Challenges for the modelling of electropermeabilization at the tissue scale

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Résumé

The modeling of electropermeabilization at the tissue scale is discussed further to the recent developments at the cell scale. Up to now, the modeling at the tissue scale is based on a non linear steady state conduction current equation; the dependence of the tissue conductivity s with respect to the electric field E translates the well known relation at the cell scale between the transmembrane potential and the external electric field. In MEMOVE project, it has been confirmed that this model is suitable to predict the a posteriori effects of irreversible electropermeabilization: numerical simulations quantitatively explain the necrosis observed at the surface of potatoe samples. However, the steady state modeling fails to predict the evolution of the electropermeabilization during the application of the electric field pulse. It should be of great interest to translate to the tissue scale the dynamic models recently developed at the cell scale. To this purpose, two approaches will be introduced: one based on measurements at the tissue scale and the other one from considerations at the microscopic scale.

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