

**SYNERGISTIC EFFECT OF NANOSECOND PULSED
ELECTRIC FIELDS COMBINED WITH LOW
CONCENTRATION OF GEMCITABINE ON
HUMAN ORAL SQUAMOUS CELL CARCINOMA
*IN VITRO***

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Oral squamous cell carcinoma (OSCC) is the most widespread malignant oral cavity neoplasm, with even higher proportion of deaths than breast cancer and cervical cancer. Although advances were made in conventional treatment for OSCC such as surgery and radiation therapy, there has not been significant increase in the 5-year survival rate in the past four decades, and chemotherapeutic drug resistance and side-effects are still main obstacles for chemotherapy. Thus, improvement in the treatment of OSCC is strongly expected.

In this study, nanosecond pulsed electric fields, known as nsPEFs, were applied in the treatment of OSCC in combination with gemcitabine, a clinical-used anti-cancer drug. Synergistic effects of nsPEFs and gemcitabine were observed and investigated. Cal-27 cells were exposed to 20 pulses with duration of 100ns at electric field intensity of 10, 30 and 60 kV/cm, and then cultured in the medium with 0.01ug/mL gemcitabine. Cell inhibition was increased by 5 fold after the combined treatment compared to gemcitabine or nsPEFs alone, verified with MTT test, and remarkable synergistic effects were obtained with synergistic quotient over 3. Cell proliferation and invasion ability decreased significantly, determined by clonogenic assay and transwell invasion assay. Cell apoptosis was evaluated by flow cytometry and morphological changes were observed by TEM. It is indicated that the combined treatment has significant advances over either gemcitabine or nsPEFs, and synergistic inhibition in cell line cal-27 was demonstrated. The combined therapy may reduce the dose of both chemotherapeutic drug and nsPEF, and thus may avoid side-effects or drug resistances as well as provide a better treatment for oral cancer.

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