

ANUPAMA MITTAL

Anupama Mittal, M.S. (Pharm), Ph.D.
Professor, Department of Pharmaceutics
National Institute of Pharmaceutical Education & Research (NIPER), SAS
Nagar, Punjab-160062
Co-founder, Nanobrid Innovations Pvt. Ltd.
E-mail: anupamamittal@niper.ac.in



Educational Qualification

Degree	Institute	Field	Year
Ph.D.	NIPER, SAS Nagar, Punjab	Pharmaceutical Sciences	2007-2012
M. S.(Pharm)	NIPER, S.A.S. Nagar	Pharmaceutics	2005-2007
B. PHARMACY	DIPSAR, Delhi University	Pharmacy	2001-2005

Research/Training Experience

Positions held	Duration	Institute
Professor	Dec 2024-present	NIPER, SAS Nagar
Associate Professor	June 2021-Dec 2024	BITS Pilani, Pilani, Rajasthan
Cross-appointed Assistant professor	01 March 2021-31 March 2023	Hiroshima University, Japan
Assistant professor	June 2014-May 2021	BITS Pilani, Pilani, Rajasthan
Visiting Research Scholar	2012- 2013	University of Tennessee Health Science Center (UTHSC), Memphis, TN, USA
Post-Doctoral Research Associate	2013- 2014	University of Nebraska Medical Center (UNMC), Omaha, NE, USA

Research specialization

- Nanotechnology based drug delivery strategies for peptides and small molecule drugs including lipidic and polymeric nanoparticles, polymeric micelles and polymer drug conjugates for diabetes and cancer
- Stem cells based exosomes as delivery vehicles for drugs and miRNAs
- Regenerative medicine (wound healing)
- Delivery strategies for miRNA and CRISPER-Cas

Technology Transfers (02)

- Surfactant free, self-assembling micelles of fatty acid conjugated to hydrophilic drug and method for preparing the same: *Anya Capital Holdings Limited*
- Orally active nanoformulation of Lisofylline and composition thereof: *Anya Capital Holdings Limited*

Patents (12)

Patents granted

1. Anupama Mittal, Kishan S. Italiya, Samrat Mazumdar, Deepak Chitkara. Surfactant free, self-assembling micelles of fatty acid conjugated to hydrophilic drug and method for preparing the same. Indian Patent # 389948 Grant Dtd: 22/2/22.
2. Anupama Mittal, Kishan S. Italiya, Samrat Mazumdar and Deepak Chitkara. Orally active nanoformulation of Lisofylline and composition thereof. Indian Patent # 395354 Grant Dtd: 25/4/22
3. Deepak Chitkara, Deepak K. Sahel, Kishan S. Italiya, Saurabh Sharma, Shruti Shah and Anupama Mittal. A Drug Conjugate and method of preparation thereof. Indian Patent # 393113 Grant Dtd: 26/3/22
4. Deepak Chitkara, Sudeep S. Pukale, Arihant K Singh, Anupama Mittal, Saurabh Sharma. A lipid-polymer hybrid nanoparticle. Patent # 387187 Grant Dtd: 24/01/22

Patent Filed

1. Lipopolymeric System for Delivery of miRNA and method of preparation thereof. 2023, Indian patent application 202311073652.
2. Cationic polymer holding therapeutically active ingredient for sustained release and method of preparing the same. 2023, Indian patent application 202311043000.
3. Polymeric Nano complexes holding therapeutically active ingredient for sustained release and method of preparing the same. 2023, Indian patent application 202311043001
4. Polymeric Nano-Formulation for Delivery of Temozolomide and Method Of Preparing The Same. 2023, Indian patent application #202311047526.
5. Anupama Mittal, Arihant K Singh, Shubham A Salunkhe, Deepak Chitkara. Formulation of peptide nano-complexes for delivery of peptide and method of preparation. 2023, Indian patent application 202311047523
6. Deepak Chitkara, Deepak K. Sahel, Imran Ansari, Anupama Mittal. CRISPR/CAS9 ribonucleoprotein lipo-polymeric nanoplexes and method of preparation thereof, 2020, Indian patent application 202011052036
7. A lipid-polymer hybrid nanoparticle. 2021, US20210369631A1 (application published, under examination) PCT/IB2020/050819, PCT Filed on Feb 03 2020.
8. Deepak Chitkara, Imran Ansari, Dr. Anupama Mittal. Novel Functionalized Cholesterol Molecules. 2023, Indian patent application 202311019415.

Edited Book

Deepak Chitkara, **Anupama Mittal**, and Ram I. Mahato, "Molecular Medicines for Cancer: Concepts and Applications of Nanotechnology", CRC Press, Taylor Francis, Florida, USA, ISBN: 9781351978378, Release Date: 03/09/2018

Guest Editor

Special Section on Nanotechnology based Delivery Strategies for Protein and Peptide Therapeutics. A Mittal and D Chitkara. *Journal of Pharmacology and Experimental Therapeutics*. 2024, 388, 37-38.

Publications

- Guha S, Jagadeesan Y, Pandey MM, Mittal A, Chitkara D. Targeting the epigenome with advanced delivery strategies for epigenetic modulators. *Bioeng Transl Med*. 2024; 10, e10710.
- Narisepalli S, Salunkhe SA, Chitkara D, Mittal A. Neurotensin Conjugated Polymeric Porous Microparticles Suppress Inflammation and Improve Angiogenesis Aiding in Diabetic Wound Healing. *Macromol Biosci*. 2024, e2400406

- Sahel DK, Giriprasad G, Jatyan R, Guha S, Korde A, Mittal A, Bhand S, Chitkara D. Next-generation CRISPR/Cas-based ultrasensitive diagnostic tools: current progress and prospects. *RSC Adv.* 2024, 14, 32411-32435
- Moumita Basak, Mrunal Kulkarni, Saibhargav Narisepalli, Deepak Chitkara, Anupama Mittal, Exosomal fragment enclosed Polyamine-salt nano-complex for co-delivery of Docetaxel and miR-34a exhibits higher cytotoxicity and apoptosis in breast cancer cells, *Sci Rep*, 2024, 14, 21669.
- Pratik Pramod Shinde, Deepak Chitkara, Anupama Mittal. Downregulation of miR-29b in Cancer and Fibrosis: Molecular Insights & Clinical Implications. *Drug Discovery Technology*, 2024, 29, 104190.
- Arihant Kumar Singh, Kommera Sai Pradyuth, Deepak Chitkara, Anupama Mittal. Restoring Physiological Parameters of Pancreas and Kidney by Treatment with a Polymeric Nano-Formulation of C-Peptide and Lisofylline Combination in Diabetic Nephropathy. *Nanoscale (RSC)*, 2024, 16, 16058-16074.
- Arihant Kumar Singh, Shubham A Salunkhe, Deepak Chitkara, Anupama Mittal. Potent anti-inflammatory and anti-apoptotic activities electrostatically complexed C-peptide nanospheres ameliorate diabetic nephropathy. *Biomaterials Advances*, 2024, 213935.
- Tharmatt A, Sahel DK, Jatyan R, Kumari A, Mishra A, Mittal A, Chitkara D. Lipo-polymeric nano-complexes for dermal delivery of a model protein. *RSC Adv.* 2024; 14, 20351-20364.
- Deepak Kumar Sahel, Sangam Giri Goswami, Reena Jatyan, Abhay Tharmatt, Vivek Singh, Manu Dalela, Sujata Mohanty, Anupama Mittal, Sivaprakash Ramalingam, Deepak Chitkara cRGD-modified hybrid lipopolymeric nanoplexes for gene editing in the posterior segment of the eye. *International Journal of Biological Macromolecules*, 2024, 271, 132426.
- A Mittal and D Chitkara. Special Section on Nanotechnology based Delivery Strategies for Protein and Peptide Therapeutics. *Journal of Pharmacology and Experimental Therapeutics. EDITORIAL*, 2024, 388, 37-38.
- Moumita Basak, Sai Bhargava Narisepalli, Shubham Arun Salunkhe, Swasti Tiwari, Deepak Chitkara, A Mittal. Macrophage derived Exosomal Docetaxel (Exo-DTX) for pro-metastasis suppression: QbD driven formulation development, validation, in vitro and pharmacokinetic investigation. (*European Journal of Pharmaceutics and Biopharmaceutics*, 2024, 195, 114175)
- Sai Pradyuth Kommera, Arihant Singh Kumar, Deepak Chitkara, Anupama Mittal. Pramlintide an Adjunct to Insulin Therapy: Challenges and Recent progress in delivery. (*Journal of Pharmacology and Experimental Therapeutics*, 2024, 388, 81-90)
- A Tharmatt, DK Sahel, R Jatyan, A Kumari, A Mishra, A Mittal, D Chitkara. Lipo-polymeric nano-complexes for dermal delivery of a model protein. *RSC advances*, 2024 14 (28), 20351-20364
- Belinostat loaded lipid-polymer hybrid nanoparticulate delivery system for Breast Cancer: Improved Pharmacokinetics and Biodistribution in tumor model. K. Sai Pradyuth, Shubham A. Salunkhe, Arihant Kumar Singh, Deepak Chitkara, Anupama Mittal. *Journal of Materials Chemistry B*, 2023, DOI: 10.1039/D3TB01317K. Online ahead of print.
- Enhanced anti-tumor efficacy and tumor accumulation of Tamoxifen through cRGD functionalized cholesterol based lipopolymeric nanoparticles for targeted breast cancer therapy. Samrat Mazumdar, Saibhargav Narisepalli, Arihant Kumar Singh, Deepak Chitkara, Anupama Mittal. *Journal of Drug Delivery Science and Technology*, 2023, 90, 105173
- Human umbilical cord blood-mesenchymal stem cell derived exosomes as an efficient nanocarrier for Docetaxel and miR-125a: Formulation optimization and anti-metastatic behavior. Moumita Basak, Biswajit Sahoo, Dharmendra Kumar Chaudhary, SaiBhargav Narisepalli, Swasti Tiwari, Deepak Chitkara, Anupama Mittal. *Life Sciences* 2023, 322, 121621.
- Pramlintide an Adjunct to Insulin Therapy: Challenges and Recent progress in delivery. Sai Pradyuth Kommera, Ankur Kumar, Deepak Chitkara, Anupama Mittal. *Journal of Pharmacology and Experimental Therapeutics*, 2023, Accepted.

- Topical delivery of Anti-VEGF nanomedicines for treating psoriasis. A Tharmatt, DK Sahel, K Raza, MM Pandey, A Mittal, D Chitkara. *Journal of Drug Delivery Science and Technology* 83, 104365.
- Temozolomide-fatty acid conjugates for glioblastoma multiforme: In vitro and in vivo evaluation. Reena Jatyan, Deepak Kumar Sahel, Prabhjeet Singh, Rajeev Sakhuja, Anupama Mittal, Deepak Chitkara. *Journal of Controlled Release* 2023, 359, 161-174.
- Asiaticoside polymeric nanoparticles for effective diabetic wound healing through increased collagen biosynthesis: In-vitro and in-vivo evaluation. Saibhargav Narisepalli, Shubham A. Salunkhe, Deepak Chitkara, Anupama Mittal. *International Journal of Pharmaceutics*, 2023, 631, 122508
- Immunocyte Derived Exosomes: Insight into the Potential Chemo-immunotherapeutic Nanocarrier Targeting the Tumor Microenvironment. Moumita Basak, Dharmendra Kumar Chaudhary, Ryou-u Takahashi, Yuki Yamamoto, Swasti Tiwari, Hidetoshi Tahara, Anupama Mittal. *ACS Biomaterials Science & Engineering*, 2023, 9, 20-39.
- Lipopolymeric nanocarrier enables effective delivery of CRISPR/Cas9 expressing plasmid. Deepak Kumar Sahel, Sangam Giri Goswami, Reena Jatyan, Anupama Kumari, Anupama Mittal, Sivaprakash Ramalingam, Deepak Chitkara. *Macromolecular Rapid Communications*, 2023, 2300101.
- Cationic lipopolymeric nanoplexes containing the CRISPR/Cas9 ribonucleoprotein for genome surgery. Deepak Kumar Sahel, Mohd Salman, Mohd Azhar, Sangam Giri Goswami, Vivek Singh, Manu Dalela, Sujata Mohanty, Anupama Mittal, Sivaprakash Ramalingam, Deepak Chitkara. *Journal of Material Chemistry B* 2022, 10, 7634-7649
- Polymeric and small molecule-conjugates of temozolomide as improved therapeutic agents for glioblastoma multiforme. ReenaJatyan, Prabhjeet Singh, Deepak K Sahel, Y G Karthik, Anupama Mittal, Deepak Chitkara. *Journal of Controlled Release*, 2022, 350, 494-513.
- Exploration of lipid based nano carriers as drug delivery systems in diabetic foot ulcer. Bhaskar Kandregula, Saibhargav N., Deepak Chitkara, Anupama Mittal. *Molecular Pharmaceutics*, 2022, 19, 1977–1998
- Delivery strategies for CRISPR/Cas Genome editing tool for retinal dystrophies: challenges and opportunities. Aayushi Lohia, Deepak Kumar Sahel, Mohammad Salman, Vivek Singh, Indumathi Mariappan, Anupama Mittal, Deepak Chitkara (*Asian Journal of Pharmaceutical Sciences*, 2022, 17, 153-176)
- Coenzyme Q10 loaded lipid-polymer hybrid nanoparticles in gel for the treatment of psoriasis like skin condition. SS Pukale, DK Sahel, A Mittal, D Chitkara. *Journal of Drug Delivery Science and Technology*, 2022, 76, 103672.
- Lipid based Nanocarriers for effective Drug Delivery and Treatment of Diabetes Associated Liver Fibrosis. Shubham Salunkhe, Deepak Chitkara, Ram I. Mahato, Anupama Mittal. *Advanced Drug Delivery Reviews*, 2021, 173, 394-415.
- Topical Application of Vitamin D₃-Loaded Hybrid Nanosystem to Offset Imiquimod-Induced Psoriasis. SS Pukale, A Mittal, D Chitkara. *AAPS PharmSciTech*, 2021, 22, 1-17
- Folate Targeted Hybrid Lipo- Polymeric Nanoplexes Containing Docetaxel and miRNA 34a for Breast Cancer Treatment. Saurabh Sharma, Sudeep Pukale, Deepak Kumar Sahel, Prabhjeet Singh, Anupama Mittal, Deepak Chitkara *Materials Science & Engineering C*, 2021, 128, 112305.
- 2,2-Bis(hydroxymethyl) propionic acid based cyclic carbonate monomers and their (co)polymers as advanced materials for biomedical applications. Imran Ansari, Prabhjeet Singh, Anupama Mittal, Ram I Mahato, Deepak Chitkara. *Biomaterials*, 2021, 275, 120953.
- Nanoparticulate tablet dosage form of lisofylline-linoleic acid conjugate for type 1 diabetes: in situ single-pass intestinal perfusion (SPIP) studies and pharmacokinetics in rat. *Italiya, K.S., Singh, A.K., Chitkara, D., Mittal A. AAPS PharmSci Tech* 22, 2021, 114.

- Exploration and insights into the cellular internalization and intracellular fate of amphiphilic polymeric nanocarriers. Samrat Mazumdar, Deepak Chitkara, Anupama Mittal. *Acta Pharmaceutica Sinica B*, 2021, 11, 903-924.
- Opportunities and Challenges of Fatty Acid Conjugated Therapeutics. Medha Bhat, Reena Jatyan, Anupama Mittal, Ram I Mahato, Deepak Chitkara. *Chemistry and Physics of Lipids*, 2021, 236, 105053.
- Nano-enabled topical delivery of anti-psoriatic small molecules, Medha Bhat, Sudeep Pukale, Saurabh Singh, Anupama Mittal, Deepak Chitkara. *Journal of Drug Delivery Science and Technology*, 2021, 62, 102328.
- Folate-targeted cholesterol-grafted lipo-polymeric nanoparticles for chemotherapeutic agent delivery. Saurabh Sharma, Sudeep Sudesh Pukale, Deepak K Sahel, Devesh S Agarwal, Manu Dalela, Sujata Mohanty, Rajeev Sakhuja, Anupama Mittal, Deepak Chitkara. (*AAPS PharmSciTech*, 2020, 21, 1-21)
- Therapeutic agents for targeting desmoplasia: Current status and emerging trends. Tania Nandi, Sai Pradyuth, Arihant Kumar Singh, Deepak Chitkara, Anupama Mittal. *Drug Discovery Today*, 2020, S1359-6446, 30365-72.
- Surface functionalization of exosomes for target-specific delivery and in vivo imaging & tracking: Strategies and significance Shubham Salunkhe, Dheeraj, Moumita Basak, Deepak Chitkara, Anupama Mittal. *Journal of Controlled Release*, 2020, 326, 599-614
- RNAi Nanotherapeutics for treatment of Glioblastoma Multiforme. Prabhjeet Singh, Aditi Singh, Shruti Shah, Jalpa Vatalia, Anupama Mittal and Deepak Chitkara. *Molecular Pharmaceutics*, 2020, 17, 4040-4066
- Multi-component clobetasol-loaded monolithic lipid-polymer hybrid nanoparticles ameliorate imiquimod-induced psoriasis-like skin inflammation in Swiss albino mice. Sudeep Sudesh Pukale, Saurabh Sharma, Manu Dalela, Arihant kumar Singh, Sujata Mohanty, Anupama Mittal, Deepak Chitkara. *Acta Biomaterialia*, 2020, 115,393-409
- Docetaxel and its nanoformulations: how delivery strategies could impact the therapeutic outcome? Saurabh Sharma, Sudeep Sudesh Pukale, Anupama Mittal, Deepak Chitkara. (*Therapeutic delivery*, 2020, 11, 755-759)
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- Samrat Mazumdar, Kishan S italiya, Saurabh Sharma, Deepak Chitkara, Anupama Mittal. Effective cellular internalization, cell cycle arrest and improved pharmacokinetics of Tamoxifen by cholesterol based lipopolymeric nanoparticles. *Int. J. Pharm.*, 2018, 543, 96-106.
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- Kishan S. Italiya, Saurabh Sharma, Ishit Kothari, Deepak Chitkara, Anupama Mittal. Simultaneous estimation of lisofylline and pentoxifylline in rat plasma by high performance liquid chromatography-photodiode array detector and its application to pharmacokinetics in rats. *Journal of Chromatography B*, 2017, 1061–1062.
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- Anupama Mittal and Neeraj Kumar A new, bioactive, antibacterial-eluting, composite graft for infection-free wound healing. *Wound Repair Regen.* 2014, 22, 527-36.
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Book Chapters

- Saibhargav Narisepalli, Deepak Chitkara, Anupama Mittal. Recent advancements in lipid based nanocarrier systems for the treatment of wounds. . Elsevier *Scheduled Release in 2024 (Under review)*
- Vinayak Sadashiv Mharugde, Sudeep Pukale, Saurabh Sharma, Anupama Mittal, Deepak Chitkara, "Advancements in Polymeric Systems for Nucleic Acid Delivery Molecular Medicines for Cancer". In *Molecular Medicines for Cancer: Concepts and Applications of Nanotechnology*", CRC Press, 2018, PP 473-492
- Shalini Verma, Kalpna Garkhal, Anupama Mittal and Neeraj Kumar, Biodegradable polymers for emerging clinical use in tissue engineering, in "Biodegradable polymers in clinical use and clinical development", 2011, (Eds. Abraham J. Domb, Neeraj Kumar, Aviva Ezra) John Wiley and Sons, Inc., ISBN No. 978-0-470-42475-9, 555-619.
- Anupama Mittal, Deepak Chitkara, Rajendra Pawar, Neeraj Kumar, Avi Domb and Ben Corn, Polymeric carriers for regional drug therapy, in "Smart Polymers: Production, study and application in biotechnology and biomedicine", 2008 (Eds. Igor Galaev and Bo Mattiasson) CRC Publications, ISBN No. 978-0-8493-9161-3, 359-400.

Financial support received

1. **Indo-Japan Bilateral Research Project by DST-JSPS (2023-2025):** Systemic delivery of senescence associated miRNA-3140 in pleural mesothelioma tumor by a multifunctional cationic nanocarrier (PI)
2. **DBT Builder project (2021-2026) Interdisciplinary Life Science Program for Advanced Research and Education in Epigenetics and Genome Editing:** Nano-carrier mediated targeted delivery of therapeutics to suppress epigenetic modulation in diabetic nephropathy (Co-I) **(9.018 Cr)**
3. **Core Research Grant by DST-SERB (2019-2022):** "Peptide tethered multifunctional cationic nanocomplexes for delivery of IL-1 receptor antagonist for treatment of type 2 diabetes mellitus" (PI) **(40.46 L)**
4. **DST sponsored Interdisciplinary Cyber-Physical Systems (NM-ICPS) Technology Innovation Hubs (TIHs)-** Member of the Bio-CPS team. "Exosome as prognostic and Diagnostic marker" (Co-I) **(50 L)**
5. **Extramural project by ICMR (2019-2022):** "Gel-based composite formulation containing asiaticoside and neurotensin for rapid healing of diabetic wounds" (PI) **(25.67 L)**
6. **Task force project under in Nanomedicine by ICMR (2019-2022):** "Self-assembling, pH-sensitive temozolomide conjugate nanomedicine for treatment of glioblastoma multiforme" (Co-I) **(25.12 L)**
7. **Nano-intervention in Management of Ophthalmic Diseases by DBT (2018-2022):** "cRGD decorated lipo-polymeric nanoplexes of CRISPR/Cas9 ribonucleoprotein (RNP) for the management of retinal dystrophic conditions" (Co-I) **(125 L)**

8. **Extramural project by DST Nanomission (2018-2021):** "Umbilical Cord Mesenchymal Stem Cells Derived Exosomes as Biogenic Nanocarriers of miRNA and Chemotherapeutic Drug for Reversal of Chemoresistance in Breast Cancer" (PI) (**Total-56.46 L**)
9. **Extramural project by DST-Rajasthan (2016-2020):** "Cyclic RGD modified lipopolymeric micelles for targeted delivery of Tamoxifen in ER+ breast cancer" (PI) (**12.53 L**)
10. **Young scientists Award by DST-SERB (2015-2018):** "Nano-formulation of lysophylline-fatty acid conjugate for effective treatment of diabetes" PI (**26.90 L**)
11. **BITS Research Initiation grant (2014-2016):** "Development and Evaluation of Lipo-polymeric Micelles for Drug Delivery" (**02 L**)

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