BTX Applications

Tech-Trends

Volume 1, Series 12

In Vivo EP induces danger signal release & antigen-presenting cell recruitment

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

Background : Plasmid DNA vaccination combined with electroporation (EP) provides a promising approach for the prevention of infectious diseases and for cancer immunotherapy. This technology has been described as being effective in activating humoural and cellular immune response in the host as well as in enhancing expression of the encoded antigen. Several reports showed EP has adjuvant-like properties when combined with plasmid DNA injection although the effect in the absence of DNA has not been investigated.
Objective : The aim of this study is to clarify whether the application of EP alone to the skeletal muscle is able to recruit and trigger cells involved in antigen presentation and immune response. *Methods* : Mouse skeletal muscle treated by EP were observed and processed for clinical, histological and immunohistochemistry analysis at different time points. *Results* : We demonstrate that EP induces transient morphological changes in the muscle with early production of endogenous cytokines responsible for signaling danger at the local level. Moreover, it causes the recruitment of inflammatory cells independently of the DNA injection and the activation of a danger pro inflammatory pathway, resulting in T-lymphocyte migration. *Conclusions* : Our data indicate EP by itself is able to recruit and trigger cells involved in antigen presentation and immune response; hence, the idea that EP has adjuvant-like properties owing to a moderate tissue injury and generation of a pro-inflammatory context with cytokine release that enhances the immune response. We suggest EP may be of practical use in clinical protocols, contributing to the development of DNA vaccination strategies.

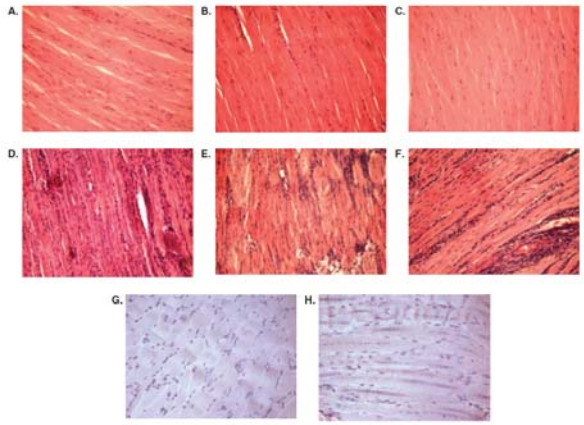


Figure 2 . Histological analysis of mouse skeletal muscle after DNA, hyaluronidase and EP treatment. Haematoxylin and eosin staining was carried out 5 days after the second vaccination into tibialis muscle of both posterior limbs (**A** – **F**). Representative sections from each muscle treatment are shown. **A.** Saline; **B.** DNA plasmid empty vector; **C.** DNA vaccine; **D.** EP; **E.** DNA vaccine + EP; **F.** DNA plasmid empty vector + EP + pretreatment with hyaluronidase; **G.** Muscles were removed and stained with haematoxylin 48 h post one single EP and **H.** 5 days after the second EP treatment. Sections are representative of each animal group (n = 5).

ECM® 830 In Vivo Electroporation Protocol

Tissue preparation:

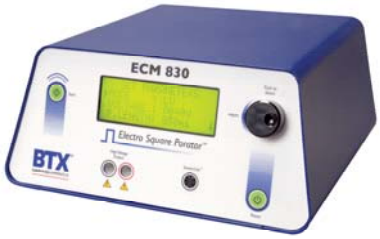
6-8 week old C3H/HeN mice were used. Mice anaesthetized by i.m. injection of ketamine-domitor mix in the muscle of the anterior limb. Mice were shaved on the hind legs to visualize the tibialis anterior muscle and injected with either saline or plasmid DNA or DNA vaccine.

Electroporation Settings:

Voltage:	175 V/cm
Pulse length:	20 ms
Number of pulses:	10
Electrode	7mm Tweezertrode

Reference;

Chiarella, P., Massi, E., De Robertis, M., Sibilio, A.,. Parrella P., Fazio MV., Signori, E. CNR,, Electroporation of skeletal muscle induces danger signal release and antigen-pressing cell recruitment independently of DNA vaccine administration, *Expert Opin. Biol. Ther.* (2008) **8**(11)



BTX® HARVARD APPARATUS
Molecular Delivery Systems

84 October Hill Rd. Holliston, MA 01746 Toll Free Ph: 800-272-2775 or 508-893-8999

Email: btxinfo@harvardapparatus.com Web: www.BTXonline.com