Electrochemical Therapy in Cancer Treatment

RCT summary for patients

Abstract

Electrochemical therapy (EChT), also named low-level direct electric current therapy, has been suggested in the past as a therapeutic potential in local cancer treatment. EChT destroys cancer cells using relatively high electric currents by electrolysis. Two or more electrodes (needles) are inserted in or near the tumor between which the direct electric current is generated. This creates a large local pH change which leads to cell death. Several studies on animal tumor models have been conducted to evaluate the effectiveness of EChT. Very few clinical trials have been published and EChT treatment is generally not established in the clinics. Nevertheless, EChT is currently available in some countries but is almost exclusively being used for palliative treatment of advanced stages of cancer incurable by any other intervention.

What is it?

Electrochemical therapy (EChT) was initially called Electro Chemo Therapy (ECT) since it entails toxic electrochemistry but its later use became known by different names. It is not to be confused with electrochemotherapy (ECT), a cancer therapy that uses a cytotoxic drug in addition to delivering electrical pulses (see RCT website for a review of this technique). EChT is specially indicated for superficial, not-operable or radio- and chemotherapy resistant advanced cancer. By definition, it is a therapeutic method that makes use of the destructive effects of electricity. It consists in the passage of a low-level direct electric current through two or more electrodes inserted into the tumor with the aim of destroying it. The electrodes are connected to an electrical device that provides a constant electric current. This current creates a flow of ions between the anode (positive electrode) and the cathode (negative electrode) within the tumor. The current produces new electrical and chemical compounds that create a toxic local microenvironment. The most important mechanism is the pH value shift due to the electrolysis of water that occurs between the electrodes. The destructive reaction products, formed at the electrodes during EChT, give rise to immediate cell death. However, cellular necrosis is not only induced by changes in pH but also by the liberation of cytotoxic gases near the electrodes. Part of these gases released at the electrodes remain present in the tumor and participate in other chemical reactions with organic and inorganic components of the tissue. These reactions can induce the production of new toxic products and further influence local pH changes. Several other contributory factors to be involved in tissue destruction have been reported, although their respective roles are not fully understood.
Does it work?

Although basic research into the mode of action of EChT started as early as the 1970s, data available in the literature is limited and heterogeneous. In these studies, different currents and voltages, a variety of electrode arrangements, and various numbers of repeated treatments have been used. The majority of studies occurred more than 10 years ago, many of them in China where large numbers of treated patients have been reported. However, the essential preclinical studies and clinical trials are missing. In general, all research and clinical data that exist so far are more a collection of single case studies. All of these cases include lung, liver, breast, prostate and skin cancer. The effectiveness of EChT has never been evaluated in the long-term or compared to other well-established treatment options. In addition, EChT at its current development has important disadvantages and limitations such as its inability to achieve a complete remission in many cases or that additional treatments are necessary. Another important drawback of this treatment technique is when the tumor is very large, which diminishes long-term outcome in almost every kind of malignancy. The duration of the treatment remains an issue as it can last up to several hours. Nowadays, EChT does not play a major role in Western industrialized countries. This is due to a lack of standardization of the EChT method regarding direct electric current doses and electrode array distribution. At present, there are clinics using EChT in China and Germany but also in Argentina, Austria, Cuba, and Brazil.

Is it safe?

In essence EChT is ablating a lesion and creating a wound that needs to heal. For small superficial therapies this process may occur in a fairly mild form with minimal pain, wound healing or other cosmetic and functional issues. However, for larger tumor volumes or tumors located deeper within the body specific complications may occur. Different adverse effects have been reported such as fever, wound infections, damages to blood vessels and nerves. Also, if the treatment is not well optimized, it is possible to destroy some of the peripheral normal tissues. No contraindications for applying EChT have been reported.

Useful links

http://www.naturheilverfahren-dr-felgner.de/Galvanotherapie.html
http://www.hyperthermie-zentrum-hannover.de/de/hyperthermie-galvanotherapie.html
http://www.nosomi.at/e04ect01.htm
http://www.galvanotherapie.info/index.php
http://www.praxis-kondritz.de/
http://www.galvanotherapie-heute.de/