



JOHNS HOPKINS
BIOMEDICAL ENGINEERING



Tuesday, June 10, 3 pm, Clark 110 (Homewood Campus)



Sialic Acid Glycoengineering: Perspectives on the First 6 Million Years

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Abstract: This presentation will give an overview of the first 6 million years of sialic acid glycoengineering. In the first ~5,999,990 years, Nature performed ‘proof of principle’ experiments demonstrating that subtle chemical modifications to sialic acid – an unusual 9-carbon sugar ubiquitously found in vertebrate animals – contribute to human intelligence, modulate susceptibility to pathogens, and regulate cell fate. In the past 7 years, (arguably) moving at a much faster pace, our laboratory has used two approaches to extend Nature’s idea of manipulating sialic acid to control biology. First, in a chemistry-driven approach, structurally-modified analogs of *N*-acetyl-D-mannosamine, the biosynthetic precursor for sialic acid, were exploited to metabolically incorporate non-natural chemical functionalities into the cell surface milieu. Then, by creating a scaffold or growth substrate with complementary chemical properties, we demonstrated that gene expression patterns and cellular outcomes could be controlled in novel ways that are potentially useful for tissue engineering. In a second strategy, static magnetic fields (SMF) were used to stimulate human stem cells and gangliosides – sialic acid containing glycolipids – were found to respond and play an intriguing role in coordinating the ensuing cellular responses. A particularly promising outcome of SMF exposure – looking forward to applications in regenerative medicine – was the selective promotion of oligodendrocyte differentiation and proliferation when primary mouse cells were exposed to this non-invasive stimulus.

A reception to celebrate Dr. Yarema’s promotion to Associate Professor will immediately follow

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