



Title: Motivations for a custom experimental apparatus for ultrasound enhanced transdermal drug delivery experimentation

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This poster outlines the motivations and initial design specifications relating to a custom experimental apparatus for sonoporation and sonophoresis experimentation. These experiments usually involve inserting a cylindrical transducer into a glass Franz diffusion cell. The motivations for a custom apparatus are: the hypothesis that the pressure amplitude that is applied to the current system by the transducer is not equal to the pressure amplitude at a point on the skin surface due to acoustic reflections in the system (this is supported by preliminary qualitative results from a numerical model under development); the ultrasound induced heating within Franz diffusion cells that often requires researchers to change experimental fluids mid experiment; and the high standard deviations in published results. Some proposed design specifications are: to maximize the uniformity of the ultrasound field; to allow for the control of temperature in all mediums present; to allow for experimental input parameter values at the skin surface to be measured or accurately estimated; and to minimize standard deviation between repetitions (maximize repeatability). Numerical modelling and 3D printing are both expected to be vital to the development of this apparatus. This proposed apparatus is intended to improve the validity and repeatability of in vitro sonoporation and sonophoresis experiments.

Biography

Jeremy is in the first year of his PhD at Canterbury University in Christchurch, New Zealand. His project is in the field of active enhancement methods in transdermal drug delivery. He is supervised by Dr Sid Becker of the Mechanical Engineering Department. Jeremy was awarded a first class honours degree from Canterbury University at the end of 2014.