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Enhanced delivery of DNA-based vaccines and immunotherapeutics through next-generation electroporation devices

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It is well known that naked DNA vaccination alone is insufficient to generate clinically relevant immune responses due to inefficient cellular uptake. *In-vivo* electroporation (EP) has been shown as an efficient non-viral method for enhancing DNA vaccine delivery and immunogenicity in animals and humans over the past twenty years. In a recent randomized, double-blind, placebo-controlled phase 2b study, Inovio Pharmaceuticals has successfully demonstrated therapeutic vaccination of CIN2/3 patients with VGX-3100, a highly optimized HPV-16/18 DNA vaccine, administered by CELLECTRA® EP device resulted robust cellular and humoral immune responses, significant viral clearance and, importantly, significant regression to CIN1 or no disease. Inovio Pharmaceuticals is currently developing additional EP devices for DNA delivery to a variety of tissues, such as muscle and skin. One of the examples- Surface Electroporation Device (SEP), which only contacts the surface of the skin and does not penetrate the skin, is capable of efficient delivery of DNA vaccines into the skin while establishing that these parameters are sufficient to elicit both robust and sustainable humoral as well as cellular immune responses without tissue damage. Here we will discuss the impact of these devices on *in-vivo* DNA uptake and how different EP strategies can be used to optimize delivery of DNA-based vaccines and immunotherapeutics for a variety of therapeutic indications for different applications.

Biography

Paul Fisher is a Bioengineering Scientist at Inovio Pharmaceuticals, where he is investigating the delivery of DNA-based therapeutics. He received his B.S. in Biomedical Engineering from the University of California, Irvine, and his Ph.D. in Biomedical Engineering from the University of Kentucky. Dr. Fisher has a background in controlled drug release from implantable and injectable biomaterials, with a focus on regenerative medicine. He has two patents pending for his work on novel sustained drug delivery systems using biodegradable polymers.

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