National Institute of Pharmaceutical Education and Research (NIPER) - Ahmedabad

राष्ट्रीय औषधीय शिक्षा एवं अनुसंधान संस्थान, गांधीनगर

अहमदाबाद
AHMEDABAD

ANNUAL REPORT 2016-17

Innovation, Collaboration, Translation

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From the Director's Desk

Greetings and welcome to the National Institute of Pharmaceutical Education and Research (NIPER)-Ahmedabad. As you navigate our website, you will gain an appreciation of our passion for excellence in Pharmaceutical education.

NIPER-Ahmedabad was established in year 2007, with an aim to train individuals showing competency in the pharmaceutical sector to meet the needs of the ever-growing health care sector. Ever since then the Institute has an outstanding record of creating excellent pharmacists, researchers, and academicians. Situated in the downtown of Gandhinagar, NIPER offers several experiential learning opportunities for its students including extramural externships at pharmaceutical companies which offer additional opportunities for research.

NIPER-Ahmedabad aspires to excel in teaching and research on a global platform. Here we believe that creating good pharmacists begins with cultivating compassion, respect, and academic integrity. Diversity is one of our core values, and we strive to inspire our students to be forces of positive change in the world.

We have faculty members and researchers on board who have excellent track records. With these exceptional faculties and our remarkable staff, the Institute motivates its students to achieve the highest standards of excellence in their courses. Our Institute is truly unique, providing a positive and meaningful experience for our students, faculty, and alumni. Students get numerous opportunities of professional development by taking courses that are designed to enhance knowledge in Pharma while participating in innovative and interdisciplinary research involving members from NIPER-Ahmedabad, Pharmaceutical Industries, Medical Centres and Technological Universities. Additionally, we also encourage student's participation in national and international conferences which in turn help them in their professional development, keeping them at par with the latest research and innovations.

I am confident that NIPER-Ahmedabad will continue to produce graduate pharmaceutical scientists who, by their diverse training and research experience, will be leaders in the Pharma sector.

Prof. Kiran Kalia
Director
NIPER-Ahmedabad

About NIPER-Ahmedabad

The wave of globalization has propelled the expansion of Indian Pharma sector. India is amongst the top 10 countries of the world, regarding volume and value of Pharmaceutical products. Enthusiastic and entrepreneurial efforts have turned Gujarat into the hub of Pharma industry.

The innovative and translational approach of the Indian scientists resulted in the paradigm shift from the industrial age to knowledge enriched economy. Pharmaceutical education has played a vital role in human resource development, catalyzing the growth of life sciences and healthcare industry.

The visionary augmentation of the Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers, Government of India has led to the establishment of six new NIPERs in 2007.

NIPER-Ahmedabad was initiated with three programs in the field of Biotechnology, Natural Products and Pharmaceutics and over the period, three more programms viz. Pharmaceutical Analysis, Medicinal Chemistry and Pharmacology and Toxicology were introduced in year 2010. Subsequently in 2012, a unique Medical Devices program was initiated in NIPER-Ahmedabad to cater as well as nurture the need of booming medical device industries with-in and outside India.

The interdisciplinary courses and cultural diversity at NIPER-Ahmedabad sparks the spirit of innovative research and all-round development of its students. The location of the institute ensures a symbiotic association with Pharmaceutical Industries, Medical centers and technological universities.

NIPER-Ahmedabad would serve as a good launching platform to revamp the pharma education and research, to initiate the new era of pharmaceutical and biomedical sciences.

Vision and Mission

Vision

To be a Nationally and Internationally recognized premier Centre of Excellence in Teaching, Research and Entrepreneurial Training in Pharmaceutical Sciences and Biomedical Technologies.

Mission

- To ensure that departmental and administrative associates are provided with necessary resources to excel in learning, research, teaching, and administration.
- To establish National Centre of Medical Devices (NCMD) for contributing to Medical Technology education through collaborative programs of mutual interest.
- To evolve Medical Technology clusters with common facilities for creating an ecosystem for the benefit of SMEs focusing on Medical Technology.
- Development of human resource by skill up-gradation of students through specialized courses and training.
- To encourage students for innovative translational research through interdisciplinary research team.
- To promote national and international collaboration with Pharmaceutical Industries, Medical Centres, and Universities.
- To facilitate international student and faculty exchange programs to enhance the diversity on the campus.
- To organize International and National conferences and structured workshops for the benefit of students and professionals.

New Campus Inauguration

Shri Mansukhabhai Mandavia, Honourable Minister of State for Shipping, Road Transport and Highways, Chemicals and Fertilizers, General Secretary of Gujarat State, Bharatiya Janata Party; Member of Rajya Sabha from Gujarat state inaugurated NIPER-Ahmedabad's new temporary building at Gandhinagar. The temporary building includes an academic area for the students and teaching staff to facilitate learning opportunities, administration area for non-teaching staff to run administrative operations, a state of the art auditorium, animal house, and canteen. Shri Rajneesh Tingal, Joint Secretary, Department of Pharmaceuticals, Dr. Y.K. Gupta Professor and Head Pharmacology Department and Spokesperson AIIMS, New Delhi Dr. C. L. Kaul, Founder Director, NIPER-Mohali, Dr. V. Nagarajan, Neurosurgeon from V. N. Neurocare Centre Madurai, Dr. USN Murty, Director NIPER-Guwahati and Dr. V. Ravichandiran, Director NIPER-Kolkata attended the inaugural function as eminent guests for this event.

Faculty

Name, Designation and Research Interest	Photograph
Prof. Kiran Kalia, Ph.D. **Director** Research Interest: • Proteomic and genomic biomarkers for diabetes and its microvascular complications • Role of miRNA in epigenetics and pathogenesis of diabetic nephropathy • Transcriptome analysis of Oral Squamous Cell Carcinomas patients from Gujarat, India	
Dr. Neelam Chauhan, Ph.D. **Assistant Professor** Research Interest: • Generation of induced pluripotent stem cell through non-viral methods and its redifferentiation • Development of biomarkers for susceptibility and study of genomic variation for personalized therapy, anti-mycobacterial and anti-cancer studies	
Dr. Akshay Srivastava, Ph.D. **Assistant Professor** Research Interest: • Translational biomedical research involving fabrication of biomaterial-based medical devices • Finding novel therapeutic strategies for tissue regeneration and developing *in vitro* platforms to understand disease pathology	
Dr. Mukty Sinha, Ph.D. **Assistant Professor** Research Interest: • Integrated concepts involving material science and biology to design bio-medical implants especiallycardiovascular, orthopedicand ocular implants • Study of biodegradable polymers and their interactions with nanomaterials	

Dr. Govinda Kapusetti, Ph.D.

Assistant Professor

Research Interest:

- Nanomaterials (graphene, layered double hydroxides and clay, etc.) and nanohybrid synthesis, fororthopedic, cardiovascular and drug delivery applications
- Nanofiber-based scaffolds for biomedical applicationsincludingtissue engineering and interfacial studies of biomaterials

Dr. Anita Mahapatra, Ph.D.

Assistant Professor

Research Interest:

- Target oriented and lead-based design and development of New Chemical Entities (NCEs) of natural scaffolds against Diabetes, TB, and Cancer
- Discovery of new bioactive leads from natural sources for cancer and neuroprotection
- Development of National repository of secondary metabolites

Dr. Amit Shard, Ph.D.

Assistant Professor

Research Interest:

- Synthesis of BAX activating compounds and neuroprotective molecules,
- Microwave assisted organic synthesis
- Novel and sustainable protocols for bioactive molecules
- Drug designing and development

Dr. Satyasheel Sharma, Ph.D.

Assistant Professor

Research Interest:

- Transition metal catalyzed C-H activation reactions for the synthesis of anticancer agents
- Design and construction of fluorine-containing scaffolds of pharmaceutical importance via C-H Bond Activation
- Unreactive C(sp2)-H, C(sp3)-H bond functionalization
- Cross dehydrogenative coupling (CDC), Catalysis
- Peripheral functionalization of porphyrin ring system

Dr. Bhagyashree Kamble, Ph.D.

Assistant Professor

Research Interest:

- Plasma phytopharmacology studies
- Screening of Ayurvedic**rasayana** botanicals on CYP isoenzymes
- Herb-drug,drug-herb,pharmacokinetic, pharmacodynamic interaction studies
- Development and screening of herbal based novel formulations

Dr.Pallab Bhattacharya, Ph.D.

Assistant Professor

Research Interest:

- Safety and efficacy study of intra-arterial delivery of mesenchymal stem cells in small and large animal model of ischemic stroke and related mechanisms of neuroprotection
- Regulatory RNA-mediated mesenchymal stem cell engineering and nanoparticle-based drug delivery to the brain

Dr. Vinod Tiwari, Ph.D.

Assistant Professor

Research Interests:

- Cellular & molecular mechanisms involved in chronic neuropathic pain and associated CNS co-morbidities
- Role of reward circuitry in peripheral opioid-induced neuropathic pain relief
- Diabetic neuropathy, nephropathy**,** and associated cognitive deficits

Dr. Rakesh Kumar Tekade, Ph.D.

Assistant Professor

Research Interest:

- Development of smart drug delivery system for targeted drug and gene therapy
- Biopolymer nanoconstructs for endosomal escape of gene therapeutics and its cytosolic delivery
- Development of implantable Chemo-Magneto-Photothermal pulsatile Nanoseeds to tackle resistant Cancers
- Cancer diagnosis and therapy (Brain tumor, Prostate and Breast cancer)

Dr.Manju Misra, Ph.D.

Assistant Professor

Research Interest:

- Exploring the potential of bovine lipid as carriers for targeted drug delivery to brain and posterior segment of eye
- Nanocrystals and other solubility enhancement techniques and application in pharmaceutical formulation development
- Thermal and solid state characterization of different pharmaceutical process

Dr. Viral Shah, Ph.D.

Assistant Professor

Research Interest:

- Formulation and characterization novel delivery systems for proteins and peptides (Transdermal microneedle systems, oral lipid vesicular systems)
- Investigate novel approaches for solubility enhancement
- Formulation and evaluation of modified release and mucoadhesive formulations

Dr. Vamsi Krishna Marothu, Ph.D.

Assistant Professor

Research Interest:

- Impurity profiling and stability studies of drugs by HPLC and LC-MS/MS
- Drug degradation kinetics
- Drug-excipient compatibility studies using IST
- Drug metabolism and pharmacokinetic studies

Administrative& Technical Staff

Administrative Staff

Name	Designation	Photograph
Prof. Kiran Kalia Ph.D.	Director	
Prof. H.C. Trivedi Ph.D.	Registrar	
Mr. Jubin Abraham MBA	PA to Director	
Mr. Sanjay Kumar Shukla MMS	Administrative Officer	
Mr. D. R. Trivedi L.L.B.	Senior Accounts Officer	
Dr. Deo Kumar Singh Ph.D.	Veterinarian	
Mr. Sujeet Pathak B.Com.	Assistant Grade-III	
Mr. Parth Thakkar MBA	Assistant Grade-III	
Mr. Nishant Nadan BBA	Assistant Grade-III	

Mr. Prakash Ravi Das B.A.	Junior Assistant (Store)	
Mr. Madhavanand Jha B.A.	Junior Assistant (Computer)	
Mr. Akil Malek M. Lib	Library and Information Assistant	

Technical Staff

Name	Designation	Photograph
Ms. Rajeshwari Rathod M.Sc	Scientific Officer	
Mr.Deven Pandya B.E. Computer	System Engineer	
Ms. Aaysha Sataniya M. Pharm.	Junior Technical Assistant	
Mr.Babubhai Rathod I.T.I.	Electrician	

4th Convocation

The 4th Convocation of the Institute was held on 4th March 2017. Shri Mansukhabhai Mandavia,honourable Minister of State for Shipping, Road Transport and Highways, Chemicals and Fertilizers, Shri Rajneesh Tingal, Joint Secretary (PSU/NIPER) Department of Pharmaceuticals, Dr. Y.K. Gupta Professor and Head Pharmacology Department and Spokesperson AIIMS, New Delhi has conferred Masters and Ph.D. degrees to the students of NIPER-Ahmedabad.

Degrees Awarded during 4th Convocation

Ph.D. Degree awarded		02
Natural Products	Dr. Satyender Kumar	01
Biotechnology	Dr. Manish Kumar Patel	01

M.S. (Pharm) Degree Awarded	32
Biotechnology	05
Medicinal Chemistry	03
Medical Devices	05
Natural Products	03
Pharmaceutical Analysis	05
Pharmacology & Toxicology	04
Pharmaceutics	07

Book Prize Awardees

Book Prize was given to five students from the collective merit list of the batch. The Winners of book prize in 4th convocation are presented below:

Book Prize Awardees	
Biotechnology	Mr. Maitray Raval
Pharmaceutical Analysis	Ms. Seema Saroj
Medical Devices	Ms. Jaicy Jacob
Pharmaceutical Analysis	Ms. Rachna Jagania
Pharmaceutics	Ms. NidhiKumari Raval

Gold Medal and Book Prize Awarded during 4th Convocation

Gold Medal Awardees	
Biotechnology	Mr. Maitray Raval
Medicinal Chemistry	Ms. RinkalTanna
Medical Devices	Ms. Jaicy Jacob
Natural Products	Ms. Ranjana Soni
Pharmaceutical Analysis	Ms. Rachna Jagania
Pharmacology & Toxicology	Ms. Rashmi Chaudhari
Pharmaceutics	Ms. NidhikumariRaval

Students Admitted during 2016-17

NIPER-Ahmedabad has a total sanctioned intake of total 75 Masters and nine Ph.D. students. NIPER-Ahmedabad has conducted orientation program for the M.S. Pharm. batch 2016-18 during 1st to 3rd August 2016. Padmshree Dr. Anil Gupta from IIM Ahmedabad graced the event as a chief guest. This program has been designed considering special learning needs arising from the academic and social transition of students from various universities to NIPER-Ahmedabad. The statistics of students admitted in various programs at NIPER-Ahmedabad is shown below.

Discipline	No. of Students
Biotechnology	09
Medicinal Chemistry	10
Medical Devices	10
Natural Products	06
Pharmaceutical Analysis	14
Pharmacology & Toxicology	10
Pharmaceutics	15

Project Titles of MS Dissertation

Batch: 2014-2016

Department of Biotechnology

- *Induced pluripotent stem cells: A new paradigm for disease modeling and developing therapies for degenerativeeye diseases.*
- *Genomic alteration in VEGF and its association in diabetic retinopathy.*
- *Production of islet-like insulin-producing cell clusters in vitro from induced pluripotent stem cells.*
- *The designof new immunogenic epitopes for salmonella typhi.*
- *Array cGH analysis of OSCC tumor sample in Indian population.*

Department of Medicinal Chemistry

- *Lead-based synthesis and in vitro anticancer activity of Quinones.*
- *Structure Based Drug Design of Small Heterocycles as Potential Anti-Diabetic Agents.*
- *Synthesis of ester-amide Containing Hybrid Molecules and their Anti-Alzheimer'sactivity.*

Department of Medical Devices

- *Study on electrospon polymeric nanofibers for the vascular application.*
- *Polymer nanofiber scaffolds for cartilage regeneration: The effect of piezoelectricity.*
- *Development and characterization of nanofibrous scaffold for bone regeneration.*
- *Targeted hyperthermia by Gadolinium nanoparticles for cancer therapy.*
- *The developmentof biocompatible electrospun nanofibrous scaffolds for wound coverage.*

Department of Natural Products

- *Synthesis and development of quinone congeners as antidiabetic leads.*
- *Investigation of marine species in search of bioactive leads.*
- *Screening of standardized plant extracts for cytochrome p-450 mediated herb–drug interaction potential.*

Department of Pharmaceutical Analysis

- *Development of stability indicating method using QbD and characterization of degradation products of Canagliflozin.*
- *Development of stability indicating the method and impurity profiling using QbD for Ramosetron drug.*
- *Bioanalytical method development and validation of combination drugs (Roflumilast+ Amoxycillin+ Levocetrizine/Tolvapatan+ Bisosprolol) using various extraction process and its pharmacokinetics application.*
- *Stability Indicating RP- HPLC method for the determination of Seratrodast in a pharmaceutical formulation.*
- *Applying greenchemistry for development and validation of SIAM for Ozagreal/ Apraclonidine/Sofosbuvir using QbD approach*

Department of Pharmacology & Toxicology

- *Pharmacokinetic- pharmacodynamic drug -drug interaction of Saroglitazarand Repaglinide for combination therapy in type II diabetes.*
- *Effect of Leflunomide against aluminium chloride induced Alzheimer's disease.*
- *Elucidating the role of isolated phytochemicals in neuroinflammation.*
- *SGLT2 inhibitor and GLP-1 analogue/DPP4 inhibitor as therapeutics aid for T2DM.*

Department of Pharmaceutics

- *Formulation and evaluation of liposome loaded biodegradable system for intravesicular retentive drug delivery.*
- *Direct nose to brain transfer of Pgp Substrate after nasal administration: Effect of lipidic carrier on penetration enhancement and Pgp inhibition.*
- *Transcutaneous Drug Delivery of the photoprotective agent.*
- *Formulation and evaluation of lipid vesicles based microneedle array for transdermal delivery.*
- *Comparative evaluation of different formulation approaches for theorally dispersible dosage form of Risperidone: Effect on physicochemical properties and pharmacokinetics.*
- *Lipid based colloidal nanocarriers for drug targeting to the posterior segment of the eye.*
- *Design and development of nanocrystals loaded buccal patches of raloxifenehydrochloride.*

Students Pursuing Ph.D.

Department of Biotechnology

- *Ms. Heta Shah (2012)-Thesis Submitted*
- *Mr. Piyush Gondaliya (2015)-Pursuing*
- *Ms. Heena Jariyal (2015)-Pursuing*
- *Mr. Chintan Chaudhary (2016)-Pursuing*
- *Mr. Gopal Agarwal (2016)-Pursuing*

Department of Medicinal Chemistry

- *Mr. Bharat Chaudhary (2015)-Pursuing*
- *Mr. Sagarkumar Patel (2016)-Pursuing*

Department of Natural Products

- *Mr. Dilawar Upadhyay (2012)-Thesis Submitted*
- *Ms. Triveni Pardhi (2012)-Thesis Submitted*
- *Mr. Bhavik Kansara (2012)-Thesis Submitted*
- *Mr. Harshit Jadav (2015)-Pursuing*
- *Ms. Komal Pandey (2016)-Pursuing*

Department of Pharmaceutical Analysis

- *Mr. Manish Sharma (2015)-Pursuing*
- *Mr. Prakash Niguram (2015)-Pursuing*
- *Ms. Disha Thakkar (2016)-Pursuing*

Department of Pharmacology & Toxicology

- *Mr. Dilip Sharma(2015)-Pursuing*
- *Ms. Deepaneeta Sarmah (2016)-Pursuing*

Department of Pharmaceutics

- *Ms. Kritika Nayak (2015)-Pursuing*
- *Ms. Shreya Thakkar (2015)-Pursuing*
- *Mr. Dignesh Khunt (2016)-Pursuing*
- *Ms. Nidhikumari Raval (2016)-Pursuing*

Placement

The goal of Placement Cell is to provide a platform to the students for gaining valuable experience of working in the Industries. This cell also acts as an interface between various companies seeking well-trained post graduates of different disciplines. During placement process, companies are encouraged to visit the campus for a pre-placement talks and personal interviews.

Placement Statistics

Batch	Total Students	% Placement	Package secured (In Lakh)	Feedback from Recruiters
2014-16	32	100	2.2- 2.7	• Students are technically sound.
2015-17	55	94	2.5-3.7	• Students have good analysing and problem-solving skills.

Our Recruiters

Curtain raiser seminar on "What does fresher's lacks for getting better jobs"

NIPER-Ahmedabad organized a one-day seminar entitled "**What does fresher's lacks for getting better jobs",** on 3rdDecember 2016,where distinguished speakers from HR team of various industries, like Zydus, Cadila, Amneal, Lupin, INTAS, Piramal, Sahajanand industries etc. delivered informative talks aligned with the theme of the seminar. The event received an overwhelming response from the students, who came to attend this seminar from various colleges. The event started with an introductory message by the chief guest of the event Mr. Arvind Risbud Retired IAS, who gave a grass root insight about how technical training to rural youth has helped them to earn a livelihood.

Job Fair

NIPER-Ahmedabad Organized a Job Fair wherein Dr. Y.K. Gupta Professor and Head Pharmacology Department and Spokesperson AIIMS, New Delhi was Chief Guest for the event. Pharmaceutical companies like ALKEM, CADILA, Lupin, Indegene, Accuprec, ERIS Pharma, INTAS, VIPRO, Sahajanand Laser Technologies, etc. actively participated in the Job fair; and offered the placements to the students of NIPER-Ahmedabad as well as students from other campuses who participated in the event.

Publications

2017

1. Gorain B, Tekade M, Kesharwani P, Iyer AK, Kalia K, Tekade RK. The use of nanoscaffolds and dendrimers in tissue engineering. Drug Discovery Today, 22, 652-664. DOI:10.1016/ j.drudis.2016.12.007(2017) [Impact Factor: 5.7].
2. Wickens JM, Alsaab HO, Kesharwani P, Bhise K, Amin MCIM, Tekade RK, Gupta U, Iyer AK. Recent advances in hyaluronic acid-decorated nanocarriers for targeted cancer therapy. Drug Discov Today. 2017 22 (4) 665-680 Doi: 10.1016/j.drudis.2016.12.009 [Impact Factor- 5.96].
3. Tambe V, Thakkar S, Raval N, Sharma D, Kalia K, Tekade RK. Surface Engineered Dendrimers in Sirna Delivery and Gene Silencing. Current pharmaceutical design, 23.DOI: 10.2174 /138161282366617031410461 9. (2017) [Impact Factor: 3.5]
4. Sharma D, Bhattacharya P, Kalia K, Tiwari V. Diabetic nephropathy: New insights into established therapeutic paradigms and novel molecular targets. Diabetes Research and Clinical Practice, 128, 91-108.DOI: http://dx.doi.org/10.1016/ j.diabres.2017.04.010.(2017) [Impact Factor: 3.045]
5. Vurugonda U, Rednam PJ, Sinha M. Development of biodegradable scaffold using polylactic acid and polycaprolactone for cardiovascular application. International journal of Polymeric Materials and Polymeric Biomaterials. DOI: 1080/00914037.2017.1297945. (2017) [Impact Factor: 1.67]
6. Shah V, Choudhary BK. Fabrication , Physicochemical Characterization and performance Evaluation of Biodegradable polymeric microneedle patch system for enhanced transcutaneous flux of high moleculer weight therapeutics. AAPS PharmSciTech. DOI: 10.1208/s12249-017-0774-5. (2017) [Impact Factor: 1.954]
7. Thakkar S, Shah V, Misra M, Kalia K. Nanocrystal Based Drug Delivery System: Conventional and Current Scenario. Recent Patents on Nanotechnology. DOI: 10.2174/1872210510666161014122439. (2017) [Impact Factor:0.5]
8. PardhiT, Vasu K. Identification of dual kinase inhibitors of CK2 and GSK3beta: combined qualitative and quantitative pharmacophore modelling approach. Journal of Biomolecular Structure and Dynamics, 1-18. DOI: http://dx.doi.org/10.1080/07391102.2016.1270856. (2017)[Impact Factor:0.67]
9. Jarial R, Shard A, Thakur S, Sakinah M, Zularisam AW, Rezania S, Kanwar SS, Singh L. Characterization of flavonoids from fern Cheilanthes tenuifolia and evaluation of antioxidant, antimicrobial and anticancer activities. Journal of King Saud University - Science. DOI: http://dx.doi.org/10.1016/j.jksus.2017.04.007. (2017) [Impact Factor: 1.85]
10. Shah B, Khunt D, Misra M. Role of butter oil in brain targeted delivery of Quetiapine fumarate microemulsion via intranasal route. Journal of Drug Delivery Science and Technology, 40, 11-20. DOI: 10.1016/j.ejps.2016.05.008. (2017) [Impact Factor: 0.53]
11. Zine R, Sinha M. Nanofibrous poly(3-hydroxybutyrate-co-3-hydroxyvalerate) /collagen/ Graphene oxide scaffolds for wound coverage. Materials Science & Engineering: C, 80, 129-134. DOI: https://doi.org/10.1016/j.msec.2017.05.138. (2017) [Impact Factor: 3.4]

12. Gupte T, Sinha M. Design and evaluation of artificial cornea with core-skirt design using polyhydroxyethyl methacrylate and graphite. International Ophthalmology. DOI:10.1007/s10792-017-0586-3. (2017) [Impact Factor: 0.99]

2016

13. Gorain B, Choudhury H, Tekade RK, Karan S, Jaisankar P, Pal TK. Comparative biodistribution and safety profiling of olmesartan medoxomil oil-in-water oral nanoemulsion. Regulatory Toxicology and Pharmacology, 82, 20-31. DOI: https://doi.org/10.1016/j.yrtph.2016.10.020. (2016) [Impact Factor: 2.4]

14. Choudhury H, Gorain B, Chatterjee B, Mandal UK, Sengupta P, Tekade RK. Pharmacokinetic and Pharmacodynamic Features of Nanoemulsion Following Oral, Intravenous, Topical and Nasal Route. Current Pharmaceutical Design. DOI: 10.2174/1381612822666161201143600. (2106) [Impact Factor: 3.5]

15. Ghanghoria R, Kesharwani P, Tekade RK, Jain NK. Targeting luteinizing hormone-releasing hormone: A potential therapeutics to treat gynecological and other cancers. Journal of Controlled Release: Official Journal of the Controlled Release Society. DOI: 10.1016/j.jconrel.2016.11.002. (2016) [Impact Factor: 7.5].

16. Dua K, Shukla SD, Tekade RK, Hansbro, PM. Whether a novel drug delivery system can overcome the problem of biofilms in respiratory diseases? Drug delivery and translational research, 7, 179-187.DOI: 10.1007/s13346-016-0349-0. (2016) [Impact Factor: 1.9]

17. Ghanghoria R, Tekade RK, Mishra AK, Chuttani K, Jain NK. Luteinizing hormone-releasing hormone peptide tethered nanoparticulate system for enhanced antitumoral efficacy of paclitaxel. Nanomedicine, 11, 797-816. DOI:10.2217/nnm.16.19. (2016) [Impact Factor: 4.9]

18. Soni N, Soni N, Pandey H, Maheshwari R, Kesharwani P, Tekade RK. Augmented delivery of gemcitabine in lung cancer cells exploring mannose anchored solid lipid nanoparticles. Journal of Colloid and Interface Science, 481, 107-116. DOI: https://doi.org/10.1016/j.jcis .2016.07. 020. (2016) [Impact Factor: 3.5].

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20. Kesharwani P, Jain A, Jain A, Jain AK, Garg NK, Tekade RK, Thakur RRS, Iyer AK. Cationic bovine serum albumin (CBA) conjugated poly lactic-co-glycolic acid (PLGA) nanoparticles for extended delivery of methotrexate into brain tumors. RSC Adv., 2016,6, 89040-89050. DOI: 10.1039/C6RA17290C. [Impact Factor- 3.289].

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22. Jarial R, Thakur S, Sakinah M, Zularisam AW, Sharad A, Kanwar SS, Singh L.Potent anticancer, antioxidant and antibacterial activities of isolated flavonoids from Asplenium nidus. Journal of King Saud University - Science. DOI: doi.org/10.1016/j.jksus.2016.11.006. (2016) [Impact Factor: 1.85]

23. Patel MS, Shah HS, ShrivastavaN. c-Myc Dependent Cell Competition in Human Cancer Cells. Journal of Cellular Biochemistry, 118, 1782-1791.DOI: 10.1002/jcb.25846. (2016) [Impact Factor:3.446]

24. Shah H, Patel M, Shrivastava N. Gene expression study of phase I and II metabolizing enzymes in RPTEC/TERT1 cell line: application in in vitro nephrotoxicity prediction. Xenobiotica: 1-7.DOI: 10.1080/00498254.2016.1236299. (2016) [impact Factor: 2.199]

25. Shah B, Khunt D, Misra M, Padh H. Non-invasive intranasal delivery of quetiapine fumarate loaded microemulsion for brain targeting: Formulation, physicochemical and pharmacokinetic consideration. European Journal of Pharmaceutical Sciences, 91,196-207. DOI: 10.1016/j.ejps.2016.05.008. (2016) [Impact Factor: 3.773]

26. Shah B, Khunt K, Misra M, Padh H. Application of Box-Behnken design for optimization and development of quetiapine fumarate loaded chitosan nanoparticles for brain delivery via intranasal route. International Journal of Biological Macromolecules, 89, 206-218. DOI: 10.1016/j.ijbiomac.2016.04.076. (2016) [Impact Factor: 3.096]

27. Shah B, Khunt D, Bhatt H, Misra M, Padh H. Intranasal delivery of venlafaxine loaded nanostructured lipid carrier: Risk assessment and QbD based optimization. Journal of Drug Delivery Science and Technology,33,37-50. DOI: http://dx.doi.org/10.1016 /j.jddst. 2016.03. 008. (2016) [Impact Factor: 0.62]

28. Thakkar S, Shah V, Misra M, Kalia K. Nanocrystal Based Drug Delivery System: Conventional And Current Scenario. Recent Patents on Nanotechnology, 10. DOI: 10.2174/ 1872210510666161014122439. (2016) [Impact Factor: 0.5]

29. Agrawal V, Sinha M. A review on carrier systems for bone morphogenetic protein-2. Journal of Biomedical Material Research-B, 105, 904-925. DOI: 10.1002/jbm.b.33599. (2016) [Impact Factor: 2.8]

Patents

1. Govinda Kapusetti, Jaicy Jacob, Kiran Kalia. Cartilage Regeneration Using Piezoelectric Based Scaffold. Indian Patent File No. 201621008797.

2. Neelam Chauhan, Shaishavi Jansari, Kiran Kalia. Minicircle DNA vector for inducing pluripotency in nucleated blood cells and other cell types and its re-differentiation for use in regenerative medicine. Indian Patent File No. 201621031592.

3. Vinod Jairaj, Satyendra Kumar, Kiran Kalia. Process of isolation and purification of Swertiamarin from *Enicostemme littorale*. Indian Patent File No. 201621008411.

Poster Presentations

1. Deepaneeta Sarmah, Dileep Yavagal, Kiran Kalia and Pallab Bhattacharya. Intra-arterial Mesenchymal Stem Cell Treatment Reduces Ischemic Brain Injury in Rats. IBRO/APRC Associate School 2017, Shillong, June, 2017.

2. Valencia Fernandes, Pallab Bhatacharya, Kiran Kalia, Vinod Tiwari. Using silibinin against neuro inflammatory signalling cascade involved in the pathophysiology of neuropathic pain. IBRO/APRC Associate School 2017, Shillong, June, 2017.

3. Kuhu Sharma, Dilip Sharma, Pallab Bhatacharya, Kiran Kalia, Vinod Tiwari. Ameliorative effects of marine natural drug in neuropathic pain models. IBRO/APRC Associate School 2017, Shillong, June, 2017.

4. Shivangi Patel, Dilip Sharma, Pallab Bhattacharya, Kiran Kalia, Vinod Tiwari. Neuroprotective potential of pentacyclic triterpenoids in schizophrenia. IBRO/APRC Associate School 2017, Shillong, June, 2017.

5. Akash Deep Rawat, Pallab Bhatacharya, Kiran Kalia, Vinod Tiwari. Neuroprotective effect of pentacyclic triterpenoid molecule on cognitive dysfunction. IBRO/APRC Associate School 2017, Shillong, June, 2017.

6. Namdev More, Jaicy Jacob, Peeush Gandulya, Govinda Kapusetti. Electrospining piezoelectric scaffold for rapid regeneration of cartilage The 14th two day National Conference And Technology Exhibition on "Indian Medical Devices & Plastics Disposables/ Implants Industry, Ahmedabad, March, 2017.

7. Ganesh Ranshinge, Samarat Majumdhar, Govinda Kapusetti. Targeted hyperthermia by gadolinium nanoparticle for cancer therapy. The 14th two day National Conference And Technology Exhibition on "Indian Medical Devices & Plastics Disposables/ Implants Industry, Ahmedabad, March, 2017.

8. Chintan Chaudhary, Gopal Agarwal, Akshay Srivastava. Biofunctional aligned collagen Type-I matrix for intervertebral disc repair. The 14th two day National Conference and Technology Exhibition on Indian Medical Devices & Plastics Disposables/ Implants Industry, Ahmedabad, March, 2017.

9. Gopal Agarwal, Chintan Chaudhary, Akshay Srivastava. Supermacroporous affinity cryogel device for generic biomacromolecule and cell separation. The 14th two day National Conference and Technology Exhibition on "Indian Medical Devices & Plastics Disposables/ Implants Industry, Ahmedabad, March, 2017.

10. Rakoti Koteswara Rao, Mukty Sinha. Electrochemical Biosensor for Cholesterol and Hydrogen Peroxide Determination. The 14th two day National Conference and Technology Exhibition on "Indian Medical Devices & Plastics Disposables/ Implants Industry, Ahmedabad, March, 2017.

11. Meenasree Bukka, Mukty Sinha. Functionalization of polymers for improving bioadhesion. The 14th two day National Conference and Technology Exhibition on "Indian Medical Devices & Plastics Disposables/ Implants Industry, Ahmedabad, March, 2017.

12. Mishika Jaiswal, Mukty Sinha. In-situ hydrogel of amine functionalized natural polymer for the treatment of Rheumatoid arthritis. The 14th two day National Conference And Technology Exhibition on "Indian Medical Devices & Plastics Disposables/ Implants Industry, Ahmedabad, March, 2017.

13. Amol Deshmukh, Govinda Kapusetti. Layered Double Hydroxide nanoparticle mediated magnetic hyperthermia and photodynamic therapy for cancer treatment.The 14th two day National Conference And Technology Exhibition on "Indian Medical Devices & Plastics Disposables/ Implants Industry, Ahmedabad, March, 2017.

14. Mounika Choppadandi, Govinda Kapusetti. Acrylic based vertebral bone cement etoxification by radicle scavenging. The 14th two day National Conference And Technology Exhibition on "Indian Medical Devices & Plastics Disposables/ Implants Industry, Ahmedabad, March, 2017.

15. Jaydeep Chauhan, Bhagyashree Kamble. In silico modeling studies of the phytoconstituents of Aegle marmelos extract. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

16. Komal Pandey, Jaydeep Chauhan, Bhagyashree Kamble.In silico screening of Basella saponins against various targets of diabetes. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

17. RajkumarPatle, Sagarkumar Patel, Amit Shard. Rational design, synthesis and computational validation of boronic acid derivatives in thwarting progression of cancer. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

18. Anuradha, Sagarkumar Patel, Amit Shard. Extended bioisosterism led synthesis of thiazole based derivativesto target Bcl-2 protein in cancer. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

19. Deepaneeta Sarmah, Pallavi Rane, Shashikala Bhute, Tikendra Kumar, Vinod Tiwari, Kiran Kalia, Pallab Bhattacharya. Use of Mesenchymal Stem Cells (MSCs) in preclinical settings for ischemic stroke therapy: A Meta-analysis. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

20. Pallavi Rane, Deepaneeta Sarmah, Shashikala Bhute,Tikendra Sonwan, Vinod Tiwari, Kiran Kalia, Pallab Bhattacharya. Preclinical assessment of polyphenols in the treatment of Parkinson's disease: A Meta-analysis.The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

21. Shashikala Bhute, Rinkle Tanna, Deepaneeta Sarmah, Pallavi Rane, Tikendra Kumar, Vinod Tiwari, Kiran Kalia, Amit Shard, Pallab Bhattacharya. An in silicostudy to evaluate the role of small heterocyclic moiety in the improvement of cognitive function. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

22. Tikendra Kumar, Shashikala Bhute, Pallavi Rane, Deepaneeta Sarmah, Vinod Tiwari, Kiran Kalia, Pallab Bhattacharya. Neuroprotective effects of alkaloids in preclinical model of stroke: A meta-analysis. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

23. Krushali Powale, Akshay Srivastav, Neelam Chauhan. To decipher the serological immune profiles in dengue infection: An effort towards dengue vaccine candidate. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

24. Supriya Gupta, Manasi Dhandhukiya, Maitray Raval, Pranav Joshi, Neelam Chauahan. Production of islet-like insulin producing cell clusters in-vitro from mesenchymal stem cells. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

25. Varsha Wagh, Akil Mansuri, Heena Jariyal, Neelam Chauhan. Stem cell derived retinal pigment epithelium cells: A new era for disease modelling and developing therapy of ocular degenerative diseases. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

26. Pranav Joshi, Supriya Gupta, Shaishavi Jansari, Neelam Chauhan. In-vitro differentiation in to insulin producing cells: regenerative medicine for diabetes. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

27. Harshit Jadav, Anita Mahapatra, Neelam Chauhan. Synthesis and glucose uptake activation of 3-amino acid analogues of 1,4-naphthoquinone. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

28. Dilip Sharma, Rashmi Chaudhary, Mukul Jain, Vinod Tiwari, Kiran Kalia. GLP-1 analogue (ZYD1) and estrogen in combination therapy to treat diabetic nephropathy. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

29. Valencia Fernandes, Dilip Sharma, Kuhu Sharma, Akash deep Rawat, Shivangi Patel, Pallab Bhattacharya, Kiran Kalia, Vinod Tiwari. Amelioration of Neuropathic Pain using Milk Thistle Seed Extracts. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

30. Kuhu Sharma, Dilip Sharma, Valencia fernandes, Akash Deep Rawat, Shivangi Patel, Pallab Bhattacharya, Kiran Kalia, Vinod Tiwari. Role of NMDA receptors in chronic constriction injury model of neuropathic pain: An updated meta-analysis. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

31. Shivangi Patel, Dilip Sharma, Akash Deep Rawat, Kuhu Sharma, Valencia Fernandes, Pallab Bhattacharya, Kiran Kalia, Vinod Tiwari. Neuroprotective potential of pentacyclic triterpenoids in animal model of schizophrenia. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

32. Akash Deep Rawat, Dilip Sharma, Valencia Fernandes, Kuhu Sharma, Shivangi Patel, Pallab Bhattacharya, Kiran Kalia, Vinod Tiwari. Efficacy of pentacyclic triterpenoid in animal model of cognitive dysfunctionThe Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

33. Bukka Meenasree, Mukty Sinha. Development of Copolymer to Improve Bioadhesion on Soft Tissue. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

34. Mishika Jaiswal, Mukty Sinha. In-situ hydrogel of amine functionalised chitosan for the treatment of Rheumatoid arthritis. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

35. Rakoti Koteshwar Rao, Mukty Sinha. Development of Cholesterol and Hydrogen Peroxide Electrochemical Biosensor. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

36. Bhavik Kansara, Neelam Chauhan, Anita Mahapatra. Synthesis and Evaluation of Naphthoquinone Analogues as Antimycobacterial and Efflux Pump Inhibitors. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

37. Bharat Chaudhary, Bhavik Kansara, Anita Mahapatra. Generation of Common Pharmacophore Hypothesis (CPH) for Protein Tyrosine Phosphatase 1B (PTP1B) Inhibitors using PHASE. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

38. Harshit Jadav, Neelam Chauhan, Anita Mahapatra. Synthesis and glucose uptake activation of 3 amino acid analogous of 1, 4 Naphthoquinone. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

39. Sai Prasad Nunewar, Bharat Chaudhary, Bhavik Kansara, Anita Mahapatra. Pharmacophore Mapping for Sodium-dependent glucose co-transporter 2 (SGLT2) Inhibitors using PHASE. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

40. Chaitrali Shevkar, Dattateya Gore, Bhavik Kansara, Anita Mahapatra. Multitargeted molecular docking studies of plant based natural products on apoptosis and cell cycle pathway for anticancer activity. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

41. Shushant Patole, Bharat Chaudhary, Bhavik Kansara, Anita Mahapatra. Molecular Docking Studies of Naphthoquinone Analogues as Novel Topoisomerase II Inhibitors for Potential Anticancer Agents. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

42. Amol Deshmukh, Govinda Kapusetti. MRI contrasting layered double hydroxide nanoparticle for magnetic hyperthermia and photodynamic therapy as cancer theranostic. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

43. Namdev More, Jaicy Jacob, Govinda Kapusetti. Smart Piezoelectric Nanofibrous Scaffold for Cartilage Regeneration. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

44. Ganesh Ranshinge, Samarat Majumdhar, Govinda Kapusetti. Drug Loaded Gadolinium Magnetic Nanoparticles for Hypothermia and Targeted Chemotherapy. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

45. Bhagavathi Siva Balan, Viral Shah. Formulation and evaluation of polymeric microneedle arrays for transdermal delivery of therapeutic proteins. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

46. Deepak Kumar Pradhan, Rakesh Tekade. Tumor microenvironment on a chip: A newer smart approach mimicking cancer environment. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

47. Kunal Rao, Manju Misra. Intranasal delivery of P- glycoprotein substrate using bovine lipid as Permeation Enhancer. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

48. Lida P Lalu, Manju Misra. Use of Differential Scanning Calorimetry in predicting interaction in a four drug antiretroviral drug combination for paediatric application. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

49. Neelima Anup, Manju Misra. Poster presentation on Comparative Evaluation of Top-Down, Bottom-up and Combination Approaches on the Preparation of Olanzapine Nanosuspensionsion. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

50. Nidhi Raval, Rakesh Tekade. Chitosan layered vesicular formulation for topical delivery in the eye. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

51. Pratiksha Kochar, Viral Shah. Design, Development and Optimization of Novel Trilayered Tablet Formulation for Controlled Delivery of Metoprolol Succinate. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

52. Shreya Thakkar, Manju Misra. Formulation and evaluation of polymeric microneedle arrays for transdermal delivery of therapeutic proteins. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

53. Suchandra Bagchi, Manju Misra. Differential scanning calorimeter: A new tool in assessment of mixing uniformity in pharmaceutical powder blend. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

54. Vimalkumar J Muniswamy, Rakesh Tekade. Hydrogel: A miraculous gel for brain regeneration. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

55. Vishakha Tambe, Rakesh Tekade. Retinal Implants Technology: Way to fight blindness. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

56. Dignesh Khunt, Manju Misra. Exploring the Potential of Bovine oil Enriched Microemulsion of Fluvoxamine Maleate for Brain Targeting via Intranasal Route. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

57. Chetan Patel, Viral Shah. Formulation and evaluation of SLN of ritonavir for lymphatic targeting. The Ramanbhai Foundation 8th International Symposium on Current Trends in Healthcare, Ahmedabad, February, 2017.

58. Manish Sharma, Rajeshwari Rathod. Comparative bioanalytical extraction method development and validation for simultaneous determination of acefyline, amoxicillin and levocetrizine in plasma by RP-HPLC. API India, Ahmedabad, February, 2017.

59. Harshita Gupta, Bhagyashree Kamble. In silico modelling studies of the phytoconstituents of Costus igneus. Drug Discovery from Natural Products and Traditional Medicine, NIPER-Mohali, November 2016.

60. Akil Mansuri, Heena Jariyal, Neelam Chauhan. Stem cells: A new paradigm for disease modelling and therapy development for ocular degenerative diseases. XL All India Cell Biology Conference & International Symposium on Functional Genomics and Epigenomics, Gwalior, November, 2016.

Oral Presentations

1. Rakesh Tekade. Pharma Industry - Growth and Prospects. A one-day seminar on “Implementation of Drug price control orders (DPCO) 2013 and its impact on accessibility, availability, and affordability of medicines for all, NIPER-Ahmedabad, December 2016.

2. Amit Shard. Extended (bio)-isosterism as an excellent tool for fragment based drug discovery against Alzheimer’s disease. National Conference themeon "Chemistry of Light and Medicine, IIT-Gandhinagar, December 2016.

Invited Talks

1. Dr. Pallab Bhattacharya Department of Pharmacology and Toxicology delivered talk on Stem cell therapy in animal model of Ischemic stroke: A move from bench to bedside at APJ Abdul Kalam Invited Talk at Indian Academy of Biomedical Science Conference,2017

2. Dr. Pallab Bhattacharya Department of Pharmacology and Toxicology delivered talk on Stem cell therapy in animal model of Ischemic stroke: A move from bench to bedside IBRO Faculty at International Brain Research Organization -APRC Associate School of Computational approaches in Neuroprotection and Neurorehabilitation at North-Eastern Hill University, Shillong, 2017

3. Dr. Manju Misra Department of Pharmaceutics delivered talk on Recent Advancesin Respiratory drug formulation at Generic Respiratory Drug Development Symposium,Mumbai, 2017

4. Dr. Pallab Bhattacharya, Department of Pharmacology and Toxicology delivered talk on Intra-arterial stem cell therapy to aid ischemic stroke recovery: Implications of brain derived growth factor (BDNF) signalling at Indian Academy of Neuroscience Meeting at National Brain Research Centre, Manesar, 2016

5. Dr. Mukty Sinha Department of Medical Devices Delivered a talk on Coating techniques for cardiac stents: new design approach at National Conference on Advances in Biomedical Science and Engineering, Calicut, 2016.

6. Dr. Viral Shah Department of Pharmaceutics delivered a talk on Novel transdermal strategies used for delivery of therapeutic biologicsat Pioneer Pharmacy College, Baroda, 2016.

Honours and Awards

- Kuhu Sharma was awarded the 1st prize in Mock interview competition at ENIGMA-2017 (Redefining Excellence), NIRMA University, Ahmedabad, February 2017.
- Shivangi Patel was awarded the 2ndprize in an Oral presentation at ENIGMA-2017 (Redefining Excellence), NIRMA University,Ahmedabad, February 2017.
- Vedika Bhatt and Aishwarya Dasarewere jointly awarded First Prize in Quiz competition at a State Level Biosciences fest, St. Xavier's College, Ahmedabad in February 2017.
- Vedika Bhatt and Aishwarya Dasarewere awarded Third Prize in National Level Quiz competition at Nirma Quest, NIRMA University, Ahmedabad in February 2017.
- Tejaswini Jadhav and Shivangi Patel were awarded 1st Runner upthe prize at Recent Trends in Nutraceuticals, Enigma 2017, NIRMA University, Ahmedabad, February 2017.
- Valencia Fernandes was awarded International Brain Research Organization (IBRO) Travel Award to attend and present poster at IBRO-APRC Associate School of Computational approaches in Neuroprotection and Neurorehabilitation, North-Eastern Hill University, Shillong, June 2017.
- Shubhangi Mahajan and Shital Shinde were awarded 2nd Prize in PowerPoint Presentation competition, Enigma 2017, NIRMA University, Ahmedabad, February 2017.

- Kuhu Sharma was awarded International Brain Research Organization (IBRO) Travel Award to attend and present poster at IBRO-APRC Associate School of Computational approaches in Neuroprotection and Neurorehabilitation, North-Eastern Hill University, Shillong, June 2017.
- Shivangi Patel was awarded International Brain Research Organization (IBRO) Travel Award to attend and present poster at IBRO-APRC Associate School of Computational approaches in Neuroprotection and Neurorehabilitation, North-Eastern Hill University, Shillong, June 2017.

- Akash Deep Rawat was awarded International Brain Research Organization (IBRO) Travel Award to attend and present a poster at IBRO-APRC Associate School of Computational approaches in Neuroprotection and Neurorehabilitation, North-Eastern Hill University, Shillong, June 2017.
- Namdev More and Mounika Choppadandi were awarded first and second runner up, Best Poster Award at 14th National Conference and Technology Exhibition on Indian Medical Devices & Plastics Disposables / Implants Industry IMDI, Ahmedabad, February 2017.

Research Projects

Project Title	Amount	Duration	Principal Investigator	Funding Body
Bioprospecting endolichenicfungi from Mangroves in Negombo lagoon in Sri Lanka and Gulf of Khambat, Gulf of Kutch from Gujarat India; An untapped treasure trove for discovery of special structures and bioactive compounds (Grant No: DST/INT/SL/P-22/2016)	47 lakhs	2017-2020	**Dr. Bhagyashree Kamble** **Prof. Kiran Kalia** **Sri Lankan Partner: Prof. Priyali Pranagama University of Kelniya, Sri Lanka**	DST, Indo Sri Lanka Joint Research Program
Mitochondrial protection in ischemic stroke by using microRNA mediated engineered stem cells (Grant No: 27319924)	10000 USD	2016-2017	**Dr. Pallab Bhattacharya**	ISN,USA
Bio-engineered three-dimensional stem cell niche for intervertebral Disc repair and regeneration (Grant No: ECR/2016/002038)	38.13 lakhs	2017-2020	**Dr. Akshay Srivastava**	DST, SERB
Aptamer targeted dendronized polymeric nanoparticles to deliver Anti-miRNA for treatment of Triple Negative Breast Cancer (Grant No: ECR/2016/001964)	49 lakhs	2017-2020	**Dr. Rakesh Tekade**	DST, SERB
Triple punch approach for triple negative breast cancer by delivering siRNA and doxorubicin using graphene oxide wrapped polymeric nanoparticles (Grant No: PDF/2016/003329)	25 lakhs	2017-2019	**Dr. Rakesh Tekade**	DST, SERB

Regulatory non-coding RNA mediated mesenchymal stem cell engineering: Safety and efficacy study in rodent model of ischemic stroke (Grant No: SB/YS/LS-196/2014)	29.30 lakhs	2016-2019	**Dr. Pallab Bhattacharya**	DST, SERB
Dissecting Brain Reward Circuitry & CNS Comorbidities in Chronic Neuropathic Pain (Grant No: ECR/2016/001846)	49.9 lakhs	2017-2020	**Dr. Vinod Tiwari**	DST, SERB
In-situ gelling mucoadhesive system for brain delivery of p-Glycoprotein (P-gp) substrates via nasal route: Effect of a novel lipidic agent on drug release and P-gp inhibition (Grant No: IFA-11/LSBM-13)	35 lakhs	2012-2017	**Dr. Manju Misra**	DST, INSPIRE
Design and Construction of Fluorine Containing Scaffolds via C-H Bond Activation (Grant No: DST/INSPIRE/04/2016/000414)	35 lakhs	2017-2021	**Dr. Satyasheel Sharma**	DST, INSPIRE

International Collaborations

NIPER-Ahmedabad is pleased to announce its initiative to establish an **International Research Collaboration** with faculties fromHarvard Medical School, Boston, USA,Johns Hopkins University School of Medicine, Baltimore, MD, USA,Massachusetts Institute of Technology, USA; University of Washington, Seattle, USA; University of Newcastle, School of Biomedical Sciences and Pharmacy, Australia; University of Mississippi School of Pharmacy, USA; Wayne State University Use-inspired Biomaterials & Integrated Nano Delivery Systems Laboratory, USA; and National University of Ireland, Galway, Ireland.Under this initiative research faculties fromthese foreign Universities/Institutes have agreed to establish future research collaborations and academic partnership with the faculty members fromNIPER-Ahmedabad.

Dr. Pallab Bhattacharya, Assistant Professor, Department of Pharmacology and Toxicology has research collaboration with following faculties from Harvard Medical School, Boston, USA and Massachusetts Institute of Technology, USA

Faculty from Harvard Medical School, Boston, USA	Photograph	Area of Research
Prof. Larry Benowitz F.M. Kirby Neurobiology Center, Boston Children's Hospital, Harvard Medical School, Boston, USA		Stroke Biology
Prof. Nutan Sharma Director, Department of Neurology, Massachusetts General Hospital, Harvard Medical School,Boston, USA		Neuroscience Research
Dr. Khalid Shah Director, Center for Stem Cell Therapeutics and Imaging, Department of Radiology and Neurology, Massachusetts General Hospital, Harvard Medical School, Boston, USA		Stem Cell Biology / Neuroscience Research

Dr. Ali Sultan Chief, Division of Vascular and Endovascular Neurosurgery, Department of Neurosurgery, Brigham and Women's Hospital, Harvard Medical School, Boston, USA		Stroke Biology
Dr. Nirav J. Patel Cerebrovascular and Endovascular Neurosurgery, Brigham and Women's Hospital, Harvard Medical School, Boston, USA		Stroke Biology

Faculty from Massachusetts Institute of Technology, USA	Photograph	Area of Research
Prof. Emilio Bizzi McGovern Institute for Brain Research, Massachusetts Institute of Technology, USA		Stroke Biology

Dr. Vinod Tiwari, Assistant Professor, Department of Pharmacology and Toxicology has research collaboration with following faculties from Harvard Medical School, Boston, USA and Johns Hopkins University School of Medicine, Baltimore, MD, USA

Faculty from Harvard Medical School, Boston, USA	Photograph	Area of Research
Prof. Qiufu Ma Dana-Farber Cancer Institute, Harvard Medical School, Boston, USA		Cellular and Molecular Mechanisms of chronic pain

Faculty from Johns Hopkins University School of Medicine, Baltimore, USA	Photograph	Area of Research
Prof. Srinivasa N. Raja Division of Pain Medicine, The Johns Hopkins University School of Medicine, Baltimore, MD, USA		Neuropathic Pain & Opioid

Prof. Xinzhong Dong Department of Neuroscience, The Johns Hopkins University School of Medicine, Baltimore, MD, USA		Pain & Neuroscience Research
Dr. Yun Guan Associate Professor, The Johns Hopkins University School of Medicine, Baltimore, MD, USA		Cellular & Molecular Mechanisms of Neuropathic Pain

Faculty from NIPER-A collaborated with University of Washington, Seattle, USA	Photograph	Area of Research
Dr. Bhagawat Prasad Assistant Professor, Department of Pharmaceutics, Pharmaceutics Faculty, School of Pharmacy, University of Washington, Seattle		Advance analytical techniques

Dr. Rakesh K. Tekade, Assistant Professor, Department of Pharmaceuticshas established a research collaboration with the following faculty members from the University of Newcastle, School of Biomedical Sciences and Pharmacy, Australia; the University of Mississippi School of Pharmacy, USA; and the Wayne State University Use-inspired Biomaterials & Integrated Nano Delivery Systems Laboratory, USA.

Faculty from NIPER-A collaborated withUniversity of Newcastle, School of Biomedical Sciences and Pharmacy, Australia	Photograph	Area of Research
Prof. Philp M. Hansbro, Professor, NHMRC Fellow and Brawn Fellow School of Biomedical Sciences and Pharmacy (Immunology and Microbiology) Faculty of Health and Medicine The University of Newcastle, Callaghan, NSW 2308, Australia.		Immunology and Microbiology, bacterial and viral infections and obstructive airway diseases such as asthma

Faculty from NIPER-A collaborated with University of Mississippi School of Pharmacy, USA	Photograph	Area of Research
Prof. Mahavir B. Chougule, Associate Professor of Pharmaceutics, Research Associate Professor in the Research Institute of Pharmaceutical Sciences, Department of Pharmaceutics and Drug Delivery, School of Pharmacy, University of Mississippi, Mississippi, TCRC 204 A, MS, USA		Drug and Gene Co-delivery, Multifunctional Nanoparticle, Cancer Therapy, Inhalation delivery

Faculty from NIPER-A collaborated with Wayne State University Use-inspired Biomaterials & Integrated Nano Delivery Systems Laboratory, USA	Photograph	Area of Research
Prof. Arun K. Iyer, Director, Use-inspired Biomaterials & Integrated Nano Delivery Systems Laboratory Department of Pharmaceutical Sciences Wayne State University Office: 259 Mack Ave, Room 3601 U-BiND Systems Lab: Room 3330 Detroit, MI 48201 USA		Use-inspired Biomaterials, Polymeric Drug and Gene Delivery, Nanomedicine and Nanotechnology

Dr. Govinda Kapusetti, Assistant Professor, Department of Medical Devices, NIPER-A has research collaboration with the following faculty from Johns Hopkins University School of Medicine, Baltimore, MD, USA

Faculty from Johns Hopkins University School of Medicine, Baltimore, MD, USA	Photograph	Area of Research
Dr. Anirudha Singh Assistant Professor, Department of Urology, Brady Urological Institute, The Johns Hopkins University School of Medicine, Baltimore, MD, USA		Smart 3D scaffolds for articular cartilage regeneration

Dr. Akshay Srivastava, Assistant Professor, Department of Medical Devices has research collaboration with faculty from Centre for Research in Medical Device National University of Ireland, Galway

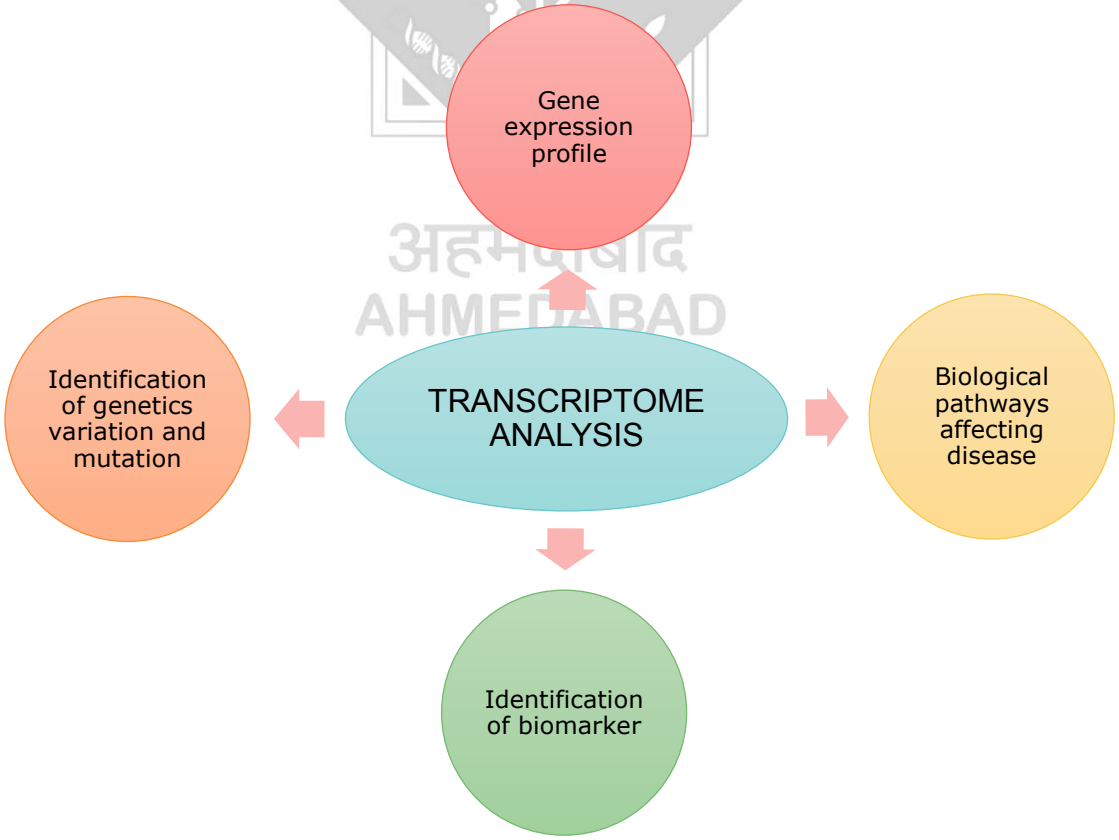
Faculty from NIPER-A collaborated with	Photograph	Area of Research
Dr. Abhay Pandit Director of a Science Foundation Ireland-funded Centre for Research in Medical Devices (CÚRAM) at the National University of Ireland, Galway.		Medical Devices

Departmental Research Activities

Biotechnology

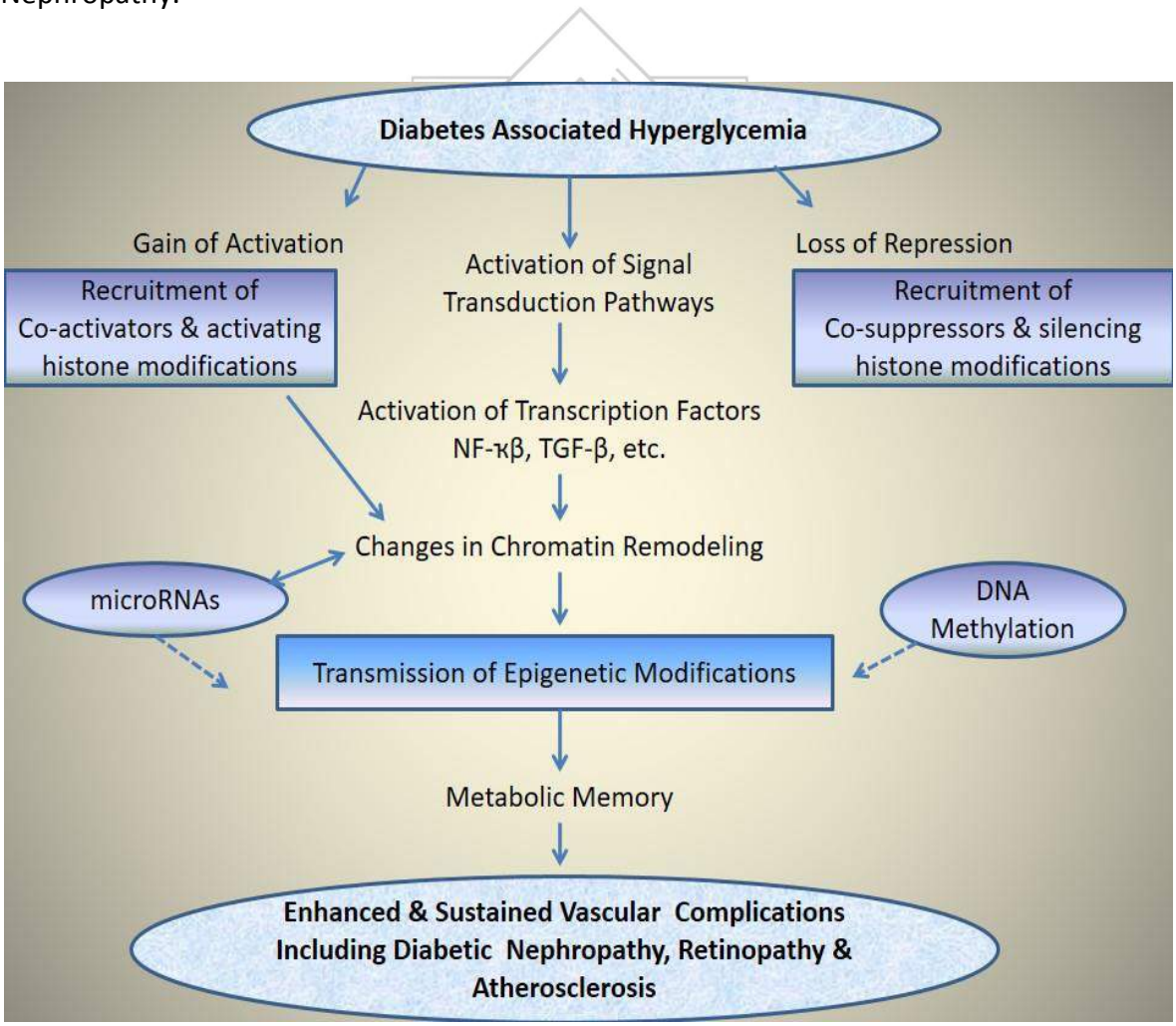
Genetic profile and biomarker identification of OSCC patients through transcriptome analysis

We are currently working in an extensive area of transcriptome analysis of tobacco-addicted patients of oral squamous cell carcinoma. This study is being carried out on tumour samples taken from Gujarat population. The idea or importance of this work seems to lie within the fact that Gujarat has been reported to be having the highest number of oral cancer reports, which is increasing year-by-year. Transcriptome analysis is an aspect which comprises of whole genomic data of the affected patients. This data is ultimately being useful to find out the Up regulated and down regulated genes and significant biomarkers in the samples and their respective validation under process. The results obtained can pave the way for identifying better targeting approaches and the idea of personalized medicine which is presently in the boom.



Epigenetic modulation in diabetic nephropathy through miRNA

We are currently working on emerging epigenetic mechanisms underlying Diabetic nephropathy, which involves micro vascular complications associated with both type 1 & type 2 Diabetes Mellitus It may be noted that Diabetes Mellitus is a leading cause of renal failure. Epigenetics plays a vital role in Diabetic Nephropathy comprises a study of heritable changes in gene expression without alterations in the underlying DNA sequences. Key epigenetic regulators are micro RNAs which are a family of small non-coding RNAs. In the case of Diabetes Mellitus, due to engagement of cytokines & growth factors with their receptors trigger signal transduction cascades, these affect epigenetic states such as DNA methylation & chromatin histone modification to augment the expression of pro-fibrotic & inflammatory genes which further leads to Diabetic Nephropathy. Hence, miRNAs could serve as the new therapeutic targets for Diabetic Nephropathy.



A non-viral approach to induced pluripotent stem cells

Induced pluripotent stem cells (iPSCs) are genetically modified by the integration of DNA-transcription factors into the adult cell genome. iPS cells are mainly generated by viral based delivery of transcription factors. We are trying to develop a non-viral vector based method for delivering the transcription factors required for reprogramming a cell from the differentiated state to the undifferentiated stem cell. These non-viral vectors are free of bacterial DNA and thus capable of high expression in mammalian cells. The goal for iPSC research will be to use the iPSC technology for therapy after their re-differentiation.

Targeting breast cancer stem cells using collateral lethality approach

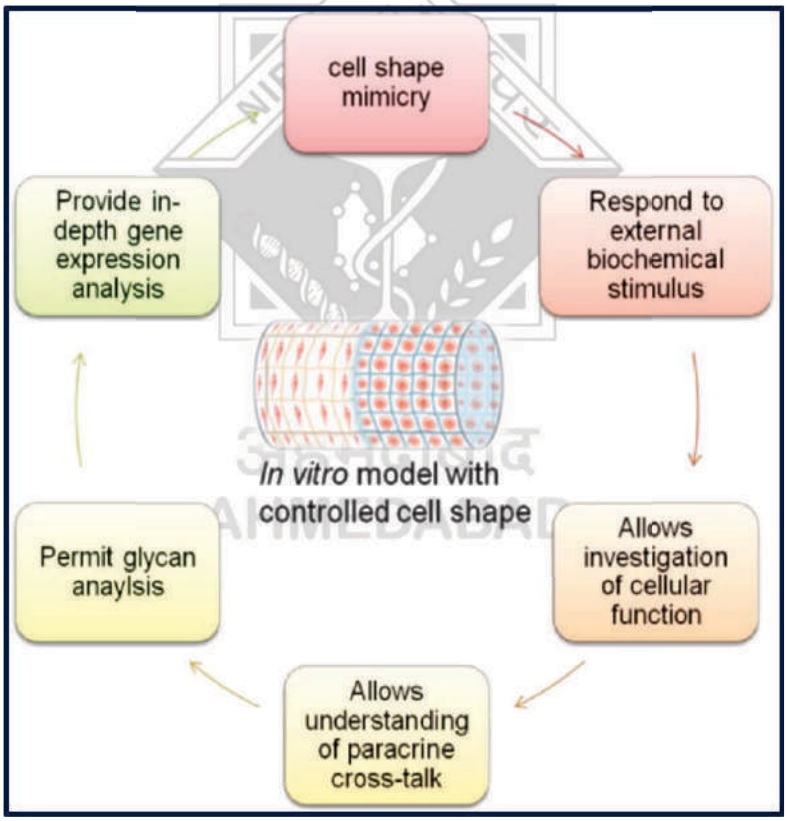
Collateral lethality, also known as synthetic lethality of housekeeping genes is a new trend for the discover cancer specific vulnerabilities caused by passenger deletions or deletions in non-tumor suppressor genes. It explains the concept that some of the genes are co-deleted with tumour suppressor genes which perform housekeeping functions and can be targeted. Sometimes passenger gene deletions render non-essential pathways to become essential. We are working on enzymes from these pathways, which may act as specific target to sensitize cancer cells and mediate cellular death.

Bioengineered three-dimensional stem cell niche for intervertebral disc repair and regeneration

Low back pain (LBP) is a common health problem that affects 60–80% of the population of developed countries at some stage in their lives. Degeneration of the intervertebral disc (IVD) is a major pathological process implicated in LBP, which is characterized by cellular apoptosis and senescence with reduced synthesis of extracellular matrix (ECM). A healthy disc is a cushion like material present between the two vertebras, function as essential shock absorbers, allows bending, flexion, and torsion of the spine. IVD is composed of central nucleus pulposus (NP) and peripheral concentric annulus fibrosus (AF) region. Recent advances in cellular and molecular biology have provided an exciting approach to regenerate IVD that focuses on the delivery of viable and therapeutically important cells to the degenerating disc. AF cell population has shown progenitor cell-like functions, which can differentiate in to osteogenic and adipogenic cell lineage. However, these stem cells reside in the highly specialized microenvironment in healthy IVD and tend to lose their phenotype in successive sub-culturing in vitro. The aligned collagen based biomaterial scaffold would mimic the IVD microenvironment by providing an artificial functional niche for maintaining progenitor cell function. Hence, my hypothesis is, a population of proliferative annulus fibrosis cells present in highly controlled IVD microenvironment, will help in regeneration of herniated AF region of IVD using functional biomaterial niche. This approach may also help in maintaining disc osmotic pressure and water retention.

Lab-on-a-chip: Bioengineered three-dimensional inflammatory disease model of degenerated tissues

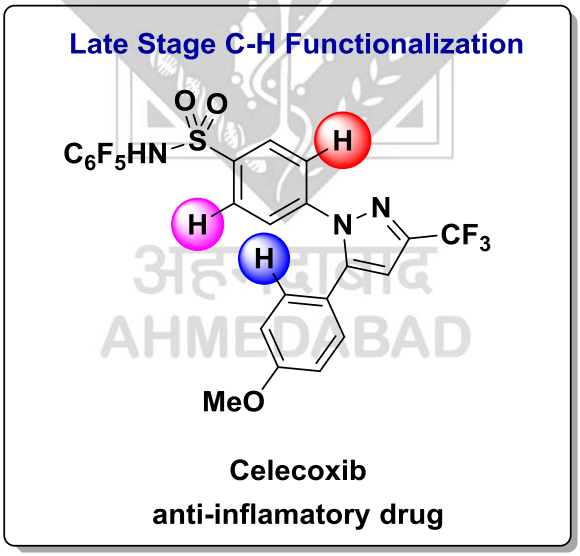
A biomaterial based in vitro three-dimensional hydrogel model will enable us to study inflammatory crosstalk in diseased conditions e.g. IVD degeneration, diabetes, cartilage, etc. The model will be based on controlling cell shape, mimicking extracellular matrix, encapsulating key inflammatory molecules and maintaining physical properties. The developed model (Srivastava et al., 2017, Biomaterials) will allow the study of paracrine crosstalk between cells and molecular changes at a genetic level under inflammatory condition. The model also enables the investigation of modulation in the glycans expression to understand the inflammatory microenvironment. We are further evaluating the impact of the mechanical stimulus on developed model to identify altered molecular pathways and cellular functions.



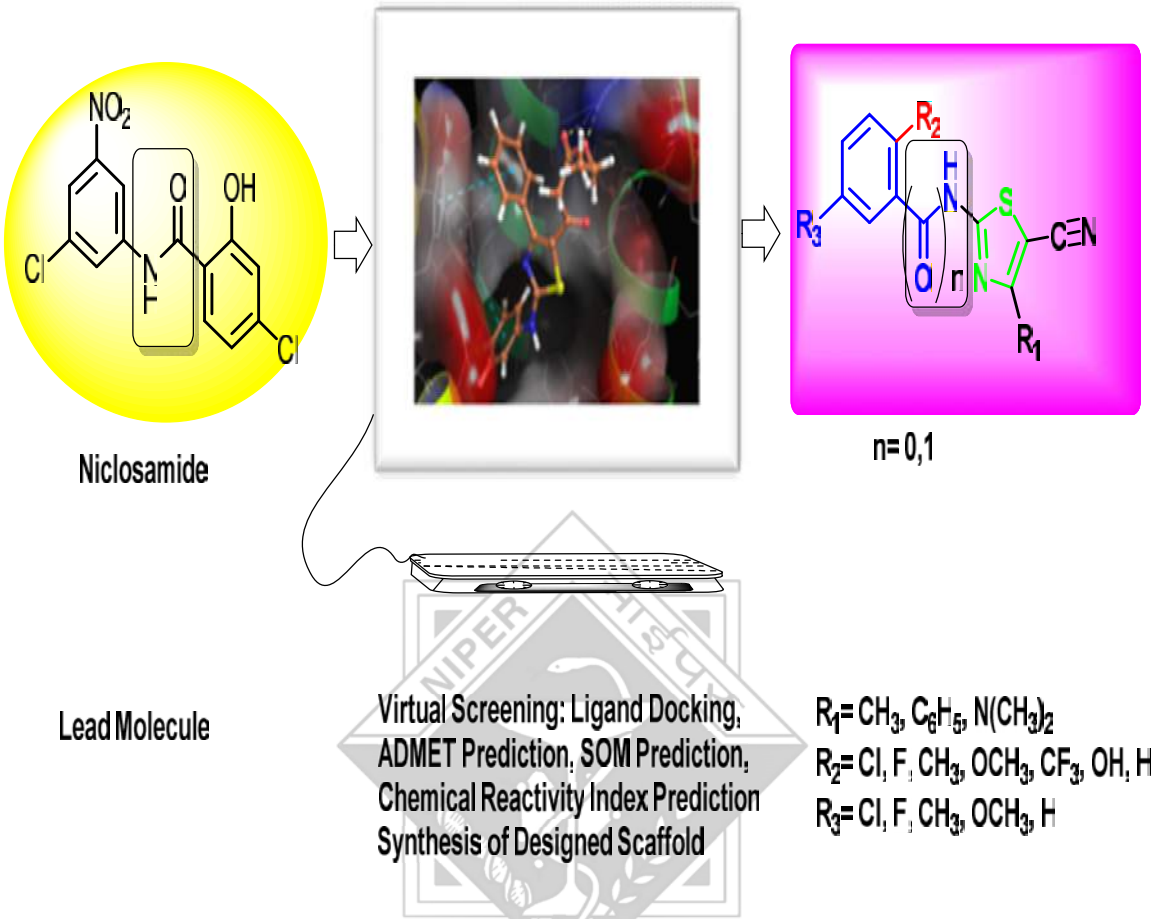
Medicinal Chemistry

Construction of pharmaceutically important molecules through C–H bond activation

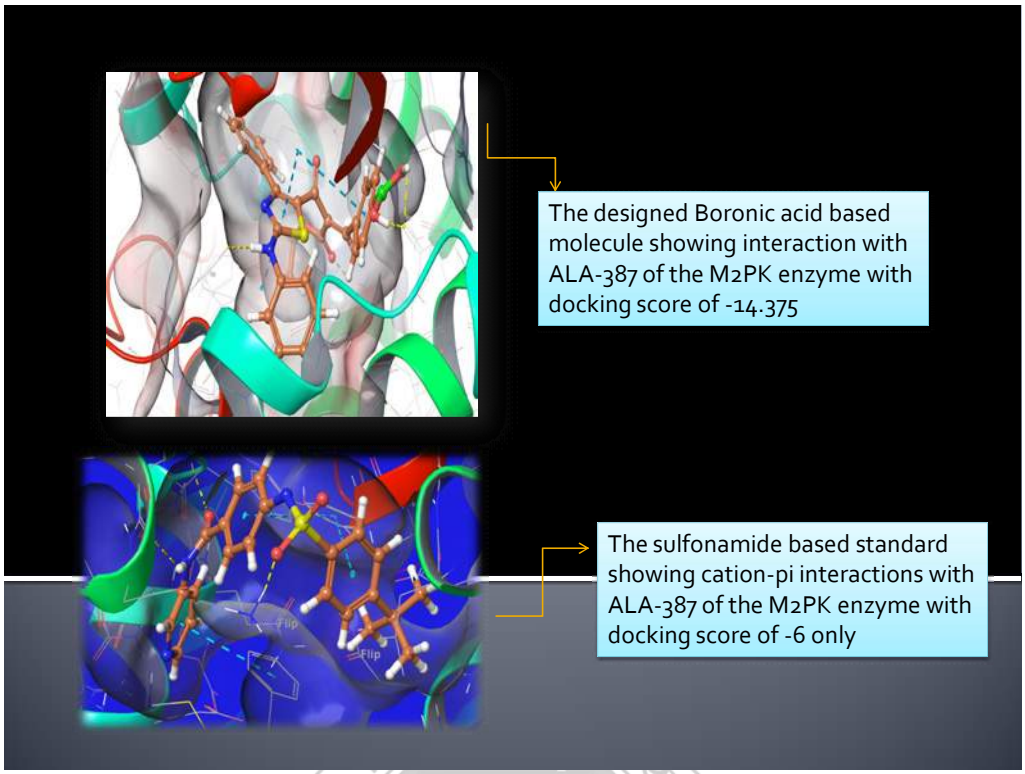
The direct transformation of C–H bonds provides shorter approach than classical organic synthesis, thus rendering straightforward and atom-economical synthetic routes. Even more appealing is that this new approach enables previously unachievable synthetic disconnections. The employment of C–H bond activation protocol in chemistry does not simply represent a gradual synthetic advance; it has implications beyond organic chemistry and through the compounds made using this methodology it reaches other fields of science such as materials science, biology, physics, and energy research. Owing to the existence of C–H bonds in all kinds of organic molecules, a specific C–H bond opens the door for the almost unlimited exploitation of this strategy for the late-stage modification of various complex molecules. This enables a rapid diversification of chemical entities into a panel of closely related analogues. Our research group focuses on the designing, synthesis and functionalization of novel heterocyclic scaffolds by using C-H activation strategy. Particularly, towards the synthesis of fluorinated compounds by employing C-H activation for the treatment of cancer and neuropathic pain.



Drug repurposing: Cancer is a multifactorial disease involving multiple pathways; simultaneously the anticancer drug discovery is also a multiyear process. In this scenario, repurposing of existing drugs is a very smart strategy to translate the drugs to market quickly. Here, we are modifying the Niclosamide, a well-known antihelminthic drug against anti-apoptoticbcl2 proteins. The strategy adopted is using isosteric and bioisosteric replicas with improved pharmacokinetic and pharmacodyanamic (PK/PD) profiles.



Reversible anticancer covalent inhibitors: Similarly, the boronic acid or boronates are having electrophillic nature by which it can coordinate with various cellular nucleophiles involved in cancer. We are also synthesizing boronic acid based molecules to target cancerous cells, and the strategy is providing promising preliminary results. The molecules are showing interactions with the electron rich sites of enzyme M2 pyruvate kinase (M2PK) which is regarded as sweet spot in glycolysis. Here a total of 22 derivatives were synthesized, purification was carried out using column chromatography, and characterization of these compounds was carried out using IR, MS, and NMR spectroscopy. Also, biologically evaluated for anti-cancer activity on various cell lines such as Colo-201, MCF-7, and Bcl-2-Jurkat some compounds are showing good inhibitory activity as compared with standard drug Doxorubicin. Four synthesized compounds showed activity on Colo-201, MCF-7 and Bcl-2-Jurkat cancer cell lines.



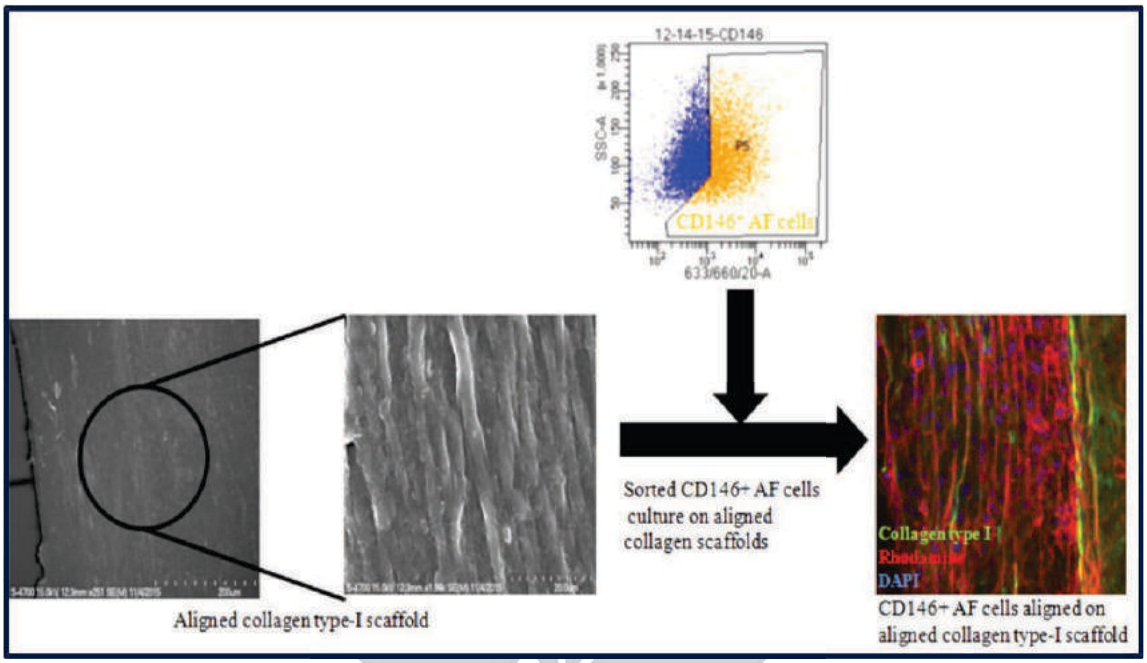
Alzheimers disease: In the case of neurodegenerative diseases, Alzheimer's disease involves multiple enzymes like GSK-3 Beta, Monoamine oxidase (MAO) and acetylcholinesterase (Ache). In the current scenario, it's strongly emphasized that one molecule which can target multiple enzymes will be more effective rather than a cocktail of drugs. Here we are designing multi-target directed ligand (MTDL) to nail down the disease from across the corners. The molecule has shown potent inhibitory activity against acetylcholinesterase enzyme and currently being investigated against other enzymes for similar effects.

Medical Devices

Biomaterial Platforms: Applications in developing medical devices and biotechnology products

New concepts in material fabrication methods have been utilized in developing advanced forms of hydrogel and particles for specific medical and biotechnological applications. The research work is focusing on designing new types of materials using physical concepts and chemical engineering tools. We develop materials as chromatography matrix for the separation of alarge particle such as mammalian cells, as a three-dimensional matrix for mammalian cell bioreactor and as particles in various forms for the delivery of biomolecules. The advanced forms of materials have been fabricated with enhanced biological properties for developing medical devices e.g. lab-on-a-chip, tissue repair patch and cell delivery vehicles. The appropriate type of biomaterial can be fabricated based on

thedesired application. We develop materials from natural (collagen, hyaluronic acid, alginate and other GAGs) and synthetic (poly (N-isopropyl acrylamide), poly(acrylamide), polycaprolactone, etc.) polymers.



Radical free, poly (methyl methacrylate) (PMMA) bone cement for joint arthroplasties

Poly (methyl methacrylate) (PMMA) polymer-based bone cement is the most commonly used bone cement because of its proven track record and efficacy. It is widely used for implant fixation and as space filler material in various orthopedics. The research is focused on treating the vertebral injuries such as vertebral compression fractures, vertebral hemangiomas, kyphosis, scoliosis, osteoporosis, and metastatic tumors by removing the residual monomer toxicity of polymethyl methacrylate bone cement. Appropriate natural antioxidants to scavenge the free radicals are identified by using, in silico studies at physiological conditions. Further, the optimized antioxidant will be evaluated by various assay methods. Physicochemical and mechanical characterization of bone cement with antioxidant will be examined for final applications. Moreover, the formulation can be useful for joint arthroplasty as well.

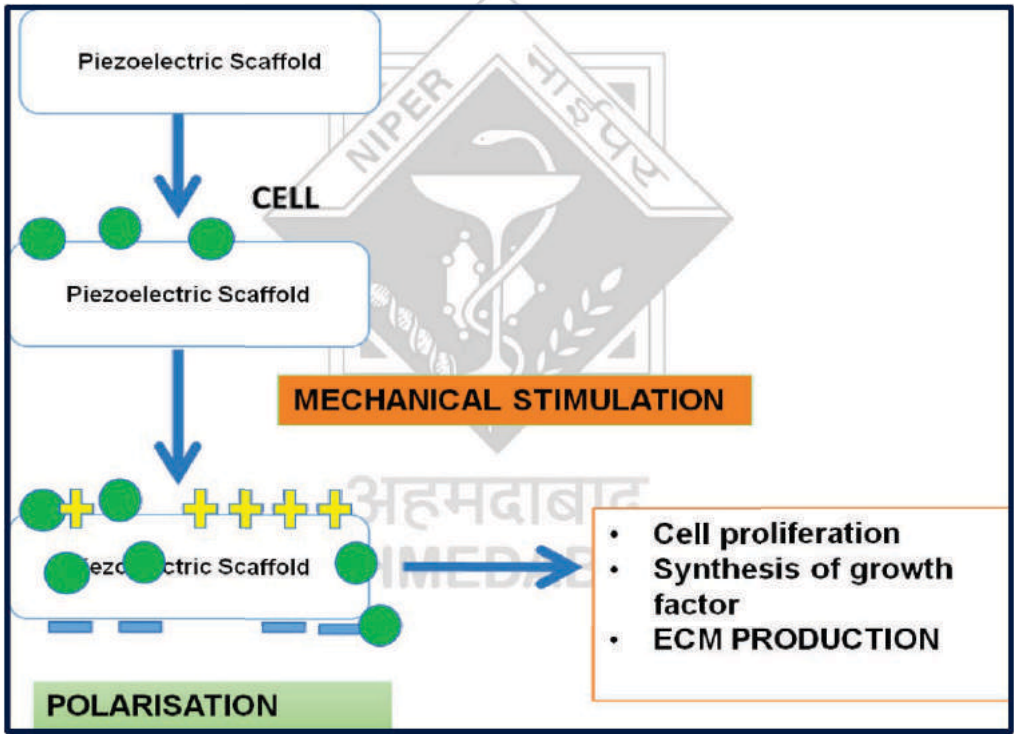
Studies on photodynamic molecules loaded superparamagnetic nanoparticle for cancer theragnosis

Conventional cancer treatments are facing long-standing obstacles lead to lowest mortality rate. The main motive of the research is to the synthesis of photodynamic molecules loaded for magnetic hyperthermia for cancer theragnosis. Initially, MRI

contrasting magnetic nano particles will be synthesized by defined methodology. Further, hyperthermia effect will be optimized for the photodynamic molecules loaded nanoparticles. The synergetic effect of the formulation will be determined and compare with the individually effect of hyperthermia and photodynamic effects.

Smart biomaterials for tissue regeneration and repair

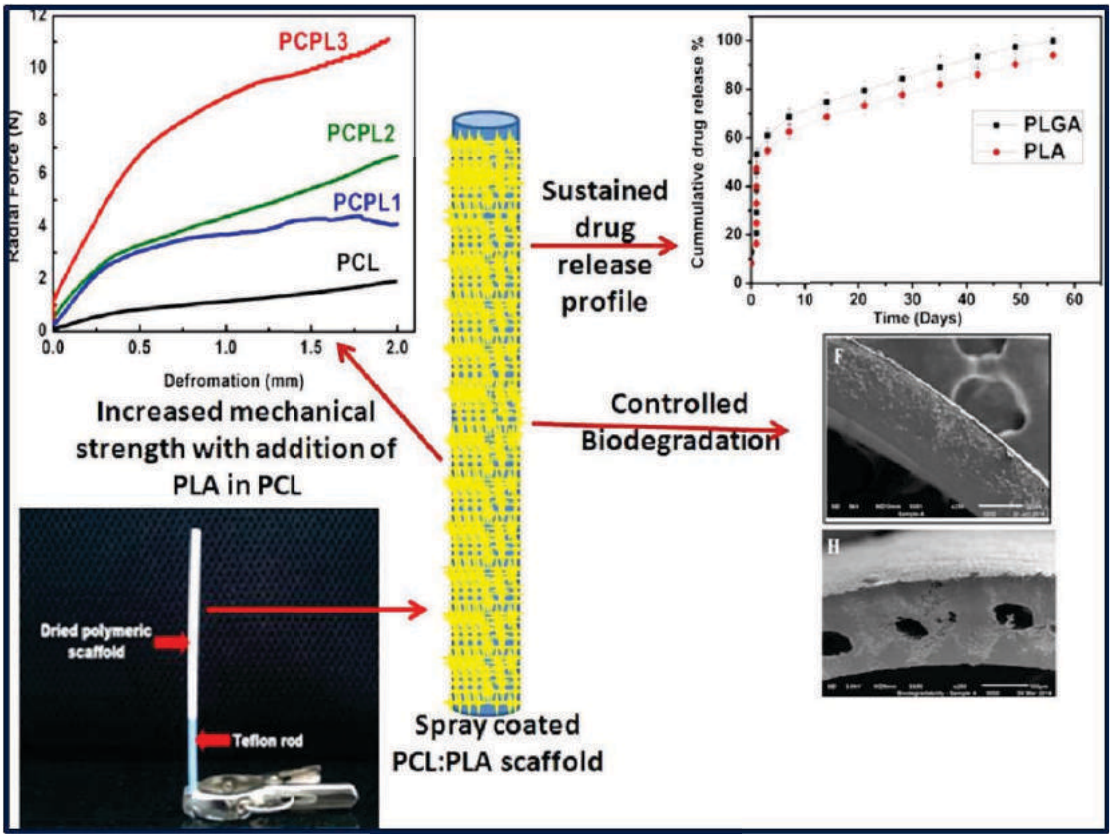
Piezoelectric materials are smart materials owing to transduce the applied mechanical pressure into electrical signals and vice-versa. The cartilage regeneration and repair is a major challenge till date due to its complex structure. The major intention of the study is the utilization of piezoelectric mechanism to stimulate the cartilage regeneration without addition of stimulating factors. The piezoelectric polymeric scaffold is prepared by electro spinning method. The scaffolds are exposed to corona poling to develop surface charge density by strong electric field. The poled scaffolds are subjected physical, chemical and biological evaluations to optimize the scaffold for cartilage regeneration and repair.



Biodegradable polymeric stents for cardiovascular applications

Coronary artery disorders are the leading cause of morbidity and mortality. Development of bare metal stents answered the problem of acute coronary occlusion due to balloon angioplasty. In consequence, it leads to other problems such as thrombosis high rate of in-stent restenosis and unfavorable lumen late remodeling which leads to drug-eluting stents (DES). The next advancement is biodegradable stents which degrade after implantation and leave behind only the healed natural vessel, with restored vasoreactivity. It eliminates the chances of late stent thrombosis and prolonged

antiplatelet therapy. The limitations of newly synthesized biodegradable stents are a low mechanical strength,fracture stiffness and fast degradability of the polymers. A cylindrical polymeric scaffolds is developed in combination with biodegradable polymers namely, polylactic acid and polycaprolactone. The objective is to improve tensile strength of the blend. Theblend illustrated no chemical interaction between polymers. The scaffold is coatedwith antiproliferative agent and sustained release profile is studied. The degradation of thescaffold is also evaluated. The developed hemocompatible polymeric scaffold may be used as for the cardiovascular application.



Coating for cardiac stent and balloon catheter

There are various coating techniques used for cardiac stent coating namely, dipping, spraying, and nanofibrous coating. A comparative study has been done to evaluate the efficacy of each technique regarding change in mechanical properties of stents, controlled release of drug, degradability and biocompatibility. Balloon coatingas another approach to combat atherosclerosis has also been explored.Bioadhesive and biodegradable polymers are chosen for the application. The selected polymer further modified by amine fictionalization to improve the bio-adhesion.

Development of Cholesterol biosensor by amperometric method using carbon nanomaterial

Cholesterol and hydrogen peroxide is the important markers in determining the cardiac problems like atherosclerosis and oxidative stress. Therefore, it is important to determine the levels of cholesterol and hydrogen peroxide (H_2O_2) in blood samples. The available electrochemical biosensors are having lack of sensitivity, selectivity and stability issues. There are several matrixes reported based on multiwall carbon nanotubs and polypyrrole. A matrix has been proposed to increases the stability, selectivity, and sensitivity measure the cholesterol and Hydrogen peroxide (H_2O_2). Herein, an electrochemical biosensor has been fabricated with carbon nanomaterials with polymer onto electrode and analysis is done by electrochemical method. The presence of carbon nanomaterial not only enhances the surface coverage but also exhibits a promising enhanced electrocatalytic activity.

In-situ hydrogel for synovial joint

Bone erosion by osteoclast is a key mediator effectors cells in the pathogenesis of bone and joint damage in Rheumatoid Arthritis. Osteoclast-mediated bone reabsorptionthat is maintained by RANKL, RANKL (receptor activated nuclear factor (NF-κB) ligand. RANKL is expressed by verity of the cell such as T-cell and synoviocyte. Available treatment of rheumatoid arthritis is non-steroidal anti-inflammatory drugs (NSAIDs), disease modifying anti-inflammatory drugs, steroid hormones and biological drugs are used in the treatment of rheumatoid arthritis they are producing unavoidable side effects likecardiotoxicity, gastrointestinal toxicity, and anaphylaxis. In-situ hydrogel or injectable gel offer some advantages over conventional dosage form, like easy formulation and maintain sterility, site specific delivery. Some of the example of in-situ hydrogels are chitosan based thermogel, PEG basedco-polymer, peptide based gel, poloxamers, and N-isopropyl acylamide copolymer. In-situ or injectable material does not require any surgical procedure.

Fabrication of nanofibrous wound dressing loaded with carbon nanomaterial

The purpose of medical care in wound management is to prevent wound from infection by covering, increase the fibroblast cell growth, and preserve function. The polymeric electrospun nanofiber scaffold made up of natural and/or synthetic polymer provides an extracellular matrix for support and initiates the growth, proliferation, and differentiation of fibroblast cells. The present study deals with the development of polymeric nanofibrous scaffold embeddedwith carbon nanomaterials and collagen. Electrospunnanofibrous could quickly start signaling pathway and attract fibroblasts to the dermis layer, which play an important role in wound healing. Electrospunnanofibrous matrix made up of Poly3-hydroxybutyric acid-co-3-hydroxyvaleric acid (PHBV) potentially offers several advantages like close structural resemblance to native extracellular matrix,

good porosity and high surface area to volume ratio that can promote hemostasis and absorb wound exudates.

Artificial biocompatible corneal implant

Corneal defects are one of the important factors for blindness. The treatment options are corneal grafts and artificial cornea. The availability of corneal graft is very less. Therefore, artificial cornea is in demand. Artificial cornea or keratoprosthesis is a synthetic substitute to replace a diseased or damaged cornea to restore vision. Polymethylmetacrylate and poly hydroxyl methyl methacrylate are the polymers used for the development of the products. The marketedAlphaCor™ has improved core skirt design compared with the Boston KPro, both of them have shown less tissue integration property. To further improve the core-skirt design for better epithelialisation, a hydrogel core with graphite incorporated skirt was developed to act as corneal substitute.

Natural Product

Target oriented synthesis of New Chemical Entities (NCEs) of natural scaffolds as anti-cancer, antitubercular and anti-diabetic leads

Higher plants continue to retain their historical significance as important sources of novel compounds useful directly as bioactive leads, model compounds for semisynthetic structure modifications and as a source of inspiration for drug discovery. Despite the attractive potency and selectivity, the limitations like toxicity, solubility, and stability of natural compounds prompt for chemical modification of the scaffolds.

We pursue research in finding new and more effective chemotherapeutic agents against various types of cancers and infectious diseases, such as tuberculosis and diabetes.

Our research efforts are directed towards the target oriented analogue synthesis and development of new chemical entities of pentacyclic triterpenoid, alkaloid, and quinone scaffolds as anti-tubercular, anti-cancer, and anti-diabetic leads. Also, we design and synthesisethiozolidinedione and thiophene analogues for drug development in these areas. Also, the *In-silico* and Structure-Activity Relation studies aimed at improving the therapeutic efficacy of lead compounds.

Synthesis, Molecular Docking and In vitro Anticancer Activity of substituted 1,4-Naphthoquinones

The new series of 1, 4-naphthoquinones derivatives has been designed and synthesized by treating with different acids. The compounds have been characterized and evaluated for their anticancer activity against neuroblastoma (IMR32), Cervical (Hela) and colon cancer (Colo-201), breast (MCF-7) cancer cell lines. All the synthetic compounds produced a dose-dependent inhibition of growth of the cells. The IC_{50} values of all test compounds

are found between 2.84 and 32.86 µM on IMR32 cell line. The most active compounds found with IC_{50}value 0.20 & 1.69 on Colo-201 cell line and 2.00 on MCF-7 cells. The compounds are not toxic at 100 µM concentration. The activity iscomparable with Doxorubicin. The *in vitro* activity is further supported by their binding to the respective protein with very good binding.

Design, Synthesis and In-silico studies of novel thiazole and thiazolidinedione analogues as glucose uptake activators

Synthetic methodology for the synthesis of novel thiazole and thiazolidinedione analogues developed and 30 structurally diverse compounds are synthesized and characterized. They are not toxic to the 3T3L-1 cell line. Among all 15 analogues activated the Glucose uptake on 3T3L-1 cell line as compared to Pioglitazone up to 25µM concentration. Molecular docking studies were performed on proteins with PBD id 4EMA and 2PRG which further supported the *invitro* activity of the compounds.

Isolation, structural elucidation and biological evaluation of new natural products from terrestrial sources

With an increasing incidence of cancer, diabetes in an ageing society and the steady spread of tuberculosis along with a growing resistance to current drugs, there is a continuous need for new and more effective drugs. Natural products chemistry is a principal area of research at the interface of the fields of chemistry and biology, and natural products are a prolific source of many life-saving drugs and functional ingredients and have played an important role in the development of pharmaceutical drugs for some diseases including cancer and infection. Ongoing drug discovery research requires a constantly expanding library of compounds with a wide range of molecular and chemical diversity.

Our research in natural products encompasses the exploration of enormous terrestrial biodiversity for novel drug lead discovery, isolation and structure elucidation of various classes of natural products of medicinal significance followed by biological activity screening for cancer, diabetes and neuroprotection, cognition enhancement.

Chemical screening and anticancer activity of some Indian medicinal plants

We select plants based on the ethonopharmacological, tribal or Ayurvedic reports for anticancer activity of the plants and screen them chemically and *invitro* anticancer activity to identify the active compounds. The bioassay guided isolated compounds are exhibiting very good activity on neuroblastoma (IMR-32), Cervical(HeLa) and Breast (MCF-7) human cancer cell lines with IC_{50} value of 4 ± 0.06µg/ml on MCF7 and 45 ± 0.15 µg/ml but not toxic to normal cells.

Chemical screening and isolation of compounds from medicinal plants as glucose uptake activators

The plants used in Ayurvedic antidiabetic formulatios are selected based and screen them chemically, and *in vitro* antidiabetic activity to identify the active compounds. They are not toxic to the 3T3L-1 cell line. Among eight selectedplants, three are activating the Glucose uptake on 3T3L-1 cell line as compared to Pioglitazone. Further, the structures of pure compounds are to be identified.

Development and screening of herbal based chewing gum formulation

We are involved in conducting *in vitro,in vivo* pharmacokinetic study, plasma phytopharmacology studies of plant extracts and phytoconstituents with antidiabetic potential. Costus igneus plant has been reported In Ayurvedic treatment for diabetic patients and been advised to chew down 2-3 leaves twice a day for a month to cure diabetes. Considering this reports we have developed Costus igneus extract incorporated medicated chewing gum for diabetic patients. Extract loaded chewing gum batches were prepared and were evaluated for various organoleptic properties and mechanical properties. Prepared Chewing gum showed an optimal extract release in 30 minutes. Considering the results of this study, it can be confirmed that the Costus igneusextract can be formulated in the form of medicinal chewing gum.

CYP-mediated herb-drug interaction studies

Herbal medicines, whether used alone or in combination with conventional drugs, are increasingly thought of as attractive options for the treatment of chronic disease conditions such as diabetes, cancer, arthritis, and CNS related disorders. Many patients take herbal medicines without a physician consent. They believe that herbal drugs are safer than conventional drugs and can be helpful in reducing side effects associated with conventional drugs. However, the use of herbal drugs in combination with conventional drugs may have a range of effects, varying from beneficial to sub-therapeutic and even toxic effects. Like conventional drugs, these kinds of combination therapies should be tested for their herb-herb and herb-drug interactions in the early phases of herbal drug development. Taking into consideration the importance of such studies we have worked on the identification of cyp mediated herb-drug interaction studies for Insulin plant with antidiabetic potential. Aripiprazole is an antipsychotic drug, used in the treatment of schizophrenia and bipolar disorder. Perthe reports, treatment with antipsychotic drug and get eliminated with hepatic metabolism involving cyp2D6. It is associated with glucose impairment; it decreases the insulin action. The possibility of diabetes or high glucose level in plasma increases in antipsychotic patients. This balance the glucose level, and the patients are advised to take antidiabetic drugs (herbal extract or marketed drug). It can lead to the potent herb-drug interaction. Insulin plant is one of the extensively used plants for the management of blood glucose level. Leaf of this plant has been reported for antidiabetic potential. Per the Ayurveda, daily consumption of one leaf can bring normal

glucose level. And there might be cases patients will be under the prescription of mentioned drug i.e. Aripiprazole and taking Insulin plant leaves or extract without informing practitioners. The use of herb- drug combination may lead to synergistic or antagonistic or even toxic effects by altering its metabolic pathway used by cyp2D6.In one of our project, we have worked on the identification of the effect of Insulin plant extract on cyp isoenzyme system.

Novel drug delivery formulations using plant extracts and phytoconstituents.

One more research area we are exploring for the natural product is the development of novel drug delivery system incorporating plant extracts to address the problems associated with it. In the current research, we have worked on the development of herbosomal formulation development incorporating Aegle marmelos extract.

Aegle marmelos (L.) Corr (Rutaceae) commonly known as the bale fruit is a highly reputed medicinal plant in the ayurvedic system of medicine. It has been known in folklore medicine as an antidiabetic. Various phyto-chemi-constituents like alkaloids, coumarins, and steroids have been isolated and identified from different parts of the tree. Leaf extract and fruit extract of Aegle marmelo shave shown potent antidiabetic effect. Despite being proved to be effective as antidiabetic extract is associated with few major challenges like less physical stability & less lipid solubility, to overcome this problem few novel approaches have been developed by researcher like development of gold nanoparticles. In the current research we have worked on development of Herbosomes incorporating Aegle marmelosfruit extract. The developed formulation has been evaluated for its physicochemical properties such as particle size, zeta potential, etc. The formulationwas evaluated for its stability and in vitro release study as well. Developed formulation showed significant results when compared with parent extract.

Pharmaceutics

Nasal to brain delivery: role of natural lipids

The blood–brain barrier (BBB), a specialized interface between the systemic circulation and brain parenchyma, effectively attenuates and regulates the flux of chemicals between these two environments. This protective barrier poses a formidable obstacle to drug delivery as inability to achieve pharmacologically active central nervous system (CNS) concentrations leads to difficulties in development of effective pharmaco therapeutic for diseases of the brain and CNS. Intranasal delivery has come to the forefront as an alternative to invasive delivery methods to bypass the BBB and rapidly target therapeutics directly to the CNS utilizing pathways along olfactory and trigeminal nerves innervating the nasal passages. We are exploring the role of butter oil from bovine origin reportedly known to be rich in omega 3 fatty acids and its role in membrane remodelling and neurogenesis. Additionally we are also investigating the potential of using butter oil as permeation enhancer for delivery of formulation to ocular compartments. The outputs of the work could be path breaking in terms of projecting butter oil in altogether new light as

till date it is rich source of cholesterol in food only (European Journal of Pharmaceutical Sciences 91, 196-207, 2016).

Application of thermal analysis in Drug excipients interaction and blend uniformity analysis

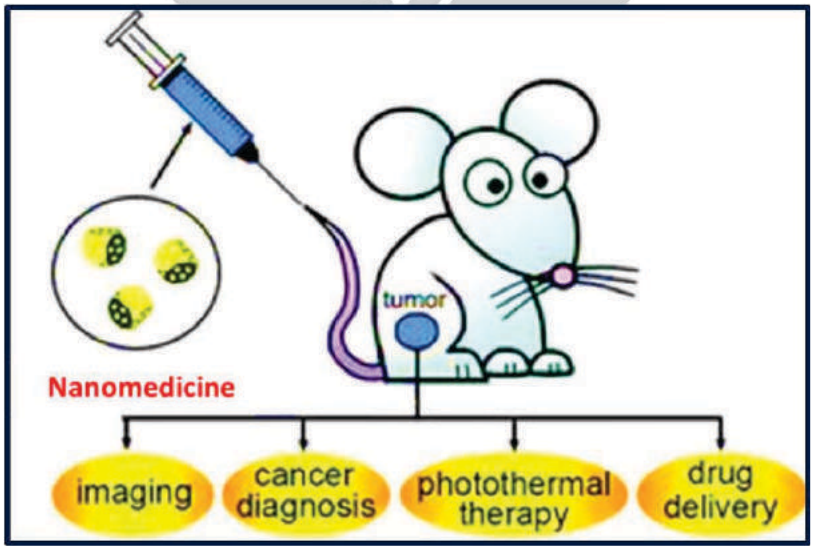
Assessing mixing uniformity of a powder blend in pharmaceutical formulation of a low dose potent drug is a very critical step, failing which the entire formulation needs to be reworked from the beginning. Thermal analytical methods like differential Scanning calorimetry [DSC] are rapid method requiring very lesser sample for quantification. In this project, we are using enthalpy values obtained from DSC for estimation of mixing uniformity in powder blend mixed using high shear mixture granulator. Influence of various parameters like melting behaviour of drug and excipients, bulk density of excipients and mixing time on the results of enthalpy values was also evaluated. The results from DSC analysis were further confirmed using HPLC analysis and a correlation was proposed between the two analytical methods. It was observed that at lower levels of drug i.e. 0.5%, 1% and2%, the relative standard deviation values obtained using DSC were higher than that using HPLC but at concentration above 5% of drug, the results of DSC and HPLC were quite similar. It was concluded that DSC could reliably predict the uniformity of powder blend where drug loading was above 5%, however results accuracy was somewhat less below this level. We are working further on exploring the use of DSC in assessing mixing uniformity during scale up studies and role of DSC in compatibility prediction especially in fixed dose combination (Powder Technology 276, 103-111, 2015).

Impact of drying process on Solid state properties of drug Nanosuspenion

Poor aqueous solubility is the leading hurdle for formulation scientists working on oral delivery of drugs and has led to use of novel formulation technologies. Size reduction in nano range can enhance the dissolution rate of the poorly water-soluble drugs and increase oral bioavailability. Currently use methods like “top-down” or “bottom-up” approaches, decrease particle size but leads to enormous surface area and drastically amplified Gibbs free energy making it difficult to retain the nanosize of the fresh precipitates due to physical (aggregation/particle fusion) and/or chemical instability (chemical reactivity of drug during storage) upon storage. We are at present involved in studying the complex interplay between stabilizers and cryoprotectant used during lyophilisation of nanosuspension to obtain nanocrystal. We are also investigating solid state properties of nanocrystals obtained using lyophilization and those obtained using electro spinningto evaluate their impact on bulk level properties of nanocrystals. It is expected that this will help us in identifying markers of instability at earlier stages and reduce the overall time required for stability assessment of final dosage form (Recent patents on nanotechnology,2016).

Development of novel polymeric nanomaterial for effective cytosolic delivery of anticancer bioactives

The focus of this research is towards the successful delivery of therapeutic agents in a controlled and targeted manner and the development of advanced delivery systems for a variety of applications. Projects ranging from fundamental science to industrially relevant applications are undertaken by postgraduate students and researchers within the cluster. The research interests include the use of biodegradable polymers for the micro and nanoparticle delivery of drugs and proteins particularly for cancer therapy. Specific examples of ongoing projects include the delivery of anti-cancer drugs and small interfering and microRNA.An overarching goal of his current research interests encompass development of novel polymeric nanomaterial for effective cytosolic delivery of anticancer bioactives. The research is also focused towards designing a new generation of nanoparticles, which could identify the cancer cells and selectively deliver anticancer drugs and genes to inhibit the growth of cancer while sparing healthy tissues. His research work involves the applications of polymer chemistry, nanotechnology, molecular biology, pharmacokinetics/pharmacodynamics and imaging techniques. Tekade lab is also involved in investigating the anticancer activity and molecular mechanism of several nanoformulations against cancer cell lines.



Formulation Development of Injectable RNA interfering nanoparticle for targeted therapy of diabetic nephropathy

Diabetic nephropathy (DN) is chronic kidney disease with microvascular complications leads to renal dysfunction, podocytes effacement leads to proteinuria (albuminuria), glomerulosclerosis and tubulointestinal fibrosis. In this context, research is focused towards the formulation development of novel nanotherapy for the treatment of the DN bearing a cocktail of the gene therapeutic cargo and drug. For development of this

podocytes targeted Nanotheraputics, novel polymers are being synthesized by bioconjugation to form protonation activepolymer. This novel polymeric bioconjugate were formulated in as nanoparticle loaded with genes and drugs. For the specific targeting purpose those nanoparticlesbears ligand that can recognize the site for binding to attain targeted delivery. It is hypothesized that prepared ligand gated nanoparticle could easily phagocytes via take up by cell, then endosome will be form and finally polymeric nanoparticle undergo proton sponge effect release the genetic material and drug. Further formulation evaluation done for its physicochemical and biological properties. Cellular uptake studies would be performing via in-vitro podocytes cell line model and induced diabetes mouse model.

Tripartite approach for treatment of triple negative breast cancer (TNBC) using graphene oxide wrapped polymeric nanoparticles

The research interest of this cluster is to develop innovative strategies to tackle barriers associated drug delivery. This research project involves development of novel formulations for the treatment of cancer using nanotechnology based platform, which involves the development of polymeric nanoparticles (NPs) trenched with multiple approaches including hyperthermia and chemotherapy for effective and promising treatment of aggressive triple negative breast cancer (TNBC). One of the component is also to establish the effective correlation between the various approaches and their individual effects towards the treatment of TNBC. For this, we consider to develop the anti-breast cancer formulation with greater in vitro and in vivo outcomes to render it liable for clinical trials and to explore the research area based on the use of RNAi mediated gene silencing, as a novel and very effective approach to treat various forms of cancer.

Biodegradable polymeric microneedle arrays for the delivery of therapeutic biologics

A systemic investigation was conducted for designing an efficient dosage form for transdermal delivery of α-choriogonadotropin and Salmon Calcitonin (high molecular weight biologic), through biodegradable polymeric microneedles. Polyvinylpyrrolidone based biodegradable microneedle arrays loaded with high molecular weight polypeptide, α-choriogonadotropin were fabricated for its systemic delivery via transdermal route. Varied process and formulation parameters were optimized for fabricating microneedle array which in turn was expected to temporally rupture the stratum corneum layer of skin, acting as a major barrier to drug delivery through transdermal route. The developed polymeric microneedles were optimized based on quality attributes like mechanical strength, axial strength, and insertion ratio and insertion force analysis. The optimized polymeric microneedle arrays were characterized for in vitro drug release studies, ex vivo drug permeation studies, skin resealing studies and in vivo pharmacokinetic studies. Results depicted that fabricated polymeric microneedle arrays with mechanical strength

of above 5N and good insertion ratio, exhibited similar systemic bioavailability of α-choriogonadotropin in comparison to marketed subcutaneous injection formulation of α-choriogonadotropin.

Lymphatic targeting of drug substance using solid lipid nanoparticle based carrier system

A systemic investigation was conducted for investigating the potential of solid lipid nanoparticles formulation as targeting carriers for lymphatic system. A highly lipophilic drug substance ritnovirwas targeted to lymphatic system with the aid of SLN as carriers exhibiting essential requirements for lymphatic targeting like logP value in range of 3-5 and particulate size range of 70-130nm. Ritonavir-SLNs were formulated with Precirol 5 ATO, Tween 80 and Poloxamer 188 as lipid, surfactant and co-surfactant respectively. SLN were fabricated using high shear homogenizer(HSH) technique. QbD based Box Behnkan design will be employed for optimization of formulation with desired quality targets.

Solubility enhancement of BCS class II drug substances using β-cyclodextrin based porous nanosponge and nanofiber formulation

A systemic and comparative investigation was conducted on solubility enhancement exhibited by β - cyclodextrin based inclusion complex in different porous dosage forms like nanofibers and naosponge. Several techniques are explored and reported for improving the aqueous solubility and therapeutic efficiency of BCS class II drug substances which is a current major concern for pharmaceutical industries. Most the reported solubility enhancement techniques exhibits several limitations like poor drug loading efficiency, low drug dose requirement, final dosage form development problems to list a few. The β–cyclodextrin based drug inclusion complex is one of the solubility enhancement approaches which has presented a great interest in 21stcentury. The research investigation was designed with a conceptual thought of utilizing dual approaches, (cyclodextrin complexation and nanotechnology) for enhancing the aqueous solubility of drug substances and to tackle the formulation related issues of cyclodextrin-based inclusion complexes. The outcome was extrapolated to translate the solubility enhancement parameter into improved bioavailability and increased therapeutic efficiency of drug substances with poor aqueous solubility.

Investigating the impact of formulation and process parameters on entrapment efficiency and physical stability of liposomal formulation

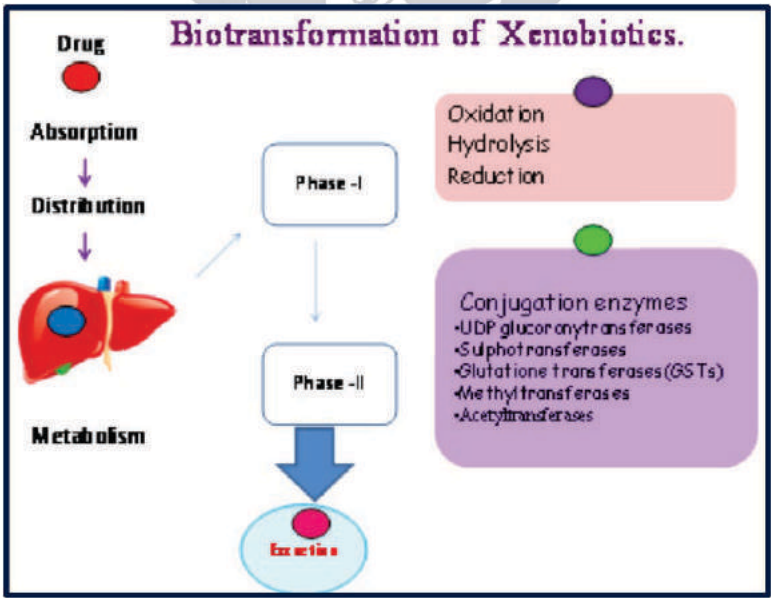
Since the pioneering discovery of Bangham particles, bilayer spherical phospholipid based vesicle system, has become one of the most extensively investigated drug delivery systems. The use of phospholipids for creating vesicles not only facilitates large-scale industrial production but also offers a unique advantage of structural and chemical composition resemblance to biological membranes of the human body. Despite several advantages, some major concerns like low entrapment efficiency and leakage of entrapped drug substances limits the application of liposomal formulations. A systemic

investigation was designed and conducted to evaluate the effect of several processesand formulation parameters on entrapment efficiency and physical stability parameters of liposome formulation. QbD based statistical approach was used for screening several processesand formulation parameters that would significantly impact and increase the entrapment efficiency of hydrophilic and lipophilic drug substances in a liposomal formulation. The investigation also emphasized on different manufacturing techniques to be employed for increasing the entrapment efficiency of hydrophilic and lipophilic drug substances in a liposomal formulation.

Pharmaceutical Analysis

Metabolite profiling of drugs by using HPLC and LC-MS/MS

Drugs are considered as xenobiotics, which are metabolizedin the body and converted to more polar compounds and eliminated easily. These are metabolizedby phase 1 and phase 2 reactions. Enzymes involved in the phase 1 reactions are Cytochrome P450s, flavin-containing monooxygenases and epoxide hydrolases. In the phase I reactions, oxidation, reduction and hydrolytic reactions were observed. In the phase II reactions, enzymes involved are sulfotransferases (SULT), UDP-glucuronosyltransferases (UGT), glutathione-S-transferases (GST), N-acetyltransferases (NAT), and methyltransferases. In these reactions addition of sulphate, glucuronic acid, glutathione, an acetyl group and methyl group may take place.



Human liver microsomes and rat liver microsomes are commonly used for in vitrodrug metabolism studies. Microsomes are used for phase 1 metabolism studies. Cytosol is used for phase II enzymatic reactions. S9 fractions contain both phase I and phase II enzymes and used to study both metabolic reactions. Microsomal studies were performed by suspending microsomes in 0.1 M phosphate buffer, add NADPH solution, drug solution and incubate at 37°C for 60 min. Samples were withdrawn at 0, 30 and 60 min. The reaction was terminated by adding few micro litres of cold methanol or acetonitrile,

centrifuge the sample and supernatant was injected into HPLC or LC-MS-MS. Simultaneously run blank (without drug), control 1 (without cofactor), control 2 (without microsomes), control 3 (without microsomes and cofactor). Control 1 is to determine whether the reaction is energy dependent or not; control 2 is to determine whether the reaction is protein dependent or not and control three is to determine the stability of the drug in phosphate buffer solution.

Forced degradation and impurity profiling of drugs by HPLC and LC-MS-MS

Forced degradation studies were performed by exposing the drug to acidic, basic, neutral, oxidative, photo and thermal stress conditions. After exposing drug to stress conditions, those samples were analyzed by HPLC and LC-MS-MS. This involves development and validation of HPLC method and application of that method to the analysis of stability samples. Degradants were characterized by analyzing the samples by LC-MS-MS. Degradants were isolated by preparative HPLC and were characterized by NMR, IR and mass. Kinetic investigations were also performed by taking samples at different intervals during stress, and the samples were analysed by HPLC. Amount of drug remained after each time point is calculated and determine the order, rate constant and shelf life of the drug under each condition. Impurity profiling is performed by separating drug and its impurities, Impurities may be obtained from the official compendia source or synthesized in-house and characterized by MS, NMR, and IR spectroscopy. Identify different impurities generated under forced degradation conditions by comparing the retention time of standard impurities.

Drug-excipient compatibility studies using isothermal stress testing

Compatibility between drugs and various excipients is determined by isothermal stress testing. The HPLC method is developed and applied to the analysis of stressed samples. The drug content and percentage of the drug is remained and the degradants are characterizewd by using LC-MS-MS, NMR and IR. These studies can used for selection of suitable excipients in the formulations.

Pharmacology and Toxicology

Regulatory non-coding RNA-mediated mesenchymal stem cell engineering: Safetyand efficacy study in rodent model of ischemic stroke

Ischemic stroke is one of the most common neurological diseases which ranks third in the leading cause of death after heart disease and cancer. The poor prognosis of cerebral ischemia is contributed majorly to the acute irreversible loss of brain cells before the patient receives medical aid, which is exacerbated by the void in delayed clinical intervention, options to protect against secondary insult. Mesenchymal stem cells (MSCs) are an especially attractive therapeutic agent due to their ease of isolation, established safety, and potential to target multiple pathways involved in neuronal regeneration. Engineering of Mesenchymalstem cell by regulatory non –coding RNA and its

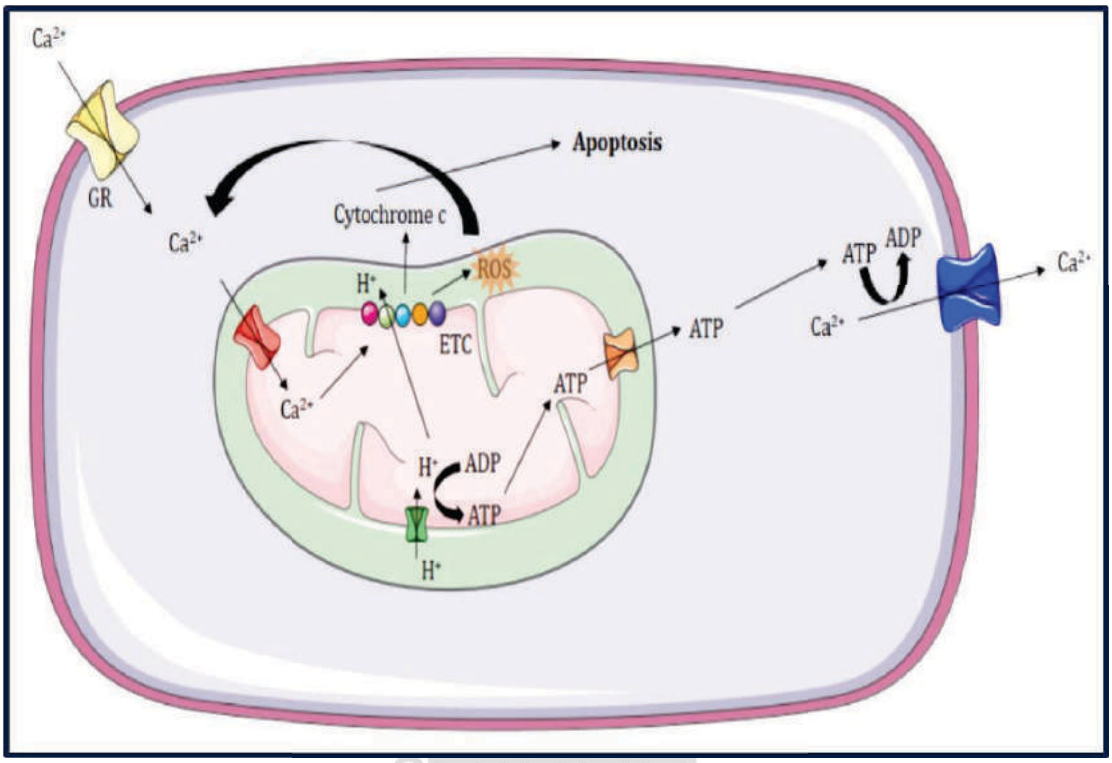
administration can be a tool to bring about desired benefits after ischemic insult. As per best of our knowledge, studies relating to the intra-arterial administration of regulatory non-coding RNA (rncRNA)- engineered MSCs in the early and late phase of brain stroke has not been reported yet. Most importantly, a late phase study of intra-arterial delivery of engineered MSCs are greatly needed as there is a need of therapy for those who already had a stroke in the past. Thus, we propose a study to evaluate the safety and efficacy of intra-arterial administration of rncRNA-engineered MSCs in rodent rMCAo. The primary objectives of the proposed project involves: (i) Bioengineering of MSCs using rncRNA-miR-210 followed by hypoxic preconditioning, (ii) to determine the optimal timing and efficacy of intra-arterial administration of engineered MSCs (eMSCs) in the early and late phase of cerebral ischemia Another major aim is to determine the extent of effective localization and integration of newly transformed eMSCs to neurons into the persistent neuronal circuitry leading to functional recovery. Next method is to elucidate the mechanism of action recruited by rncRNA-engineered MSCs on the post-ischemic brain. Our future plan shall be to explore the beneficial role of different long non coding RNAs in manoeuvring mesenchymal stem cell property that can be used for cell transplantation therapy in an animal model of ischemic brain stroke.

Mitochondrial protection in ischemic stroke using intra-arterial mesenchymal stem cell treatment

In last decade, laboratory studies suggest stem cell therapy as a prospective treatment for stroke. Studies demonstrate that the post-ischemic delivery of mesenchymal stem cells (MSCs) significantly reduces ischemic brain damage in the animal models of ischemic stroke. Furthermore, MSCs are delivered either by direct transplantation, intravenous or intra-arterial/carotid route. The intra-arterial (IA) administration of MSCs is promising for ischemic stroke treatment because it delivers cells directly to the site of injury as unlike systemic delivery of MSCs following traditional intravenousapproach. Additionally, IA MSC therapy is minimally invasive than direct transplantation.Post-ischemic mitochondrial dysfunction plays an important role in cerebral ischemic damage. This dysfunction involves a drastic change in the activity of mitochondrial respiratory chain complexes, increased production of reactive oxygen species (ROS), mitochondrial swelling, the release of mitochondrial pro-apoptotic molecules, and related cellular damage. Highly interconnected reticular mitochondrial networks continuously undergo cycles of fusion and fission as a part of performing normal physiological functions.

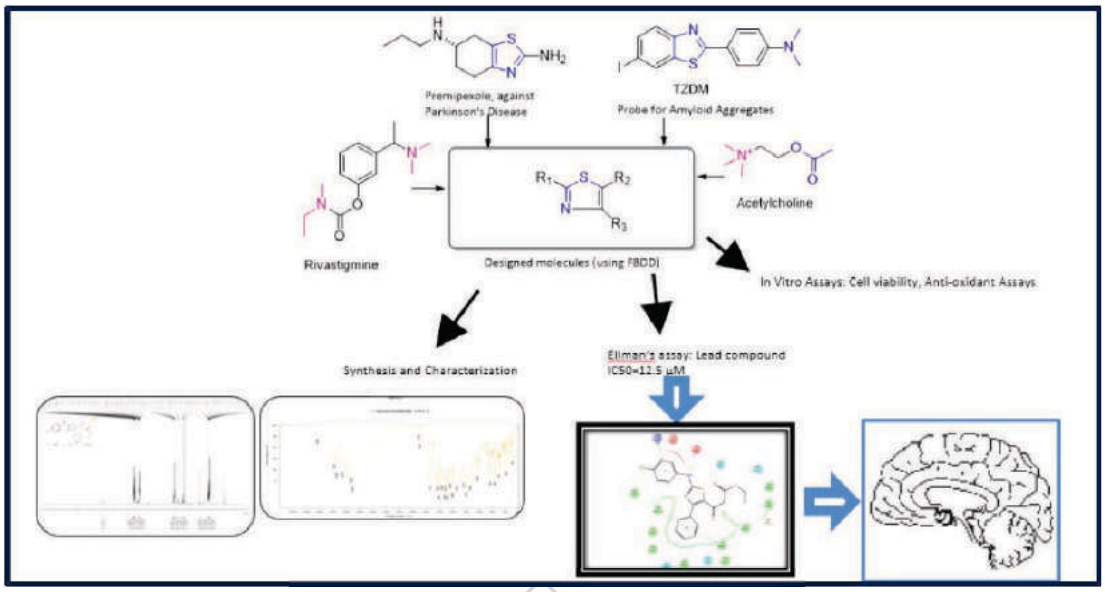
Earlier studies have demonstrated that neuronal death following cerebral ischemia involves mitochondrial fission and preventing post-ischemic mitochondrial fission can lower cerebral ischemic damage. Protecting post-ischemic mitochondrial function by cell therapy can be an important strategy for post-ischemic neuroprotection. Therefore, we shall also dissect the mechanism for the same via mitochondrial dynamic studies. To achieve our purpose, we will first determine the optimal timing and efficacy of intra-

arterial administration of MSCs in the rodent model of MCAo in the early and late phases of cerebral ischemia for reducing tissue damage and improving functional and neurological outcome. Secondly, we will be considering neuroprotection by rescuing mitochondrial functions using IA stem cells. Finally, we will study the extent of effective localization and look to elucidate the mechanism of mitochondrial protection in the post-ischemic brain by IA stem cells.

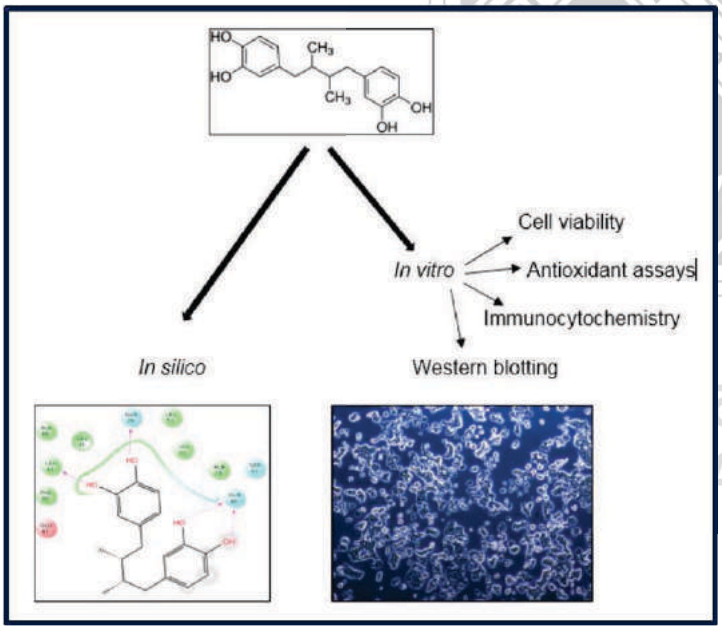


An in silico and in vitro evaluation of the role of small heterocyclic moiety in intervening cognitive dysfunction

Mild cognitive impairment may eventually develop into Alzheimer's and other types of dementia. Alzheimer's disease (AD) is a chronic neurodegenerative disorder that manifests into disturbances of cognitive functions such as amnesia. The present study is designed to investigate the anti-amnesic effect of a small heterocyclic lead compound on neurochemical changes in *in vitro* model of cognitive impairment. All compounds were designed considering Lipinski's rule of five. We firstly performed an in-silico testing of the lead compound. The parameters that were analysed for determining in silico competence were docking score, site of metabolism, QikProp, DFT calculations. Further, the test compound was analyzed for cytotoxicity and antioxidant properties on PC12 cells. The compound exhibited an in vitro anticholinesterase activity in Ellman's assay giving an IC50 value of 12.5 µM.



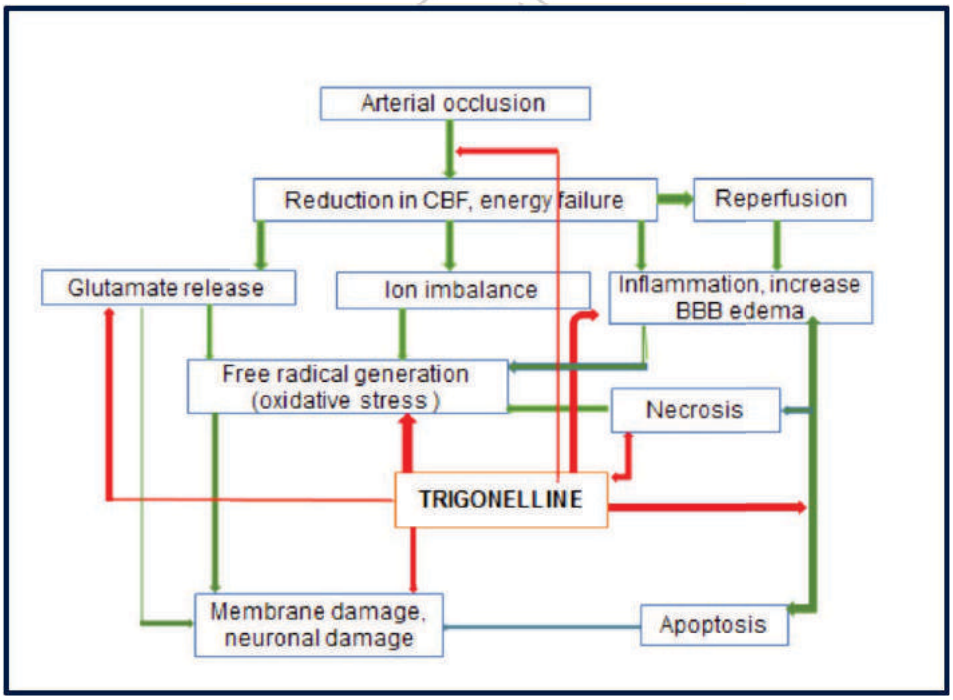
Neuroprotective effect of nordihydroguaiaretic acid (NDGA) in *in vitro*model of Parkinson's Disease



Parkinson's disease (PD) is associated with motor dysfunction and clinical symptoms associated with the disease are tremors, bradykinesia, muscle rigidity, postural instability, and akinesia.The neuropathological hallmarks of PD are characterized by progressive and profound loss of dopaminergic neurons in the Substantia Nigra pars compacta (SNpc) and a depletion of postsynaptic dopamine within the striatum along with the presence of protein alpha-synuclein (αS) in Lewy bodies (LBs) and Lewy neurites (LNs). Nordihydroguaiaretic acid (NDGA) is a polyphenol compound and has also shown to inhibit αS filament assembly by forming soluble, non-cytotoxic, oligomeric complexes with the αS protein. So we propose that NDGA may show the effect by treating the cause in rotenone-induced Parkinson model. We have performed in silico test (docking) of NDGA on αS protein molecule. NDGA has a good docking score of -5.2 as compared to that of curcumin which has a docking score of -3.3. Further, we have performed cell viability assays, antioxidant assays, and immunocytochemistry which proves that NDGA may show the neuroprotective effect by inhibiting αS and can be further tested in *in vivo*.

Elucidating the effect of trigonelline in in-vitro model of hypoxia

Ischemic stroke is caused due to obstruction in blood flow to a part of the brain leading to brain damage. Energy failure, excitotoxicity, acidosis, an increase in intracellular calcium level, oxidative stress, mitochondrial dysfunction, inflammation, apoptosis and finally neurodegeneration are the outcome of such a cerebrovascular event. Although there are increasing evidence that trigonelline exhibits neuroprotective effects against ischemic brain damage, little is to know about the mechanism.*In silico* work was performed to check the binding affinities of trigonelline to ASIC1a (4NYK), MMP2 (3AYU) and MMP9 (5I12) and docking scores were found to be -2.982, -3.405 and -3.26 respectively in comparison to standards. We have also performed cell viability assays, antioxidant assays and western blotting which give evidence that trigonellinehas protective effects against hypoxia; and can be further testedunder*in-vivo* settings.This could lead to the development of novel therapeutic strategies by exploring different pathophysiological mechanisms and pave ways for advanced research into this field.



Stroke-Parkinsonism complex: model validation and a systematic study exploring the link between cerebral stroke & Parkinson's disease

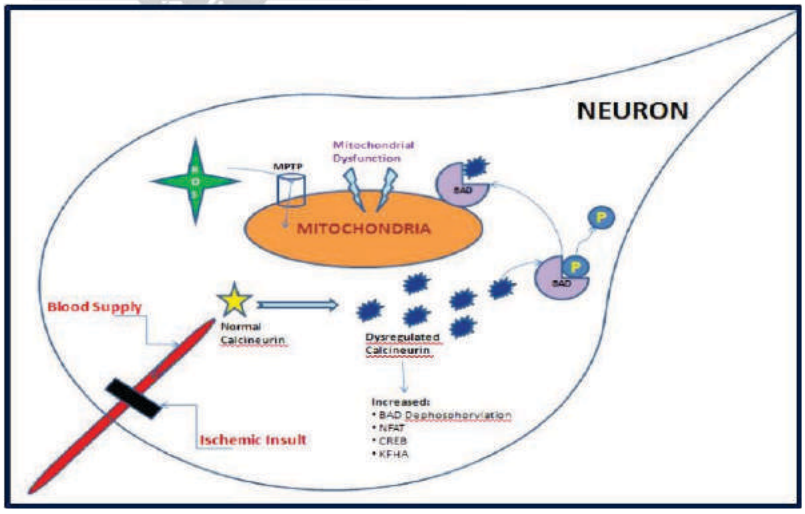
Stroke and Parkinson's disease have been studiedindividually, and their biochemical assays have been performed in the past. Studies have reported that patients with transient stroke may develop Parkinson's disease in the late stage. Hence, in our proposal, we plan to validate an animal model of stroke with Parkinson's disease and further explore the associated molecular mechanism of such a transition. We will explore different biomarkers and perform a battery of behavioral tests to validate the model

having both pathologies. Furthermore, our objective is to analyze different neurotransmitters in this study and explore their influence in either of the pathologies.

Exploring the influence of intra-arterial mesenchymal stem cells on calcineurin in the cardiac arrest model of global cerebral ischemia

During ischemic insult, there is the generation of oxidative stress and inflammation which insidiously damage the cerebral neurons, leading to various complications. During ischemic insult, many signaling pathways become abnormal in their processes and exacerbate the rapid neuronal cell death. One of these endogenous signaling molecules is calcineurin which is a calcium/calmodulin-dependent phosphatase having a vast role in maintaining many homeostatic processes for neurons in the CNS. In normal conditions, calcineurin regulates normal neuronal functions and is neuroprotective. However, during ischemic insult, it has been observed that not only does calcineurin become overly-expressed during stroke but it also behaves in a dysregulated manner and switches over to triggering apoptotic signals and accelerates neuronal cell death.

Past studies, both in vitro and in vivo, have shown that inhibition of calcineurin post-ischemic insult leads to attenuation of neuron degeneration and mitigates cell death and prolongs neuronal survival. Although calcineurin inhibition displays this neuroprotective effect, the current calcineurin blockers have shown undesired side-effects. Mesenchymal stem cells (MSCs) are hypothesized to modify and inhibit this neurotoxic effect of dysregulated calcineurin while also mitigating the associated side-effects since they can effectively modify and regulate factors like calcineurin in a more judicious manner. MSCs have the unique capability of homing towards the infarct site and releasing neurotrophic factors which protect the neurons from apoptosis and stimulate neurogenesis to form new synapses and help regain and maintain lost functions of the damaged neurons in the brain after ischemic insult.



Exploring myeloperoxidase inhibition by trigonelline therapy in tMCAo model of cerebral ischemia

Cerebral ischemia is a condition in which there is insufficient blood flow to the brain to meet metabolic demand. Thisclinical situation leads to poor oxygen supply or cerebral hypoxia and thus to the death of brain tissue or cerebral infarction. It is the third most common cause of death in developed countries. As reported in the past, trigonelline prevents oxidative stress during reperfusion injury and attenuates the behavioral deficits with histopathological alterations secondary to hypoperfusion. The present study will also be done to find out the neuroprotective effect of trigonelline on transient cerebral ischemia (MCAo). Myeloperoxidase (MPO) is a hemoprotein, which is abundantly expressed by active neutrophils, monocytes, macrophages, and microglia. On the one hand MPO has been found to propagate the inflammatory cascade and delay resolution of inflammation, but on the other hand, MPO inhibition has been reported to decrease the infarct size after stroke markedly. Hence, a mechanistic relationship between inflammation and neurogenesis in stroke needs further exploration. As trigonelline plays a key role in addressing inflammation, we hypothesize that trigonelline may inhibit MPO to impact neurogenesis in ischemic stroke

Role of melatonin to obviate interferon-β-mediated cortical and hippocampal monoamine turnover in rodent model of ischemic stroke

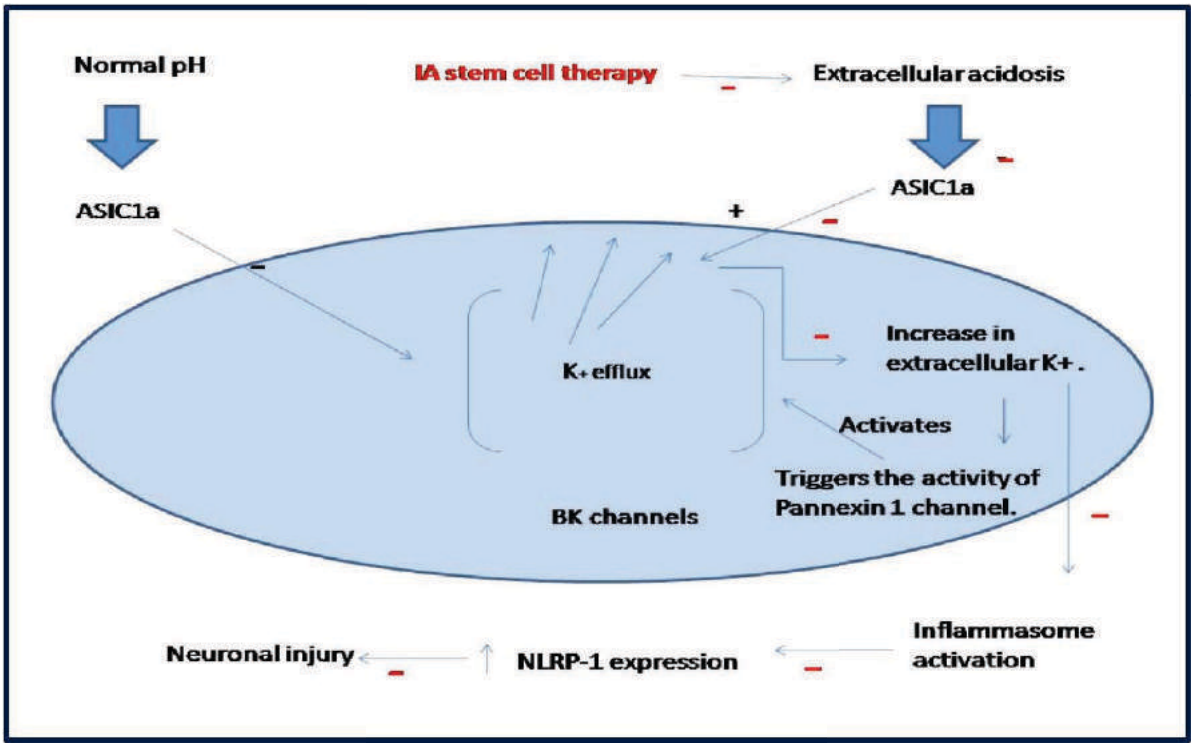
Use of melatonin as a drug has been explored by many researchers in the past due to its intrinsic free radical scavenging potential and contributing role in modulating physiological processes including regulation of circadian rhythm, blood pressure, oncogenesis, retinal, physiology, seasonal reproduction, ovarian physiology, and osteoblast differentiation. The neuroprotective potential of melatonin and its possible involvement in the regulation of cerebral metabolism, antioxidant and anti-excitotoxic properties, neurotransmitter modulation, influence on neuronal apoptosis also makes it a molecule of choice to intervene complex neurological disorders like a stroke.

Interferon beta (IFN-β) therapy improves stroke outcome but has a downside of producing depression. Although interferon treatment in stroke is not so common, it still has a scope to evolve as one of the supplementary drugs of choice if the limitations are counteracted. Hence, to move further to study the spectrum of other beneficial effects of melatonin in stroke, we propose to explore its role in counteracting IFN-β-induced depression in the stroke which stands to be one of the limiting factors for IFN- β therapy in clinical settings.

This present study is designed to understand the role of melatonin in modulating the interferon-β-mediated monoamine turnover that will be helpful in improving ischemic stroke outcome by using MCAo in the rat model.

Modulating the expression of NLRP1 inflammasome by intra-arterial stem cell therapy in rodent model of ischemic stroke

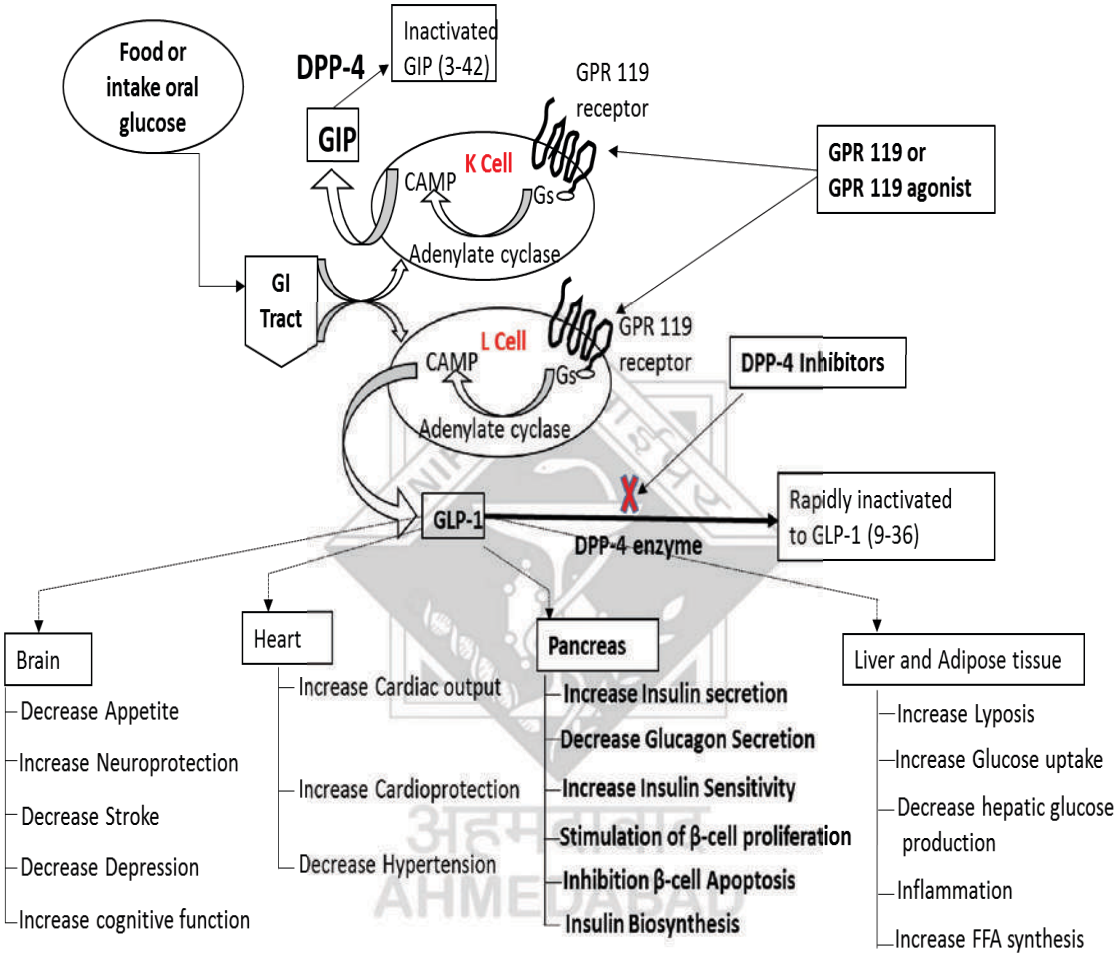
The increasein extracellular proton concentrations in stroke activates ASIC1a in the brain. This activated ASIC1a increases the expression of the NLRP1 inflammasome in a pH-dependant manner. This NLRP1 inflammasome is a key component that is formed after ischemic stroke. The NLRP1 inflammasome is a key player in the inflammatory mechanism and contributes to the progression of ischemic damage. This inflammasome worsens the pathology of stroke by the production of inflammatory cytokines. Intra-arterial (IA) mesenchymal stem cells (MSCs) carry minimal risks and prove efficacious through the secretion of trophic, protective, neurogenic and angiogenic factors. We hypothesize that IA MSC therapy may inhibit the formation of inflammasomes to render neuroprotection.



Potent and active GPR119 Agonists for the Treatment of Diabetes

Diabetes is a chronic metabolic disease, which is characterized by hyperglycemia, glycosuria and hyperlipidemia that in long-term increases the probability of developing diabetic complication such as macrovascular and microvascular complications which in turn increases mortality and morbidity. The number of people living with diabetes is expected to rise from 366 million in 2011 to 552 million by 2030, including nearly 183 million people with undiagnosed diabetes for a long duration. Microvascular complications include diabetic cardiomyopathy, nephropathy, retinopathy, and neuropath. Currently, available drug therapies like TZD (insulin sensitizers), sulphonylureas and insulin (insulin secretagogue) have a major drawback of

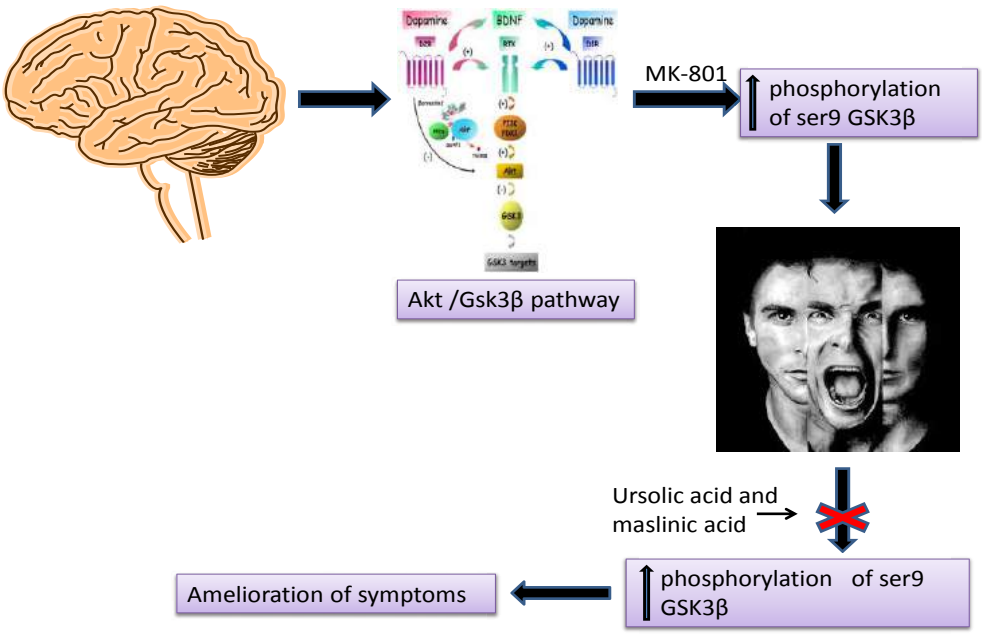
hypoglycaemia and weight gain due to an insulin-dependent mechanism of action. GPR119 is one of the numerous candidates of G-protein coupled receptors; many other modulators like GPR40, GPR41, GPR43, and GPR120 are currently under investigation as a potential target for elevating GLP-1. It can be used with a great added advantage of the improvement in glucose handling and homeostasis in treating diabetes.



Neuroprotective potential of pentacyclic triterpenoids in animal model of schizophrenia

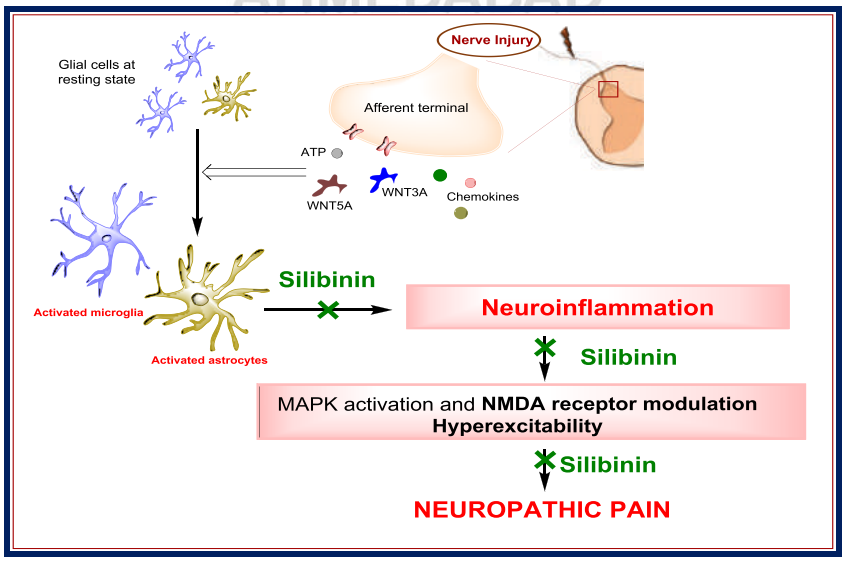
Schizophrenia is a heterogeneous chronic neurological disease that affects approximately 1% of the world's population making it the seventh most costly medical illness. It is characterized by severe behavioural perturbations including positive (e.g., hallucinations, delusions, disorganized speech and thought), negative (e.g. blunted affect and social isolation), and cognitive symptoms (e.g. executive and memory dysfunction).The main pathophysiology of this disease includes dopaminergic over activity in the mesolimbic region of the brain. The severity of symptoms of schizophrenia depends on the antioxidant levels. Various antioxidants are related to the positive, negative and cognitive

symptoms, poor premorbid functions and computed tomography abnormalities since oxidative stress is considered a potent intracellular signalling mechanism that induces changes in the dopamine D2 receptor. Reactive oxygen species (ROS) produced in any tissue is directly proportional to its oxygen consumption. Since the brain is continuously under oxidation/antioxidant process, it is prone to oxidative stress. Aberration in the Akt/GSK3β pathway also partly contributes to the pathophysiology of schizophrenia. Currently, the anti-psychotics which are available in the market are successful in treating the positive and negative symptoms but not the cognitive symptoms. We still require alternative options to successfully treat the cognitive symptoms and reduce the side effects of the available antipsychotics. Therefore, in this project, we attempt to elucidate the neuroprotective potential of two pentacyclic triterpenoids, ursolic acid and masilinic acid in ameliorating the symptoms of schizophrenia by acting on the Akt/GSK3β pathway and oxido-inflammatory cascade. The objectives of the study are to perform insilico studies to determine the binding of these pentacyclic triterpenoids to GSK3β, PPARα, acetycholinesterase,D2 and D3 receptor, to perform *invitro*studies to determine the effect of oxidative stress on PC-12 cell lines and to generate a subchronic model of schizophrenia by using MK-801.Insilico studies revealed encouraging results to move forward for *in-vitro* studies. *In-vitro* studies also revealed a neuroprotective effect against LPS-induced oxidative stress in PC-12 cell lines. Future studies will throw more light on the novel mechanisms and pathways which can be targeted to demonstrate the potential of pentacyclic triterpenoids in schizophrenia.



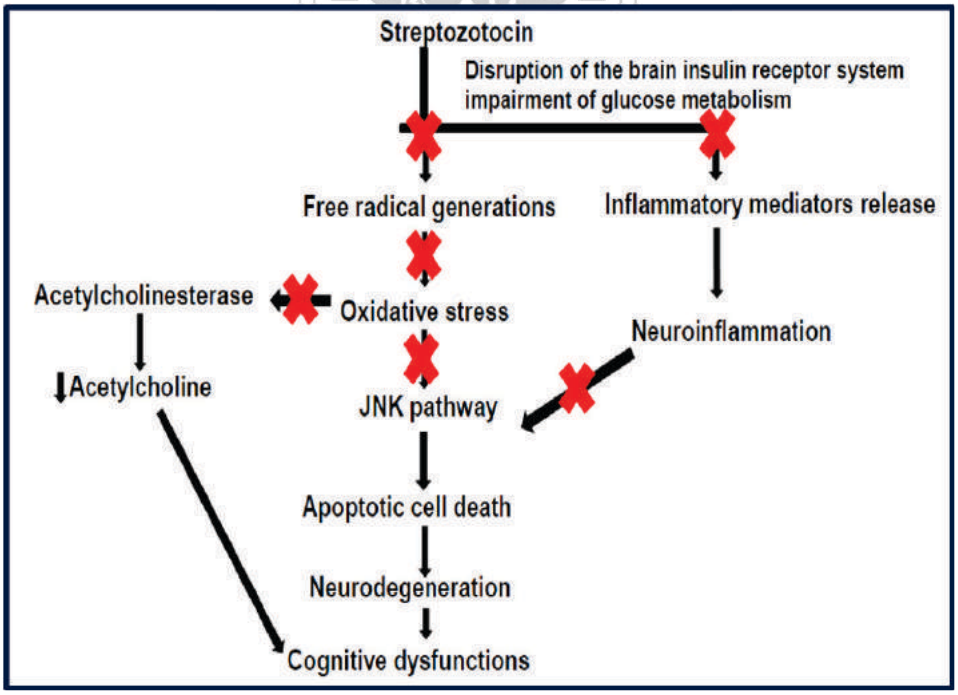
Targeting neuroinflammatory signaling cascade using natural polyphenols for the treatment of neuropathic pain

Neuropathic pain is a debilitating condition affecting millions of individuals worldwide. Current pharmacotherapeutic for neuropathic pain such as opioids and non-steroidal anti-inflammatory drugs (NSAIDs) predominantly act on symptomatic relief lacking satisfactory efficacy owing to tolerance development and undesirable side effects. Contemporary studies have found that tissue injury activates glial cells in the peripheral and central cellular circuitry. Microglia, the immune and defence glia, respond very quickly to a noxious stimulus and enter an activated state. Histological analysis shows proliferation and hypertrophy of this activated microglia in neuropathic pain. These cells not only exert morphological changes but also exhibit some functional alterations when activated compared with when in a quiescent state. p38 MAPK (p38 mitogen-activated protein kinase) activation plays a characteristic feature in the pathophysiology of pain leads to the activation of microglia and astrocytes present in the dorsal horn and dorsal root ganglia (DRG) and subsequent neuroinflammation cascade. Thus, in this project, we focus on suppressing the activation of glial cells targeting the p38 MAPK specifically to resolve the neuroinflammation cascade using natural polyphenols and thereby offering a better therapeutic alternative for the treatment of neuropathic pain. In-silico results have shown better affinity of silibinin (which is a flavanolignan obtained from Milk thistle (Silybummarianum, Asteraceae) seeds) with p38 MAPK as compared to purino-P2X4 receptor and chemokine CX3CR1 receptors (The latter two receptors are also involved in the activation of glial cells). In-vitro results have shown a protective effect of silibinin against oxidative stress and decrease in p-p38 MAPK (phosphorylated p38 MAPK) levels in the LPS-induced C6 glial cells. In-vivo studies which are to be done using L5 spinal nerve ligation (SNL) will further justify the use of milk thistle's active constituent, silibinin for the treatment of neuropathic pain.



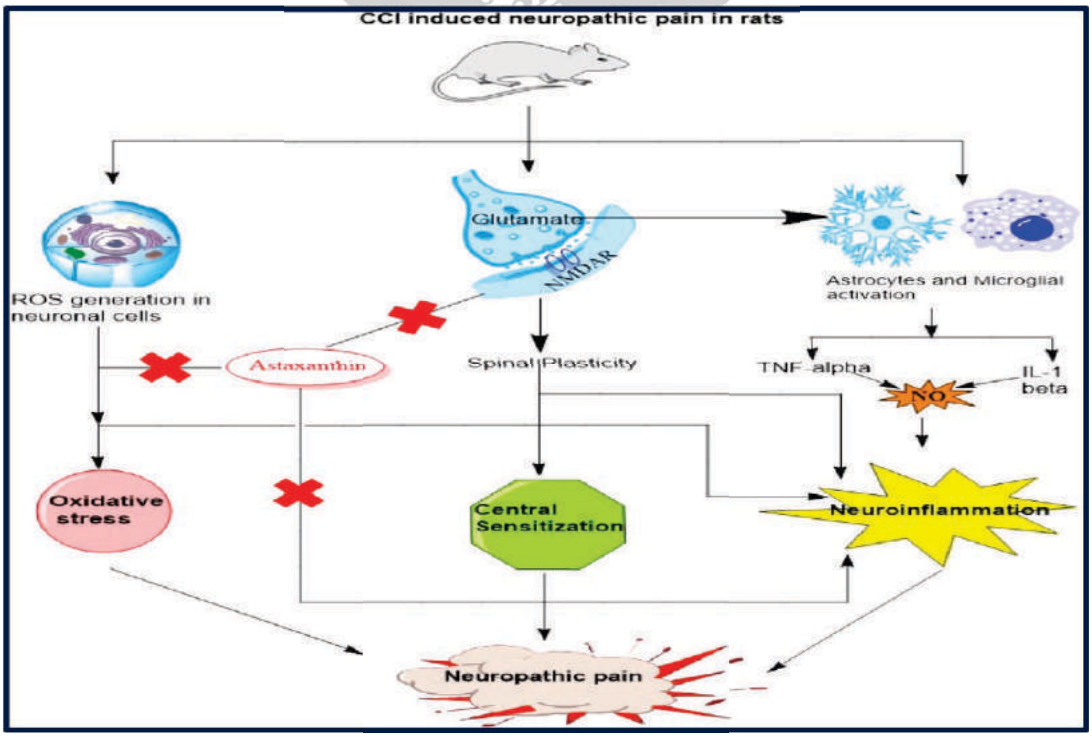
Neuroprotective effect of pentacyclic triterpenoid molecule in animal model of cognitive dysfunction

Cognitive dysfunction is one of the most common hallmarks of several disorders including Alzheimer's, schizophrenia, chronic fatigue syndrome, multiple sclerosis, and depression that primarily affect learning, memory, perception, and problem solving, and include amnesia, dementia, and delirium. Most often it is associated with enhanced inflammation and neuronal cell death in brain regions associated with cognition. IntracerebroventricularStreptozocin (ICV-STZ)-induced animal model of cognitive dysfunction is widely used to study memory improvising effects of novel therapeutics. The objective of present study was designed with an aim to investigate the neuroprotective effect of Lupeol, a pharmacologically active triterpenoid, having potent anti-inflammatory and neuroprotective properties in in-silico, in-vitro and in-vivo models of cognitive dysfunction. We performed in silico studies to evaluate the effect of Lupeolon inhibition of acetylcholinesterase activity, one of the biomarkers of cognitive dysfunction. Our preliminary findings suggest the inhibition of acetylcholinesterase activity by lupeol. The results obtained were encouraging, and we moved further to in-vitro studies where we found the neuroprotective effect of lupeol against H202 induced oxidative stress in PC-12 cell lines. Further, in-vivo studies on rodents are on the way to investigate the effect of Lupeolon oxidative stress, mitochondrial dysfunction, neuroinflammation and cognitive function. Therefore, this elucidates the neuroprotective potential of pentacyclic triterpenoid in cognitive function associated disorders.



Ameliorative effects of marine natural drug in animal model of neuropathic pain

The research studies focused on therapeutic targeting of the marine natural drug against mechanical and thermal hypersensitivity. An animalmodel of neuropathic pain will be developed by sciatic nerve ligation. The CCI-induced nerve injury involves the release of pro-inflammatory cytokines and nociceptive mediators which increase the sensitivity of peripheral and central pain pathways by activating N-methyl-D-aspartate (NMDA) receptors. This model of nerve injury combined with pain hypersensitivity testing provides a model system to investigate the effectiveness of potential therapeutic agents to modify chronic neuropathic pain. Many therapeutic options are available, but they still are unable to effectively cure the mechanical and thermal hypersensitivity associated with neuropathic pain. The study is proposed to elucidate the neuroprotective effect of Astaxanthin, a marine natural drug, having potent anti-oxidant and anti-inflammatory activities,inanimal model of CCI-induced neuropathic pain. Reports confirm the involvement of NMDA receptor up-regulation in the spinal cord after chronic constriction injury. An attempt will be made to evaluate the effect of marine natural drug Astaxanthin on oxido-inflammatory and NMDA receptor down-regulation pathway by performing in-silico, in-vitro and in-vivo studies. In in- silico studies, molecular modelling was performed to dock the test compound astaxanthin into the active site of NR2A, and NR2B receptor proteins.



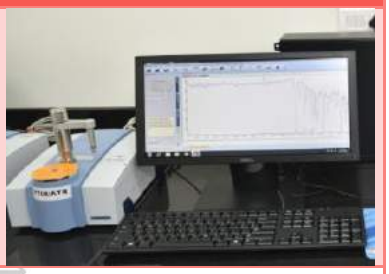
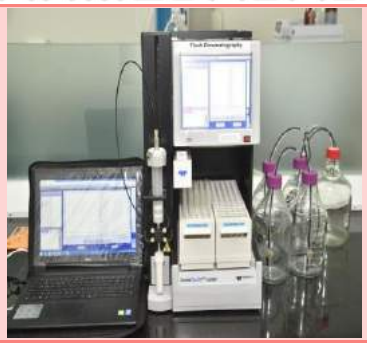
In-silico molecular docking study ascertains the binding affinity of the drug to NMDA receptor and shows antagonistic effects. The results obtained were encouraging enough to proceed further for in-vitro and in-vivo studies. We further investigated the effect of marine natural bioactive Astaxanthin in-vitro on neuroinflammatory events associated to

the production of reactive oxygen species (ROS) generation, nitric oxide (NO) release, MDA production, intracellular GSH level in LPS stimulated rat C6 astrocytoma cell line, and explored the regulation of cytokines. The *in vitro* protective effect of Astaxanthin against LPS-induced neuroinflammation in the C6 glial cell is duly supported by molecular docking studies. In-vivo studies include therapeutic targeting of marine natural drug Astaxanthin using various behaviour assessments, CNS toxicity assessments, ELISA tests for quantification of inflammatory cytokines (TNF-α, IL-1β), biochemical assays for oxidative and nitrosative stress assessment and further down-regulation of NMDA receptor using western blot analysis. This study may provide insight of the role of NMDA receptor, oxidative and nitrosative stress, and neuroinflammation involved in disease progression. Findings from the present study may open new therapeutic avenues for the prevention and treatment of neuropathic pain.

Institutional Facilities

Central Instrument Facility

National Institute of Pharmaceutical Education and Research (NIPER)- Ahmedabad provides the facilities of Research Laboratories with sophisticated instruments to fulfil the departmental needs based on the research programs of M.S. (Pharm.) and Ph.D. students. The Central Instrumentation Facilities are constantly upgraded as per the latest advancements in research, developments and technologies.

CIF Laboratory		
		
Q-TOF-LCMS	FTIR	ATR
		
Gas Chromatography	HPLC-UV/RI	Gel Permeation Chromatography
		
HPLC-PDA/FLD	Flash chromatography	Semipreparative HPLC

Porosity meter

Ultracentrifuge

Thermogravimetric Analyzer

Multimode Reader

UV Plate Reader

Differential Scanning Calorimeter

Polarimeter

UV-VIS Spectrophotometer

Microbalance

Chemical Biology Laboratory

Gel Doc System

Inverted Microscope

CO_2 Incubators

Nanodrop

Real-Time PCR

Bioanalyzer

Rotary Evaporator

Temperature Controlled Centrifuge

Parallel Synthesizer

Deep Freezer (-80°C)

Rotary Shaker

Biosafety Cabinet (Class II)

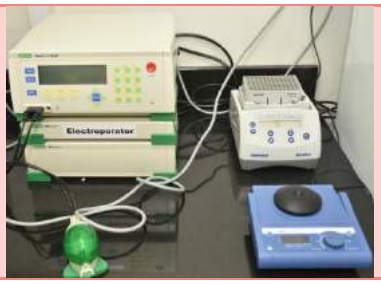
Cryo Can

Western Blot Unit

Gel Electrophoresis Unit

Melting Point Apparatus

Fumehood



Electroporator

Drug Discovery and Delivery Laboratory

Rapid Mixer Granulator

Autocoater

Potentiostat-Galvanostat

Stability Chamber

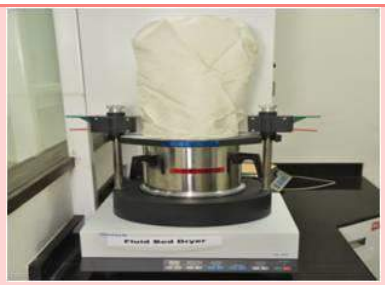
Mastersizer

Zetasizer

Hot stage microscope

Rheometer

Magneto Meter



Fluid Bed Dryer

Texture Analyzer

Rotary Compression Machine

Disintegration Apparatus

Poling Setup

Universal Testing Machine

Electron Spinning Setup

Piezometer

Probe Sonicator

Regulatory Laboratory

Passive Avoidance Apparatus

Refrigerated Centrifuge

Rota Rod

Hot Plate Analgesiometer

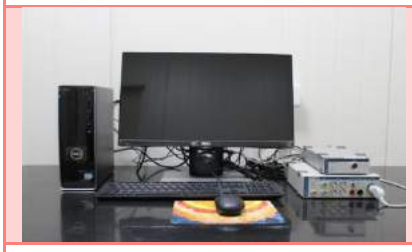
IVC Cages

Metabolic Cages

Electronic Von-Frey

Hargreaves Apparatus

Surgical Microscope



Stroke Apparatus

Animal Ventilator

Sterotaxic Instrument

		
Cryostat	Small Animal Anesthetizer	Deep Freezer (-80^{o}C)

Computer Lab

NIPER-Ahmedabad has central computer facility for the students and staff to avail a high-speed Internet facility. A dedicated Internet leased line with 10 Mbps accessing speed has been installed to provide uninterrupted Internet service to all students, faculty, and staff. The adequatesecurity mechanism is implemented to protect and monitor against virus, worms, phishing and hacking incidents. All the computers are connected through Local Area Network (LAN) using 1 GB Dlink managed the switch. HP Prolient Server is installed to work as an application server to host applications like Koha Library Management Software, ERPnext,TallyERP, etc. These applications can be easily accessed by students, faculty, and staff via LAN. The Computer Centre is also equipped with various open source operating systems like Linux Centos 7, Ubuntu, etc. along with licensed Operating Systems like Microsoft Windows 8 AND Windows 10.Software including SPSS, Schrodinger (QSAR and Molecular Modelling), Microsoft Office 2013,etc is available for use.

All faculty rooms, seminar rooms, class rooms, library, and laboratories equiped with Wi-Fi facility. Apart from this, all class rooms, seminar rooms, and the auditorium is equipped with Projector, TV, video conference facility etc. for the conducive learning environment.

Library

NIPER-Ahmedabad library comprises more than twelve hundred books and around 30 international journals subscriptions, encompassing all disciplines of pharmaceutical sciences and technology viz. analytical chemistry, medicinal chemistry, pharmacology, pharmaceutics, natural products, biotechnology and medical devices. It has ample collection of e-books, huge reading hall, photocopy facility, many Ph.D. & M.S. Pharm. thesis copies and NIPER workshop & conference Reports. The libraryis efficiently equipped with open source Library Management Software - KOHA. The software facilitates issue, return, notification, suggestion, and search related to library resources in Institute Local Area Network environment. It also reflects bibliographic information of the libraries shelf for ready access by users. Library resources and facilities being updated from time to time as per the requirements of the students as well as faculty recommendations. The library has elaborate arrangements for conservation and preservation of books, journals, and thesis for posterity. The libraryis also well equipped with a good collection of motivational books by Robin Sharma, textbooks from renowned authors including classic literature from the likes of Munshi Premchand, etc.Further, to generate curiosity and to inculcate reading habit in students, it is planned to equip Library with much more fiction, scientific novels, biographies, autobiographies, story books also.

Hostel

The Institute has a separate hostel for boys and girls, which are are inthe near by locality. Bus facility is available for the students residing in the hostel. The hostel rooms are spacious and well-furnished. Each student is provided with basic furniture including chair, study table, cupboard, and a bed at the beginning of the academic year. The hostels have sports and other recreational facilities, such as gym, common area for interaction, playing and festival celebration, etc. All the hostel rooms have internet connectivity round the clock. The hostel is under 24 x 7 CCTV and security surveillance.

Hostel mess serves nutritious food throughout the year to students. Hygiene and cleanliness within the Hostel premises are well taken care of by providing round the clock housekeeping service and breakdown maintenance services. Apart from this transport facility is available for students residing in hostel.

Canteen

Canteen is located on the Institute campus, which provides a variety of hygienic and healthy food, snacks and beverages, etc. Keeping in view the requirements of research students, the canteen remains open until extended hours as well as during weekends. We at NIPER-Ahmedabad believe that research ideas are germinated at places like canteen where students can openly interact and discuss their prepositions. Canteen has a large well-covered shaded sitting area, where the students carry out the off-classroom brainstorming sessionson their innovative ideas. It is also a place for students to celebrate fun filled events like laboratory, parties, birthday, celebrations, marriage awards, anniversaries, and successes etc.

Recreation

Students of NIPER Ahmedabad participate in a variety of indoor games, outdoor games, and gym activities. Instead of confining a student to research and classroom studies, such recreational activities are largely encouraged by NIPER-Ahmedabad to promote an all-round personality development of a student.

Gymnasium

"Healthy mind resides in a healthy body" is a much-clichéd saying. Students participating in sports are more likely to succeed in the classroom. A good physical education program plays an important role in the all-round development of students. It is an integral part of the total education of any student and is closely related to skill acquisition in other areas. NIPER-Ahmedabad was having an agreement with Ekalavya Sports Academy, Ahmedabad for using its facilities. After shifting to a new campus at Gandhinagar, a new Gymnasium facility is currently being installed for all the students at the hostel premises.

Visits of Dignitaries

Visits of Hon'ble Minister Shri Mansukh Mandaviya at NIPER-Ahmedabad

Honorable Union Minister of State for Chemicals and Fertilisers, Road Transport, Shipping & Highway visited NIPER Ahmedabad on 13 Aug 2016 at its new premises at Gandhinagar. In his address to faculty & students he emphasised on need to enhance the research work. He promised all the necessary support to the institute from Ministry.

Shri Mansukh Mandaviya, Honorable Minister of State for Chemical and Fertilizers, Road Transport, Shipping & Highway General Secretary of Gujarat State, Bharatiya Janata Party; Member of Rajya Sabha from Gujarat state visited NIPER-Ahmedabad campus on Friday 13th January 2017 to interact with students and staff of NIPER-Ahmedabad. Honorable Minister interacted with students and appreciated their points to consider the establishment of medical device testing laboratory in Ahmedabad.

Honorable Minister assured students that he would seriously consid

er the key points suggested by students. Dr. Pallab Bhattacharya I/c Dean of NIPER-Ahmedabad presented vote of thanks and expressed gratitude to Honorable Minister for his valuable time while requesting him to persistently guide NIPER-Ahmedabad.

Visits of Shri Rajneesh Tingal at NIPER-A

Shri Rajneesh Tingal,Joint Secretary, Department of Pharmaceuticals, Ministry of Chemical and Fertilizer, Government of India has recently visited NIPER-Ahmedabad campus located at Palaj Gandhinagar, Gujarat on 12th January 2017.Mr. Tingal visited all the laboratories and state-of-art facilities of NIPER-Ahmedabad, and immensely appreciated the efforts laid towards its construction and faculty recruitment. He immensely appreciated the working principles of NIPER-Ahmedabad. Mr. Tingal interacted with all the faculties of NIPER-Ahmedabad, and discussed how working in NIPER can give them opportunities to flourish in research and development sector.

Invited Lectures

Prof. Abhay Pandit has visited NIPER-Ahmedabad on 16th April 2016 and delivered a lecture. He is the Director of a Science Foundation Ireland-funded Centre for Research in Medical Devices (CÚRAM) at the National University of Ireland, Galway. Prof Pandit has over 20 years' experience in the field of designing biodegradable biomaterials. He pursued his postgraduate degree and Ph.D. at the University of Alabama at Birmingham, USA. Prof. Pandit discussed on ***"Biological Basis for Designing Biomaterials for the Injured and Degenerated Host".*** It was a very good learning session for young faculties and students.

Dr. T.P. Singh, One of the pioneers in the field of Biotechnology, and **senior INSA scientist** at AIIMS New Delhi, delivered a talk at NIPER-A on 14th Dec 2016. The topic of his talk entitled **'Structural basis of Antibacterial action of Innate immune proteins & their Exploitation as Protein Antibiotics'** focused on protein as potential natural antibiotic candidate held at NIPER-Ahmedabad on 14thDecember 2016.He has been consistently involved in exploring different areas of research including Biophysics, Biochemistry, Structural biology, Immunology for more than four decades. He shared some of his interesting research insights on protein structure elucidation, amino acid interaction & peptide design. The work that he discussed during his lecture emphasized on how protein molecules can render activity like antibiotic to various bacterial infections whilst assisting the activity of the innate immune system.

Workshop/Seminar/Conference/ Training

Seminar on "Implementation of the provisions of DPCO 2013 & Accessibility, Availability and Affordability of Medicines for All" in collaboration with NPPA

NIPER-Ahmedabad has organized one-day seminar on topic **"Implementation of the provisions of DPCO 2013 & Accessibility, Availability and Affordability of Medicines for All",** on 7thDecember2016, where distinguished speakers from State Drug Controller, Gujarat, National Pharmaceutical Pricing Authority(NPPA) New Delhi, NIPER-A, IIM Ahmedabad, Representatives of GMSCL, representative of AIOCD/Gujarat and Chemists and Druggists Association. The event received an overwhelming response from the participants, who came to attend this seminar. The event started by a welcome address by State Drug Controller, Gujarat Dr. H.G Kosia, followed by an introductory session by Member Secretary, NPPA New Delhi Dr. Sharmila Mary Joseph who briefed the importance of price control as well as various initiatives taken by NPPA, New Delhi to control the prices of essential medicines. Dr. Rakesh Tekade, faculty NIPER-Ahmedabad gave an interesting and motivating talk on "Pharma Industry – Growth and Prospects". During this he described various aspects including availability of skilled young skilled man power, positive government policies, favorable circumstances, investment prospects and others that makes India a potential destination for various Pharma Industries, clinical trial agencies, research & development organizations in India. Prof. Kiran Kalia Director, NIPER-A expressed her thanks towards NPPA team for this opportunity to collaborate on organizing such a useful seminar of high importance. The event was concluded with a vote of thanks by Dr. Sharmila Member Secretary, NPPA and Dr. Rakesh Tekade, Faculty NIPER-Ahmedabad, which was followed by a group photo of all participants and speakers.

Foundation day ceremony of NIPER Ahmedabad

On 16th December 2016, NIPER-Ahmedabad organized a lecture series with eminent speakers from industry and academic research institutes to commemorate the completion of one year of its foundation stone laying ceremony. The talk titled **"Plasmodium Enolase - Host Cell Invasion and Hope for a Broad-Spectrum Multi-Stage Anti-Malaria Vaccine"** by Dr. Gotam K. Jarori, Professor of Parasite Biology, Tata Institute of Fundamental Research, Mumbai was phenomenal**.** The event was also graced by Dr Kapileshwar Swain from Wockhardt laboratories, who explained the importance of powder handling in pharmaceuticals and the analytical methods used. The event was also graced by Dr. Aruna Vanikar, Professor ,and Head, Department of Pathology, Lab. Medicine, Transfusion Services; Immunohematology, at Institute of Kidney Diseases and Research Centre, Ahmadabad, who discussed role of stem cells and its role as therapeutics.

The Mammalian Cell Culture workshop

NIPER Ahmedabad had hosted **"The Mammalian Cell Culture workshop"** training from 23rd February to 25th February 2017, wherein the Ph.D, research scholars and master students from Indian Institute of Technology (Gandhinagar), Nirma University and St. Xavier's College had participated. The participants were exposed to an array of cell and molecular biology techniques and were given Hands-on-experience in cell culture, cell-based assays, immuno cytochemistry (ICC), enzyme-linked immunosorbent assay (ELISA) and fluorescence microscopy.

Training Program for Teachers (under Make in India Initiative) on Advanced Pharmaceutical Techniques

A one day hands on **Training Program for Teachers (under Make in India Initiative) on Advanced Pharmaceutical Techniques was held on September 28th, 2016,** at NIPER-Ahmedabad with the objective to train the pharmacy teachers to become future leaders. The event witnessed the participation of 17 teachers from various pharmacy institutes across Gujarat namely Parul Institute of Pharmacy and Research, KBIPER, SNLP College of Pharmacy, Anand College of Pharmacy, Ganpat College of Pharmacy, etc. The training initiative was driven by NIPER-Ahmedabad's pledge to enthusiastically participate in skill development program under 'Make-in-India" initiatives and to encourage and build skilled professionals.

Co-Curricular Activities

Personal Development

Personal development club of NIPER-Ahmedabad provides a forum for open discussion on topics relevant to overall personality development and grooming of students. The club conducts activities like group discussions, debating, SWOT analysis, resume building and other skills required for facing job interviews.

Journal Club

It is a platform to provide exposure to the researchers at NIPER-A with recent updates in scientific Diaspora. Utilizing all the available resources; including the past and recent peer-reviewed journal articles, it acts as a tool that gives insight into approach, opportunity and application aspects of ongoing research. It provides an opportunity to improve presentation skills, learn and practice critical thinking, share ideas, knowledge, and experience.

Sports

Sports teach us that it is good to compete, good to achieve, good to sweat, good to get dirty and tired and feel fit, fine and refreshed - Martina Navratilova. With the above objectives, NIPER-Ahmedabad held its first Annual Sports Day during the January 2017. After an informal inauguration, various events were held, like cricket, running a competition for boys and girls, kabaddi, tug-of-war, and various races. The event was a week long and opens to all. It witnessed an enthusiastic participation by students, faculty,

and staff. The finals of all the events were held and prizes and certificates were awarded during the 3rdalumni meet cum Annual Day Celebration.

Sports Day Celebrations

A sports day was organized on 26th January 2017 at NIPER-Ahmedabad. Many sports competition were organized for the students and staff. All students and staff participated in the sports enthusiastically. A cricketmatch was organized between the senior and junior students; the winner of this match played against the faculties and won the match.
Badminton and lingoracha competition was organized for girl students. Kabbadi and tug of war was also organized for students. It was good to see students encouraging their respective teams during the play, and sweating it out in the sun.

Extra-Curricular Activities

Cultural Activity

Festivals and celebrations in college campus add colours to the academic life of students and carry fun filled memories to be cherished forever. The celebrations in NIPER-Ahmedabad for the year 2014-15 started with Independence Day which was followed by various other celebrations including Teacher's day, Annual day, Ganesh Chaturthi and Navratri festivals. While the end of 2014 was marked with Christmas celebrations, the New Year 2015 was welcomed by students and faculties alike with a grand party. The Valentine's Day celebrations were filled with different themes like Rose day, Twins day, Group day, etc. The College Annual day function on 4th March 2017 was a great event for the students of NIPER-Ahmedabad to showcase their different talents.

Celebration of Navaratri (Garba Night)

As part of cultural enrichment the students organisedgarba program on Sharad Purnima. Faculty and students actively participated in this event

NIPER-Ahmedabad 3rd Alumni Meet cum Annual Day Celebration

Alumni Association of NIPER-Ahmedabad (AANA) organized its 3rd alumni meet cum annual day celebration on 4th March 2017. Dr. C. L. Kaul, Founder Director NIPER-Mohali and Dr. V. Nagarajan, Neurosurgeon, V. N. Neurocare Centre, Madurai were eminent guests gracing this event. Alumni from past batches of NIPER attended the function; and shared their experience of working at NIPER-Ahmedabad. For this event, the current students of NIPER –Ahmedabad made special arrangements to welcome the senior passed out students viz: alumni trees, a well decorated selfie corner, collection of some memorable photos were also shown to them as video. Students of current batches performed several entertaining and informative cultural activities during the program including Gujarati garba, western dance, mimickery, drama, songs etc., which was equally enjoyed by alumni, guest staff and students. It was a memorable evening and a very good opportunity for alumni, to visit the new campus of NIPER Ahmedabad and interact with fellow students.

National Festivals and Events

Republic Day and Independence Day Celebration

NIPER Ahmedabad celebrated **70th Independence Day** wherein I/c Director Dr Vinod Jairaj hoisted the national flag. Faculty and Students also expressed their views on this day. A skit was also performed by students to show communal harmony and unity.

68th Republic Day, was celebrated at NIPER-Ahmedabad on January 26th 2017. The event started with flag hosting where the girl student who has recently ranked top in the semester exam, hosted the flag along with the Director and Registrar of NIPER-Ahmedabad. Many sports competitions were organized for the students and staff. All students and staff participated in the sports enthusiastically.

Hindi Pakhavada Celebration

दिनांक १४ सितंबर को हर वर्ष की भाँति रास्ट्रीय महत्व के संस्थान नाईपर-अहमदाबादने हिंदी दिवस बड़े हर्ष और जोश से मनाया। राजभाषा समिति, नाईपर-अहमदाबाद द्वारा आयोजित इस कार्यक्रम में विभिन्न प्रतियोगिताओं का समायोजन किया गया था, जिनमें तात्कालिक-भाषण,निबंध-लेखन, सुलेख, प्रश्नोत्तरी, चित्र-प्रदर्शनी, वादविवाद एवं स्वरचित-कविता पाठ प्रमुख हैं। इन सभी प्रतियोगिताओं में कुल प्रतिभागियों की संख्या १२१ रही। इस आयोजन में विद्यार्थियों का उत्साह देख ते ही बनता था। विद्यार्थी अपने नियमित अनुसंधान के साथ-साथ विभिन्नप्रतियोगिताओं की तैयारियों में भी तल्लीन देखे गए।इस कार्यक्रम में मुख्य अतिथि के रूप में डॉ. निर्मला वाधवानी (महिला एवम बाल विकास मंत्री, गुजरात सरकार) एवं गुजरात विद्यापीठ के हिंदी विभागाध्यक्ष डा. जसवंतभाई पंड्या भी थें।

Teachers Day Celebration

The students organised the teacher's day function on 5th September 2016 wherein they felicitated the teachers and organized few activities for the teachers. It was a good gesture of students to pay respect to teachers. The event was marked by gifting a sapling to all the faculties instead of usual floral bouquet which was very thoughtful and innovative gesture from students.

Celebration of National Unity Day

Keeping up with Govt of India's directive to observe the birth anniversary of Sardar Vallabhbhai Patel, on October 31st October 2016 as "Rashtriya Ekta Diwas' (National Unity Day),NIPER-A organized a 'Run for Unity' event to commemorate this event. As a part of celebrating this event,Faculty and students expressed their views on this day, emphasizing eminent work and efforts taken by Sardar Vallabhbhai Patel to build our nation.

Vigilance Awareness Week Celebration

NIPER-Ahmedabad celebrated vigilance awareness week from 31st October to 5th November 2016. The theme of the event was "**Public Participation in promoting Integrity and Eradicating Corruption".**

Various competitions were organized during this period. Prof.Shisoo, Ex Principal LM College of Pharmacy was the chief guest for this event.

अहमदाबाद
AHMEDABAD

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