GLIOMA CELL RESPONSE TO AU@SIO_2 NANOSPHERES NIR-LIGHT IRRADIATION TREATMENT

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Malignant gliomas are one of the most debilitating and lethal forms of cancer. Despite advancement in treatments, the survival and quality of life for high-grade malignant brain tumor patients remain poor. Current treatment modalities include surgery, radiotherapy and chemotherapy [1].
Here we present a novel nanoparticle therapy based on the NIR-light irradiation of mesoporous gold encapsulated- silica nanospheres.
These hybrid nanoparticles were prepared by pseudomorphic transformation of pre-formed gold-silica nanospheres. Their size varies between 100-150 nm and their metal cores ranging fron 15 to 30 nm. They were characterized by XRD, ^{29}Si and ^{13}C-MAS-NMR, TEM and N_2-adsorption isotherms (BET) [2].
In vitro assays were performed using 42-MGBA human glioma cells. The cells were cultured at 37ºC under 5% CO_2 following the usual protocol. After 12 hours, nanospheres were added to the cultures.
All the cell cultures were analyzed before and at the end of the treatment period using an inverted microscope. Measurement of cell viability and proliferation was performed using the MTT (3,4,5-dimethylthiazol-2,5-diphenyl tetrazolium bromide) cell proliferation assay and DNA was quantified using the Hoechst method. Furthermore, we used transmission electron microscopic analysis to determine the subcellular localization of the nanoparticles.
Cells were exposed to NIR light (800nm) at and above 180mW. The diameter of the laser beam was 1mm and the irradiation times ranged from 1s to 1min [3,4].
To quantify the cancer cell viability, the irradiated cells were stained with Acridine Orange and different sample zones were photographed and counted.
We observed up to 40% of cell death. These results suggest that our nanostructured system is highly biocompatible and could serve as an effective tool for malignant cell destroying.

References:

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[2] Botella P., Corma A., Navarro M.T., Chem. Mater. **19** (2007) 1979-1983
[3] Jingyi C., Danling W., Jiefeng Xi , Leslie Au , Andy S. , Addie W. , Nano Letters.**7**(2007) 1318-1322
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Figures:

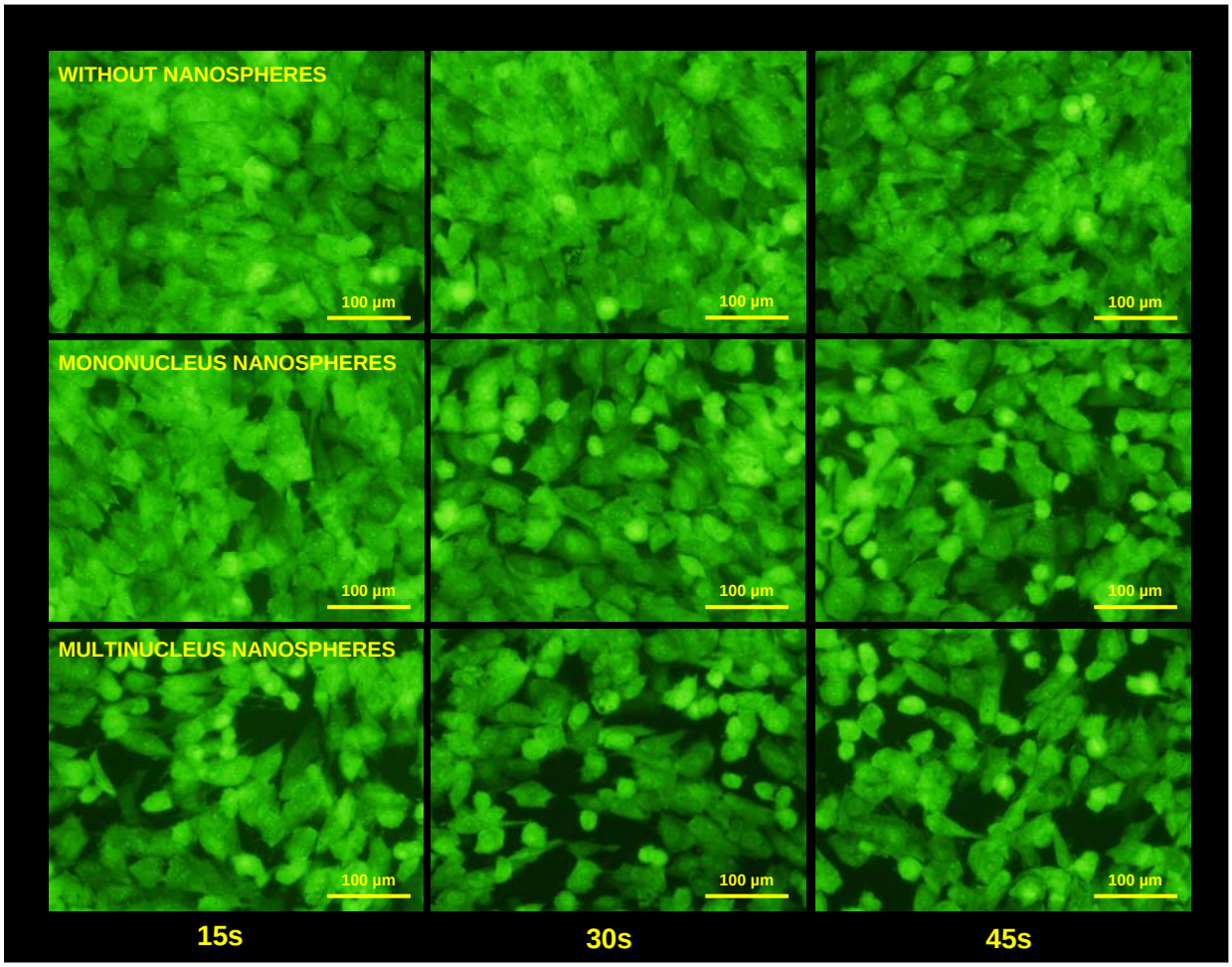

Figure 1: Fluorescence imaging of 42-MG-BA Human Glioma Cells with and without nanospheres, after NIR irradiation.

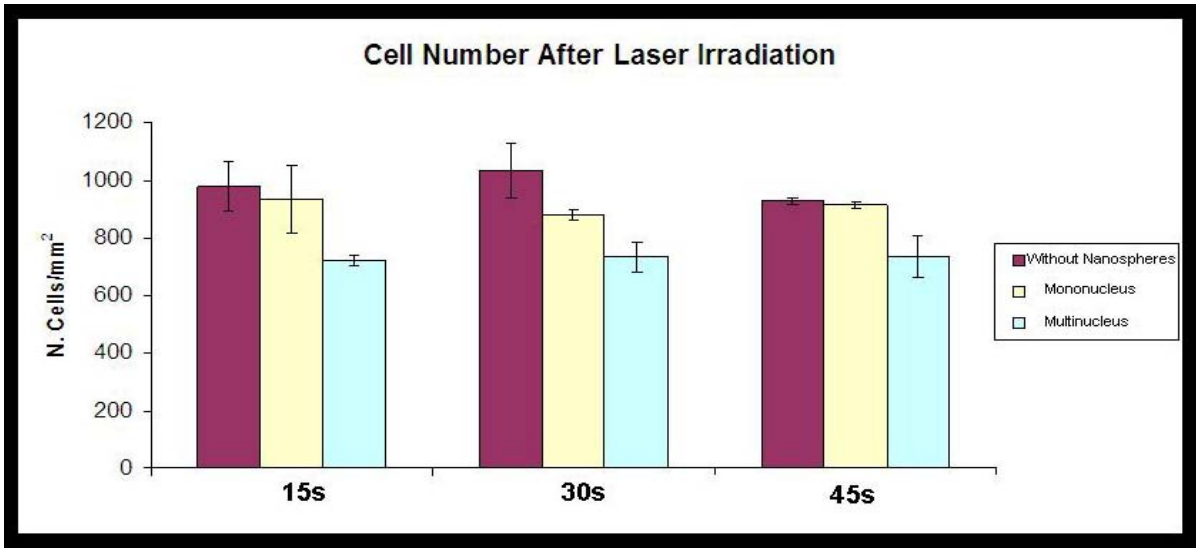

Figure 2 : Cell Density results after NIR laser exposition.