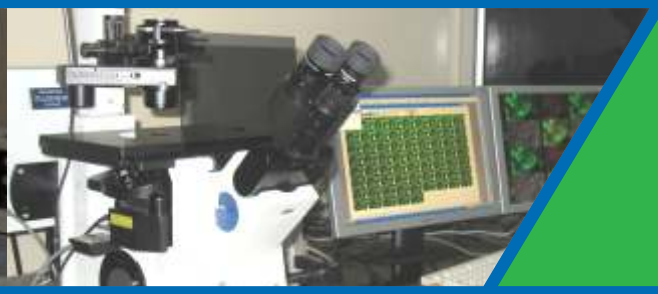
S.A.S. NAGAR



वार्षिक प्रतिवेदन/Annual Report 2016-17

राष्ट्रीय औषधीय शिक्षा एवं अनुसंधान संस्थान (नाईपर)

National Institute of Pharmaceutical Education and Research (NIPER)

वार्षिक प्रतिवेदन/*Annual Report*
2016 - 17

एस.ए.एस. नगर

राष्ट्रीय औषधीय शिक्षा एवं अनुसंधान संस्थान (नाईपर)

National Institute of Pharmaceutical Education and Research (NIPER)

Patron
Prof. Raghuram Rao Akkinepally
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From the Director's Desk

I feel honoured to present before you the activities and achievements of NIPER, S.A.S. Nagar, and highlight the Institute's glorious journey over the past year, in the form of Annual Report 2016-2017. The brand name of NIPER is now well-established and is considered as a template of excellent higher education in pharmaceutical sciences within the country. The Institute strives continuously to identify and breach its shortcomings and to strengthen its core areas of expertise. There is also a conscious effort to involve the pharmaceutical industry in designing our academic curriculum and in our attempt to fulfil their expectations. We are open to collaborative efforts with academia and industry and are currently working in consonance with the mandate of the National Health Policy, Govt. of India.

I am proud of the achievements of our faculty members and students which are reflected in this report. Their accomplishments in various national and international platforms are significant. The support of the technical and scientific staff members and the logistic support provided by members of the administrative staff cannot be ignored. I convey my hearty congratulations and best wishes to all the graduating students for success in their professional as well as personal lives.

I am grateful to the Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers, Govt. of India, for their continued support. The vision and direction provided by the learned members of our Board of Governors are thankfully acknowledged. I am also thankful to the various funding agencies who have provided financial assistance in the form of extramural grants and support to the research work in the Institute. Last but definitely not the least; I am thankful to members of the faculty, staff members and students, who have continued with their dedicated and unconditional support to the growth of the Institute. I invite you to read this report and get a glimpse of the Institute's activities over the past one year, 2016-2017.

(Raghuram Rao Akkinepally)

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

1991 Registered as a Society
1994 First Director Joined
1996 Initiation of Research Activities
1998 Institute of National Importance: Niper Act 1998
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
2007 Amendment of NIPER Act to establish six new NIPERs
2009 Establishment of SMPIC
2010 Amendment of Ordinance Regulating the Courses of Study and Procedures There of
Establishment of Patent Facilitation Cell
2014 Amendment of Ordinance regulating the courses of study and procedures thereof
2016 Silver Jubilee Year of establishment as a Society

ADMISSION OF STUDENTS IN 2016-2017

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 (2016-2017)		Proposed admission (2017-18)
	MASTERS	Ph.D.	
Medicinal Chemistry	43	05	The Institute proposes to admit 205 Masters', 44 MBA (Pharm.) and 41 Ph.D. students in the next academic year.
Natural Products	16	01	
Traditional Medicine	05	Not offered	
Pharmaceutical Analysis	09	-	
Pharmacology & Toxicology	23	06	
Regulatory Toxicology	10	Not offered	
Pharmaceutical Technology Biotechnology Formulations Process Chemistry	 10 07 16	 - - -	
Pharmaceutics	17	06	
Biotechnology	31	02	
Pharmacy Practice	07	01	
Clinical Research	08	Not offered	
Pharmacoinformatics	19	01	
Pharmaceutical Management	40	Not offered	

GRADUATION OF STUDENTS

175 Masters' students and 37 MBA (Pharm.) students graduated in the current academic year. 24 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 industry 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.

EIGHTH CONVOCATION

Degrees Awarded

M.S. (Pharm.) /M.Pharm./ M.Tech. (Pharm.)	M.B.A. (Pharm.)	Ph.D.	Total
601	128	83	812

Eighth Convocation was held on Nov. 26, 2016. Prof. Chandrakant Kokate was the Chief Guest

A student receiving Gold Medal during the eighth Convocation

LIST OF GOLD MEDALISTS

BATCH	STREAM	NAME
2012-14	Masters' Programme in Sciences	MALVIKA SHARMA
2012-14	Masters' Programme in Business Administration (Pharm)	MADHURI LUTHRA
2013-15	Masters' Programme in Sciences	SHREYA THAKKAR
2013-15	Masters' Programme in Business Administration (Pharm)	KATHIRIYA BIPINKUMAR HARJIBHAI
2014-16	Masters' Programme in Sciences	GOURAV DAS
2014-16	Masters' Programme in Business Administration (Pharm)	SHEFALI GULATI

Ph.D. THESES APPROVED FOR AWARD OF DEGREE IN 2016-2017

Name	Discipline	Title
Ganesh Shete	Pharmaceutics	Development and evaluation of nanocrystalline solid dispersions of antioxidants
Neeradi Dinesh	Biotechnology	3-Hydroxy-3-methylglutaryl coenzyme a reductase (HMGR) from *Leishmania donovani:* A potential anti-leishmanial drug target of sterol biosynthetic pathway
Saptarshi Ghosh	Pharmaceutical Technology (Biotechnology)	Studies on microbial production of shikimic acid
Babita Tanwar	Medicinal Chemistry	Design and synthesis of molecular entities belonging to new structural scaffolds as anti-tubercular agents
Preet Kamal Kaur	Biotechnology	Identification and functional characterization of a novel enzyme Ribose 5 - phosphate isomerase B (RpiB) from *Leishmania donovani*
Lunagariya Nitin Amarshibhai	Natural Products	Synthesis and biological evaluation of substituted β carboline and isoquinoline analogues
Neetu Dayal	Pharmaceutical Technology (Process Chemistry)	Convergent synthesis of tricyclic fused nitrogen heterocycles via palladium-catalyzed mono C(sp^2)-H/Double C(sp^2)-H functionalization strategies
Sandeep Kumar	Pharmacology and Toxicology	To study molecular mechanisms of fatty acid induced insulin resistance and renal injury
Nihar Ranjan Dass	Pharmacology and Toxicology	Effects of pharmacological interventions targeting peroxisome proliferator activated receptors (PPARs) and PPAR co-activator 1 (PGC-1) in cognitive deficits associated with Parkinson's disease

Prasad Vilas Pawar	Pharmaceutics	Development of oral nanopolymersome formulation for the treatment of breast cancer
Modi Sameer Ramanlal	Pharmaceutics	Impact of differential surface anisotropy of crystal habits on pharmaceutical performance of Celecoxib: a BCS class II drug
K S Satyanarayana T	Pharmaceutical Technology (Process Chemistry)	Convergent synthesis of fused nitrogen heterocycles via palladium-catalyzed domino and transition metal-free oxidative reactions
Tarate Bapurao Pandurang	Pharmaceutics	Enhancement of oral bioavailability of coenzyme Q10 using eutectic based self-emulsifying drug delivery system
Priyank Purohit	Medicinal Chemistry	Development of novel anti-inflammatory scaffolds: Synthesis via newer C-O/C-H/C-Br activation protocols and determination of their COX inhibitory potential
Rameshwar Prajapati	Pharmacoinformatics	Molecular insights on substrates and inhibitors binding of human pglycoprotein using multi-targeted molecular dynamics and in vitro inhibition studies on P-glycoprotein
Sabbir Khan	Pharmacology and Toxicology	Anti-diabetic and anti-fibrotic effects of selected HDAC inhibitors in experimental diabetic rat: elucidation of molecular mechanisms
Jagtap Sneha Chandrakant	Natural Products	Evaluation of mahanimbine and phyllanthin against obesity and associated metabolic disorders
Dharam Pal	Biotechnology	Approaches for the generation of recombinant human interferon-β from *Escherichia coli*

Bihade Umesh Ratnakar	Pharmaceutical Technology (Biotechnology)	Development of probiotic co-culture system and studies on their therapeutic potential
Sumit Arora	Pharmaceutics	Dry powder inhalable formulation(s) of voriconazole for effective pulmonary delivery
Satya Prakash Tripathi	Pharmacoinformatics	Pharmacoinformatics studies on human UDP-glucuronosyltransferase isoforms
Garima Priyadarshani	Medicinal Chemistry	Scaffold hopping of flavonoids: synthetic exploration and studies of topoisomerase II-targeting anticancer activities
Shivcharan Prasad	Biotechnology	Modulation of properties of selected proteins by engineering protein structure and growth medium
Mukesh Gangar	Medicinal Chemistry	Studies towards asymmetric aldol and alkylation reactions using imidazolidinone based chiral auxiliary and its application in the synthesis of pharmaceutically active compounds

CURRENTLY ENROLLED Ph.D. STUDENTS

Snehal Sainath Jawalekar	Poonam Singh Thakur	Bhimpuria Rohan Ajaybhai
Panuganti Venkataharsha	Yadav Jayprakash Amarpal	Dinesh Kumar Tanwar
Komal Sharma	Ikjot Sodhi	Patel Ketulbhai Vijaybhai
Gulshan Kumar	Sandeep Suresh Zode	Asim Kumar
Gurudutt Dubey	Sneha Sheokand	Neha Patel
Shams Aaghaz	Pallapati Anusha Rani	Nitin Bagra
Wanjari Pravin Jaikrushna	Nimma Ramesh	Narender Yadav
Ritu Kalia	Eshita Das	Sumit Sunil Chourasiya
Thakore Samarth Dharmeshbhai	Preeti	Santosh Kumar Giri
Amanpreet Kaur	G Siva Kumar	Shah Purvi Ajaykumar
Katanguru Vishruth Reddy	Boya Chandra Sekhar	Isha Saraf
Chaudhari Dasharathbhai Ramsibhai	Ruchi Singhal	Priyanka Mangal
Parmar Prashantkumar Khodabhai	Dhameliya Tejas Manjibhai	Rakesh Dilip Nimbalkar
Sumit Mukesh	Shweta Bhagat	Sunil Kumar Surapaneni
Sivangula Srikanth	Deepika Kathuria	Bhanu Prakash Arakareddy
Vaibhav Girishkumar Sheth	Shailendra Sisodiya	Bharat Prasad Dwivedee
Gohel Vivek Jashvantbhai	Vaja Maulikkumar Dineshbhai	Neeraj Singh Thakur
Prashant Gupta	Meenu Saini	Gopal Patel
Zahid Rafiq	Sanjay Kumar	Varun Kushwah
Sumathi Poleboina	Shweta Tiwari	Moolchand Kurmi
Chittaranjan Sahu	Ravi Kumar Mittal	Mahendra Singh
Mir Mahmood Asrar	Shahbaz Eqbal	Anjana Barola
Firdoos Ahmad Sofi	Sujit Ratnakar Tangadpalliwar	Santosh Prakash Rav
Tejender Singh	Vishnu Kumar Sharma	Rajesh Gour
Gautam Kumar	Kahkashan Resham	Puneet Khurana
Ambati Goutami Godavari	Umashanker	Shiv Gupta
Rohini Verma	Gujjari Lohitha	Yogesh Kumar Bulani
Ladumor Mayurbhai Kathadbhai	Piyush	Patel Kinjal Ashokbhai
Dilip Kumar Singh	Surbhi Soni	Chander Parkash
Pavan Thapak	Seema Kirar	Rohani Prasad Burman
Durgesh Kumar Dwivedi	Vinay Kumar	Kiran Dashrath Bhilare
Yadaigiri Ganesh	Katiyar Sameer Sarvesh	Mahesh Sharma
Dinesh Kumar	Sharma Jagadish	Neha Trivedi
Kale Dnyaneshwar Prakashrao	Shubhra Sharma	Rajiv Ahlawat

MASTERS' STUDENTS GRADUATED IN JUNE 2016

Discipline	Name	Title of thesis
Medicinal Chemistry	Akbar Abdul Shaikh	Toxicity originating from cyclopropylamine (CPA)Derivatives: A quantum chemical study
Medicinal Chemistry	Aman Gupta	Design and synthesis of novel benzimidazole derivatives as potential anti-inflammatory agents
Medicinal Chemistry	Amit Kumar	Synthesis of galactose-based potential antibacterial agents
Medicinal Chemistry	Avinash I	Total synthesis of neolignan derivative isolated from ocoteacymosa
Medicinal Chemistry	Dhara Raghavji Patel	Amide or Imide? The dilemma in *N*-Heterocyclic benzenesulfonamides
Medicinal Chemistry	Dhumal Kisan Shivaji	Molecular modelling studies on merbarone analogues
Medicinal Chemistry	Divyani	Synthesis of N-fused pyridine heterocycles by using Umpolung chemistry
Medicinal Chemistry	Fale Balu Bhaskar	Design and synthesis of substituted benzamidine derivatives as trypanothione reductase inhibitors
Medicinal Chemistry	Garasiya Gaurangkumar Valjibhai	An auxiliary mediated alkylation approach towards the synthesis of β-amino carbonyl deivatives
Medicinal Chemistry	Gourav Das	Design and synthesis of hybrid molecules as potential anti-malarial agents
Medicinal Chemistry	Harikrishnan M	Imidazolidinone based chiral auxiliary mediated asymmetric synthesis of pharmaceutically important intermediates of PPAR agonists and total synthesis of lignans rhapidecursinol A, virolongin B and 7,8-secoholostylone B
Medicinal Chemistry	Indrila Saha	Design and synthesis of pyridopyrimidinone based compounds as potential trypanothione reductase inhibiting anti-leishmanial agents
Medicinal Chemistry	Komal Sharma	Mechanochemical synthesis of alditol-based triazole-linked lipid derivatives
Medicinal Chemistry	Kumari Anjila	Design and synthesis of quinazoline based compounds as potential trypanothione reductase targeting anti-leishmanial agents
Medicinal Chemistry	Makhal Priyanka Nirapada	Design and synthesis of carbazole-based compounds as potential trypanothione reductase-targeting anti-leishmanial agents
Medicinal Chemistry	Manasa K	Development of new anti-tubercular agents through exploration of enzymes involved in glyoxylate pathway
Medicinal Chemistry	Meenakshi Mandloi	N-Arylation of amino acids using bidentate ligands
Medicinal Chemistry	Mohammad Ovais Dar	Synthesis of triazole-linked glycolipids as potential antimicrobial agents
Medicinal Chemistry	Mrunali Ramesh Patil	Synthesis of 2-substituted 4-aryl quinolines as potential anti-tuberculosis agents
Medicinal Chemistry	Neeraj Verma	Direct C-2 alkynylation of histidine
Medicinal Chemistry	Neha Rai	Synthesis of short peptides as potential antimicrobial agents
Medicinal Chemistry	Nikam Sampada Sunil	Chalcone based aminoguanidine derivatives as novel class of trypanothione reductase inhibitors

Medicinal Chemistry	Priti Singh	Design and synthesis of substituted benzazoles as potential anti-leishmanial agents
Medicinal Chemistry	Puja Kumari	Amidation of α-amino acids under microwave irradiation
Medicinal Chemistry	Ripul	Synthesis of 4-(1-adamantyl)-2-substituted quinolines as potential anti tuberculosis agents
Medicinal Chemistry	Sachin Babasaheb Puri	Concise total synthesis of cannabisin E and Balanophonin A
Medicinal Chemistry	Sakshi	Design and synthesis of 3,5-disubstituted 1,2,4-triazoles as potential antileishmanial agents
Medicinal Chemistry	Sarak Sharad Changdeo	An auxillary mediated glycolate aldol approach towards stereoselective synthesis of reboxetine
Medicinal Chemistry	Saurabh Mahajan	Design and synthesis of 1-(2-(benzothiazol)phenyl)-3-aryl/alkylureas as potential COX-2 inhibitors
Medicinal Chemistry	Shah Yesha Vijay	Synthesis of polyfunctionalised pyrroles
Medicinal Chemistry	Shelar Ketki Eknath	Design and synthesis of 1-(2-(Benzoxazole) phenyl-3-aryl/alkylureas as potential COX-2 inhibitors
Medicinal Chemistry	Shubhendu Yadav	Synthesis of D-mannose-derived cross-linked mannosides
Medicinal Chemistry	Shuja Uddin Ahmed	Synthesis of *C*-glycoside-based pyrrole derivatives as potential antimicrobial agents
Medicinal Chemistry	Yadav Tanuja Tanaji	Design and synthesis of oxazolidinone derivatives as potential anti-tubercular agents
Natural Products	Meenakshi	Synthesis and bioactivity study of Biarylimidazole as potent mPGES-1 inhibitors
Natural Products	Avaneesh Kumar	Isolation of Anthocyanins from the Seeds of *Punica granatum*
Natural Products	Randhir Kumar	Isolation of Anthocyanins from peels of *Solanum melongena*
Natural Products	Jay Sompura	Chemical Investigation of an endophytic fungus *Lasiodiplodia pseudotheobromae*
Natural Products	Pankaj Rai	Synthesis of 2,5-disubstituted-1,3,4-oxadiazole as potential COX inhibitors
Natural Products	Astha Arora	Synthesis of carbohydrazides as potential Isocitrate lyase inhibitors
Natural Products	Dharm Pal	Isolation of Phyllanthin and synthesis of its derivatives for anti-obesity activity
Natural Products	Aruna Dhage	Extraction and isolation of *Clerodendrum colebrookianum*
Natural Products	Amandeep	Phytochemical Investigation of *Gmelina arborea* and its evaluation for antiobesity potential
Natural Products	Shilpi Saloni	Design,synthesis and biological evaluation of isoquinoline derivatives
Natural Products	Aditya Kucheriya	*In-vivo and in-vitro* anti-obesity potential of *Artocarpus heterophyllus Linn.*
Natural Products	Pratiksha Kamble	Isolation of compounds from *Hippophae rhamnoides.*
Natural Products	Bhagat Singh	Phytochemical Investigation of *Melia azedarach L.*for the anti inflammatory activity

Natural Products	Battu Mahender	Design,synthesis and biological evaluation of styrylquinoline derivatives for anti-HIV activity
Traditional Medicine	Sourabh Sharma	Development of SEDDS formulation of Bergenin
Traditional Medicine	Kapil Singla	Development of liposome and phytosome formulation of arjunolic acid from *Terminalia arjuna*
Traditional Medicine	Vaishali Dhiman	Standardization and monograph development of Lodhrasava
Traditional Medicine	Durgam Raja Simha	Development of monograph and standardization of Mridvikarista
Pharmaceutical Analysis	Bhoopendra Singh Kushwah	Comparision of solution and solid state degradation behaviour of aliskiren, amlodipine and/or hydrochlorothiazide
Pharmaceutical Analysis	Dhaval A Gohil	a) Screening of quality of marketed pharmaceuticals b) stress degradation studies on selected drugs
Pharmaceutical Analysis	Patil Amol Abasaheb	Identification of stable and reactive metabolites of terbinafine using *in silico* and LC-MS
Pharmaceutical Analysis	Rohit Pandey	Stress degradation studies on selected drugs
Pharmaceutical Analysis	Shaik Karimullah	Forced degradation and drug-excipient interaction studies on Mitiglinide and Tenoxicam
Pharmaceutical Analysis	Shristy Satish Tiwari	Study of metabolism mediated reduction in hepatotoxicity of combination of paracetamol with diclofenac
Pharmaceutical Analysis	Vijaya Madhyanapu Golla	Comparison of stability of tenofovir prodrugs and their salts
Pharmacology & Toxicology	Akula Mamtha	To evaluate the effect of azatidine conjugated gold nanoparticles in breast cancer cells
Pharmacology & Toxicology	Gagandeep Kaur Birgi	Effect of Ang (1-9) on Ang II mediated inflammation and hypertrophy on renal cells
Pharmacology & Toxicology	Harjinder Singh	Effect of intermittent fasting and esculin on thioacetamide induced hepatic fibrosis in mice
Pharmacology & Toxicology	Jyoti Singh	The combined effect of artesunae and ciprofloxacin against mice infected with *Plasmodium berghei*
Pharmacology & Toxicology	Karanam Laxmi Swetha	To prepare and evaluate the effect of Disulfiram loaded PLGA nanoparticles on skin and lung cancer cell lines
Pharmacology & Toxicology	Kirti	Development of L-Arginine and DEDTC induced acute pancreatitis model in rats
Pharmacology & Toxicology	Madhav Gautam	To study the effect of estrogen on DNA methylation in diabetic male rats
Pharmacology & Toxicology	Malothu Ranjith	To determine the antimalarial activity of antiretroviral protease inhibitor (ritonavir) against *Plasmodium berghei* infected mice
Pharmacology & Toxicology	Mogili Laxmi	Effect of chemical chaperone and antioxidant on long term neurological functional and histological outcomes in diabetic stroke model
Pharmacology & Toxicology	Mohd Aslam Saifi	Evaluation of efficacy of curcumin and naringenin nanoformulation in renal artery ligation induced cardiac hypertrophy
Pharmacology & Toxicology	Masumkhan Lalkhan Pathan	Effect of Endothelin B-receptor agonist IRL-1620 in experimental model of global cerebral ischemia
Pharmacology & Toxicology	Piyush Agarwal	Evaluation of new antileishmanial compounds potential to cause Qt prolongation
Pharmacology & Toxicology	Puppala Sri Lakshmi	Evaluation of pharmacological activity of new COX 2 inhibitors
Pharmacology & Toxicology	Purbali Chakraborty	To study the effect of rapamycin on experimental rodent malaria

Pharmacology & Toxicology	Raji Siva Rupa	Protective effects of propyl gallate on STZ-induced diabetic male germ cell damage
Pharmacology & Toxicology	Singh Rohit Dineshkumar	Investigation of protease activated receptor in neuropathic pain using pharmacological interventions
Pharmacology & Toxicology	Siddanthi Divya Geetha	Protective effects of propyl gallate on STZ-induced diabetic nephropathy
Pharmacology & Toxicology	Saurabh Sahu	Studies on thioacetamide induced hepatic fibrosis in mice: intervention of sodium-phenyl butyrate and aspirin
Pharmacology & Toxicology	Sourabh Chokhandre	To determine the effect of cinnamaldehyde on course of *Plasmodium berghei* infection in Swiss mice
Pharmacology & Toxicology	Sumedha Sharma	To study the effect of estrogen and estrogen receptor modulator in ovarectomized insulin resistant rats
Regulatory Toxicology	Ch Gopinath	To evaluate the pharmacological effect of melatonin selenium nanoparticles in acute pancreatitis in Swiss albino mice
Regulatory Toxicology	Chavan Sapana Babarao	Effect of intermittent fasting and metal chelation on DNA damage and cyotoxicity induced by selected agents
Regulatory Toxicology	Harpreet Kaur	To compare efficacy of metformin via oral and inhalation route in asthma
Regulatory Toxicology	L Pavan Kumar Naik	To study molecular mechanism of insulin induced hypoglycaemia associated with cardiovascular complications in Type I diabetic rats
Regulatory Toxicology	Sarode Lopmudra Poleshwar	To study the effe ct of aspartame on the progression of Type II diabetes in SD rats
Regulatory Toxicology	Sruthy K G	Integration of DNA damage and male germ cell toxicity assay in repeated dose toxicity study: A regulatory perspective
Regulatory Toxicology	U Bala Sai Sandeep	Studies on germ cell perturbations in rats: influence of high sucrose diet
Regulatory Toxicology	Yenuganti Ravi	Risk assessment of complex mixture; study with selected drugs and pesticides
Pharmaceutics	Bhava Lakhabhai Dadubhai	Lipid nanoparticles for the treatment of bacterial biofilm infections
Pharmaceutics	Deore Sandip Vikram	Tumor microenvironment responsive multifunctional liposome with cytotoxic and antiangiogenesis drug
Pharmaceutics	Katangur Vishruth Reddy	Evaluation of stability approach(es) for oral peptide delivery
Pharmaceutics	Kiran Jaywant Dongare	Development, optimization and evaluation of anticancer drug loaded solid self emulsifying drug delivery system
Pharmaceutics	Lalit Mishra	Correlation of crystallographic features of polymorphs with nanonization by top down milling
Pharmaceutics	Navpreet Kaur	PBPK modelling of a model drug: implications of pH, solubility profile on oral drug absorption
Pharmaceutics	Polaka Suryanarayana	Synthesis and characterization of curcumin prodrugs
Pharmaceutics	Priyanka Parkash	Design and characterization of self nanoemulsifying
Pharmaceutics		drug delivery system of lipidic conjugate of Doxorubicin
Pharmaceutics	Sakshi	Generation, characterisation and biopharmaceutical evaluation of febuxostat eutectics
Pharmaceutics	Shamandeep Kaur	Solid phospholipid-bile salt dispersions of exemerture: formulation, permeability and in-vivo pharmacokinetic study

Pharmaceutics	Sonvane Bhavin Balkrushna Bhai	Formulation optimization and characterization of lipid polymer hybrid nanoparticles of valsartan
Pharmaceutics	Tanshu Jain	Generation of different crystalline forms of Aspirin and evaluation of their hygroscopicity, stability and compaction behaviour
Pharmaceutics	Thakore Samarth Dharmeshbhai	PBPK modelling of a model drug in its formulations with special emphasis on absorption
Pharmaceutics	Vaishali Saini	Synthesis and physicochemical characterization of raloxifene prodrugs
Biotechnology	Abhishek Nag	Role of *M. tuberculosis* GAPDH (Rv1436) as a soluble transferrin receptor
Biotechnology	Agrawal Gopal Surajbhan	Refolding of bacterially produced recombinant prolidase
Biotechnology	Amrutha Kusam	Effect of organic solvents on aggregation of α-synuclein
Biotechnology	Anjali Dwivedi	Effect of harmine and harmaline on yeast cells
Biotechnology	Attem Jyothi	Expression and purification of *M. tuberculosis* Elongation factor-Tu (tuf, Rv0685)
Biotechnology	Bambharoliya Chintan Parasotambhai	Mutagenesis approach to improve OP-hydrolyzing activity of recombinant SsoPox
Biotechnology	Bangar Priyanka Ranjit	Sire directed mutagenesis of conserved residues of pyriodoxal kinase from *Leishmania donovani*
Biotechnology	Bhuva Ankur Raghubhai	Studies on aggregation of α-synuclein
Biotechnology	Dhara Anita	Studies on aggregation of p53
Biotechnology	Dobariya Prakashkumar Bavchandbhai	Subcloning and expression of recombinant human erythropoietin in *E. coli*
Biotechnology	Gandhari Shankar	Creation of *Mycobacterium tuberculosis* Glyceraldehyde 3-phosphate dehydrogenase (GAPDH, Rv1436) mutant strains
Biotechnology	Mohit Goyal	Improving the OP-hydrolyzing activity of recombinant SsoPox by random mutagenesis
Biotechnology	Moodu Devender	Confirmation of monoalletic gene deletion mutant s of 3-hydroxy-3-methyl glutaryl-CoA reductase (HMGR) of *Leishmania donovani* by PCR
Biotechnology	Mukesh Kumar Saroj	Creation of *M. tuberculosis* Elongation factor-Tu (tuf, Rv0685) fluorescent construct
Biotechnology	Navi Hasan	Expression and purification of *M. tuberculosis* Enolase (Rv1023) using *M.tb* H37Ra as host
Biotechnology	Pawara Narendra Khandu	Generation of monoallelic genee deletion mutants of *Leishmania donovani* pyrodoxal Kinase
Biotechnology	Prabhakar Srivastava	Studies on aggregation of huntingtin
Biotechnology	Rachita Balasaheb Patkar	Expression and purification of *M. tuberculosis* pyruvate kinase (Rv1617)
Biotechnology	Ravi Shankar Gautam	Effect of inhibitors on recombinant trypanthione reductase from *Leishmania donovani*
Biotechnology	Rohit Kumar	Biochemical characterisation of Glutamine Synthase
Biotechnology	Saloni Azad	Estimatiion of thiols in promastigotes of *Leishmania donovani*
Biotechnology	Srijeet Majumder	Subcloning and expression of recombinant human interferon-alpha in *E. coli*
Biotechnology	Swarali Suhas Joshi	Effect of dietary restriction on inducible expression of proteins
Biotechnology	Swati Jain	Studies on aggregation of huntingtin protein on yeast cells

Biotechnology	Thadaka Niranjan	Immunomodulatory role of Pyruvate Kinase M2 (PKM2)
Biotechnology	Thool Madhuri Kawadu	*In vitro* refolding of recombinant diisopropylflurophosphatase
Biotechnology	Utekar Bhagyashree Gangaram	Enzymatic characterization of recombinant SsoPox (r-SsoPox) variant
Pharmaceutical Technology (Formulations)	Rhythm Arora	Lipid based nano-therapeutics for the treatment of psoriasis
Pharmaceutical Technology (Formulations)	Betmogrekar Venketesh Marotirao	Evaluation of PEG-chain length on stealth property of nanoparticles
Pharmaceutical Technology (Formulations)	Patil Devendra Umakant	Preparation and evaluation of pH-modulated solid dispersion of febutostat by spray drying technique
Pharmaceutical Technology (Formulations)	Raviteja Gowdu	Chitosan-thiamine nano succinate conjugate for stomach specific drug delivery: synthesis, characterization and in-vitro evaluation
Pharmaceutical Technology (Formulations)	Ohol Swati Balasaheb	Co-crystals of repaglinide for enhanced dissolution
Pharmaceutical Technology (Formulations)	Kunnal Sharma	To propose functionality related characteristics (FRCs) and functionality related tests (FRTs) of polymeric excipients in amorphous solid dispersions (ASDs). To study the impact of excipient variability on them
Pharmaceutical Technology (Formulations)	Kallem Divya Jyothi	Structural attributes of co-amorphous drug delivery systems
Pharmaceutical Technology (Process Chemistry)	Adari Santhosh	Applications of metal catalyzed decarboxylative
Pharmaceutical Technology (Process Chemistry)	Anjali Ratan	Process for preparing substituted hydantoin and synthesis of antiepileptic drug Ethotoin
Pharmaceutical Technology (Process Chemistry)	Bhavana Deshmukh	Process for the preparation of substituted 1,2,4 - triazol-3-one and synthesis of its analogues as antidepressant agents
Pharmaceutical Technology (Process Chemistry)	Devendra Rajak	An improved and scalable synthesis of indolic Enamide: Coscinamide A, B and their analogues.
Pharmaceutical Technology (Process Chemistry)	Shruti Sharma	Biocatalytic approach towards the synthesis of enantiopure drug intermediates
Pharmaceutical Technology (Process Chemistry)	Misha Sharma	Enzymatic decarboxylative benzylation
Pharmaceutical Technology (Process Chemistry)	Gurudutt Dubey	Synthesis of fluorenone and azafluorenone by palladium catalyzed decarboxylative arylation
Pharmaceutical Technology (Process Chemistry)	Patel Sagar Kumar Arvindbhai	Novel approaches for the synthesis of Flourenone
Pharmaceutical Technology (Process Chemistry)	Mandeep Kaur Hunjan	Applications of dehydrogenative coupling in the synthesis of N-heterocycles
Pharmaceutical Technology (Process Chemistry)	Pinninti Dileep Kumar	Synthesis of Isatin semicarbazone as anticonvalsant agents
Pharmaceutical Technology (Process Chemistry)	Shantanu Gupta	Studies toward synthesis of Carpatamide A-B cytotoxic arylamine derivative from a marine derived *Streptomyces sp*.
Pharmaceutical Technology (Biotechnology)	Avaghade Sachin Rajendra	Fermentative production of immunosuppressive drug (tacrolimus)
Pharmaceutical Technology (Biotechnology)	Balaji Piraji Surywanshi	Studies on the various cell disruption techniques for the release of intracellular arginine deiminase from *Pseudomonas putida*

Pharmaceutical Technology (Biotechnology)	Kanadje Akash Prakash	Preformulation study of imidazopyrazine derivative as a potent topoisomerase IIα inhibitor
Pharmaceutical Technology (Biotechnology)	Bhim Singh	Development of biocompatitable PLGA-acridine/Rose Bengal nanoparticles as nanomedicinal-diagnostic agents
Pharmaceutical Technology (Biotechnology)	Deepak	Oxidoreductase-mediated biocatalytic approach for synthesis of drug and drugs intermediates
Pharmaceutical Technology (Biotechnology)	Snehal Sainath Jawalekar	Nitrilase incorporated nanobiocatalytic probes for synthesis of drugs and drug intermediates
Pharmacy Practice	Mukhtar Ahmad	Identification & characterization of adverse drug reactions in the wards of a public teaching hospital
Pharmacy Practice	M Amarnath	Use of anti-hypertensives & nonsteroidal anti-inflammatory drugs in prevention & delaying progression of parkinson's disease: A systematic review & meta analysis
Pharmacy Practice	Vatte Rambabu	Assessment of prognostic value of neuropathic pain screening questionnaires in assessing pain related outcomes in chronic non-cancer neuropathic pain conditions
Pharmacy Practice	Brijesh Nelson	Antimicrobial usage in intensive care unit of a public teaching hospital: A prospective observational study
Pharmacy Practice	Gopal Chudasama	Identification & evaluation of potentially inappropriate prescriptions in hospitalized geriatric patients in a tertiary care setting
Clinical Research	Murali Krishna	A comparative effectiveness, safety & tolerability of all pharmacological interventions for chronic low back pain (CLBP): A systematic review and bayesian network meta-analysis of randomized controlled trials (RCTs)
Clinical Research	Nikunjkumar	Profiling of patients & assessment of outcome at primary care homeopathic hospital
Clinical Research	Swati Deshwal	Study on the use of medicines at a private paediatric hospital
Clinical Research	Himanshu Modi	Pharmacovigilance analysis of adverse events reported for newer anti-diabetic drugs- A real-world post marketing experience from the US FDA adverse event reporting system (FAERS)
Clinical Research	Nisha	Assessment of medications use behavior in paediatric patients and evaluation of safety of yellow fever vaccine in healthy travelers
Clinical Research	Nimeesha	Evaluation of the number of clinical trials conducted & respective drug approvals in Last 10 years: A critical appraisal of a regulatory framework in India
Pharmacoinformatics	Anunay Sourabh Sharma	Machine learning approaches to predict EC number: An application to metabolic network gap-filling
Pharmacoinformatics	Bachu Deepak	Therapeutic target prediction and drug repositioning for kinetoplastids: A proteochemometric approach
Pharmacoinformatics	Bairumalla Laxmi Praveen	A computational study to identify potential VP35 inhibitors for Ebola Virus
Pharmacoinformatics	Kapil Dhingra	Target identification of antikinetoplastid drugs: A ligand based approach
Pharmacoinformatics	Neeraj Sharma	To develop a pharmacoinformatic tool for fingerprint-based screening of anti-Leishmanial compounds

Pharmacoinformatics	Sarika Sonkusre	System analysis of *Klebsiella pneumoniae* metabolic model (MGH 78578, iYL1228) for novel target identification and drug discovery
Pharmacoinformatics	Smrithi Radhakrishnan	An in silico approach for epitope based vaccine design against Ebola virus
Pharmacoinformatics	Sunam Kumari	Design of potential inhibitor as an antitubercular agent against isocitrate lyase using in silico approaches
Pharmacoinformatics	Suvojit Hazra	Pharmacoinformatics study of LdRpiB: Probing the structural details to assist antileishmanial drug design
Pharmacoinformatics	Thati Manoj Nag	Molecular capsules for enhancing the solubility and bioavailability of drug molecules using in silico approaches
Pharmacoinformatics	Trupti Chandrakantbhai Donga	Molecular dynamics simulation on trypanothione reductase inhibitors
Pharmacoinformatics	Tukesh Ram Sahu	Computational analysis of the metabolic network of *Mycobacterium tuberculosis*, to detect potential drug target
Pharmacoinformatics	Vivek Giri Goswami	Computational screening and identification of bioactive phytochemicals against NS5B polymerase of HCV
Pharmacoinformatics	Yalavarthi Jayanthi	Development of computational model for P-gp transporter and asses its role in BBB permeability
Pharmaceutical Management	Abhishek Rajkumar Lulla	Internationalization strategies adopted by Indian Pharmaceutical Companies: A comparison of entry mode theories
Pharmaceutical Management	Ajay Puri	Comparative study of segment reporting adopted by pharmaceutical companies
Pharmaceutical Management	Amit Khan	To study the implication of mergers and acquisition on the price of major brands as well as product portfolio of both the target pharmaceutical company and acquirer company
Pharmaceutical Management	Arora Chetan Shekhar	To identify issues and challenges in transfer of technology in selective Govt. backed R&D institutions
Pharmaceutical Management	Barot Purva Jagdishkumar	Non Tariff barriers faced by Indian Pharmaceutical companies: Perspective of Europe and US market
Pharmaceutical Management	Bhandari Ankur Rameshchand	Performance evaluation of pharma SEZ in India
Pharmaceutical Management	Bharat Kumar	Risk analysis of regulatory non compliance in pharma
Pharmaceutical Management	Bishwjit Ghoshal	Global scenario of monoclonal antibodies in therapeutics and improvements possible
Pharmaceutical Management	Brijesh Kumar Lodhi	A comprehensive study of outsourcing: A pharmaceutical perspective
Pharmaceutical Management	Daniel Adani	To study the discrepancy between import and export of medical device in India
Pharmaceutical Management	Deepak Digamber Chaudhari	To study the inflow of FDI in Indian pharmaceutical industry and their impact
Pharmaceutical Management	Divya Bharathi M N	A study on novel framework to make India a self reliant nation- In case of critical bulk drugs
Pharmaceutical Management	Gayatri Sharad Parab	Market orientation vs brand orientation - An insight from Indian pharmaceutical industry

Pharmaceutical Management	Jayakumaran Chandana	A comprehensive study of value based pricing mechanism as a means to increase patient access to medicines
Pharmaceutical Management	Kadamandla Lavnya	Analysis of consumer behaviour towards OTC weight loss supplements
Pharmaceutical Management	Kamath Sanketh Balkrishna	Scope of cell therapy and its potential in the Indian market
Pharmaceutical Management	M Vinod Goud	Regulations in pricing of pharmaceutical products in global pharma market and alternatives of DPCO
Pharmaceutical Management	Md Hassan Fasahat	Attitude, belief and perception of herbal medicines among consumers
Pharmaceutical Management	Mukesh	To study the consumer buying behaviour towards health food drink segment
Pharmaceutical Management	Narender Kumar	To study attitude belief and perception of diabetic patients for glucometers
Pharmaceutical Management	Nellore Sheba Priyanka	Assessment of issues related to accessibility of medicines in India
Pharmaceutical Management	Nishu	Rationale behind FDCs ban and impact on pharmaceutical industry
Pharmaceutical Management	Nunavath Srinivas	Analysing the prominent activities performed by the pharma companies, which yield better results
Pharmaceutical Management	Oshin Santoshi	Market dynamics of Hepatitis C Segment
Pharmaceutical Management	P. Chandravadan Jagdishbhai	Measurement of effectiveness of branding strategy using brand score technique- A conceptual study
Pharmaceutical Management	Pottu Rohith Kumar	Customer perception regarding online pharmacies
Pharmaceutical Management	Prabha Yadav	An evaluation of complaint handling system- A study on hospitals
Pharmaceutical Management	Ravi Kant	Impact of Aesthetic consideration on consumer purchasing decision
Pharmaceutical Management	Saurabh Nigam	Impact of branding on consumers regarding nutritional products
Pharmaceutical Management	Shailee R Patel	To study the consumer perception of private label healthcare products, with special reference to Apollo pharmacy, Chandigarh
Pharmaceutical Management	Shefali Gulati	The relationship between perceived market orientation, perceived brand orientation, perceived patient benefits, patient loyalty and satisfaction in service sector (Path lab)
Pharmaceutical Management	Shruti Kochhar	Corporate social innovation- A case approach
Pharmaceutical Management	Simranjit Singh	States vs derived importance factors to measure customer satisfaction index of path labs services
Pharmaceutical Management	Swati Kinger	Operational excellence in pharma industry
Pharmaceutical Management	Vikas Soni	Assessment of consumer perception, knowledge & attitude towards self medication practices of prescription drugs (Antibiotics)
Pharmaceutical Management	Vishakha Chauhan	Impact of patient choice in hospital selection: A study of hospitals
Pharmaceutical Management	Zaib Iqbal Shaikh	Impact of service recovery on customers loyalty -A study on path labs

FOUNDATION DAY 2017

Foundation Day of the Institute was celebrated on Feb 15, 2017. Prof. A. K. Ganguli, Director, Institute of Nanoscience and Technology, Mohali was the Chief Guest and delivered a lecture on "Nanoscience: A truly interdisciplinary science"

Prof. A. K. Ganguli, Director, Institute of Nanoscience and Technology, Mohali, Chief Guest on Foundation Day 2017, being felicitated by Prof. P. V. Bharatam

Sh. Nityanand Gahan, Assistant Grade I (Finance and Accounts section), received the best employee award for administrative support at the Foundation Day 2017 function

Mr. Mahajan Rahul Rameshrao, Technical Assistant, Department of Pharmaceutics, received the best employee award for technical support at the Foundation Day 2017 function

RESEARCH ACTIVITIES

MEDICINAL CHEMISTRY

Target-based design and synthesis of new chemical entities as inhibitors of various enzymes involved in the pathophysiology of different diseases:

Inflammation:

Inhibitors of cyclooxygenase: Design, synthesis and biological evaluation of NCEs to generate novel leads

The nonsteriodal 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 nephropathy interest to develop more effective COX-2 selective agents has taken a fresh gear.

Total 100 compounds belonging to different chemotypes such as (2-(2'-phenyl benzothiazole/benzoxazole, 2-(3-oxo-1,3-diphenylpropyl)cyclohexane-1,3-dione/3,3'-(pyridine-2,3-diylbis(azanediyl))dicyclohex-2-enone/3,3'-(1,2-phenylenebis(azanediyl)) dicyclopent-2-enone, and 3,3'-(1,2-phenylenebis(azanediyl))dicyclohex-2-enone have been synthesized. Newer methodologies for the synthesis of COX inhibitors via directing group assisted ortho C-H bond activation, heterobimetallic nanoparticle catalyzed synthetic transformations and C-C cross coupling reactions have been developed. Total 50 compounds belonging to the 2-(2'-phenoxyphenyl)benzoxazole/benzothiazole and 2-(biphenyl-2-yl)benzo[d]oxazole, 2-(biphenyl-2-yl)benzo[d]thiazole classes have been synthesized using these methodologies. The invitro COX inhibitory assay studies are in progress.

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 fifty-five compounds containing (2-(benzo[d]thiazol-2-yl)-4,5-dialkoxy/cycloalkoxyphenyl)(phenyl)methanone and (2-(benzo[d]thiazol-2-yl)phenyl)(3,4-dialkoxyphenyl)methanone were synthesized and evaluated for their PDE4B2 inhibitory activity. Twenty-three compounds have shown more than 70% inhibitory activity of PDE4B2 enzyme at 10 μM concentration. In addition to this, the PDE4B inhibitory compounds have been synthesized via cross dehydrogenative coupling of heterocyclic scaffolds with unfunctionalised aroyl surrogates by palladium (II) catalyzed C(sp^2)-H aroylation through organo-catalytic dioxygen activation.

Leishmaniasis: New anti-leishmanial chemotype

Trypanothione Reductase (TR) has been considered as one of more relevant and novel target for leishmaniasis. Total fifty-four compounds to two different series (2-alkyl/aryl/hetero arylalkyl/arylquinazolin-4(3H)-one and 3-(4-(piperazin-1-yl)phenyl)quinazolin-4(3H)-one) were

synthesized based on the computational studies that compounds belonging to this structural class would be TR inhibitors. The biological evaluation against leishmania of these compounds is under progress.

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 endeavour various small molecules were designed to target ATPPRTase (HisG) and FTsZ.

181 compounds belonging to different series (quinoline-3-carboxamides and other aryl/alkyl carboxamides, oxazolidinones, benzaothiazole-2-carboxamides and benzimidazole-2-carboxamides and 2-styryl quinazolinones) have been synthesized and shall be evaluated for anti-TB and anti-bacterial activity in collaboration with Central Drug Research Institute (CDRI), Lucknow.

Green chemistry: Sustainable chemical synthesis through novel concepts

Ensembling catalysis by Ni-Pd heterobimetallic nanoparticles

A novel ensembling and cooperative catalysis by Ni-Pd binary NCs for C-O bond activation for Suzuki-Miyaura cross coupling of o-heterocycle-tethered sterically hindered aryl ester, silyl ether, sulfonates, carbamate, and carbonates with aryl boronic acids has been developed for the first time. Use of lesser catalyst loading, molecular oxygen, phenol based electrophiles and a novel mechanistic pathway are some of the important features of the reaction. The catalyst system comprising Ni-Pd binary NCs was found to be distinctly superior to the various Pd/Ni compounds/complexes reported for Suzuki-Miyaura cross-coupling reaction involving a phenol-based electrophilic coupling partner. A total 20 compounds have been synthesized by this methodology.

Cross dehydrogenative coupling of heterocyclic scaffolds with unfunctionalised aroyl surrogates by palladium (II) catalyzed C(sp^2)-H aroylation through organ catalytic dioxygen activation

Cross dehydrogenative coupling of bio-relevant heterocyclic with arylmethanes for aroylation during the Pd(II)-catalysed C(sp^2)-H activation has been achieved through dioxygen activation by NHPI. Mass spectrometry and ^{1}H NMR based kinetic isotope effect studies revealed C-H bond activation as the rate determining step. Radical scavenging experiments indicated radical pathway. The ^{1}H NMR of an aliquot of reaction mixture and in situ trapping with 2-aminothiophenol revealed formation of aldehyde during aerobic oxidation of the arylmethanes. The reaction has broad scope for different variation of the aroyl source and the directing group that include benzothiazole, benzoxazole, pyridine, quinoxaline, pyrimidine, and azoarene. The benzylic methylene moiety was found to be the source of the aroyl carbon with the benzyl ether moiety being the most preferred followed by the carbonyl group of aryl aldehyde and the aryl methane. However, the ease of availability of aryl methanes makes them most attractive as aroyl source. A time dependent selective mono- and bis-aroylation can be achieved. The 1,3-diarylpyrimidines exhibited regioselective aroylation of the 2-phenyl moiety irrespective of the absence or presence of any substitutent (electron withdrawing or electron donating) in the 3-phenyl moiety. For unsymmetrical azoarenes, selective aroylation took place in the phenyl moiety bearing the substituent.

Ionic liquid catalysed N,N'-carbonyldiimidazole (CDI) mediated amidation of amines with acids.

Reverse amides containing benzo[d] thiazole-2-carboxamides have been identified as potent anti-mycobacterial agents. These led us to adopt to develop some new synthetic strategy to develop green synthetic methodology for the synthesis of reverse amides and other amide containing compounds. Although non-classical methods for the synthesis of amide bonds have emerged as powerful tool in organic synthesis, their limitation with substrate scope often poses a problem to synthetic/medicinal chemists. In this work, we established [bmim][Cl] as catalyst for *N*, *N*'-Carbonyldiimidazole (CDI) mediated amidation of hindered/heteroaromatic carboxylic acid with weak

nucleophilic aromatic/hindered amines under mild reaction conditions. The role of ionic liquid has been envisaged through ambiphiphilic dual activation through the formation of intermediates involving hydrogen bonds between the oxygen atom of acid carbonyl and C-2 hydrogen of bmim cation and enforced hydrogen bond between amine N-H and anion of IL. The intermediates were fished by LCQ-MS and MS-MS studies. The role of hydrogen bonding was further corroborated by kinetic studies.

Anticancer Agents

Artemisinin (ART) and some of its derivatives (ARTs) have been a set of extremely successful drugs used for combating malaria, in particular resistant malaria. Some of the important attributes of ARTs, such as their high efficacy, quick action and minimum side effects, have greatly influenced researchers around the globe prompting them to study their pharmacological properties beyond the antimalarial activity. The activity of ARTs in many of the instances was attributed to the endoperoxide residue, the structural element that distinguished them from others. Thus, alongside antimalarials, we also focused our synthetic program on synthesizing derivatives of ART for evaluation as anticancer agents in attempts to derive the best desired effect against cancer cells. Indeed we have been successful in developing a library of ARTs that are cytotoxic to cancer cell lines, with IC_{50} of 5-50 M, but safe on normal cells.

Antimicrobial Agents

Synthesis of ricinoleic acid derivatives including several sugar-linked compounds as potential antibacterial agents has continued in order to facilitate a fruitful SAR study on them. Some of them were proved indeed potent compounds performing in certain instances better than some of the commercially used substances, the notable characteristic of our compounds being that they are easy to prepare.

Development of 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.

Iminothiazolidin-4-one derivatives were explored as selective GSK-3β inhibitors. Molecular docking analysis was carried to design a series of compounds, which were synthesized using substituted thiourea, 2-bromoacetophenones and benzaldehydes. Out of the twenty five compounds synthesized during this work, the in vitro evaluation against GSK-3 led to the identification of nine compounds with activity in lower nano-molar range (2-85 nM). Further, in vitro evaluation against CDK-2 showed five compounds to be selective towards GSK-3.

Coordination chemistry of bonds between main group elements and electron donating ligands as in L→E (where E is electron acceptor centre like C^0, Si^0, N^1, P^1, As^1, B^1 and L is an electron donating N-heterocyclic carbene) has been recently gaining attention. Many important drugs have nitrogen atom as an electron acceptor center and can be represented by two general formulae: $(L\rightarrow N\leftarrow L)^{\oplus}$ and L→N-R. Divalent N1 compounds possess two lone pairs at central nitrogen and low nucleophilicity

associated with them is found to be of importance. In this article, electronic structure analysis of drug molecules like picloxydine, chlorhexidine, and moroxydine was performed at B3LYP/6-311 ++G(d,p) level of theory. Further, electronic structure analysis of drugs like clonidine, apraclonidine, brimonidine and xylazine indicated the presence of electronic structure similar to L→N-R systems.

Computational studies performed on dendrimer-drug complexes usually consider 1:1 stoichiometry, which is far from reality, since in experiments more number of drug molecules get encapsulated inside a dendrimer. In the present study, molecular dynamic (MD) simulations were implemented to characterize the more realistic molecular models of dendrimer-drug complexes (1:n stoichiometry) in order to understand the effect of high drug loading on the structural properties and also to unveil the atomistic level details. For this purpose, possible inclusion complexes of model drug Nateglinide (Ntg) (antidiabetic, belongs to Biopharmaceutics Classification System class II) with amine- and acetyl-terminated G4 poly(amidoamine) (G4 PAMAM(NH_2) and G4 PAMAM(Ac)) dendrimers at neutral and low pH conditions are explored in this work. MD simulation analysis on dendrimer-drug complexes revealed that the drug encapsulation efficiency of G4 PAMAM(NH_2) and G4 PAMAM(Ac) dendrimers at neutral pH was 6 and 5, respectively, while at low pH it was 12 and 13, respectively.

P218 is one of the very important and recent lead compounds for antimalarial research. The 3D structural and electronic details of P218 are not available. In this article, quantum chemical studies to understand the possible 3D structures of P218 are reported and compared with 3D structures from the active site cavities of hDHFR and PfDHFR. The neutral P218, can adopt open chain as well as cyclic arrangements. Under implicit solvent condition a zwitterionic-cyclic conformer is found to be quite possible. Microsolvation studies using explicit water molecules indicate that one water molecule may bridge the two ends of zwitterionic-cyclic P218. It was observed that the protonation occurs preferentially at N^1 position of the 2,4-diaminopyrimidine ring, with a proton affinity of 274.49 kcal/mol (implicit solvent phase) and 236.35 kcal/mol (gas phase). A dimer of P218 may be zwitterionic dimer, the dimer formation can release upto 28.60 kcal/mol (implicit solvent phase).

Malaria

The aim of our research is to discover newer compounds with broad-spectrum of antimalarial activity possibly against both blood-and tissue stages of *P. falciparum*, and also to discover new structural class of peptide-based antimalarials. The work on 8-aminoquinolines as antimalarials continues. Herein, we synthesized a new series of quinoline-based derivatives. The in vitro activity determination of this class is underway.

Tuberculosis

Our effort to design and identify new structural classes of ring-substituted quinolines as anti-tuberculosis agent continues this year. It is well known that the rise in TB incidents can be attributed to the development of resistance by *Mycobacterium tuberculosis* to commonly used anti-tuberculosis drugs, raising incidences of disease in immuno-compromised patients, and longer durations of therapy that are required as a results of resistance development. As a result tuberculosis epidemic has not only begun to worsen but also poses an unprecedented medical, social and economic threat to the world. Consequently, new drugs with divergent and unique structure and with a mechanism of action possibly different from that of existing drugs are urgently required. We have earlier reported the discovery of ring-substituted quinolines as a new structural class of anti-TB agents. We have synthesized about ninety new quinoline-based compounds as anti-TB agents by multistep synthetic strategies. The newly synthesized ring-substituted quinolines were evaluated for bioactivity as the proton pump of ATP-synthetase inhibitors of *Mycobacterium Tuberculosis* and against *Mycobacterium Tuberculosis* H37Ra. It was good to see some of the tested compounds exhibiting very promising inhibitory activity in the enzymatic and in vitro assay.

Synthesis of Thyrotropin - Releasing Hormone (TRH) Analogues

Thyrotropin-Releasing Hormone (TRH) is a key factor responsible for proper brain-body coordination. TRH is synthesized mainly in the hypothalamus. It was the first hypothalamic peptide characterized and acts as a neurohormone, neurotransmitter and a neuromodulator. As a neurohormone, TRH stimulates the release of thyrotropin (thyroid-stimulating hormone, TSH) and prolactin from the anterior pituitary gland. As a neurotransmitter in the central nervous system (CNS), it modulates various systems and exerts a variety of extrahypothalamic effects. TRH executes its activity in rodents through two subtypes of G-protein coupled (7-transmembrane-spanning) receptors, TRH receptor type 1 (TRH-R1) and TRH-R2. These receptors activate the same signaling pathways, mediated primarily by coupling to Gq/11 proteins with the subsequent activation of phosphoinositide specific phosholipase C. However, although TRH-R1 and TRH-R2 show identical binding affinities and indistinguishable potencies for TRH and some TRH analogues they exhibit different basal signaling activities and different rates of internalization. It is of note that humans have only a single type of TRH receptor that is more similar to TRH-R1 than TRH-R2. The two TRH receptors show clear differences in their anatomical distribution suggesting distinct biological roles. TRH-R1 has been shown to mediate endocrine and CNS functions. No function of TRH are mediated by TRH-R2, however, as it is highly expressed in several brain regions it is expected to mediate some neurotransmitter effects. Nevertheless, administration of TRH causes a number of CNS effects including arousal, antidepressant activity, anxiolytic effects, increase in locomotor activity, antagonism of pentobarbital (PB)-induced sedation, thermoregulation, and cardiovascular and gastrointestinal autonomic functions. All synthesized TRH analogues were evaluated in vitro as agonists at HEK mTRH-R1 and HEK mTRH-R2 cell lines expressing receptor binding assay (IC_{50}), and cell signaling assay (EC_{50}). The synthesized TRH analogues were then evaluated in vivo by using the antagonism of a pentobarbital-induced sleeping time model to determine analeptic activity. The best analogue showed lower binding affinity and signaling activity in FLIPR functional assay toward TRH-R1 and TRH-R2 with high selectivity for TRH-R2. We then started an investigation on the delivery of these peptides through encapsulation and nanoparticle formation. The results of these investigations demonstrate that the stability of the test peptide increase after formulation.

Synthesis of Antimicrobial and Antifungal Peptides

We have discovered structurally new peptidomimetics, rich in synthetically modified L-histidine and arginine. A number of dipeptidomimetics and tripeptidomimetics were synthesized by varying alkyl and aryl group at the N-1 and C-2 position of L-histidine and at the N- and C-terminus of the peptide. The data indicates that peptides possessing highly lipophilic adamantan-1-yl and biphenyl groups displayed strong inhibition of *C. neoformans*. The selectivity of these peptides to microbial pathogen was examined by a tryptophan fluorescence quenching study, Scanning electron microscopy and transmission electron microscopy. These studies indicate that the peptides plausibly interact with the mimic membrane of pathogen by direct insertion, and results in disruption of membrane of pathogen. We also designed, synthesized and evaluated in vitro antimicrobial activity of ultra short peptidomimetics. The tagging study of this class of peptides is finished and provided vital clue in mechanism of action. The combination study of the peptides with known antifungal drugs were performed using checerk board assay. The peptides were found to exhibit synergisitic activity with the known drugs. Along the same lines, a large number of new structural classes of short peptides were synthesized during this year. The preliminary results of bioactivity evaluation confirms that some of the peptides are highly potent against fungal as well as bacterial infections.

Synthesis of Amyloid β-Sheet Breaker Peptides

Polymerization of amyloid β-peptide (Aβ) into amyloid fibrils is a critical step in the pathogenesis of Alzheimer's disease. Studies have indicated that a polymerization involves interaction between binding sequences in the A β-peptide. Hence, a rational pharmacological approach for prevention of amyloid formation would be to use agents that interfere with Abeta-Aβ interaction and polymerization. A region located in the central part of Aβ corresponding to $Aβ_{38-42}$ and $Aβ_{39-42}$, displayed prominent binding of radioactive $Aβ_{1-42}$. The shortest peptide that displayed high Aβ 1-42 binding capacity was found to have the sequence KLVFF. We have modified the lead peptide by performing a partial amino acid scan. We have synthesized 65 tetrapeptides. The peptides were evaluated for cell viability assay using Abeta1-42, Abeta1-40 and Abeta25-35 fragments. The bioactivity evaluation is currently under progress in our laboratory.

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. 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 utilized. 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 study on these compounds for further development is underway. In the antitubulin study, combretastatin A-4 (CA-4, a clinical agent)-inspired compounds were found potent compared to CA-4 in tubulin polymerization inhibition and antiproliferative activities in various cancer cells. Further study is going on.

Discovery of Leishmanicidal Agents: Specific Target-interfering Heterocyclic Ligands

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 groves) 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 designed heterocyclic compounds. Some of them were found to exhibit potent antileishmanial activities and were significantly less cytotoxic. Further studies are going on.

PHARMACOINFORMATICS

Database development for adverse drug reactions

The web interface for InAADR (Interactions Associated with Adverse Drug Reactions) database is being developed and links to the original publications from which the data have been collected is created. It provides drug-protein-ADRs, drug-drug and drug-food interaction information and their associated side effects.

The database may be accessed from http://14.139.57.41/InAADR/.

Comparative homology modelling of GAPDH and mutant analysis

GAPDH is homo-tetramer composed of four identical 36 kDa subunits. The structure of GAPDH alongwith its associated cofactor NAD^+ has been reported for other homologous organisms. The sequence of *M.tb* H37Rv GAPDH was retrieved from NCBI (GenBank: CAB09248.1), the protein sequence is composed of 339 amino acids. The template (PDB ID: 1GD1) was assembled into its homo-tetrameric structure, each unit of modeled *M.tb* GAPDH was then superimposed upon this template. The position of the two mutations was analyzed in context of the GAPDH tetramer and its proximity to the NAD^+ binding site. Two selected mutations (N142S and P295L) were experimentally tested for their enzyme activity and ability to bind lactoferrin. Of these the Asparagine 142 is conserved residue, mutation to serine resulted in a loss of enzyme activity. Both mutations were explored to predict the effect on protein stability and proximity to substrate binding site. The effects of mutations on proteins stability were analyzed using the DUET, mCSM and Site Directed Mutator.

Proteochemometric drug interaction profiling for therapeutic targets, cytochrome P450s and transporters

The classification models developed for prediction of therapeutic targets, membrane transporters and CYP enzymes were incorporated into a single desktop based application called 'Drug Interaction Profiler'. A user can submit a molecule to the 'Drug Interaction Profiler' in order to profile it against variety of therapeutic targets, thirteen membrane transporters and five major CYP isoforms. For therapeutic target prediction, RF based models are used as they were performing better than other models. Average prediction probability is used to prioritize the predicted targets. User can set the cut-off for APP to display the predicted results. In case of transporters and CYPs; PHE and QHE models are used in tool. The results are displayed in the graphical form. Upon submission of the query molecule in SMILES format, the program calculates the desired descriptors and fingerprint for the molecule. Important descriptors will be then selected and subjected to the respective models. Outcome from each models are then ensembled into final results.

Identification and Design of Small Molecule Inhibitors of Tankyrases

The aim of proposed work is to identify and design novel small molecule inhibitors of tankyrases as anticancer agents using computational approaches. To accomplish the proposed work, in silico alanine scanning mutagenesis study was performed to reveal quantitative profile of hydrophobic chemical space around the binding pocket and the contribution of residues responsible for hydrophobic interactions of tnks-tnksi complexes. Comparative conformational variation and flexibility analysis of binding site d-loop of tankyrases have been carried out to discover its importance in designing of potential tankyrases inhibitors. Ligand based shape comparison application have been used to identify specific features essential for inhibition of tnkss followed by molecular docking and molecular dynamic studies.

ATPase inhibitors as anti tuberculosis agents

Structure based studies on newly designed molecules using the structure of Mycobacterium phlei

Molecular docking studies were carried out using the structure of mycobacterium phlei for the newly designed molecules. The role of water molecules in binding the designed molecules was also explored. Molecules were also analyzed for drug like properties. The analyses revealed a rational way of optimizing the designed molecules as potent inhibitors. Some of the molecules designed and procured were subjected to biological screening studies and the work is under progress.

Binding studies on in house molecules as anti tuberculosis ATPase inhibitors

In this study 57 compounds, synthesized in-house were selected for binding studies. These molecules were docked in the binding site of ATPase (4V1F) using Glide software. Many crucial steps including assignment of charges, protonation and ionisation states were taken care before subjecting the molecules to docking studies. Structure based

studies showed that many of the molecules possess high binding affinity towards ATPase and this work is being continued.

Molecular Design of Malate Synthase Inhibitors as Anti Tuberculosis Agents

Structure based and ligand based design of malate synthase inhibitors as anti tuberculosis agents

Ligand based pharmacophore model was developed and the Pharmacophore query was subjected to data base screening. The obtained hits were studied for their binding affinity with the enzyme. E-pharmacophore studies followed by virtual screening were carried out using Maestro software. Validation of the energetically optimized Pharmacophore was performed with the help of Phase 3D database. Molecular dynamics studies of three obtained hits with highest docking score were preformed. Novel molecules were identified as probable MS inhibitors.

Molecular modeling studies on ICL inhibitors as anti tuberculosis molecules

Forty-nine in house molecules were studied and binding site characterization studies were performed for these molecules. The ability of the binding of the molecules, the structural features and the size of the molecules were studied. The analysis of docking results shows that only few molecules were partially docked at the validated active site while most of the other molecules were docked at different site. The active site for ICL is smaller in size so the molecules with substitution at terminal benzene ring were docked at different site. It is proposed that there may be another adjacent site to the primary active site, which can be explored further for obtaining potential molecules.

Newly designed molecules of PTP1B allosteric inhibitors as anti diabetic agents

A new hydrophobic cavity was identified which has not been explored so far. Computer aided drug design methods helped us to identify this pocket and this pocket was explored to design novel molecules. The new molecules are promising and the designed molecules are subjected to other in silico strategies to validate the proof of concept and further studies.

Identification of new fluroquinolone derivatives as anti tuberculosis agents to address MDR TB

The antibiotic Moxifloxacin is a second-generation drug used in the treatment of tuberculosis. The resistance of this drug prompted us to explore mutated structure of DNA-gyrase A. This work was initiated to study the mutated crystal structure complexes and to design new molecules according to the conformational changes observed in the mutated ones. In this study, 6 mutated residues were chosen and subjected to molecular dynamics studies to explore the conformational changes that occurred due to mutations. The new conformations were used to design new molecules. Efforts in this direction presumably help in addressing the MDR-T.

Structure based design of HK2 inhibitors as anti cancer agents

Hexokinase II is playing a crucial role in cancer growth and metabolism by taking part in glucose metabolism by special pathway known as Warburg effect which is prominent in cancer cells. Recently a novel 2,6-disubstituted glucosamine series of potent and selective hexokinase 2 inhibitors have been identified. In this study, we explored that several co-crystal structures of HK2 with inhibitors. These co-crystal structures reveal the fexibility of the HK2 protein and that the catalytic site can adopt an "induced- fit" conformation with inhibitors. Using these information, 2,6-disubstituted glucosamine series was rationally explored to identify new molecules.

Computer aided drug design of small molecule agonist of GLP1-receptor

In the absence of the experimental structure human GLP1-Receptor Homology modeling of GLP-1R was carried out to determine the 3D structure the receptor. Reported molecules were docked onto the modeled structure and based on the dock scores e-pharmacophore was generated, followed by shape

based virtual screening of specs database to get 500 hits. These 500 molecules were subjected to QikProp to analyze and further screen molecules based on physicochemical parameters.

Molecular design of potential inhibitors of NHE1 using in silico techniques

NHE1 is the most predominant isoform expressed in heart where it contributes to cardiomyocyte pH homeostasis. Inhibition of the NHE1 can afford substantial protection against myocardial ischaemia (MI). In this study we identified a new binding site for NHE1 using computational methods and used the site for performing structure based methods and identified new NHE1 molecules.

In silico analysis of HK2 as anticancer target and investigation into acidic tumour microenvironment

A major characteristic of Warburg Effect phenomenon is acidic microenvironment and low altered O_2 supply to the cells. In this study, we investigated HK2 as an anticancer target and explored the acidic tumor microenvironment for its binding characteristics. To accomplish these structural analyses of different isoforms II, III, IV, and I were studied and their binding characteristics were explored. The role of magnesium in the binding of Hexokinase II was studied using molecular dynamics. The simulations of the structure of Hexokinase I and Hexokinase II in acidic pH were performed using molecular dynamics.

In silico design of dual inhibitors of ICAM-1 and ICAM-4: Targets for tuberculosis and malaria

ICAM-1 and ICAM-4 are involved in the pathogenesis of Tuberculosis and Malaria respectively. The project involved homology modeling of ICAM-1 and ICAM-4. The active sites of ICAM-1 and ICAM-4 determined by Site map module of maestro software and ICAM-1 site 2 was docked with the molecules from the SPEC database, and further screened the molecules on the basis of docking score and with QuikProp module of maestro software. From the screening result 1000 molecules are docked with ICAM-1 site 1 and 56 molecules with ICAM-4. The best-docked molecule of ICAM-1 site 2 docking was subjected to Molecular dynamics for the validation of the docking result.

3D QSAR study on mycobacterial ATP synthase inhibitors

ATP Synthase is a multi-subunit, membrane-associated protein complex that catalyzes the phosphorylation of ADP to ATP at the expense of a proton motive force generated by an electron transport chain in energy-transducing membranes. In this study we collected the SAR data reported in the literature and developed a robust 3D-QSAR model. The model was validated using test data set. This model was used to predict the biological activity of the in house designed molecules as ant tuberculosis ATPase inhibitors.

Identification of potent inhibitors targeting Ebola virus VP40 protein: A computational study

Ebola Virus matrix protein (VP40) is the most abundant protein located under the viral bilayer is VP40, and it is required to make the structural integrity of the viral particles. It plays an important role either in the RNA metabolism of viral or in the host cell. In this work, we studied the protein druggability of viral proteins of Dengue, HIV, Hepatitis C Virus, Influenza and Ebola. We explored the dimeric and octameric structures of Ebola VP40 and analyzed them to characterize their binding pattern. We also identified new anti viral molecules for VP40 using the dimeric structure using computational approaches such as site map, ligand based and structure based methods.

NATURAL PRODUCTS

Our research group is involved in design and synthesis of natural product analogues to find potent antileishmanial and anti-HIV compounds. The isolation and characterisation of compounds from natural resources is also being carried out in our laboratories. Major research activities include:

- Design and synthesis of benzimida -zole, indole and β-carboline derivatives as antileishmanial agents.
- Design and synthesis of derivatives of naphthyridine, pyrazole and isoquinoline for evaluation of anti-HIV activity.

- Phytochemical investigation of Indian and Australian Eucalyptus species, Acalypha Indica, Alistonia Scholaris and Codonopsis clematidea.

- Isolation of secondary metabolites from fungus *Fusarium equiseti* and *Lasiodiplodia pseudotheobromae.*

Standardization of anti-eczematic formulation of hydroalcoholic extract of *Euphorbia thymifolia.*

Design and synthesis of potential heterocyclic compounds as microsomal prostaglandin E2 synthase (mPGES)-1 inhibitors

Molecular docking was performed using Glide software (Grid-based Ligand Docking with Energetics), (Glide, version 5.7, Schrödinger, LLC, New York, NY, 2011) with the standard precision (SP) mode to estimate protein-ligand binding affinities and static intermolecular interactions. Intially, to check the reliability of the docking protocol, the bound ligand (as given in X-ray crystal structures) was redocked in the active-site of mPGES-1 enzyme and RMSD value of the docked poses were compared to the X-ray crystallographic conformation of the ligand. After the validation of docking protocol, MK886, MF63 and the designed molecules were docked flexibly into the active-site of mPGES-1 enzyme. A maximum of ten docking poses per ligand were generated in each case and analyzed further for the binding mode and intermolecular interactions.

Synthesis: Synthesis of 1,2,3-triazole derivatives in 5 series 1 and 2 was carried out by by Cu-Catalyzed Azide-Alkyne Cycloaddition reaction (Huisgen cycloaddition reaction), Suzuki coupling reaction and Sonogashira coupling reaction.

The mPGES-1 enzyme inhibition in vitro assay has been developed, validated and established in our laboratory to screen natural products and synthetic derivatives as potential anti-inflammatory agents.

Using 5 schemes, total 70 novel biaryl substituted triazoles have been synthesized and screened for mPGES-1 inhibitory activity in vitro.

- Synthesis of biarylimidazoles as potential mPGES-1 inhibitors: Total 16 compounds were synthesized in series and screened for mPGES-1 inhibitory activity in vitro.

- Synthesis of Tetra-substituted quinoline analogues as potential anti-TB agents: 17 novel compounds have been synthesized.

  Synthesis of quinoline based 1,3,5-trisubstituted pyrazoles as potential anti-tubercular agents: 8 novel compounds were synthesized.

- Synthesis of 2,5-disubstituted 1,3,4-oxadiazoles as potential COX inhibitors: 10 novel compounds were synthesized.

- Isolation of phyllanthin from *Phyllanthus amarus* Schumach and Thonn: and preparation of its semisynthetic derivatives: 5 g of phyllanthin was isolated and 10 novel analogues of phyllanthin were synthesized.

PHARMACEUTICAL ANALYSIS

Assessment of metabolism-based herb-drug interaction potential of traditional Indian ayurvedic medicine(s) with modern drugs

The use of herbal products has increased significantly over the past decades to manage various common chronic diseases and health. As more consumers concomitantly use herbal products with prescribed drugs, the probabilities of potential pharmacokinetic and/or pharmacodynamic based herb-drug interactions increase. The primary mechanism of reported pharmacokinetic herb-drug interactions is modulation of metabolizing enzymes and/or transporters in the liver and the intestine. The inhibition or induction of enzymes/transporters leads to increased or decreased plasma drug concentration, respectively, which subsequently leads to adverse events/toxicity or therapeutic failure. A project is being carried out to study metabolism-based herb-drug interaction potential of traditional Indian ayurvedic medicine(s) with modern drugs.

Hepatic and extra-hepatic metabolite detection and characterization using hyphenated techniques

Drugs are metabolized in the body extensively through liver. These studies are important as

formation of reactive metabolites is mainly held responsible for toxicity show by the drugs. A project is targeted to characterize stable and reactive metabolites of multiple drugs using modern hyphenated mass tools, such as LC-MS^n, LC-MS/TOF, etc. Also, in vitro metabolite identification studies on selected drugs are being carried out in mouse, rat and human models using same hyphenated techniques to establish inter-species differences.

Development of data module of ADME QPrOmics™ database for applications in PBPK modelling

A compilation is being done of the reported quantitative protein, mRNA and activity data of drug metabolizing enzymes (DMEs), drug transporters (DTs) and nuclear receptors (NRs) in animal and human organs to create comprehensive repository information as a data module, which is being compiled in a publicly accessible database (ADME Q :Promicshttp://qpromics.uw.edu/qpromics/data/). The key information in data module includes different species (mouse, rat, dog, monkey, and human) and tissues (liver, intestine, kidney, brain, and lung); and information on mean or median abundance value, standard deviation (SD), range (minimum to maximum), % coefficient of variance (% CV), units, analytical method and relative or absolute quantification of protein, mRNA, and activity. In addition, the data module tends to provide information on effects of demographic variables like, number of sample (n), age (neonates to adults), sex, ethnicity, genotype, disease, smoker, alcohol consumption, and medication on the expression of the same. This data is useful for developing physiologically based pharmacokinetic (PBPK) models which permits prediction of absorption, distribution, metabolism and excretion (ADME) of xenobiotics in humans and other animal species. The data module is an open access resource for system pharmacolo-gists and pharmacometricians in the drug development industry, regulatory and academia.

Drug-drug and drug-excipient interaction studies on various drug combinations

Many drugs are given in fixed-dose combinations due to their higher efficacy, low dose, reduced resistance and cost-effectiveness, etc., but some combinations show physical and chemical incompatibilities leading to stability related problems. Compatibility studies are being carried out on multiple FDCs among different drug categories, like anti-HIV, anti-malarial (artesunate and amodiaquine), etc.

Stress studies on selected drugs and characterization of their degradation products by using hyphenated techniques

Multiple drugs have been selected for stress testing, in particular those whose degradation behaviour is not reported in the literature. For this, degradation studies are being carried out under different stress conditions like hydrolytic, photo, oxidative and thermal. The formed degradation products are separated by HPLC and the method is transferred to LC-MS^n, LC-MS/TOF and LC-NMR for their characterization. The studies also involve isolation of degradation products using semi-preparative HPLC and their characterization with the help of 1D and 2D NMR data. This piece of investigations is currently being carried out on besifloxacin, naratriptan, azelastine, celiprolol, silodosin, fosamprenavir and sunitinib.

Comparative degradation study of selected drugs using different oxidative stressors

Oxidation is the second most common degradation pathway in pharmaceuticals, but the conditions regarding oxidative stress studies are not mentioned in any of the regulatory guidelines. In practice, oxidative stress studies are done by using hydrogen peroxide, free radical initiator, oxygen purging, transition metals, singlet oxygen, Fenton's reagent etc. A number of drugs have been selected for the study, especially those where no literature reports are available. We are comparing oxidative degradation profile of the selected drugs using different oxidative stressors to understand the responsible source for oxidative degradation in the selected formulation and critical comparison of solution and solid state oxidative stress degradation profiles.

PHARMACOLOGY AND TOXICOLOGY

CNS Research

Cerebral ischemia

We investigated the neuroprotective potential of ER stress inhibitor in global cerebral ischemia-induced by bilateral carotid artery occlusion (BCAO) in Mongolian gerbil. BCAO caused significant neurological deficits and hippocampal damage. Significant alterations in locomotor activity, ambulatory time and percent alternations in Y maze were observed after BCAO. 4-PBA treatment significantly ameliorated neurological deficits, alterations in neurological functions and hippocampal damage. These results indicate the neuroprotective effect of an ER stress inhibitor in global cerebral ischemia model. We have also investigated effect of endothelin (ET-B) receptor agonist in global cerebral ischemia model in gerbils.

Cognitive Impairment

We investigated the effects of dimethyl fumarate (DMF), a nrf2 activator in animal models of cognitive impairment. Intracerebroventricular administration of amyloid beta (Aβ) or scopolamine was used to induce cognitive impairment (CI) in male SD rats. CI was confirmed using various behavioral tasks. Aβ treated rats were orally administered with DMF to investigates its effects. Animals administered with DMF exhibited a significant recovery which was evident in behavioral, biochemical and histological examination in Aβ-induced memory impairment. In scopolamine-induced CI, DMF pretreatment reversed CI induced by scopolamine again which was evident from improvement of behavioral, biochemical and histological parameters. This study suggests the potential of DMF in cognitive impairment.

Diabetic Complications Research

Diabetic Neuropathic Pain

We investigated the effects of vigabatrin in diabetes-induced neuropathic pain and chemotherapy-induced neuropathic pain. Streptozotocin (50 mg/kg) was administered to induce diabetic neuropathic pain in rats. Cancer chemotherapeutic agents - paclitaxel (2 mg/kg) was used to induce chemotherapy-induced neuropathic pain in rats. Animals were assessed for pain (thermal, mechanical and cold hyperalgesia) and neuronal functions (MNCV, NBF) before and after vigabatrin treatment. Vigabatrin treatment significantly reversed thermal and mechanical hyperalgesia. Neuronal functions like MNCV and NBF were significantly improved with vigabatrin treatment. These results suggest the neuropathic pain relieving effect of vigabatrin. Recently the role of transient receptor potential vanilloid subfamily member 2 (TRPV2), a nonselective cation channel shown to participate in peripheral sensitization and mechanisms leading to persistent pain after inflammation due to its involvement in heat hyperalgesia. The effect of pharmacological intervention targeting at TRPV2 has not yet been investigated in neuropathic pain. In this study, we investigated the effect of specific TRPV2 antagonist, tranilast in experimental models of neuropathic pain. We observed that tranilast treatment for one week produced significant reversal of behavioural and functional pain parameters in chronic constriction injury and paclitaxel induced neuropathic pain model. This study implicates the potential of TRV2 antagonists in the treatment of neuropathic pain.

Diabetic Cardiomyopathy

Diabetes is considered to be one of the leading cause of cardiovascular complication and diabetic cardiomyopathy (DCM) is a fatal cardiovascular complications associated with diabetes. Despite understanding involvement of mechanisms in the pathophysiology of DCM still, management of diabetic cardiomyopathy remains difficult and demands extensive research on compounds having translational potential. In this study, we have investigated the role of protease activated receptor (PAR) in the condition of DCM in Type 2 diabetes mellitus (T2DM) rats using pharmacological approach. We used argatroban, a direct thrombin inhibitor for targeting PAR. T2DM in rats was associated with cardiac structural and functional disturbances as evidenced from impaired cardiac functional parameters and increased fibrosis.

Argatroban treatment ameliorated metabolic alterations, ventricular dysfunctions, cardiac fibrosis apoptosis. Reduced expression of PAR1 and PAR4 in argatroban treated group indicates response towards inhibition of thrombin. In addition, AKT, GSK-3β, NFβB phosphorylation, TGF-β, COX-2, and caspase-3 expression were reduced significantly along with the increase in SERCA expression in comparison with the diabetic animals. This study suggests that beneficial effect of argatroban in DCM which may be attributed to improvement of ventricular functions and reducing fibrosis, inflammation, apoptosis and PAR expression.

Cardiovascular Research

Myocardial Infarction

Nrf2 is a key protein responsible for generation of antioxidants inside the tissue and provide a protective mechanism against tissue damage in the cardiovascular system. Cardiac injury induced by myocardial infarction (MI) is responsible for downregulation of Nrf2 in myocardium. We investigated the effects of dimethyl fumarate (DMF), an Nrf2 activator in cardiac injury associated with myocardial infarction. MI was developed by administration of Isoproterenol at 100 mg/kg s.c. The effect of pretreatment of dimethyl fumarate was investigated in MI with the help of structural (H&E and TTC staining), functional (blood pressure and left ventricular function), biochemical, plasma parameters and change in protein expression (Nrf2, SERCA, pAKT). Carvedilol 100 mg/kg was used as a positive control. Isoproterenol (ISO) elevated the production of reactive oxygen species, leading to severe oxidative stress, structural and functional deficits in the myocardial tissue along with downregulation of Nrf2, SERCA and pAKT. Pre-treatment with dimethyl fumarate at both the doses showed beneficial effects on cardiac structural damage. DMF pretreatment significantly increased expression of Nrf2, SERCA and pAKT. Our preliminary results show the beneficial effect of dimethyl fumarate in isoproterenol-induced myocardial infarction.

Zinc 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. 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. Biochemical, histopathological, and protein expression profiles were determined to decipher the role of Zn in protecting the cellular perturbations. Further, histopathological analyses of testes and epididymis showed deranged architecture along with other noted abnormalities.

Nrf2 in Diabetes Induced Germ Cell Damage

Nrf-2 (nuclear erythroid 2-related factor 2) is a transcription factor binds to the antioxidant response element (ARE) and thereby regulates the expression of a large number of genes involved in the cellular antioxidant, anti-inflammatory and stress associated responses. Nrf-2 also plays a critical role in the maintenance of cellular homeostasis. Based on the literature it has been evident that micro minerals (trace elements) like Zinc and Selenium influence the down regulation of Nrf-2. Zinc and selenium are among the most important micro minerals necessary for the proper development and maintenance of the testes. The emerging evidence that the transcription factor Nrf-2 is a regulator of protein degradation, DNA damage and cell death, suggests that exploring Nrf-2 -ARE molecular pathways in normal and pathological models will have significant human relevance. Zinc and selenium involvement with novel testicular markers at molecular level will improve the detection of the germ cell damage and will also help in understanding the mechanism of the testicular and associated organ injuries during the progression of diabetes.

Inflammasomes in Hepatic Damage and Fibrosis

Inflammation contributes to the pathogenesis of most acute and chronic liver diseases that lead to fibrosis. Inflammasomes are intracellular multi-molecular complexes expressed in both parenchymal and non-parenchymal cells of the liver. Inflammasomes can sense danger signals from damaged cells and pathogens and assemble to mediate caspase-1 activation, which proteolytically activates the cytokines IL-1β and IL-18. Inflammasome activation has been studied in different human and experimental liver diseases and has been identified as a major contributor to hepatocyte damage, immune cell activation and amplification of liver inflammation. The application and translation of these discoveries using potent protective agents can provide a novel approach in the treatment of inflammatory liver diseases.

Centre for Infectious Diseases
Malaria

Screening of new potential compounds from NIPER for their antimalarial activity

NIPER artemisinin compound Nos. NP-2821, NP-2824, NP-2826, NP-2827, NP-2829 and NP-2831 were evaluated for their blood-schizontocidal activity against *Plasmodium berghei* infection in Swiss mice at a dose of 50 mg/kg/day x 7. Out of these 6 compounds, only 2 of them, NP-2829 and NP-2831, were observed to have some activity in terms of increased mean survival time (MST) of 22 days and 24 days, respectively, as compared to an MST of 11 days of the vehicle-treated (negative controls) Swiss mice. Compounds NP-2821 and NP-2827 were active (treated animals were negative up to D+7) but were partially soluble in the recommended solvent. The remaining compounds NP-2824 and NP-2826 were toxic (all treated animals died within D+4).

Development of a new model of rodent model of cerebral malaria

Plasmodium Yoelii nigeriensis infection in Swiss mice is being developed as a suitable experimental cerebral malaria (CM) model to mimic the human CM. The infection was initiated by the injecting $1x10^3$ *P. Yn*-infected erythrocytes, intraperitoneally, to naive mice (14-16 g). These animals were closely monitored 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 about 50-60% of mice showed neurological symptoms and ultimately died. These mice showed hypothermia (rectal temperature < $31^{\circ}C$) and their body temperature was drastically reduced to about 28-29°C from the normal range of temperature 37-$38^{0}C$. Cytokine imbalance is highly responsible for immuno-pathology of CM; so here we have determined the serum cytokines levels using multiplexing method. Enkephalins were reported to protect the neurons from damage; due to oxygen glucose deprival (OGD) conditions such as stroke, cerebral ischemia and other CNS related diseases. The similar OGD condition was found in CM also; so here we have initiated the treatment using natural and synthetic analogues of enkephalins. The treatment has prolonged the survival rate when compared to the negative control and decreased the severity of CM. From the above observations we found that cytokine level changes in this MCM model is very much similar to immunopathology of the HCM and treatment with enkephalins has shown promising hope to develop the new therapeutic approaches to reduce the CM related morbidity and mortality.

Immunomodulatory studies in a rodent malaria model: Stand-alone and combined effects of lithium chloride and some known agents

Emergence of drug resistance and serious adverse effects to the current anti-malarial therapy has led to the urgent search for potential anti-malarial compounds. LiCl being GSK-3 inhibitor has immunomo- dulatory properties and also has a direct stimulatory effect on granulocyte-macrophage progenitor cells. Curcumin, a known immunomodulatory agent also proved to have anti-malarial property. Here, we have tested the combined and stand-alone effect(s) of LiCl and curcumin on the *P. berghei* infected Swiss mice. Different doses of LiCl and curcumin were tested in *P. berghei* infected Swiss mice. LiCl (100 and 300 mg/kg) and curcumin (50 and 100 mg/kg) has shown protective effects on the course of *P. berghei* infection in Swiss mice. Co-

treatment of LiCl and curcumin has shown better anti-malarial effects and enhanced the survival rate in *P. berghei* infected Swiss mice compared to LiCl/curcumin treatment alone. Ex vivo phagocytic activity (% phagocytosis and infected erythrocytes ingested per MØ) was enhanced in LiCl and curcumin co-treated *P. berghei* infected mice peritoneal macrophages compared to LiCl/curcumin treatment alone. Thus, combined effect of LiCl and curcumin may be an alternative approach to control malaria. Further continuation of work in combination of some known immunomodulatory agents with LiCl is in process.

Biotherapy of experimental tuberculosis: some in vitro studies

The literature regarding the project topic was collected which included the disease etiology, epidemiology, pathophysiology, current treatments, treatments under clinical trails, new targets and experimental biotherapeutic approaches. The basic principles of cell culture, immunology and laboratory manual along with the details regarding biosafety cabinet were studied. The experiments were carried out to learn the laboratory procedures necessary to start the project. The procedure for the preparation of complete DMEM media was standardized. The standard procedure to isolate peritoneal macrophages of Balb/c mice via 3% w/v Thioglycollate medium was standardized. The subculturing of adherent J774 murine cell lines was standardized. The procedure for preparation of Middlebrook 7H9 & 7H11 media for culturing the mycobacterial strains were standardized and H37Ra strain of Mycobacteria was cultured followed by passaging at regular intervals. The phagocytosis assay was done to check the interaction between macrophage and bacteria via acid fast staining (Ziehl neelsen staining) and Giemsa stain. New objectives will be developed and completed after learning the experimental protocols and acquisition of animals for the completion of the project. All the standardized procedure related to the experiments were documented and reviewed in the laboratory notebook provided by NIPER.

Biotherapy of experimental tuberculosis: determination of the effect of oipoids and GM-CSF, in vitro

The literature regarding the project topic was collected and presented to get a better grasp of the project and related experimental designs. The literature review included the disease etiology, epidemiology, pathophysiology, current treatments, treatments under pipeline, new emerging targets and experimental biotherapeutic approaches. After grasping a brief description of the project at hand, the experiments were carried out to learn the laboratory procedures necessary to start the project. The standard procedure to isolate peritoneal macrophages of Balb/c mice via 3% w/v Thioglycollate medium was developed. The procedure for the preparation of complete DMEM media was also standardized. The basic principles of cell culture and laboratory manual along with the details regarding biosafety cabinet were studied. The standardization of the staining procedure for phagocytosis assay was carried out. The subculturing of adherent J774 murine cell lines was standardized. The procedure for preparation of Middlebrook 7H9 media for culturing the mycobacterial strains was also standardized and H37Ra strain of Mycobacteria was cultured followed by passaging at regular intervals. The phagocytosis assay was done to check the interaction between macrophage and bacteria via AFB and Giemsa stain. New objectives will be developed and completed after learning the experimental protocols and acquisition of animals for the completion of the project.

Determination the antimalarial activity of telithromycin in P. berghei-infected Swiss mice

Telithromycin acts by interfering protein synthesis. Telithromycin has also shown inhibition of *P. falciparum* growth in vitro. Telithromycin is expected to show activity against *P. berghei* infection telithromycin at dose of 10mg/kg was shown least significant reduction in parasitemia level of significant indicate telithromycin at 10mg/kg is effective in reducing parasitemia.

Determination of the stand-alone and combined effect of thapsigargine and artesunate in Plasmodium berghei-infected Swiss mice

Thapsigargine is a selective and irreversible inhibitor of sarcoendoplasmic reticulum Ca^{2+} ATPase (SERCA). Thapsigargine causes rapid inhibition of SERCA pumps to avoid reduction of lumen sarcoplasmic reticulum Ca^{2+} levels in smooth cells decrease histamine-induced Ca^{2+}. Thapsigargine and artemisinin against PfATP6 expressed in oocytes are similar. Thapsigargine especially inhibits the P-type of ATPase of the malaria parasite. Thapsigargine at doses of 0.2 mg/kg, showed least significant reduction in parasitemia as compared to negative controls. But thapsigargine at doses of 0.6 mg/kg and 1.8 mg/kg showed significant reduction in parasitemia, level of significance indicates thapsigargine at 1.8 mg/kg is more effective in reducing parasitemia. Treatment of thapsigargine (0.6 mg/kg and 1.8 mg/kg) showing significant reduction in parasitemia on day+4, day+7, day+10, day+12, day+15 and +17day of infection (with $p<0.001$). Detailed studies are in progress.

Study of the effect of valproic acid stand-alone and in combination with artesunate in Plasmodium berghei-infected mice

Valproic acid belongs to short-chain fatty acid HDAC (histone deacetylase) inhibitors. HDACs have been identified in all the major human parasitic pathogens. Only one of the three identified class-I/II HDAC homologues has been investigated for *Plasmodium falciparum.* PfHDAC1 has upto approximately 55% amino acid identity to other eukaryotic class-I HDACs and it is nucleus localized and expressed or transcribed across multiple lifecycle stages of parasite. The consequence of HDAC inhibitor treatment of *Plasmodium falciparum* parasites elucidated that PfHDAC1 is involved in the post-translational modification of histone and therefore control gene expression. Valproic acid at doses of 3.5 mg/kg and 5 mg/kg were showed least significant reduction in parasitemia as compared to negative control. Valproic acid at dose 10 mg/kg showed significant reduction in parasitemia on day+4, day+7 and day+10, level of significance indicates valproic acid at 10 mg/kg is more effective in reducing parasitemia. Combination of valproic acid (10 mg/kg) with artesunate (5 mg/kg) is showing significant reduction in parasitemia on Day+4, Day+7 and Day+10 of infection.

Determination of the effect of anisomycin in Plasmodium berghei-infected mice

The current objective of my research project is to determine the antimalarial activity of anisomycin over a different range of doses and revalidation of effective dose of the same on the *Plasmodium berghei* infected Swiss. As per the first objective the model development was done with 1×10^7 infected erythrocytes in Swiss mice (18±2g),

The positive control group was used as chloroquine (8 mg/kg/oral) and the negative control group used as vehicle treated (0.5%) with treatment doses of anisomysin (3 mg/kg, 9 mg/kg, 27 mg/kg, 54 mg/kg and 80 mg/kg/i.p) in five Swiss mice per each group. The result obtained from the initial study of control group(8 mg/kg chloroquine), negative group(vehicle treated) and three doses of anisomysin (3 mg/kg, 9 mg/kg, and 27 mg/kg i.p) on +4,+7, +10 and +14 days of post infection data values was expressed as mean ± SEM.

Study the effect of moxifloxacin stand-alone and in combination with artesunate in Plasmodium berghei-infected mice

The apicoplast, originates by an endosymbiotic process, contains a range of metabolic pathways and housekeeping processes that differ from the host, and thereby presents ideal strategies for anti-malarial drug therapy. Drugs are designed by targeting the unique mechanism of the apicoplasts genetic machinery. Several anabolic and catabolic processes, like fatty acid, isopentanyl diphosphate and heme synthesis in this organelle, have also been targeted by drugs. Moxifloxacin acts on apicoplast metabolic pathways are isoprenoid precursor synthesis, fatty acid synthesis, heme synthesis and iron-sulfur cluster biogenesis and it also has some functions of genome replication, transcription,

translation, posttranslational modification and protein turnover. Moxifloxacin at doses 30 mg/kg and 50 mg/kg were shown least significant reduction in parasitemia; however, 80 mg/kg and 100 mg/kg doses showed significant reduction in parasitemia as compared to positive control chloroquine (CQ). As per results median dose of moxifloxacin was considered 65 mg/kg. Combination of moxifloxacin (50 mg/kg, 65 mg/kg and 80 mg/kg) with artesunate (5 mg/kg, 10 mg/kg) showed significant result on day +4, +7, +10, +14, +17 and +21.

Leishmaniasis

DoP funded institutional Kala-azar new drug research project: Development of L. donovani-infected hamster model for the screening of potential anti-leishmanial agents

A consistent and high level of infection has been observed in infected hamsters. Under gross observation, the spleen and liver were observed to be highly enlarged in *L. donovani-infected* hamster compared to the untreated control hamsters. The spleen was enlarged in *L. donovani-infected* hamster (size, 5.5 cm; weight, 1400 mg) compared to the control hamster (size, 3.2 cm; weight, 400 mg), 85 days, post-infection. The liver was enlarged in *L. donovani-infected* hamster (weight, 5.3 g) compared to the control hamster (weight, 4 g). In the spleen of infected hamsters, the percentage of infection was observed to be 450 amastigotes/100 host cell nuclei, 85 days post-infection. In the livers of infected hamsters, the percentage of infection was observed to be 98 amastigotes/100 host cell nuclei, 85 days post-infection. Compared to splenic parasitic burden, liver parasitic burden was observed to be low, 85 days post-infection; this observation in consonance with the existing literature. The emaciation was clearly observed in *L. donovani-infected* hamsters. The treatment of infected hamsters, with standard anti-leishmanial drugs miltefosine (25 mg/kg/day x 5, orally) and sodium stibogluconate (40 mg/kg/day x 5, i/m) yielded a positive outcome, as expected. Further observations on therapeutic outcomes, fine-tuning of the curative doses of standard drugs and validation are going on.

PHARMACEUTICAL TECHNOLOGY (BIOTECHNOLOGY)

Nanobiotechnology and nanophototheranostics

Biocatalysis involves the application of enzymes in a suitable form (whole-cell, immobilized or commercial preparation) to catalyze chemical reactions. As the predominant outlook of the industry is always on economically expedient, dependable and scalable processes with minimal waste generation, biocatalysis has become a cornerstone for the synthesis of chiral intermediates. Nanobiocatalysis, integrating the biocatalyst and nanoscale materials has drawn a great attention in white technology. With the latest advances, **nanobiocatalysis** could achieve higher enzyme loading capacity, significantly enhanced mass transfer efficiency and reasonable stabilization of enzymes in organic solvents. It contributes in the development of simple, mild, environment-friendly, less hazardous, and economically attractive processes. Our laboratory has developed nanoscaffolds (nanoparticles, nanotubes, nanofibers, nanocrystals etc.) for immobilization of enzymes on solid support. It has enhanced the enzyme stability, ease of separation and recovery of enzyme for reuse without significantly hampering their catalytic activity. Our work in nanobiocatalysis mainly deals with enzyme immobilization on the nanoscale support via classical immobilization methods such as simple adsorption, covalent attachment, entrapment etc. Beyond the simple combination of nanoscale support and biocatalysis, enzyme stabilization and biotransformation in organic solvent is also being worked out. Many drugs have been successfully synthesized using lipase catalyzed **chemo-enzymatic route**. Various metal nanoparticles (selenium, silver, gold, platinum and copper) were synthesized using biological catalysts from microbial and plant sources and characterized using the standard techniques. The functionalization of metal nanoparticles using various dyes and photo sensitizers was performed to improve therapeutic activity, targeted delivery and diagnostic purpose. The therapeutic applications of these nanoparticles were evaluated (In vitro) for antioxidant, antibacterial

and anticancer activities. Currently, our group is focusing on **nanophototheranostic** formulation development and their use in biomedical applications. We are developing metallic, polymeric, liposomal and lipid-polymer hybrid **nano-phototheranostic formulations.**

Topoisomerases in the Target Based Drug Discovery

DNA-processes are guided by several enzymes, one of which is **DNA topoisomerase**. In support of our ongoing anticancer drug discovery program based on the target based drug discovery against hTopoII, In vitro assays were developed and validated. Numerous heterocyclic compounds were screened for the hTopoII inhibitory potential as well as to elucidate their mode of inhibition at different stages of the catalytic cycle. DNA binding studies using gel retardation and UV and CD based DNA affinity studies were carried out to get an idea of the mode of interaction of the compound with DNA. Outcomes from these studies played a key role in the designing and identification of hit candidate.

Bioprocess Technology

A high-throughput plate based-screening method to select mutants of interest from large libraries of **nitrilase** variants was generated. The process parameters using statistical tool (CCD) analysis for maximizing the yield of a thermostable nitrilase producing mutant (*Escherichia coli* BL21) was optimized in shake flask level. Plackett Burmann model was used in the same direction for realizing the critical factors that would affect the nitrilase production both in shake flask as well as in fermenter. The fermentation laboratory works on different enzyme like, arginine deaminase, nitrilase, methioninase (anti-cancer), mycophenolic acid (immunosuppressant), etc. In the upstream process, microbial cells (bacterial, yeast or fungal) are grown in bioreactors with all possible controls and then harvested. Next downstream processing starts for the purification of enzymes and other biochemicals. Arginine modulates the metabolic and signaling pathways of cells. **Arginine deiminase** (ADI) degrades arginine to citrulline and ammonia with great ease than arginase. *Pseudomonas putida* KT2440 was selected as a potential producer of ADI. Effect of various physico-chemical parameters was studied to improve its production in bioreactor level. Various physico-chemical processes were optimized for the downstream processing of ADI from the cellmass of *Pseudomonas putida.* **Mycophenolic acid (MPA)** is an important pharmaceutically active secondary metabolite obtained from various strains of fungi. The effect of different process parameters on the production of MPA from Penicillium brevicompactum was investigated in shake flask level both by submerged and solid state fermentation.

PHARMACEUTICAL TECHNOLOGY (PROCESS CHEMISTRY)

Laboratory scale synthesis of Sildenafil, a top selling marketed drug

A unified approach to the tandem preparation of diverse nitrogen heterocycles via decarboxylative acylation of ortho-substituted amines with α-oxocarboxylic acids and subsequent intramolecular cyclizations has been developed. The reactions of readily available ortho-substituted aryl or heteroaryl amines and β-oxocarboxylic acids occur in the presence of $K_2S_2O_8$ affording a diverse nitrogen heterocycles in good to excellent yields. The distinctive features of this work include a) realization, for the first time, of a transition-metal-free decarboxylative amidation of β-ocarboxylic acids with ortho-substituted aromatic amines, b) event of intramolecular cyclization of amides without any requirement of additional reagents, c) $K_2S_2O_8$ promoted unprecedented amide formation and subsequent intramolecular cyclizations appealing a mechanistic debate, and d) practical application to the synthesis of a top-selling marketed drug. A tandem approach has been developed for the synthesis of sildenafil (Viagra™), which is a selective inhibitor of cyclic guanosine monophosphate (cGMP) specific phosphodiesterase type 5 (PDE5) used in the treatment of male erectile dysfunction.

Synthesis of Azafluorenones

Azafluorenones are privileged molecular scaffolds ubiquitously found in natural products and pharmaceuticals showcasing diverse pharmacological and biological activities. An intramolecular acylation of unactivated pyridines at 2, 3, or 4-positions via successive C-H functionalizations of a methyl, hydroxymethyl, or aldehyde group present in arylpyridines has been developed. The optimized condition in our study is quite resourceful warranting broad applications to the synthesis of all four azafluorenones, fluorenones, and related heterocycles. A key feature of this work includes demonstration, for the first time, of an intramolecular acylation of unactivated pyridines via multiple C(sp^3/sp^2)-H bond functionalizations and subsequent preparation of all four azafluorenones that are otherwise accessible by classical acylation with difficulty. Also, a transition-metal-free intramolecular Minisci acylation has been developed for the synthesis of azafluorenones.

Synthesis of fluorene tethered heterocycles for potential use in organic light emitting devices (OLEDs)

Development of fluorene based fluorescent organic emissive materials for the use in organic light emitting devices (OLEDs) is one of the emerging technologies in the field of organic electronics. We have demonstrated a translation potential of our developed protocols for the synthesis of new fluorene tethered heterocycles. These organic emitters could open a new area for the preparation of OLEDs.

The Department is also actively engaged in process R&D, organic synthesis and Lab scale synthesis of pharmaceutical compounds, NCEs, drug intermediates and conjugates. Our main focus is to develop scale-able, cost effective, environmentally benign synthetic routes to drug molecules.

PHARMACEUTICS

Nanocrystalline solid dispersion using NanocrySP technology

Our lab has developed a novel spray drying based technology (NanoCrySP) for generating nanocrystalline solid dispersions (NCSDs) of APIs along with small molecule excipients. We had already generated a proof-of-concept for the generation of NCSD of numerous poorly water soluble drugs using NanoCrySP. The studies which are further being carried out using this technology involves extensive and a systematic research on finding out the critical parameters (process and /or material) involved in generation of nanocrystals; implementation of a quality-by-design (QbD) approach; development of a robust and commercially viable dosage form of NCSD generated using NanoCrySP; evaluation of biopharmaceutical and pharmacodynamics aspects of solid dosage form consisting of NCSDs; establishment of in vitro-in silico-in vivo relationship for a NCSD dosage form.

Lyophilization of Pharmaceuticals

We are working on lyophilization based product development wherein we are currently exploring the NanocrySP technology for generation of nanocrystals for parenteral administration. We are exploring this novel bottom up concept in lyophilization since the technology has great potential in terms of commercial application and intellectual property rights. Further, we are striving to improve the stability of amorphous solid form generating in final lyophilized formulation by induction of varying degree of collapse during lyophilization.

Amorphous drug delivery systems

We are exploring the mechanistic understanding of thermodynamic and kinetic stabilization of amorphous form of different poorly soluble BCS class II drugs. The projects currently ongoing are related to the study of miscibility behaviour, factors affecting the miscibility and impact of miscibility on in-vivo supersaturation. This would essentially helpful in selecting the polymers for preparing the robust and commercially viable amorphous solid dispersion based drug products. In another project a newly introduced concept of functionality of excipient and its variability is explored for excipients, mainly polymers, used for developing the amorphous solid dispersions.

Formulation aspects of pharmaceutical co-crystals

This project encompasses generation, characterization and evaluation of biopharmaceutical performance of pharmaceutical cocrystals of poorly water-soluble drugs (BCS class II and IV). Physicochemical and mechanical properties of cocrystals shall be evaluated which aid in developing suitable formulation. Rational formulation and process design to get cocrystal product having improved biopharmaceutical performance is the principal goal of this project.

Centre for Pharmaceutical Nanotechnology

Centre for Pharmaceutical Nanotechnology (Department of Pharmaceutics) is actively engaged in the development and evaluation of novel nano drug delivery systems (NanoMedicines) viz. nanoemulsion, self nanoemulsifying drug delivery systems, solid lipid nanoparticles, nanostructured lipid carriers etc. for various biomedical applications. Research group thrives in developing various drug or pharmaceutical active(s) loaded nano carriers for the following applications:

- Drug phospholipid complex and their nanoformulations to improve solubility, metabolic stability and overall deliverability of anticancer drugs.
- Self nanoemulsifying drug delivery systems for oral bioavailability enhancement of drugs.

  Novel lipid based nanoparticles for sustain release of anticancer agent with reduction in toxicity.
- Novel β-cyclodextrin nanoparticles for efficient and targeted delivery of anticancer agent with reduction in toxicity.
- Increasing deliverability and augmenting effectiveness of pharmaceutical actives using nano carriers via topical route for treatment of psoriasis.
- Design of polyplexes with improved haemocompatibility and reduced toxicity.
- Preparation and characterization of protein functionalized carbon nano-tubes to explore their biocompatibility and dispersibility, respectively.
- Efficient transdermal delivery of therapeutics using high permeation vesicles (HPVs) by utilizing the concept of synergistic combination of permeations enhancers (SCOPE).
- Drug-drug conjugates to optimize solubility and co-delivery of anticancer drugs for synergistic chemotherapy.

Nanoparticulate formulations play an important role in delivering anticancer agents in a controlled manner. Delivering drug through the nanoparticles make it possible to achieve the desired concentration of the drug to the specific site. Hence, we have undertaken nanoformulations of tamoxifen along with P-gp inhibitors to increase the bioavailability and vis-a vis anticancer efficacy of tamoxifen in estrogen receptor positive breast cancer. We formulated tamoxifen loaded mixed micelles and assessed its pharmacokinetic, anticancer efficacy, and safety potential. In another project we prepared multicomponent pharmaceutical adducts of alpha eprosartan to increase its bioavailability.

BIOTECHNOLOGY

Protein Misfolding and Stress Response

The cellular heat shock response (HSR) and unfolded protein response (UPR) protect cells from toxicity associated with defective protein folding. Though heat shock proteins have gained considerable importance in protein folding and aggregation during stress conditions, the production of organic solutes also contributes critically to this balance. Both heat shock proteins and trehalose are reported to be members of the heat shock response machinery which work to protect the cell against protein aggregation. The levels of trehalose and the aggregation modulator, Hsp104, are seen to be tightly regulated in the yeast cell. Our studies have investigated the relationship between trehalose and the heat shock response in ensuring enhanced cell

survival during protein misfolding and aggregation. The results suggest that the osmolyte trehalose may play a greater role than Hsp104 in determining the solubility of mutant huntingtin (103Qhtt) and point to a differential role of Hsp104 and trehalose in response to proteotoxic stress in the cells.

Earlier results in the lab had shown the interaction of wild type and mutant huntingtin and the ability of the former to solublize the latter. In order to investigate if the N-terminal domain of wild type huntingtin (wt-htt) may function as a part of the cellular proteostasis network, N-terminal-wt-htt and synuclein were coexpressed in yeast cells. Fluorescence Recovery after Photobleaching (FRAP) and co-immunoprecipitation analysis showed a direct interaction between the two proteins. Solubilization of synuclein led to reduced intracellular oxidative stress with increased cell viability. These studies established a novel function for N-terminal-wt-htt in the cell, as an inhibitor of protein aggregation and provided an insight into the functions of this less explored protein.

Continuing with our work which established nucleic acid aptamers as novel inhibitors of protein aggregation, we coexpressed mutant huntingtin protein and pairs of RNA aptamers, resulting in increased solubilization of mutant huntingtin protein, reduction in the level of reactive oxygen species (ROS) and alleviation of mitochondrial dysfunction, which is considered to be a key mechanism of pathogenesis in Huntington's disease. Mutant huntingtin-mediated mitochondrial damage like loss of mitochondria, depletion of mitochondrial DNA, decreased ATP production and metabolic activity were found to be alleviated in the presence of aptamers, resulting in significantly higher cell survival. Thus, decrease in the aggregation of mutant huntingtin associated cellular abnormalities following the treatment with RNA aptamer(s) was found to be a promising approach for developing a treatment regime for Huntington's disease.

Development of lab-scale technologies for the production of biosimilars

Protein pharmaceuticals are mostly recombinantly-produced proteins that are used for the therapeutic purpose. Over the past decades, advance in the development of technologies for the production of protein pharmaceuticals, has brought hundreds of therapeutic proteins into the clinical applications. It is evident now that, in coming decade, the domestic as well as the international market for protein pharmaceuticals will grow rapidly and will expand its share of the entire pharmaceuticals market.

Biosimilars are recombinantly-produced protein molecules that are very similar to their 'native' counterparts in term of their biological effect(s). The main goal of this project is to develop lab-scale technologies for the coast-effective production of biosimilar using *E. coli* expression system. Towards this, we have cloned and expressed a variety of biosimilar molecules (viz., human enzymes, interferons, growth factors and hormones).

Engineering Biobetters

Biobetters are engineered version of 'native' protein molecules which possesses superior properties (viz., increased circulatory half-life, reduced immunogenicity and target-specificity). The main goal of this project is to provide a clear proof-of-concept that particular engineered molecules possess desirable properties and also a method to produce these engineered proteins. In one of the project, by using fusion technology, we are trying to develop recombinant human arginase (a promising therapeutic candidate for the treatment of several form of cancers) possessing enhanced circulatory half-life.

Development of novel protein pharmaceuticals

Elucidation of the role of variety of proteins in imparting protection against a variety of conditions has provided an opportunity to explore their use as a therapeutic in humans. In this project we are trying to develop human Paraoxonase 1 enzyme as a prophylactic against nerve-agent poisoning in humans. In our lab, we have not only generated novel variants of this enzyme but also developed a lab-scale process to produce these recombinant enzymes. By using fusion-technology we are

improving the circulatory half-life of these engineered variants.

Multifunctional Proteins in Host Pathogen Interaction

The laboratory is investigating the role of multifunctional enzymes that are involved in pathogenesis of *Mycobacterium tuberculosis.* Areas of interest include their role in iron uptake, bacterial metastasis and virulence. Enzymes of the glycolytic pathway are known to possess alternate functions that promote their virulence, in M.tb many of the homologues are yet to be fully characterized, primarily due to the difficulties in obtaining recombinant protein. Our studies have recently established an alternate system to obtain these highly hydrophobic proteins that cannot be purified by expression in conventional hosts such as *E.coli and M.smegmatis.* The laboratory has established that the attenuated strain *M.tuberculosis* H37Ra is an ideal expression host, to obtain a high yield of functionally active protein. Our studies have shown that post-translational modifications vary depending on the expression strain, it is known that these modifications can in turn alter the function of a protein.

Previously, studies in the laboratory had identified that the multifunctional M.tb enzyme Glyceraldehyde-3-phosphate dehydrogenase (GAPDH) functions as a receptor for human transferrin. In an effort to identify the key residues involved in this interaction, a bioinformatics approach was undertaken to identify the 3D model and essential residues (inter-departmental collaboration). Selected residues were then mutated and individual mutant proteins have been purified for further analysis. The laboratory also identified that GAPDH functions as a receptor for the iron transport protein lactoferrin. Recombinant M.tb Lactate dehydrogenase (LDH), was also purified characterization of this protein is ongoing. Previous studies in our laboratory had identified this enzyme as a receptor for transferrin, its role in iron uptake in ongoing.

The laboratory is 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 three other targets (isocitrate lyase, malate synthase and ATP synthase) have been established, compound screening to identify potential lead molecules had been carried out. Other collaborative studies have identified the role of Mammalian GAPDH as a plasminogen receptor that can mediate cell migration.

Identification of pyridoxal kinase, a vitamin B6 salvage pathway enzyme and elucidation of its functional role in *Leishmania donovani*

Leishmaniasis is one of the world's most neglected diseases, largely affecting the developing countries. Due to the emergence of resistance to the available antileishmanial drugs there is an immediate need to identify molecular targets on which to base future work strategies. Pyridoxal kinase (PdxK, EC 2.7.1.35) is an important enzyme of vitamin B6 salvage pathway which is required for phosphorylation of B6 vitamers using ATP as a phosphoryl donor. Pyridoxal-5'-phosphate is an important cofactor in more than 140 different enzyme reaction, which are associated with amino acid and sugar metabolism, lipid biosynthesis, regulation of polyamine metabolism. The *pdxK* gene from *Leishmania donovani* was cloned, expressed in BL21 (DE3) strain of *E.coli* and kinetically characterized. Multiple sequence alignment suggested that the "GxGD" motif might play an important role in LdPdxK enzyme activity. In this study, site-directed specific mutagenesis approach was used to determine the functional significance of this motif. Our results demonstrated that the mutation of Thr229 to Ala did not affect the catalytic function of LdPdxK. The corresponding site-directed mutants of Gly228 to Ala, Gly230 to Ala and Asp231 to Ala displayed no enzyme activity with respect to the wild-type recombinant LdPdxK. The antileishmanial potential of theophylline and theobromine (reported Pdxk inhibitors) has been focused in our study. To determine the functions of LdPdxK in Leishmania promastigotes LdPdxK overexpressing parasites were generated by episomal expression of the enzyme in promastigotes.

The overexpressor revealed two fold increase in growth with respect to wild type revealing its significance for the parasite. In silico studies of human and parasite PdxK revealed interesting differences in the substrate binding site raising the possibility of designing parasite specific inhibitors to tackle this disease where resistance to conventional drugs is the main issue. Its role in host infection is currently being studied.

HMGR is an important enzyme of the mevalonate pathway which synthesizes mevalonic acid from HMG-CoA. We had earlier identified HMGR as a potential antileishmanial drug target of sterol biosynthetic pathway and worked extensively on this enzyme. Two antidepressants were found to have antileishmanial activity and HMGR was one of the targets. To validate it as a potential antileishmanial drug target, sequentially the two alleles of HMGR were disrupted by using gene disruption approach. The disruption of the two alleles of the genes was confirmed by PCR. The dual knockout of the alleles impaired parasite growth teamed with severe reduction in ergosterol levels and reduced enzyme activity. Its role in parasite infectivity is yet to be elucidated.

As part of intra-institutional project on KALA AZAR approximately 250 compounds (designed and synthesized based on the trypanothione reductase target) which were screened in the cell based assay. In vitro antipromastigote and cytotoxicity studies revealed 30 compounds to be active. Some of the active compounds were also tested on the L. donovani recombinant trypanothione reductase assay.

PHARMACY PRACTICE

The project on "Study of Diabetes care and Family-functioning in patients with Type 1 Diabetes" is continuing. The projects on mapping of healthcare institutions using Hospital Information systems, assessment of paediatric drug therapy and some more shall close in the next quarter. Further to the interest in chronic diseases, a study on hepatitis C has been initiated as a doctoral study. This 2 year long study shall investigate various dimensions of hepatitis C and the newer agents used to treat Hepatitis C. In collaboration with the private tertiary care facility, four new projects are at the stage of feasibility analysis. These one year long projects are timed to start in July 2017.

Health economics and outcomes research Lab

Health economics and outcomes research (HEOR) is a growing field that provides important information regarding patient access to specific drugs and services for making healthcare coverage and access decisions. HEOR can provide data to help healthcare payers determine if treatments work in the populations they serve, and how much of the drug or treatment cost should be reimbursed by the healthcare system. Use of pharmacoeconomic models to assess the impact of pharmacotherapies in health and economic outcomes is becoming routine practice to support health care decision-making. These models serve as tools to estimate health benefits and economic implications for the health systems. Currently we are working on Cost effective analysis of antiepileptic therapy in paediatrics, pharmacotherapeutic intervention in chronic low back pain and antiobesity drugs.

Data mining in pharmacovigilance

The increasing availability of electronic health records (EHRs) presents opportunities to investigate a wide spectrum of adverse drug effects and to detect signals closer to real time. Compared to clinical trial data, population-based EHR databases contain data from clinical practice about larger populations and longer follow-up periods. We are working on developing and testing algorithms and modules that can be used by academic researchers for the timely detection of adverse drug reactions that are novel by virtue of their clinical nature, severity and frequency.

PHARMACEUTICAL MANAGEMENT

The Department of Pharmaceutical Management is excellent centre in management education. It sets itself different with the good industry interface; student driven activities and value added consulting. The hard working and experienced faculty provides the students, a strong platform to excel in pharmaceutical management horizon. The Department has also carried out collaborative projects with other departments of the Institute which gives the benefit in terms of wider and deeper

understanding. Corporate recruiters value our graduates for their intellectual abilities in Pharma and management domain.

Last year the students have completed the following projects:

1) Entrepreneurial Marketing: An exploratory study in Diagnostics services organisations
2) Conceptualising workplace flexibility and engagement of work force: A study of selected pharmaceutical organisations
3) Availability and affordability of NLEM products in Haryana
4) Adoption of mercury free automated Sphygmomanometers and Thermometers in Healthcare settings
5) Understanding the dimensions of customer based brand equity for Hygiene wash for women
6) Buying behaviour of consumers in OTC segment with reference to Herbal topical analgesics
7) Visual merchandising of Pharma OTC products
8) Impact of digitalization on Pharma Industry
9) Comparative study of export procedures of regulated, semi regulated and unregulated markets
10) Ethical issues in Pharma industry in India

An MoU was signed between NIPER S.A.S. Nagar and Biocon Ltd. in the august presence of the Hon'ble President of India during the Visitor's Annual Conference at Rashtrapati Bhavan held on Nov 16-18, 2016

Prof. G. R. Desiraju, FNA, FTWAS, Indian Institute of Science, Bengaluru, being felicitated after delivering a lecture under the aegis of AAPS NIPER student chapter on Feb 26, 2017

The fifth biennial International Conference on New Developments in Drug Discovery from Natural Products and Traditional Medicines (DDNPTM) was organized from Nov. 18-20, 2016

CENTRAL FACILITIES

COMPUTER CENTRE

Computer Centre (CC) at NIPER SAS Nagar is the central facility to caters the computing needs of the faculty, staff and students for their research, development and teaching. The Computer Centre is responsible for:

- Providing email services and uninterrupted internet connectivity (wired/wireless) to the staff, faculty and students.
- Catering to all the general and high computational needs of the faculty staff and students for research purpose.
- Managing the Campus-Wide Network (wired/wireless).
- Hosting and updating information on the official website of the institute.
- Providing office-automation services.

The activities of the Computer Centre are organized under four verticals e.g:-

- High-Performance Computing,
- Networks,
- E-Services,
- Data Centre and Support

Each vertical is focused on continually improving its services to meet the needs of the NIPER SAS Nagar community.

- High Performance Computing: A High Performance Computing (PharmaGrid) catering to the needs of all faculty and other researchers in their pharmaceutical research have been placed at Computer Centre.

Network: There is a Campus wide Network connecting all the major blocks / buildings of the Institute. A high speed network is established connecting all the buildings on Fiber Backbone. Various network services including Video conferencing are facilitated through this network. NIPER is an active partner of the National Knowledge Network (NKN). Presently, connected with 1 Gbps for high-speed internet services. Regular project meetings and important events are organized through this NKN Connectivity, which are being attended not only by the NIPER staff and Faculty, but outsider agencies are also invited to participate in these events. The following are some of the key activities carried out under Networks vertical:

- Building-wise VLAN segmentation.
- Internet Leased Line (HFCL) of 12 Mbps.
- Network support connectivity for video-conferences and online job-interviews for Campus Placement through VC-Setup.
- Installation of Wi-Fi and Up gradation of LAN is initiated and is under-process for completion.
- Computer Centre has very successfully conducted The H.E. President of India's Address to the students and faculty members of the institutions of higher learning through Video-Conferencing using NKN on 10th August, 2016
- The Video-Conference meeting of the "Directors of all NIPERs with Joint Secretary to Govt. of India, Department of Pharmaceuticals", on 30th September, 2016 has been conducted efficiently.
- The H.E. President of India's Address to the students and faculty members of the institutions of higher learning through Video-Conferencing using NKN has been one again conducted effectively at Computer Centre Central Lab. (A-303) on 10th January, 2017.

Computer Centre has successfully organized the various video-conference sessions for online-interviews and online examinations for campus placements with Dr. Reddy's Laboratories, Hyderabad, Novartis, Astrazeneca, GreyB, Cadila Pharma, Cheors, Cadila, Charak Pharmaceuticals, Decision Resource Group, OMICS International etc.

Computer Centre Lab has around 60 desktop systems. The Computer Centre Lab is accessible for all students authorized users for 16 hours a day (8 am to 11 pm) on weekdays. The computer centre staff is available for trouble-shootings any problem held to the computer lab users.

All the Course lectures and practical examinations of Computer/IT related courses are organized in Computer Centre Lab to the best satisfaction of the students.

Hardware maintenance (Desktop/Laptop/ Server support), Software support, Anti-Virus and other Malware and trouble shooting are being handled by the Computer Centre capably.

Computer Centre has UTM at Gateway level having firewall, intrusion detection, antimalware, spam and content filtering and VPN capabilities for smooth functioning of NIPER Campus Network.

E-Services: The E-Services vertical focuses on services such as web system configurations, e-mail, web access, web security and storage solutions and support. To cater the increasing need of e-governance of the Govt., several new services are enhanced and added under the e-services. The major services maintained and initiated are Mail services, Web services, Security and monitoring services, User management services, Storage solution and Development and deployment services. All these facilities are monitored and upgraded from time to time by computer centre.

Data Centre: The function of the Data Centre vertical is to ensure appropriate facility management for efficient functioning of all the service verticals of the Computer Centre, which is also taken care and maintained by computer centre resource-fully.

CENTRAL INSTRUMENTATION LABORATORY

Central Instrumentation Laboratory (CIL) is providing analytical services to the faculty members, 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 user charges.

POWDER XRD

2DGC WITH HEAD SPACE

GCMS-MS

FLUORESCENCE SPECTROMETER

HIGH RESOLUTION LCMS/MS

NMR SPECTROMETER

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); $GCMS^n$ 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); $LCMS^n$ where n=9 with APCI/ESI Probe LCQ (Finnigan Mat); $LCMS^n$ 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); Titro Processor with Karl Fischer, Potentiometric titration, pH, pK_a values (Metrohm); Ultracentrifuge

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).

All the samples for analysis by CIL instruments and other analytical instruments installed at different departments of NIPER are received through CIL. A revised composite list of CIL instruments and instruments installed at other locations of NIPER are made available to industry, SMPIC, academic and research institutes at nominal charges. The additional available instruments are LC-NMR SPECTROMETER, Make: Jeol, Model: ECA 500 MHZ; LC/MS MicroTOF, Make: Bruker, Model: Q-TOF; $LCMS^n$ 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: Millipore, Model: Guave Easy Cyte-8HT; Ultracentrifuge (Refrigerated), Make: Beckman, Model: Optima TL; 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.

SMALL AND MEDIUM PHARMACEUTICAL INDUSTRY CENTRE

NIPER has set up a dedicated Small and Medium Pharmaceutical Industry Centre (SMPIC) to serve SME Pharma sector. The main objective of the centre is to develop and assist SME pharma units to meet global challenges including Good Laboratory Practices and regulatory requirements. The centre provides forum for manufacturers, regulators and suppliers to come together to discuss topics of mutual interest and new technologies. 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. SMPIC is well-known for its trainings and educational programs. The centre organizes seminars on issues of relevance to pharma SMEs. Practical training sessions on sophisticated analytical instruments are conducted for Pharma personnel from Government agencies, Science and Pharmacy students. NIPER also extends help to registered pharma SMEs through SMPIC, by allowing them to avail its existing testing facilities in various departments.

Seminars Organized

S No.	Topics	Date
1.	Selection of Excipients For Oral Solid Dosage Forms	30th June, 2016
2.	Selection of Excipients For Oral Liquid Dosage Forms	30th September, 2016
3.	Facility Qualification for Oral Solid Formulation Unit	11th January, 2017

Hands-on practical trainings conducted on analytical instruments

Training Programs	Participants Attended
9	47

LIBRARY AND INFORMATION CENTRE

The Library and Information Center comprises of a large collection of over **7630** books and text books, **1746** Hindi books, **19385** bound journals, **53** pharmaceutical market reports, **1608** theses and dissertations, **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 are 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 subscribes 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 an 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 (Issue & 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 (GLP-Certified)

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. NTC was the first government centre of the country with GLP certification. Recently the test facility has been **re-certified third time** for the GLP certification by National GLP Compliance Monitoring Authority (NGCMA), Dept. of Science and Technology (DST), Govt. of India. The areas of expertise as per the certification are toxicity studies including the acute toxicity, sub-acute toxicity and chronic toxicity studies. The test facility is certified to conduct the mentioned toxicity studies for industrial chemicals, pharmaceuticals and food additives in rat, mice ad guinea pigs. Also, 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 of National Toxicology Centre

- 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 AREAS

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 StudySub- chronic Toxicity Study
- Chronic Toxicity Study
- Cytotoxicity Study
- Genotoxicity Study

DETAILS OF PROJECTS UNDERTAKEN AT NATIONAL TOXICOLOGY CENTRE DURING 2016-17		
PROJECT NO.	TITLE OF PROJECT	SPONSOR NAME
SP-224	TESTING OF ANTI-DIABETIC FORMULATION (HERBAL EXTRACT)	SIVANARAY INC., CALIFORNIA, USA
GC-KBT-17-03	(I) ACUTE ORAL TOXICITY STUDY OF DIAFENTHIURON IN RATS UNDER GLP ENVIRONMENT (II) ACUTE ORAL TOXICITY STUDY OF DIAFENTHIURON IN RATS UNDER GLP ENVIRONMENT	PUNJAB CHEMICALS AND CROP PROTECTION LTD., MUMBAI
SP-225	TESTING OF SIVISBRM FORMULATION	SIVANARAY INC., CALIFORNIA, USA
SP-227	TO INVESTIGATE THE EFFECT OF SIVANARAY FORMULATIONS ON METABOLIC SYNDROME AND TO CHECK THE LIPID LOWERING EFFECT OF THE FORMULATIONS	SIVANARAY INC., CALIFORNIA, USA

NATIONAL CENTRE FOR SAFETY PHARMACOLOGY

Safety pharmacology (SP) is an essential part of the drug development process that aim to identify and predict adverse effects prior to clinical trial in healthy volunteers. SP studies are are need to be carried out as per the International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use (ICH) guidelines S7A and S7B. The core battery and supplemental SP studies evaluate effects of a new chemical entity (NCE) at both anticipated therapeutic and supra-therapeutic exposures on major organ systems, including central nervous system, cardiovascular system, respiratory system, renal and gastrointestinal system. National Centre for Safety Pharmacology (NCSP) was established to carry out evaluation of safety pharmacology of NCEs/ Formulations. NCSP can conduct SP studies in non-GLP environment. CNS safety pharmacology core battery, CVS safety pharmacology core battery, Respiratory system safety pharmacology core battery and Gastrointestinal system supplemental safety pharmacology can be carried out on NCEs/Formulations. We have investigated the safety pharmacology of quinolone derivative (SKG 40-12) using CNS core battery and CVS core battery safety pharmacology. CNS safety pharmacology core battery like functional observational battery (FOB), locomotor activity, motor co-ordination and CVS core battery like blood pressure and heart rate were carried out in rats. Caffeine and diazepam were used as positive control in CNS study, whereas phenylephrine and sodium nitroprusside were used as positive control in CVS study. SKG 40-12 did not produce any undesirable pharmacodyna-mics effect in CNS core battery studies In CVS core battery studies, SKG 40-12 did not alter blood pressure (systolic, diastolic and mean arterial pressure) and heart rate. These results indicate that SKG 40-12 did not produce any undesirable pharmacodyna -mic effect in CNS and CVS core battery safety pharmacological studies.

TECHNOLOGY DEVELOPMENT CENTRE

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 up to 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 2016-17 are listed below:

1. Contract Research Projects:

Following projects were executed at TDC-Pilot Plant during 2016-17 fiscal year

PROJECTS FOR 2016-17		
1	IND SWIFT	SCALE UP OF ISLLC-0573 PRODUCT STAGE 00
2	IND SWIFT	VALIDATION BATCHES OF ISLLC-361 STAGE 03 IND-SWIFT COMPOUND
3	INDO-PHYTO	PROCESS DEVELOPMENT OF AN INTERMEDIATE
4	IND SWIFT	ISLLC-361 STAGE AZP-02 SCALE-UP BATCHES
5	IND SWIFT	VALIDATION BATCHES OF ISLLC-361 AZP-02
6	IND SWIFT	SCALE UP STUDIES INVOLVING AZP PRODUCT
7	INDO-PHYTO	SCALE UP OF NAD MERCAP INTERMEDIATE
8	IND SWIFT	ANOTHE BATCH OF ISLLC-362 AZP-02
9	IND SWIFT	SCALE UP OF ISLLC-361 STAGE IV (SCHIFF'S BASE)
10	IND SWIFT	VALIDATION OF AZP STAGE II PRODUCT
11	IND SWIFT	DEVELOPMENT PROJECT OF ISLLC-650 INTERMEDIATE STAGE 01
12	IND SWIFT	VALIDATION STUDIES OF ISLLC 361 AZP PRODUCT
13	IND SWIFT	VALIDATION BATCHES OF ISLLC 650 INTERMEDIATE STAGE II
14	IND SWIFT	ADDITIONAL VALIDATION BATCHES OF ISLLC 650 STAGE II
15	IND SWIFT	SCALE-UP AND REVALIDATION BATCHES OF ISLLC 650 STAGE II
16	IND SWIFT	DEVELOPMENT PROJECT OF ISLLC-650 INTERMEIDATE STAGE 01 & STAGE 02
17	INDO-PHYTO	DEVELOPMENT BATCH OF IPC PROJECT STAGE 1 AND 2
18	IND SWIFT	VALIDATION BATCHES OF PROJECT ISLLC-573 STAGE-I
19	IND SWIFT	ADDITIONAL VALIDATION BATCHES OF PROJECT ISLLC-573 STAGE-I
20	NAARI PHARMA PVT LTD	SCALE UP OF DIMER-CAP TO MER-CAP PROJECT
21	NAARI PHARMA PVT LTD	ADDITIONAL BATCH OF CALE UP OF DIMER-CAP TO MER-CAP PROJECT

2. Industrial 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 June, 2016. In addition to PTPC students, other students from NIPER also participated.
- Another Industrial training program in collaboration with SMPIC for 10 students from other institutions.

NATIONAL BIOAVAILABILITY CENTRE

The National Bioavailability Centre is approved for conducting BA/BE studies in healthy human subjects.

In 1998, NIPER took an initiative to set up a bioavailability centre. It was inspected and approved by Drugs Controller General of India (DCGI). The Centre has carried out many BE/BE trials on healthy humans for evaluation of fixed dose combination of anti-tubercular drugs. Earlier the clinical part of the trials were conducted in make shift arrangement in hostel buildings, NIPER dispensary. Finally, in the year 2002, Department of Science and Technology (DST), Government of India agreed to support setting up of National Bioavailability Centre (NBC) in a dedicated new building comprising of 5000 sq.ft. area in NIPER campus with an initial cost of Rs.268 lakhs. We have carried out a three way cross over of anti-tubercular drugs on healthy human subjects in the year 2004.

The Centre is reapproved by the Drug Controller General of India in 2015 for conducting Bioavailability / Bioequivalence (BA / BE) on healthy human subjects. The Centre has tie up with Fortis hospital, Mohali which is within 2 km radius of NIPER for screening tests and handling any hypersensitivity reaction.

We at NBC desire to assist the national and international generic drug industry to evaluate and develop bioequivalent dosage forms by conducting BA / BE studies in healthy human volunteers. NBC is a non-profit government aided centre to not only provide services for BA/BE studies but also advice industry to design, develop and evaluate dosage forms in an efficient, cost effective and timely manner to suit their needs and also regulatory expectations in terms of quality and compliance to GLP and GCP. NBC was one of the two reference laboratories in the world accredited by WHO for conducting

bioequivalence studies for anti-TB fixed dose combinations (FDCs).

The centre has a 24 bedded air conditioned volunteer room with a nursing station, and attached toilets. It has a separate dining room with attached kitchen. It has reception, frisking area, informed consent room and a doctor room. It has a sample collection room with two phlebotomy stations, a sample processing room with refrigerated centrifuge and deep freezers (-80°C), and one bed ICU. It also has a Pharmacy room, Archives and a HIV Counseling Room.

Currently, NIPER offers a post graduate course on clinical research. The students of the clinical research course are to be acquainted with the procedures followed during BA/BE studies on healthy human volunteers. This center has offered a hands on training to these students about nitty-gritty of the BA/BE studies, strating from the approval from The DCGI, New Delhi to submission of the report. We educated these students for the procedures followed according to the SOPs.

During the year 2016-17, there were visitors from different Govt. Institutions and pharma industries. The NBC staff was involved in counselling to these people about procedures and regulatory needs of the NBC for conducting the BA/BE studies.

The delegates from National Workshop on Clinical Pharmacology and Therapeutics, organized by Post Graduate Institute of Medical Education and Research, Chandigarh (6-10 March, 2017), visited the NBC. They have been educated about the DCGI guidelines for BA/BE studies. They have been allowed to see the entire facility.

The guidance to one of the Ph.D. students of Pharmacy Practice was given for the development of analytical laboratory. The method of transportation of samples from PGIMER, Chandigarh to NIPER, processing and final analysis of collected biosamples was explained to her.

Reply to Transaction Audit of NIPER Mohali for the years from 2015-16 and 2016-17 (up to December, 2016) was given w.r.t. National Bioavailability Centre.Reply to Comptroller and Auditor General of India (CAG) para 10 was written and submitted.

The activity of usage of deep freezer by the student of Pharmaceutics and pharmaceutical analysis was coordinated.

CENTRAL ANIMAL FACILITY

National Institute of Pharmaceutical Education and Research (NIPER), S.A.S. Nagar as an establishment is registered with Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Ministry of Environment, Forest & Climatic Change, Government of India for the Research for education, Research for the commercial purpose, Breeding for in-house use and Breeding for the purpose of trading of small laboratory animals (108/GO/Re/Rc/Bi /Bt/99/CPCSEA). Recently, annual inspection of animal house facilities of NIPER was conducted by CPCSEA main nominee at the end of Dec 2016. The Central Animal Facility (CAF) is the double storied building with 'Two-way corridor system' to minimize the cross contamination and for the efficient animal house operations. The first floor is dedicated to the breeding of different small laboratory rodents like mice, rats, hamsters, gerbils and guinea pigs.

Inspection of CAF was conducted by CPCSEA main nominee at the end of Dec

In addition to the breeding unit, there is a separate experimental unit available for the holding and conducting the experiments on

animals. CAF's main function is the Breeding, Maintenance and Supply of the animals to the various IAEC approved in-house as well as to the consultancy research and regulatory projects. It also supplies animals on payment basis on request to the outside CPCSEA registered establishments for research purpose on stipulated terms and conditions. Each species of animals is separately housed in individual rooms to prevent interspecies disease

transmission and to eliminate anxiety and possible physiological and behavioral changes due to interspecies conflict.

The animals are maintained under controlled environmental conditions (temperature (22±2ºC), relative humidity (50 ±10 %), 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. 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 this purpose. Periodic health monitoring of the animals is carried out to ascertain the health status. In addition, feed and water analysis are carried out for assessing their quality and microbiological contamination. The 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 research purpose.

Participants attending the one day seminar on "Implementation of DPCO 2013' and 'Affordability, Availability and Accessibility of Medicines for All" organized on Nov. 16, 2016 at NIPER S.A.S. Nagar, in association with the National Pharmaceutical Pricing Authority (NPPA), Department of Pharmaceuticals, Ministry of Chemicals & Fertilizers, Government of India.

Participants included State Drug Controllers (Punjab, Haryana and Himachal Pradesh), Drug Inspectors from Punjab, Haryana, Himachal Pradesh, and Chandigarh, Chemists/Medical Superintendent/s from U.T. Hospitals, students from the Department of Pharmaceutical Management.

PHARMACEUTICAL HERITAGE CENTRE

During the year Pharmaceutical Heritage Centre was actively engaged in enriching its archival collections; and to try and bring the importance of the country's rich pharmaceutical heritage to the visitors of the Centre.

1. **Collection**: The collections added during the period are:

(i) Certificates of Degrees, Awards and Trophies/Medals of Professor Harkishan Singh (76 numbers)

(ii) Photographs (~500) of various luminaries of Indian Pharmacy, events/occasions important in the context of the country's pharmaceutical history, etc. from the collection of Professor Harkishan Singh.

2. **Preservation and Documentation**: All the photographs (~500) were scanned and their digital copies were prepared for easy accessibility and longer preservation.

3. **Other Activities**:The Centre received visitors from all sections of life including VVIPs, students from various institutions, etc.

The following two photographs have been selected from those taken during a daylong official tour by the Hon'ble Minister of State Sri Mansukh L. Mandaviya, Ministry of Chemicals & Fertilizers, Government of India, to NIPER on 18-1-2017.

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:
Granted: 10
Filed: 04

Sri Mansukh L. Mandaviya, Hon'ble Minister of State, Ministry of Chemicals & Fertilizers, GoI along with Professor P. V. Bharatam, Director (Officiating) and other officials of NIPER

Sri Mansukh L. Mandaviya, Hon'ble Minister of State, Ministry of Chemicals & Fertilizers, GoI, interacting with Staff/Faculty of NIPER during his visit to PHC on 18.1.2017

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Hon'ble Minister of State Shri Mansukh L. Mandviya visiting the Pharmaceutical Heritage Centre on Jan 18, 2017

Hon'ble Minister of State Shri Mansukh L. Mandviya being felicitated during his visit on Jan 18, 2017

PATENTS GRANTED

S. No.	Inventors	Title	Patent No. and Date of Grant
1.	Rahul Jain and Waquar Ahsan	A process for synthesis of 4-substituted-2,8-bis (trifluromethyl) quinolines effective as anti-tuberculosis agents	272888 29.04.2016
2.	Chitra Gopalakrishnan and Kamlesh Kumar Bhutani	Nutraceutical formulation	273347 31.05.2016
3	Uma Ramachandran, Alka Mittal and Rakesh Kumar	An improved process for the preparation of S-citalopram	273424 06.06.2016
4.	Arvind Kumar Bansal, Mohammad, G.A. and Vibha Puri	Co-Processed APIs (Modified title: A pharmaceutical composition)	275805 22.09.2016
5.	Asit Kumar Chakraborti and Sunay Vijaykumar Chankeshwara	A novel dealkylation process	276107 30.09.2016
6.	Asit Kumar Chakraborti and Sunay Vijaykumar Chankeshwara	An improved organocataltic process for esterification and amidation reaction	277349 18.11.2016
7.	Arvind Kumar Bansal, Mohammad, G.A. and Vibha Puri	An improved process for producing Stavudine polymorphic form III	278845 31.12.2016
8.	Rahul Jain and Amit Nayyar	4-(1-Adamantyl)-2-substituted quinolines as new structural class of anti-tuberculosis agents	279395 19.01.2017
9.	Majeti Naga Venkata Ravikumar, Dhawal D Ankola, Vishwanad Bhoomi, Vivekanand Bhardwaj, Poduri Ramarao	Nanoparticulate formulation for oral delivery of Co-enzyme Q 10	279395 23.01.2017
10.	Asit Kumar Chakraborti, Sunay V. Chankeshwara and Bavneet Singh	An improved solid support catalyst system for direct esterification reaction	281460 17.03.2017

PATENTS FILED

S.No.	Inventors	Title	Application No. and Date of Filing
1.	Dinesh Kumar Tanwar, Anjali Ratan, Manjinder Singh Gill	One pot process for the preparation of substituted hydantoins	201611039634 21.11.2016
2	Dinesh Kumar Tanwar, Anjali Ratan, Manjinder Singh Gill	One pot process for the preparation of substituted 1-sulfonyl hydantoins	201611039635 21.11.2016
3.	Abhay Hariram Pande, Dharam Pal, Rajan Kumar Tripathy, Madaka Surya Teja, Prakashkumar Bavchandbhai Dobariya, Mukesh Kumar, Uttam Chand Banerjee	A novel polynucleotide encoding rhIFN - β polypeptide and a method of production of said polypeptide	201711008247 09.03.2017
4.	Asit K. Chakraborti, Sahaj Pancholia and Tejas M. Dhameliya	N-Arylbenzo[D]thiazole-2-carboxamides as anti-tubercular agents	2017110110231 23.03.2017

Dr. Upneet Lalli, Deputy Director, Institute of Correctional Administration, delivered a lecture on "Provisions of the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act 2013", as a part of workshop on geneder sensitization organized on Oct. 18, 2016

Dr. Vidhu Mohan, former Head, Department of Psychology, Panjab University participated in an interactive session on "Psychosocial aspects of prevention and dealing with sexual harassment" with students on March 1, 2017

AWARDS & HONOURS

Name	Discipline	Recognition
Prof. Saranjit Singh	Pharmaceutical Analysis	• Dean, Faculty of Pharmaceutical Sciences, IKGPTU, Jalandhar • Member, Expert Advisory Panel on the International Pharmacopoeia and Pharmaceutical Preparations, World Health Organization, Geneva • Member, Indian Pharmacopoeia Impurity Standards Review Committee • Member, Board of Post-graduate Studies, UIPS, Panjab University, Chandigarh • Member, Editorial Advisory Board, Journal of Pharmaceutical and Biomedical Analysis (Netherlands) • Member, Editorial Board, Eurasian Journal of Analytical Chemistry (Turkey) • Member, Editorial Board, Indian Journal of Pharmaceutical Sciences
		• Member, Editorial Board, Asian Journal of Pharmaceutics • Member, Editorial Board, Indian Drugs • Editor, Special Issue on Impurities, Trends in Analytical Chemistry
Prof. U. C. Banerjee	Pharmaceutical Technology (Biotechnology)	Chairman, Technical Expert Committee of Biochemical Kits Laboratory, National Institute of Biologicals, New Delhi (2016-19)
Prof. K. P. R. Kartha	Medicinal Chemistry	Special Issue Editor, Trends in Carbohydrate Research
Prof. Arvind Kumar Bansal	Pharmaceutics	• Fellowship of American Association of Pharmaceutical Scientists by American Association of Pharmaceutical Scientists (AAPS) • Member, Editorial Advisory Board, Journal of Pharmaceutical Sciences (for a period of three years from Jan 1, 2017) • Member, Editorial Advisory Board, Molecular Pharmaceutics
Prof. S. S. Sharma	Pharmacology and Toxicology	• Editorial Board Member, Behavioural Neurology • Editorial Board Member, Current Neurovascular Research (Bentham Science) • Executive Review Advisor, International Journal of Pharmaceutical Sciences and Nanotechnology (Pharma Book Syndicate) • Co-organizing Secretary, 49th Annual Conference of Indian Pharmacological Society, PGIMER, Chandigarh, Oct 18-22, 2016

Dr. M. E. Sobhia	Pharmacoinformatics	Distinguished Scientist, Venus International Research Awards 2016 (VIRA 2016) by Venus International Foundation (VIF), India for initiatives and research activities in the area of Computer Aided Drug Design
Dr. Dipika Bansal	Pharmacy Practice	• Expert member, Signal Review Panel of National Coordination Centre - Pharmacovigilance Programme of India (CDSCO) • Best oral presentation award at fifth national conference of pharmacoeconomics and research, New Delhi, Mar 3-4, 2017
Dr. J. N. Singh	Pharmacology and Toxicology	ICMR HRD Fellowship-Long Term Fellowship/Training in Foreign Institute
Tejas M. Dhameliya	Medicinal Chemistry	Best poster award, 2nd National Conference of Institute of Pharmacy (NCIP 2017) on Emerging Trends in Drug Discovery, Development and Molecular Targets for Cancer Research, organized by Institute of Pharmacy (IPNU), Ahmedabad, Jan 24-25, 2017 at Nirma University, Ahmedabad
Pradeep Jadhavar	Medicinal Chemistry	Rajnibhai V. Patel PharmInnova Award for the most "Innovative Thesis" in Ph.D. (Pharmaceutical Chemistry) category in Pharmaceutical Sciences 2016-17
Neha Patel	Medicinal Chemistry	DST Travel Award
Deepika Kathuria	Medicinal Chemistry	Best poster award at International Conference on Computational Modelling of Molecules and Materials (CM3-2016), IIT Indore, Oct 20-22, 2016
Neha Patel	Medicinal Chemistry	Best poster award at 5th International Conference on Modeling of Chemical and Biological Reactivity (MCBR-5), Central Leather Research Institute, Chennai, Feb 18-21, 2017
Mahesh Sharma	Pharmacoinformatics	DST Travel Award
Krishna Prahlad Maremanda	Pharmacology and Toxicology	• ASIO 2017 International Toxicologist Travel Award • ICMR Travel Award
Neeraj Singh Thakur	Pharmaceutical Technology (Biotechnology)	DST Travel Award
Gopal Patel	Pharmaceutical Technology (Biotechnology)	DBT Travel Award
Krupal Jethava	Pharmaceutical Technology (Process Chemistry)	• DST Travel Award • Selected for flash presentation at 21st International Conference on Organic Synthesis (ICOS), IIT Bombay, Dec. 11-16, 2016

Varun Kushwah	Pharmaceutics	• Commonwealth Split-Site (PhD) Scholarship • Fulbright-Nehru Doctoral Research Fellowship
Chander Parkash	Pharmaceutics	DBT Travel Award
Ratnika Sethi	Biotechnology	Travel support from EMBO and DST
Kinjal Patel	Biotechnology	• DST Travel Award • Recipient of Keystone Symposia Future of Science Fund Scholarship; one of two students selected all over the world for this scholarship
Anjana Barola	Pharmacy Practice	Student Travel Grant, ISPOR
Ruchi Singhal	Pharmacy Practice	Award for designing the T-shirt for 21st Annual International Meeting of ISPOR, Washington DC, USA
Ishfaq Rashid	Pharmacy Practice	Newsletter Award of ISPOR, Nov 2016
Jyoti Rawat	Pharmacy Practice	Newsletter Award of ISPOR, Nov 2016
Shibila VK	Pharmacy Practice	Newsletter Award of ISPOR, Nov 2016
Amarnath Mullapudi	Pharmacy Practice	Travel award from organizers of 4th World Parkinson's Congress
Murali Krishna	Pharmacy Practice	ISPOR Travel Grant
Rambabu Vatte	Pharmacy Practice	Travel grant from International Society for Pharmacoepidemiology (ISPE)
Amarnath Mullapudi	Pharmacy Practice	Travel grant from International Society for Pharmacoepidemiology (ISPE)

Mr. Krishna Prahlad Maremanda, Ph.D. candidate, Department of Pharmacology and Toxicology, receiving the ASIO 2017 International Toxicologist Travel Award in the Society of Toxicology SOT Annual Meeting from March 12-16, 2017 at Baltimore, USA.

Mr. Gunjan Kohli, Technical Assistant, Department of Pharmaceutics visited Rashtrapati Bhavan for Poster Presentation of NanocrySP technology developed by NIPER, Mohali in the "Festival of Innovations-2017 (FOIN-2017)" on March 8, 2017

VISITS ABROAD

Name	Discipline	Visit
Prof. Pramil Tiwari	Pharmacy Practice	34th Annual meeting of European Society of Paediatric Infectious Diseases, Brighton, UK, May 10-14, 2016
Prof. I. P. Singh	Natural Products	Keynote talk at 2017 International Symposium toward the Future of Advanced Researches in Shizuoka University, Japan, Feb. 27, 2017.
Dr. Sanyog Jain	Pharmaceutics	• Invited talk, AAPS workshop on enabling the development of oral therapeutics with innovations in lipid formulation technologies, Plainsboro, USA, Sept. 19-20, 2016 • Guest lecture, University of Louisville, Kentucky, USA, Sept. 21-22, 2016
Dr. Dipika Bansal	Pharmacy Practice	Short talk at International Congress on Obesity and Metabolic Syndrome (ICOMES) 2016, Seoul, South Korea, Sept. 1-4, 2016
Dr. J. N. Singh	Pharmacology and Toxicology	ICMR HRD Fellowship-Long Term Fellowship/Training at School of Biomedical Sciences, Faculty of Biological Sciences, University of Leeds, UK, Jan 29, 2016-Jan 28, 2017
Neha Patel	Medicinal Chemistry	Oral presentation at European Symposium on Chemical Bonding (ESCB1), University of Rouen (France), Aug 29 - Sept 2, 2016
Mahesh Sharma	Pharmacoinformatics	International Conference on System Biology (ICSB 2016), Sept. 16-20, 2016
Isha Saraf	Natural Products	Australian National University, Canberra, Australia, Sept. 28 - Oct. 31, 2016
Krishna Prahlad Maremanda	Pharmacology and Toxicology	Oral presentation, Society of Toxicology SOT Annual Meeting, Baltimore, USA, Mar 12-16, 2017
Neeraj Singh Thakur	Pharmaceutical Technology (Biotechnology)	Poster presentation at Gordon Research Conference, Les Diablerets, Switzerland, June 5 – 10, 2016
Gopal Patel	Pharmaceutical Technology (Biotechnology)	Poster presentation at 2nd International Conference, Bioprocessing Asia 2016, Phuket, Thailand, Dec. 5 – 8, 2016

Krupal Jethava	Pharmaceutical Technology (Process Chemistry)	Poster presentation at Third International Symposium on C-H Activation, University of Montreal, Canada, May 30 – June 2, 2016
Varun Kushwah	Pharmaceutics	Strathclyde Institute of Pharmacy and Biomedical Science, University of (Pharmaceutics), Strathclyde, Glasgow, Scotland, UK, Feb 1 - June 30, 2016
Varun Kushwah	Pharmaceutics	James Graham Brown Cancer Center, University of Louisville, Kentucky, USA, Sept. 1, 2016 – Feb. 28, 2017
Chander Parkash	Pharmaceutics	Poster presentation at 43rd Annual Meeting & Exposition of the Controlled Release Society, Seattle, USA, July 17 - 20, 2016
Ratnika Sethi	Biotechnology	Poster presentation at EMBO Conference ('Towards novel therapies: Emerging insights from structural and molecular biology'), Groningen, the Netherlands, Mar 6-8, 2017
Kinjal Patel	Biotechnology	Oral and poster presentations at Keystone symposia on molecular and cellular biology, Alberta, Canada, Feb. 5-9, 2017
Anjana Barola	Pharmacy Practice	Poster presentation at 21st Annual International Meeting of ISPOR, Washington DC, USA, May 21-25, 2016
Amarnath Mullapudi	Pharmacy Practice	Poster presentation at 4th World Parkinson's Congress (WPC-2016), Portland, USA Sept 20 23, 2016
Murali Krishna	Pharmacy Practice	Poster presentation at International Society for Pharmacoeconomics and Outcomes Research (ISPOR) 7th Asia-Pacific Conference, Suntec, Singapore, Sept. 3-6, 2016
Rambabu Vatte	Pharmacy Practice	Poster presentation at 32nd International Conference on Pharmacoepidemiology and Therapeutic Risk Management (ICPE-2016), Dublin, Ireland, Aug 25-28, 2016
Amarnath Mullapudi	Pharmacy Practice	Poster presentation at 32nd International Conference on Pharmacoepidemiology and Therapeutic Risk Management (ICPE - -2016), Dublin, Ireland, Aug 25-28, 2016

SEMINARS / WORKSHOPS

Date	Seminars/Workshops
April 30, 2016	Workshop on health technology assessment
June 30, 2016	Selection of excipients for oral dosage forms (SMPIC)
July 8, 2016	Hindi Workshop
Sept 13 - 23, 2016	Advanced analytical techniques: basic principles and applications for quality assessment of drugs and pharmaceuticals (ITEC-SCAAP)
Sept 30, 2016	Selection of excipients for oral liquid dosage forms (SMPIC)
Nov 07 - 17, 2016	Pharmaceutical quality by design: a risk based approach (ITEC-SCAAP)
Nov 18 - 20, 2016	5th biennial international conference on new developments in drug discovery (DDNPTM-2016)
Nov 16, 2016	'Implementation of DPCO 2013' and 'Affordability, availability and accessibility of medicines for all'; Seminar organized by NPPA in association with NIPER, S.A.S.Nagar
Dec. 16, 2016	Hindi Workshop
Jan 11, 2017	Facility qualification for oral solid formulation unit (SMPIC)
Feb. 27, 2016	Hindi Workshop

Participants being felicitated at the conclusion of the Workshop on "Advanced analytical techniques: basic principles and applications for quality assessment of drugs and pharmaceuticals" organized under ITEC SCAAP on Sept. 13-23, 2016

Participants at the Workshop on "Pharmaceutical quality by design: a risk based approach" organized under ITEC SCAAP on Nov. 7-17, 2016

Participants attending the seminar on "Selection of excipients for oral liquid dosage forms" organized by SMPIC on Sept. 30, 2016

A lecture being delivered during the one day seminar on "Facility qualification for oral solid formulation unit" organized by SMPIC on Jan. 11, 2017

The student chapter of the International Society of Pharmacoeconomics and Outcome Researc (ISPOR) had organised a one day workshop (April 30, 2016). The workshop was well attended by young graduate stduents and teachers of the region.

LECTURES DELIVERED BY EXPERTS FROM ACADEMIA/INDUSTRY

Date of Program	Title of lecture	Speaker
Sept. 8, 2016	Transporters: How there are leveraged during drug discovery and development	Dr. Jasminder Sahi, Senior Director, DSAR, AP, Sanofi (China)
Sept. 12, 2016	GASTROPLUS in formulation design: An industrial perspectives	Dr. Sheila Peters, Merck, Germany
Feb. 23, 2017	Novel approaches in drug delivery	Dr. Dimitrios A. Lamprou, University of Kent, Canterbury
Feb. 26, 2017	Crystal engineering: Enhancement of pharmaceutical physicochemical properties	Prof. Gautam R. Desiraju, Solid State and Structural Chemistry, Indian Institute of Science, Bangalore, India
March 2, 2017	Journey of drug products from lab to clinic	Prof. Anil Gulati Midwestern University, Illinois, USA

LECTURES DELIVERED BY NIPER FACULTY

Name	Date	Title ofInvited Lecture	Conference, Place
Prof. A.K. Chakraborti	09.04.2016	Innovation of Green Chemistry Tools: Recent Trends in Pharma Research	Symposium Emerging Trends in Translation Research in India, Shiv Nadar University, Noida
Prof. U.C. Banerjee	13.04.2016	Process development for the production of rifamycin oxidase and subsequent hydrolysis of rifamycin B to rifamycin S by *Curvularia lunata*	TEQIP-II sponsored on Application of Biotechnology in Industry and Society (ABIS-2016), Dr. B. R. Ambedkar National Institute of Technology, Jalandhar
Dr. Sanyog Jain	16.04.2016	Novel nanomaterials for cancer therapeutics	International Conference on Biomaterials, Biodiagnostics, Tissue Engineering & Drug Delivery (BiTERM-2016), Indian Institute of Technology , Delhi
Prof. Saranjit Singh	22.04.2016	Expiry Dating of Ayurvedic/Herbal Medicinal Products	National Conference on Amalgamation of Recent Pharmaceutical Developments in Ayurveda (LPUNASYAC ON-2016), National Ayurveda Students and Youth Association (NASYA) and Lovely Profesional University (LPU), Phagwara
Prof. U.C. Banerjee	29-30.04. 2016	Development of Bioprocesses Involving Nanobiocatalysts as Enzyme Source for the Synthesis of Chiral Drugs and Drug Intermediates	Department of Biotechnology, Faculty of Engineering & Sciences, Manglayatan University, Beswan, Aligarh
Prof. Saranjit Singh	30.04.2016	Implementing Successful Stability Testing Operations and Implementing Successful Stability Testing Operations in Times of Intense Regulatory Scrutiny: Select Practical Considerations	Implementing Successful Stability Operations, Aavi Medicare in association with Newtronic at Mumbai
Prof. U.C. Banerjee	28.05.2016	Bioreactor design starting from Shake Flask to Fermenter	Mata Gujri College, Fatehgarh Sahib , Punjab
Prof. Saranjit Singh	22.06.2016	Recent Trends in Applications of Chromatography and Spectroscopy	Workshop on Chromatographic and Spectroscopic Techniques held at Punjabi University, Patiala
Prof. Sanjay Jachak	04.07.2016	Standardization of Herbal Products	Faculty Development Programme, PTU, Chitkara College of Pharmacy, Rajpura Campus, Punjab
Prof. A.K. Chakraborti	21.07.2016	Innovation of Green Chemistry Tools in Medicinal Chemistry:Recent Trends in Pharma Research	Orientation programme for PG new entrants, Institute of Pharmacy, NIRMA University, Ahmedabad
Prof. A.K. Chakraborti	28.07.2016	Green Chemistry Tools in Pharma Research: Paradigm Change in Innovation for APIs	ASSOCHAM, India, Baddi, Himachal Pradesh.
Prof. Saranjit Singh	29.07.2016	Application of Science and Risk-Based Approach to Stability Testing (with Special Focus on Degradation/Interaction Products in	UBM India International Conference on Innovations in Formulation & Drug Delivery, Mumbai

Dr. Sanyog Jain	30.07.2016	Implication of nanotechnology in enhancing oral bioavailability of bioactives	DST-SERB Sponsored two days national seminar on Bioavailability Enhancement: An Industry Desire and Regulatory Constrains, Saurashtra University, Rajkot, Gujarat
Prof. Saranjit Singh	04.08.2016	Implementing Successful Stability Testing Operations	'Implementing Successful Stability Operations', Aavi Medicare in association with Newtronic at Hyderabad
Prof. Arvind Bansal	21-28.08.2017	Effect of crystallographic features on tableting behaviour of pharmaceutical actives	24th Congress and General Assembly of the International Union of Crystallography, Hyderabad
Dr. Sankar K. Guchhait	29-30.08.2016	Sustainable Organic–Medicinal Chemistry: Discovery of Topoisomerase II-Targeting Anticancer Agents	Organic Chemistry in Sustainable Development: Recent Advances and Future Challenges *(OCSD-2016)*, BITS-Pilani, Rajasthan
Prof. Saranjit Singh	16.09.2016	Quality by Design (QbD) to Continuous Manufacturing	Smt. Kishoritai Bhoyar College of Pharmacy, New Kamptee, Nagpur
Dr. Sanyog Jain	17.09.2016	Advanced Nanomaterials for Drug Delivery Applications	TEQIP workshop on Nanomaterials: Emerging Trends, Institute of Chemical Technology (ICT), Mumbai
Dr. Sanyog Jain	19.09.2016	Oral Bioavailability Enhancement with Self Nano-Emulsifying Drug Delivery Systems	AAPS Workshop on Enabling the Development of Oral Therapeutics with Innovations in Lipid Formulation Technologies, Plainsboro, NJ, USA
Dr. Sanyog Jain	21.09.2016	Self Nano Emulsifying Drug Delivery Systems (SNEDDS) and combinatorial drug polymer bioconjugates for effective anticancer drug delivery	James Graham Brown Cancer Center, University of Louisville, Louisville, Kentucky, USA
Prof. Saranjit Singh	22.09.2016	Impurity Profiling and Nondestructive Analysis and Imaging Techniques	ITEC-SCAAP, NIPER, SAS Nagar
Dr. Sanyog Jain	29.09.2016	Nanomedicines and Drug Delivery	Recent Advances in Green Nanotechnolgy, Bahra University, Shimla Hills, Solan
Prof. Saranjit Singh	01.10.2016	Preventing Product Recalls and Warning Letters due to OOS Results of Degradation Products (Through Science and Risk Based Approach)	19th IDMA-APA Pharmaceutical Analysts' Convention (PAC) 2016, Mumbai
Prof. Saranjit Singh	14.10.2016	Recent Developments in Pharma World	School of Pharmaceutical Sciences, Shoolini University, Solan, HP
Dr. Sanyog Jain	16.10.2016	Oral bioavailability enhancement using nanotechnology	21st APTI Annual National Convention (APTICON - 2016), Manipal University, Manipal
Prof. S. S. Sharma	18.10.2016	GLP and Safety Pharmacology	Preconference, 49th Annual Conference of Indian Pharmacological Society, PGIMER Chandigarh
Prof. S. S. Sharma	18.10.2016	Neurobehavioural studies in safety Pharmacology	Preconference, 49th Annual Conference of Indian Pharmacological Society, PGIMER Chandigarh

Prof. S. S. Sharma	18.10.2016	Translational stroke research	Preconference, 49th Annual Conference of Indian Pharmacological Society, PGIMER Chandigarh
Dr. G.B. Jena	20-23.10.2016	GLP in Risk Assessment (Non clinical - Toxicity Study): The Interface between Science & Regulation	Indian Pharmacological Society Conference, PGIMER, Chandigarh
Prof. Saranjit Singh	22.10.2016	Test and Control of Impurities during Drug and Product Development: A Requirement with Deep Impact	Emerging Trends in Drug Discovery & Drug Development held at Shriman Sureshdada Jain College of Pharmacy, Neminagar, Chandwad, Nashik
Prof. Saranjit Singh	07.11.2016	Quality by Design (QbD) to Continuous Manufacturing	ITEC-SCAAP, NIPER, SAS Nagar
Prof. A.K. Chakraborti	10.11.2016	Career Development through Education in Pharmaceutical Sciences	INSPIRE Internship Camp, Lyallpur Khalsa College, Jalandhar, Punjab
Prof. Saranjit Singh	11.11.2016	Current Scenario and Challenges in Industrial-Academia Interaction in Pharmaceutical Sector	3rd Annual Conference of APTI (Haryana State Branch), Jan Nayak Ch. Devi Lal Memorial College of Pharmacy, Sirsa
Prof. Sanjay Jachak	17.11.2016	Exploring Medicinal Plant Biodiversity for Drug Discovery and Development	Zoocon 2016, Deptt. of Zoology, Panjab University, Chandigarh
Dr. M. E. Sobhia	23-25.11.2016	Identification of Potential Allosteric Inhibitors of PTP1B using Computational Approaches	World Congress on Drug Discovery & Development, Indian Institute of Science, Bengaluru
Dr. Sanyog Jain	24.11.2016	Nanomaterials for Healthcare & Medicine, Short Term Training Course on Nanomaterials: Characterization and Applications	National Institute of Technical Teachers Training & Research, Chandigarh
Prof. Saranjit Singh	01.12.2016	Science and Risk Based Approach during Stability Testing	The First Science Day of Janssen India, Mumbai
Prof. Sanjay Jachak	08.12.2016	Drug Discovery from Natural Products: Recent Developments	20th Quality Improvement Programme for Faculty, DPSRU, Delhi
Prof. U.C. Banerjee	15-17.12.2016	Development of bioprocesses using nanobiocatalysts as enzyme source for the synthesis of chiral drugs and drug intermediates	Bioprocessing India 2016, Centre of Innovation and Applied Bioprocessing (CIAB), Mohali,
Prof. U.C. Banerjee	14.01.2017	Bioreactor design and Scale up	TEQIP-II sponsored Faculty development programme cum refresher course on Recent trends and Advances in Engineering and Technologies Organized by University Institute of Engineering & Technology, Kurukshetra University, Kurukshetra
Dr. Sanyog Jain	21.01.2017	From Injectable to Oral: Can Nanotechnology Help?	1st International Drug Delivery Congress 2017 (IDC 2017), RVS College of Pharmaceutical Sciences, Coimbatore
Prof. U.C. Banerjee	24.01.2017	Development of bioprocesses using nanobiocatalysts as enzyme source for the synthesis of chiral drugs and drug intermediates	UGC-SAP sponsored one day seminar on Recent Techniques in Biotechnology 2017, Department of Biotechnology, Panjab university

Dr. Sankar K. Guchhait	28-29.01.2017	Starting from Drug and Trekking the Topoisomerase and Tubulin -Tour: Discovery of Novel Anticancer Agents	2nd National conference on new frontiers in chemistry – from fundamentals to applications-II, BITS – Pilani, Goa Campus
Prof. Saranjit Singh	20.02.2017	Analysis of Micro/Trace Components during Drug Lifecycle, and Improvement of Pharmaceutical Education	Faculty Development Program, Dept. of Pharmaceutical Sciences, Saurashtra University, Rajkot
Prof. Inder Pal Singh	23.02.2017	Natural Products-Inspired approaches for new Bioactive Molecules	RIGST, Shizuoka University, Hamamatsu, Japan
Prof. Saranjit Singh	25.02.2017	Non Destructive Pharmaceutical Analysis and Visualization	International Conference on Advances in Engineering, Pharmaceutical & Applied Sciences held by Sagar Society of Interdisciplinary Research & Technology, Sagar Group of Institutions, Bhopal
Prof. Saranjit Singh	25.02.2017	Analysis of Micro/Trace Components during Drug Lifecycle	Lecture delivered to students and faculty of RGPV, Bhopal
Prof. Inder Pal Singh	27.02.2017	Quantitative NMR: Applications in Herbal Drug Analysis (Keynote address)	International Symposium Toward the Future of Advanced Researches in Shizuoka University, GSST/RIGST, Shizuoka University, Shizuoka, Japan
Prof. A.K. Chakraborti	02.03.2017	Enrichment of Medicinal Chemists' Tool-Box: Search for Novel Antiinflammatory Scaffold	International Conference on Challenges in Drug Disc overy and Delivery: ICCD3-2017, BITS Pilani, Pilani, Rajasthan
Prof. S. S. Sharma	02-04.03.2017	Safety Pharmacology: Current Guidelines and Emerging Concepts	International Conference on Challenges in Drug Discovery and Delivery (ICDD3-2017), BITS, Pilani, Rajasthan
Prof. Sanjay Jachak	02-04.03.2017	Drug Discovery from Natural Products and Application of NDDS to Herbal Drugs/Bioactives	International Conference on Challenges in Drug Discovery and Delivery (ICDD3-2017), BITS, Pilani, Rajasthan
Dr. Joydev K. Laha	03-05.03.2017	Recent Trends of Chemical & Biological Sciences in Medicine, Natural Products, and Drug Discovery	International Conference, Bhubaneswar
Prof. A.K. Chakraborti	04.03.2017	Innovative Approaches Towards Sustainable Chemistry Development	12th JK Science Congress on Science and Technology: Emerging Trends and Innovations, University of

Prof. Saranjit Singh	04.03.2017	Use of LC-MS and LC-NMR Tools in Establishment of Degradation Chemistry of Drugs	International Conference on Challenges in Drug Discovery and Delivery (ICCD3 - 2017), BITS, Pilani, Rajasthan
Prof. S. S. Sharma	06-10.03.2017	Exploratory Safety Pharmacology	35th National Workshop on Clinical Pharmacology and Therapeutics (NWCPT), PGIMER, Chandigarh
Prof. U.C. Banerjee	08-10.03.2017	Synthesis of chiral drugs and drug intermediates using nanobiocatalysts as enzyme source	International Conference (ICABBS-2017) on Advances in Biotechnology and Biotherapeutics, Sathyabama University, Chennai
Dr. Chaaya Iyengar	10.03.2017	Moonlighting proteins: a versatile mechanism for bacterial camouflage	Molecular Immunology Forum, Panchkula
Prof. U.C. Banerjee	15.03.2017	Bioreactor Design and Scale up	Department of Chemical Engineering, Panjab University, under TEQIP –II Programme
Prof. Saranjit Singh	16.03.2017	Recent Advances in Analytical Techniques: Nondestructive Pharmaceutical Analysis and Visualization, and Use of Hyphenated Tools for the Characterization of Trace Components	National Conference on Analytical Techniques and Thei r Applications (NCATA - 2017), Dr APJ Abdul Kalam Central Instrument Laboratory, Guru Jambheshwar University of Science and Technology, Hisar
Prof. U.C. Banerjee	16-17.03.2017	Synthesis of chiral drugs and drug intermediates using nanobiocatalysts as enzyme source	7th Annual National Conference “NATCONPH 2017” on Inter Disciplinary Research in Pharmaceutical Technology & Healthcare Management at NSHM Knowledge Campus, Kolkata
Prof. Inder Pal Singh	18.03.2017	Natural Products – Drug Discovery and Development	Responsible Research and Innovations in Science and Technology (RRIST), Guru Nanak College, Budhlada
Prof. U.C. Banerjee	24.03.2017	Different facets of biotechnology in the benefit of mankind	Biotechnology Day 2017, Department of Biotechnology, Himachal Pradesh University, Shimla
Dr. Sanyog Jain	24.03.2017	Implication of nanotechnology in oral bioavailability enhancement	9th NIPER (RBL)-CSIR-CDRI Symposium on Empowering Drug Discovery by Pharmaceutical and Clinical Research, NIPER, Raebareli
Dr. Joydev K. Laha	25-27.03.2017	Recent Trends in Chemistry Research	Visva-Bharati University, Santiniketan

LIST OF EMPLOYEES: SCIENTIFIC AND TECHNICAL STAFF

NAME	DESIGNATION
Dr. K. K. Bhutani[a]	Director (Officiating)
Dr. P. V. Bharatam	Director (Officiating)
Dr. U. S. N. Murty	Director (Officiating)
Dr. A. K. Chakraborti	Dean (till Aug 14, 2016)
Dr. P. V. Bharatam	Dean
Dr. Rahul Jain	Associate Dean (Academic)
Dr. Anil Angrish	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. Srikant Bhagat	Scientist Grade I
Dr. Meenakshi Jain	Scientist Grade I
Mr. G. Murugesan	Technical Assistant (Glass Blowing)
Mr. Pravin Jaikrishna Wanjari	Technical Assistant
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 OF 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[a]	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 Rahul Rameshrao	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
Dr. Shivcharan Prasad	Technical Assistant
Dr. N. Kishore Babu	Technical Assistant
Mr. Ranbir Singh	Junior Technical Assistant
Dr. 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

DEPARTMENT OF PHARMACEUTICAL MANAGEMENT

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

PHARMACEUTICAL HERITAGE CENTRE

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

COMPUTER CENTRE

Mr. Rajwinder Singh	Head
Mr. Amandeep Jindal	Programmer
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. Vikas Grover	Technical Supervisor Grade II
Mr. Sandeep Sachdeva	Technical Assistant
Dr. Manish Kumar Goyal	Technical Assistant
Mr. Mallikarjun Bolusani	Technical Assistant
Dr. Ashish Chauhan	Technical Assistant
Dr. Bharti Mittu	Technical Assistant
Mr. Rajdeo Kumar	Technical Assistant
Ms. Preeti	Technical Assistant
Mr. Anil Kumar Saw	Junior Technical Assistant
Mr. Jashwant Singh[b]	Junior Technical Assistant
Mr. Thongtinlal Haokip	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. Mukesh Kumar	Technical Assistant
Mr. Tara Dutt Bhatt	Junior Technical Assistant
Mr. Sunil Kumar	Junior Technical Assistant
Mr. Manish Kumar Verma	Junior Technical Assistant
Mr. Anil Bhardwaj	Junior Technical Assistant

NATIONAL BIOAVAILABILITY CENTRE

Dr. Arvind Bansal	Professor and In Charge
Ms. Kanwal Jit Kaur	Scientist Grade II
Mr. Inderjit Singh	Scientist Grade II
Mr. B. Shantharam R.	Technical Assistant

NATIONAL TOXICOLOGY CENTRE

Dr. K. B. Tikoo	Professor and In Charge
Ms. Vibha Ahuja	Junior Technical Assistant

CENTRAL BIOLOGICAL TESTING LABORATORY

Dr. K. B. Tikoo	Professor and In Charge
Dr. Anubha Singh	Scientist Grade II
Mr. S. S. Jhamb	Scientist Grade II
Dr. Balkar Singh	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. Sanjeev Bhardwaj	Junior Technical Assistant
Mr. Mohd. Yamin Saifi	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. Anand Sharma	Professor and In Charge

TECHNICAL CELL

Dr. Alok Goyal	Scientist Grade II
Mr. Lalit Sood	Stenographer Gr. C

ACADEMIC & EXAMINATION SECTION

Lipton Sharma	Data Processing Assistant
Govindaraj G.	Junior Technical Assistant (Audio Visual)

ENGINEERING SECTION

Mr. Ajay K. Sharma	Assistant Engineer
Mr. Major Singh	Assistant Engineer
Mr. T. P. Singh	Junior Engineer
Mr. Kamal Kishore	Sub-overseer

a	Superannuated on 30.12.2016
b	Resigned and relieved on 26.09.2016

Employees participating in the Vigilance Awareness Week

Observance of Army Flag Day on Dec. 7, 2016

Observance of Communal Harmony and Fund raising Week (Nov 19 - 25, 2016)

LIST OF EMPLOYEES: ADMINISTRATIVE STAFF

NAME	DESIGNATION
Wg. Cdr. PJP Singh Waraich (Retd.)	Registrar
Mr. Sushil Kumar Singh[c]	Deputy Registrar (Admn and Purchase)
Mr. Jitendra Kumar Chandel	Deputy Registrar (Finance and Accounts)
Mr. M. Jose	Finance and Accounts Officer
Ms. Bhuvan Gautam	Store and Purchase Officer
Mr. K. G. N. Acharya[d]	Secretary to Director
Mr. Gautam Khanna[e]	Section Officer (Store & Purchase)
Mr. Manoj Tiwari	Assistant Registrar (Establishment)
Mr. Vishal Kumar	Section Officer (Finance and Accounts)
Mr. Vikram Singh	Section Officer (Administration)
Mr. Ranbir Singh Kanwar	Security Supervisor (Academic and Examination)
Mr. K. S. Saini	Stenographer Gr. B (Pharmaceutical Management)
Mr. Deepraj Sharma	Stenographer Gr. B (Recruitment Cell and PR Cell)
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 (Establishment)
Mrs. Yogita	Stenographer Gr. C (Medicinal Chemistry)
Mrs. Nisha Sharma	Stenographer Gr. C (Academic and Examination)
Ms. Uma	Stenographer Gr. C (Academic and Examination)
Mr. Ashu Kumar	Stenographer Gr. C (Pharmaceutical Analysis)
Mr. Anil Gupta	Storekeeper (S&P; Engineering Stores)
Mr. S. U. S. Ramesh	Storekeeper (Store & Purchase)
Mr. Jairaj Meena	Storekeeper (Store & Purchase)
Ms. Sukhwinder Kaur	Assistant Gr. I (Establishment)
Ms. Prakriti Aggarwal	Assistant Gr. I (Academic and Examination)
Mr. Nityanand Gahan	Assistant Gr. I (Finance and Accounts)
Ms. Vijay Kumari Sharma	Assistant Gr. II (Biotechnology)
Ms. Dimple Sohal	Assistant Gr. II (Finance and Accounts)
Mr. Pardeep K. Verma	Data Entry Operator (Placement Cell)
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 (Administration)
Mr. Dheeraj Bhardwaj	Guest House In Charge
Mr. Arun Gautam	Assistant Gr. III (Store & Purchase)
Mr. Mohinder Singh Dhiman	Assistant Gr. III (Finance and Accounts)
Ms. Usha Rani	Assistant Gr. III (Registrar's Office)
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 (Finance and Accounts)
Mr. Gagandeep Singh	Assistant Gr. III (Administration)

c	Repatriated to ICAR on 01.03.2017
d	Superannuated on 30.12.2016
e	Premature retirement on 30.11.2016

नाईपर में राजभाषा गतिविधियॉं
(2016–17)

- **नाईपर को प्रथम राजभाषा पुरस्कारः**

  राष्ट्रीय औषधीय शिक्षा एवं अनुसंधान संस्थान (नाईपर), एस.ए.एस. नगर को ट्राईसिटी में वर्ष 2014–15 के लिए 116 संस्थानो (उत्पादन, प्रशिक्षण एवं अनुसंधान संस्थान) की श्रेणी में राजभाषा के क्षेत्र में सराहनीय कार्य करने हेतु प्रथम राजभाषा पुरस्कार प्रदान किया गया। यह पुरस्कार नगर राजभाषा कार्यान्वयन समिति (नराकास) द्वारा दिनांक 28.02.2017 को टैगोर थियेटर, चण्डीगढ़ में आयोजित वार्षिक राजभाषा पुरस्कार वितरण समारोह के दौरान श्री कैलाश चन्द्र जैन, प्रधान मुख्य आयकर आयुक्त एवं अध्यक्ष, नराकास, चण्डीगढ़ द्वारा प्रदान किया गया। यह पुरस्कार संस्थान का प्रतिनिधित्व कर रहे श्री जितेन्द्र कुमार चंदेल, उप कुलसचिव (वित्त एवं लेखा), डॉ. सविता सिंह, कार्यकारी राजभाषा अधिकारी एवं प्रौमिला ठाकुर, कनिष्ठ हिन्दी अनुवादक ने प्राप्त किया।

- **राजभाषा कार्यान्वयन समिति की बैठकः**

  संस्थान में वर्ष 2016–17 में राजभाषा कार्यान्वयन समिति की चार बैठकों का आयोजन किया गया। मंत्रालय द्वारा निर्धारित लक्ष्यों के अनुसार प्रत्येक तिमाही में राजभाषा कार्यान्वयन समिति की बैठक का आयोजन किया जाना अनिवार्य है जिसका अनुपालन किया जाता है। यह बैठकें 29 अप्रैल 2016 जिसकी अध्यक्षता प्रो. पी. वी. भारतम, डीन ने की। द्वितीय बैठक का आयोजन 10 अगस्त 2016 को किया गया जिसकी अध्यक्षता प्रो. क.कु. भूटानी, निदेशक कार्यवाहक ने की। तृतीय बैठक का आयोजन 04 अक्टूबर 2016 को किया गया जिसका अध्यक्षता भी प्रो. क.कु. भूटानी, निदेशक कार्यवाहक ने की। राजभाषा कार्यान्वयन समिति की चतुर्थ बैठक 11 जनवरी 2017 को आयोजित की गई। इस बैठक की अध्यक्षता प्रो. सरनजीत सिंह, विभागाध्यक्ष ने की। इन बैठकों का उददेश्य संस्थान में राजभाषा की प्रगति हेतु राजभाषा गतिविधियों, प्रचार–प्रसार, प्रयोग एवं प्रगति की चर्चा के साथ साथ राजभाषा के सही कार्यान्वयन के प्रयास की समीक्षा करना होता है।

- **हिन्दी पखवाड़ा**

  राष्ट्रीय औषधीय शिक्षा एवं अनुसंधान संस्थान (नाईपर), एस.ए.एस. नगर (मोहाली) में 01 से 15 सितम्बर तक राजभाषाा 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।

  01 सितम्बर से प्रारंभ हुए हिन्दी पखवाड़ा के दौरान 06 विभिन्न प्रतियोगिताओं जैसे श्रुतलेख प्रतियोगिता,

तत्काल व्याख्यान, अंग्रेजी शब्दों का हिन्दी अनुवाद, अंताक्षरी, स्वरचित कविता वाचन तथा स्लोगन प्रतियोगिता में नाईपरवासियों ने बढ़–चढ़ कर अपनी सहभागिता निभाई।

14 सितम्बर 2016 को आयोजित हिन्दी पखवाड़ा के समापन समारोह की अध्यक्षता प्रो. क.कु. भूटानी, कार्यवाहक निदेशक नाईपर ने की। उन्होंने अपने विचार रखते हुए कहा कि हिन्दी का प्रयोग केवल हस्ताक्षर तक ही समिति न रखें बल्कि अपने दैनिक कार्य में अधिक से अधिक हिन्दी का प्रयोग करें ।

संस्थान के संकायाध्यक्ष प्रो. पी.वी. भारतम ने कहा कि चाहे हम किसी भी राज्य के वासी हों, हमें अपनी राजभाषा सीखना अनिवार्य हैं और अपनी बोलचाल की भाषा में हिन्दी का प्रयोग करना चाहिए क्योंकि हिन्दी बोलचाल की सबसे सरल भाषा है। संस्थान के कुलसचिव विंग कमांडर पी.जे.पी. सिंह वड़ैच (से.नि.) ने मुख्य अतिथि, कार्यवाहक निदेशक नाईपर, हिन्दी पखवाड़ा आयोजन समिति, समस्त अधिकारियों एवं कर्मचारियों का धन्यवाद व्यक्त किया और कहा कि आजादी के बाद देश की राजभाषा के बारे में जब चर्चा कि गई तो हिन्दी सबसे अधिक राज्यों की बोलचाल की भाषा थी। इसको राजभाषा का दर्जा देने के लिए संसद में दो दिन का सत्र चला जोकि 14 सितम्बर को पूरा हुआ। इसलिए 14 सितम्बर को हिन्दी दिवस के रुप में मनाया जाता है।

डॉ. सविता सिंह, कार्यकारी हिन्दी अधिकारी एवं वैज्ञानिक ने वर्ष 2015–16 के दौरान संस्थान का राजभाषा प्रगति–प्रतिवदेन प्रस्तुत किया और बताया कि नगर राजभाषा कार्यान्वयन समिति (नराकास) चण्डीगढ़ द्वारा दिनांक 22.06.2016 को आयोजित छमाही बैठक में यह सूचित किया गया है कि नाईपर मोहाली को वर्ष 2014–15 में राजभाषा के क्षेत्र में उत्कृष्ट कार्य करने हेतु उत्पादन/प्रशिक्षण/अनुसंधान संस्थानों की श्रेणी में प्रथम स्थान प्राप्त हुआ है। जिसका पुरस्कार अक्टूबर माह में होने वाले नराकास के वार्षिक कार्यक्रम में प्रदान किया जाएगा।

हिन्दी पखवाड़ा के समापन कार्यक्रम के दौरान विभिन्न हिन्दी प्रतियोगिताओं के विजयी प्रतिभागियों को कार्यवाहक निदेशक प्रो. क.कु भूटानी, संकायाध्यक्ष तथा कुलसचिव द्वारा नगद पुरस्कार तथा प्रमाण–पत्र प्रदान किये गए। इसके अलावा वर्ष 2015–16 में हिन्दी में उत्कृष्ट कार्य करने के लिए अधिकारी वर्ग में डॉ. श्याम सुंदर शर्मा, प्राध्यापक एवं कर्मचारी वर्ग में श्री सुभाष चंद्र, कनिष्ठ तकनीकी सहायक तथा गैर हिन्दी भाषी कर्मचारियों में यह पुरस्कार श्री जी. गोविंदराज, कनिष्ठ तकनीकी सहायक को प्रदान किया गया।

समापन कार्यक्रम में 150 से ज्यादा लोगों ने भाग लिया जिसमें नाईपर के संकाय सदस्य, अधिकारीगण कर्मचारीगण तथा विद्यार्थीगण उपस्थित थे। कार्यक्रम का सफल संचालन श्री सुशील कुमार सिंह, उप कुलसचिव (प्रशासन एवं क्रय) ने किया। संस्थान में आयोजित हिन्दी पखवाड़ा, हिन्दी पखवाड़ा आयोजन समिति के मार्गदर्शन में हिन्दी कक्ष द्वारा आयोजित किया गया।

● हिन्दी कार्यशालाएं:

08 जुलाई 2016:

08 जुलाई 2016 को नाईपर में राजभाषाा के प्रचार–प्रसार हेतु हिन्दी कार्यशाला का आयोजन किया गया। इस कार्यशाला में संस्थान के अधिकारियों, कर्मचारियों एंव विद्यार्थियों ने भाग लिया। इस कार्यशाला में दो प्रतियोगिताओं का आयोजन किया गया जिसमें 'हिन्दी शब्दों का अंग्रेजी अनुवाद' तथा 'समाचार पत्र वाचन' प्रतियोगिता थीं। दोनों प्रतियोगिताओं में लगभग 30 प्रतिभागियों ने भाग लिया। हिन्दी शब्दों का अंग्रेजी अनुवाद में सुश्री भाग्यश्री सिताराम नवार, छात्रा प्रथम स्थान पर तथा सुश्री सुनिता मेत्रे, छात्रा द्वितीय स्थान पर रहे तथा समाचार पत्र वाचन प्रतियोगिता में प्रथम स्थान पर सुश्री इकजोत सोढी, छात्रा प्रथम स्थान पर तथा सुश्री प्रीतिका गुप्ता, छात्रा द्वितीय स्थान पर रहे। विजयी प्रतिभागियों को डॉ. पी.वी. भारतम, प्रोफेसर द्वारा क्रमशः रू0 300/– एवं रू0 200/– का 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 हिन्दी शब्दों का अंग्रेजी अनुवाद प्रतियोगिता में निर्णायक की भूमिका श्री सुशील कुमार सिंह, उप कुलसचिव (प्रशासन एवं क्रय) तथा समाचार पत्र वाचन प्रतियोगिता में डॉ. ईप्सिता रॉय, सह प्राध्यापक ने निभाई। कार्यशाला में अधिकारीगण, कर्मचारीगण, तथा विद्यार्थीगण सहित लगभग 40 लोग उपस्थित थे।

16 दिसम्बर 2016:

16 दिसम्बर 2016 को नाईपर में वर्ष की तृतीय हिन्दी कार्यशाला का आयोजन किया गया। इस कार्यशाला में संस्थान के कर्मचारियों एंव विद्यार्थियों ने भाग लिया। कार्यशाला में दो प्रतियोगिताओं का आयोजन किया गया जिसमें अंग्रेजी शब्दों का हिन्दी अनुवाद तथा वाद– विवाद प्रतियोगिता थीं। दोनों प्रतियोगिताओं में लगभग 25 प्रतिभागियों ने भाग लिया। अंग्रेजी शब्दों का हिन्दी अनुवाद में प्रथम स्थान डॉ. बलकार सिंह, वैज्ञानिक एवं द्वितीय स्थान श्री महेश चंद, तकनीकी सहायक ने प्राप्त किया। इसी प्रकार वाद–विवाद प्रतियोगिता जिसका विषय 'सरकार द्वारा उठाया नोटबंदी का कदम– उचित या अनुचित' था जिसमें प्रथम स्थान श्री देशभूषण लिंगायत, छात्र एवं द्वितीय स्थान श्री इन्द्रजीत सिंह, वैज्ञानिक ने प्राप्त किया। विजयी प्रतिभागियों को डॉ. अनिल अंग्रीश, सह प्राध्यापक द्वारा क्रमशः रू0 300/– एवं रू0 200/– का नगद पुरस्कार एवं प्रमाणपत्र से सम्मानित किया गया।

कार्यशाला में आयोजित अंग्रेजी शब्दों का हिन्दी अनुवाद प्रतियोगिता में निर्णायक की भूमिका डॉ. सुषमा सिंह, सहायक प्राध्यापक एवं वाद विवाद प्रतियोगिता में डॉ. अनिल अंग्रीश, सह प्राध्यापक ने निभाई। कार्यशाला में अधिकारीगण, कर्मचारीगण, तथा विद्यार्थीगण सहित लगभग 25 लोग उपस्थित थे।

- **27 फरवरी 2017:**

27 फरवरी 2017 को नाईपर में जनवरी–मार्च 2017 तिमाही की हिन्दी कार्यशाला का आयोजन किया गया। कार्यशाला का उद्देश्य संस्थान में राजभाषा का प्रचार–प्रसार एवं प्रयोग करना था। 27 फरवरी 2017 को आयोजित कार्यशाला में दो प्रतियोगिताओं का आयोजन किया गया जिसमें सामान्य ज्ञान एवं भाषण प्रतियोगिता का आयोजन किया गया। दोनों प्रतियोगिताओं में लगभग 25 प्रतिभागियों ने भाग लिया। भाषण प्रतियोगिता में प्रथम स्थान डॉ. मनीष कुमार गोयल, तकनीकी सहायक, द्वितीय स्थान श्री विष्णु शर्मा, कनिष्ठ तकनीकी सहायक एवं तृतीय स्थान श्री रणवीर सिंह, कनिष्ठ तकनीकी सहायक ने प्राप्त किया। इस प्रतियोगिता के निर्णायक डॉ. दीपिका बंसल, सहायक प्राध्यापक थीं। दूसरी प्रतियोगिता सामान्य ज्ञान थी जिसमें प्रथम स्थान डॉ. मनीष कुमार गोयल, तकनीकी सहायक, द्वितीय स्थान श्री अनंगपाल, तकनीकी सहायक एवं तृतीय स्थान श्री सत्यप्रकाश गजभरे, छात्र ने प्राप्त किया। इस प्रतियोगिता के निर्णायक डॉ. श्याम सुंदर शर्मा, प्राध्यापक थे।

विजयी प्रतिभागियों को डॉ. श्याम सुंदर शर्मा द्वारा क्रमशः रू 500/–, रु300/– एवं रू 200/– का नगद पुरस्कार एवं प्रमाणपत्र से सम्मानित किया गया। कार्यशाला के समापन अवसर पर डॉ. सविता सिंह, कार्यकारी राजभाषा अधिकारी ने उपस्थित नाईपरवासियों का आभार जताया तथा विजेताओं को बधाई दी एवं छात्रों एवं कर्मचारियों से आगामी कार्यशाला में अधिक से अधिक संख्या में भाग लेने एवं दूसरों को भाग लेने के लिए प्रेरित करने का अनुरोध किया। कार्यशाला में अधिकारीगण, कर्मचारीगण, तथा विद्यार्थीगण सहित लगभग 35 लोग उपस्थित थे।

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

चण्डीगढ़ नगर राजभाषा कार्यान्वयन समिति की बैठक किसान भवन, सैक्टर 35 में 22 जून 2016 को आयोजित की गई जिसकी अध्यक्षता श्रीमती मधु महाजन, आयकर महानिदेशक, उत्तर पश्चिम क्षेत्र, चण्डीगढ़ ने की जिसमें केन्द्र सरकार के विभागों, संगठनों तथा संस्थानों के करीब 100 से अधिक प्रतिनिधि सम्मिलित हुए। बैठक में राजभाषा विभाग का प्रतिनिधित्व श्री प्रमोद कुमार शर्मा, उप निदेशक, क्षेत्रीय कार्यान्वयन कार्यालय, नई दिल्ली ने किया। नाईपर से इस बैठक का प्रतिनिधित्व डॉ. सविता सिंह, कार्यकारी राजभाषा अधिकारी ने किया।

नगर राजभाषा कार्यान्वयन समिति की द्वितीय छमाही बैठक किसान भवन, सैक्टर 35 में 28 नवंबर 2016 को आयोजित की गई जिसकी अध्यक्षता श्री राजेन्द्र कुमार, प्रधान मुख्य आयकर आयुक्त एवं अध्यक्ष नराकास, उत्तर पश्चिम क्षेत्र, चण्डीगढ़ ने की। बैठक में राजभाषा विभाग का प्रतिनिधित्व श्री प्रमोद कुमार शर्मा, उप निदेशक, क्षेत्रीय कार्यान्वयन कार्यालय, नई दिल्ली ने किया। बैठक में केन्द्र सरकार के विभागों, संगठनों तथा संस्थानों के करीब 110 से अधिक प्रतिनिधि सम्मिलित हुए। नाईपर से इस बैठक का प्रतिनिधित्व सुश्री प्रौमिला ठाकुर, कनिष्ठ हिन्दी अनुवादक ने किया।

- **हिन्दी टंकण प्रशिक्षण :**

संस्थान से नियमित रूप में कर्मचारियों को हिन्दी टंकण प्रशिक्षण के लिए भेजा जाता है। वर्ष जनवरी 2017 में श्री सतेन्द्र रावत, डाटा प्रोसेसिंग असिसटेंट ने हिन्दी टंकण परीक्षा 84 प्रतिशत से उत्तीर्ण की है।

- **हिन्दी पुस्तकालयः**

वर्ष 2016–17 में हिन्दी पुस्तकालय के लिए आबंटित बजट में से रु 10000/– की हिन्दी पुस्तकें खरीदी गई हैं जिनकी संख्या अब 1746 हो गई है। पुस्तकालय में धार्मिक ग्रंथों के अलावा हिन्दी साहित्य, विज्ञान जगत, चिकित्सा, अनेक शब्दकोश, बच्चों के लिये पुस्तकों, खेल से संबंधित अनेकों रोचक किताबें उपलब्ध हैं।

- **राजभाषा की धारा 3(3) का अनुपालन**

मंत्रालय के सतत् मार्गदर्शन एवं निर्देशन में संस्थान में राजभाषा की धारा 3(3) का अनुपालन भी किया जाता है। इसके अलावा हिन्दी पत्राचार भी शत् प्रतिशत रहे, इसका भी पूरा ध्यान रखा जाता है।

28.02.2017 को टैगोर थियेटर, चण्डीगढ़ में आयोजित वार्षिक राजभाषा पुरस्कार वितरण समारोह के दौरान श्री कैलाश चन्द्र जैन, प्रधान मुख्य आयकर आयुक्त एवं अध्यक्ष, नराकास, चण्डीगढ़ द्वारा पुरस्कार प्राप्त करते श्री जितेन्द्र कुमार चंदेल, उप कुलसचिव (वित्त एवं लेखा), डॉ. सविता सिंह, कार्यकारी राजभाषा अधिकारी एवं प्रोमिला ठाकुर, कनिष्ठ हिन्दी अनुवादक।

08 जुलाई 2016 को आयोजित हिन्दी कार्यशाला में विजयी प्रतिभागियों के साथ डॉ. सविता सिंह, कार्यकारी राजभाषा अधिकारी।

हिन्दी पखवाड़ा 2016 के समापन समारोह में उपस्थित नाईपरवासी14 सितम्बर 2016 को आयोजित हिन्दी पखवाड़ा के समापन समारोह के दौरान मंचासीन (दाएं से – संस्थान के कुलसचिव विंग कमांडर पी.जे.पी. सिंह वड़ैच (से.नि.), पूर्व कार्यवाहक निदेशक प्रो. के.के. भुटानी, प्रो. प्रसाद वि. भारतम, डीन नाईपर

हिन्दी पखवाड़ा 2016 के समापन समारोह में उपस्थित नाईपरवासी

हिन्दी पखवाड़ा 2016 के समापन समारोह के दौरान विजयी प्रतिभागियो को पुरस्कार देते पूर्व कार्यवाहक निदेशक प्रो. के.के. भुटानी

16 दिसंबर 2016 को आयोजित हिन्दी कार्यशाला में विजयी प्रतिभागी को पुरस्कार प्रदान करते डॉ. अनिल अंग्रीश, सह प्राध्यापक।

27 फरवरी 2017 को आयोजित हिन्दी कार्यशाला में विजयी प्रतिभागी को पुरस्कार प्रदान डॉ. श्याम सुंदर शर्मा, प्राध्यापक।

MEMBERS, BOARD OF GOVERNORS

Constituted by Ministry of Chemicals & Fertilizers, Department of Pharmaceuticals letter F. No. 52/37/2009-NIPER (Pt. II) dated 03.10.2016 & Corrigendum F. No. 50013/3/2015-NIPER dated 06.10.2016

S. No.	NAME	DESIGNATION
1	**Dr. V.M. Katoch** Former Secretary, Department of Health Research	Chairperson
2	**Prof. Raghuram Rao Akkinepally** (w.ef. 12.05.2017) Director NIPER S.A.S. Nagar	Member (*ex officio*)
3	**Sh. Rajneesh Tingal** Joint Secretary in charge of pharmaceutical industries in the concerned Ministry or Department Govt. of India	Member (*ex officio*)
4	**Sh. M.P. Singh**, IAS Secretary, Technical Education Govt. of Punjab	Member (*ex officio*)
5	**Ms. Meenakshi Gupta** Financial Advisor Department of Pharmaceuticals Ministry of Chemicals & Fertilizers Govt. of India	Member (*ex officio*)
6	**Dr. G. N. Singh** Drug Controller General of India Ministry of Family & Health Welfare Govt. of India	Member (*ex officio*)
7	**Prof. A.P. Mittal** Member Secretary, All India Council of Technical Education	Member (*ex officio*)
8	**Prof. Ashwini Kumar Nangia** Director CSIR- National Chemical Laboratory Pune 411 008	Member (Director of any one of the national laboratories of the Council of Scientific and Industrial Research to be nominated by the Director General of Council of Scientific and Industrial Research, New Delhi)
9	To be nominated	The Director of either the All India Institute of Medical Sciences, New Delhi or the Post Graduate Institute of Medical Education and Research, Chandigarh to be nominated by rotation by the Ministry of Health and Family Welfare of the Government of India
10	**Sh. Deepnath Roy Chowdhury** President, Indian Drugs Manufacturers Association	Member (*ex officio*)

11	**Prof. M.D. Karvekar**	Member (A representative of Pharmacy Council of India)
12	**Dr. Shailesh Ayyangar** President, Organization of Pharmaceutical Producers of India,	Member (*ex officio*)
13	**Prof. Anil K Gupta** Centre for Management in Agriculture, IIM, Ahmedabad	(Three eminent pharmaceutical experts, one of whom shall be an educationist, to be nominated by the Central Government;)
14	To be Nominated	Member (Three eminent pharmaceutical experts, one of whom shall be a research scientist, to be nominated by the Central Government
15	**Prof. R. S. Verma** IIT, Chennai	Member (Three eminent pharmaceutical experts, one of whom shall be a biotechnologist, to be nominated by the Central Government)
16	**Dr. Vijayalaxmi Deshmane** Oncologist, Professor and Head Kidwai Memorial Instt. on Oncology Karnataka.	Member (Three eminent public persons or social workers one of whom shall be either from Scheduled Castes or the Scheduled Tribes, to be nominated by the Visitor out of a panel prepared by the Central Government)
17	**Dr. P.C. Rai** Former CMO, NTPC Ministry of Power	Member (Three eminent public persons or social workers one of whom shall be either from Scheduled Castes or the Scheduled Tribes, to be nominated by the Visitor out of a panel prepared by the Central Government**)**
18	**Prof. M.R. Doreswamy** Educationist	Member (Three eminent public persons or social workers one of whom shall be either from Scheduled Castes or the Scheduled Tribes, to be nominated by the Visitor out of a panel prepared by the Central Government
19	**Sh. Sudhir Mehta** Chairman, Torrent Pharmaceutical Limited Gujarat	Member (Two pharmaceutical industrialists to be nominated by the Visitor, out of a panel prepared by the Central Government)
20	**Sh. Satish Reddy** Chairman, Dr. Reddy's Lab, Hyderabad	Member (Two pharmaceutical industrialists to be nominated by the Visitor out of a panel prepared by the Central Government
21	**Wing Cdr PJP Singh Waraich (Retd.)** NIPER S.A.S. Nagar	Secretary

MEMBERS, ACADEMIC PLANNING AND DEVELOPMENT COMMITTEE (APDC)

Constituted on 08.02.2017.

S. No.	Name	Designation
1	**Prof. Bhushan Patwardhan**	Chairperson
2	**Prof. Raghuram Rao Akkinepally** (w.ef. 12.05.2017) Director NIPER S.A.S. Nagar	Member (*ex officio*)
3	**Prof. Arvind Kumar Bansal** Department of Pharmaceutics NIPER S.A.S. Nagar	Member (One Professor of the Institute nominated by the Board in consultation with the Director)
4	**Prof. H. Ila** JNCASR, Bangalore	Member (Six external experts representing different disciplines of pharmaceutical and allied sciences, from academic and research Institutions and from pharmaceutical industries to be nominated by the Board on the recommendation of the Director)
5	**Dr. D.K. Dikshit** Ex-Scientist, CDRI, Lucknow	Member (Six external experts representing different disciplines of pharmaceutical and allied sciences, from academic and research Institutions and from pharmaceutical industries to be nominated by the Board on the recommendation of the Director)
6	**Prof. Prabhjeet Singh** G.N.D.U., Amritsar	Member (Six external experts representing different disciplines of pharmaceutical and allied sciences, from academic and research Institutions and from pharmaceutical industries to be nominated by the Board on the recommendation of the Director)
7	**Prof. N. Udupa** Manipal Institute of Pharmaceutical Sciences, Manipal, Karnataka	Member (Six external experts representing different disciplines of pharmaceutical and allied sciences, from academic and research Institutions and from pharmaceutical industries to be nominated by the Board on the recommendation of the Director)
8	**Prof. Alok Bhattacharya** School of Life Sciences	Member (Six external experts representing different disciplines of pharmaceutical and allied sciences, from academic and research Institutions and from pharmaceutical industries to be nominated by the Board on the recommendation of the Director)
9	**Dr. (Mrs.) Vandana B. Patravale** Institute of Chemical Technology (ICT), Mumbai	Member (Six external experts representing different disciplines of pharmaceutical and allied sciences, from academic and research Institutions and from pharmaceutical industries to be nominated by the Board on the recommendation of the Director)
10	**Prof. P. V. Bharatam** Dean NIPER S.A.S. Nagar	Member Secretary (*ex officio*)

MEMBERS, SENATE

Constituted on 21.11.2016.

S. No.	Name	Designation
1	**Prof. Raghuram Rao Akkinepally** (w.ef. 12.05.2017) Director NIPER S.A.S. Nagar	Chairman (*ex officio*)
2	**Prof. P. V. Bharatam** Dean NIPER S.A.S. Nagar	Member (*ex officio*)
3	**Prof. P. P. Singh** Department of Pharmacology and Toxicology NIPER S.A.S. Nagar	Member (Five Professors of the Institute, nominated by the Chairperson in consultation with the Director, by rotation)
4	**Prof. S. S. Sharma** Department of Pharmacology and Toxicology NIPER S.A.S. Nagar	Member (Five Professors of the Institute, nominated by the Chairperson in consultation with the Director, by rotation)
5	**Prof. S. M. Jachak** Department of Natural Products NIPER S.A.S. Nagar	Member (Five Professors of the Institute, nominated by the Chairperson in consultation with the Director, by rotation)
6	**Prof. I. P. Singh** Department of Natural Products NIPER S.A.S. Nagar	Member (Five Professors of the Institute, nominated by the Chairperson in consultation with the Director, by rotation)
7	**Prof. Prabha Garg** Department of Pharmacoinformatics NIPER S.A.S. Nagar	Member (Five Professors of the Institute, nominated by the Chairperson in consultation with the Director, by rotation)
8	**Dr. Neelam R. Prakash** Department of Electronics & Communications Engineering PEC University	External Member (Engineering) (Three persons not being employees of the Institute, nominated by Chairperson in consultation of the Director, from among educationists of repute, one each from the fields of science, engineering & humanities and one of them shall be either from the SC or from ST)
9	**Prof. Y. K. Chawla** Ex. Director, PGI, Chandigarh	External Member (Science) (Three persons not being employees of the Institute, nominated by Chairperson in consultation of the Director, from among educationists of repute, one each from the fields of science, engineering & humanities and one of them shall be either from the SC or from ST)
10	**Prof. Ronki Ram** Department of Political Sciences Panjab University, Chandigarh	External Member (Humanities) (Three persons not being employees of the Institute, nominated by Chairperson in consultation of the Director, from among educationists of repute, one each from the fields of science, engineering & humanities and one of them shall be either from the SC or from ST)

11	**Dr. G. B. Jena** Department of Pharmacology & Toxicology NIPER S.A.S. Nagar	Member (One Associate Professor by rotation)
12	**Dr. Chaaya Iyengar** Department of Biotechnology NIPER S.A.S. Nagar	Member (One Assistant Professor by rotation)
13	**Prof. Arvind Kumar Bansal** Department of Pharmaceutics NIPER S.A.S. Nagar	Member (Head of Department, unrepresented)
14	**Prof. Anand Sharma** Department of Pharmaceutical Management NIPER S.A.S. Nagar	Member (Head of Department, unrepresented)
15	**Prof. P. Tiwari** Department of Pharmacy Practice NIPER S.A.S. Nagar	Member (Head of Department, unrepresented)
16	**Prof. Saranjit Singh** Department of Pharmaceutical Analysis NIPER S.A.S. Nagar	Member (Head of Department, unrepresented)
17	**Prof. U. C. Banerjee** Department of Pharmaceutical Technology NIPER S.A.S. Nagar	Member (Head of Department, unrepresented)
18	**Wing Cdr PJP Singh Waraich (Retd.)** NIPER S.A.S. Nagar	Secretary (*ex officio*)

MEMBERS FINANCE COMMITTEE

Constituted on 08.02.2017

S. No.	Name	Designation
1	**Prof. Raghuram Rao Akkinepally** (w.ef. 12.05.2017) Director NIPER S.A.S. Nagar	Chairman (*ex officio*)
2	**Prof. P. V. Bharatam** Dean NIPER S.A.S. Nagar	Member (*ex officio*)
3	**Sh. A. V. Lakra** Deputy Secretary, IFD	Member (Director (Finance)/Dy. Financial Advisor of DCPC, GoI)
4	**Sh. Sushil Thakur** Financial Advisor PGIMER, Chandigarh	Member (Three persons nominated by the Board to represent education, research and industry)
5	**Sh. Raj Kumar Droch** Deputy Financial Advisor CSIR & Ex-FAO, Institute of Microbial Technology, Chandigarh	Member (Three persons nominated by the Board to represent education, research and industry)
6	**Sh. Shirish Ghoge** Ex. Director, Sanofi & Abbott	Member (Three persons nominated by the Board to represent education, research and industry)
7	**Wing Cdr PJP Singh Waraich (Retd.)** NIPER S.A.S. Nagar	Member Secretary (*ex officio*)

MEMBERS LABORATORY SERVICES BUILDINGS & WORKS COMMITTEE (LSBWC)

Constituted on 08.02.2017

S. No.	Name	Designation
1	**Prof. Raghuram Rao Akkinepally** (w.ef. 12.05.2017) Director NIPER S.A.S. Nagar	Chairman
2	**Prof. P. V. Bharatam** Dean NIPER S.A.S. Nagar	Member
3	**Er. P. S. Saini** Chief Engineer/Head of Engineering Wing, PGIMER, Chandigarh	Member (One nominee of the Board)
4	**Sh. A. V. Lakra** Deputy Secretary, IFD	Member (Director (Finance)/Dy. Financial Advisor of DCPC, GoI or his nominee)
5	To be nominated	Member (An officer of CPWD not below the rank of Superintending Engineer to be nominated by the Ministry of Urban Development, Government of India, or his nominee not less than an Executive Engineer)
6	**Prof. Rahul Jain** NIPER S.A.S. Nagar	Member (One Professor of the Institute to be nominated by Board in consultation with Director of the Institute)
7	-	Member (*ex officio*) (Chief Maintenance Engineer of the Institute)
8	**Wing Cdr PJP Singh Waraich (Retd.)** NIPER S.A.S. Nagar	Member Secretary (*ex officio*)

GRANT - IN - AID

Non-Plan Grant Received/Expenditure (2016-17)

Expenditure Head	Grant-in-Aid received (Rs. in crores)	Expenditure (Rs. in crores)
Salary and allowances	14.75	22.88
General	12.73	16.64
Total	27.48	39.52

Against the non-plan budget estimate (BE) of Rs. 68.09 crore, Department of Pharmaceutical (GoI) has released Rs. 27.48 crore as Grant -in-Aid (Non Plan) for Financial Year 2016-17.

An MoU was signed between NIPER S.A.S. Nagar and Biocon Ltd. in the august presence of the Hon'ble President of India during the Visitor's Annual Conference at Rashtrapati Bhavan held on Nov 16-18, 2016

Cultural function presented by students at the Independence Day 2016 celebrations at NIPER, S.A.S. Nagar

Prof. K. K. Bhutani hoisting the National Flag at the Independence Day 2016 celebrations at NIPER, S.A.S. Nagar

Prof. P. V. Bharatam hoisting the National Flag at the Republic Day 2017 celebrations at NIPER, S.A.S. Nagar

EXTRAMURAL FUNDING

Project No.	Funding agency	Principal Investigator	Amount (Rs.)
GP-252	DBT	Prof. U. C. Banerjee	3943566.00
GP-387	ICMR	Prof. I. P. Singh	1031940.00
GP-396	DBT	Prof. U. C. Banerjee	313000.00
GP-400	SERB	Prof. A. K. Bansal	700000.00
GP-401	SERB	Dr. J. K. Laha	650000.00
GP-404	SERB	Dr. A. H. Pande	600000.00
GP-405	CSIR	Dr. Sankar Guchhait	374718.00
GP-410	DBT	Dr. Ipsita Roy	3698000.00
GP-412	ICMR	Dr. Dipika Bansal	210850.00
GP-416	DST	Dr. Sankar Guchhait	2675000.00
GP-417	DBT	Dr. A. T. Sangamwar	1540000.00
GP-418	DBT	Dr. Chaaya Iyengar	500000.00
GP-419	DST	Dr. Chaaya Iyengar	2477200.00
GP-420	DBT	Prof. I. P. Singh	9789400.00
GP-421	DST	Dr. Sanyog Jain	3190400.00
GP-422	ICMR	Prof. A. K. Bansal	3224592.00
GP-423	DST	Dr. Chaaya Iyengar	762708.00

STUDENTS FELLOSHIP PROJECTS

INSPIRE 4	DST	Ms. Neha Hura	418123.00
INSPIRE 07	DST	Ms. Survi Soni	320000.00
INSPIRE 08	DST	Ms. Dipika Kathuria	369200.00
CNF-135	NCCS Pune	Mr. Mahesh Daga	366000.00
CNF-136	NCCS Pune	Mr. Kiran Dashrath	366000.00
CNF-137	NCCS Pune	Ms. Kinjal Patel	366000.00
CNF-145	NCCS Pune	Mr. Gopal Patel	366000.00
CNF-156	NCCS Pune	Ms. Eshita Das	330000.00
CNF-157	NCCS Pune	Ms. Preeti	309597.00
CNF-160	SERB	Dr. Rajan Swamy	960000.00
CNF-161	SERB	Dr. Gaurav Parashar	794700.00

PRIVATE PROJECTS

SP-223	M/S LYKA	Prof. A. K. Bansal	750000.00
SP-224	M/S SIVANARY, USA	Prof. K. B. Tikoo	1189346.00
SP-225	M/S SIVANARY, USA	Prof. K. B. Tikoo	1076748.00
SP-226	M/S DSM SINOCHEM	Prof. A. K. Bansal	286250.00
SP-227	M/S SIVANARY, USA	Prof. K. B. Tikoo	632267.00

In addition, 105 consultancy projects and technical services worth Rs. 164.93 lakh were provided to the industry.

SPANDAN 2017

S.A.S. NAGAR

राष्ट्रीय औषधीय शिक्षा एवं अनुसंधान संस्थान (नाईपर)

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