Penetration enhancement of drugs into biological tissues using differentia pulse method

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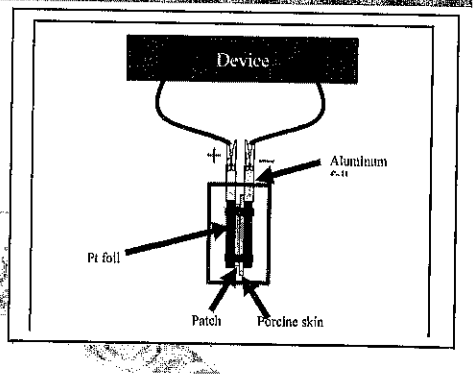

Experience:

- DDS, School of Dentistry, National Taiwan University
- MS, Graduate Institute of Clinical Dentistry, National Taiwan University
- PhD, Graduate Institute of Clinical Dentistry, National Taiwan University
- Assistant Professor, Graduate Institute of Oral Biology, National Taiwan University
- Associate Professor, Graduate Institute of Oral Biology, National Taiwan University

Market Needs:

Oral cancer is among the ten most common causes of death from cancer. The current treatment methods are mainly surgery, radiotherapy, and chemotherapy. Surgical resection is the most common treatment but if its scope is large, it is likely to damage the appearance and function of the affected tissues. It is often used in conjunction with chemotherapy drugs, most of which are administered in high doses to kill cancer cells, which can easily cause severe side effects.

Cisplatin is widely used in clinical treatment as an anticancer drug, but it has many side effects, such as nephrotoxicity and neurotoxicity. This invention reduces the negative effects of cisplatin. We expect that the lesion area can be reduced and then surgically removed. This method can not only reduce the required dose of chemotherapy drugs, but also enhance their specificity to cancer tissues to benefit more patients.

Our Technology:

To make the nanoparticles enter the affected area at a specific time, we loaded cisplatin in a chitosan nanocarrier and mixed the particles with a temperature-sensitive hydrogel. As expected, the hydrogel changed phase when it was close to the temperature of the human body and the nanoparticles were extruded. The positive charge of the nanoparticles was then used to import them into the cancer tissue via electrochemical iontophoresis, negatively charging the skin or mucosal layer, the cationic permeability of which and can promote the import of anti-cancer drugs into cancer tissues. The optimal iontophoresis group was differential pulse voltammetry (DPV) 63 cycles, Ei=1.5 V, 2h, in which up to 6.74 μg/mL of cisplatin was able to penetrate porcine skin, and 6.74 μg/mL of cisplatin was sufficient to inhibit 50% of cancer cells. Overall, the variable voltage group had higher iontophoresis efficiency than the variable current group, and DPV 63 cycles, Ei=1.5 V, 2h (variable voltage group) had the highest iontophoresis efficiency.

Strength:

Clinical treatment for cancer using electrochemical method has yet to be developed. Literature report using differential pulse voltammetry (DPV) for cancer treatment was not found.

Competing Products:

No product is available for clinical cancer treatment.

Intellectual Properties:

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