Abstract Submitted
for the TSS16 Meeting of
The American Physical Society

Tracking RAC1 Drug Activity on DNA Chips MONICA LOU, University of Texas at Dallas, EDDIE MERINO, ANISH VADUKOOT, University of Cincinnati, JASON SLINKER[1], University of Texas at Dallas — Cancer treatments that induce cancer-selective DNA damage represent a promising strategy for therapy. The drug RAC1 is activated by elevated levels of hydrogen peroxide in cancer cells and functions by forming phenol adducts on DNA bases. It is hypothesized that this interferes with hydrogen bonding and reduces the stability of DNA, a potential link to anticancer activity. Utilizing electrochemical chips to determine changes in duplex stability, this correlation is observed. Chip signals are highly sensitive to structural perturbation of DNA and enable study of real-time activity of DNA damaging drugs that disrupt DNA double helix stability, such as RAC1. Duplex stability changes in response to drug treatment were tracked by room temperature current-voltage characteristics on DNA chips, particularly with square wave voltammetry peak heights. The kinetics of DNA-drug adduct formation were determined; the activity involves the formation of two bonds with each base. The timescale for the second bond is consistent with a structural rearrangement that presumably disrupts DNA base pairing. These features were discerned by following changes in voltammetry peak height versus time. This work supports the notion of DNA destabilization by RAC1 and clarifies the timescales of activity.

[1]Principal Investigator

Monica Lou
University of Texas at Dallas

Date submitted: 02 Mar 2016 Electronic form version 1.4