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Molecular basis of non-thermal plasma effect on cancer cells

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Protein functions in a living cell are tightly governed by their three-dimensional structures via communicating genetic information. Plasma is an ionized gas consisting of ions, electrons as well as neutral atoms and molecules. A number of studies demonstrated effect of non-thermal plasmas on the inactivation of micro-organisms, wound healing, blood coagulation, skin regeneration and cancer treatment. Very recently, it has been proposed that non-thermal plasma could be applied to cancer cells and tissues for clinical purpose. However, a detailed molecular mechanism related to plasma effect has not revealed yet. Structural biology plays a major role in studying structure and dynamics of proteins in solution. In this presentation, I demonstrate that NMR spectroscopy and X-ray crystallography would be used as powerful techniques to uncover non-thermal plasma effect on oncogenic proteins during cellular signaling. Data suggest that plasma irradiation induces structural fluctuation as well as functional change of proteins, which are important aspects in understanding molecular function of proteins modified by cold plasma.