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Guo Awarded Prestigious NIH Grant

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Peixuan Guo, PhD, Sylvan G. Frank Endowed Chair in Pharmaceutics and Drug Delivery Systems at The Ohio State University College of Pharmacy, has been awarded a \$2.79 million grant from the National Cancer Institute (NCI) Alliance for Nanotechnology in Cancer, part of the National Institutes of Health (NIH), to identify and optimize RNA nanoparticles for cancer targeting and treatment. Guo hopes to someday promote RNA nanoparticles as a new generation of drugs for the treatment of cancers.

RNA nanotechnology has progressed rapidly during the past several years. This nanotechnology includes the integration of multiple functional modules into one nanoparticle, of which the scaffolds, ligands, therapeutics and regulators can be composed of RNA. Dr. Guo is the pioneer of RNA Nanotechnology. He proved the concept of RNA nanotechnology in 1998 by showing that RNA dimers, trimers and hexamers can be constructed by bottom-up assembly of modified nature RNA. He published his findings in *Molecular Cell* and was featured in *Cell*.



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Guo's lab has constructed RNA nanoparticles of diverse size, shape and stoichiometry displaying high chemical and thermodynamic stability, and has demonstrated their ability to harbor different functional groups. The lab is currently working to characterize the behavior of RNA nanoparticles in vitro and in vivo, with a goal to improve the efficiency for specific cell targeting, internalization and intracellular trafficking, favorable bio-distribution without entrapment in liver, endosome escape, and tumor regression.

Guo's study aims to dissect the intracellular pathways taken by RNA nanoparticles and enhance their endosome escape capabilities; inspect the pharmacokinetics pharmacodynamics and bio-distribution of RNA nanoparticles; and evaluate the immune responses of RNA nanoparticles to minimize non-specific side effects. Previously, they reported that the immune response of RNA nanoparticles are size, shape and sequence dependent. They can make the RNA nanoparticles non-immunogenic, or highly immunogenic to serve as vaccine adjuvants or reagents in cancer immunotherapy.

The NIH is the largest public funder of biomedical research in the world, investing more than \$32 billion a year to enhance life, and reduce illness and disability. NIH-funded research has led to breakthroughs and new treatments, helping people live longer, healthier lives by building a research foundation that drives discovery. The NCI Alliance in Cancer Nanotechnology is the key entity driving the field of cancer therapy and prevention using nanotechnology.

Guo, one of the top nanobiotechnology experts in the world, joined the college last January. He was recruited in collaboration with Ohio State's Dorothy M. Davis Heart and Lung Research Institute (DHLRI) and holds a joint appointment in the College of Medicine's Department of Physiology & Cell Biology, as well as the Department of Cancer Biology and Genetics. Said Guo: "The strong support from the National Cancer Institute with multi-million dollar funding will advance the emerging field of RNA nanotechnology, and will speed up the pace toward cancer therapy."

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