Dr. Ashwani Kumar. N

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PROFESSIONAL ACHIEVEMENTS

I am a researcher/academician by profession and passion. The major contribution to the scientific field in my seven years of research career is the key involvement in an invention regarding the lipid nanoparticle formulation for nucleic acid (mRNA) delivery. The finding was thought to be having potential impacts in gene therapy thereby uplifting the current status of healthcare/medicine. ***The technology was transferred and licensed by Moderna Therapeutics(a reputed biotech company in USA which is one of the frontrunner in the development of COVID-19 vaccine) and received royalty for the invention***. In addition to this, I have published **14 scientific publications** in highly reputed international journals and filed **two provisional patent applications** at USPTO over the years. I have presented my scientific findings at more than 17 international conferences/seminars also. My passion also extends to academic areas as I was involved in teaching profession for more than two years in various degree colleges across Kerala.

PROFESSIONAL EXPERIENCE

Jan 2019 – Till Date : **Assistant Professor of Chemistry**
Sir Syed College, Taliparamba. Kerala State, India

August 2016- Dec 2018 : **Post Doctoral Research Scholar** at Oregon State University / Oregon Health and Science University College of Pharmacy, Portland, OR, USA
Advisor: ***Prof. Gaurav Sahay***

March 2015 - July 2016 : **Assistant Professor of Chemistry (FIP-Substitute)**
Malabar Christian College, Calicut, Kerala State, India

March 2012 - March 2015 : **Senior Research Fellow**, Chemical Biology Division, Rajiv Gandhi Centre for Biotechnology (RGCB), Trivandrum, India
Advisor: ***Dr. G.S. Vinod Kumar***
Ph.D Thesis title: "SYNTHESIS, CHARACTERIZATION AND BIOLOGICAL EVALUATION OF NOVEL NANOPARTICULATE DRUG DELIVERY SYSTEMS FOR COLON CANCER"

March 2010 - March 2012 : **Junior Research Fellow**, Chemical Biology Division, RGCB-Trivandrum.

July 2009 - Feb 2010 : **Assistant Professor of Chemistry (FIP-Substitute)**
Government College, Kasaragod. Kerala State, India

June 2007- July 2007 : **JNCASR-Summer Research Fellow** at Indian Institute of science Education and Research (IISER), Pune
Advisor: ***Prof. K.N.Ganesh (Director, IISER-Pune)***
Dissertation title: "Synthesis and structural studies of *Pro-Gly* dipeptide"

ACADEMIC BACKGROUND

Ph.D - Chemistry : Chemical Biology Division, Rajiv Gandhi centre for Biotechnology, Trivandrum, India (March 2010 – March 2015) [Completed with ***MR Das award for Best Thesis***]

M.Sc - Chemistry : Dept. of Studies in Chemistry, University of Mysore, Mysore, India
[**Topper in Organic Chemistry Specialization**, University II Rank Holder] (2006 –2008)

B.Sc : St Aloysius College, Mangalore University, India
(2003 –2006)

RESEARCH SKILLS

I have got research experience in development of nanomaterials comprising of polymeric and peptide backbone for drug and gene delivery applications. Our synthetic strategy mainly focused on solid phase synthesis, free radical polymerisation, condensation polymerisation etc. The characterization of the nanomaterials was achieved by different physicochemical and biological assays. It is remarkable that the combined evaluation of the nanomaterials produced a number of coherent drug delivery systems for the drug of interest: 5-Fluorouracil (5-FU) with high degree of specificity and selectivity in cancer chemotherapy. As a post doctoral scholar, I was involved in developing a novel lipid nanoparticle formulation which enhances mRNA delivery to 200 fold and the technology was licensed by a reputed company. In addition to these, I was also involved in developing a platform technology to fabricate twisted peptide nanodrills from a cationic cell penetrating peptide by the addition of sequentially programmed amino acids

ANALYTICAL SKILLS

i. Synthesis and characterization of various polymers, peptides and synthetic drug analogues as nanomaterials for drug delivery
ii. Hands on experience in operating various analytical instruments such as FT-IR, UV-VIS, CD, Fluorescence spectra, DSC, HPLC, GPC, Ultracentrifuge, High Pressure homogeniser,
DLS, Lyophilizer, Rotary Evaporator etc.
iii. Hands on experience in various cell based assays like MTT assay, Cell uptake experiments using confocal microscopy, FACS and Western Blotting analysis for apoptosis etc.

Computer Skills: Adapt knowledge in using MS-Office programmes like MS-Word, MS-Excel, MS-Powerpoint etc. Chem-Office programmes like Chem-Draw, Chem-3D, Adobe Photoshop, End Note etc.

Languages Known: Fluent in English, Hindi, Malayalam and Kannada

LIST OF PUBLICATIONS

(*h* index=**11**, Google Scholar ID- https://scholar.google.co.in/citations?user=1C1mzg4AAAAJ&hl=en&oi=ao , Listed in AD SCIENTIFIC Index 2021)

1) MP Nambiar, **N Ashwanikumar**, A Anoop, AR Biju, *Binding energy analysis and molecular dynamic simulation studies of the designed orally active, non-toxic GABARAP modulators,* **Journal of Biomolecular Structure and Dynamics**,**2022**,40, 1-19. (**Impact factor = 5.325**). ISSN 1538-0254

2) Siddharth Patel, **N Ashwanikumar**, Ema Robinson, Yan Xia, Cosmin Mihai, Joseph P Griffith, Shangguo Hou, Adam A Esposito, Tatiana Ketova, Kevin Welsher, John L Joyal, Örn Almarsson, Gaurav Sahay *Naturally-occurring cholesterol analogues in lipid nanoparticles induce polymorphic shape and enhance intracellular delivery of mRNA*. **Nature Communications 2020**, 11 (1), 1-13 . (**Impact factor = 17.69**). ISSN 2041-1723

3) S Meenu Vasudevan, **N Ashwanikumar**, GS Vinod Kumar *Peptide decorated glycolipid nanomicelles for drug delivery across the blood–brain barrier (BBB)* ***Biomaterials Science*** **2019**, 7 (10), 4017-4021 . (**Impact factor = 7.59**). ISSN 2047-4849

4) Jeonghwan Kim, **Ashwanikumar N**, Siddharth Patel, Gaurav Sahay *Advances in intracellular delivery through supramolecular self-assembly of oligonucleotides and peptides* **Theranostics 2019**, 9 (11), 3191-3212 (**Impact factor = 11.56**). ISSN 1838-7640

5) Siddharth Patel[#], Avathamsa Athirasala[#], Paula P. Menezes[#], **N. Ashwanikumar**, Ting Zou, Gaurav Sahay, Luiz E. Bertassoni "*Messenger RNA Delivery for Tissue Engineering and Regenerative Medicine Applications"* ***Tissue Engg. Part A***. **2019**, 25 (1-2), 91-112 (**Impact factor = 4.080**). ISSN 1937-3376 [# denotes equal contribution]

6) **N Ashwanikumar**, Justin S. Plaut, Barmak Mostofian, Siddharth Patel, Peter Kwak, Conroy Sun, Kerry McPhail, Daniel M. Zuckerman, Sadik C. Esener, Gaurav Sahay. "*Supramolecular self assembly of nanodrill-like structures for intracellular delivery"* ***Journal of Controlled Release***. **2018**, 282, 76-89. (**Impact factor = 11.47**). ISSN 0168-3659
(Research highlighted by "***Science Daily***" on March 27, 2018 https://www.sciencedaily.com/releases/2018/03/180327094010.htm, Research highlighted by "***Controlled Environment Magazine***" on March 27, 2018 https://www.cemag.us/news/2018/03/special-delivery-thanks-cell-penetrating-nanodrills)

7) Siddharth Patel, **N Ashwanikumar**, Emily Robinson, Allison DuRoss, Conroy Sun, Kerry Benenato, Cosmin Mihai, Örn Almarsson, Gaurav Sahay "*Boosting intracellular delivery of lipid nanoparticle encapsulated messenger RNA*" ***Nano Letters***. **2017**, 17 (9), 5711-5718. (**Impact factor = 12.26**). ISSN 1530-6984

8) **N. Ashwanikumar**, Nisha Asok Kumar, P.S. Saneesh Babu, K.C. Sivakumar, Mithun V Varghese, Parvathi Nair, I. Hema Saranya, S. Asha Nair, G.S. Vinod Kumar "*Self assembling peptide nanofibrous scaffold containing phenylalanine for the controlled delivery of 5-fluorouracil*" , ***International Journal of Nanomedicine,* 2016**, 11:5583-5594. (**Impact factor = 7.033**). ISSN: 1178-2013. (Featured as ***Highly accessed article***)

9) Jisha J Pillai, A.K.Thulasidasan, R.J.Anto, N.C.Devika, **N.Ashwanikumar**, and GSV. Kumar "*Curcumin entrapped folic acid conjugated PLGA–PEG nanoparticles exhibit enhanced anticancer activity by site specific delivery" **RSC Advances,* 2015**, *5*, 25518–25524. (**Impact factor = 4.036**). ISSN 2046-2069

10) **N Ashwanikumar**, N.A.Kumar, S.A.Nair, G.S Vinod Kumar *"5-Fluorouracil - lipid conjugate: Potential candidate for the drug delivery through encapsulation in hydrophobic polyester based nanoparticles" **Acta Biomaterialia***. **2014,** *10*, 4685-4694 (**Impact factor = 10.63**). ISSN: 1742-7061

11) **N Ashwanikumar**, N.A.Kumar, S.A.Nair,G.S Vinod Kumar "*Dual drug delivery of 5-Fluorouracil (5-FU) and Methotrexate (MTX) through random copolymeric nanomicelles of PLGA and Polyethylenimine demonstrates enhanced cell uptake and cytoxicity in-vitro*" ***Colloids and Surfaces B: Biointerfaces***. **2014,** *122*,520-528. (**Impact factor = 5.999**). ISSN: 0927-7765

12) **N Ashwanikumar**, N.A.Kumar, S.A.Nair,, G.S Vinod Kumar *"Phenylalanine containing self assembling peptide nanofibrous hydrogel for the controlled release of 5-fluorouracil and leucovorin" **RSC Advances***, **2014**, *4*, 29157–29164. (**Impact factor = 4.036**). ISSN 2046-2069

13) J.J.Pillai, A.K.Thulasidasan, R.J.Anto, N.C.Devika, **N.Ashwanikumar**, and GSV. Kumar "*Folic acid conjugated cross-linked acrylic polymer (FA-CLAP) hydrogel for site specific delivery of hydrophobic drugs to cancer cells" **Journal of Nanobiotechnology,* 2014,** *12*, 25-33 (Featured as ***Highly accessed article***). (**Impact factor = 9.429**). ISSN:1477-3155

14) **N Ashwanikumar,** N.A.Kumar, S.A.Nair,G.S Vinod Kumar , **"***Methacrylic-based nanogels for the pH-sensitive delivery of 5-Fluorouracil in the colon*" ***International Journal of Nanomedicine,* 2012**;*7*, 5769 – 5779. (**Impact factor = 7.033**). ISSN: 1178-2013. (Featured as ***Highly accessed article***)

15) Deepa.G, **N.Ashwanikumar**, J.J.Pillai, GSV Kumar, **"***Polymer Nanoparticles – A Novel Strategy for Administration of Paclitaxel in Cancer Chemotherapy*", ***Current Medicinal Chemistry,* 2012**;*19*, 6207-6213. (**Impact factor = 4.740**). ISSN:1875-533X (Online) ISSN: 0929-8673 (Print)

LIST OF PATENTS

1) "*Lipid nanoparticle formulation*" Provisional patent application number 16/493,814 (**Received royalty for the invention**)

2) "*Supramolecular self-assembly of nanodrill-like structures for intracellular delivery*" Provisional patent application number 62/637,305

3) *"PEG-Lipids in lipid nanoparticle formulation*" Provisional patent application filed.

MEMBERSHIP IN JOURNALS

Editorial Board member of the Journal - Biomedical Nanotechnology (Speciality section of "**Frontiers in Nanotechnology**" journal)

CONFERENCE PRESENTATIONS

1) **Best poster award** at *15th International Nanomedicine and Drug Delivery Symposium (NanoDDS-2017)* held at University of Michigan at Ann Arbor, MI, USA from Sept 22-24, 2017.
2) **Best Paper award** for the Oral Presentation in National Seminar on "*Emerging Trends in Chemical Sciences*" held at St Aloysius College, Mangalore on Feb 14-16, 2013.
3) **Best poster (Second prize)** *International Conference on Recent Advances in Material Science and Technology (ICRAMST-13)* held at National Institute for Technology, Surathkal, Karnataka from Jan 17-19, 2013.
4) Oral presentation at *25th Kerala Science Congress* held at Techno Park, Trivandrum from 29-1-2013 to 1-2-2013
5) Oral presentation at the *International Conference on Synthetic and Structural Chemistry (ICSSC-2011)* at Mangalore University, Mangalore, Karnataka, India from December 8-10, 2011

6) Poster presentation at *6th International meeting on Halogen Chemistry (HALCHEM)* at Indian Institute of Science, Bangalore from Dec 8-11,2012.
7) Poster presentation at *5th International Conference on Current Trends in Drug Discovery and Research (CTDDR-2013) at* Central Drug research Institute, Lucknow from Feb 26-28, 2013.
8) Poster Presentation at *MEDCHEM-13 (Advances in Anticancer drug discovery and development)* at Indian Institute of Technology, Madras from Oct 25-26, 2013.
9) Poster Presentation at *ICAFM-2014 (International Conference on Advanced Functional Materials)* held at Mascot Hotel, Trivandrum from Feb 19-21,2014
10) Oral presentation at *RTS-2014 (Recent trends in Spectroscopy)* held at IIT madras, Chennai from June 20-21,2014
11) Poster presentation at "*Annual gene therapy symposium*" held at Oregon health and science University Portland , OR, USA, on Oct 11, 2017
12) Oral presentation at "*National Symposium on Emerging Trends in Bionanotechnology*" held at St Joseph's College Alappuzha on Feb 12-14, 2015.

TRAINING/ WORKSHOPS ATTENDED

Completed Animal Handling training programme for *in-vivo* experiments organized by Animal Research Facility, RGCB,Trivandrum successfully during April-May 2013.

PRIZES / AWARDS / FELLOWSHIPS

1. Got listed in AD Scientific Index-2021 (World Scientists and University ranking)
2. Best Mentor Award for CURE Programme in Oregon Health and Science University, Portland, OR, USA
3. Best Poster award at NanoDDS-2017at Ann Arbor, MI, USA
4. Oregon State University Post Doctoral Fellowship 2016-19
5. Dr.M.R.Das Career award for the best Ph.D. Student from Rajiv Gandhi Centre for Biotechnology 2015-16 (Rs- 25,000/- with gold medal).
6. Best Paper award at ETCS-2013
7. Best Poster Award (Second) award at ICRAMST-2013
8. Gold medals and cash prize for the topper in M.Sc-Organic Chemistry specialization
    - Prof. C. Anjanamurthy memorial gold medal
    - Sathyabhama Devi Roy Gold medal
    - Vrushabhendrappa Endowment gold medal
    - Prof .Sreenivasamurthy memorial cash prize
9. CSIR-JRF December-2008
10. GATE 2009 Qualified with Percentile - 94.91
11. JNCASR - Bangalore summer research fellowship 2007
12. Ist place in Chemistry Quiz at Mangalore University in 2005-06

EXTRA CURRICULAR ACTIVITIES

- Secured prizes in Quiz at University, College and School levels
- Secured prizes in Cultural activities at College and School levels

PERSONEL

Full name : Ashwani Kumar Narayana
Age & Date of birth : 37 years, 15-10-1985
Sex & Marital status : Male, Married
Nationality : Indian

REFERENCES

1. Dr. Gaurav Sahay,
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