Bi-Phasic Switch-Based Biosensor Chemistry

Technology Licensing and Collaboration Opportunity

Background: The pursuit of biomarkers capable of both identifying the current status and predicting the future status of an organism has permeated every relevant field of biology. Whether seeking an improved disease diagnostic or a means to more effectively screen drug candidates in vitro, identification of the biomarker is only the first step. Arguably, the more difficult step is developing and optimizing the assay to accurately and precisely detect the biomarker of interest in a manner which enables discrete quantification. There is a trade-off among current methods: robust/specific detection and quantification requires multiple complex steps and significant infrastructure, while on the other hand, simpler methods are not robust, lack standardization, and present a greater risk for false positives.

Solution: To address these shortcomings, MSU researchers have developed a novel chemistry which is both simple and adaptable to a broad range of detection applications. This novel chemistry provides an "OFF" phase which, when in the presence of a target molecule, may switch to a high-output "ON" phase. The kinetics (both timing and amplitude) of each phase can be controlled via the thermodynamics of oligonucleotide binding and reaction conditions. The technology is potentially further tailorable by incorporating logic gates and other reaction circuit features to ensure specificity and to suppress signals from reactions where the target biomarker is below a threshold concentration, where this threshold is either an absolute concentration or relative to another marker. This switch-based chemistry will provide a simple and cheap solution allowing investigators to rapidly confirm the presence of target biomarkers with confidence.

Benefits:

- Novel chemistry allows user to tightly control and optimize reactions to generate highly sensitive and specific detection of targeted biomolecules
- Digital ("ON/OFF") output allows for precise quantification while providing resistance to endogenous reaction inhibitors
- Readily adaptable to a variety of high throughput platforms

Researchers:

Stephanie McCalla, Ph.D. http://www.chbe.montana.edu/staff/mccalla/
Tomas Gedeon, Ph.D. http://www.math.montana.edu/gedeon/

Contact for Inquiries:

Quinton King (quinton.king@montana.edu), 406-994-7795

Keywords: molecular biology, biosensor, reporter, miRNA