The Department of Chemistry and Biochemistry

Seminar Series

Presents a Seminar Entitled:

"The Synthesis and Testing of Iron Oxide Nanoparticle-Based Theranostics to Target Fast Growing Tumors in the Body"

Presented By

Dr. Joseph Hall

Professor of Chemistry
Norfolk State University

Second to heart disease, cancer is the leading cause of death in the United State, and among the various cancers, lung cancer is the leading cause of death among men and women. Emerging research has shown that the amino acid, glycine "fuels" (*i.e., enhances the growth*) of fast-growing adult cancerous tumors of the lung, breast, and colon. These fast-growing cancerous tumors has been shown to take up glycine at a much faster rate than non-cancerous cells. In fact, non-cancerous cells can produce sufficient quantities of glycine on their own, and therefore have no need to take up glycine from an external source such as from surrounding tissues. Although there have been some major advances in the treatment modality for cancer (*e.g., immune therapy, EGFR and ALK inhibitors*), there is still a need to develop new treatment therapies to combat lung cancers, particularly in patients whose fast-growing tumors do not express certain receptors, are highly resistant, or patients that do not respond well to immune therapies. In our laboratory, we have demonstrated previously that super paramagnetic iron nanoparticles (SPIONs) induces cellular apoptosis (*i.e., programmed cell death*) in normal lung epithelial cells. Since fast-growing cancerous tumors, and not normal cells consume glycine at a faster rate, we hypothesize that fast-growing cancerous tumors will synthesize more glycine transport proteins (e.g., GLYT1 receptors). This research direction has lead our research group to propose synthesizing and testing a glycine-conjugated SPION that will specifically target adult fast-growing cancerous tumors. Surface engineering of SPIONs to specifically target glycine membrane receptors may hold much promise as an alternative treatment modality that is both diagnostic and therapeutic.

References:

(1) American Cancer Facts & Figures, 2015.
(2) Jain M, Nilsson R, Sharma S, Madhusudhan N, Kitami T, Souza A, Kafri R, Kirscher MW, Clish CB, Mootha VK (2012). Metabolic profiling identified a key role for glycine in rapid cancer cell proliferation. *Science*. Vol. 336: 1040-1044.
(3) Ramesh V, Ravichandran P, Copeland Cl, Gopikrishnan R, Biradar S, Goornavar V, Ramesh GT, and **Hall JC** (2012). Magnetite induces oxidative stress and apoptosis in lung epithelial cells. *Mol. Cell. Biochem*. Vol., 363: 225-234.

Friday, November 18th, 2016 at 2:00 p.m. in OCNPS 200