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プラズマ培養液によるグリオブラストーマ脳腫瘍培養細胞における アポトーシスの細胞内分子機構

Intracellular molecular mechanisms of apoptosis in glioblastoma brain tumor cells by plasma-activated medium

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Recently, medical applications using nonequilibrium atmospheric pressure plasmas (NEAPPs) have attracted attention in the field of medicine. We have previously reported that the inactivation of *Penicillium digitatum* spores and selective killing effects on ovarian cancer cells against fibroblast normal cells using our developed high-electron-density nonequilibrium atmospheric pressure plasmas [1, 2]. In addition, we and other groups have found that plasma might provide any effects on cells not only directly but also indirectly through plasma-activated solutions.

In this study, we used plasma-activated medium (PAM) rather than directly treating cells with plasma because of the reasons described below. Plasma generally produces ions, electrons, free radicals, and light such as ultra violet and vacuum ultra violet. Using PAM, we eliminated any direct effects of light on the cells. Second, rather than treating each sample one by one, we were able to simultaneously treat multiple samples, which reduces experimental errors.

Glioblastoma brain tumor cells and normal astrocytes were treated with PAM. Cell proliferation assays showed that glioblastoma cells were selectively killed by PAM. PAM induced morphological changes consistent with apoptosis in glioblastoma cells and the cells decreased in size, and we confirmed that those cells induced apoptosis using an apoptotic molecular marker, cleaved Caspase3/7.

In addition, we are studying intracellular mechanisms of PAM-mediated apoptosis in glioblastoma cells, and we found that PAM downregulated the expression of AKT kinase, a marker molecule in a survival signal transduction pathway [3].

References

[1] Iwasaki M, Inui H, Matsudaira Y, Kano H, Yoshida N, Ito M, and Hori M 2008 *Appl. Phys. Lett.* **92** 081503

[2] Iseki S, Nakamura K, Hayashi M, Tanaka H, Kondo H, Kajiyama H, Kano H, Kikkawa F, and Hori M 2012 *Appl. Phys. Lett.* **100** 113702

[3] Tanaka H, Mizuno M, Ishikawa K, Nakamura K, Kajiyama H, Kano H, Kikkawa F, and Hori M *Plasma Medicine* (accepted in 2012)