



Dr. Vinit Kumar

Professor

Specialization: DNA Nanotechnology, G-quadruplex, Tumor glycolysis, Drug discovery, Nanomedicine, bioimaging probes and cancer therapeutics

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Dr. Vinit Kumar did his M.Sc and PhD from Indian Institute of Technology Roorkee (IITR) and later he did his postdoctoral research for 5 years at Frontier Institute of Biomolecular Engineering and Research, Kobe, Japan and National Cancer Institute, Aviano, Italy. Back to India, he Joined Amity Institute of Molecular Medicine and Stem Cell Research (AIMMSCR) in 2016, where he heads 'Nucleic Acid Nanotechnology and Drug Discovery' Laboratory. He is among the first to demonstrate that in addition to possessing codes for gene expression, RNA can be used to create advance nanomaterials with tailored properties for various bio applications such as biosensing and drug delivery. Dr. Kumar's lab employs molecular engineering tools to create new functional DNA- based devices for targeted drug delivery and bioimaging. His lab is also working on the machine-learning-assisted synthesis and translation of deep-red fluorescing carbon nanoparticles as novel fluorescent probes for biomedical applications. His lab is attempting to decipher the role of higher nucleic acids structures in cancer and cancer stem cells to develop relapse free cancer therapy. His lab is identifying small molecules that recognize and stabilize genomic G- quadruplex structures in oncogenes and metabolic enzymes with very high binding affinity and selectivity for the development of next-generation therapeutics. For this purpose, he uses various biophysical, microscopic, chemical, computational and molecular biology techniques.

Awards/Honours:

Guest Editor: Seminars in Cancer Biology (IF: 17.02) (2022-)
Associate Editor: BMC Cancer (IF: 4.6) (2020-)
ECR-SERB (2019)
Postdoc Fellowship, Italian Ministry of Education, Italy (2013)
Postdoc Fellowship, FIBER, Japan (2011)
CSIR-JRF (2004)
GATE (2004)

Grants:

EMBO (2022-20230)

Title: Tumor Metabolism: Current Understandings and opportunities for novel drug discovery

DBT Welcome Trust India Alliance (2022-2023)

Title: Tumor Metabolism: Current Understandings and opportunities for novel drug discovery

Next generation Drug discovery EU (2022-2024)

Title: Structural analysis and unfolding dynamics of cMYC G-quadruplex upon Ligand binding using high filed NMR for next-generation anticancer therapeutics

UPCST (2022-2025)

Title: Synthesis and Development of Deep Red/NIR Fluorescent Carbon Nanoparticles for Targeted Tumor Imaging

SERB ECR (2018-2021)

Title: Engineering DNA Origami-Based Nanodevice for Bio-applications and Multiplex Analysis

Selected publications:

1. M. Singh, D. Sharma, A. Baliyan, M. Garg, R. Rani, **V Kumar***, "Current Understanding of Biological Interactions and Processing of DNA Origami Nanostructures: Role of Machine Learning and Implications in Drug Delivery" *Biotechnol. Adv.* 61, 108052, **2022**. [IF: 17.68]
2. N. Sharma, R. Rani, **V Kumar**, A. Kumar, "Discovery of a potent Guanidine derivative that selectively binds and stabilizes the human BCL-2 G-quadruplex DNA and downregulates the transcription" *Gene*, **2022**, (10.1016/j.gene.2022.146975) [IF: 3.3]
3. M. Singh, R Gupta, A Paciaroni, R Rani, **V Kumar*** "BCL-2 G quadruplex Binding Small Molecules: Current Status and Future Prospects in the Development of Next-generation Anticancer Therapeutics" *Drug Discovery Today*, 27, 2551-2561, **2022**. [IF: 8.37]
4. Daisuke Miyoshi D, and Saxena S, "Significant structural change in human c-Myc promoter G-quadruplex upon peptide binding in potassium" *RSC Adv.* 12, 7594-7604, **2022**. [IF:4.03]
5. Palazzolo S, Hadla M, Russo Spena C, Caligiuri I, Rotondo R, Adeel M, Kumar Vinit, Corona G, Canzonieri V, Toffoli G, Rizzolio F "An Effective Multi-Stage Liposomal DNA Origami Nanosystem for In Vivo Cancer Therapy" *Cancers*, 11, 1-12, **2019**. [IF: 6.57]
Bayda S, Hadla M , Kumar Vinit, Palazzolo S, Ambrosi E, Pontoglio E, Agostini M, Bendetti A, Riello R, Corona G, Toffoli G, Rizzolio F, "A bottom-up synthesis of carbon nanoparticles with better doxorubicin efficacy" *J. Control. Release*, 248, 144-152, **2017**. [IF: 11.46]
6. **K Vinit**, Palazzolo S, Bayda S, Corona G, Toffoli F, Rizzolio F, "DNA Nanotechnology for Cancer Therapeutics" *Theranostics*, 6, 720-725, 2016. [IF: 11.61]
7. **K Vinit**, Bayda S, Halda M, Caligiuri I, Spena CR, Palazzolo S, Kempter S, Corona G, Toffoli G, Rizzolio F, "Enhanced Chemotherapeutic Behaviour of Open-Caged DNA@Doxorubicin Nanostructures for Cancer Cells" *J. Cell. Phys.* 231, 106-110, 2016. [IF: 6.5]
8. Kumar A, **K Vinit**, "Biotemplated Inorganic Nanostructures: Supramolecular Directed Nanohybrids of Semiconductor/Metal with Nucleic Acids and their properties." *Chem. Rev.*, 114, 7044-7078, 2014. [IF: 72.08]
9. **K Vinit**, Endoh T, Murakami K, Sugimoto N, "Dehydration from conserved stem regions is fundamental for ligand dependent conformational transition of the adenine-specific riboswitch". *Chem. Commun.*, 48, 9693-9695, 2012. (Front Cover of the Journal). (This article is also part of the RSC Themed Issue of Nucleic Acids: New Life, New Materials). [IF: 6.06]
10. Kumar A, **K Vinit**, "Supramolecular -Directed Synthesis of RNA-Mediated CdS/ZnS Nanotubes". *Chem. Commun.*, 5435-5437, **2009**. [IF: 6.06]