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Chip-Based Synthetic Biology to Track Anticancer Drug Activity\fs20 DIMITHREE KAHANDA, JASON SLINKER, University of Texas at Dallas, GAURAB CHAKRABARTI, DAVID BOOTHMAN, University of Texas Southwestern Medical Center, Dallas, SLINKER LAB COLLABORATION, BOOTHMAN LAB COLLABORATION — It is advantageous to develop systems that represent significant complexity of biological systems, while maintaining control over specific factors involved in a particular process. We have established a chip-based electrochemical platform for following the repair of DNA damage produced by a redox-cycling anticancer drug, beta-lapachone(β-lap). These chips, which possess key features to reproduce the cellular environment, drug cofactors, and base-excision repair (BER) enzymes tracked DNA damage repair activity with redox probe-modified DNA monolayers on gold. We were able to observe drug-specific changes in the square wave voltammetry at therapeutic drug concentrations with high statistical significance over drug-free control. We also demonstrate high correlation of this change with the specific drug cycle through rational controls. Thus, this chip-based platform enabled tracking of drug-induced damage repair processes when biological criteria were met, providing a unique synthetic platform for uncovering activity normally restricted to inside cells.

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