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A nano-scale approach to mitochondrial uncoupling for the treatment of obesity

Obesity is recognized as a national and global epidemic, as approximately 65% of adults in the United States are classified as overweight or obese as defined by body mass index. While obesity is associated with increased risk for metabolic syndrome and cardiovascular disease, even a modest reduction in body weight has been shown to consistently reduce or reverse health risk factors. In the 1930s it was recognized that increasing the body's basal metabolism using mitochondrial uncouplers, directly resulted in steady and rapid weight loss. During this period the mitochondrial uncoupler, 2, 4-dinitrophenol, was sold over the counter as a weight-loss supplement. It is the only compound to date that has been shown to be 100% effective for weight-lossbut was eventually pulled from the shelves by the Food and Drug Administration as people were routinely overdosing on the compound in an effort to increase their rate of weight loss. To overcome this challenge, we have developed non-carbon-based, "self-rectifying" nano-scale devices, in which we can specifically and step-wise set the uncoupling capacity that when reached shuts the device off to further proton conductance. By targeting mitochondrial bio-energetic uncoupling in a controlled manner using nano-scale devices, we hypothesize that this will significantly alter metabolism and result in significant weight loss in a model of diet-induced obesity. Data will be presented demonstrating that these devices can produce weight loss without decreasing food intake in multiple animal experiments.

Biography

Patrick G Sullivan completed his PhD at the University of Kentucky in Anatomy and Neurobiology in 2000 and immediately began a Postdoctoral fellowship at the Reeve-Irvine Research Center at the University of California at Irvine under the direction of Oswald Steward. In August of 2002, he was recruited to the position of Assistant Professor in the Spinal Cord and Brain Injury Research Center and Anatomy & Neurobiology at the University of Kentucky. Currently he is a Professor of Anatomy & Neurobiology and an Endowed Chair in the Spinal Cord and Brain Injury Research Center. He has published over 80 peer-reviewed manuscripts and his work has been cited over 4200 times.

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