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A novel capacitive biosensor for the detection of small molecule S-nitrosothiols

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Small molecule S-nitrosothiols are endogenous chemicals which are produced by various forms of nitric oxide synthase. Their regulation plays a key role in the control of a variety of bodily processes and disease models, including: Breathing, blood pressure, pulmonary hypertension, and asthma. However, these molecules are extremely labile, making *in vivo* detection extremely challenging as most small molecule S-nitrosothiols exists at very low concentrations in the body. We have developed a capacitive biosensor which employs poly-dopamine as its sensing and functional layer. A thin film of poly-dopamine behaves like a semiconductor and also will covalently crosslink to all free amines, free thiols, and S-nitrosylated thiols in solution. We treated with formaldehyde to block all free amines and free thiols, leaving only the S-nitrosothiols. S-nitrosothiol bonding to the semiconducting surface of the sensing electrode changes its capacitance, allowing for extremely sensitive detection of S-nitrosothiols in biological samples. We will present evidence of attomolar detection of S-nitrosocysteine which can be abolished by the addition of mercury to the fixing buffer, or by exposing the sample to UV light during fixing, both methods of degrading S-nitrosothiols. We will also present evidence of the presence of small molecule S-nitrosothiols in blood and saliva.

Biography

James Seckler has completed his PhD at Case Western Reserve University, and Post-doctoral studies at University of Rochester and Case Western Reserve University. He is currently a Postdoctoral Fellow in Department of Pediatrics at Case Western Reserve University. His field of study includes experimental and theoretical protein dynamics, FET capacitive sensors, and studying role of S-nitrosothiols in biological tissues.

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