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Femtomedicine in Cancer: Discovery of New Antitumor Molecules for Natural Targeted Chemotherapy and Radiotherapy of Cancers

Monday 13 June 2016 13:00 (30 minutes)

The conquest of cancer continues to pose great challenges to medical science. There is a compelling need for innovative cancer research integrating biomedical sciences with physical sciences in order to ultimately conquer cancer. Femtomedicine (FMD), which integrates femtosecond time-resolved laser spectroscopy with biomedical sciences, was recently coined to advance fundamental understanding and therapies of human diseases notably cancer [1,2]. Our studies in FMD have led to the discoveries of the reductive damaging mechanism in DNA and living cells and the molecular mechanisms of action of existing anti-cancer agents. These have offered unique opportunities to develop new effective drugs for high-performance therapy of cancer[3,4]. We have particularly found a new class of non-platinum-based anticancer compounds (called FMD compounds) for natural targeted chemotherapy and radiotherapy of a variety of cancers, e.g., cervical cancer, ovarian cancer, head and neck cancer, breast cancer, lung cancer, etc. Treatments of various cancer cells in vitro and in vivo mouse xenograft models with FMD compounds led to effective chemotherapy and enhanced radiotherapy, while the compounds themselves induced no or little systemic and radiation toxicity. These compounds are therefore a new class of potent antitumor agents that can be translated into clinical trials for targeted chemotherapy and radiotherapy of multiple types of cancer. The results also show that FMD can bring breakthroughs in understanding fundamental biological processes and lead to advances in cancer therapy. This presentation will discuss some progress in this new frontier—FMD in Cancer.

1. QB Lu, Mutat. Res.: Rev. Mutat. Res. 704, 190-199 (2010).
2. J Nguyen et al., PNAS 108, 11778-11783 (2011).
3. QB Lu et al., EBioMedicine 2, 544-553 (2015).
4. CR Wang et al., Mol. Cancer Ther. (2016). doi: 10.1158/1535-7163.MCT-15-0862.

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