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Modelling of *in-vivo* tissue electroporation and subsequent cellular drug uptake

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The primary motivation of this study is to develop a macroscopic model of mass transport in electroporated biological tissue in order to determine the cellular drug uptake. The model captures the influences of both irreversible electroporation as well as the transient resealing of the cell membrane associated with reversible electroporation. The model attempts to fit the microscopic behaviour of the cell membrane to the macroscopic transport characteristics through an empirically based representation of the bulk tissue electrical conductivity. Two case studies are conducted to illustrate the applicability of this model by comparing transport associated with two electrode arrangements: side-by-side arrangement and the clamp arrangement. The results show increased drug transmission to viable cells is possible using the clamp arrangement due to the more uniform electric field produced.

Biography

Bradley is in the first year of his PhD at Canterbury University in Christchurch, New Zealand. His project involves numerical modelling of biological processes relating to transdermal drug delivery. He is supervised by Dr Sid Becker of the Mechanical Engineering Department. Bradley was awarded an honours degree from Canterbury University at the end of 2014.

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