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Aptamers for quantitative sensing of small molecules using graphene biosensors and Surface-enhanced Raman spectroscopy

In many cases, conventional affinity reagents (e.g. antibodies) are not well suited for the sensitive detection of small molecule analytes. Small molecule targets are often non-immunogenic or, at the other end of the spectrum, too toxic for effective production of antibodies. Furthermore, many classes of pharmaceuticals such as opioids, for example, comprise many molecules of very similar structure and therefore the available antibodies are cross-reactive. Aptamers, however, are discovered by purely in vitro means and thus toxicity or lacks of immunogenicity are not an issue in their discovery. Furthermore, negative selection steps can be performed to rid candidate pools of binders to closely related analyte confounders. In the presentation, we highlight the use of novel aptamers to small molecules discovered at Base Pair in two separate sensing platforms – 1) a commercial graphene-based field effect biosensor and 2) Surface enhanced Raman spectroscopy. Among the analytes are tenofovir, an important HIV drug, several opioid compounds and a metabolite implicated in early, asymptomatic malaria infection. We present limits-of-detection in each platform as well as the potential advantages and disadvantages of each.

Biography

Bill Jackson is the Founder and Chief Scientist of Base Pair Biotechnologies. He is an experienced biomedical and chemical engineer in charge of molecular diagnostic and molecular biology development at Base Pair. He is a recognized leader in the aptamer space having authored 12 peer-reviewed publications on aptamers as well as 30+ posters and conference proceedings. He is also the inventor of Base Pair's patented, multiplex aptamer selection process and inventor on 12 other issued patents and a number of additional patents pending. He holds a BSc in biomedical engineering from Texas A&M University and a PhD in chemical engineering from the University of Houston.

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