VINOSHENE PILLAI RAJAN

NEST Laboratories
National Enterprise for nanoScience & nanoTechnology
Scuola Normale Superiore
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EDUCATION

Scuola Normale Superiore, Pisa 2015-Present
PhD in Biophysical Sciences
Specialization: Intravital Two-photon Imaging of Glioblastoma Mouse Models

National University of Malaysia, KL & National Science University of Malaysia, PNG 2011-2015
Masters in Organic Chemistry
Specialization: Isolation, characterization and pharmaceutical properties of secondary metabolites from lichens

National University of Malaysia, KL 2009-2011
Bachelor's Degree in Chemistry

CURRENT RESEARCH ACTIVITY

Main Project:

- Studying the tumor growth and invasion of peritumoral tissues of fluorescent glioblastoma mouse models
    1. Morphology and invasion of glioma cells along collagen fibers
    2. Short time-lapse to see the micromovements of protrusions and blebbing
    3. Long time-lapse to monitor the speed of cells at different areas
    4. Glioma cells (GL261) expressing GCaMP6S and LifeAct-mdsRed2 for calcium imaging and structural imaging
    5. Multimodal imaging and spectroscopy technique using Two photon microscopy and Raman spectroscopy to better understand the molecular fingerprints of glioma
- Exploiting an inducible model of glioblastoma
    1. Introducing an oncogene (HRasV12) coupled with fluorescent reporters via in-utero electroporation technique.
    2. Observing coordinated migration of tumor cells and the formation of cell streams.
    3. Studying the correlation between tumor cell morphology and calcium activity to understand the role of intracellular signalling in tumor metastases.

Other Project:

- Circadian rhythm and intracellular chloride concentration in neurons
    1. Electrophysiological analysis of circadian sleep at different times of the day and correlating the recording pattern with different cellular chloride concentration throughout the day
    2. Chloride concentrations are regulated by two different cotransporters NKCC1 and KCC2, therefore recordings are also done by blocking one of these two cotransporters and measuring the circadian recordings

PAST RESEARCH PROFILE

1) BASICS:
    - HPLC method development.
    - Proficient in handling Preparative HPLC.

- Well versed in TLC Techniques & Isolation Techniques and extraction using Maceration & Soxhlet technique.
- Mobile phase & buffer preparations.
- Columns handling & Maintenance.
- Antibacterial using Minimal Inhibitory Concentration (MIC), Minimal Bactericidal Concentration (MBC) & Disk Diffusion.
- Antioxidants (DPPH, FRAP, TPC, TFC).
- Daily Calibration of pH meter, weighing balance, micropipettes, Karl fisher titer and HPLC (both partial and full).
- Interpretation & Analysis of NMR & Mass Spectrometry.
- Detailed knowledge on stability studies.
- Imparting training to new joiners or project trainees.

2) STABILITY TESTING:
   - Conducted stability studies for Mitragynine.
   - Stability conducted using Pka Calculation Method.
3) STUDIES:
   - Evaluating toxicity of heavy metal levels using Inductively Coupled Plasma Mass Spectrometry with human hair.
   - Drug Absorption studies using Human & Murine Plasma.
   - HPLC method development of Mitraygnine.
   - Conducted extraction and preliminary screening of lichen extracts.
   - Detailed on Bio-Assays (Antibacterial & Antioxidant) of the lichen extracts.
   - Isolation & characterization of active compounds.
   - Was a part of all the extra studies conducted in QC as a requirement for R&D.

RESEARCH INTEREST

- To understand the invasion pattern of glioblastoma into brain tissues
- To observe the micromovements and movement speed of tumor cells using time-lapse technique
- Understanding and analysing calcium signalling of mutant cells and wild type cells in-vitro and in-vivo
- To identify and characterize the molecular fingerprint of glioma using multimodal spectroscopy
- To understand the relationship between circadian clock and intracellular chloride concentration

PUBLICATIONS and PRESENTATIONS

1. Baria, E., Praccuci, E., **Pillai, V.**, Pavone, F. S., Ratto, G. M., Cicchi, R. (2019). *In vivo* multimodal fibre-probe spectroscopy for glioblastoma detection in mouse model. Proc. SPIE 11073, Clinical and Preclinical Optical Diagnostics II, 11073N (19 July 2019)
2. **Rajan, V. P.**, Gunasekaran, S., Ramanathan, S., Murugaiyah, V., Samsudin, M.W., Din, L.B. (2016). Biological activity of four Parmotrema species of Malaysian origin and their chemical constituents. Journal of Applied Pharmaceutical Science, Vol. 6(08), pp 036-043.
3. Gunasekaran, S., **Pillai Rajan, V.**, Ramanathan, S., Murugaiyah, V., Samsudin, M.W., Din, L.B. (2016) Antibacterial and antioxidant activity of lichens *Usnea rubrotincta*, *Ramalina dumeticola*, *Cladonia verticillata* and their chemical constituents. Malaysian Journal of Analytical Science, 20 (1), 1-13.
4. **Pillai Rajan, V.**, Gunasekaran, S., Ramanathan, S., Murugaiyah, V., Samsudin, M.W., Din, L.B. (2015) Antibacterial activity of extracts of *Parmotrema praesorediosum*, *Parmotrema rampoddense*, *Parmotrema tinctorum* and *Parmotrema reticulatum*. AIP Conference Proceedings, 1678, 050015-1 - 050015-4 (2015); doi: 10.1063/1.4931294.

5. **Rajan, V. P.**, Gunasekaran, S., Ramanathan, S., Murugaiyah, V., Samsudin, M. W., Din, L. B. (2015). Antibacterial and Antioxidant Activities of Four *Parmotrema* species of Malaysian Origin and their Chemical Constituents. 1st International Conference on Antioxidants and Degenerative Diseases 3-4 June 2015, NP-04, page 74. **(Printed in Conference Book & Best Poster Award)**

RELATED ACADEMIC ACTIVITIES

Colloquium

Universiti Kebangsaan Malaysia, Faculty of Science and Technology 2015 Postgraduate Colloquium. 15–16 April 2015.

Conference

1. International Conference on Antioxidants and Degenerative Diseases – ICADD, 3-4 June 2015, Kuala Lumpur, Malaysia– Poster Presentation (Best Poster Award).
2. "Stem Cells and Cancer" Gordon Research Conference, 24-29 March 2019, Ventura Beach Marriot, Ventura, California – Poster Presentation.

Workshop

1. 2nd Nic@Iit Nanoscopy 2.0 Practical Workshop on Advanced Microscopy 1-4 December 2015- Nikon Imaging Center, Intitute of Instituto Italiano di Tecnologia, Genoa, Italy.
2. Euro BioHighTech, Smart Health: Research for Business Innovation, Stazione Marittima di Trieste, Italy, 26-27 Settembre 2018

Spring School

International School of Biophysics «Antonio Borsellino» 43rd Course: Nanoscale biophysics: Focus on Methods and Techniques (Directors: A. Diaspro - P.Bianchini) - Erice, Sicily, Italy, 17-24 April 2016.

Seminars

1. The phasor analysis applied to fluorescence lifetime imaging of environmental probes: biophysical and technological applications (Antonella Battisti -NEST, NANO CNR) 17th November 2016
2. Neuroscience Seminar- Cell cycle control of glioblastoma cancer stem cells by CLIC1 protein functional expression in the plasma membrane (Michele Mazzanti-CNR) 20th April 2017
3. Why are cortical networks prone to seizures? (Andy Trevelyan, Newcastle University, UK), NEST Scuola Normale Superiore, 27th October 2017

Advance Courses

1. Sleep and Cognition- Neuroscience School of Advanced Studies @Certosa di Pontignano, Siena, Italy, 8-15th July 2017
2. Molecular Stratagem of Glioblastoma- Neuroscience School of Advanced Studies @San Servolo, Venice, Italy, 5-12th May 2018

Outreach Activities

1. Researchers Night- BRIGHT Pisa, Poster Presentation, Logge dei Banchi, CNR, Pisa, Italy, 29 Sepetember 2017
2. Researchers Night- BRIGHT Pisa, Poster Presentation, Brogo Stretto, Pisa, Italy, 5 October 2018
3. Nanomeeting 2018, Sala Azzura- Scuola Normale Superiore, Pisa, Italy, 29 October 2018
4. NEST Congress- Highlights in Nanoscience, Aulla Dini, Scuola Normale Superiore, Pisa, Italy, 10 & 11 June 2019
5. Institute of Neuroscience Annual Retreat 2019- Poster Presentation, Consiglio Nazionale delle Ricerche, Pisa, Italy, 2nd-4th October 2019