

GEC15-2015-000796

Abstract for an Invited Paper
for the GEC15 Meeting of
the American Physical Society

Systematization of the Mechanism by Which Plasma Irradiation Causes Cell Growth and Tumor Cell Death

NOBUYUKI SHIMIZU, International University of Health and Welfare/Sanno Hospital, Japan

New methods and technologies have improved minimally invasive surgical treatment and saved numerous patients. Recently, plasma irradiation has been demonstrated that might be useful in medical field and the plasma irradiation device is expected to become practically applicable. Mild plasma coagulator showed some advantages such as hemostasis and adhesion reduction in experimental animal model, but the mechanism of plasma irradiation remains unclear. Our study group aim to clarify the mechanism of plasma irradiation effects, mainly focusing on oxidative stress using cultured cell lines and small animal model. First, a study using cultured cell lines showed that the culture medium that was activated by plasma irradiation (we called this kind of medium as “PAM” -plasma activated medium-) induced tumor cell death. Although this effect was mainly found to be due to hydrogen peroxide, the remaining portion was considered as the specific effect of the plasma irradiation and we are now studying focusing on this effect. Second, we established a mouse intra-peritoneal adhesion model and checked biological reaction that occurred in the adhesion part. Histopathological study showed inflammatory cells infiltration into adhesion part and the expression of PTX3 that might involve tissue repair around adhesion part. We also confirmed that cytokines IL-6 and IL-10 might be useful as a marker of adhesion formation in this model. Applying “PAM” or mild plasma irradiation in this model, we examine the effects of plasma on inflamed cells. The samples in these experiments would be applied to targeted proteomics analysis, and we aim to demonstrate the systematization of the cells reaction by plasma irradiation.