

Abstract Submitted
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The Hydrodynamics of Needle-Free Intradermal Jet Injection

JONATHAN SIMMONS, JEREMY MARSTON, Texas Tech University, PAUL FISHER, KATE BRODERICK, Inovio Pharmaceuticals — Needle-free methods of drug delivery circumvent the drawbacks associated with the use of hypodermic needles such as needle-stick injuries, needle-phobia, cross contamination and disposal. Furthermore, pioneering DNA-based vaccines that aim to treat cancer and fight infectious diseases, such as HIV, Ebola and Zika, require precise deposition into the skin to target the immune response producing cells found only in the epidermis and dermis. Intradermal (ID) delivery can be achieved using a needle and the Mantoux technique but this requires a highly skilled technician and so extensive use of DNA vaccines calls for an alternative method of delivery. One option is jet injection which has been employed in mass vaccination programs for intramuscular or subcutaneous delivery and is used by some diabetic patients to inject insulin. In this talk I will present results from our ongoing ex-vivo experimental study into ID jet injection. Ultra-high-speed imaging is used to visualize the process of the jet exiting the nozzle and striking excised skin. A skin bleb grows as liquid is deposited within the skin. I will discuss how the control parameters, such as the rheological profile of the liquid and the stand-off distance, influence the volume of liquid successfully delivered intradermally.

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