Seminar

Institute for Plasma Research

Title : A Pre-clinical in vivo study: Cold atmospheric plasma in treatment of gingivobuccal squamous cell carcinoma

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Date : 9th January 2020 (Thursday)

Time : 03:30 PM

Venue : Seminar Hall, IPR

Abstract :

Oral cancer is a major public health problem in regions with high consumption of smokeless tobacco in various forms, such as, areca nut, lime or betel leaves as quid, pan, masheri or gutka. The treatment modality of GB-SCC comprises of surgical resection of the tumor in conjunction with chemotherapy or radiation therapy. Cold atmospheric plasma (CAP) is now considered as the fourth arm for treatment of cancer. In the current study, we investigated the effect of CAP on gingivobuccal squamous cell carcinoma. CAP has shown to induce cancer cell death but the mechanism of interaction of CAP with tumor is not yet fully understood. Here, we firstly established the in vitro efficacy of plasma treatment on GB-SCC, MCF7 and HEK293 cell lines using MTT assay and Raman spectroscopy. We observed a time dependent decrease in the cell viability on treatment with plasma jet. Comparative study with the current treatment modality of radiation indicated that plasma has a potent effect on tumor cell lines. We further analyzed its effect on in vivo hamster buccal pouch (HBP) model. Tumor was induced in hamsters using DMBA which closely resembles premalignant lesions and carcinomas of human. Direct CAP treatment on tumors was performed for 5 and 10 minutes, thrice a week for 1 month. We observed tumor regression in CAP treated tumors as compared to control and helium treated tumors. Our in vitro findings of CAP induced cell death are being validated by in vivo studies conducted in hamsters, implying the pre-clinical significance of the study. A major limitation of current treatment modalities is their inability to differentiate normal and tumor cells; hence we are exploring the effect of CAP treatment on normal tissues. We further intend to establish the mechanism of CAP induced cell death by performing immunohistochemical analysis on tumors. Moreover, CAP would also be evaluated for its penetration capability in treatment of superficial cancers.