthesis of Ranolazine as an Anti-anginal Cardiovascular Drug
Pharmacy Practice	G B N Sireesha	Antimicrobial Utilization Study in the Multidisciplinary ICUs of a Public Teaching Hospital
Pharmacy Practice	Kandukuri Priyanka	Pharmacovigilance in ICUs of a Public Teaching Hospital
Pharmacy Practice	Anuradha	Pharmacovigilance in Wards of a Public Teaching Hospital
Pharmacy Practice	Anita Sheoran	Study on Identification of Medication Errors in the Wards of a Public Teaching hospital
Pharmacy Practice	Gundu Mounika	Prescription Analysis in Pediatric Private Outpatient Clinic
Pharmacy Practice	Boya Chandra Sekhar	Evaluation of Prescribing Pattern in Older Adults at the Medicine Wards of a Public Teaching Hospital in India
Pharmacy Practice	Ramya Smruthi	Assessment of Cardiovascular Risk in Newly Diagnosed Type 2 Diabetes Mellitus Patients
Pharmacy Practice	Esam Hariprasad	Assessment of Prevalence and Predictors of Cancer in with Type 2 Diabetes Mellitus Patients
Pharmacy Practice	Kanukula Raju	Assessment of Effectiveness, Tolerance of Pharmacotherapy and its Impact on Functional Disability in Patients with Chronic Low Back Pain
Clinical Research	Basa Pradeep	Effectiveness, Tolerability and Impact on QoL of Antiepileptic Pharmacotherapy in Paediatric Patients with Idiopathic Epilepsy
Clinical Research	Divya	Effectiveness, Tolerability and Impact on QoL of Antiepileptic Pharmacotherapy in Paediatric Patients with Symptomatic Epilepsy
Clinical Research	Kapala Pavan	Evaluation of Body Composition, Lifestyle Factors and Physical Functioning in Healthy Young Indian Adults
Clinical Research	Pagada Amitkumar	Clinical Profiling and Costing of Treatment of Inpatients with Gastrointestinal and Liver disorders

Clinical Research	Mahammad Shaik Rafik	A Community Based Study in North Indians to Assess the Prevalence, Knowledge, Disability, and Service Utilization in Low Back Pain
Clinical Research	Y Manohar Babu	Evaluation of Neurobehavioral Functioning in Indian Population
Pharmacoinformatics	Abdul Wahid Khan	The Elucidation of the Binding Site of Calreticulin on LRP1 and Binding Mechanism of Full Length Calreticulin Mechanism Based Inhibitor Originating from Quinone Methide: A Quantum Chemical Study
Pharmacoinformatics	Adivishnu Naga Swathi	
Pharmacoinformatics	Hitendra Kumar Tandan	Design of Selective Arylamine N-Acetyl Transferase (NAT) Inhibitors as Anti-tubercular Agents
Pharmacoinformatics	Kancharla Ramya Deepika	Structural Basis of Inhibitor Selectivity in <i>Leishmania donovani</i> HMG-CoA-Reductase (HMGR)
Pharmacoinformatics	Konduru Guruprasad Varma	Study of Intrinsically Disordered Protein (PTEN) using Computational Approaches
Pharmacoinformatics	Lingineni Karthik	Development of Computational Model for MRP-1 Substrates and Assess its Role in BBB Permeability
Pharmacoinformatics	Mori Abhaysinh Mayurbhai	Parameterization of Electronic State for the Electrotopological Descriptors: E-State Indices
Pharmacoinformatics	Mutyala Kuladeep	Computer Aided Drug Design of LEDGF/p75 Inhibitors
Pharmacoinformatics	Nakka Meher Baba Kumar	Identification of the Structural Features Essential for the Inhibition of <i>Mycobacterial</i> FabH
Pharmacoinformatics	Neha Verma	Metabolic Inhibition of Intestinal UGTs by Surfactant: Mechanistic Study using Molecular Dynamics Analysis BCS Classification using Machine Learning Techniques
Pharmacoinformatics	P Gangadhar	
Pharmacoinformatics	Pankaj Kumar	Evaluation of P-glycoprotein Translocation by Free Energy Analysis
Pharmacoinformatics	Parikh Rutul Janakkumar	Design of Selective <i>Mycobacterium</i> GigE Pathway Inhibitors using <i>in-silico</i> Approaches
Pharmacoinformatics	Patil Ujwalkumar Premasukh	Structure Based Design of PKC- β II Inhibitors based on its Allosteric Inhibition Mechanism
Pharmacoinformatics	Richpreet Kaur	Identification of Pregnane X Receptor Activators by Machine Learning Approaches
Pharmacoinformatics	Rohit Bansal	Investigations on Mechanism Involved in P-glycoprotein Inhibition by Pharmaceutical Excipients
Pharmacoinformatics	Rosiamliana Colney	Characterization of Novel Allosteric Site of PTP1B and its Implication in Inhibitor Design
Pharmacoinformatics	Sanchit Dahikar	Molecular Modeling Studies to Investigate the PfDHFR Inhibitor from the Compounds Included in Malaria Box
Pharmacoinformatics	Sapna Rani	Homology Modeling of Human CXCR2 Receptor and Identification of Dual Inhibitors of CXCR1 - CXCR2
Pharmacoinformatics	Sumit Jain	Mechanistic Study of Pregnane X Receptor Mediated Transcriptional Regulation of Drug Metabolizing Enzymes and Efflux Transporter
Pharmacoinformatics	Vivek Neekhra	Modelling of Aryl Hydrocarbon Receptor Ligand Binding Domain to Investigate Novel AhR Substrate and Inhibitors

Pharmacoinformatics	Vyas Palak Ashvinkumar	Comparative Molecular Docking Study of Neuraminidase with its Antibody and Inhibitors
Pharmacoinformatics	Waghmare Sandip Sayajirao	Identification of Novel PKnB inhibitors as Anti-tubercular Agents
Pharmaceutical Management	Amit Kumar	Market Analysis and Perception Mapping of Doctors towards Biologics used in Rheumatoid Arthritis
Pharmaceutical Management	Anil Kumar	To Identify the Underlying Factors which Affect the Performance of Pharmaceutical Sales Representatives
Pharmaceutical Management	Anup Maurya	To Study Consumer Perception regarding Self Medication
Pharmaceutical Management	Arvind Patidar	Perception and Attitude of Physicians towards Generic Medicines
Pharmaceutical Management	Barhate Janu Arun	Current Scenario of Drug Reimbursement and Health Insurance System of India and Estimation of Medicine Expenditure for Reimbursing Drugs used in Diabetes Mellitus Type 2 in India
Pharmaceutical Management	Bhatt Kaushal Himanshukumar	Perception Analysis of the Open Innovation in Pharmaceutical Sector Research & Development
Pharmaceutical Management	Bhawna Sharma	To Study the Importance of Pharmaceutical Industry to the Indian Economy
Pharmaceutical Management	Bikya Suresh	To Study Consumer Awareness and Future Scope and Trends of e-Healthcare e-Commerce in India
Pharmaceutical Management	Bodiwala Denish Ashvinkumar	To Study the Effectiveness of OTC Advertising and its Impact on Consumer Buying Behavior
Pharmaceutical Management	Bojja Vijay Kumar	To Study the Role of Community of Pharmacies Sector
Pharmaceutical Management	Chatla Chandrasheker	Perception Mapping of Doctors for Correct Management of Osteoporosis by Vitamin K2
Pharmaceutical Management	Chetana Priya Maddi	Measuring Consumer Based Brand Equity of NIPER (Student Perspective)
Pharmaceutical Management	Dasari Ganesh	Tool to Identify KOLs for Orthopaedic Medical Device Industry
Pharmaceutical Management	Dheeraj Singh Patel	Perception and Acceptance of e-Detailing among Physicians
Pharmaceutical Management	G Srisailam	Compendium on National Pharmaceutical Pricing Policy and its Effect on Indian Pharmaceutical Market
Pharmaceutical Management	Himanshu Kumar	Prescribing Behaviour of Oral Hypoglycemic Agents
Pharmaceutical Management	Isha Jain	Perception Mapping of Physicians towards Pharmaceutical Promotion in India
Pharmaceutical Management	J Prem Kumar	Experience Role in the Job Satisfaction of "Medical Representatives" in Indian Pharmaceutical Industry
Pharmaceutical Management	Kadam Raju Vitthalrao	Consumer Perception of Quality of Health Information Available on Internet and its Use
Pharmaceutical Management	Kaushik Parmar	To Study the Emerging Trends of NDDS and its Future Growth Drivers
Pharmaceutical Management	Koneru Gayathri Devi	Key Parameter Analysis for the Selection Criteria of Knee and Hip Replacement Set
Pharmaceutical Management	Krishna Murthy Siripuram	Factors Influencing Scope and Accessibility of E-Detailing as Pharmaceutical Marketing Tool in India

Pharmaceutical Management	Kumbha Srinivasarao	GCC Pharmaceutical Market
Pharmaceutical Management	Lakhmir Singh	Impact of DPCO on Prescription Pattern and Major Focus on Antibiotic Segment
Pharmaceutical Management	Lalvani Ronakkumar Dolatbhai	Identification and Assessment of Factors Affecting Consumer Buying Behaviour of an OTC Product
Pharmaceutical Management	M Jyothsna Devi	Perception Mapping of Medical Websites, Networking Sites, and Mobile Applications their Use by Doctors in their Clinical Practice
Pharmaceutical Management	M Sharath Chandra	To Assess FDA's Regulatory Action on Pharmaceutical Companies using Digital and Social Media for the Promotion of their Products
Pharmaceutical Management	Madhuri Luthra	To Elucidate the Influence of Lifestyle of Working Women on their OTC Purchasing Behaviour
Pharmaceutical Management	Mansuri Altamash Raees	To Study the Perception, Attitude, Belief and Knowledge of Housewives on Self Medication in Case of Common Ailments
Pharmaceutical Management	Mohd Omar Farooq	A Study on Perception of HIV among General and Consultant Physicians
Pharmaceutical Management	Nandini Nema	To Study the Awareness, Purchase Behaviour and Complications of Contact Lenses
Pharmaceutical Management	Naveen Patidar	A Study on Job Satisfaction of Pharmaceutical Sales Representatives: A Comparison between Multinational and Domestic Pharmaceutical Companies
Pharmaceutical Management	Neeraj Kumar Pandey	Study the Various Dimensions of Availability of Newly Launched Brands Across the Supply Chain
Pharmaceutical Management	Pallavi Vishwakarma	A Study to Assess the Consumer's Buying Behavior on Purchase of Skin Care Cosmetics
Pharmaceutical Management	Patel Ankik Bharatbhai	To Study the Perception of Doctors Regarding Business Potential of New Diabetes Drugs Lipaglyn and SGLT-2 Inhibitors
Pharmaceutical Management	Patel Maulik Babubhai	To Find out Factors Affecting Cognitive Bias in Salesperson of Pharmaceutical Industry and Interpret the Relationship Amongst them Through Total Interpretive Structural Modelling (TISM)
Pharmaceutical Management	Patel R. Kanjibhai	Concept of Branding Strategies in Indian Pharma Industry
Pharmaceutical Management	Patel Vinus Ashokbhai	Developing a Model for Creation of Low Cost Hospitals in Tier 1, 2 and 3 Cities
Pharmaceutical Management	Peruka Venkata Ramana Prasad	Future Trends and Changing Dynamics of Global Oncologic Market
Pharmaceutical Management	Prashanth kumar	To Analyze the Factors Influencing Consumers Purchasing Pattern of OTC Drugs in the Indian Context
Pharmaceutical Management	Pruthviraj U	Ethical Issues in the Pharmaceutical Industry: An Analysis of Indian Newspapers
Pharmaceutical Management	Rahmat Hadi	To Understand the Perception about Bioabsorbable Drug Eluting Vascular Scaffold
Pharmaceutical Management	Ramkrishna Birle	Perception Mapping of Physicians towards Diabetes and its Complications and Future Challenges
Pharmaceutical Management	Ritika Jain	To Study of Achievement of High Sales Performance by Implementation of Key Account Management (KAM) in Indian Pharmaceutical Industry
Pharmaceutical Management	Rupesh Gandhi Naik M	To Study the Perception of Doctors about Electronic Health Records

Pharmaceutical Management	Sai Krishna Sangem	Revival Strategies for CPSUs in Indian Pharmaceutical Industry
Pharmaceutical Management	Sana Kauser	Project Analysis and Selection Criteria in R&D Intensive Organizations
Pharmaceutical Management	Sanchit Gupta	To Assess Compliance of Marketing Practices of Pharmaceutical Companies with UCPMP
Pharmaceutical Management	Shah Nehal Sanjay	To Study the Implications of Merger and Acquisition on the Price of Major Brands as well as Product Portfolio of both the Target Pharmaceutical Company as well as the Acquirer
Pharmaceutical Management	Shah Vrunda Satishkumar	Acceptance Mapping of Saroglitazar for the Treatment of Diabetes Dyslipidemia among Doctors
Pharmaceutical Management	Shamshad Ah Riyaz Ah	A Study to Understand the Physicians towards Medical Representatives
Pharmaceutical Management	Sheth Dhwni Bharatkumar	Mining of DPCO: A Captious Study in Search of Betterment
Pharmaceutical Management	Shinde M Dhanaji	Changing Focus of R&D with Specific Emphasis on Neglected Tropical Diseases
Pharmaceutical Management	Shinde Nitin Dattatraya	To Study the Effect of Packaging of Pharmaceutical OTC Products on Buying Behaviour of Customer
Pharmaceutical Management	Sneha Rajan	To Study the Impact of the Post-TRIPS Amendments in the Indian Patent law over the 'Access to Medicines' Situation in India and the Indian Pharmaceutical Industry as a Whole
Pharmaceutical Management	Soni Pruthvish Jagdishchandra	A Study to Gain Insights from Marketing Professionals towards Differential Pricing of Pharmaceuticals in Purview of DPCO-2013
Pharmaceutical Management	Swapnil Jain	Mapping of Institutional Purchase Mechanism of Pharmaceuticals
Pharmaceutical Management	V S Karthik Yada	Perception of Doctors towards Adverse Drug Reaction Reporting
Pharmaceutical Management	Vadali Sagar Raju	Impact of Dividend on Market Value of Stock
Pharmaceutical Management	Vamika P	Does Brand Name Influence Physician Prescription Pattern
Pharmaceutical Management	Varun Yadav	A study to Assess the Role of Chemist in Promoting the OTC Product
Pharmaceutical Management	Vikas Kumar	To do Comparative Analysis for Regulatory Affairs between Developed v/s Developing Nations
Pharmaceutical Management	Vyas Vishalkumar Pravinbhai	Study to Find out the Acceptance Rate of Branded Generics through Online Retail Pharmacy and to Study Current Online Pharma Market in India, Future Issues and Challenges

RESEARCH ACTIVITIES

MEDICINAL CHEMISTRY

Target-based Design, Synthesis, and Biological Evaluation of New Chemical Entities as Inhibitors of Various Enzymes Involved in the Pathophysiology of Different Diseases

Institutional Thrust Areas:

Parasitic Diseases: Malaria and Leishmaniasis

New anti-Leishmanial Chemotype

Trypanothione Reductase (TR) has been considered as one of more relevant and novel target for leishmaniasis. Total sixty-two compounds to different series (*N*-(2-(benzo[d]thiazol-2-yl)phenyl)nicotinamide, *N*-(2-(benzo[d]thiazol-2-yl)phenyl)nicotinamide and *N*-phosphorylalkyl substituted 3,5-bis(arylidene)piperidones) were synthesized and computational docking against TR revealed that these compounds might be acting on TR as they were found to fit into the active site of TR.

Dihydroartemisinin Derivatives

Dihydroartemisinin derivatives have emerged as important new drugs for treating malaria. However they lack the desired *in vivo* metabolic stability and therefore compounds with enhanced metabolic stability are of great interest for evaluation as anti malarial agents. Based on this concept the work on the synthesis of S-containing dihydroartemisinin derivatives were continued employing the indigenously developed method. Two compounds that were found to be more active than the naturally occurring compound (artemisinin) were taken up for some of the pre-formulation studies and this work is in progress. In the meanwhile more members of this library of compounds have also been prepared for evaluation of their antimalarial activity.

Peptide-based Anti-malarial Agents

A series of short peptides were synthesized and submitted for evaluation as antimalarial agents.

Heterocyclic Ligands of Topoisomerase II, DNA and Trypanothione Reductase

Kala-azar (Visceral Leishmaniasis, VL), a most fatal form of leishmaniasis and one of most neglected diseases, is endemic in rural and suburban areas of developing countries including India. Leishmanial topoisomerases I and II, and DNA (AT rich sequence of minor grooves) have been recognized as important targets in the discovery of potential antileishmanial agents. Recent studies have showed *Leishmania donovani* (Ld) Trypanothione reductase (TR) as a new and valuable target. With the aim of discovery of novel agents for VL, we focus on synthesis of rationally designed, antileishmanial drugs/agents-inspired heterocyclic compounds that can interfere with these targets. We have developed diversity-feasible synthetic methodologies and synthesized several series of

heterocyclic compounds. Some of them were found to exhibit potent antileishmanial activities in promastigote assay compared to standard antileishmanial drugs and were significantly less cytotoxic. Further bioactivity studies are going on.

Tuberculosis

Design and Synthesis of Novel Heterocyclic Scaffolds As Potential Anti-Tubercular Agents

Diversity oriented synthesis (DOS) of new agents targeting the tuberculosis is a well sought exercise to find new anti-TB molecules. Towards this endeavor various small molecules were designed to target the ICL, MS (proteins regulating bacterial energy metabolism in mycobacteria). Thirty-six benzo[d]thiazol-2-yl(piperazin-1-yl)methanones have been synthesized and have been subjected for biological evaluation against HisG (macromolecule regulating aminoacid metabolism in Mtb). Several compounds belonging to different series (2-carboxamidobenzothiazoles, diaryl quinolines, styryl quinolines, 1,2-diamines, and 2-amino pyrimidines) have been synthesized and evaluated for anti-TB activity (MIC = 0.78 - >25 µg/mL) in collaboration with Birla Institute of Technology & Science-Pilani, Hyderabad Campus, Hyderabad. Several compounds have shown promising anti-TB activity (MIC = 0.78 µg/mL).

Carbohydrate-based Anti-TB Agents

Based on the fact that the cell wall is a defining characteristic of the mycobacterium, and forms the basis for the unique microbiological properties exhibited by the organism, its biosynthesis is of special interest for developing target-based drug molecules. Hence the metabolic pathways identified as essential for the survival of the bacterium became our focal point for finding new drug candidates for treating tuberculosis. Galactofuranose (Gal_f) moiety, an essential constituent of the mycobacterium cell wall, has recently been shown to be a product of the action of uridine diphosphate-galactopyranose (UDP-Galp) mutase on UDP-Galp. As galactofuranose residue is not encountered in human being this enzyme serves as the basis for selective targeting against the bacterium. Two compounds prepared in this context were found to be moderately active.

This work was also extended to include synthesis of sugar-linked ricinoleic acid-based compounds as potent antibacterial agents.

Ring-substituted Quinolines as Anti-Tuberculosis Agents

Several ring-substituted quinolines have been synthesized as potential anti-TB agents. The newly synthesized hydrazides of ring-substituted quinolines are awaiting bioactivity evaluation.

Diabetes

Inhibitors of PTP1B

The worldwide epidemic of NIDDM has urged for generation of new molecular entities to act on newer drug targets. Out of several options, the Protein tyrosine phosphatase-1B (PTP-1B) has drawn attention as a new drug target for generating new therapeutic leads. Twenty-one compounds belonging to 2,4-diphenylquinoline class have been synthesised.

Other Therapeutic Areas:

Inflammation

Inhibitors of Cyclooxygenase: Design, Synthesis and Biological Evaluation of NCEs to Generate Novel Leads

The nonsteroidal anti-inflammatory drugs (NSAIDs) have been the mainstay of therapy for rheumatoid arthritis manifested as inflammation and pain of the joints but are associated with side effects such as gastrointestinal and renal toxicity due to non-selective inhibition of cyclooxygenase (COX-1 and COX-2) isozymes that witnessed the upsurge of COX-2 selective agents such as rofecoxib, celecoxib, valdecoxib, lumiracoxib etc. in the past several years. However, rofecoxib and valdecoxib were withdrawn from the market due to increase in cardiovascular adverse effects and lumiracoxib due to hepatotoxicity. Due to the inadequacy of safe drugs and the recognition of new avenues for selective COX-2 inhibitors such as cancer, Alzheimer's disease, Parkinson's disease, schizophrenia, major depression, ischemic brain injury and diabetic peripheral neuropathy interest to develop more effective COX-2 selective agents has taken a fresh gear.

Total 162 compounds belonging to different chemotypes (2-phenyl benzthiazole, 2-phenyl benzoxazole, 2,4-substituted pyrimidine, 2'-hydroxy 2-phenyl benzoxazole, 2'-hydroxy 2-phenyl benzthiazole, 2'-amino 2-phenyl benzoxazole) were synthesised. Total twenty-four compounds (2-phenyl benzthiazole, 2-phenyl benzoxazole) were evaluated for COX-1 and COX-2 enzyme inhibitory activities. Out of these four compounds have comparable potency to the marketed COX-2 selective drugs.

Inhibitors of Phosphodiesterase- Design, Synthesis and Biological Evaluation of Novel Heterocyclic Ligands

Recognition of a molecule with multiple pharmacophoric feature is associated with various complications hence

strategies were set to design NCEs either by incorporating the identify pharmacophoric frameworks in one common structure or attaching them through a linker as it offers several pharmacokinetic and pharmacodynamic benefits. Anti-asthmatic activity and PDE-IV inhibitory potentials were selected as prime criteria and different pharmacophore were designed by hybridizing the structural features of anti-asthmatics and PDE-IV inhibitors.

A library of seventy-two compounds containing 2,4,5-trisubstituted and 1,2,4,5-tetrasubstituted imidazole were synthesized and evaluated for their PDE4B2 inhibitory activity. Fourteen compounds have shown more than 50% inhibitory activity of PDE4B2 enzyme at 10 μ M concentration.

Antibacterial Bacterial Antigens

In recent years it has been demonstrated that binding of monovalent receptor molecules to proteins possessing manifold symmetry can be enhanced dramatically by converting them into the corresponding multivalent compounds of the same symmetry. Cholera toxin (CT), the causative agent of the deadly diarrhoeal disease cholera, and verotoxin (VT), produced by certain strains of *E. coli* that causes fatal food poisoning, are typical examples of closely related oligomeric proteins that can possibly be targeted effectively by the use of multivalent receptor antagonists. Towards this end we have now completed the synthesis of some cyclic glycopeptides as potential inhibitors for CT and VT.

Peptides-based therapeutics for Alzheimer's disease

Series of dipeptides were synthesized by varying lipophilicity at the C-2 position of L-histidine and at the N- and C-terminus. These mechanistic studies indicate that the peptides plausibly interact with the mimic membrane of pathogen by direct insertion, and results in disruption of membrane of pathogen. Polymerization of amyloid β -peptide (Ab) into amyloid fibrils is major step in the pathogenesis of Alzheimer's disease. A region located in the central part of A β corresponding to A β_{9-18} to A β_{13-22} , displayed prominent binding of radioactive A β_{1-40} . Another binding region was the hydrophobic C-terminus of the molecule, but it showed relatively lesser binding. A β_{11-20} was selected for further investigation of structural requirements for binding. The TEM study on the synthesized peptides is currently underway.

Cancer: Anti-prostate Studies

Carcinoma of the prostate is one of the most frequently diagnosed noncutaneous cancers in men. The specific causes of prostate cancer remain unknown till date. Dihydrotestosterone and testosterone are the main androgenic hormones which are implicated in the initiation

and promotion of the disease. *In vitro* studies using the AR+ human prostate cancer cell line, LNCaP, provided the first evidence that structural alteration in the AR is responsible for prostate cancer. Currently, there are two main classes of antiandrogens that are clinically used. A few steroidal ligands have been used as antiandrogens, including cyproterone, oxendolone and spironolactone. However, the clinical application of steroidal antiandrogens has been limited greatly by poor oral bioavailability, lack of tissue selectivity, poor pharmacokinetic properties and potential side effects like hepatotoxicity, androgenic effects and feminizing side effects like gynecomastia and loss of libido in men. Moreover, the rigid steroid backbone does not allow wide structural modifications for newer drug development. Non-steroidal antiandrogens are the current pharmacological treatment of choice for progressive androgen-dependent prostate cancer. The non-steroidal ligands are more favorable for clinical and therapeutic applications because of the lack of cross-reactivity with other steroidal receptors which eliminates the unwanted side effect. Moreover, they demonstrate a highly improved oral bioavailability as compared to their steroidal counterparts and are also open to various structural modifications. The propionanilide derivatives are the first developed non-steroidal antiandrogens and include drugs such as flutamide, hydroxyflutamide, nilutamide and bicalutamide. However, the clinical application of these non-steroidal ligands has been limited by its hepatotoxicity after long-term administration. The drawbacks of currently available drugs emphasize the need for the development of new candidates with high anti-prostate cancer activity and low adverse effects. Our interests on heterocyclic scaffolds helped us to unravel highly potent Quinoxaline and substituted pyrrole derivatives as a new class of anti-prostate cancer agents. Research pursuits also led us to identify spirooxindole derivatives and substituted triazole derivatives as potential anti-prostate cancer agents.

Topoisomerase and Tubulin-Targeting Anticancer Agents

DNA topoisomerases and tubulin are important targets in anticancer drug discovery. About 50% of antitumoral treatment regimens rely on the use of at least one drug that inhibits topoisomerases. Recent studies and marketed tubulin-targeting anticancer drugs are the obvious evidence for tubulin as valuable target. With the aim of discovery of new and potent topoisomerase or tubulin -targeting anticancer agents, our research involves the rational design of target-specific natural product-based/inspired heterocyclic compounds, target-oriented synthesis, and *in vitro* bio-evaluation studies. A novel strategy of switch in site of inhibition for structure based discovery of human topoisomerase II α catalytic inhibitors has been established.

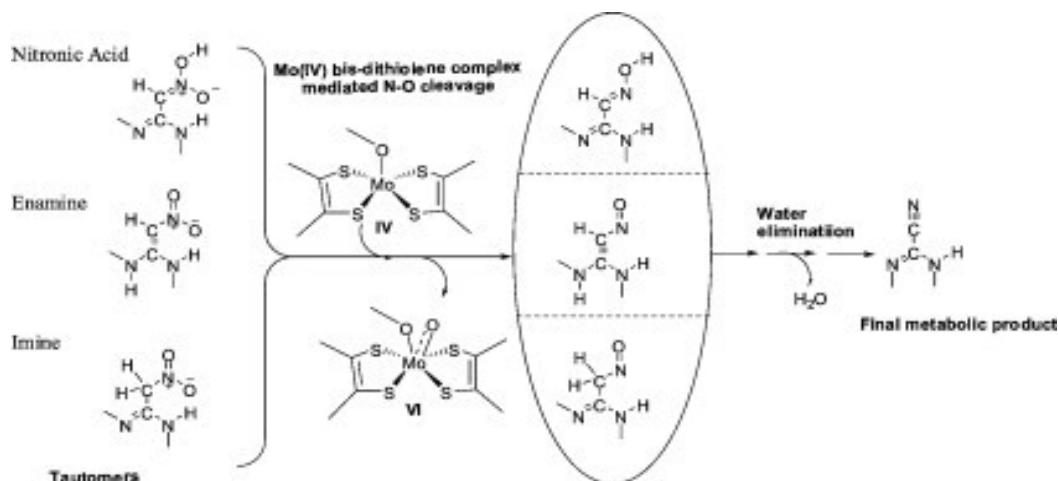
-oxide reductase enzyme.

In the targeted synthesis, diversity-feasible synthetic methodologies that favour the preparation of relevant diverse substituted/functionalized compounds required for lead identification and SAR studies are developed and adopted. Several of synthesized compounds have been found to be potent catalytic inhibitors of topoisomerase II and anticancer agents (*in vitro* cell line studies). They have showed higher topoisomerase II inhibitory and anticancer activities than a topoisomerase-targeting anticancer drug, etoposide and relatively lower cytotoxicities to normal cells. The studies on these compounds for further development are underway. In the antitubulin study, several compounds (other series) were found potent compared to standard antitubulin drug/clinical agent. Further detailed mode of action and SAR studies are going on.

Computational Chemistry

Molecular dynamics simulations were performed to evaluate the origin of the antimalarial effect of the lead compound P218. The simulations of the ligand in the cavities of wild-type, mutant *Plasmodium falciparum* Dihydrofolate Reductase (PfDHFR) and the human DHFR revealed the differences in the atomic-level interactions and also provided explanation for the specificity of this ligand toward PfDHFR. The binding free energy estimation using Molecular Mechanics Poisson-Boltzmann Surface Area method revealed that P218 has higher binding affinity (~ -30 to -35 kcal/mol) toward PfDHFR (both in wild-type and mutant forms) than human DHFR (~ -22 kcal/mol), corroborating the experimental observations. Intermolecular hydrogen bonding analysis of the trajectories showed that P218 formed two stable hydrogen bonds with human DHFR (Ile7 and Glu30), wild-type and double-mutant PfDHFR's (Asp54 and Arg122), while it formed three stable hydrogen bonds with quadruple-mutant PfDHFR (Asp54, Arg59, and Arg122). Additionally, P218 binding in PfDHFR is stabilized by hydrogen bonds with residues Ile14 and Ile164. It was found that mutant residues do not reduce the binding affinity of P218 to PfDHFR, in contrast, Cys59Arg mutation strongly favors inhibitor binding to quadruple-mutant PfDHFR. The atomistic-level details explored in this work will be highly useful for the design of non-resistant novel PfDHFR inhibitors as antimalarial agents.

Molecular docking studies helped in the identification of a Switch in Site of Inhibition of Human Topoisomerase II α Catalytic Inhibitors. This aspect was utilized to design structurally modified inhibitors, which bind at the marbarone binding site rather than the substrate binding site. Nitroethenediamine based drug molecules exist in three tautomeric forms: nitronic acid, enamine and imine. The lower bioavailability of this class of drug molecules may be attributed due to the N-oxide bond cleavage by the Mo(IV) bis-dithiolene catalytic center [Mo(OMe)(mdt)₂]- of N



The self-association behavior of a newly characterized β -strand-mimic, presented by an achiral nonproteinogenic model system Boc- γ -Abz-NHMe (1: Boc = tert-butyloxycarbonyl; γ -Abz = γ -aminobenzoic acid; NHMe = N-methylamide), have been investigated using ^1H NMR and FT-IR absorption spectroscopy, in combination with computational *ab initio* calculations. The concentration dependence of ^1H NMR chemical shifts of the amide-NHs in CDCl_3 exhibited noncooperative behavior of self-association, whereas the variable temperature ^1H NMR chemical shifts data of the amide-NHs, i.e. temperature-coefficient ($\Delta\delta/\Delta T$) values, could be accounted for by significant enhancement of self-association, i.e. aggregates higher than dimers. In the absence of N-H \cdots O intramolecular H-bond in 1, the intense FT-IR absorption bands in informative amide-A region, i.e., N-H stretches at ~ 3465 and 3438 cm^{-1} in chloroform solution, could be interpreted in terms of intermolecular H-bonding. The *ab initio* quantum mechanical calculations performed on two discrete isolated antiparallel H-bonded duplexes with a face-to-face and an edge-to-edge aromatic-aromatic interaction provided strong support for their relative importance to stabilize favorable dimeric structures. The thermodynamic parameters deduced from van't Hoff plots, constructed from variable temperature ^1H NMR data of the amide-NHs in CDCl_3 , also substantiated the effectiveness of aromatic-aromatic interactions for dimer formation and higher-order self-association. In view of the enormous structural importance of β -strand-like building blocks in peptide design, we highlight intrinsic self-associating potentials of the readily available γ -Abz moiety, besides the fact that such planar secondary structural mimics are presumed to offer greater prospective for constructing peptidomimetics and therapeutically relevant small molecules.

Donor-stabilized divalent N(I) systems have recently gained attention in the field of organic chemistry. Existence of low-valent nitrogen(I) species with moderate nucleophilicities in several pharmacophoric functionalities is prompting extensive exploration in this field. Quantum chemical analysis on the imidazole, oxazole, and thiazole derivatives of thiazole-2-amine indicated that these species preferably exist in the iminic state. Electronic structure analysis of these systems suggested the existence of hidden divalent N(I) character in a neutral state ($L \rightarrow N-R$) and the explicit divalent N(I) character ($L \rightarrow N \leftarrow L$)⁺ in the protonated state. The strength of $L \rightarrow N$ interaction in these systems was analyzed, and the variations in the nucleophilicity trend at the coordinating nitrogen center were rationalized by estimating the electronic (TEP (Tolman electronic parameter) and MESP minimum (V_{min})) as well as steric parameters (r -repulsiveness and ΔH elimination of CO group, in $L \rightarrow \text{Ni}(\text{CO})_3$) of the coordinating ligands L . The importance of energetically preferred ionic and tautomeric representations of thiazol-2-amine derivatives in iminic and aminic forms was also demonstrated by carrying out comparative docking analysis with the enzyme lymphocyte-specific kinase (Lck).

Green Chemistry: Sustainable Chemical Synthesis through Novel Concepts

Metal Cooperativity in Metal Nano-Clusters

The cooperative effect of Pd-Ni binary nano-clusters (prepared *in situ*), as new catalyst system, has been described during the Suzuki-Miyaura coupling of challenging sterically hindered *ortho*-heterocycle-tethered aryl bromides with aryl/heteroaryl/alkyl-boronic acids to generate the 2-(2-aryl/heteroaryl/alkyl-phenyl)benzoxazoles as new anti-inflammatory chemotypes with new leads. The inferior results obtained with the reported Pd/Ni salts/complexes or individual Pd/Ni nanoparticles revealed the superior catalytic performance of Pd-Ni nano-clusters via the cooperative effect of both the constituents.

Mechanochemical Methods for Organic Reactions

Complexity in the structures of biologically important carbohydrates and their derivatives makes their synthesis a challenging and difficult task that involves multi-step processes requiring selective functional group manipulations. Many of these reactions involve use of environmentally unfriendly solvents such as pyridine, dimethylformamide, etc. Hence solvent-free synthesis proves more environmentally benign and economically feasible and is extremely important in the context of the fact that waste minimization has become an essential part of the regulatory issues associated with chemical industry worldwide. In this context, ball milling, a mechanochemical technology scarcely used in synthetic organic chemistry, seemed particularly attractive. Under this scheme we explored the possibilities for the application of planetary ball milling technology to carbohydrate reactions with rewarding results. The work has therefore been continued.

PHARMACoinFORMATICS

Role of Active Efflux Transporter on Blood Brain Barrier Permeability

CNS acting drug molecules interact with BBB prior to their target site, so there is need to develop predictive models for BBB permeability which can be used in the initial phases of drug discovery process. Most of the drug molecules are transported to brain via passive diffusion which is explored extensively; on the other hand the role of active efflux transporters in BBB permeability is unclear. The aim here is to develop predictive models for BBB permeability that include active efflux transporter like BCRP and MRP-1. The *in silico* models have been developed to assess the role of efflux transporters on BBB permeation. Nine descriptors were selected, which also include BCRP and MRP-1 substrate probabilities for model development. Few molecules satisfy the criteria for passive diffusion but having low logBB value, these molecules were identified as MRP-1 substrates computationally. This study gives new mechanistic insight into correlation of low logBB values and efflux mechanism of MRP-1 in BBB. This model is integrated into a web server (using PHP, Java Script, Python language) and available at:

<http://www.databases.niper.ac.in:8080/jsmol/transb3pred/>

Pharmacoinformatics Approach to Identify Small Molecule Inhibitors for *Mtb*-ASADH

The ASADH enzyme plays a very important role in biosynthesis of essential amino acids and several important metabolites in microbes and some higher plants. The aspartate biosynthetic pathway is completely absent in mammals but absolutely essential for the survival of microbes, so this key enzyme of pathway can be targeted selectively in these microbes to exhibit anti-bacterial and

fungicidal effects. A combined structure and ligand based pharmacophore modeling, molecular docking and molecular dynamics approaches were used to identify potent inhibitors of *Mtb*-ASADH. The screened hits were subjected to ADMET filters, and subsequently to the molecular docking analysis. Best docked compounds carry the characteristics of highly electronegative functional groups (-COOH and -NO₂) on both sides and exhibited the H-bonding interactions with highly conserved residues Arg99, Arg249 and His256. For further validation of docking results, molecular dynamics simulation studies were carried out on compounds NSC51108 and ZINC04203124 and RC-563682. These compounds remain bound to the key active residues of *Mtb*-ASADH during the MD simulations. Identified ten molecules were selected for biological activity for *Mtb*-ASADH. Six molecules show significant (ranging 65 μ M -100 μ M) IC₅₀ values, remaining four molecules do not show significant inhibition up to 100 μ M inhibitor concentrations.

Proteochemometric Drug Interaction Profiling for Therapeutic Targets, Cytochromes P450 and Transporters

Drugs interact promiscuously with various biomolecules (proteins) like therapeutic targets, metabolizing enzymes and membrane transporters which determine its bioactivity. Proteochemometric (PCM) approach can use such large scale data to train a machine learning algorithm to predict unknown interactions. For development of PCM based drug target interaction models, 3D structure database was selected to study the effect of 2D and 3D descriptors on the model development and prediction. Co-crystallized structures retrieved from scPDB database were considered as interacting pairs where proteins are regarded as target and ligands as an interacting drug. Anticancer drugs from natural resources were retrieved from Therapeutic Target Database (TTD) database for predicting targets using developed models (SVM and Random Forest). These predictions were further validated by docking drug set into binding cavities of predicted targets using Autodock Vina. All model predictions and high throughput reverse docking were automated through python scripts. This methodology yielded novel therapeutic targets for existing drugs supporting their anticancer activity. Interestingly, some of the predictions are suggesting new therapeutic uses for drugs.

Metabolic Systems Biology Analysis of *Leishmania donovani* for Novel Target Identification and Drug Discovery

Reconstruction of genome-scale metabolic models and its simulation provides systems-level understanding of a microorganism's metabolism; necessary to find out essential enzymes. *Leishmania donovani* is a protozoan parasite

which causes lethal visceral leishmaniasis. The purpose of this work is to identify novel targets. Initial draft metabolic network for *L. donovani* BPK282A1 was constructed in automated manner using software tools. Extensive manual curation was performed using primary literature and databases to curate reactions, fill gaps and to rectify wrong GPR associations. Furthermore, network was iteratively evaluated in COBRA toolbox employing constraint-based flux-balance analysis. The built network accounts for 610 genes, 1143 reactions, 1135 metabolites and 8 sub-cellular localizations. The validated network will be further subjected to identify potential drug target by employing *in silico* gene deletions studies.

BiAnaCA (Biochemical assay Analyzer and Calculator)

We have developed a freely available standalone tool BiAnaCA which can perform the data handling, processing, calculation, visualization and data analysis for experimental bioassay results.

The various tools developed can be accessed at

<http://www.databases.niper.ac.in/>

Studies Carried out on InhA and its Inhibitors for *Mycobacterium tuberculosis*

Probing INH Resistance Mechanism using Comparative Molecular Dynamics Simulations for inhA Wild and Mutant Type

The increasing cases of INH resistance have aggravated to find the functional role of mutation on INH-inhA complex. To study the mutations, causing a different pattern of NADH interaction within the binding pocket, comparative molecular dynamics simulation has been done on wild (WT) and mutant (MT) type of inhA. This study strongly advocates the use of other inhibitors to make a new combination with isoniazid for treating the isoniazid-resistance TB and to fight against the current drug-resistance complications for TB treatment.

Comparative Physico-Chemical Properties Study of Anti-TB Drugs to Derive the Empirical Parameter for Permeability

In this study, the empirical parameters were derived by calculating the descriptors for first line anti-TB drugs and molecules in clinical trials to address their cell wall permeability property. These empirical parameters contained some important descriptors. Finally, these parameters are validated using 50 direct inhA inhibitors which have unsatisfactory permeability and molecules

meeting all the criteria concurrently are supposed to have adequate cell wall permeability.

Studies Carried out on Protein Kinase C β II – A Target for Diabetic Complications

Molecular Dynamics Approach to Probe PKC β II-ligand Interactions and Influence of Crystal Water Molecules on these Interactions

Present study probes the molecular interactions of PKC β II with its clinically important ligands. Computational methodologies, coupled with molecular mechanics-Poisson-Boltzmann surface area and generalized born surface area (MM-PB[GB]SA) were employed. The structural changes in the presence and absence of crystal water molecules in PKC β II ATP binding site residues, and its interaction with bound ligand, were identified. The findings of present work may integrate the new aspects in the drug design process of PKC β II inhibitors.

Scaffold Hopping for Identification of Novel PKC β II Inhibitors Based on Ligand and Structural Approaches, Virtual Screening and Molecular Dynamics Study

To develop selective inhibitors for protein Kinase C β II (PKC β II), robust 3D hypotheses were developed using both the crystal structure and available PKC β II ligands, and were validated by feature mapping and screening in-house database of reported PKC β II compounds. Ligand and receptor based pharmacophore model was used for the flexible search of ligands from chemical databases. After docking studies the new scaffold of its inhibitors with good estimated activities, favorable binding interactions, and high docking score were identified.

Studies Carried out on Protein Tyrosine Phosphatase 1B (PTP1B) and its Inhibitors for Type 2 Diabetes and Obesity

Structural and Energetic Mapping of Interactions at the Allosteric Site of PTP1B and TCPTP

In this study, three PTP1B and three TCPTP models generated for allosteric inhibitors were subjected to the MD studies to understand the mechanism, energetics and structural features associated with allosteric inhibition of PTP1B and TCPTP. This study presents the detailed analysis of individual residue energy contribution towards the binding of inhibitors and the interactions that provide potency and selectivity to the allosteric inhibitors.

Simultaneous Binding of Substrate and Allosteric Inhibitor in PTP1B

Allosteric-site ligand binding to a conformation of PTP1B results in a cascade of events that ultimately leads to the closure of WPD loop over the substrate. MD simulations were performed for the three complexes where peptide and allosteric inhibitors are bound at their respective sites. It was confirmed that allosteric inhibitor stabilizes the WPD-loop in the open state and forbid its closure over the substrate.

Other Projects

Computational Study on the Binding Interactions of Ketoamide Inhibitor Narlaprevir against HCV NS3 Protease and its Mutants (R155K, D168V, A156T and T54A)

Preclinical characterization of hepatitis C virus (HCV) protease NS3-4A inhibitor narlaprevir (SCH900518) revealed several mutants varying wide range of reduction in viral replication. In this study, the binding models of four different mutants were examined and analysed by using molecular dynamic simulations. Our results show residues, playing the most crucial role in the binding of narlaprevir with the wild-type and its mutants. In addition, per residue free energy decomposition suggests the important interactions for the selectivity.

In silico Identification of Targets for a Novel Scaffold, 2-Thiazolylimino-5-benzylidin-thiazolidin-4-one

Thiazolidinone derivatives have been found to exhibit a wide range of pharmacological activities. In our work, we identified seven putative targets for the scaffold using web servers such as DRAR CPI, PharmMapper and TarFisDock and databases such as BindingDB and ChEMBL. For uniform scoring, these targets were further validated by molecular docking wherein the binding site of ligands was set based on co-crystallized ligands. When compared to thiazole derivatives, benzothiazole compounds were showing proper alignment in the active site of most of the targets.

Rescuing and Repurposing of Drugs for Cancer

This project focusses on the collection of all the withdrawn drugs and failed molecules from the clinical trials and identifying possible cancer targets to identify method for rescuing or reusing drug or drug like molecules.

Tools developed by Pharmacoinformatics MS students

1. **DeProCa:** A tool to calculate Structural properties of Dendrimers.

2. **DruLiTo Plus:** DruLiTo Plus tools predict the absorption of the drug molecule based upon the Drug-likeness Rules plus metabolizing CYP isoform of a drug molecule/substrate, based on SVM models developed using CDK descriptors.
3. **EsPRO:** A Protein estimation tool, help in calculating the protein concentration of test samples using the information provided by the user.
4. **PharmDy Tool – 1.0:** An automated tool to convert absorbance values into different pharmacodynamics parameters and assist in choosing the best formulation.
5. **Q2 VALIDATOR_(1.0):** This is the tool for method validation like UV and HPLC.

NATURAL PRODUCTS

Evaluation of Anti-Obesity Potential of Natural Products

Total 52 extracts of 13 different plant materials of six plants were screened for anti-obesity potential using pancreatic lipase inhibition and anti-adipogenic *in vitro* assays. *Oroxylum indicum* was further processed for isolation and three compounds were isolated and screened for both activities.

Evaluation of Anti-inflammatory Potential of Natural Products and Synthetic Compounds

From the ethyl acetate extract of *Ailanthus excelsa* six compounds were isolated and characterization of three compounds was done. Lead compound “Cinnamoyl tyramine” and its 8 derivatives were synthesized and characterized. Further synthesis is under progress. Pinostrobin was isolated, characterized, formulation prepared and tested for *in vivo* studies have been performed.

Synthesis and Evaluation of Natural Product Scaffold for Anti HIV, Antileishmanial and Cytotoxic Potential in Human Cancer Cell Lines

Structural modifications of scaffolds such as β -carboline and isoquinoline were designed to synthesize and to generate structure-activity relationship for antileishmanial activity and cytotoxic potential against various human cancer cell lines. Scheme for synthesis of substituted β -carboline was optimized and various analogues were prepared. Compounds were tested for the antileishmanial and

cytotoxic potential. Synthesis of isoquinoline derivatives is under progress.

Identification of potential anti-HIV natural product analogs using molecular docking and medicinal chemistry approaches was carried out. Structural modifications of scaffold such as styryl quinoline were designed to synthesize and to generate structure-activity relationship for anti HIV activity. Based on the results, synthesis of various styryl quinoline derivatives is under progress.

Evaluation of Antiobesity Potential of Natural Products

Ethylacetate extract of *Ferula asafoetida*, *Murraya koenigii* and their combinations have been evaluated for their pancreatic lipase enzyme inhibition activity by *in vitro* and *in vivo* activity using Murine 3T3 L1 preadipocytes and High Fat Diet rat model, respectively.

64 extracts of 16 culinary and medicinal plant materials were screened for antiadipogenic activity against 3T3 L1 murine adipocytes. Lead molecules from *Murraya koenigii* and *Phyllanthus amarus* were isolated and tested for antiobesity activity using *in vitro* and *in vivo* testing models. Lead moieties like capsinoid and 6-gingerol and their derivatives of were synthesized and to be tested against antiobesity activity.

Synthesis and Biological Evaluation of 1,3,4-Oxadiazole Derivatives as Anti-inflammatory Agents

Total 30 derivatives of 1,3,4-oxadiazole have been synthesized and evaluated for *in vitro* COX inhibitory and *in vivo* anti-inflammatory activity. All the compounds displayed selective COX-2 inhibition. The compounds possessing methylsulfonyl group (**13 compounds**), displayed most potent and selective inhibition of COX-2. Among these compounds **5 compounds** emerged as most potent and selective COX-2 inhibitors with IC₅₀ values less than 1 µM (in the range of 0.4 to 0.8 µM). Eight compounds that displayed potent COX-2 inhibition (≥90% inhibition) were evaluated for anti-inflammatory potential in carrageenan-induced rat paw edema assay at 150 µmol/kg dose. Three oxadiazole derivatives showed significant reduction of rat paw edema (55-59% inhibition) in comparison to celecoxib (49% inhibition) at 5 h. Cell viability of potent compounds was evaluated against RAW 264.7 and J774 cells. None of the tested compounds exhibited cytotoxicity against these cells.

Synthesis of Chromeno-oxadiazoles and Substituted Triazoles as Potential Anti-TB Agents

A series of substituted 3-(5-phenyl-1,3,4-oxadiazole-2-yl)-2H-chromene-2-one was synthesized by accessing coumarin-3-carboxylic acid and reacting with various

substituted benzoic acid hydrazides. Total 7 compounds are synthesized in this series including 4 novel compounds with good yields.

A series of various substituted triazoles was synthesized by reacting 4-picolyl chloride hydrochloride with substituted phenylacetylenes by employing click chemistry approach. Total 8 novel compounds have been synthesized in this series with good yields. These compounds were submitted for *in vitro* anti-TB activity.

Development of Nanoparticle Formulation of 3-O-Acetyl-11-keto-β-Boswellic acid (AKBA) and 11-Keto-β-Boswellic acid (KBA)

AKBA and KBA were isolated in lab-scale from the oleo-gum resin of *Boswellia serrata* Roxb. AKBA- and KBA-loaded Poly(lactic-co-Glycolic Acid) (PLGA) nanoparticle formulations were prepared separately by emulsion-diffusion-evaporation method. The prepared nanoparticles of AKBA and KBA were characterized with respect to particle size, PDI, Zeta potential, Particle shape, surface morphology, physical state and entrapment efficiency. Further both nanoparticle formulations were evaluated for *in vivo* anti-inflammatory activity and pharmacokinetic study. *In vivo* anti-inflammatory activity of AKBA and AKBA-NPs revealed highest anti-inflammatory potential of AKBA-NPs in comparison to AKBA and ibuprofen, at a dose of 50 mg/kg. The observed significant anti-inflammatory activity of AKBA-NPs could be attributed to increased bioavailability of AKBA in nanoparticle formulation. In comparison to AKBA, the AKBA-NPs showed 5.7, 2.1, 9.1 and 1.8 fold increase in peak plasma concentration (C_{max}), plasma half life (t_{1/2}), total area under curve (AUC_{total}), and mean residence time (MRT), respectively.

Also in comparison to KBA, the KBA-NPs showed 4.4, 2.5, 7.1 and 1.9 times increase in peak plasma concentration (C_{max}), plasma half life (t_{1/2}), total area under curve (AUC_{total}), and mean residence time (MRT) were enhanced with, respectively, in KBA-NPs as compared to corresponding KBA.

The promising results of *in vivo* pharmacokinetic study and *in vivo* anti-inflammatory activity of AKBA-NPs and KBA-NPs suggested that a polymeric nanoparticle formulation is an effective alternative for enhancement of oral bioavailability of poorly absorbed, highly lipophilic molecules, AKBA and KBA.

Liposome formulation of puerarin, an anti-diabetic flavonoid glycoside was developed and characterized.

Phytosome formulation of agnuside, an anti-inflammatory iridoid glycoside was developed and characterized.

Isolation and Quantification

Phytochemical investigations were carried out on roots of *R. imbricata* for anticancer and antioxidant molecules. Nineteen compounds, including four new compounds were isolated from the ethyl acetate soluble fraction of methanol extract and were evaluated for anticancer and antioxidant activities.

The isolated compounds were quantified in the methanol extract by HPLC-UV method.

Phytochemical investigations on *Tephrosia purpurea* (whole plant) resulted in isolation of pongamol (350 mg) from the hexane extract.

Phytochemical investigation of methanolic extract of leaves of *Eucalyptus sieberi* resulted isolation of Eucalyptin (150 mg).

Pinocembrin was quantified in ten species of *Eucalyptus* (*E. sieberi*, *E. rossii*, *E. fastigata*, *E. macrorhyncha*, *E. fraxinoides*, *E. agglomerata*, *E. considiniana*, *E. pauciflora*, *E. dives* and *E. obliqua*) by qNMR and HPTLC.

Semisynthetic Compounds

Mangiferin (5.4 g) was isolated from methanol extract *Mangifera indica* leaves (5.0 kg) for the preparation of semisynthetic analogues and the evaluation of their antileishmanial activity.

Piplartine (3.0 g) was isolated from methanolic extract of stem of *Piper retrofractum* (2.5 kg) and four semisynthetic analogues of piplartine have been synthesized for their evaluation as antileishmanial agents.

Natural Product Analogues

A new methodology for the synthesis of polymeric phloroglucinols (symmetrical, unsymmetrical dimeric and trimeric) was developed and by exploiting this methodology thirty unsymmetrical dimers, ten trimeric and eleven coumarin linked phloroglucinols were synthesized. All the synthesized compounds were submitted for anti-HIV /antileishmanial activity. Several hydrazone derivatives of quinoline have been synthesized and characterized successfully.

PHARMACEUTICAL ANALYSIS

Identification of Recombinant Cytochrome 3A4 Amino Acid(s) Covalently Modified by HIV Protease Inhibitors and their Reactive Metabolite(s)

This study is targeted to fill the knowledge gaps with respect to CYP3A4-dependent metabolism of HIV-protease inhibitors and interaction of their reactive metabolites with the apoprotein part of CYP3A4, which is mostly expressed in the human liver, but is present and distributed all over the body. Accordingly, this enzyme is involved in metabolism of more than 50% of the clinically used therapeutic agents. It is also subjected to MBI by a number of drugs, which occurs by covalent interaction of the drug or its reactive metabolite with its apoprotein part, leading to irreversible enzyme inhibition. As HIV protease inhibitors also show MBI, which occur by covalent binding of reactive metabolite with the

protein, the adduct was anticipated to activate immune system resulting in idiosyncratic reaction or could directly result in toxicity. Thus the objective of the present study was to explore the covalent binding of reactive metabolite(s) of HIV protease inhibitors with CYP3A4 to explain their clinical toxicity, whether the same was mediated by the metabolism route.

Optimization of Protocol for Trypsin Digestion of Membrane Bound Protein

Membrane proteins play important role in cell signalling and transport across membrane. So it is very important to know exact amount of these proteins, so that personalized medicine system could be designed. Quantitation study of these proteins involves a step of trypsin digestion. This study has been designed to optimize protocol for digestion of membrane proteins, involving parameters like protein:trypsin ratio, digestion temperature, denaturing agent, surfactant usage, etc.

MS/MS Fragmentation Behaviour of Metabolite-Protein Adducts

Reactive metabolites are known to cause toxicity by binding covalently to the biomacromolecules like DNA, proteins, etc. Based on the hypothesis that metabolite-protein adducts have a different chemical environment and bond energies due to covalent modification, when compared to the native protein, our intention in this study is to highlight the differences in mass fragmentation patterns of the native protein and the protein adduct, i.e. difference in b and y ions formed and their relative intensities. For this approach we are generating reactive metabolites *in vitro* by facile chemical synthesis and incubating them with RLM (rat liver microsomes). Also, trypsin digested peptides are being used for studying the differences in MS/MS fragmentation behaviour.

QbD Approach to Study Factors Affecting the Stability of Peptides during Quantitation by LC-MS

Because of their high sensitivity and high accuracy, LC-MS techniques have replaced the earlier used immunological techniques for the quantitation of peptides and proteins. Though, LC-MS based quantitation of peptides has many advantages but still it faces some unexplained challenges such as peptidic stability. It is essential to evaluate the influence of all the factors, such as temperature, pH, etc., which could affect the stability of peptides. The study would help to identify amino acids that are more liable to degradation (also their degradation behaviour) and that are stable and can be used for quantitation.

Drug-drug and Drug-excipient Interaction Studies of Selected Anti-HIV Drugs

A single drug alone is generally not sufficient to control rapidly growing HIV virus, therefore, antiretroviral drugs

must be taken in combination to act effectively against HIV. Currently available antiretroviral FDCs have some stability and formulation related issues. To delineate these problems, this project was designed to study physical and chemical interactions among selected drugs and excipients used in anti-HIV formulations. The drugs were chosen among NRTIs and NNRTIs, as these are used as first-line regimen and majority of FDC formulations in the market are from these therapeutic categories.

Study of Physical and Chemical Interactions of Selected Fixed-Dose Combinations

Most drugs are given in fixed-dose combinations due to their higher efficacy, low dose, reduced resistance and cost-effectiveness, etc., but these combinations show physical and chemical incompatibilities showing stability related problems. Compatibility studies are being carried out on FDCs containing aliskiren. Enough indications have been found of physical interaction of aliskiren with amlodipine and hydrochlorothiazide.

Development of Stability-Indicating Method(s) for Various Formulations of Tacrolimus

Different formulations of a drug can have different stability behaviour, considering the presence of different excipients and their chemical compatibility with the drug substance. It was decided to develop stability-indicating method(s) for solid, semi-solid and parenteral formulations of tacrolimus and improve knowledge space about formulation development studies of tacrolimus. As tacrolimus is poorly UV active, detection using charged aerosol detector (CAD) is being tried, along with UV detection at 210 nm.

Stress Testing on Selected Drug(s) and Development of Stability-indicating Method (SIM) using Quality by Design (QbD) Approach

In analytical field, the principles of QbD can be used during method development to ensure that an appropriate analytical method is selected. Stability-indicating methods for aprepitant and metolazone are under development by employing the QbD approach. The study is being conducted in multiple steps involving: a) establishment of analytical target profile, b) identification of critical quality attributes, c) risk assessment to prioritize experiments, d) application of design of experiment to help in method optimization, and e) method validation. Stress studies are also in progress for aprepitant and metolazone by using DoE approach.

Stress Testing on Selected Drugs and Characterization of their Degradation Products by using Hyphenated Techniques

Two drugs, viz. rufinamide and ranolazine had been selected for stress testing because reports on their degradation behaviour are not available in the literature. For

this, degradation studies under different stress conditions like hydrolytic, photo, oxidative and thermal are under progress. Further investigation involves separation of formed degradation products by HPLC method and transfer of the same to LC-MSⁿ, LC-MS/TOF and LC-NMR for characterization of their degradation products.

The department provides analytical services to academic institutes, private drug testing laboratories and industry. An earning of Rs. ~19.00 lacs was made through external testing till November 2014.

PHARMACOLOGY & TOXICOLOGY

Epigenomics in Diabetes and its Complications

Diabetes is associated with high risk of cardiovascular complications, which in turn increases the susceptibility to various disorders like hypertension, atherosclerosis and aneurysms. Hyperglycaemia induces inflammation, hypertrophy and premature endothelial senescence, which are the main culprits for the emergence of diabetic cardiovascular complications. Diabetic nephropathy is becoming the world leading cause of chronic and end-stage renal disease. Hyperglycaemia/hyperinsulinemia is the leading cause for the induction type 2 diabetes and the role of post-translational histone modifications in deregulating the expression of genes has emerged as potential important contributor in the progression of disease. We investigated the role of mTORc1 and PP2A in palmitate induced podocyte death. Our data show that palmitate treatment induces IR, in human urine derived podocyte-like epithelial cells (HUPECs), as evident by decrease in insulin-induced p-AKT, p-GSK3 β and p-ERK1/2. This impairment in insulin signalling prevents insulin induced SIRT 1 expression and deacetylation of p53. Pharmacological interventions using rapamycin and okadaic acid have also been carried out to study the mechanism behind palmitate induced podocyte death. We also investigated the role of metabolic memory in long standing partnership between insulin resistance and endothelial dysfunction. Our data show that diet reversal (HFD to NPD) improves insulin sensitivity and endothelial function slightly. Moreover, biochemical parameters responsible for insulin resistance and endothelial dysfunction got normalized with diet reversal, but alteration at the molecular level (eNOS) still persisted thus highlighting the role of metabolic memory. In addition we have also investigated the effect of ACE2 activator (DIZE) on the progression of STZ induced type 1 diabetic nephropathy. Currently, we are investigating the effect of estrogen on DNA methylation in type 2 Diabetes. We are also elucidating the molecular mechanism behind insulin induced hypoglycaemia associated cardiovascular complications in type 1 diabetes.

Cancer

We are mainly focused on breast and lung cancer research. We are actively involved in exploring various combination therapies which can potentiate the anticancer activity of chemotherapeutic agents and minimize their toxicity. We

investigated the effect of 5-Azacytidine in breast cancer cells (MCF-7: non-invasive, hormone dependent, and MDA-MB-231: invasive, hormone independent) and provided the first evidence that expression of PTPN12 is epigenetically regulated. 5-Azacytidine (5-Azac), a DNA hypomethylating agent, significantly increased the expression of PTPN12 at low concentrations (1 μ M and 2.5 μ M) and decreased the expression of PTPN12 at 5 μ M in the MDA-MB-231 and BT-549 triple-negative breast cancer cell lines. Gefitinib is an Epidermal Growth Factor Receptor (EGFR) tyrosine kinase inhibitor, approved for patients with non-small cell lung cancer (NSCLC) but the major drawback of this drug is drug resistance. In order to overcome this problem, we have synthesised an aptamer and conjugated with GNPs and further observed high anticancer activity in H1975 cells both qualitatively as well as quantitatively. Apt was selected through Cell-SELEX (systemic evolution of ligands by exponential enrichment) process against gefitinib-resistant H1975 lung cancer cells. Software analysis using the MATCH tool predicted Ets1, a proto-oncoprotein, to be the target of the selected aptamer. Interestingly, the localization of identified aptamer varied in descending order of Ets1 expression, wherein maximum localization was observed in H1975 cells than in MDA-MB231, DU-145, H23, H460, A431, A549 and MCF-7 cells, and minimum in L132 cells. We also observed that, a single intratumoral injection of the Apt-GNP bio-conjugate abrogated the growth of tumor in H1975 xenograft nude mice. We have not only investigated the effect of AKT inhibitor in A549 and MCF-7 cell lines but also the miRNA regulating the expression of AKT and various proteins in both of these cell lines.

Nanotoxicology

We assessed the toxicological effects of two types of in-house synthesized vanadium oxide NPs in Wistar rats exposed to NPs through inhalation route. Our data show that, VO₂ NP-exposed animals had higher levels of lactate dehydrogenase, gamma-glutamyl transpeptidase and alkaline phosphatase as compared to V₂O₅ NP-exposed animals in Bronchoalveolar lavage (BAL) fluid. Surprisingly, we also observed the carcinogenic potential of vanadium oxide NPs by terminal deoxynucleotidyl transferase dUTP nick-end labeling assay as well as the decreased levels of p53 and Bax, in lung tissue of NP-exposed animals. We also checked the protective effect of selenium nanoparticles (SeNPs) in the progression of diabetic nephropathy (DN). Our data show that SeNPs elevated the levels of heat shock protein (HSP-70), longevity protein SIRT 1 and also modulated apoptotic proteins Bax and Bcl-2 in diabetic kidney. Moreover SeNPs also attenuated the levels of BUN, creatinine, fibronectin and collagen and increased the levels of albumin in diabetic rats. We also checked the co-treatment effect of gold nanoparticles and metformin in A549 AND MCF-7 cell lines. Moreover ZnO nanoparticles are found to be showing better effects in PC-3 and HeLa cell lines compared to free drug. Currently, we are also investigating the effect of Disulfiram nanoparticles in PLC/PRF/5, A549 and A431 cell lines. In addition we are also exploring the additive/synergistic effects of gold nanoparticles conjugated with 5-Azacytidine in MDA-MB231 and MCF-7 cell lines.

Atherosclerosis

Atherosclerosis refers to the buildup of fats, cholesterol and other substances in and on your artery walls (plaques), which can restrict blood flow. These plaques can burst, triggering a blood clot. Although atherosclerosis is often considered a heart problem, it can affect arteries anywhere in our body. Atherosclerosis can lead to serious problems, including heart attack, stroke, or even death. We investigated the effect of Atorvastatin in rabbit model of atherosclerosis (High cholesterol diet induced atherosclerosis). Our data shows that atorvastatin increase the ACE2 protein expression in the heart and kidney of HCD rabbits and ACE2 mRNA levels in the heart but not in kidney of HCD rabbits. Moreover, atorvastatin also induced epigenetic alterations such as increased histone H3 acetylation marks in the promoter region of ACE2 in the heart of HCD rabbits. Our data suggest a novel way of replenishing ACE2 expression for preventing not only atherosclerosis but also other cardiovascular disorders.

Acute pancreatitis

Acute pancreatitis is a sudden inflammation of the pancreas that lasts for a short time. In severe cases, acute pancreatitis can result in bleeding into the gland, serious tissue damage, infection, and cyst formation. Severe pancreatitis can also harm other vital organs such as the heart, lungs and kidneys. Recognizing patients with severe acute pancreatitis as soon as possible is critical for achieving optimal outcomes. We have developed and validated the caerulein induced model for acute pancreatitis in mice. Earlier, we studied the dose-dependent effect of casein kinase 2 inhibitor (TBBt) in caerulein induced acute pancreatitis in mice. We observed that low dose of TBBt prevents the progression of acute pancreatitis. Whereas, high dose of TBBt further enhanced the oxidative stress and inflammation in acute pancreatitis. Currently, we are investigating the effect of melatonin-selenium nanoparticles (Me-SeNPs) in caerulein induced acute pancreatitis in swiss albino mice.

CNS Research

Stroke Research

Stroke (cerebral ischaemia) is the acute neurological injury occurring as a result of loss of blood supply or inadequate blood flow to brain. Stroke is known to be a major cause of morbidity and mortality and is, perhaps, the leading cause of chronic disability. Stroke has two major potential therapies; dissolving the intravascular thrombus by thrombolytic therapy and protecting the brain from the cellular and metabolic consequences of ischaemic injury by neuroprotective therapy. Though thrombolytic therapy is in use, it has only a limited utility in the patients in which it is given within 3 hours of onset of stroke. Thrombolytic therapy can cause serious complication such as cerebral haemorrhage. Cognitive deficits following stroke are common in stroke patients and always interfere with recovery. Therefore we planned to assess memory and cognition in stroke model. We observed significant

impairment in memory in middle cerebral artery occlusion model of stroke, which was evident from passive avoidance and morris water maze test. The effect of endoplasmic reticulum stress inhibitor on stroke induced cognitive impairment is under investigation.

Parkinson's disease-induced Cognitive Impairment

Effect of alpha lipoic acid (ALA), a PGC 1 alpha activator was evaluated in cognitive impairment model of Parkinson's Disease (PD). PD was induced by intranigral administration of MPTP hydrochloride (100 µg/µl/side) using stereotaxic apparatus into following coordinates of the brain: (AP), -5.0mm from the bregma; mediolateral (ML), ± 2.1mm from the midline; dorsoventral (DV), -7.7mm from the skull. ALA was administered from day 21 to day of completion of behavioral studies (i.e. day +29; day of sacrifice). In behavioral tests like Morris water maze, passive avoidance significant cognitive impairment was observed in MPTP and vehicle treated groups which was ameliorated by ALA treatment. Treatment of ALA at a dose of 30 or 100 mg/kg significantly reduced MDA levels in the brain and restored the reduced glutathione level. Further evaluation is underway for the effects of ALA on mitochondrial genes and mitochondrial biogenesis and apoptosis.

Diabetic Complications

Diabetic Neuropathic Pain and Electrophysiology

Diabetic neuropathy is one of the major chronic complications usually developed in more than 50% of the diabetic patients. We investigated the effects of rufinamide on tetrodotoxin-resistant sodium current (TTX-R I_{Na}) in acutely dissociated rat dorsal root ganglion (DRG) neurons isolated from streptozotocin-induced diabetic rats by using whole-cell voltage-clamp configuration. In addition, the functional and behavioural nociceptive parameters were evaluated to assess its potential in diabetic neuropathy. Diabetic rats demonstrated the mechanical allodynia and thermal hyperalgesia with reduced nerve perfusion and conduction velocity as compared to control. Rufinamide treatments (3 and 10 mg/kg) significantly improved these functional and nociceptive deficits in diabetic rats. TTX-R I_{Na} density was significantly increased in DRG neurons isolated from diabetic rats as compared to control. Rufinamide treatments significantly blocked the TTX-R Na^+ channel activity as evident from significant reduction in I_{Na} density and hyperpolarizing shift in activation and inactivation curves as compared to diabetic control. This suggests that rufinamide acts on TTX-R Na^+ channels, reduces channel activity and attenuates mechanical allodynia and thermal hyperalgesia in diabetic rats.

Diabetic Encephalopathy

Diabetes is associated with deficits in memory and cognitive functions and sustained inflammation. Recently, involvement of NF-κB has been postulated in many cognitive functions and have well-characterized role in the immune system and inflammation. Despite of role of NF-κB in inflammation, there is a large gap remains in understanding of the

mechanisms and consequences of NF-κB activation in memory and cognition. In this study, we have evaluated the effects of NF-κB (nuclear factor κB) inhibition on memory functions, neurotransmitter levels changes and brain inflammatory cytokines in type-2 diabetic rats. BAY 11-7082 (BAY) was used as a pharmacological inhibitor of NF-κB to block NF-κB activation. HFD-STZ type-2 diabetic rats showed significant memory impairment at 15th week. Three weeks BAY treatment produced significant increase in Morris water maze test learning and memory performance. Diabetic animals also showed improved performance in passive avoidance and Y maze test paradigm following treatment with NF-κB inhibitor BAY. BAY treatment did not show any significant effect on blood glucose and insulin levels. NF-κB inhibition significantly reduced neuroinflammation as evidenced by decrease in IL-6 and TNF-α levels. BAY treatment in diabetic rats also increased the phosphorylation of CREB which indicates that the NF-κB activation inhibitor engage a CREB regulated mechanism in-vivo. Moreover, BAY also reversed the alterations in brain glutamate and GABA levels in diabetic rats. These findings corroborate that targeting NF-κB may be effective in the treatment of diabetes associated cognitive deficits.

Diabetic Cardiomyopathy

Diabetic patients are more prone towards heart failure than non-diabetics. Diabetic cardiomyopathy is the unique type of condition in diabetic patients, characterized by presence of ventricular dysfunction in the absence of hypertension and coronary artery diseases. Several mechanisms have been postulated for diabetes induced cardiac dysfunctions but still management of diabetic cardiomyopathy remains obscure. We are elucidating the pathophysiology of diabetic cardiomyopathy using pharmacological approaches.

Cardiovascular Research

Myocardial Infarction

We have established isoproterenol-induced myocardial infarction (MI) model in rats for investigating the effect of antioxidants in MI. We assessed the structural alterations (gross morphological observations- heart size, heart size to body weight ratio and histology of heart), functional changes (heart rate, blood pressure and left ventricular functions) and biochemical abnormalities (enzymatic biomarkers of myocardial injury) after isoproterenol administration. Isoproterenol increases the production of reactive oxygen species which leads to severe oxidative stress and structural injury in the myocardial tissue. We investigated effect of naringenin at different doses in isoproterenol-induced MI. Naringenin pre-treatment showed improvement in structural, functional and biochemical parameters.

Diabetes

Presently, we are exploring the involvement of the HDACs in the pathogenesis of diabetes such as beta cell destruction,

insulin resistance as well as diabetes associated end organ complication. In addition to this, we are using inhibitors of HDAC to explore the possible protective role in experimental diabetes and associated complication. Moreover, we have extended the role of HDAC inhibitors in diabetes as well as chemical induced fibrosis model to establish the anti-fibrotic effect of HDAC inhibitors. Our results provide several new insights on the possible mechanisms and effects of HDAC inhibitors in both type-1 and type-2 diabetes. HDAC inhibitors can exert several pharmacological effects through its chromatin-dependent and independent complex molecular signaling. Thus, our laboratory results highlighted the new therapeutically relevant effects of HDAC inhibitors for the prevention and treatment of both type-1 and type-2 diabetes by chromatin-dependent and independent mechanisms.

Zinc deficiency and male reproductive health

Zinc (Zn), one of the most important trace elements in the body is ubiquitously present throughout the body and is second only next to iron in its occurrence. Zinc is required for the vital activity of more than three hundred enzymes; even mild zinc deficiency presents several immunological problems. Zn has a very prominent role in the reproductive development, both in males and females. Our goal is to focus on the compounding causes of male infertility, especially those who are under chemotherapy and diabetes. Our understanding and experimentations in this diverse field led to the conclusion that chemotherapy with agents like cyclophosphamide caused decrease in the zinc levels both in the serum and testes of the treated rat. Zinc supplementation has proved beneficial to those rats under chemotherapeutic agents; it has improved several of the reproductive damages caused by the anticancer agent. Further we have deciphered the role of zinc dependent proteins in these improvements. We are also investigating in the area of diabetes, which was already proved to be a hypozincemia condition. Thus we are exploring the novel pathways and mechanisms that guide the proper sperm development and dictate the male reproductive health under various diversified conditions, unified with the role of zinc.

Centre for Infectious Diseases

Malaria

Development of a New Murine Cerebral Malaria Model

Plasmodium yoelii nigeriensis infection in Swiss mice has been found to be a suitable experimental cerebral malaria (CM) model to mimic the human CM. We initiated infection of malaria in Swiss mice by injecting *P. yoelii nigeriensis*-infected erythrocytes (IEs), in to ten female and ten male mice. These animals were closely monitored every day till their death for the changes such as body temperature reduction, parasitemia progression and neurological symptoms such as ataxia, paralysis, convulsions and coma etc. Between Day + 5 and Day + 6, nearly 50-60% of male mice and about 20-30% female mice showed neurological symptoms such as ataxia, paralysis, coma and ultimately

died. These mice showed hypothermia (rectal temperature < 32°C); their normal body temperature normal range being 37-38°C. Crushed brain smears prepared from the brain tissues of the dead male and female mice which showed neurological symptoms were stained with Wright's stain. Microscopic examination prominently showed the sequestration of IEs in the brain microvessels and clogging of the capillaries of the brain with IEs, as is found in the postmortem examination of the brains of the human CM patients. Some free parasites were also found in the brain parenchyma apart from the microvessels, which may be due to the blood-brain-barrier breakdown as in case of pediatric human CM. From the above observations we can conclude that this host-parasite combination may serve as a suitable murine CM model to understand immunopathophysiology of the human CM, and to develop the new therapeutic approaches to reduce and prevent the CM related human morbidity and mortality.

Determination of the effect of vitamins on the course of *Plasmodium berghei* infection in Swiss mice

Oxidative stress may be considered as a promising rational for antimalarial chemotherapy. In recent studies it has been shown that micronutrients (Vitamins and minerals) have anti-oxidative effect(s), and can be used as chemotherapeutic and adjuvant in treating malaria infections. We studied the effect of vitamin A (60 mg/kg) and Vitamin E (100 mg/kg) either alone or in combination in *Plasmodium berghei*-infected Swiss mice. All animals were divided into four groups, viz. (A) Negative control (Olive oil), (B) Vitamin A (60 mg/kg), (C) Vitamin E (100 mg/kg) and Vitamin A and E and infected with 1×10^7 *P. berghei* infected erythrocytes (IEs). All vitamin treatments were given *per oral* route. Vitamin A decreased the blood parasitaemia level as compared with the negative control and suppressed the blood parasitaemia by nearly 50%. Vitamin E had no effect on the progression of parasitaemia. Combination of vitamin A and Vitamin E showed almost the same results as Vitamin A alone. From the above results it is concluded that vitamin A has some antimalarial activity and it can be used as an adjuvant or potential partner of currently used antimalarial drugs.

Plasmodium berghei Infection in Mice: Determination of Dapsone Dose-reduction Potential of Probenecid

Combinations of dapsone-proguanil (DS1+PG10, DS2+PG10, DS8+PG10 and DS10+PG10) showed suppressive antimalarial activity, whwewas a combination DS4+PG10 mg/kg/day \times 4 was curative against *P. berghei* infection. Probenecid showed a maximum of 4-fold dapsone dose-reduction potential in the best combination of DS-PG without compromising its antimalarial suppressive potential. Addition of PB may improve the suppressive efficacy of DS-

PG combination. From these data it is apparent that probenecid has the potential to be developed as an adjunct for the treatment of malaria along with various other known antimalarial drug. Detailed studies are warranted along these lines.

To Determine the Effect of Curcumin on the *Plasmodium berghei* Antigens Induced-Elaboration of Colony-Stimulating Factors by Macrophages, *in Vitro*

These studies are directed towards developing new biotherapeutic agents for the treatment of malaria. Curcumin (5-20 μ M) in a concentration dependent manner enhanced the *P.berghei* total parasite soluble antigens (0.1 mg/ml)-induced production of CSFs by macrophages. Because CSFs are important immunoregulatory and immunotherapeutic molecules, curcumin as an adjunct or stand-alone, may effective for the treatment of malaria.

To Determine the Effect of Chloroquine on *P. berghei* Antigen-induced Elaboration of Colony-stimulating Factors by Macrophages, *in vitro*

This study demonstrated that chloroquine caused statistically significant reduction in the production of *P. berghei* total parasite soluble antigens-induced elaboration the CSFs by macrophages. These data demonstrate that chloroquine has an immunosuppressive effect during malaria infection.

Determination of the Role of IL-18 in the Pathogenesis of Rodent Malaria

This NOVEL study has provided evidence on the crucial role and involvement of IL-18 in mediating the severity of malaria. Targeting IL-18 in malaria therapy may thus prove to be beneficial to the host, because the outcome from this study has demonstrated that neutralising IL-18 using anti mice IL-18 antibody has decreased the development of parasitaemia and increase the survival time. The treatment with pentoxifylline which inhibits IL-18 synthesis has shown similar results. The release of IL-18 during malaria infection was, therefore, proven to be detrimental to the host and immunopharmacological therapy aiming at suppressing IL-18 may prove beneficial for the treatment of malaria.

To Determine the Blood-Schizontocidal Activity of a Combination of Linolenic Acid and Linoleic Acid in *Plasmodium Berghei*-Infected Swiss Mice

Linolenic acid and linoleic acid have anti-malarial activity (suppressive) against *P.berghei* infection in Swiss mice with minimum effective dose of 600 mg/kg and 400 mg/kg, respectively. Potentiation of antimalarial effect was observed with the combination of linolenic acid and linoleic acid when compared to individual drug treatments with similar dose.

To Determine the Blood-Schizontocidal Activity of a Combination of 5-Fluoroorotate and Pyrimethamine against *Plasmodium yoelii*nigeriensis-Infection in Mice

Pyrimethamine showed dose-dependent mean % parasitaemia reduction at these doses. 5-fluoroorotate compound had shown significant antimalarial activity (suppressive) as compare to negative control. The combination pyrimethamine and 5-fluoroorotate at doses (FOA9+PYR5) mg/kg \times 4 on day +4 and day +7 post-infection achieved 99.49% and 95.60 % parasitaemia reduction, respectively.

To Determine the Effect of Artesunate on the Phagocytosis of *Plasmodium berghei*-Infected Erythrocytes by Macrophage, *in vitro*

Artesunate at various concentrations 2 μ M, 3.5 μ M and 5 μ M caused significant decrease in the phagocytic activity of *Plasmodium berghei*-infected erythrocytes by mice peritoneal macrophages, *in vitro*. From these data it is apparent that artemisinin class of compounds, besides their direct anti-malarial activity also play a role in the clearance of malaria parasites though phagocytic mechanisms.

Two artemisinin derivatives synthesized at NIPER, NP-1136 and NP-1138, which have already been tested and found to be curative at 10 mg/kg/d \times 7 dose each against *P.berghei* infection in mice were evaluated for their additive or synergistic effect with curcumin. The combinations tried were 7.5 mg of both the compounds with 2.5 mg curcumin and 5 mg of both the compounds with 5 mg curcumin. Five mg NP-1136 in combination with 5 mg curcumin, and 7.5 mg NP-1138 in combination with 2.5 mg curcumin were found curative, whereas 7.5 mg NP-1136 and 2.5 mg curcumin and 5 mg NP-1138 and 5 mg curcumin combined together exerted only suppressive activity against *P.berghei* infection in mice.

NIPER Compounds NP-2119, NP-2120, NP-2121, NP-2122 and NP-2123: Blood-Schizontocidal Activity Studies against *Plasmodium yoelii*nigeriensis Infection in Mice

NIPER compound NP-2119 has been shown to have curative effect against *P.yoelii*nigeriensis at the dose of 100 mg/kg \times 4 day. But NP-2119 at the dose of 50 mg/kg \times 4 day was found to be only active. The compounds NP-2120 and NP-2121 at the dose of 50 mg/kg \times 4 day and 25 mg/kg \times 4 day have shown only the suppressive effect. The compounds NP-2122 and NP-2123 were also studied against *P. yoelii*nigeriensis at doses of 100 mg/kg \times 4 day and 50 mg/kg \times 4 day. Compound NP-2122 at both the doses has shown significant suppressive ($P < 0.001$) effect on the day +4, +7, +10 and +14 as compared to negative control. Whereas, compound NP-2123 has shown curative

effect at the dose 50 mg/kg x 4 day while it was found to be toxic at the dose of 100 mg/kg x 4 day.

NIPER Compounds NP-2705, NP-2709 and NP-2713: Blood-Schizonticidal Activity Studies in *Plasmodium berghei*-Infected Mice

NIPER compound NP-2705 at the dose of 50 mg/kg x 4 day is the minimum effective dose against *Plasmodium berghei* infection in swiss mice. Compound NP-2713 showed the minimum effective dose against *Plasmodium berghei* infection in Swiss mice at a dose of 40 mg/kg x 4 day.

Effect of Lithium Chloride on *P. berghei* Infection in Mice

The treatment was started after 2 hours of initiation of infection on Day 0 and treatment was continued till 4 days (day 0, day +1, day +2 and day +3). The parasitemia was determined for day+4, day +7, day +10, day +14, day +17, day +21 and day +28. LiCl 300mg/kg decreased the parasitaemia level by 65% as compared to controls. LiCl 100, 30 and 10mg/kg suppressed the parasitaemia by 37% and suppression was observed till day +10, then after it slowly increased. Apparently, LiCl has suppressive effect on the course of malaria infection in mice.

PHARMACEUTICAL TECHNOLOGY (BIOTECHNOLOGY)

Bioprocess Technology

Shikimic acid, the sole chemical building block for the antiviral drug oseltamivir (Tamiflu®) is one of the potent pharmaceutical intermediates with three chiral centers. Microbial transformation of quinic acid to shikimic acid by the whole cells of *Bacillus megaterium* with good yield has been accomplished. Metabolically engineered recombinant *Bacillus megaterium* strain with *aroE* (shikimate dehydrogenase) overexpressed, for the production of shikimic acid has been generated. In a 7 L bioreactor, shikimic acid yield of 12.4 g/L was obtained using the recombinant strain over 0.53 g/L of wild type. The enhancement of total shikimate dehydrogenase activity was 2.13-fold than the wild type. Fructose, as carbon source showed the highest yield of shikimic acid. Downstream processing of shikimic was optimized from the fermentation broth using amberlite IRA-400 resin and 89% pure shikimic acid was achieved. **Arginine** is involved in numerous metabolic pathways of immense importance in human body and plays important role in maintaining normal cellular functioning. Alterations in arginine availability can modulate metabolic and signalling pathways of normal and tumor cells. Arginine deiminase (ADI) degrades arginine to citrulline and ammonia and also, compared to arginase, ADI has higher affinity for arginine. *Pseudomonas putida* KT2440 was selected as a potential producer of ADI. Effect of various physio-chemical parameters such as cultivation

temperature, initial pH of the medium, inoculum volume, carbon sources, nitrogen sources, inducer and their concentration was evaluated in shake flask using statistical methods. Plackett-Burman design was used to screen the various variables significantly affecting ADI production. The production of ADI was improved up-to 4.37 U/ml compared to 0.87 U/ml in un-optimized medium. **Probiotics** can prove themselves as rich repository of bioactive metabolites that can be mined for therapeutic benefits like production of different peptides having antidiabetic, antimicrobial and anticancer activities. Probiotic co-culture system was developed for co-cultivation of Lactobacilli and yeast. Interaction of probiotic strain with gut is generally influenced by composition of fermentation medium and growth conditions and the relation between fermentation condition and bacterial surface properties and adhesion behaviour was studied. Isolation and purification methodology for DPP IV inhibitory and antimicrobial peptides were developed. These bioactive peptides were isolated by anion exchange and size exclusion chromatography and further purified by high performance liquid chromatography. Survival through GI tract is an essential criterion for probiotic formulations and we have performed the effect of co-cultivation on viability of individual cultures in simulated gastric condition. Effect of physiochemical parameters like pH, aeration, agitation and substrate feeding for the growth and production of bioactive metabolites are being studied at laboratory scale bioreactor. **Mycophenolic acid (MPA)** is a secondary metabolite which is produced by various strains of fungi such as *Penicillium brevicompactum*, *P. stoloniferum*, *P. roqueforti*, *Byssoschlamys nivea*, etc. It has diverse biological properties and extensively studied for their antineoplastic, immunosuppressive, antiviral, antipsoriasis and antifungal activities. The effect of different process parameters on the production of MPA by *Penicillium brevicompactum* was investigated in shake flask. The maximum production (1.4 g/L) was obtained in a medium having 60 g/L glucose as carbon source, 20 g/L peptone as a nitrogen source and 6 g/L KH₂PO₄ as a phosphate source with glycine and methionine as precursors. A strategy of "choice-based change" in catalytic mode of inhibition of **hTopoII α** has been established by working towards the target based drug discovery and applying rational structural modulation and synthesis with various in vitro assays.

Nanobiocatalysis

The biocatalytic approaches for the synthesis of different drugs (Acebutolol, Atenolol, Esmolol, Bunitrolol) and drug intermediates have been explored. To accomplish this, numerous microorganisms were screened for the presence of oxidoreductases and lipases. Different strains of *Candida parapsilosis* were found to possess the requisite oxidoreductases for the desired biocatalytic reactions. In parallel, various metal nanoparticles (mainly gold and silver)

were synthesized using biological as well as chemical sources. These nanomaterials were then conjugated to therapeutic (drugs) and diagnostic (imaging) agents to form 'theranostic nanoagents' for possible biomedical applications. Nanobiocatalytic probes are further developed by conjugating various biocatalysts (e.g. lipase) on the surface of nanomaterials for biocatalytic applications.

PHARMACEUTICAL TECHNOLOGY (PROCESS CHEMISTRY)

- A new tactic for the installation of sulfonamide pharmacophores on heterobiaryls has been developed by palladium-catalyzed intramolecular oxidative coupling in N-arylsulfonylheterocycles followed by ring opening of heterobiarylsultam with amine nucleophiles.
- A direct access to biarylsultams with a free NH-group required for late stage diversification in drug discovery has been made available. The developed protocol is quite resourceful warranting broad applications to the synthesis of annulated biarylsultams embedded into a seven member ring, analogous biarylsultones and phenanthridinones.
- Clozapine and Olanzapine have been approved by US-FDA for Bipolar disorders. The drugs went on generic in 2007 and 2011, respectively. The JKL group at NIPER has developed a one-step synthesis of the drug skeleton from suitably modified substrates. Using the protocol developed in the laboratory, the drugs will be synthesized.

PHARMACEUTICS

Compaction Physics of Pharmaceutical Powders

Compaction physics of pharmaceutical powders

Compaction behavior of pharmaceuticals has attracted increasing attention due to its importance in compacted dosage forms. Understanding structure property relationship (SPR) enables prediction of mechanical properties of different solid forms based on their crystal structures. This helps in the selection of the appropriate solid form and excipients for formulation development.

Amorphous drug delivery systems

Our laboratory is working on understanding the thermodynamic and kinetic properties, molecular interactions involved in the amorphous systems to give an insight into the stabilization mechanisms. Taking Celecoxib as a model drug we have demonstrated (i) differences in

molecular interactions in crystalline and amorphous state (ii) solubility benefits associated with the amorphous systems.

Pre-formulation profiling for assessing drugability of NCEs

Pre-formulation profiling and early formulation development of NCEs coming out of NIPER's discovery pipeline are being carried out to identify challenges of 'drugability' and pharmaceutical development. Department of Pharmaceutics is involved with NIPER discovery team to proactively identify 'drugability' issues in NCEs and provides suitable technological interventions.

Nanocrystalline Solid Dispersion Using NanoCrysp Technology

Our lab has developed a novel technology to prepare nanocrystalline solid dispersion for oral delivery of poorly water soluble drugs. It is a spray drying based method to generate drug nanocrystals with small molecule excipients acting as crystallization inducing agent.

Crystal Engineering

Crystallization is often used in the pharmaceutical industry for purification and isolation of pharmaceutical compounds, and also as a means of generating polymorphs or isomorphs. There are numerous reports on the generation, characterization and performance characteristics of polymorphs in the literature. However, there is little information on the influence of isomorphs on the biopharmaceutical properties of drugs. Our lab is extensively involved in exploring the effect of isomorphs on biopharmaceutical properties of drugs.

Centre for Pharmaceutical Nanotechnology

The centre is actively engaged in the formulation and evaluation of nanotechnology based novel drug delivery systems (NANOMEDICINES). Group is actively engaged in developing various drug loaded nano and micro carriers for the following applications:

- Improving oral bioavailability of poorly water soluble/ poorly permeable drugs (e.g. anticancer drugs such as tamoxifen, docetaxel, paclitaxel, doxorubicin; antifungal drugs such as amphotericin B, cyclosporine A; antioxidants etc.) & acid labile drugs using different types of nano formulations.
- Delivery of anticancer/antifungal drug(s) along with antioxidant(s) by nanocarriers for augmenting efficacy and reducing the toxicity.
- Ligand anchored multifunctional nanocarriers for targeted drug delivery for cancer treatment.
- Drug delivery using nanocarriers via topical route for treatment of psoriasis.
- Oral delivery of antigen(s) using targeted nanocarriers for mucosal immunization.

- Preparation and characterization of multiple functionalized drug(s) loaded carbon nanotubes to explore their potential in targeted cancer therapy.
- Pulmonary delivery of therapeutics for the targeted treatment of infectious diseases.

Intestinal Drug Delivery

In our lab we target the phase I, phase II, and phase III metabolism of the drugs which are major reasons of reduced bioavailability. The different strategies include prodrugs, co-crystals, inhibitors etc. The specific examples of drugs under study are tamoxifen, capecitabine, raloxifene, valsartan, repaglinide, atorvastatin, etc.

BIOTECHNOLOGY

Protein Misfolding in Disease Conditions

Parkinson's disease (PD) is the second most common neurodegenerative disorder. Aggregation of the intrinsically disordered protein, α -synuclein, has been implicated in the progression of PD. Several epidemiological studies have deciphered a beneficial relationship between coffee drinking and PD. A similar inverse relationship has been reported between cigarette smoking and the occurrence of this disorder. To test the association reported in epidemiological studies and to understand if caffeine and nicotine have any effect on aggregation of α -synuclein, resulting in the observed positive outcome, effects of caffeine and nicotine on aggregation of recombinant human α -synuclein were analyzed in vitro. The same was also studied in the well-validated yeast model of sporadic and familial PD. Caffeine was found to accelerate the formation of fibrillar aggregates, resulting in a kinetic hurdle to the accumulation of the toxic oligomeric species. Aggregates formed in the presence of caffeine were found to retain the phospholipid-binding ability of α -synuclein. Attenuation of toxicity was accompanied with decreased oxidative stress, lower oxidative damage to the proteome and higher cell viability. On the other hand, nicotine was found to drastically delay the formation of the seed nucleus, thus slowing down the process of aggregation of α -synuclein. The extent of aggregation was significantly lower in the presence of the alkaloid, with amelioration of toxicity and beneficial effect on cell survival. In both cases, the conformation of the intrinsically disordered protein was found to be altered which led to the formation of off-pathway intermediates which were able to overcome the toxic effect of protein aggregation. Thus, the results of our investigations provide a rational explanation of the correlation between coffee drinking and smoking and occurrence of PD.

Nucleic Acid Aptamers as Protein Stabilizers

Aggregation and cytotoxicity of mutant proteins containing an expanded length of polyglutamine (polyQ) repeats is a

hallmark of several polyglutamine diseases, including Huntington's disease (HD). Studies suggest that a series of toxic polyQ-expanded huntingtin N-terminal fragments are produced from the full length protein, via proteolysis, which form neuronal cytoplasmic and nuclear inclusions characteristic of HD. Several small molecules, antibodies and oligonucleotides have been employed to inhibit the expression and/or aggregation of huntingtin, resulting in increased cell survival. Nucleic acid aptamers have the ability to recognize their targets with high affinity and specificity and bind to them on the basis of shape complementarity. They have the potential to inhibit protein-protein interaction and hence, protein aggregation. Specific aptamers were selected against the pathogenic N-terminal fragment of huntingtin, which did not bind to wild-type huntingtin protein. Binding of aptamers led to reduction in aggregation, with concomitant reduction in oxidative stress, damage to proteome, cytotoxicity and increased cell survival. Presence of the aptamers was able to inhibit sequestration of proteins like GAPDH, restoring their cellular function. Solubilisation of mutant huntingtin also resulted in rescuing the defect in endocytosis due to protein aggregation. Combination therapy showed a synergistic inhibition effect, demonstrating that the two aptamers bound to different aptatopes on the protein surface. This is the first ever report of employing nucleic acid aptamers as inhibitors of protein aggregation.

Design and Development of Organophosphate-Degrading Enzymes as Prophylactic against OP-Poisoning

Organophosphates (OPs) are neurotoxic chemicals commonly used as pesticides and insecticides in various industries. Certain OPs are also exploited as nerve agents. Current treatments available for OP-poisoning are inadequate and unsatisfactory and more effective treatment is urgently needed to combat OP-poisoning. OP-degrading enzymes from various organisms have emerged as a new generation antidote for the pre-treatment and therapy of OP-poisoning (e.g., human paraoxonase 1, SsoPox, DFPase, OP-hydrolase). However, there are numerous limitations regarding large-scale production and use of these enzymes as a therapeutic candidate, viz. low OP-hydrolyzing activity of the native enzymes, difficulties in expression & purification of these recombinant enzymes, and poor stability of the purified enzymes. In this project we are trying to design and develop these enzymes as prophylactic against OP-poisoning.

Development of Protocol for the Production of Bio-Generics

Bio-generics represent a high-growth sector in India. A variety of recombinant proteins are manufactured and sold by a number of biotech companies. The cost of these

protein biopharmaceuticals sold by the multinational companies keeps them out of reach for much of the world. Development of cost-effective technologies for the production of these bio-generic proteins along with improving the properties of these proteins (*viz.* circulatory half-life, immunogenicity, shelf life, *etc.*) will definitely help to improve the affordability of these drugs in the national health care system. In this project we are trying to develop protocol(s) for the production of bio-generic proteins (recombinant human interferons).

Novel Anti-inflammatory Peptides

Peptides derived from apolipoprotein have emerged as a promising candidate for the treatment of various inflammatory diseases in humans. Infusion of these peptides has been shown to reduce the development and progression of inflammatory conditions in variety of animal models and recent study has suggested that these peptides are safe and well tolerated in humans. In this project we are trying to design and develop novel anti-inflammatory peptides for therapeutic use.

Multifunctional Proteins in Host Pathogen Interaction

The laboratory is focusing on the role of conserved multifunctional enzymes of *M.tuberculosis* (*M.tb*) and their relevance in host-pathogen interaction. Our research is also investigating the role of *M.tb* Glyceradehyde-3-phosphate dehydrogenase (GAPDH) and other conserved proteins in transferrin mediated iron uptake.

Many of enzymes of the glycolytic and TCA cycle are known to possess alternate functions in several pathogens where these enzymes are known to function as virulence factors. In contrast many of the *M.tb* counterparts are yet to be fully characterized, primarily due to the difficulties in obtaining purified recombinant protein. Our studies have recently established an alternate system to successfully express such conserved and hydrophobic proteins that cannot be purified by expression in conventional hosts such as *E. coli* and *M. smegmatis*. We are currently characterizing selected enzymes and also assessing the significance of their alternate functions in pathogenesis.

In addition we have identified that for the first time that *M.tb* expresses cell surface GAPDH and other conserved proteins that function as receptors for the human iron transport protein transferrin. It was largely believed that iron acquisition by *M.tb* occurs primarily by the synthesis of small iron chelators known as siderophores. Our findings have instead established that cell surface receptors sequester transferrin at the bacterial surface. Iron acquisition involves the internalization of the receptor-transferrin complex which is an entirely novel process reminiscent of receptor-

mediated endocytosis. Infection experiments established that intraphagosomal bacilli acquire iron by this mechanism. This siderophore-independent process has never previously been reported in bacteria. Further studies are underway to fully characterize this mechanism and other receptors identified in this pathway. At present we are also evaluating the anti-mycobacterial properties of small molecule inhibitors to some of these enzymes.

As part of intra-institutional collaborative research, an *in vitro* assay for two other targets (Isocitrate lyase and Malate synthase) has been established; compound screening to identify potential lead molecules has been initiated.

Visceral Leishmaniasis: Identification and Validation of Potential Drug Targets

Visceral Leishmaniasis (VL) also known as kala-azar is a disease which results in swelling of organs, anemia and fever and is fatal if left untreated. Few drugs are available for VL treatment and the ones which are currently used have issues of toxicity, teratogenicity, increased cost, difficult administration and parasite resistance. Moreover in the absence of vaccines to combat Visceral Leishmaniasis, efforts are being made to strengthen the chemotherapeutic strategies by identification of novel drug targets, designing of effective drugs with less toxicity and therapeutic switching of available drugs.

Our group has identified and characterized a number of metabolically important enzymes in the parasites which can be specifically targeted with minimal host toxicity. One such enzyme is 3-hydroxy-3-methyl glutaryl-CoA reductase (HMGR) enzyme which is the rate limiting enzyme of the ergosterol biosynthesis. Our studies have recently identified potential statins with good efficacy against both extracellular and intracellular forms of the parasite. Differences in active sites between the parasite and host HMGR enzyme by *in silico* analyses was performed for future parasite specific designing of molecules. Active site prediction revealed differences in the amino acid residues between these two enzymes. Validation of these predicted active site amino acid residues is currently being done by site directed mutagenesis and the HMGR variants being kinetically characterized to evaluate the role of these residues in substrate binding.

In addition, our group is working on Ribose 5-Phosphate isomerase B, a key enzyme of the pentose phosphate pathway (PPP). We have overexpressed RpiB in *Leishmania donovani* and evaluated the dose dependent effect of H₂O₂ on *Leishmania* promastigotes and parasite's intracellular survival. It was observed that RpiB overexpressing parasites showed higher growth rate than wild type, were resistant to higher concentrations of H₂O₂ and exhibited enhanced replication of parasites within

macrophages. Further elucidation of the functional importance of this enzyme by double targeted gene replacement is underway.

AMP-acetyl CoA synthetase (AMP-AceCS) is a key enzyme which catalyzes the activation of acetate to acetyl CoA. Multiple sequence alignment of *Leishmania donovani* AceCS with other organisms revealed the presence of a highly conserved Leucine residue at 684 position which is reported to be crucial for acetylation by protein acetyl transferases in other organisms. In an attempt to understand the role of this residue in enzyme catalysis, Leucine (L) was mutated to Proline (P) by site directed mutagenesis. Our data provides evidence for the role of Leucine 684 in substrate recognition, catalysis and acetylation of the AceCS enzyme. This data would open up the possibility of further understanding the regulatory mechanism of AceCS enzyme in this pathogen.

Target Specific Screening of Synthetic and Natural Product Based Compounds

Another target which our group is working on is trypanothione reductase. We are currently involved in screening of natural products and synthetic compounds in cell based and target based assays to identify potential lead molecules. A number of compounds have shown good antileishmanial activity and lesser cytotoxicity.

PHARMACY PRACTICE

Research on Chronic Kidney Disease

Chronic kidney disease (CKD) is one of the major problems for the increasing global morbidity and mortality due to non-communicable disease in developing countries. This burden is continuously increasing over time. The prevalence of CKD in India is reported to vary from 0.78-1.4%. Diabetes mellitus and hypertension are the major risk factors for the CKD. A registry programme on CKD was started by Indian Society of Nephrology.

Drug utilization studies in CKD patients help to understand and build evidence for the drug use. Moreover, cost of treatment is one of the biggest barrier for the patients of CKD, as the patient requires a lifelong treatment. Most of the time patients cannot afford the best treatment available for treating particular co-morbidity in CKD. Adherence to medication in chronic kidney disease depends on several factors such as cost of treatment, its effectiveness, the adverse effect(s), number of medications, and patient's knowledge about the disease. Poor adherence to therapy in CKD patients will not only compromise the outcome but also the quality of life (QoL); in addition, it also increases the cost of treatment. Because of these reasons, it becomes important to study the extent of adherence in patients of CKD and how does it impact the patient care. Therefore, it becomes essential to address these issues in CKD patients. Evidence on the prescribing pattern, cost of illness, adherence to medication, depression and quality of life in

patients of CKD are lacking in India. Therefore, a study entitled "Study of the prescribing patterns, treatment cost and patient related factors influencing adherence to therapy in patients with Chronic Kidney Disease" has been initiated in collaboration with the Govt. Medical College & Hospital, Chandigarh.

Studies on Pricing of Pharmaceuticals

High cost of treatment and price control of pharmaceuticals is a topic of discussion all around the globe. Every country wants to provide these products to their population at a reasonable cost. In India, majority healthcare expenditure is out of pocket (86% in 2013), which is a direct burden on the population. The Government of India has a price control mechanism for pharmaceuticals since 1970. The current Drug Price Control Orders (DPCO-2013) controls the prices of 348 drugs (652 formulations) listed in the National List of Essential Medicine, 2011 (NLEM, 2011). But these pharmaceuticals are only a handful of total and include only the generic drugs. And there is no control on price of the patented drugs, which is solely fixed by the innovator.

In order to understand the impact of the most recent change in DPCO, a study was initiated to compare the prices of drugs in the NLEM. This comparison takes January, 2013 as the reference point and captures the prices on regular interval of time.

Another study to suggest a viable mechanism of pricing for patented drugs in the country has been initiated. Study of the pricing models of patented drugs across the globe has been initiated.

Online Pharmacy: Global Scene and Indian Opportunity

The US market for online pharmacies was \$4.4 billion and Newswise projected that the enterprise may expand globally to \$75 billion by 2010 and it reach \$200 billion in 7 to 8 years. Several countries, like Australia, Belgium, Barbados, Brazil, Canada, China, Germany, Greece, France, permit Internet pharmacies to operate. And, Australia, Brazil, Canada, Germany, Netherland, United Kingdom and USA have regulations related to online pharmacies in place. In the Indian context, the Drugs and Cosmetics Act and Rules do not provide or sale of medicines through online/Internet. Yet, it has been reported that some e-tailers were selling medicines over the online pharmacies. This is the core of the study initiated. The study will present a factual picture of the operations, scope, risk and benefits of the online sale of medicines in India.

Study on the Knowledge, Attitude and Practices of Medicine Use

While the search of newer medicines is important in certain therapeutic areas, it is equally true that incorrect use of medicines is responsible for a large proportion of the irrational use that is reported. This study has aimed to capture the knowledge, attitude, and practices (KAP) of medicine use in young students. Using a standardized questionnaire, the study will bring out the elements of KAP in young students.

Community Prevalence of Low Back Pain

Low back pain is a major public health problem all over the world. Most people suffer incapacitating low back pain at some stages in their lives. Approximately 1.5 million new cases of low back pain are seen by physicians in each month. In India, occurrence of low back pain is also alarming; nearly 60 per cent of the people in India have significant low back pain at some time or the other in their lifespan. Since there are very few studies have been conducted on the prevalence of low back pain of non-specific causes in the Indian community, the research group is conducting a large cross-sectional study to assess the prevalence of low back pain at any point of life, in the past three years and the people currently suffering from low back pain. The study is also assessing knowledge, awareness, attitude, factors associated with Low back pain as well as health service utilization patterns among low back pain patients.

Chronic Low Back Pain: Diagnostic and Prognostic Value of Involvement of Neuropathic Pain Component

Pathophysiology of low back pain is complex and the mechanisms leading to both nociceptive and neuropathic pain are involved. Since its a mixed pain syndrome the extent of neuropathic pain involvement is not clear; varying between 17-54%. Standard treatments such as NSAIDs and acetaminophen have no proven efficacy in neuropathic pain, whereas other drug classes, such as anticonvulsants and antidepressants, are more likely be effective in neuropathic than in nociceptive pain. Thus, in the setting of severe pain, the earlier diagnosis of neuropathic pain will help in minimizing comorbidities, disability, and absenteeism or sick leave. But diagnosis of neuropathic pain remains a challenge to physicians due to lack of golden standard method of assessment of diagnosis of neuropathic pain. Quantitative Sensory testing (QST) is costly, time consuming and the correlation between disability and QST recordings are poor. Screening questionnaires seems a better option. The present research aims to assess the appropriate and reliable method to diagnose neuropathic pain including translation of screening questionnaires in local languages and validating them in Indian population. Research is also going on comparative analysis of QST with screening questionnaires.

Continuing projects

- Assessment of effectiveness, tolerance and its impact on Quality of life (QoL) in patients with chronic low back pain (In collaboration with Department of Anaesthesia and Intensive care, PGIMER, Chandigarh.

PHARMACEUTICAL MANAGEMENT

The Department is continuously engaged in developing skill set of the students so that they can compete in the changing pharmaceutical industry environment. The students of this Department are well accepted by the Indian as well Multinational Corporate Houses. This year the Department has organized lectures of Mr. Varun Gupta, Manager, Novartis, on "Strategic levers for successful drug commercialization in India" and of Mr. Rehan Khan, Managing Director, Abbott India Ltd. on "Leadership" in the month of November and February 2014 respectively. The research activities of the Department are mainly focused in the areas of Sales Management, Service Recovery Aspects, Hospital Selection, entrepreneurial Marketing and other Strategic aspect of the Industry. In addition to this the Department was also engaged in consultancy project. The students have completed following projects last year:

1. Project Analysis and Selection in R&D Intensive Organizations: A study of Selective Government-funded institutions in Northern India
2. Study of Achievement of High Sales Performance by Implementation of Key Account Management (KAM) in Indian Pharmaceutical Industry
3. Implications of Merger and Acquisition on the price of major brands as well as Product Portfolio of Both the Target Pharmaceutical Company as well as Acquirer
4. Mapping of Institutional Purchase Mechanism in India
5. Importance of pharmaceutical industry to Indian economy
6. Role of community pharmacist in delivering primary healthcare
7. Perception of Open innovation in pharmaceutical R&D institutes
8. Compendium on National pharmaceutical pricing policy and its effect on Indian Pharmaceutical market

FOUNDATION DAY



Foundation Day of the Institute was celebrated on Feb 15, 2015. Prof. R. K. Kohli, Vice Chancellor, Central University of Punjab, Bhatinda, was the Chief Guest.

Prof. R. K. Kohli, the Chief Guest at the Foundation Day celebrations, being felicitated by the Director and the Dean.



Mr. Rajan Tripathi, Junior Technical Assistant (Department of Biotechnology), received the best employee award for technical support at the Foundation Day 2015 function.



Mr. Arun Gautam, Assistant Grade III (Stores and Purchase section), received the best employee award for administrative support at the Foundation Day 2015 function.



CENTRAL FACILITIES

COMPUTER CENTRE

The Computer Centre (CC) of NIPER SAS Nagar is the central computing resource pool of the whole institute. The Computer Centre is responsible for:

- Providing Email service and Internet Connectivity through the whole NIPER Campus.
- Catering to all the general and high computational needs of the faculty staff and students.
- Manages the Campus-Wide Network.
- Hosting and Updating Information and Maintenance of official website of the Institute.
- Providing Office Automation services.

NIPER is an active partner of the National Knowledge Network (NKN). Presently, we have been connected with 100Mbps. connectivity for video-conferences, virtual classrooms and high-speed internet services. Regular project meetings and important events are attended through this NKN virtual classroom.

Computer Centre caters to the needs of all faculty, staff and students for their pharmaceutical research by providing High Performance Computing called as PharmaGrid which is managed and administered by Computer Centre. PharmaGrid consists of Linux Cluster and Windows Cluster which are interconnected by 20Gbps. speed InfiniBand Switch. Linux Cluster consists of 1 Master Node and 24 Computational Nodes. Each Node has 8 Cores which in total provide (25 Nodes x 8 Cores) 200 Cores out of which 192 Cores are used for computational purpose. Similarly, Window's Clusters consist of 1 Master Node and 8 Computational Nodes. Each Node have 8 Cores which

forms total of (9 Nodes x 8 Cores) 72 Cores out of which 64 Cores are used for computational purpose. 15TB of is the storage capacity available for data.

The Central Lab. at Computer Centre presently has more than 62 high-end desktops. The Central Lab. remains accessible to all authorized users for 16 hours everyday. Course lectures and practical examinations of Computer/IT related courses of students held at Central Lab. of Computer Centre.

The Computer Centre always provides its full assistance and resources to successfully accomplish various public lectures and important national events viz. **"New Year Message by 'The Hon'ble President of India to the Institutes of Higher Learning through Video-Conference'"** on 19th January, 2015. Computer Centre also assisted the Placement-Cell during Campus Placement of Students/Research Scholars in conducting online-examination and interviews of the students through Video-Conferencing.

Computer Centre has planned for laying Single-Mode Optic-Fibre Cabling infrastructure with adequate redundancies so as to improve the reliability of network access. The replacements for core network switches are under active consideration. The goal is to have a future-ready network that can be easily migrated to a 1/10 gigabit infrastructure.

During year 2015, we are planning to implement to increase storage space of our Mail Server which enables us to double the mail storage-capacity of all the users.

Computer Centre is also planning for Implementation of ERP at NIPER Campus, in future.



LC- HRMS



NMR 400 MHz



Powder XRD



MALDI TOF/TOF MS



LCMS LTQ-XL



DSC

CENTRAL INSTRUMENTATION LABORATORY

Central Instrumentation Laboratory (CIL) is providing analytical services to the faculties, and PhD and masters Students of NIPER since its inception in 1994. CIL is also providing its analytical services to the industry, educational and scientific research institutes across the country on pre-fixed charges.

The laboratory is equipped with the following state of the art analytical instruments:

Atomic absorption spectrometer (Analytical Jena); Capillary Electrophoresis (Beckman Coulter); Circular Dichroism (Jasco, J-815); DSC with auto sampler (Mettler Toledo); DSC (Perkin Elmer); Luminescence Spectrometer (Perkin Elmer); Fluorescence Spectrometer (Varian); Freeze Dryer (Heto FD-8-85); Lyophilizer (Heto FD-1-110); FTIR with IR Microscope (Perkin Elmer); GCMSⁿ where n=5 Polaris Q (Thermo Fisher); High Resolution LCMS Maxis (Bruker); HPLC with UV & ELSD detectors (Shimadzu); HPLC with UV, PDA, Fluorescence & RI detectors (Shimadzu); LCMSⁿ where n=9 with APCI/ESI Probe LCQ (Finnigan Mat); LCMSⁿ where n=9 with APCI/ESI Probe LTQ-XL (Thermo Scientific); MALDI TOF – TOF Mass Spectrometer Ultra flex (Bruker); NMR Spectrometer 400 MHz with auto sampler (Bruker); Polarimeter with 365, 405, 436, 546, 589, and 633 nm wavelength (Rudolph); Powder XRD with auto sampler, temperature and humidity controller (Bruker); TGA with auto sampler (Mettler Toledo); Titro Processor with Karl fischer, Potentiometric titration, pH, pKa values (Metrohm); Ultra Centrifuge Refrigerated LE-80K (Beckman Coulter); UV/VIS Spectrophotometer double beam equipped with sample temperature controller (Shimadzu); 2D GC Trace GC Ultra (Thermo); Elemental Analyzer Flash 2000 (Thermo), DVS Q 5000 SA (TA), Ultra pure water purification system (ELGA Purelab Pulse & Purelab Flex).

A new initiative of providing access to all major analytical instruments at NIPER to external scientific fraternity was started in November 2014. Under this initiative, a number of major equipment installed in various laboratories at NIPER was made available two days per week for sample analysis to all outside users. This initiative for the first time has made previously untapped highly sophisticated analytical instruments, synthesizers and purification systems available to outside users, through a single window clearance system. All the samples for analysis are received at CIL, and forwarded to the instrument facility for analysis. A policy for sample analysis, its cost, and a list of instruments are made available at the NIPER web site for information (<http://www.niper.gov.in/>). The initiative has achieved

resounding success in a short span of time. The instruments available under this program are:

LC-NMR SPECTROMETER, Make: Jeol, Model: ECA 500 MHZ; LC/MS MicroTOF, Make: Bruker, Model: Q-TOF; LCMSⁿ Make: Thermo, Model: LTQ-XL; Accelerated Solvent Extraction (ASE), Make: Dionex, Model: ASE300; HPLC, Make: Shimadzu, Model: SCL-10AVP; HP-TLC, Make: CAMAG, Model: TLC SCANNER-3; GC-MS with Head Space, Make: Perkin Elmer, Model: Clarus 600 C; LCMS, Make: WATERS, Model: ZQ MIRCROMASS 4000; Spray Dryer, Make: BUCHI, Model: B191; Supercritical Fluid Extraction (SCFE) Facility, Make: Deven Super Critical Pvt. Ltd., Model: Lab Scale; Supercritical Fluid Extraction (SCFE) Facility, Make: Deven Super Critical Pvt. Ltd., Model: Pilot Scale; HR-TEM, Make: FEI, Model: TECNAI G2F-20; Variable Pressure Scanning Electron Microscope (SEM) Hitachi S3400N, Make: Hitachi, Model: S3400N; Atomic Force Microscope-Veeco Bioscope II Life Science (with IOM Nikon TE2000), Make: Veeco, Model: Bioscope II; Confocal Laser Scanning Microscope, Make: Olympus, Model: Microscope FV 1000 SPD; Real Time In Vivo Optical Imaging (Biospace Measures, France), Make: Biospace, Model: Photon Images PI0100002; Research Grade Rheometer, Make: Malvern, Model: Bohlin C-V0R150; High Pressure Homogenizer, Make: Avestin, Model: Emulsified C-3; Zeta Sizer, Make: Malvern Instruments, Model: Nano ZS; Semi Preparative HPLC, Make: Shimadzu, Model: Prominence; Preparative HPLC, Make: Shimadzu, Model: LC-8A; Automated flash purification system, Make: Biotage, Model: Isolera-One; Size Exclusion Chromatography, Make: Spectrum, Model: CF-2; Freeze Dryer, Make: Virtus, Model: Benchtop K; Flow Cytometer, Make: Beckman, Model: Optima TL; ULTRA CENTRIFUGE (Refrigerated), Make: Millipore, Model: Guave Easy Cyte-8HT; CEM Liberty Microwave Peptide Synthesizer, Make: CEM Liberty, Model: 909600; CEM Parallel Microwave Synthesizer, Make: CEM Explorer, Model: 909155; AAPTEC Peptide Synthesizer, Make: AAPTEC, Model: Focus XC 36AA.

CIL provides online data dissemination facility for sample analysis data of various analytical instruments at CIL to the faculty members and students of NIPER, directly at their laboratory through LAN network. The data is provided in the pre-created PDF files. For equipments such as NMR and pXRD, the raw data files are also loaded on the server for processing by users at their end, using pre-installed processing software. The server is also used to create a backup of all electronic analytical data generated at CIL. The outside sample analysis report are provided via email in the PDF files.

CIL has generated analysis reports for more than thirty thousand two hundred (>30200) samples in the fiscal year

2014-2015. This contains approximately 28900 internal samples and 1300 outside samples. Some of the highly used equipments in CIL are: NMR (~13200 samples); LCMS LCQ (~1600 samples); HPLC (~1650 samples); HRMS (~3200 samples); Fluorescence (~1050 samples); Circular Dichroism (~700 samples); pXRD (~650 samples) and MALDI-TOF-TOF MS (~1150 samples). CIL has generated receipts of more than Rs. 16.5 lakhs for analyzing outside samples in the fiscal year 2014-2015. Since November, 2014, CIL has been able to get 160 samples analyzed, and generated a revenue of Rs. 3.5 lakhs for the analysis of samples at other various instrument facilities located within NIPER.

SMALL AND MEDIUM PHARMACEUTICAL INDUSTRY CENTRE

Small and Medium Pharmaceutical Industry Centre (SMPIC) aims at creating synergy between industry and academia. The main objective of SMPIC is to develop and assist SME pharma units to meet global challenges in regulatory requirements and Good laboratory practices. The centre was also set up to build a pool of trained man-power by training science and technology students in analytical instruments thus enhancing their practical skills. The department, under the program, organizes seminars on GLP, GMP and other allied areas. Practical training sessions on sophisticated instruments are conducted for pharma personnel from government agencies and students from pharma and science stream. NIPER also extends help to registered pharma SMEs through SMPIC, by allowing them to avail its existing testing facilities in various departments.

During the period, April 2014 to March 2015, eight hands-on practical training sessions on analytical instruments were conducted with a total of 64 participants. Additionally, four seminars were organized on issues of relevance to pharma SMEs. SMPIC also provided single window services for testing facilities to members registered with SMPIC. About 350 samples were analyzed at CIL and other departments.

LIBRARY AND INFORMATION CENTRE

The Library & Information Center comprises of a large collection of over **7578** books and text books, **1708** hindi books, **19305** bound journals, **53** pharmaceutical market reports, **1486** thesis and dissertation, **270** CD-ROM databases, etc.

The library subscribes to **82** international and national journals in the field of pharmaceutical and allied sciences for research scholars. The library has Chemical Abstracts from 1907 till date which is also accessible online through Sci-Finder Scholar, a leading and comprehensive scientific

online information service, giving access to a wide diversity of research disciplines like chemistry, pharmaceutical sciences, biotechnology and biomedical engineering. The library subscribe to **203** electronic journals of Science Direct, an online electronic full text journal collection on Science, Technology & Medical Sciences. Apart from this library also subscribes to E-journals from Wiley Inter-science, Springer Link, Taylor and Francis etc.

Library has LIBSYS 7 (Web centric Library Management Software) software for library automation.

Library is institutional member of Chandigarh Library Consortium, British Library Chandigarh, and Current Science Association Bangalore, Association of Indian Universities (AIU), Delhi.

The library and Information centre is accessible to all pharmacy professionals from the country and abroad and provides information to the academia, researchers and the industry personnel.

Services

The following services are provided to the users,

- Circulation (Issues & Return of Books)
- Photocopy
- News Clipping Service
- Literature search service (Online and Offline)
- Reference and Information
- Document Delivery
- Interlibrary Loan

Apart from this library has set up contacts with other libraries for getting articles, copies of books which are not available in our library through Chandigarh Libraries consortium

Services to Corporate Members

NIPER library also caters to the needs of non-governmental organizations and Industry personnel engaged in the area of pharmaceutical and allied sciences

Photocopying facility to corporate members is available in the library at nominal charges as per NIPER Library rules.

Current awareness service: Journal contents (of the currently subscribed journals) can be sent through e-mail by mutual arrangement.

NATIONAL TOXICOLOGY CENTRE

Toxicity testing of new compounds is essential for the process of drug development and also for the extension of therapeutic potential of existing molecules. The toxic effects of chemicals, food substances and pharmaceuticals etc. have gained great significance in 21st century. Pre-clinical

toxicity testing is an integral part of drug safety evaluation. The goals of the pre-clinical safety evaluation include characterization of toxic effects with respect to target organ, dose dependence, relationship to exposure and potential reversibility. This information is of great importance for the estimation of an initial safe starting dose for clinical trials and the identification of parameters for clinical monitoring for potential adverse effects. The number of drug failing due to toxicity in pre-clinical testing is in the range of approximately 30% to 40%, making toxicity the number one reason for pre-clinical attrition. The need of a toxicological facility covering different safety aspects of pharmaceuticals in India is eagerly felt by the drug regulatory authorities as well as by the pharmaceutical industries. Prevention of risk by testing chemicals and to determine their toxic effects depends on the quality of data that are produced in the laboratories engaged in the risk assessment process. Implementation of Good Laboratory Practice (GLP) in toxicity testing facilities in developing countries, especially in India was seen as an urgent issue. In this view the Indian program of GLP certification has already been initiated based on the OECD principles of GLP & compliance monitoring to ensure high quality test data and the mutual acceptance of test results among OECD member countries. NIPER being leading institute in pharmaceutical sciences in India took initiative and set up a pre-clinical toxicological testing facility at NIPER in June, 2005. Recently the test facility has been approved for the GLP certification by National GLP Compliance Monitoring Authority (NGCMA), Dept. of Science and Technology (DST), Govt. of India. After the approval, NTC has now become the first government centre of the country with GLP certification. This certification will facilitate in the testing of New Chemical Entities (NCEs) for regulatory submission by different industries and academic institutions, apart from making use of the facility in internal research projects and hands-on training for research student.

Infrastructure

National Toxicology centre (NTC), a state-of-art test facility was established at National Institute of Pharmaceutical Education and Research (NIPER), S.A.S.Nagar for pre clinical toxicity studies of New Chemical Entities(NCEs). It is designed on a concept of clean and dirty corridor and has six state-of-art animal rooms, a separate fully equipped necropsy room and three laboratories equipped for testing in biochemistry, hematology, histopathology and genotoxicity. The facility has in-vitro testing room to screen new chemical entities (NCEs) in the early phase of development to support further testing in the drug discovery and development. The centre is equipped with fully and semi- automated instruments to carry out testing of different aspects of toxicology.

The centre has one sample receiving room and one sample preparation room. A full fledged Quality Assurance Unit (QAU) is in place to monitor all the activities of the centre and generates audit report which is being sent to the management from time to time. Dry and wet archive sections have been established in the facility for the proper storage of SOPs, raw data, study reports, wet tissues, paraffin blocks, slides and other study/facility related material.

Objective

- This facility can be used by the pharmaceutical companies/ industries and research organizations to test their New Chemical Entities (NCEs).
- To train the manpower and to improve the technical skill in the area of regulatory toxicology.

Major Work Area

The facility can undertake the following studies under the principles Good Laboratory Practice (GLP) for testing of New Chemical Entities (NCEs). In house historical control data have been generated to validate different toxicity testing.

- Acute Toxicity Study
- Sub- chronic Toxicity Study
- Chronic Toxicity Study
- Sensitization Study
- Inhalation Study

Completed Sponsored Projects (Year 2014-15)

The following projects have been completed for the above mentioned sponsor:

1. Repeated dose 28-days oral toxicity study of test item (MNE; CAS No. 93-04-9) in Sprague Dawley (SD) rats.
2. Repeated dose 28-days oral toxicity study of test item (ZDS; CAS No. 557-05-1) in Sprague Dawley (SD) rats.
3. Repeated dose 28-days oral toxicity study of test item (VAC; CAS No. 5413-60-5) in Sprague Dawley (SD) rats.
4. Repeated dose 28- days oral toxicity study of test item (IBC; CAS No. 3407-42-9) in Sprague Dawley (SD) rats.
5. Repeated dose 28- days oral toxicity study of test item (SBL; CAS No. 6786-83-0) in Sprague Dawley (SD) rats.

NATIONAL CENTRE FOR SAFETY PHARMACOLOGY

National Centre for Safety Pharmacology (NCSP) is equipped to carry out evaluation of safety pharmacology of NCEs/Formulations in non-GLP environment. CNS safety pharmacology core battery (motor activity, behavioural changes, coordination and body temperature), CVS safety pharmacology core battery (blood pressure, heart rate, and electrocardiogram), Respiratory system safety pharmacology core battery (respiratory rate and hemoglobin oxygen saturation) and Gastrointestinal system supplemental safety pharmacology (Gastric secretion, gastrointestinal injury potential, gastric pH measurement) can be carried out on NCEs/Formulations. We investigated the safety pharmacology of centhaquine citrate using CNS and CVS cardiovascular core battery safety pharmacology. In CNS and CVS safety pharmacological studies, centhaquin citrate did not produce undesirable effect except some changes in supported rears and body temperature at doses of 1 and 3 mg/kg and reduction in motor performance at 3 mg/kg.

TECHNOLOGY DEVELOPMENT CENTRE

NIPER, a national institute of excellence, caters to the diverse human resource, research and consultancy needs of the pharmaceutical industry. As a part of its mandate, it has set up a state of the art Technology Development Centre (TDC) – Pilot Plant, where in experimental, pilot plant scale-up and validation, and infrastructural facilities have been made available to companies. Pilot plant facility caters to needs for advanced studies and to support strong API and Herbal generic India pharma role by offering the facility to SME industry. As per the directions of the competent authority 40% of the facility to be used for contract research, and 60% for internal use i.e. NIPER scale-up projects and training to the students.

Technology Development Centre-Pilot Plant activities for the year 2013-14 are listed below:

Contract Research Projects

- 6APA-Dicloxacillin amide synthesis R&D (DSM Antiinfective India Pvt. Ltd.)
- Process research and development chemistry research for industry (DSM Antiinfective India Pvt. Ltd.)
- Process scale up studies of a commercial product (HPL additives, Project cost Rs. 3,04,460/-)
- Studies involving removal of residual solvent from coffee extract (World Herb Life)
- Process R&D involving synthesis of a an antibiotic intermediate (NAF) (DSM Antiinfective India Pvt. Ltd.)
- Scale-up process development for FCMICG-Flucloxacilloic acid (DSM Antiinfective India Pvt. Ltd)
- Process R&D and scale-up validation studies involving hydrogenation and chemical modification of Taversonine (Quad Lifesciences)
- Scale-up and validation studies of Vincadifformine (Quad Lifesciences)
- Scale-up and validation studies involving Vincaffermin conversion into Vincamine (Quad Lifesciences)
- Scale-up and validation studies involving synthesis of Vinpocetine (Quad Lifesciences)
- Scale up and development of candidate HM-5383 CV (Celeste Lifesciences)

Training

Industrial training titled “Practical training on in-process testing and plant machinery, process and management” was imparted to the students of NIPER. This, a four week program, involves safety, cGMP manufacturing, pilot plant operations, and in-process testing aspects, and has been conducted during the month of July, 2013. In addition to PTPC students, students from PTBT also received the training.

Internal Research Project

Development of chemo-enzymatic processes for key Intermediates of an anti-asthmatic drug and other drugs are being explored in the laboratory.

NATIONAL BIOAVAILABILITY CENTRE

The Centre has been inspected by a team of inspectors appointed by the office of Drug Controller General of India (DCGI), New Delhi on 22.09.2014 and 23.12.2014 for renewal of approval of the centre for conducting Bioavailability / Bioequivalence Studies on healthy human subjects. The approval has been granted by the competent authority.

CENTRAL ANIMAL FACILITY

The Central Animal Facility (CAF), NIPER is a double storied building constructed with two-way corridor system to minimize the cross contamination. Our establishment is registered with CPCSEA, Ministry of Environment and Forest, Government of India (108/GO/BiRe/S/1999/CPCSEA) for the breeding and research purpose. The different species of small laboratory animals like mice, rats, hamsters, gerbils, and guinea pigs were bred in-house and maintained mainly to cater the needs of investigators for the various research purposes within the institute. In addition to meeting the huge internal demands for animals, CAF also supplied the animals on request and non-profit basis to some outside government and private CPCSEA registered establishments for the research purpose. CAF inspection was carried out by two members' committee from CPCSEA in view of renewal of registration of establishment.

Each species of animals is housed in barrier maintained individual rooms to avoid inter-species cross infection. The animals are maintained under controlled environmental conditions (temperature $(23 \pm 2^\circ\text{C})$, relative humidity (40-60 %), 12:12 h light and dark cycle with 100 % of fresh air exchange in animal rooms) with uninterrupted power supply. The macro- and micro- environment around the animals are maintained as per the CPCSEA guidelines.

Separate building for holding of infective and non-infective experimental animals is available. A high degree of hygienic conditions is being maintained. Regular disinfection of animal rooms and cleaning and sterilization of cages, water bottles, bedding, etc. are practiced. Heavy duty steam sterilizers have been provided for sterilization of required items entering into animals rooms. In addition to the conventionally maintained colonies, CAF do have the animal isolator and individually ventilated caging systems (IVC) for breeding and maintaining the animal colonies.

Periodic health monitoring of the animals and staffs are carried out to ascertain their health status. In addition, feed and water analysis are carried out periodically for assessing their quality and microbiological contamination. The various records of the inbred/out bred animals and animal house are maintained as per CPCSEA guidelines. Waste disposal is carried out through environment friendly incinerator. A team of well qualified veterinarian/scientist and technical assistants, who are experienced and trained in modern methods of animal care, breeding and husbandry, manage this facility. The daily animal care and routine works at CAF are carried out as per the standard operating procedures

adopting GLP principles to achieve the high quality supply of the animals for the biomedical/pharmaceutical research and development.

PHARMACEUTICAL HERITAGE CENTRE

Heritage Centre is actively engaged in its continued collection of specimens, making of exhibits and setting up permanent display galleries.

Collection of specimens: Specimens of pulverizers, grinders and pill making machines used in the preparation of traditional medicines by various vaidyas were collected. Ayurvedic herbal drug samples *Mallotus philippinensis* and *Peurania tuberosa* were also added to the collection of the Centre. Replica of the seven surgical instruments excavated from Taksasila, Pakistan (dated 3rd/2nd century BC to 1st century AD, Fig 1) and 17 other traditional surgical instruments were fabricated. Dhanvantari images (three units in different postures) of 4'6" were readied.



Figure 1 Replica of surgical instruments excavated from Taksasila

Infrastructural development: Wall panel of 69' x 6' was readied for permanent display purposes. Four display

pedestals and 40 acrylic display stands of various sizes were got prepared for displaying exhibits during the period.

Other activities: Enlarged prints of photographs/pictures related to the information on the developments in the area from the ancient systems of medicine to the current era of pharmaceuticals were obtained printed for display purposes. A separate wall panel of Pharmacopoeial History of India was readied by displaying 29 enlarged title pages starting from Persian Print of Hindoostanee version (1824) of the London Pharmacopeia (1809) and seven other related archival materials. And displaying of drug samples on the table top showcases based on the रसरत्न समुच्चयः/*Rasaratna Samuchchaya* (7th Century AD) has been done as below:

1. रत्न/Gem stones.
2. साधारणरस/Sadharanarasa
3. महारस/Maharasa
4. उपरस/Uparasa

INTELLECTUAL PROPERTY RIGHTS (IPR) CELL

The IPR Cell was created as a central facility in 2004 to facilitate the creation of intellectual wealth for the institute by identification and protection of pharmaceutical innovations emanating from public funded research. It facilitates the filing and licensing of patents for all departments of the institute and is presently located in the Pharmaceutical Management Department. The cell has an IPR training lab and other infrastructural facilities.

During the year, the IPR Cell carried out following activities regarding patents:

Number of patents: Filed: 03; International filing: 02; Licensed: 01

CDA/Non-disclosure/Technology and other Agreements Processed from IPR Cell: 11

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Mr. Sabbir Khan, Ph.D. scholar (Pharmacology and Toxicology), received the Gandhian Young Technological Innovation (GYTI) Award-2015, instituted by the Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI), from Dr. R. A. Mashelkar, Chairperson, National Innovation Foundation (NIF) of India, on 8th March, 2015, during the Festival of Innovations (FOIN) in the Rashtrapati Bhavan, New Delhi, India. *From left to right:* Prof. K. Vijay Raghavan, Secretary, Department of Biotechnology, Government of India, Dr. R. A. Mashelkar, Chairperson, National Innovation Foundation (NIF) of India, Dr. Renu Swarup, Senior Adviser to the Department of Biotechnology (DBT), GoI and Prof. Anil K Gupta, Center for Management in Agriculture (CMA). IIMA and Founder of Honey Bee Network.

TECHNOLOGY DEVELOPMENT

TECHNOLOGY/INVENTION LICENSED OUT

S.No.	Title	Principal Inventor	Licensee
1.	A Novel One-Step Process For Preparation Of Nanocrystalline Solid Dispersions	Arvind Kumar Bansal	Windlas Biotech Limited on 15/10/2014
	Patent Details: Filing Details :674/DEL/2012 Filed on 07/03/2012 PCT/IB2013/051807 Filed on 07/03/2013		

PATENTS FILED

S.No.	Title	Inventors	Application No. and Date of Filing
1.	An improved oxidant and solvent free one step synthesis of 5-oxochromenopyridine derivatives	Asit K Chakraborti, Naisargee Parikh	1518/DEL/2014 06.06.2014
2.	Ets-1 Identifying Rna Aptamer As Cancer Therapeutics	Kulbhushan Tikoo, Jasmine Kaur	1623/DEL/2014 16.06.2014
3.	High Permeation Vesicles For Transdermal Drug Delivery System And Process Of Preparation Thereof	Sanyog Jain, Mahesh Kishorlal Katariya, Harshad Harde, Sumit Arora	2064/DEL/2014 21.07.2014
4.	Indolylquinoline-Phenylamidines As Novel Antileishmanial Agents	Sankar Kumar Guchhait, Sushma Singh, Sunil Kumar, Vikas Chaudhary, Garima Priyadarshani, Preet Kamal Kaur, Neeradi Dinesh	2187/DEL/2014 01.08.2014
International Filings			
5.	A Novel One-Step Process For Preparation Of Nanocrystalline Solid Dispersions	Arvind Kumar Bansal, Ajay Kumar Raju Dantuluri, Shete Ganesh Bhaskarao, Pawar Yogesh Bapurao	US Application Filed: 14/383,888 Filing Details :674/DEL/2012 Filed on 07/03/2012 PCT/IB2013/051807 Filed on 07/03/2013
6.	A Novel One-Step Process For Preparation Of Nanocrystalline Solid Dispersions	Arvind Kumar Bansal, Ajay Kumar Raju Dantuluri, Shete Ganesh Bhaskarao, Pawar Yogesh Bapurao	European Application Filed: EP20130724871 Filing Details :674/DEL/2012 Filed on 07/03/2012 PCT/IB2013/051807 Filed on 07/03/2013

AWARDS & HONOURS

Name	Discipline	Award
Prof. K. P. R. Kartha	Medicinal Chemistry	Member, Editorial Board, Carbohydrate Research
Prof. Arvind Kumar Bansal	Pharmaceutics	Guest editor for the special issue on "Excipients used in nano-formulations," Journal of Excipients and Food Chemicals [International Pharmaceutical Excipient Council (IPEC), USA], December 2014
Prof. Pramil Tiwari	Pharmacy Practice	Invited expert, Himachal Public Service Commission Joint Secretary ISPOR India chapter 2014-2016 Editorial Board Member, Indian Journal of Pharmacy Practice Editorial Board Member, International Journal of Drug Delivery & Technology Editorial Board Member, Journal of Pharmaceutical Care & Health Systems
Prof. Shyam Sunder Sharma	Pharmacology and Toxicology	Fellow of Indian Pharmacological Society (FIPS)
Prof. Shyam Sunder Sharma	Pharmacology and Toxicology	Editorial Advisory Board Member, Current Neurovascular Research Review Editor: International Journal of Pharmaceutical Sciences & Nanotechnology
Dr. Ipsita Roy	Biotechnology	Member, National Academy of Sciences
Dr. Sanyog Jain	Pharmaceutics	Expert member, Radiopharmaceutical Committee (RPC), Department of Atomic Energy (DAE), Govt. of India
Dr. Sanyog Jain	Pharmaceutics	Associate Editor (for India, Egypt and the Near East): AAPS PharmSciTech (Springer, USA)
Sabbir Khan	Pharmacology and Toxicology	ASIO 2015 International Toxicologist Award, In 54 th Annual Meeting of SOT in San Diego, California, USA
Sabbir Khan	Pharmacology and Toxicology	Gandhian Young Technological Innovation (GYTI) Award, Presented by Dr. R. A. Mashelkar at Rashtrapati Bhavan, New Delhi, Mar 8, 2015
Bhushan Munjal	Pharmaceutics	2014 Ranbaxy Research Scholar Award
Kaushik Thanki	Pharmaceutics	2014 AAPS Lipid based drug delivery graduate student award
Kaushik Thanki	Pharmaceutics	Mike How Award 2014, Industrial Pharmacy Section (IPS), International Pharmaceutical Federation (FIP)
Amit Jain	Pharmaceutics	The PharmInnova Award 2014 for best Ph.D Thesis in Pharmaceutical Sciences
Shiv Gupta	Natural Products	Best presentation award in "Workshop on Green Science and Technology of Global Young Researchers" conference, Shizuoka University, Japan, Jan 27-28, 2015.

Isha Bagdyan	Biotechnology	First prize. Poster presentation. In: 2 nd International Conference on Biotechnology and Bioinformatics (ICBB-2015), International Centre for Stem Cells Cancer and Biotechnology Pune, India, Feb. 6-8, 2015.
Shivani Mahajan	Natural Products	Best poster award at 4 th biennial International Conference on New Developments in Drug Discovery from Natural Products and Traditional Medicine (DDNPTM), Nov. 20-22, 2014, NIPER, S.A.S. Nagar
U. C. Agrahari	Natural Products	Best poster award at 4 th biennial International Conference on New Developments in Drug Discovery from Natural Products and Traditional Medicine (DDNPTM), Nov. 20-22, 2014, NIPER, S.A.S. Nagar
Puneet Khorana	Natural Products	Best poster award at 4 th biennial International Conference on New Developments in Drug Discovery from Natural Products and Traditional Medicine (DDNPTM), Nov. 20-22, 2014, NIPER, S.A.S. Nagar
Alka Chaudhary	Natural Products	Best poster award at 4 th biennial International Conference on New Developments in Drug Discovery from Natural Products and Traditional Medicine (DDNPTM), Nov. 20-22, 2014, NIPER, S.A.S. Nagar
Saptarshi Ghosh	Pharmaceutical Technology (Biotechnology)	Young Scientist Award, Third place for oral presentation in 'Bioprocessing India 2014', Institute of Chemical Technology Mumbai, Dec 17-19, 2014.
Shalu Jhajra	Pharmaceutical Analysis	Best poster award. Drug Metabolism & Discovery ADMET organized by SelectBio, Mumbai, India, Sept 11, 2014
Dhameliya Tejas Manjibhai	Medicinal Chemistry	Rajinibhai V. Patel PharmInnova Award for the most "Innovative Thesis" in M. Pharm. (Pharmaceutical Chemistry) category in Pharmaceutical Sciences 2014-15
Rameshwar Prajapati	Pharmacoinformatics	DAAD Sandwich Model Fellowship at Department of Pharmaceutical Chemistry, University of Bonn, Germany, June 12-Dec 31, 2014
Sumit Arora	Pharmaceutics	DAAD Scholarship 2014 for pursuing part of Ph.D. work at Max Planck Institute, Germany
Neetu Dayal	Pharmaceutical Technology (Process Chemistry)	Best poster award in International Symposium on Recent Advances in Medicinal Chemistry (ISRAM), NIPER, S.A.S. Nagar, Sept 8-10, 2014
Garima Priyadarshani	Medicinal Chemistry	Best poster award in International Symposium on Recent Advances in Medicinal Chemistry (ISRAM), NIPER, S.A.S. Nagar, Sept 8-10, 2014
Sheenu Abbat	Pharmacoinformatics	Best poster award at the Indo-US Conference on Molecular Modeling and Drug Design (M ² ID ²), NIPER, S.A.S. Nagar, Nov 3-6, 2014

Vishant M Boradia	Biotechnology	Student Bursary from Biochemical Society; ICMR International Travel Award.
Ankan Kumar Bhadra	Biotechnology	The Wellcome Trust/DBT India Alliance Travel Award; DST International Travel Award
Sabbir Khan	Pharmacology and Toxicology	Society of Toxicology (SOT) Graduate Student Travel Award
Shalu Jhajra	Pharmaceutical Analysis	Third place young scientist award at Clinical & Pharmaceutical Solutions through Analysis, Shanghai, China Apr 15-19, 2014
Sandeep Kumar	Pharmacology and Toxicology	DST International Travel Award ASBMB Travel Grant
Vikas Chaudhary	Medicinal Chemistry	DST International Travel Award
Kapil Gudala	Pharmacy Practice	Travel grant from International Society for Pharmacoeconomics Travel Grant from International Diabetes Federation
Rajiv Ahlawat	Pharmacy Practice	Travel grant from International Society of Nephrology ICMR International Travel Award
Rajender Kumar	Pharmacoinformatics	DST International Travel Award
Saptarshi Ghosh	Pharmaceutical Technology (Biotechnology)	DST International Travel Award
Shalu Jhajra	Pharmaceutical Analysis	DST International Travel Award CICS International Travel Award CSIR International Travel Award
Srinu Lavudiya	Pharmacy Practice	Travel Grant from International Diabetes Federation
Kaushik Thanki	Pharmaceutics	ICMR International Travel Award DBT International Travel Award Industry Pharmacy Group, FIP, the Netherlands
Bhushan Munjal	Pharmaceutics	Genentech, Inc., International Travel Award

VISITS ABROAD

Name	Discipline	Visit
Prof. Saranjit Singh	Pharmaceutical Analysis	Invited lecture on stability testing in industry, M/s Bilim Ilac, Istanbul, Turkey, May 25-June 01, 2014
Prof. P. V. Bharatam	Medicinal Chemistry	Conference on Modelling Chemical and Biological Reactivity, University of Heidelberg, Germany. Feb. 23-25, 2015 Delivered lectures at Helmholtz Institute of Pharmaceutical sciences, Saarbrücken, Saarland, Germany, ETH, Zurich, Switzerland
Prof. Inder Pal Singh	Natural Products	Invited Lecture at '2015 International symposium toward the future of advanced researches in Shizuoka University', Shizuoka University, Japan, Jan 27-28, 2015. Funded by Shizuoka University, Japan
Dr. Ipsita Roy	Biotechnology	10 th International Conference on Protein Stabilization (ProtStab 2014), Stresa, Italy, May 7-9, 2014
Dr. Sanyog Jain	Pharmaceutics	41 st Annual Meeting and Exposition of the Controlled Release Society (CRS), Chicago, Illinois, USA, July 13-16, 2014 Dept. of Pharmaceutical Sciences, Chicago College of Pharmacy, Midwestern University, Chicago, Illinois, USA; College of Pharmacy, Roosevelt University, Schaumburg, Illinois, July 05-07, 2014 Guest lectures at University of Louisville, Louisville, Kentucky; Department of Pharmaceutical Sciences, College of Pharmacy, South Dakota State University, Brookings, South Dakota, July 08-11, 2014
Dr. Jayeeta Bhaumik	Pharmaceutical Technology (Biotechnology)	Oral presentation at 4 th World Congress on Cancer Science and Therapy, Chicago, Illinois, USA, Oct 20-22, 2014
Kaushik Thanki	Pharmaceutics	Poster presentation at 5 th Pharmaceutical Sciences World Congress (PSWC-2014), Melbourne, Australia Apr 13-16, 2014
Shalu Jhajra	Pharmaceutical Analysis	Poster presentation at Clinical & Pharmaceutical Solutions through Analysis, Shanghai, China, Apr 15-19, 2014
Rajiv Ahlawat	Pharmacy Practice	Poster presentation at the 19 th Annual Meeting of ISPOR Montreal Canada, May 31-June 4, 2014
Rajender Kumar	Pharmacoinformatics	Poster presentation at IBBI 14 - Conference on Isolated Biomolecules and Biomolecular Interactions, Porquerolles Island, France May 18-23, 2014

Vikas Chaudhary	Medicinal Chemistry	Poster presentation at the Tetrahedron Symposium on "Challenges in Bioorganic and Organic Medicinal Chemistry", London, UK June 24-27, 2014
Saptarshi Ghosh	Pharmaceutical Technology (Biotechnology)	Poster presentation at Gordon Research Conference; Rhode Island, USA July 6-11, 2014
Vishant M Boradia	Biotechnology	Oral presentation/Abstract/Poster presentation at the Biochemical Society Conference, London, UK July 29-30, 2014
Neha Trivedi	Pharmacoinformatics	DAAD-funded Modern Computational Science - Summer School at University of Oldenburg, Oldenburg, Germany, Aug 25-Sept 5, 2014
Satyaprakash Tripathi	Pharmacoinformatics	DAAD-funded Modern Computational Science - Summer School at University of Oldenburg, Oldenburg, Germany, Aug 25-Sept 5, 2014
Bhushan Munjal	Pharmaceutics	Poster presentation at GPEN (Graduate Pharmaceutics Education Network) 2014, University of Helsinki, Finland Aug 27-30, 2014
Ankan Kumar Bhadra	Biotechnology	Oral presentation. FEBS EMBO 2014, Paris, France, Aug 30-Sept 4, 2014
Kaushik Thanki	Pharmaceutics	Poster presentation at 74 th FIP World Congress, Bangkok, Thailand, Aug 31-Sept 4, 2014
Shalu Jhajra	Pharmaceutical Analysis	Poster presentation at International ISSX & JSSX Meeting, San Francisco, USA, Oct 17-24, 2014
Kapil Gudala	Pharmacy Practice	Poster presentation at 30 th International Conference on Pharmacoepidemiology & Therapeutic Risk Management, Taipei, Taiwan Oct 24-27, 2014
Kaushik Thanki	Pharmaceutics	Poster presentation at 2014 AAPS Annual Meeting and Exposition, San Diego, USA, Nov 2-6, 2014
Kapil Gudala	Pharmacy Practice	Poster presentation at 10 th International Diabetes Federation-Western Pacific Region (IDF-WPR) Congress 2014, Singapore Nov 21-24, 2014
Srinu Lavudiya	Pharmacy Practice	Poster presentation at 10 th International Diabetes Federation-Western Pacific Region (IDF-WPR) Congress 2014, Singapore Nov 21-24, 2014
Shiv Gupta	Natural Products	Workshop on Green Science and Technology of Global Young Researchers conference, Shizuoka University, Japan, Jan 27-28, 2015.

Chaitanya Kr. Jaladanki	Medicinal Chemistry	Training School on Modelling Chemical and Biological (Re)activity (MCBR4), University of Heidelberg, Germany, supported by the organizers of the MCBR4 conference, Feb 26-Apr 26, 2015
Mahesh Sharma	Pharmacoinformatics	Whole Cell Modeling Summer School, University of Rostock, Rostock, Germany Mar 9-13, 2015
Rajiv Ahlawat	Pharmacy Practice	Poster presentation at the 23 rd Annual Meeting of ISN, South Africa Mar 13-17, 2015.
Sabbir Khan	Pharmacology and Toxicology	Poster presentation at 54 th Annual Meeting of Society of Toxicology at San Diego, California, USA, March 22-26, 2015.
Sandeep Kumar	Pharmacology and Toxicology	Poster presentation at the Experimental Biology Meeting, 2015, Boston, USA, Mar 28-Apr 1, 2015
Vajinder Kumar	Medicinal Chemistry	Poster presentation at the the 248th ACS Meeting, San Francisco, USA, Aug 10-14, 2014



Prof. Shyam S. Sharma, Department of Pharmacology and Toxicology, NIPER, S.A.S. Nagar receiving Fellow of Indian Pharmacological Society (FIPS) for his outstanding contribution in the field of pharmacological Sciences from the President of Indian Pharmacological Society (IPS) Dr Dinesh Kumar and Prof. Y. K. Gupta, former President of IPS during an inaugural function of 47th Annual Conference of Indian Pharmacological Society on December 28-30, 2014 at Guwahati.

SEMINARS/WORKSHOPS

Date	Seminars/Workshops
June 6, 2014	Seminar on 'Formulation Development of Liquid Oral Dosage Forms' (SMPIC)
September 5, 2014	Seminar on 'Dissolution and Solubility Enhancement Techniques in Pharmaceutical Formulations' (SMPIC)
September 8-10, 2014	International Symposium in Recent Advances in Medicinal Chemistry (ISRAM)
November 3-6, 2014	Indo-US Conference on Molecular Modeling and Drug Design (M ² ID ²)
November 20-22, 2014	4 th biennial international Conference on New Developments in Drug Discovery from Natural Products and Traditional Medicine (DDNPTM)
Nov. 24-Dec. 4, 2014	Advanced Analytical Techniques: Basic Principles & Application for Quality
November 27, 2014	Seminar on 'HPLC Method Development and Validation' (SMPIC)
February 18-21, 2015	7 th International symposium on Drug Metabolism and Pharmacokinetics (DMPK)
March 20, 2015	Seminar on 'Process Validation and Equipment Qualification: A Risk Based Approach' (SMPIC)



Inauguration of Indo-US Conference on Molecular Modeling and Drug Design (M²ID²), 3rd-6th Nov. 2014, NIPER, S.A.S. Nagar



Cultural event at Indo-US Conference on Molecular Modeling and Drug Design (M²ID²), 3rd-6th Nov. 2014, NIPER, S.A.S. Nagar

LIST OF EMPLOYEES: SCIENTIFIC AND TECHNICAL STAFF

Name	Designation
Dr. K. K. Bhutani	Director (Officiating)
Dr. A. K. Chakraborti	Dean
Dr. P. P. Singh	Associate Dean (Academic)
Dr. G. B. Jena	Associate Dean (Students)
Department of Medicinal Chemistry	
Dr. A. K. Chakraborti	Professor and Head
Dr. K. P. R. Kartha	Professor
Dr. P. V. Bharatam	Professor
Dr. Rahul Jain	Professor
Dr. Vipin Nair	Associate Professor
Dr. Sankar Guchhait	Associate Professor
Dr. Meenakshi Jain	Scientist Grade I
Dr. Srikant Bhagat	Scientist Grade I
Mr. Pravin Jaikrishna Wanjari	Technical Assistant
Mr. G. Murugesan	Technical Assistant (Glass Blowing)
Mr. Santosh Kumar Giri	Technical Assistant
Mr. Anang Pal	Technical Assistant
Mr. C.V.Ravi Prakash Reddy	Technical Assistant
Mr. Binod Kumar Prasad	Junior Technical Assistant
Centre for Pharmacoinformatics	
Dr. P. V. Bharatam	Professor and In Charge
Dr. Prabha Garg	Professor
Dr. Elizabeth M. Sobhia	Associate Professor
Mr. Vishnu Kumar Sharma	Junior Technical Assistant
Department of Natural Products	
Dr. K. K. Bhutani	Professor and Head
Dr. Sanjay Jachak	Professor
Dr. Inder Pal Singh	Professor
Dr. A. S. Sandhu	Garden Supervisor
Dr. S.M. Tripathi	Scientist Grade I (TM)
Dr. Alok Goyal	Scientist Grade II
Dr. Pamita Bhandari	Scientist Grade II
Mr. Mohd. Shahid Khan	Technical Assistant
Mr. Sanjay Vir	Technical Assistant
Mr. Amit Srivastava	Technical Assistant
Mr. K. Prasanna	Junior Technical Assistant
Mr. Rakesh Kumar	Junior Technical Assistant

Department of Pharmaceutical Analysis

Dr. Saranjit Singh	Professor and Head
Dr. Archana Sahu	Scientist Grade II
Mr. Sanjay Kumar	Scientist Grade II
Ms. Parul Sharma	Technical Assistant

Department of Pharmacology and Toxicology

Dr. K. B. Tikoo	Professor and In Charge
Dr. S. S. Sharma	Professor
Dr. G. B. Jena	Associate Professor
Dr. Jitendra Narain Singh	Scientist Grade II
Dr. Malti Singh	Scientist Grade II
Ms. Rupinder Pal Kaur	Technical Assistant
Ms. Nidhi Singh	Technical Assistant
Mr. Sharath Babu S.	Technical Assistant
Mr. Jang Bahadur Ram	Junior Technical Assistant

Center for Infectious Diseases

Dr. P. P. Singh	Professor
Dr. Savita Singh	Scientist Grade I

Department of Pharmaceutical Technology

Dr. U. C. Banerjee	Professor and Head
Dr. Manjinder Singh	Assistant Professor
Dr. Joydev Laha	Assistant Professor
Dr. Alka Mittal	Scientist Grade II
Mr. S. Roy	Scientist Grade II
Mr. Villendra Singh Negi	Junior Technical Assistant
Mr. Subhash Chander	Junior Technical Assistant

Department of Pharmaceutics

Dr. Arvind K. Bansal	Professor and Head
Dr. Sanyog Jain	Associate Professor
Dr. Abhay T. Sangamwar	Assistant Professor
Mr. Gunjan	Technical Assistant
Mr. Kishore Totaba Dhotare	Technical Assistant
Mr. Mahesh Chand	Technical Assistant
Mr. Mahajan R. Ramesh Rao	Junior Technical Assistant
Mr. Sanjaya Kumar Samal	Junior Technical Assistant

Department of Biotechnology

Dr. U. C. Banerjee	Professor and In Charge
Dr. Ipsita Roy	Associate Professor
Dr. Abhay H. Pande	Associate Professor

Dr. Chaaya Iyengar	Assistant Professor
Dr. Sushma Singh	Assistant Professor
Mr. Shivcharan Prasad	Technical Assistant
Mr. N. Kishore Babu	Technical Assistant
Mr. Ranbir Singh	Junior Technical Assistant
Mr. Rajan Kumar Tripathy	Junior Technical Assistant
Mr. Rajesh Kumar	Junior Technical Assistant

Department of Pharmacy Practice

Dr. Pramil Tiwari	Professor and Head
Dr. Dipika Bansal	Assistant Professor
Dr. Amit Kondal	Scientist Grade I
Dr. Pooja Arora	Scientist Grade I

Department of Pharmaceutical Management

Dr. Anand Sharma	Professor and In Charge
Dr. Sunil Gupta	Assistant Professor
Dr. Anil Angrish	Assistant Professor

Pharmaceutical Heritage

Dr. K. P. R. Kartha	Professor and In Charge
Mr. M. Arbindo Singh	Museum Curator

Computer Centre

Dr. A. K. Chakraborti	Professor and In Charge
Mr. Rajwinder Singh	Head
Mr. Deepak Joshi	Technical Assistant
Mr. Promod Kumar	Data Processing Assistant
Mr. Satendra Rawat	Data Processing Assistant

Library and Information Centre

Dr. A. K. Chakraborti	Professor and In Charge
Mr. Anurag Sharma	Library and Information Assistant
Mr. Amit Thapar	Library and Information Assistant

Central Instrument Laboratory

Dr. Rahul Jain	Professor and In Charge
Mr. Ashok Aggarwal	Scientific Officer
Mr. Vikas Grover	Technical Supervisor Grade II
Dr. Manish Kumar Goyal	Technical Assistant
Mr. Sandeep Sachdeva	Technical Assistant
Mr. Mallikarjun Bolusani	Technical Assistant
Dr. Ashish Chauhan	Technical Assistant
Ms. Bharti Mittu	Technical Assistant
Mr. Rajdeo Kumar	Technical Assistant

Ms. Preeti	Technical Assistant
Mr. Anil Kr. Saw	Junior Technical Assistant
Mr. Jashwant Singh	Junior Technical Assistant
Mr. Vishal Gupta	Junior Technical Assistant
Mr. Vinod Kumar	Junior Technical Assistant
Technology Development Centre	
Dr. Manjinder Singh	Assistant Professor and In Charge
Dr. Animesh Roy	Scientist Grade II
Mr. Harvinder Singh Anand	Scientist Grade II
Mr. Mukesh Kumar	Technical Assistant
Mr. Anil Bhardwaj	Junior Technical Assistant
Mr. Sunil Kumar	Junior Technical Assistant
Mr. Manish Kumar Verma	Junior Technical Assistant
Mr. Tara Dutt Bhatt	Junior Technical Assistant
National Bioavailability Centre	
Dr. Arvind Bansal	Professor and In Charge
Mr. Inderjit Singh	Scientist Grade II
Ms. Kanwal Jit Kaur	Scientist Grade II
Mr. B. Shantharam R.	Technical Assistant
National Toxicology Centre	
Dr. K. B. Tikoo	Professor and In Charge
Ms. Vibha Kohli	Junior Technical Assistant
Central Biological Testing Laboratory	
Dr. Balkar Singh	Scientist Grade II
Dr. Anubha Singh	Scientist Grade II
Mr. S. S. Jhamb	Scientist Grade II
Mr. Vijay K. Mishra	Junior Technical Assistant
Central Animal Facility	
Dr. S. S. Sharma	Professor and In Charge
Dr. K. Srinivasan	Scientist Grade I
Mr. Mohd. Yamin Saifi	Junior Technical Assistant
Mr. Sanjeev Bhardwaj	Junior Technical Assistant
Small and Medium Pharmaceutical Industries Centre	
Dr. Arvind Bansal	Professor and In Charge
Ms. Nishi Sharda	Scientist Grade I
Mr. Baljinder Singh	Technical Assistant
Intellectual Property Rights Cell	
Dr. A. K. Chakraborti	Professor and In Charge
Mr. Chandan Chandna	Scientist Grade I

Technical Cell

Dr. Alok Goyal

Mr. Chandan Chandra

Mr. Lalit Sood

Scientist Grade II

Scientist Grade I

Stenographer Gr. C

Academic & Examination Section

Govindaraj G.

Amandeep Jindal

Junior Technical Assistant (Audio Visual)

Programmer

Engineering Section

Mr. Sanjiv Kumar Taggar

Mr. Ajay K. Sharma

Mr. Major Singh

Mr. T. P. Singh

Mr. Kamal Kishore

Chief Maintenance Engineer

Assistant Engineer

Assistant Engineer

Junior Engineer

Sub-overseer



Swachh Bharat Abhiyan activities at NIPER, S.A.S. Nagar



Swachh Bharat Abhiyan activities at NIPER, S.A.S. Nagar

LIST OF EMPLOYEES: ADMINISTRATIVE STAFF

Name	Designation
Wg. Cdr. PJP Singh Waraich (Retd.)	Registrar
Mr. Jitendra Kumar Chandel	Deputy Registrar (Finance and Accounts)
Mr. M. Jose	Finance and Accounts Officer
Mr. B. L. Sharma	Assistant Registrar (Establishment)
Ms. Bhuvan Gautam	Store and Purchase Officer
Mr. Kshitij Sharma	Security Officer
Mr. K. G. N. Acharya	Secretary to Director
Mr. Gautam Khanna	Section Officer (Store & Purchase)
Mr. Vishal Kumar	Section Officer (Finance and Accounts)
Mr. Ranbir Singh Kanwar	Security Supervisor
Mr. K. S. Saini	Stenographer Gr. B (Pharmaceutical Management)
Mr. Deepraj Sharma	Stenographer Gr. B (Recruitment Cell and PR Cell)
Mr. John K. J.	Stenographer Gr. C (Pharmacology and Toxicology)
Mr. Manoj K. Sood	Stenographer Gr. C (Registrar's Office)
Mr. Lalit Sood	Stenographer Gr. C (Director's Office, Technical Cell and Natural Products)
Mr. Binay K. Sinha	Stenographer Gr. C (A&E)
Mrs. Yogita	Stenographer Gr. C (Medicinal Chemistry)
Mrs. Nisha Sharma	Stenographer Gr. C (S&P)
Ms. Uma	Stenographer Gr. C (A&E)
Mr. Ashu Kumar	Stenographer Gr. C (Pharmaceutical Analysis)
Mr. Anil Gupta	Storekeeper (S&P; Engineering Stores)
Mr. S. U. S. Ramesh	Storekeeper (S&P)
Mr. Jairaj Meena	Storekeeper (S&P)
Mr. Lipton Sharma	Data Processing Assistant (Administration)
Ms. Sukhwinder Kaur	Assistant Gr. I (S&P)
Ms. Prakriti Aggarwal	Assistant Gr. I (A&E)
Mr. Nityanand Gahan	Assistant Gr. I (F&A)
Ms. Vijay Kumari Sharma	Assistant Gr. II (Biotechnology)
Ms. Dimple Sohal	Assistant Gr. II (F&A)
Mr. Pardeep K. Verma	Data Entry Operator (A&E)
Mr. Geeta Prasad Nautiyal	Data Entry Operator (S&P)
Mr. Baldev Raj Bains	Data Entry Operator (Dean's Office)
Ms. Promila Thakur	Jr. Hindi Translator (Hindi Section/Administration)
Mr. Dheeraj Bhardwaj	Guest House In Charge
Mr. Arun Gautam	Assistant Gr. III (S&P)
Mr. Mohinder Singh Dhiman	Assistant Gr. III (F&A)
Ms. Usha Rani	Assistant Gr. III (Registrar's Office)

Mr. Gagandeep Singh	Assistant Gr. III (Administration)
Ms. Beena Negi	Receptionist-cum-Telephone Operator
Mr. Kuldeep Singh Chouhan	Receptionist-cum-Telephone Operator
Mrs. Meena	Stenographer Gr. D (Pharmacy Practice)
Ms. Meenakshi	Stenographer Gr. D (Pharmacology & Toxicology)
Ms. Arti Chetri	Stenographer Gr. D (Pharmaceutics)
Mr. Sunil Kumar Pandey	Hindi Typist (Hindi Cell)

Staff Resigned and Relieved

Mr. Hardeep Singh	Section Officer (Administration)	April 2014
Mrs. Geeta K. Yadav	Receptionist-cum-Telephone Operator	April 2014
Sh. Gaurav Prakash	Tech. Supr./Scientist Grade-I (Technical Cell)	September 2014
Mr. Rajesh Moza	Dy. Registrar (A&E)	December 2014
Ms. Harleen Kaur	Assistant Gr. III (Registrar's office)	March 2015
Sh. Harvinder Singh Anand [Tech. Supr./Scientist Grade-II (TDC)] left for his heavenly abode in Dec. 2014. The Institute mourns his loss and prays for the welfare of his family.		



National Unity Day celebrations at NIPER, S.A.S. Nagar

नाईपर में राजभाषा गतिविधियाँ (2014–15)

- नाईपर राजभाषा कार्यान्वयन समिति की बैठकें:

मंत्रालय द्वारा दिए गए लक्ष्यों के अनुसार प्रत्येक तिमाही में राजभाषा कार्यान्वयन समिति की बैठक आयोजित की जाती हैं। संस्थान में वित्तीय वर्ष अप्रैल 2014 से मार्च 2015 तक राजभाषा कार्यान्वयन समिति की चार बैठकें आयोजित की गईं। यह बैठकें 30 जून 2014, 27 अक्टूबर 2014, 30 जनवरी 2015 तथा 27 मार्च 2015 को आयोजित की गईं। इन बैठकों में संस्थान में हो रही राजभाषा गतिविधियों, कार्यान्वयन, प्रचार—प्रसार, प्रयोग एवं प्रगति हेतु चर्चा की गई।

- नगर राजभाषा कार्यान्वयन समिति (नराकास) चण्डीगढ़ द्वारा दिनांक 11–12–2014 को टैगोर थियेटर, सेक्टर-18 बी, चण्डीगढ़ में वार्षिक राजभाषा पुरस्कार वितरण एवं सांस्कृतिक समारोह का आयोजन किया गया जिसकी अध्यक्षता श्री स्वतंत्र कुमार, प्रधान मुख्य आयकर आयुक्त, उ.प. क्षेत्र, एवं अध्यक्ष नराकास, चण्डीगढ़ ने की। समारोह में नाईपर मोहाली को वर्ष 2012–13 में राजभाषा के प्रयोग के लिए सराहनीय प्रयासों हेतु नगर राजभाषा कार्यान्वयन समिति द्वारा द्वितीय पुरस्कार से सुशोभित किया गया तथा नराकास



संस्थान को राजभाषा के प्रयोग के लिए सराहनीय प्रयासों हेतु द्वितीय पुरस्कार से पुरस्कृत करते श्री स्वतंत्र कुमार, प्रधान मुख्य आयकर आयुक्त, उ.प. क्षेत्र एवं अध्यक्ष नराकास, चण्डीगढ़।

संस्थान की गृह पत्रिका 'नाईपर दर्पण' को तृतीय पुरस्कार से पुरस्कृत करते श्री स्वतंत्र कुमार, प्रधान मुख्य आयकर आयुक्त, उ.प. क्षेत्र एवं अध्यक्ष नराकास, चण्डीगढ़।



के सदस्य कार्यालयों द्वारा प्रकाशित पत्रिकाओं में वर्ष 2012-13 के लिए 'नाईपर दर्पण' को तृतीय पुरस्कार से सम्मानित किया गया। डॉ. सविता सिंह, कार्यकारी हिन्दी अधिकारी को वर्ष 2012-13 में राजभाषा का प्रयोग बढ़ाने के लिए किए गए प्रशंसनीय प्रयासों हेतु प्रशंसा पत्र से सम्मानित किया गया।

• हिन्दी पखवाड़ा

15 से 30 सितम्बर 2015 तक नाईपर में हिन्दी पखवाड़ा मनाया गया

राष्ट्रीय औषधीय शिक्षा एवं अनुसंधान संस्थान (नाईपर), एस.ए.एस. नगर (मोहाली) में 15 से 30 सितम्बर 2014 तक राजभाषा के प्रचार-प्रसार के लिए 'हिन्दी पखवाड़ा' का आयोजन किया गया। हिन्दी पखवाड़ा के आयोजन का मुख्य उद्देश्य, संस्थान में हिन्दी भाषा का प्रचार-प्रसार तथा राजभाषा के प्रयोग को अधिक से अधिक प्रोत्साहित करना है।

15 सितम्बर से प्रारंभ हुए हिन्दी पखवाड़ा के दौरान 06 विभिन्न प्रतियोगिताओं में लगभग 100 प्रतिभागियों ने अपनी सहभागिता निभाई।

30 सितम्बर 2014 को आयोजित हिन्दी पखवाड़ा के समापन कार्यक्रम के मुख्य अतिथि प्रो. क.कु भूटानी, कार्यवाहक निदेशक, नाईपर, एस.ए.एस. नगर थे। उन्होंने अपने विचार रखते हुए कहा कि हमारे माननीय प्रधानमंत्री श्री नरेन्द्र मोदी जी ने संयुक्त राष्ट्र की सभा को हिन्दी में संबोधित करते हुए राष्ट्र को यह संदेश दिया कि हमें अपनी राष्ट्रभाषा पर गर्व होना चाहिए और चाहे कितना भी बड़ा मंच क्यों न हो हमें अपने विचार अपनी राष्ट्रभाषा में व्यक्त करने में कोई संकोच नहीं करना चाहिए। प्रो. भूटानी ने यह भी कहा कि केवल हिन्दी का ज्ञान होना ही पर्याप्त नहीं है, बल्कि हमें हिन्दी का प्रयोग अपने दैनिक कार्यों में करना चाहिए। उन्होंने कहा कि भारत सरकार हिन्दी को प्रोत्साहित करने के लिए अनेकों सराहनीय कदम उठा रही हैं इन्हीं सराहनीय कदमों का परिणाम होगा कि आने वाले समय में हमको हिन्दी के प्रचार की आवश्यकता नहीं होगी,

सम्पूर्ण राष्ट्र में हिन्दी का प्रयोग होगा। संस्थान केन्द्र सरकार द्वारा दिये गये निर्देशों का पालन करने के लिए प्रतिबद्ध है।

संस्थान के कुलसचिव विंग कमांडर पी.जे.पी. सिंह वडैच (से.नि.) ने निदेशक महोदय, हिन्दी पखवाड़ा आयोजन समिति, समस्त अधिकारी एवं कर्मचारियों का धन्यवाद व्यक्त किया जिन्होंने हिन्दी पखवाड़ा के आयोजन में अपना महत्वपूर्ण योगदान दिया। उन्होंने यह भी कहा कि हमें दैनिक व्यवहार में हिन्दी का उपयोग करना चाहिए।

डॉ. सविता सिंह, कार्यकारी राजभाषा अधिकारी एवं वैज्ञानिक ने संस्थान के वर्ष 2013-14 का राजभाषा प्रगति प्रतिवर्दन प्रस्तुत किया।

हिन्दी पखवाड़ा के समापन कार्यक्रम के दौरान विभिन्न हिन्दी प्रतियोगिताओं के विजयी प्रतिभागियों को प्रो. क. कु. भूटानी, कार्यवाहक निदेशक द्वारा नगद पुरस्कार तथा प्रमाण-पत्र से पुरस्कृत किया गया। वर्ष 2013-2014 में हिन्दी में प्रशंसनीय कार्य के लिए प्रो. प्रमिल तिवारी, विभागाध्यक्ष को अधिकारी वर्ग में, श्री गीता प्रसाद नौटियाल, डाटा एंट्री ऑपरेटर को और श्री भान्ताराम आर. भदे, तकनीकी सहायक (गैर हिन्दी भाषी क्षेत्र से) को कर्मचारी वर्ग में पुरस्कृत किया गया। इसके अतिरिक्त हिन्दी पखवाड़े के दौरान आयोजित प्रतियोगिताओं के निर्णायकों को भी सम्मानित किया गया।

समापन कार्यक्रम में नाईपर के वरिष्ठ अधिकारीगण कर्मचारीगण तथा विद्यार्थीगण उपस्थित थे। कार्यक्रम का सफल संचालन डॉ. संयोग जैन, सह प्राध्यापक ने किया।

• हिन्दी कार्यशालाएं:

हिन्दी कार्यशाला – 06 जून 2014

06 जून 2014 को नाईपर में राजभाषा के प्रचार-प्रसार हेतु हिन्दी कार्यशाला का आयोजन किया गया। इस कार्यशाला में संस्थान के अधिकारियों, कर्मचारियों एवं



30 सितम्बर को हिन्दी पखवाड़ा के समापन कार्यक्रम पर मंचासीन (बाएं से) प्रो. यू.सी. बैनर्जी, विभागाध्यक्ष, प्रो. क.कु. भूटानी, कार्यवाहक निदेशक, (मध्य में) तथा कुलसचिव विंग कमांडर पी.जे.पी. सिंह वडैच (से.नि.)।

हिन्दी कार्यशाला के दौरान संयुक्त रूप से विजयी प्रतिभागियों को पुरस्कृत करते प्रो. प्रतिपाल सिंह, प्राध्यापक



हिन्दी पखवाड़े के समापन समारोह में उपस्थित वरिष्ठ अधिकारीगण, कर्मचारीगण एवं विद्यार्थीगण।



हिन्दी कार्यशाला को सम्बोधित करती डॉ. सविता सिंह, कार्यकारी हिन्दी अधिकारी



विद्यार्थियों ने भाग लिया। कार्यशाला का उद्देश्य राजभाषा के अधिक से अधिक प्रयोग के लिए नाईपरवासियों को अभिप्रेरित करना था। कार्यशाला को मनोरंजक एवं ज्ञानवर्धक बनाने के लिए दो प्रतियोगिताओं का आयोजन भी किया गया। जिसमें प्रथम प्रतियोगिता “स्लोगन प्रतियोगिता” तथा द्वितीय प्रतियोगिता “भाषण प्रतियोगिता” थी जिसका विषय “महिला सशक्तिकरण” था। दोनों प्रतियोगिताओं में लगभग 25 प्रतिभागी सम्मिलित हुये। “स्लोगन प्रतियोगिता” में श्री हार्दिक भाह (छात्र) प्रथम स्थान पर तथा सुश्री हिना लतीफ़ निज़ामी (छात्रा) द्वितीय स्थान पर रही तथा “भाषण प्रतियोगिता” में प्रथम स्थान पर सुश्री किंजल पटेल (छात्रा) तथा सुश्री हिना लतीफ़ निज़ामी (छात्रा) एवं श्री हार्दिक भाह (छात्र) संयुक्त रूप से द्वितीय स्थान पर रहे। विजयी प्रतिभागियों को प्रो. प्रतिपाल सिंह, प्राध्यापक द्वारा क्रमशः ₹0 300 /— एवं ₹0 200 /— नगद पुरस्कार एवं प्रमाणपत्र से सम्मानित किया गया।

कार्यशाला के समापन अवसर पर डॉ. सविता सिंह, कार्यकारी हिन्दी अधिकारी ने उपस्थित नाईपरवासियों का आभार जताया और अपने विचार व्यक्त करते हुए कहा कि संस्थान के हिन्दी कक्ष का यह राजभाषा के प्रचार-प्रसार के लिए एक सराहनीय कदम है, मैं आशा करती हूँ कि आगामी हिन्दी से संबंधित कार्यक्रमों में अधिक से अधिक नाईपरवासी अपनी भागीदारी निभायेंगे।

कार्यशाला में आयोजित स्लोगन प्रतियोगिता में निर्णायक की भूमिका में डॉ. ईप्सिता रॉय, सहायक प्राध्यापक तथा “भाषण प्रतियोगिता” में निर्णायक की भूमिका प्रो. प्रतिपाल सिंह, प्राध्यापक ने निभाई।

कार्यशाला में कई वरिष्ठ अधिकारीगण, कर्मचारीगण, तथा विद्यार्थीगण सहित लगभग 40 लोग उपस्थित थे।

हिन्दी कार्यशाला – 17 दिसम्बर 2014

17 दिसम्बर 2014 को नाईपर में राजभाषा के प्रचार-प्रसार हेतु हिन्दी कार्यशाला का आयोजन किया

गया। इस कार्यशाला में संस्थान के अधिकारियों, कर्मचारियों एवं विद्यार्थियों ने भाग लिया। कार्यशाला का उद्देश्य राजभाषा के अधिक से अधिक प्रयोग के लिए नाईपरवासियों को अभिप्रेरित करना था। कार्यशाला को मनोरंजक एवं ज्ञानवर्धक बनाने के लिए दो प्रतियोगिताओं का आयोजन भी किया गया। जिसमें प्रथम प्रतियोगिता “सुलेख प्रतियोगिता” तथा द्वितीय प्रतियोगिता “वाद-विवाद” थी जिसका विषय “क्या फिल्में (सिनेमा) सामाजिक बुराईयों का कारण है?” था। दोनों प्रतियोगिताओं में लगभग 20 प्रतिभागी सम्मिलित हुये। “सुलेख प्रतियोगिता” में श्री समीर आर. मोदी (छात्र) प्रथम स्थान पर तथा सुश्री नम्रता सिंह (छात्रा) द्वितीय स्थान पर रही तथा “वाद-विवाद प्रतियोगिता” में प्रथम स्थान पर श्री देवेश कुमार जैन (छात्र) तथा श्री स्वप्निल सिंह (छात्र) एवं डॉ. बलकार सिंह, वैज्ञानिक संयुक्त रूप से द्वितीय स्थान पर रहे। विजयी प्रतिभागियों को प्रो. प्रतिपाल सिंह, प्राध्यापक तथा ले. कर्नल श्री एस. के. तग्गड़ (से.नि.) मुख्य अनुरक्षण अभियन्ता द्वारा क्रमशः ₹0 300 /— एवं ₹0 200 /— नगद पुरस्कार एवं प्रमाणपत्र से सम्मानित किया गया।

कार्यशाला के समापन अवसर पर डॉ. सविता सिंह, कार्यकारी हिन्दी अधिकारी ने उपस्थित नाईपरवासियों का आभार जताया तथा विजेताओं को बधाई दी।

कार्यशाला में आयोजित सुलेख प्रतियोगिता में निर्णायक की भूमिका में डॉ. ईप्सिता रॉय, सह प्राध्यापक तथा “वाद-विवाद प्रतियोगिता” में निर्णायक की भूमिका प्रो. प्रतिपाल सिंह, प्राध्यापक ने निभाई।

कार्यशाला में कई वरिष्ठ अधिकारीगण, कर्मचारीगण, तथा विद्यार्थीगण सहित लगभग 30 लोग उपस्थित थे।

हिन्दी कार्यशाला – 23 फरवरी 2015

23 फरवरी 2015 को नाईपर में राजभाषा के प्रचार-प्रसार हेतु हिन्दी कार्यशाला का आयोजन किया गया। इस कार्यशाला में संस्थान के अधिकारियों, कर्मचारियों एवं विद्यार्थियों ने भाग लिया। कार्यशाला का



हिन्दी कार्यशाला में उपस्थित अधिकारीगण,
कर्मचारीगण तथा विद्यार्थीगण

हिन्दी कार्यशाला में उपस्थित अधिकारीगण,
कर्मचारीगण तथा विद्यार्थीगण



विजयी प्रतिभागी को पुरस्कृत करती डॉ. ईप्सिता
राय, सह प्राध्यापक

उद्देश्य राजभाषा के अधिक से अधिक प्रयोग के लिए नाईपरवासियों को अभिप्रेरित करना था। कार्यशाला को मनोरंजक एवं ज्ञानवर्धक बनाने के लिए दो प्रतियोगिताओं का आयोजन भी किया गया। जिसमें प्रथम प्रतियोगिता “अंग्रेजी टिप्पणियों का हिन्दी अनुवाद” तथा द्वितीय प्रतियोगिता “स्वरचित कविता वाचन” थी। दोनों प्रतियोगिताओं में लगभग 25 प्रतिभागी सम्मिलित हुये। “अंग्रेजी टिप्पणियों का हिन्दी अनुवाद प्रतियोगिता” में डॉ. बलकार सिंह, वैज्ञानिक प्रथम स्थान पर तथा श्री महेभा चन्द, तकनीकी सहायक द्वितीय स्थान पर रहे तथा “स्वरचित कविता वाचन प्रतियोगिता” में प्रथम स्थान पर श्री देवेश कुमार जैन (छात्र) तथा श्री बालाजी पिरानी सूर्यवंशी (छात्र) द्वितीय स्थान पर रहे। विजयी प्रतिभागियों को डॉ. ईप्सिता राय, सह प्राध्यापक तथा डॉ. पूजा अरोड़ा, वैज्ञानिक द्वारा क्रमशः ₹0 300/- एवं ₹0 200/- नगद पुरस्कार एवं प्रमाणपत्र से सम्मानित किया गया।

कार्यशाला के समापन अवसर पर डॉ. सविता सिंह, कार्यकारी हिन्दी अधिकारी ने उपस्थित नाईपरवासियों का आभार जताया तथा विजेताओं को बधाई दी और कहा कि मैं आशा करती हूँ कि आप अन्य लोगों को भी प्रेरित करके आगामी कार्यशाला में अधिक से अधिक संख्या में उपस्थित होंगे।

कार्यशाला में आयोजित “अंग्रेजी टिप्पणियों का हिन्दी अनुवाद” में निर्णायक की भूमिका में डॉ. पूजा अरोड़ा,

वैज्ञानिक तथा “स्वरचित कविता वाचन प्रतियोगिता” में निर्णायक की भूमिका डॉ. संयोग जैन, सह प्राध्यापक ने निभाई।

कार्यशाला में कई वरिष्ठ अधिकारीगण, कर्मचारीगण, तथा विद्यार्थीगण सहित लगभग 40 लोग उपस्थित थे।

नगर राजभाषा कार्यान्वयन समिति (नराकास), चण्डीगढ़ की बैठकें:

- चण्डीगढ़ नगर राजभाषा कार्यान्वयन समिति की बैठक किसान भवन, सैक्टर 35 में 26.06.2014 को आयोजित की गई जिसकी अध्यक्षता श्री स्वतंत्र कुमार, प्रधान मुख्य आयकर आयुक्त, उ.प. क्षेत्र, एवं अध्यक्ष नराकास, चण्डीगढ़ ने की जिसमें केन्द्र सरकार के विभागों, संगठनों तथा संस्थानों के करीब 80 से अधिक प्रतिनिधि सम्मिलित हुए। नाईपर से इस बैठक का प्रतिनिधित्व डॉ. सविता सिंह, कार्यकारी हिन्दी अधिकारी ने किया।

चण्डीगढ़ नगर राजभाषा कार्यान्वयन समिति की बैठक किसान भवन, सैक्टर 35 में 27.11.2014 को आयोजित की गई जिसकी अध्यक्षता श्री स्वतंत्र कुमार, प्रधान मुख्य आयकर आयुक्त, उ.प. क्षेत्र, एवं अध्यक्ष नराकास, चण्डीगढ़ ने की जिसमें केन्द्र सरकार के विभागों, संगठनों तथा संस्थानों के करीब 70 से अधिक प्रतिनिधि सम्मिलित हुए। नाईपर से इस बैठक का प्रतिनिधित्व श्रीमती प्रौमिला ठाकुर, कनिष्ठ हिन्दी अनुवादक तथा श्री सुनील कुमार पाण्डेय, हिन्दी टंकक ने किया।

MEMBERS, BOARD OF GOVERNORS

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12.	Prof. T. Alesan Associate Professor Department of Economics, Kamraj College Thoothukudi, Tamilnadu	Member
13.	Prof. Dr. Nagaraajan Venkataraman Professor Emeritus in Neurosciences, Tamilnadu Dr. MGR Medical University, Senior Consultant Neurologist	Member
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17.	Sh. Lalit Kumar Jain PHARMACHEM	Member

18.	Prof. B. Suresh Vice Chancellor, JSS University, Mysore & President of Pharmacy Council of India Combined Councils' Building Kotla Road, Post Box No.7020 Aiwan-e-Galib Marg, New Delhi	Member
19.	Dr. Girish Sahni Director, IMTECH, Sector 39A, Chandigarh	
20.	Sh. Naresh Kumar Gupta President Lupin Laboratories Ltd. Mumbai 400051	Member
21.	Wing Cdr P. J. P. Singh Waraich (Retd.) Registrar National Institute of Pharmaceutical Education & Research S.A.S. Nagar, Punjab	Secretary

The term of BOG expired on 21.06.2014. Currently, the BoG is under reconstitution.

MEMBERS, ACADEMIC PLANNING AND DEVELOPMENT COMMITTEE (APDC)

S. No.	Name	Designation
1.	Dr. Bhushan Patwardhan Professor & Director Department of Interdisciplinary School of Health Sciences University of Pune Ganeshkhind Road Pune 411007	Chairman
2.	Prof. S. V. Kessar Emeritus Professor Panjab University H. No. 635, Sector 11 Chandigarh	Member
3.	Dr. Debashish Datta M/s. Lupin Laboratory Ltd. B/4, Laxmi Towers Bandra Kurla Complex, Bandra (E) Mumbai 400051	Member
4.	Prof. Y. K. Gupta Department of Pharmacology AIIMS, Ansari Nagar, New Delhi	Member
5.	Avadhesha Surolia , Ph.D., D.Sc. Bhatnagar Fellow Council for Scientific & Industrial Research (CSIR) Ex. Director, NII Honorary Professor, Molecular Biophysics Unit Indian Institute of Science Bangalore 560012	Member
6.	Dr. Rakesh Tuli Executive Director NABI (DST) C-127, Indl. Area, Phase VIII S.A.S. Nagar, Punjab	Member
7.	Dr. V.V. Parashar 13-P, Bharat Nagar Nagpur- 440033	Member
8.	Prof. K. K. Bhutani Officiating Director NIPER, S.A.S. Nagar	Member
9.	Prof. Saranjit Singh Head, Department of Pharmaceutical Analysis NIPER, S.A.S. Nagar	Member
10.	Prof. U.C. Banerjee Dean NIPER, S.A.S. Nagar	Member Secretary

The term of APDC expired on 06.09.2014. Currently, the APDC is under reconstitution.

MEMBERS, SENATE

S. No.	Name	Designation
1.	Prof. K. K. Bhutani Officiating Director, NIPER	Chairman
2.	Prof. U. C. Banerjee Dean, NIPER	Member
3.	Prof. A. K. Chakraborti Head, Department of Medicinal Chemistry, NIPER	Member
4.	Prof. P. V. Bharatam In charge, Department of Pharmacoinformatics, NIPER	Member
5.	Prof. Rahul Jain Department of Medicinal Chemistry, NIPER	Member
6.	Prof. Arvind Bansal Head, Department of Pharmaceutics, NIPER	Member
7.	Prof. K. B. Tikoo In-charge, Department of Pharmacology & Toxicology, NIPER	Member
8.	Prof. C. Kokate Vice Chancellor KLE University, Belgaum JNMC Campus, Belgaum, Karnataka	Member
9.	Prof. H. S. Nigah Prof. (Mech. Engg.) (Retd.) P.E.C., Chandigarh H.No. 1962, Phase 10, S.A.S. Nagar	Member
10.	Dr. Pramod Kumar Director Institute for Development and Communication (IDC), Chandigarh & Chairperson of the Punjab Governance Reforms Commission	Member
11.	Dr. S. M. Jachak Associate Professor, Department of Natural Products, NIPER	Member
12.	Dr. Elizabeth Sobhia Assistant Professor, Department of Pharmacoinformatics, NIPER	Member
13.	Prof. Saranjit Singh Head, Department of Pharmaceutical Analysis, NIPER	Member
14.	Prof. Pramil Tiwari Head, Department of Pharmacy Practice, NIPER	Member
15.	Prof. Anand Sharma In charge, Department of Pharmaceutical Management, NIPER	Member
16.	Wing Cdr P. J. P. Singh Waraich (Retd.) Registrar, NIPER	Secretary

The term of the Senate expired on 06.09.2014. Currently, the Senate is under reconstitution.

MEMBERS, FINANCE COMMITTEE

S. No.	Name	Designation
1.	Prof. K. K. Bhutani Officiating Director, NIPER	Chairman
2.	Prof. U. C. Banerjee Dean, NIPER	Member
3.	Sh. V.K. Mehta Director (Finance) Department of Pharmaceuticals Govt. of India	Member
4.	Prof. R. C. Mahajan Emeritus Professor PGIMER (Research) H. No. 276, Sector 6, Panchkula, Haryana	Member
5.	Prof. N. Sathyamurthi Director, IISER Mohali (Education) Sector 81, Knowledge City, P.O. Manauli S.A.S. Nagar, Mohali	Member
6.	Dr. J. N. Verma Managing Director Lifecare Innovations (Industry)	Member
7.	Wing Cdr P. J. P. Singh Waraich (Retd.) Registrar, NIPER	Member Secretary

The term of the Finance Committee expired on 06.09.2014. Currently, the Finance Committee is under reconstitution.

MEMBERS, LABORATORY SERVICES BUILDINGS & WORKS COMMITTEE (LSBWC)

S. No.	Name	Designation
1.	Prof. K. K. Bhutani Officiating Director, NIPER	Chairman
2.	Prof. U. C. Banerjee Dean, NIPER	Member
3.	Dr. Sunita Saxena Director, National Institute of Pathology Safarjang Hospital Campus, P. B. No. 4909 New Delhi	Member
4.	Sh. V.K. Mehta Director (Finance) Department of Pharmaceuticals Government of India, Shastri Bhawan New Delhi	Member
5.	Sh. Harnam Singh SE (Civil) CPWD, 2 nd floor Kendriya Sadan Sector 9, Chandigarh 160009	Member
6.	Prof. P. V. Bharatam In charge, Department of Pharmacoinformatics, NIPER	Member
7.	Chief Maintenance Engineer NIPER	Member
8.	Wing Cdr P. J. P. Singh Waraich (Retd.) Registrar, NIPER	Member Secretary

The term of LSBWC expired on 06.09.2014. Currently, LSBWC is under reconstitution.

GRANT-IN-AID

Plan Budget (2014-2015)	
Expenditure Head	Amount (Rs. in crores)
Anti-Tuberculosis	1.22
Anti-Kala azar	1.22
Total	2.44

Non-Plan Budget/Expenditure (2014-15)	
Expenditure Head	Amount (Rs. in crores)
Salary and allowances	18.01
Electricity and water expenses	3.03
Lab consumables and consumables stores	1.83
Office expenses	3.75
Stipend and Contingency	4.51
Total Non-Plan Expenditure	31.13

Against the non-plan budget of Rs. 47.93 crore, Department of Pharmaceutical (Gol) has released Rs. 20.87 crore as Grant in Aid (Non Plan) for Financial Year 2014-15.

EXTRAMURAL FUNDING

Project No.	Funding agency	Principal Investigator	Amount (Rs.)
GP-252	Department of Biotechnology	Dr U C Banerjee	3823289
GP-348	Department of Biotechnology	Dr Sanyog Jain	390000
GP-350	Department of Biotechnology	Dr. Chayya Iyengar	1077000
GP-355	Department of Science and Technology	Dr. S S Sharma	500000
GP-356	Department of Biotechnology	Dr. K B Tikoo	103480
GP-357	Department of Science and Technology	Dr. Sankar Guchhait	27156
GP-363	Council of Scientific & Industrial Research	Dr. Sushma singh	332853
GP-368	Council of Scientific & Industrial Research	Dr. Abay Sangamwar	173000
GP-371	Council of Scientific & Industrial Research	Dr. P.V Bharatam	596806
GP-372	Science Engineering and Research Board	Dr. Ipsita Roy	450000
GP-373	Department of Information and Technology	Dr. Prabha Garg	163000
GP-375	Department of Science and Technology	Dr. Abhay Sangamwar	236900
GP-376	Defence Research and Development Organisation	Dr. I P Singh	350000
GP-377	Indian Council of Medical and Research	Dr. Ipsita Roy	1326744
GP-379	Science Engineering and Research Board	Dr. Vipin A Nair	300000
GP-380	Science Engineering and Research Board	Dr. S K Guchhait	400000
GP-381	Department of Science and Technology	Dr. Sushma Singh	400000
GP-382	Council of Scientific & Industrial Research	Dr. Sarasija Suresh	538500
GP-384	Department of Science and Technology	Dr. U.C Banerjee/ Dr. Jayeeta Bhaumik	700000
GP-385	Department of Biotechnology	Dr. P V Bhartam	611000
GP-387	Department of Biotechnology	Dr. I P Singh	806806
GP-393	Department of Biotechnology	Dr. K K Bhutani	382000
GP-394	Science Engineering and Research Board	Dr. Chaaya Iyengar	500000
GP-399	Council of Scientific & Industrial Research	Dr. M.E. Sophia	1307000
GP-400	Science Engineering and Research Board	Dr. A K Bansal	1000000
GP-401	Science Engineering and Research Board	Dr. J K Laha	3300000
GP-405	Council of Scientific & Industrial Research	Dr. S K Guchhait	317000
GP-406	Department of Biotechnology	Dr. A K Bansal	1188980
SP-205	University of Louisville	Dr. I P Singh	542163
TOTAL			21843677

OTHER SERVICES

Consultancy No.	Title	Principal Investigator	Sponsor
GC-14-01	Repeated dose toxicity studies for five compounds under GLP conditions	Dr. K B Tikoo	Dr. Shruti Ralegaonkar, Representative of Sustainability Support Services, C/o Unique Chemicals and Allied Products, Nagpur
GC-14-03	Surface tension analysis of Cyclosporine samples	Dr. A K Bansal	M/s Famy Care Ltd.
GC-14-04	Particle Size Determination of API in Mefipristone tablets	Dr. A K Bansal	M/s Cipla
GC-14-05	Particle Size Determination of API in Capsules	Dr. A K Bansal	M/s Genovo Development Services Ltd.
GC-14-06	Particle Size Determination of API in Praziquantel Tablets	Dr. A K Bansal	M/s Chemo Laboratrios Liconsa S.A., Spain.
GC-14-07	Particle Size Determination of API in Abiraterone Acetate Tablets	Dr. A K Bansal	M/s Chemo Laboratrios Liconsa S.A., Spain.
GC-14-08	Particle Size Determination of API in Tadalafil Tablets	Dr. A K Bansal	M/s Torrent Pharmaceuticals Limited, Gandhinagar
GC-14-09	Particle Size Determination of API in Silodosin Capsules	Dr. A K Bansal	M/s Torrent Pharmaceuticals Limited, Gandhinagar
GC-14-10	Quantification of Tyloxapol in Brinzolamide Ophthalmic Suspension samples	Dr. A K Bansal	M/s Simson Pharma, Mumbai
GC-14-11	Reverse Engineering of Moxifloxacin Formulation	Dr. A K Bansal	M/s Orbicular Pharmaceutical Technologies Pvt. Ltd.
GC-14-12	Particle Size Determination Of Efavirenz API Samples	Dr. A K Bansal	M/s Getz Pharma Research Pvt Ltd, Mumbai.
GC-14-13	Characterization of MPA Injectable suspensions	Dr. A K Bansal	M/s Famy Care Ltd.
GC-14-14	Particle Size Determination of API in Tablets	Dr. A K Bansal	M/s Genovo Development Services Ltd.
GC-14-15	Particle Size Distribution of API in Thalidomide Capsules	Dr. A K Bansal	M/s Natco Pharma Limited, Hyderabad
GC-14-16	Characterization of API using Goniometry	Dr. A K Bansal	M/s Dr. Reddy's Laboratories Ltd.
GC-14-17	Particle Size Distribution of API in Tablets	Dr. A K Bansal	M/s Fresenius Kabi Oncology Ltd., Gurgaon
GC-14-18	Determination of porosity of vaginal rings	Dr. A K Bansal	M/s Laboratorios Leon Farma, Spain
GC-14-19	Particle Size Determination of API in Etoricoxib Tablets	Dr. A K Bansal	M/s CIPLA, MUMBAI

GC-14-20	Particle Size Distribution of API in Albendazole Tablets	Dr. A K Bansal	M/s Getz Pharma Research, Mumbai
GC-14-21	Characterization of MPA injectable suspension	Dr. A K Bansal	M/s Famy Care Ltd.
GC-14-22	Particle Size Distribution of API in Mesalamine formulations	Dr. A K Bansal	M/s IPCA Laboratories Ltd., Mumbai
GC-14-23	Assessment of vascular pain with propofol formulations in rats	Dr. S S Sharma	M/s Troikaa Pharmaceutical Ltd.
GC-14-24	Particle Size Distribution of API Glyburide Tablets	Dr. A K Bansal	M/s Ajanta Pharma Limited, Mumbai
GC-14-25	Process Development for the Final Step of Levosulpiride Synthesis	Dr. M S Gill	M/s Kimia Bio Sciences Pvt. Ltd.
GC-14-26	Scale Up and Validation of Amine-N-Oxide Batches	Dr. M S Gill	M/s Celeste Life Sciences Pvt. Ltd
GC-14-27	Lab Scale Process Development Studies for Processing of Polymeric Material	Dr. M S Gill	Veekay Polycoats Ltd. (New Delhi)
GC-14-28	Process R&D and Scale-up on Kilogram Scale of Compound-3-HM5384CV	Dr. M S Gill	M/s Celeste Life Sciences Pvt. Ltd.
GC-14-29	Wettability analysis of Ticagrelor API samples	Dr. A K Bansal	M/s Dr Reddy's Laboratories Ltd.
GC-14-30	De-formulation and product benchmarking of innovator product and comparison with in-house product	Dr. A K Bansal	M/s Natco Pharma Ltd., Hyderabad
GC-14-31	Identification, isolation and characterization of particle size of API in dosage form using hot stage microscopy	Dr. A K Bansal	M/s S. Zhaveri Pharmachem Pvt. Ltd.
GC-14-32	Wettability Assessment of Rivaroxaban API samples	Dr. A K Bansal	M/s Dr. Reddy's Laboratories Ltd.
GC-14-33	Method Development and Quantitative Analysis of Poloxamer-188 and Meglumine in Formulations	Dr. A K Bansal	M/s Watson Pharma Pvt. Ltd., Ambarnath
GC-14-34	Method Development and Quantitative Analysis of Poloxamer-407 in Formulation	Dr A K Bansal	M/s Simson Pharma Services, Mumbai
GC-14-35	Identification, isolation and Analysis of Particle Size of Febuxostat in Adenuric Tablets	Dr. A K Bansal	M/s S. Celogen Lifescience & Technologies Pvt. Ltd.
GC-14-36	Lab Scale Process Development for Cilnidipine	Dr. M S Gill	M/s Kimia Biosciences Pvt. Ltd.
GC-14-37	Scale up and Validation of Amine to N-oxide	Dr. M S Gill	M/s Celeste Life Sciences Pvt. Ltd.
GC-14-38	Lab Scale Process Development for 2-Amino Methyl-1-Ethyl Pyrrolidine	Dr. M S Gill	Kimia Biosciences Pvt. Ltd., New Delhi, India
GC-14-39	Lab scale synthesis of Oxaceprol	Dr. M S Gill	Kimia Biosciences Pvt. Ltd., New Delhi, India
GC-14-40	Pilot Studies Involving Hydrogenation of an Intermediate	Dr. M S Gill	Kimia Biosciences Pvt. Ltd., New Delhi, India
GC-14-41	Solid State Characterization and Particle Size analysis of Innovator and In-house Formulations of Metaxalone	Dr. A K Bansal	M/s Alembic Research Center, Vadodara (Gujarat)
GC-14-42	Surface area analysis of Magnesium stearate samples	Dr. A K Bansal	M/s Genovo Development Services Ltd.

GC-14-43	Quantitative analysis of Povidone K30 in Ophthalmic solution	Dr. A K Bansal	M/s Orbicular Pharmaceutical Technologies Pvt. Ltd.
GC-14-44	Solubilization of a NCE	Dr. A K Bansal	M/s COLNRM, GVK Biosciences Pvt. Ltd.
GC-14-45	Scale up Batch of N-Oxide Intermediate	Dr. M S Gill	M/s Celeste Life Sciences Pvt. Ltd.,
GC-14-46	Pilot Scale Drying Trials Using Nauta Dryer	Dr. M S Gill	M/s Cadila Pharmaceutical Ltd.,
GC-14-47	Pilot Scale Extraction of Natural Product	Dr. M S Gill	Individual/Anupam Jamwal, Himachal Pradesh, India
GC-14-48	Surface tension analysis of samples	Dr. A K Bansal	M/s Famy Care Ltd.
GC-14-49	Assessment of Differential wetting kinetics of investigational drug with different solvents	Dr. A K Bansal	M/s Johnson & Johnson Ltd., Mumbai
GC-14-50	Feasibility Report for Manufacturing of Mepacrine for Commercial Production	Dr. A K Chakraborti	M/s Sumeeth Lifesciences, Bangalore
GC-14-51	Development of an Injectable Formulation	Dr. A K Bansal	M/s Windlas Healthcare Private Limited
GC-14-52	Particle size analysis of Deferasirox	Dr. A K Bansal	M/s S. Zhaveri Pharmachem Pvt. Ltd.
GC-14-53	Particle size analysis of Efavirenz API samples	Dr. A K Bansal	M/s Getz Pharma Research Private Limited, Mumbai
GC-14-54	Particle size and surface tension analysis of suspensions	Dr. A K Bansal	M/s Famy Care Ltd.
GC-14-55	Identification, isolation and particle size analysis of Ranolazine in tablets	Dr. A K Bansal	M/s Cipla Ltd., Mumbai
GC-14-56	Determination of Globule size in cream formulation	Dr. A K Bansal	M/s Famy Care Ltd.
GC-14-57	Identification, isolation and Particle size analysis of API in Tablets	Dr. A K Bansal	M/s Ajanta Pharma Limited, Mumbai
GC-14-58	Determination of Globule size in cream formulation	Dr. A K Bansal	M/s Famy Care Ltd.
GC-14-59	Particle size analysis of otic suspension	Dr. A K Bansal	M/s Famy Care Ltd.
GC-14-60	Identification, isolation and particle size analysis of Sofosbuvir in tablets	Dr. A K Bansal	M/s Cipla Ltd., Mumbai
GC-14-61	Gap Analysis to "ascertain and determine by way of a study that the products listed in USP publications specifically USP-NF and USP-MC and/or the USP catalog and the pharmaceutical products such as drug products, drug substances, API's being currently manufactured and sold by Indian Pharmaceutical Companies in India"	Dr. Anand Sharma	M/s United States Pharmacopeia – India Private Limited
GC-14-62	Hydrogenation of a Semi-synthetic Intermediate	Dr. M S Gill	Chemical Resources, Panchkula, India
GC-14-63	Pilot Studies involving Hydrogenation of an Intermediate	Dr. M S Gill	Chemical Resources, Panchkula, India

GC-14-64	Identification, isolation and Particle size analysis of Fenofibrate in capsules	Dr. A K Bansal	M/s Ajanta Pharma Limited, Mumbai
GC-14-65	Identification, Isolation and Particle size analysis of API in Formulations	Dr. A K Bansal	M/s Alembic Research Centre, Vadodara
GC-14-66	Identification, isolation and Particle size analysis of Clarithromycin in Innovator and Test tablets	Dr. A K Bansal	M/s Ajanta Pharma Limited, Mumbai
GC-14-67	Identification, isolation and Particle size analysis of Clopidogrel bisulphate in Tablets	Dr. A K Bansal	M/s Ajanta Pharma Limited, Mumbai
GC-14-68	Identification, isolation and Particle size analysis of API in Formulations	Dr. A K Bansal	M/s Alembic Research Centre, Vadodara
GC-14-69	Testing of anti-diabetic formulation	Dr. K B Tikoo	Dr. Ronald W. Miller, Miller Pharmaceutical Technology Co.
GC-14-70	Identification of solid form and particle size evaluation of Ticagrelor in Innovator and test formulation	Dr A K Bansal	M/s Torrent Pharmaceuticals Limited, Gandhinagar
GC-14-71	Identification of solid form and particle size evaluation of Lacosamide in Tablets	Dr. A K Bansal	M/s S. Zhaveri Pharmachem Pvt. Ltd.
GC-14-72	Identification of solid form and particle size evaluation of Apixaban	Dr. A K Bansal	M/s Torrent Pharmaceuticals Limited
GC-14-73	Identification, isolation and Particle size analysis of Carbamazepine in Tablets	Dr. A K Bansal	M/s Ajanta Pharma Limited, Mumbai
GC-14-74	Identification, isolation and Particle size analysis of Lamotrigine in Tablets	Dr. A K Bansal	M/s Ajanta Pharma Limited, Mumbai
GC-14-76	Identification, isolation and Particle size analysis of Rabeprazole in Tablets	Dr. A K Bansal	M/s Ajanta Pharma Limited, Mumbai
GC-14-77	Identification, isolation and Particle size analysis of API in Tablets	Dr. A K Bansal	M/s Glenmark-Generics
GC-14-78	Identification, isolation and Particle size analysis of Nimesulide in Tablets	Dr. A K Bansal	M/s Ajanta Pharma Limited, Mumbai
GC-14-79	Characterization of Amiodarone Samples	Dr. A K Bansal	M/s Glenmark-Generics
GC-14-80	Determination of Globule size in cream formulation	Dr. A K Bansal	M/s Famy Care Ltd.
GC-14-81	Identification, isolation and Particle size analysis of Abiraterone acetate in Tablets	Dr. A K Bansal	M/s Getz Pharma Research Pvt. Ltd., Mumbai
GC-14-82	Identification, isolation and Particle size analysis of Pioglitazone and Metformin in Innovator and Test Tablets	Dr. A K Bansal	M/s Ajanta Pharma Limited, Mumbai
GC-14-83	Identification, isolation and Particle size analysis of Oxacarbazepine in Suspensions	Dr. A K Bansal	M/s Aizant Drug Research Solutions Pvt. Ltd., Hyderabad
GC-14-84	Assessment of wetting kinetics of mebendazole with different probe liquids	Dr. A K Bansal	M/s Johnson & Johnson, Mumbai
GC-14-85	Surface Area Analysis of Metoprolol succinate	Dr. A K Bansal	M/s Intas Pharmaceuticals Ltd.

GC-14-86	Surface Area Analysis of Magnesium stearate	Dr. A K Bansal	M/s Genovo Development Services, Bangalore
GC-14-87	Surface Area Analysis and porosity analysis of samples	Dr. A K Bansal	M/s Intas Pharmaceuticals Ltd.
GC-14-88	Identification, Isolation and Analysis of Particle size of Salmeterol Xinafoate and Fluticasone Propionate in Test and Reference Product	Dr. A K Bansal	M/s Glenmark Pharma
GC-14-89	Identification, isolation and particle size analysis of Tadalafil in Tablets	Dr. A K Bansal	M/s Micro Advanced Research Centre, Bangalore
GC-14-90	Identification, isolation and particle size analysis of Carbamazepine in Tablets	Dr. A K Bansal	M/s Genovo Development Services Ltd.
GC-14-91	Identification, isolation and particle size analysis of Ursodeoxycholic acid in Tablets	Dr. A K Bansal	M/s Genovo Development Services Ltd.
GC-14-92	In-vitro Adhesion – Comparative Performance of Buccal Tablets	Dr. A K Bansal	M/s Watson Pharma
GC-14-93	Identification, isolation and particle size analysis of Albendazole in Tablets	Dr. A K Bansal	M/s Cipla Ltd., Mumbai
GC-14-94	Identification, isolation and particle size analysis of Deferasirox in Tablets	Dr. A K Bansal	M/s Cipla Ltd., Mumbai
TS-14-01	Morphology of Samples	Dr. A K Bansal	M/s IPCA Laboratories Limited
AC-14-01	Advice on Solid state characterization of an API	Dr. A K Bansal	M/s APL Research Centre (Aurobindo Pharma), AP
AC-14-02	Advice on Formulation Development of veterinary formulation	Dr. A K Bansal	M/s Zoetis, Mumbai



Lamp-lighting Ceremony at NIPER, S.A.S. Nagari for ISRAM-2014, 8th-10th Sept. 2014



Group photograph of speakers and delegates at ISRAM-2014, 8th-10th Sept. 2014, NIPER, S.A.S. Nagar



Lighting of the lamp by Prof. Sukh Dev at the inauguration of 4th biennial International Conference on New Developments in Drug Discovery from Natural Products and Traditional Medicine (DDNPTM), Nov. 20-22, 2014, NIPER, S.A.S. Nagar



Lighting of the lamp by Prof. Harkishan Singh at the inauguration of 4th biennial International Conference on New Developments in Drug Discovery from Natural Products and Traditional Medicine (DDNPTM), Nov. 20-22, 2014, NIPER, S.A.S. Nagar



Prof. Acharan S. Narula giving away distinction awards at the conclusion of 4th biennial International Conference on New Developments in Drug Discovery from Natural Products and Traditional Medicine (DDNPTM), Nov. 20-22, 2014, NIPER, S.A.S. Nagar



Group photograph of speakers and delegates at 4th biennial International Conference on New Developments in Drug Discovery from Natural Products and Traditional Medicine (DDNPTM), Nov. 20-22, 2014, NIPER, S.A.S. Nagar



Group photograph of participants and organizers at ITEC/SCAAP training programme, Nov. 24 - Dec. 4, 2014, NIPER, S.A.S. Nagar



Group photograph of speakers and delegates at 7th International Symposium on Drug Metabolism and Pharmacokinetics Applications toward Drug Discovery and Development (DMPK), Feb. 19-21, 2015, NIPER, S.A.S. Nagar

SPORTS ACTIVITIES AT SPANDAN 2015



CULTURAL ACTIVITIES AT SPANDAN 2015



INDEPENDENCE DAY & REPUBLIC DAY



Prof. K. K. Bhutani hoisting the National Flag at the Independence Day 2014 celebrations at NIPER, S.A.S. Nagar



Prof. K. K. Bhutani hoisting the National Flag at the Republic Day 2015 celebrations at NIPER, S.A.S. Nagar



Cultural function presented by students at the Independence Day 2014 celebrations at NIPER, S.A.S. Nagar



Cultural function presented by students at the Republic Day 2015 celebrations at NIPER, S.A.S. Nagar



S.A.S. NAGAR

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