

Treatment of glioblastoma: New application for CAPs?

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Glioblastomas (GBM) represent the most common primary brain tumors in adults. GBM is a highly aggressive tumor and is associated with extremely poor prognosis. Although options for initial treatment have improved, nearly all GBMs recur and treatment options are limited. So far, the median survival remains approximately 15 months for glioblastoma patients [1]. Current standard therapy for GBMs consists of surgery followed by radiotherapy combined with the alkylating agent temozolomide (TMZ). A crucial challenge is to develop and deliver effective drugs to cure this deadly disease.

Treatment of glioblastoma cell lines

Cold atmospheric plasma (CAP) displays features that are favorable in tumor biology. In this study we were able to demonstrate that CAP - using the Surface Micro Discharge (SMD) technology for plasma production [2] - is able to block cell proliferation, to induce S/G₂-phase cell cycle arrest and mediate apoptosis to a lower extent in three different glioma cell lines. Very short treatment times of about seconds strongly inhibit human glioma cell proliferation. Cell cycle arrest in S/G₂- phase was induced after sixty seconds and persists at least for 72h when cells were treated with CAP once. In combination with the standard chemotherapeutic, temozolomide, CAP treatment is more effective in inhibition of cell viability and clonogenicity compared to TMZ alone. This data on glioblastoma might open new applications in brain tumor biology using cold atmospheric plasma.

References

[1] Stupp et al., N Engl J Med (2005), 352, 987-996

[2] Morfill et al., NJP (2009), 11, 115019