

Designer Nanoparticles to Overcome Therapeutic Resistance in Cancer

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Chemistry
Seminar on
Nanotechnology
and Cancer
therapeutics

4:00 p.m.
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Via Zoom

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Abstract: Lung cancer is the number one cause of cancer-related deaths in men and women, with an 8-10 month post-treatment median survival time. Non-Small Cell Lung Cancer (NSCLC) accounts for 80 % of lung cancers. The treatment plan for NSCLC patients is determined based on the active mutations (EGFR, ALK/ROS, and KRAS) present in the tumor. For example, if the patient bears mutations in the EGFR region, the treatment plan involves tyrosine kinase inhibitors (TKI) such as Osimertinib or Erlotinib. The initial treatment eliminates the tumor from the patient, but the cancer returns after 12-14 months. But, this time, the TKIs fail to control the tumor growth, finding an alternative pathway to survive. Our team elucidated the mechanism of drug resistance and identified the alternative biomarker pathway. Based on the data, we developed an RNAi -nanoparticle, which can reduce the tumor's biomarkers (or protein) levels. The reduction in protein levels reverses the drug resistance in cancer and sensitizes it to TKI. Furthermore, we demonstrated that this nanoparticle could control tumor growth in several animal studies. In the talk, I will present the synthesis of the designer RNAi nanoparticle and results from cell and animal studies.

About the speaker: Dr. Raghuraman Kannan received his Master of Science in Chemistry from the Indian Institute of Technology, India, and earned a Ph.D. in Chemistry (Gold Medal) from the Indian Institute of Science, India, in 1999. Dr. Kannan's primary research focuses on the use of nanotechnology in the treatment of cancer. Dr. Kannan has, since 2002, published more than 60 peer-reviewed articles in high-impact journals, including *Cancer Research*, *Nano Letters*, *Journal of the American Chemical Society*, *Nanomedicine*, *Proceedings of the National Academy of Sciences*, and other journals. He is the primary inventor on more than 22 patents/disclosures pertaining to production and application of nanoparticles for cancer diagnosis, imaging, and therapy. Dr. Kannan has founded four start-up companies, two of which have surpassed \$1 million in investments. Dr. Kannan is a founding editor-in-chief for *Cancer Nanotechnology* (Springer Publishers) and Editor-in-Chief for *Synthesis and Reactivity in Organic Chemistry* (Taylor and Francis). Dr. Kannan currently serves Associate Editor of *Nanomedicine* (Elsevier). Dr. Kannan is an Ad Hoc Study Section Member of the National Institutes of Health (NIH), NIH-NSF, NIH-NANO, and NIH-SBIR. Dr. Kannan received UM Presidents Award for Economic Development and has received over \$5 million in grants so far.