RESEARCH

Research - Overview

Cancer remains a difficult-to-cure disease despite the use of aggressive chemotherapy and surgical procedures. Even though a great deal of resources has been invested in identifying new oncogenic pathways and discovering novel therapeutic molecules that specifically target these pathways, so far very few of these findings are translatable into meaningful clinical outcomes.

This trend is particularly concerning in advanced solid tumor (e.g. prostate, breast, ovarian and brain cancers) treatment as this class of malignancies do not only demonstrate additional drug resistance, their compact structures also render them inaccessible by anticancer drug molecules delivered using the conventional free drug formulations.

Our research seeks to solve this therapeutic inefficiency issue by exploring alternative strategies founded on the fast-expanding field of nanomedicine. With the advance of nanomedicine, anticancer compounds can be delivered to solid tumors in a more efficient, specific and well-controlled manner. This added level of control over the precise fate of drug molecules in human body also enables strategic uses of multiple drugs including both the small molecule compounds and novel molecular therapeutics for cancer treatment and prevention with substantially higher translational potential.

Key Research Interests

1. Hybrid or lipid-based nanotechnology: Design, evaluation and optimization of lipid-polymer hybrid nanocarriers or lipid-based nanocarriers for sustained, controlled and targeted delivery of therapeutic oligonucleotides (e.g. RNAi agents) and small molecule compounds (e.g. poorly water-soluble novel molecules and chemo agents).

2. Strategically merging the “old” and “new”: Develop advanced nanomedicine-based therapeutic strategies for novel combination treatment (e.g. chemo-gene; chemo-molecular targeting agent) of malignant diseases, with emphasis on drug-resistant, metastatic prostate cancer, breast cancer and ovarian cancer.

In addition, my group is expanding our advanced drug delivery research into other areas. Key areas include brain delivery for CNS illnesses, bone delivery for bone diseases (e.g. osteomyelitis and bone metastasis), peptide-based treatment of endocrine diseases.

Research Funding in Recent Years

2012 – 2017 R01 grant (R01CA168917), National Institute of Health/National Cancer Institute (NIH/NCI) (PI)
2012 – 2013 Drug Discovery Initiative from Temple University (PI)
2011 – 2012 Faculty Senate Seed Money Grant from Temple University (PI)
2008 – 2009  Concept Award, Pennsylvania CURE Tobacco Settlement Formula (PI)