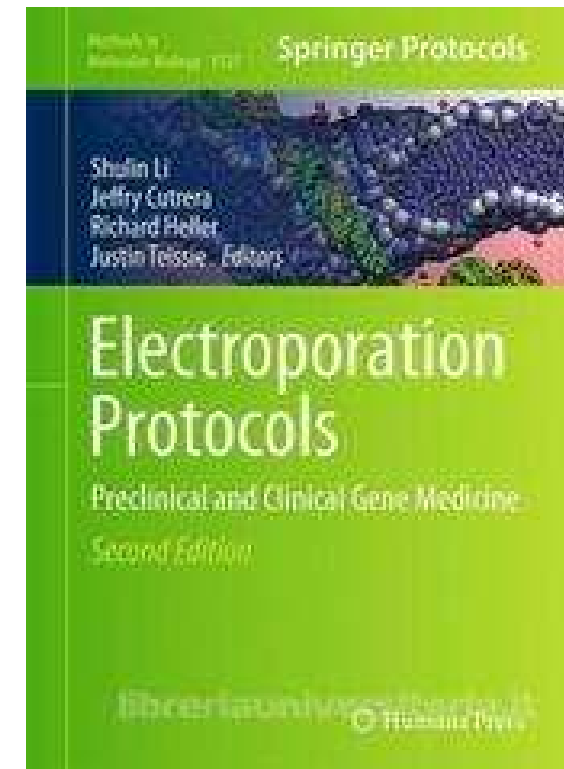
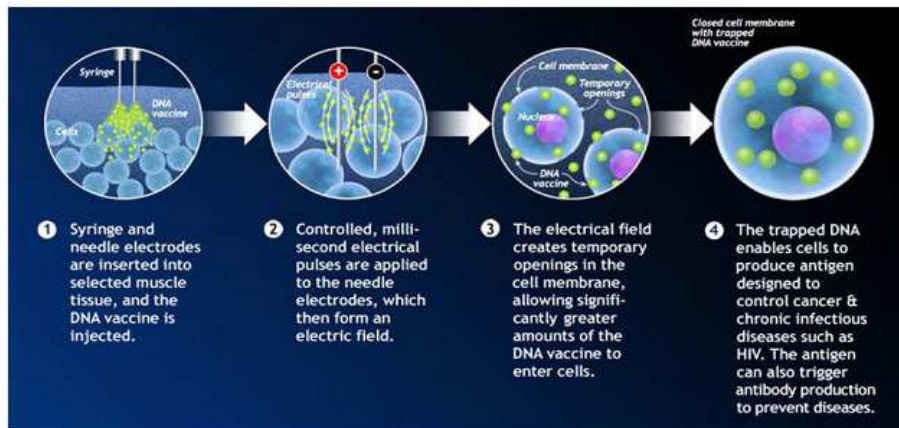


Gene Transfer Mediated by Electric Fields

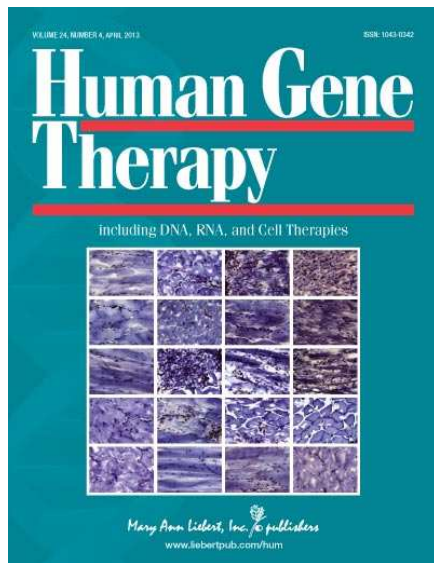


The use of electric pulses as a safe tool to deliver therapeutic molecules to tissues and organs has been rapidly developed over the last decade. This technology leads to a transient increase in the permeability of cell membranes when exposed to electric field pulses. This process is commonly known as electroporation or electropermeabilization.



ADVANTAGES OF ELECTROTRANSFER

- ❑ Improving of Antigen amount and Time of exposure of the antigen
Enhancement of DNA in-take and Improvement of antigen synthesis
- ❑ Stimulation of Innate Immunity by recruitmet of *danger signal* molecules
Adjuvant of innate immunity by production of IL-6 IL-1 β e TNF- α
- ❑ Targeting and antigen presentation
Recruitment e maturation of Dendritic Cells and macrophages responsible for Ag presentation to T lymphocytes



ADJUVANT PROPERTIES



Expert Opin. Biol. Ther. (2008) 8(11):1645-1657

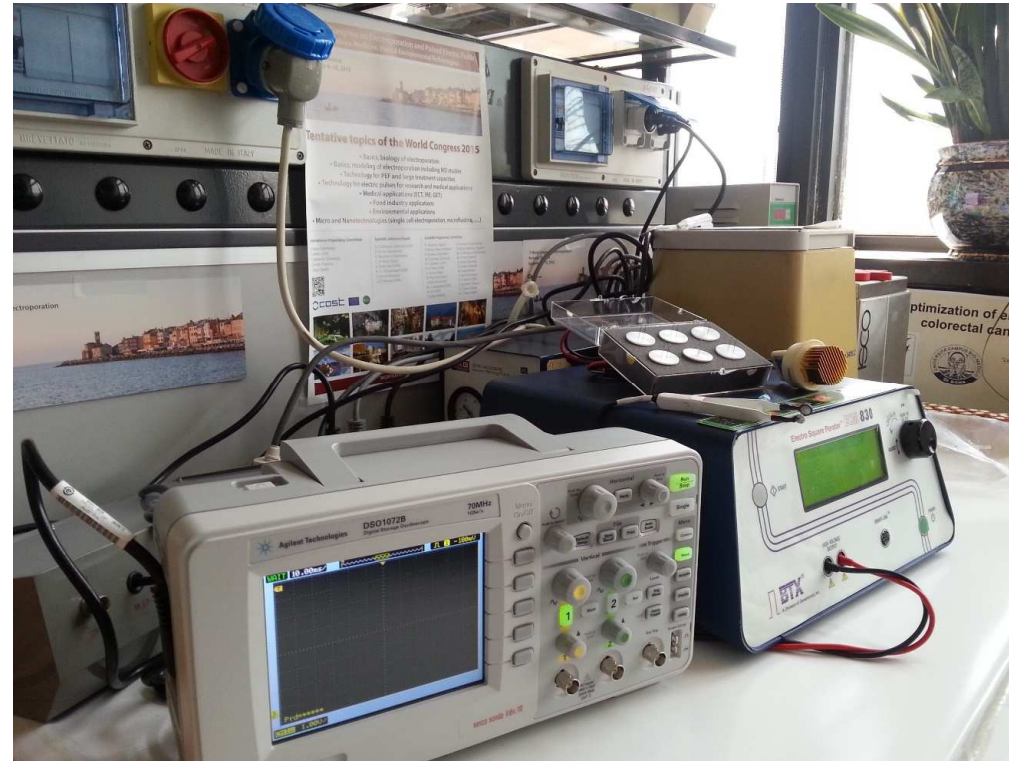
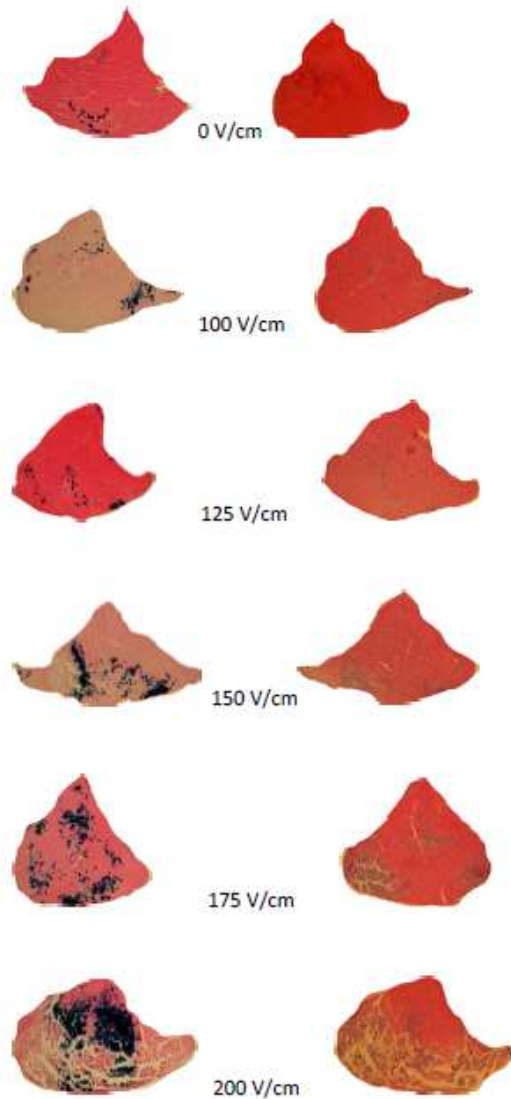
Original Research

Electroporation of skeletal muscle induces danger signal release and antigen-presenting cell recruitment independently of DNA vaccine administration

Pieranna Chiarella, Emanuela Massi, Mariangela De Robertis, Annarita Sibilio, Paola Parrella, Vito Michele Fazio & Emanuela Signori[†]

Since 2000: Optimization of Electrotransfer Conditions for plasmid DNA in-take

Prof DJ Wells - Imperial College – London, UK



Gene Therapy (2001) 8, 1264-1270
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www.nature.com/gt

RESEARCH ARTICLE

Optimisation of electrotransfer of plasmid into skeletal muscle by pretreatment with hyaluronidase – increased expression with reduced muscle damage

JM McMahon^{1,*}, E Signori^{2,3,*}, KE Wells¹, VM Fazio^{3,4} and DJ Wells¹

In collaboration with:

Fidia Farmaceutici-Div Noto



CNRS-IPBS, Toulouse (FR)



Protocolli di elettrotrasferimento genico *in vivo* mediante somministrazione di ialuronidasi

Electro gene transfer is one of the preferred strategy used to deliver plasmid DNA into skin and skeletal muscle. The combination of hyaluronidase with electrotransfer enhances transfection of muscular fibers and increases the expression of the encoded sequences. In the past, we have demonstrated that hyaluronidase amplifies the electrotransfer effect in terms of inflammatory cells recruitment: we observed inflammatory cells migration in the muscle treated with hyaluronidase and electrotransfer in a time window between day 4 and 7, following cytokine induction.

Because these observations are important in the choice of prime-boost intervals, we are working to improve electrotransfer-based DNA delivery protocols by the use of a new hyaluronidase provided by Fidia Farmaceutici.

In collaboration with:



Consejo Nacional de Investigaciones
Científicas y Técnicas



Facultad de Ciencias Exactas y Naturales - Universidad de Buenos Aires

We analyzed the role of pH in tissue damage in gene electrotransfer protocols. Theoretical modeling confirms experimental measurements and shows that in GET protocols whether with or without hyaluronidase pretreatment, pH fronts are the principal cause of muscle damage near the electrodes.



Bioelectrochemistry

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Bio-Electroporation organised by COST TD1104



Tissue damage modeling in gene electrotransfer: The role of pH



N. Olaiz ^{a,1}, E. Signori ^{b,1}, F. Maglietti ^a, A. Soba ^a, C. Suárez ^a, P. Turjanski ^a, S. Michinski ^c, G. Marshall ^{a,*}



We are also investigating the effects of immunotherapeutic protocols in cancer diseases, combining **electrochemotherapy** and **gene electrotransfer** approaches for IL-2 and IL-12 delivery in veterinary medicine.

