**Morphological changes and cell viability of GL261 and SMA-560 mouse glioma cells affected by direct infrared light illumination**

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Glioma is a type of primary, malignant brain tumour [1]. This is a highly lethal tumour, which can cause headaches, vomiting, vision and memory loss, seizures, speech difficulties and complex visual hallucinations. Prevailing glioma treatment options include chemotherapy, surgical removal, and radiation therapy, which can cause severe side effects. On the other hand, light-based therapies, such as direct light therapy [2], photothermal [3], and photodynamic therapy [4], are minimally invasive, non-cumulative, and non-toxic treatment modalities, offering an effective and less damaging alternative to more invasive anti-cancer treatments.

We have experimentally examined the in vitro photokilling potential of continuous-wave infrared laser light on murine GL261 and SMA-560 glioma cancer cells. Cell viability was measured as a function of laser beam intensity and compared to a control, which was kept in the dark for 30 minutes. The laser wavelength was centered at 831 nm, and the beam diameter was approximately 6 mm. Glioma cells in each microtiter well were illuminated for 10 minutes at room temperature, ≈ 20˚C, with a total dose of ≈492 J/cm² and ≈ 313 J/cm2 for SMA 560 and GL261 cells, respectively. The SRB assay, which measures the absorbance of sulforhodamine B dye at 550 nm, was performed 48 h after the treatment. The obtained results showed that the minimal achieved viability was slightly below 60% for the SMA-560, whereas for the GL261 cell line, this value was ≈ 69%.

Monitoring the morphological changes in illuminated cells is often used to elucidate the influence of light on cancer cells [5]. In GL261 cells, after illumination, a large number of round cells grouped in clusters can be observed. In SMA-560, after the light treatment, there is a significant decrease in the number of living cells, accompanied by a change in shape: cells lose their characteristic elongated profile and become round and shrunken. These morphological changes are typically observed in dying cells and suggest a cytotoxic effect of the light on the glioma cell lines.

These results demonstrate the effect that direct light therapy has on glioma cells and emphasise the potential of this approach in combating cancer.

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