



Assistant Professor

Dr. Amit Patwa

Division of Chemistry, School of Science

Qualifications

BSc, MSc, PhD

- Doctor of Philosophy (PhD) from the National Chemical Laboratory, Pune, Maharashtra, India
- PhD Thesis Title: 'DNA-Ferrocene Covalent Adducts for Studying DNA Conductance and Engineering Molecular Recognition Switch of DNA Base Pairing'
- Research Guide: Prof. Krishna. N. Ganesh; Research Co-Guide: Dr. Vajjayanti A. Kumar
- Master of Science (MSc) Organic Chemistry from The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India
- Bachelor of Science (BSc) Chemistry from The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India

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Profile

Dr. Amit Patwa joined Navrachana University in October 2017 as an Assistant Professor. Prior to that, he worked as a post-doctoral research fellow in the laboratory of Prof. Mark W. Grinstaff at Boston University, Boston, USA. He was involved in synthesis, characterisation and purification of

- i) Contrast agent for sensitive and quantitative cartilage imaging,
- ii) Polymer and polymeric hydrogel for biomedical applications,
- iii) Photoresponsive Crosslinker for light-induced cleavage and biomedical release application.

As post-doctoral research fellow in the laboratory of Prof. Philippe Barthélémy at INSERM, France, he was involved in three different projects. His post-doctoral research work involved molecular recognition and the use of bio-inspired amphiphiles (e.g. Glycosylated Nucleoside Lipids (GNLs), Locked Nucleic Acid (LNA)-based nucleolipids, oligonucleotides-based nucleolipids, etc.) to create novel supramolecular assemblies for multiple applications ranging from molecular building blocks for self-assemblies, to nucleic acids imaging to drug or biomolecule delivery systems.

During the course of his doctoral research (under the guidance of Prof. Krishna. N. Ganesh and Vijayanti. A. Kumar at NCL), he was involved in the studies towards the design, synthesis and X-ray crystal structure studies of ferrocene-nucleobase conjugates. The results are interesting from the point of understanding and engineering supramolecular assemblies through rational design of base pairing patterns.

Before his doctoral research, he was working as Project Assistant in polymer chemistry division. The objective of the project was to provide a narrow polydispersity polymer with photo initiation at room temperature and providing controlled/'living' radical polymerization utilising visible light thereby avoiding the use of free radical initiator. During this period, experience in synthetic organic chemistry and photochemical polymerization using synthesized initiating system were gained.

Immediately after his master's degree, he was working in a company 'Synth Services' - a custom manufacturer of specialty chemicals and drug intermediates. During this period, he gained experience in pure synthetic organic chemistry. During his tenure, he had an opportunity to work in a process development plant where he gained experience in high vacuum distillation and handling of hazardous chemicals on kilogram scale. With these experiences, he now describes himself as a synthetic organic chemist who is keen to understand the biochemical processes in the living organism with the knowledge of bio-organic chemistry.

Research Vision

He gained extensive research experience (more than 14 years) in the field of synthetic organic chemistry, nucleic acid chemistry, molecular recognition & supramolecular chemistry and bio-organic chemistry. Over the years his research approaches have been experiencing transformations from pure synthetic organic chemistry to bio-organic chemistry to nucleic acid chemistry.

Understanding the momentousness of present research scenario, he developed a strong interest in interdisciplinary research that will provide scope for diversity of experimental and intellectual approaches that include: synthetic organic chemistry, bio-organic chemistry, molecular recognition and supramolecular chemistry.

His basic research question has always been to develop a contrivance for better understanding of biochemical processes in the living organism to address questions of importance in biology and medicine. His involvement as research fellow at NCL and postdoctoral fellow at INSERM and Boston University has given him ample opportunities to interact with several scientists in India, France, UK and USA. This has immensely contributed to his scientific development. In the near future, he would like to conduct an interdisciplinary research collaborating with these scientific partners in addition to new collaborators. His research vision calls for the development of a laboratory where synthesis and application of bio-inspired molecules will be the central theme. Research demands effective communication with the scientific community and stakeholders. Therefore, he looks forward to publishing his research team's work in high-impact journals.

Teaching

Professor Patwa has more than three years of teaching experience in the field of Organic Chemistry and related areas at post-graduate and undergraduate level (MSc and BSc). His teaching philosophy can better be described as a philosophy of learning. Therefore, it is much effective in teaching the students how to learn, rather than giving mere facts. Learning through active interaction between an instructor and a student is a part of teaching. Thus, his goal is to ensure students have a better understanding of basic concepts, theories and practical knowledge so that they may apply this information to their future research or professional activities.

List of Publications

Total Publications: 23 | Total Citation: 490 | h-index: 13 | i10-index - 16

- Brad B. Nelson, Janne T. A. Mäkelä, Taylor B. Lawson, Amit N. Patwa, Brian D. Snyder, C. Wayne McIlwraith, Mark W. Grinstaff, Laurie R. Goodrich and Chris E. Kawcak, Cationic contrast-enhanced computed tomography distinguishes between reparative, degenerative, and healthy equine articular cartilage. *Journal of Orthopaedic Research*, 2020, doi: 10.1002/jor.24894.

- Anna M. McDermott, Samuel Herberg, Devon E. Mason, Joseph M. Collins, Hope B. Pearson, James H. Dawahare, Rui Tang, Amit N. Patwa, Mark W. Grinstaff, Daniel J. Kelly, Eben Alsberg and Joel D. Boerckel, Recapitulating bone development through engineered mesenchymal condensations and mechanical cues for tissue regeneration, *Science Translational Medicine*, 2019, 11, 495, eaav7756. (Impact Factor: 16.304)
- Brad B. Nelson, Janne T.A. Mäkelä, Taylor B. Lawson, Amit N. Patwa, Myra F. Barrett, C. Wayne McIlwraith, Mark B. Hurtig, Brian D. Snyder, Valerie J. Moorman, Mark W. Grinstaff, Laurie R. Goodrich, Chris E. Kawcak, Evaluation of Equine Articular Cartilage Degeneration After Mechanical Impact Injury Using Cationic Contrast-Enhanced Computed Tomography, *Osteoarthritis and Cartilage*, 2019, 27, 1219-1228. (Impact Factor: 4.793)
- Benjamin Dourthea, Reza Nickmaneshb, David R. Wilsonb, Priscilla D'Agostinoa, Amit N. Patwa, Mark W. Grinstaff, Brian D. Snyder, Evie Vereecke, Assessment of healthy trapeziometacarpal cartilage properties using indentation testing and contrast-enhanced computed tomography, *Clinical Biomechanics*, 2019, 61, 181-189. (Impact Factor: 1.624)
- Brad B. Nelson, Rachel C. Stewart, Chris E. Kawcak, Jonathan D. Freedman, Amit N. Patwa, Brian D. Snyder, Laurie R. Goodrich, Mark W. Grinstaff, Quantitative Evaluation of Equine Articular Cartilage Using Cationic Contrast-Enhanced Computed Tomography, *Cartilage*, 2018, DOI: 10.1177/1947603518812562. (Impact Factor: 3.857)
- Bruno Alies, Mohamed A. Ouelhazi, Amit Patwa, Julien Verget, Laurence Navailles, Valérie Desvergnés and Philippe Barthélémy, Cytidine- and guanosine-based nucleotide-lipids, *Organic & Biomolecular Chemistry*, 2018, 16, 4888-4894. (Impact Factor: 3.412)
- Abhisek Bhattarai, Juuso TJ Honkanen, Katariina AH Myller, Mithilesh Prakash, Miitu Korhonen, Annina EA Saukko, Tuomas Virén, Antti Joukainen, Amit N Patwa, Heikki Kröger, Mark W Grinstaff, Jukka S Jurvelin, Juha Töyräs, Quantitative Dual Contrast CT Technique for Evaluation of Articular Cartilage Properties, *Annals of Biomedical Engineering*, 2018, 46(7), 1038-1046. (Impact Factor: 3.324)
- Rachel C. Stewart, Amit N. Patwa, Hrvoje Lusic, Jonathan D. Freedman, Michel Wathier, Brian D. Snyder, Ali Guerhazi, and Mark W. Grinstaff, Synthesis and preclinical characterisation of a cationic iodinated imaging contrast agent (CA4+) and its use for quantitative computed tomography of ex vivo human hip cartilage, *Journal of Medicinal Chemistry*, 2017, 60 (13), 5543-5555. (Impact Factor: 6.205)
- Patwa, A.; Thiéry, A.; Lombard, F.; Lilley, M. K. S.; Boisset, C.; Bramard, J.-F.; Bottero, J.-Y.; Barthélémy, P. Accumulation of nanoparticles in 'jellyfish' mucus: a bioinspired route to decontamination of nano-waste. *Sci. Rep.* 2015, 5, 11387; doi: 10.1038/srep11387. (Impact Factor: 3.998)
- Patwa, A.; Labille, J.; Bottero, J.-Y.; Thiéry, A.; Barthélémy, P. Decontamination of nanoparticles from aqueous samples using supramolecular gels. *Chem. Commun.* 2015, 51, 2547-2550. (Impact Factor: 5.996)
- Gissot, A.; Oumzil, K.; Patwa, A.; Barthélémy, P. A hybrid lipid oligonucleotide: a versatile tool for supramolecular chemistry. *New J. Chem.* 2014, 38, 5129-5134. (Impact Factor: 3.288)
- Latxague, L.#; Patwa, A.#; Amigues, E.; Barthélémy, P. Glycosyl-Nucleolipids as New Bioinspired Amphiphiles. *Molecules* 2013, 18, 12241-12263. (#) These authors contributed equally to this work. (Impact Factor: 3.267)
- Patwa, A.; Salgado, G.; Dole, F.; Navailles, L.; Barthelemy, P. Tuning Molecular Interactions in Lipid-oligonucleotides Assemblies via Locked Nucleic Acid (LNA)-based Lipids. *Org. Biomol. Chem.* 2013, 11, 7108-7112. (Graphics was selected as inside front cover of the same issue.) (Impact Factor: 3.412)
- Aimé, A.; Beztsinna, N.; Patwa, A.; Pokolenko, A.; Bestel, I.; Barthélémy, P. Quantum Dot Lipid Oligonucleotide Bioconjugates: Toward a New anti-microRNA Nanoplatform. *Bioconjug. Chem.* 2013, 24, 1345-1355. (Impact Factor: 4.031)
- Dolain, C.; Patwa, A.; Godeau, G.; Barthélémy, P. Nucleic Acid Based Fluorinated Derivatives: New Tools for Biomedical Applications. *Appl. Sci.* 2012, 2, 245-259. (Impact Factor: 3.044)

- Ziane, S.; Schlaubitz, S.; Miraux, S.; Patwa, A.; Lalande, C.; Bilem, I.; Lepreux, S.; Rousseau, B.; Le Meins, J.-F.; Latxague, L.; Barthélémy, P.; Chassande, O. A Thermosensitive Low Molecular Weight Hydrogel as Scaffold for Tissue Engineering. *Eur. Cell. Mater.* 2012, 23, 147-160. (Impact Factor: 3.741)
- Latxague, L.; Dalila, M.-J.; Patwa, A.; Ziane, S.; Chassande, O.; Godeau, G.; Barthélémy, P. Glycoside Nucleoside Lipids (GNLs): An Intrusion into the Glycolipids' World? *Comptes Rendus Chim.* 2012, 15, 29-36. (Impact Factor: 2.223)
- Latxague, L.; Ziane, S.; Chassande, O.; Patwa, A.; Dalila, M.-J.; Barthélémy, P. Glycosylated Nucleoside Lipid Promotes the Liposome Internalisation in Stem Cells. *Chem. Commun.* 2011, 47, 12598-12600. (Graphics was selected as back cover of the same issue.) (Impact Factor: 5.996)
- Patwa, A.; Gissot, A.; Bestel, I.; Barthélémy, P. Hybrid Lipid Oligonucleotide Conjugates: Synthesis, Self-assemblies and Biomedical Applications. *Chem. Soc. Rev.* 2011, 40, 5844-5854. (Impact Factor: 42.846)
- Patwa, A. N.; Gonnade, R. G.; Kumar, V. A.; Bhadbhade, M. M.; Ganesh, K. N. Ferrocene-bis(thymine/uracil) Conjugates: Base Pairing Directed, Spacer Dependent Self-assembly and Supramolecular Packing. *J. Org. Chem.* 2010, 75, 8705-8708. (Impact Factor: 4.335)
- Patwa, A. N.; Gupta, S.; Gonnade, R. G.; Kumar, V. A.; Bhadbhade, M. M.; Ganesh, K. N. Ferrocene-linked Thymine/uracil Conjugates: Base Pairing Directed Self-assembly and Supramolecular Packing. *J. Org. Chem.* 2008, 73, 1508-1515. (Impact Factor: 4.335)
- Patwa, A. N.; Tomer, N. S.; Singh, R. P. Visible Light-induced Controlled/'living' Radical Polymerization of Styrene. *J. Mater. Sci.* 2004, 39, 1047-1049. (Impact Factor: 3.553)
- Singh, R. P.; Patwa, A. N.; Desai, S. M.; Pandey, J. K.; Solanky, S. S.; Vishwa Prasad, A. Synthesis of New Polymeric Hindered Amine Light Stabilizers: Performance Evaluation in Styrenic Polymers. *J. Appl. Polym. Sci.* 2003, 90, 1126-1138. (Impact Factor: 2.520)

Book Chapter

1. Kern, A., Seitz, O., Patwa, A., Gissot, A., Oumzil, K., Barthélémy, P., Strazewski, P., Latorre, A. and Somoza, Á. (2014) Conjugation of DNA with Biomolecules and Nanoparticles, in *DNA in Supramolecular Chemistry and Nanotechnology* (eds E. Stulz and G. H. Clever), John Wiley & Sons, Ltd, Chichester, UK. doi: 10.1002/9781118696880.ch4.

Patent and Enveloppe Soleau

1. Philippe Barthélémy, Alain Thiéry, Amit Patwa. Hydrogel-based decontamination of aqueous samples containing nanoparticles. US Patent App. 14/374,676, 2013.
2. Patwa, A.; Thiéry, A. and Barthélémy, P. Nanoparticles decontamination by nanostructure gels (2011) Env. Soleau N° 412082, Institut National de la Propriété Industrielle (INPI). 03-2011.

International Conference Papers (Co-author)

1. Effect of Molecule Structure to the Diffusion of the Cationic Contrast Agent CA4+ 'Orthopaedic Research Society-ORS 2019 Annual Meeting (Paper No. 0228)' held on 2nd - 5th February 2019 at Austin Convention Center, Austin, TX, USA, organised by Orthopaedic Research Society (ORS).
2. CA4+ Contrast Enhanced MicroCT Imaging of Fixed Articular Cartilage Tissues and Feasibility of Histology. 'Orthopaedic Research Society-ORS 2019 Annual Meeting (Poster No. 1348)' held on- 5th February 2019 at Austin Convention Centre, Austin, TX, USA, organised by Orthopaedic Research Society (ORS).
3. Tantalum oxide nanoparticles for use in contrast enhanced computed tomography. '256th American Chemical Society National Meeting and Exposition' held between 19th - 23rd August 2018 at Boston Convention & Exhibition Center, Boston, MA, USA, organised by American Chemical Society (ACS).

4. PEGylated-hydrogel matrix for sustained release of proteins. '256th American Chemical Society National Meeting and Exposition' held between 19th - 23rd August 2018 at Boston Convention & Exhibition Center, Boston, MA, USA, organised by American Chemical Society (ACS).
5. Tantalum Oxide Nanoparticles for use in Contrast Enhanced Computed-Tomographic Imaging of Articular Cartilage. 'Orthopaedic Research Society-ORS 2018 Annual Meeting (Poster No.1186)' held between 10th - 13th March 2018 at Hyatt Regency New Orleans, New Orleans, LA, USA, organised by Orthopaedic Research Society (ORS).
6. Cationic Contrast-Enhanced Computed Tomography Biomarkers Distinguish Reparative and Degenerative Articular Cartilage in an Equine Model. 'Orthopaedic Research Society-ORS 2018 Annual Meeting (Paper No.0037)' held between 10th - 13th March 2018 at Hyatt Regency New Orleans, New Orleans, LA, USA, organised by Orthopaedic Research Society (ORS).

Selected Presentations

1. Large-scale Synthesis and Pre-Clinical Characterisation of a Cationic Iodinated Imaging Contrast Agent (CA4+) and Its Use for Quantitative Computed Tomography of Ex Vivo Human Hip Cartilage. '252nd American Chemical Society National Meeting and Exposition' held between 21st - 25th August 2016 at Pennsylvania Convention Center, Philadelphia, PA, USA.
2. Tuning molecular interactions in Lipid-Oligonucleotides assemblies via locked nucleic acid (LNA)-based lipids. 'IVth International Symposium on Supra Biomolecular system (Supra Bio IV-Next generation)' held on 13th and 14th June 2013 at Cassis, French Riviera, and France.
3. Glycoside nucleoside lipids (GNLs): An intrusion into the glycolipids' world? 'International Meeting on Chemical Biology (May 26-28, 2013)' held between 26th - 28th May 2013 at Indian Institute of Science Education and Research (IISER), Pune, India.
4. Synthesis, characterisation and physio-chemical studies of Locked nucleic acid (LNA)-based lipids 'XXVIth Scientific GTRV meeting' (Groupe Thematique de Recherche sur la Vectorization-Thematic Research Group of the Vectorization) held between 5th - 7th December 2011 at Université Catholique de Louvain, Brussels, Belgium.
5. Locked nucleic acid (LNA)-based lipids: Effect of the locked ribose conformation on their supramolecular assemblies. 'Sixth Cambridge Symposium on Nucleic Acids Chemistry and Biology' held between 4th - 7th September 2011 at Queens' College, Cambridge, UK.
6. Ferrocene linked thymine/uracil conjugates: Base pairing directed self-assembly and supramolecular packing. 'US-India Nanoscience and Engineering Institute (USINSEI)' held between 9th and 18th January 2008 at MGM Beach Resorts, Chennai-India.
7. Design, synthesis and characterisation of Ferrocene linked thymine/uracil conjugates: Base pairing directed self-assembly and supramolecular packing 'Asia Academic Seminar on Molecular, Supramolecular Materials with Designed Functions' held between 24th - 28th February 2007 at National Chemical Laboratory, Pune (Maharashtra)-India.
8. Synthesis and characterisation of Ferrocene linked thymine/uracil conjugates and their supramolecular assemblies 'Royal Society of Chemistry-West India Section Student Symposium 2006' held on 13th and 14th October 2006 at Department of Chemistry, Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara (Gujarat) - India.

Invited Lectures

1. Synthesis and Pre-clinical Characterisation of a Cationic Iodinated Imaging Contrast Agent CA4 and Its Use for Quantitative Computed Tomography of Ex Vivo Human Hip Cartilage. 'International Conference on Frontiers at the Chemistry-Allied Science Interface (FCASI-2018)' held on 21st and 22nd December 2018 at University of Rajasthan, Jaipur, and Rajasthan, India.
2. Cationic Iodinated Imaging Contrast Agent (CA4+) for Quantitative Computed Tomography: synthesis, pre-clinical characterisation and effect of molecular structure to the diffusion of the contrast agent. 'Advances of Chemistry of Bioactive Molecules (ACBAM-2020)' held on 17th - 18th January 2020 in the Department of Chemistry, The Maharaja Sayajirao University of Baroda, and Vadodara.

Fellowship / Awards

1. Junior Research Fellowship (2003-2005) and Senior Research Fellowship (2005-2008), awarded by the University Grants Commission, India, on the basis of National Eligibility Test (NET).
2. Lectureship Award (LS) awarded by 'University Grants Commission of India-CSIR (UGC-CSIR)', on the basis of National Eligibility Test (2002).
3. Qualified in Graduate Aptitude Test in Engineering (GATE) 2003, with a percentile score of 96.19 (All India Rank - 110, Total candidates appeared - 2936).
4. Recipient of Shri Madhavji Bhatt Prize and Dr. M. S. Patel Prize for securing the highest number of marks in first year B. Sc. (1996) and second year BSc (1997)

Affiliation

1. American Chemical Society (ACS) membership (2016-2017)