APOPTOSIS OF HUMAN HEPATOCELLULAR CARCINOMA CELL (HEPG2) INDUCED BY A PLASMA JET DEVICE THROUGH G2/M PHASE ARREST*

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The cell cycle is divided into two main parts: interphase and mitosis. During the interphase, the cell grows and replicates its chromosomes. The interphase accounts for all but an hour or two of a 24-h cell cycle, and is subdivided into three phases: gap phase 1 (G1), synthesis (S), and gap phase 2 (G2). During the interphase, the cell is growing and preparing for the mitosis (M phase) by accumulating nutrients and replicating DNA. The interphase is followed by the M phase, which is composed of two coupled processes, i.e. mitosis (nuclear division) and cytokinesis (cell division). In the mitosis, the chromosomes are partitioned between the two daughter cells. In the cytokinesis, the cytoplasm physically divides, forming the two daughter cells.

The cold atmospheric pressure plasma, which has been widely used for biomedical applications, may potentially affect the cell cycle and cause cell apoptosis. In this letter, human hepatocellular carcinoma cell (HepG2) was treated by a single electrode plasma jet device. Further investigation by using the flow cytometric analysis demonstrated that the plasma treatment increased the percentage of apoptotic cells being associated with cell cycle arrest at G2/M phase. Results of the present investigation indicate that the plasma jet device may have potential therapeutic activity, such as sterilization of living tissue and tumor therapy of the postoperative treatment process.

1. M. Laroussi and X. Lu, Appl. Phys. Lett. 87, 113902 (2005).
2. M. Keidar and I. Belis, Appl. Phys. Lett. 94, 191501 (2009).
3. E. Stoffels, I. Kieft, R. Sladek, L. Van den Bedem, E. van der Laan, and M. Steinbuch, Plasma Sources Sci. Technol. 15, S169 (2006).
4. M. Laroussi, IEEE Trans. Plasma Sci. 37, 714 (2009).
5. G. Fridman, G. Friedman, A. Gutsol, A. B. Shekhter, V. N. Vasilets, and A. Fridman, Plasma Processes Polym. 5, 503 (2008).
6. X. Lu, Z. Xiong, F. Zhao, et al. Appl. Phys. Lett. 95, 181501 (2009)

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