Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Tissue expansion and fluid absorption by skin tissue following intradermal injections through hollow microneedles[1] PRANAV SHRESTHA, BORIS STOEBER, Univ of British Columbia — Hollow microneedles provide a promising alternative to conventional drug delivery techniques due to improved patient compliance and the dose sparing effect. The dynamics of fluid injected through hollow microneedles into skin, which is a heterogeneous and deformable porous medium, have not been investigated extensively in the past. We have introduced the use of Optical Coherence Tomography (OCT) for real-time visualization of fluid injections into excised porcine tissue. The results from ex-vivo experiments, including cross-sectional tissue images from OCT and pressure/flow-rate measurements, show a transient mode of high flow-rate into the tissue followed by a lower steady-state infusion rate. The injected fluid expands the underlying tissue and causes the external free surface of the skin to rise, forming a characteristic intradermal wheal. We have used OCT to visualize the evolution of tissue and free surface deformation, and advancement of the boundary between regions of expanding and stationary tissue. We will show the effect of different injection parameters such as fluid pressure, viscosity and microneedle retraction on the injected volume.

[1]This work has been supported through funding from the Collaborative Health Research Program by the Natural Science and Engineering Research Council of Canada and the Canadian Health Research Institute, and through the Canada Research Chairs program

Pranav Shrestha
Univ of British Columbia

Date submitted: 31 Jul 2017 Electronic form version 1.4