Pan-Cancer Diagnostic Using Activity-Based Nanoparticles

Sage Hill School, Newport Coast, CA, US

Harriet Lai, Jayla Chan, Sarah Huang, Nancy Sun Derek Shapiro (teacher), Dr. Peter Horanyi (mentor-UCB)

Many cancers have been associated with the dysregulation of extracellular proteases[2].One such family of proteases is Matrix metalloproteinases, or MMPs, which have shown similar patterns of upregulation across various cancers[2]. This project aims to create a method of detecting upregulated matrix metalloproteinases using inhalable nanosensors with PATROL (point-of-care aerosolizablenanosensors with tumor-responsive oligonucleotide barcodes) technology. Using reporter DNA barcodes bound to 8-arm PEG nanoparticles by MMP substrates, upregulation of MMPs can be indicated when arms are cleaved, releasing barcodes into the bloodstream and eventually the urine, which can be detected with a lateral flow assay urine test. This method, which requires a simple urine strip to test, can be a cheaper and more accessible alternative to scans and other costly cancer screening methods requiring heavy equipment/technology within low-income or developing areas.