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Commentary

Embryonic Skin Explant Using Electroporation and Electro Chemotherapy (ECT) in Oncology

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DESCRIPTION

The chick embryo has a long and illustrious history as a key model system in developmental biology. It has also made important contributions to the fields of cell biology, genetics, virology, cancer and immunology. Due to electroporation, it has now grown to be even more powerful. Thin film tissues, such as the skin are more delicate and difficult to electroporate due to the risk of cell damage from the standard embryonic electroporation parameters the earlier the skin tissue is in the development process. In a few investigations skin linked to a filter was placed in an chamber containing plasmid with the epidermal side towards the cathode. This procedure involved electroporation plasmid DNA onto the skin of chick embryos. Through the use of this protocol it is possible to guarantee that the skin is worked on in a liquid environment effectively preventing the skin from being poked and from curling. In order to prevent extreme changes in the voltage supplied to the skin the distance between the electrodes and the skin is fixed. Here, it presents a flexible and reliable method for skin electroporation of chick embryos that enables the targeted delivery of plasmid DNA to extremely specific target locations. The study of gene regulation during skin development and time-lapse imaging are both possible with these methods.

It is easy to assemble the electroporation chamber and the experiment may be carried out more quickly with the right conditions. The electroporation of thin film tissues like the endocardium, mucosal epithelium and retina can also be referred to as using this approach. High-frequency electrical pulses are used in the non-thermal process of electroporation to penetrate cell membranes. Irreversible Electroporation (IRE) refers to the loss of semipermeable barrier qualities in membrane cells which explains apoptosis by fatally disrupting the osmotic equilibrium between the interior of the cell and its surroundings. If transitory changes to cell membrane characteristics occur electroporation can be reversed. Both procedures prevent the heat sink effect for tumors close to major vessels and do not harm the extracellular matrix due to the absence of cell membrane structure. Prostatic, renal, pancreatic and liver malignancies have all been treated with IRE.

IRE can be carried either openly or percutaneous while being guided by imaging. Before the surgery no special preventative measure is taken. At least three weeks before the procedure, chemotherapy is frequently stopped. The cytotoxicity was used as the proof of concept for Electro Chemotherapy (ECT) and electroporation as opposed to the drug alone, the cytotoxicity of this agent was increased 700-fold. The technique seems to be safe and successful. Due to the drug's direct and local delivery by electric pulses which were administered directly to the malignant tissue positioned between the electrodes, the side effects were significantly reduced.

Emerging procedures with potential oncological outcomes include IRE and ECT. For locally advanced liver, kidney, pancreas and prostate malignancies IRE is only moderately related with morbidity. There are accounts of the use of ECT for the treatment of other malignancies such as melanoma although these are rare. The device's straightforward design enables the flow to position the cell in areas with strong local electric fields. Both larger charged molecules like plasmid DNA and smaller ones like fluorescent tracer molecules that are membrane impermeable can be delivered using the device. This gadget uses electroporation to transfer molecules while maintaining cell viability. When protein-encoding plasmid DNA is electro transferred with this method a high degree of gene transfection is accomplished.

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