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Electrospun nanofibers releasing salinomycin for glioblastoma treatment

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Glioblastoma multiforme conventional treatments have not been efficacious to ameliorate the median survival of the patients which stems from the blood brain barrier (BBB) effect and the high rate of tumor recurrence. Localized drug delivery at the surgical resection margin via implantable electrospun nanofibers can not only circumvent the BBB, but also diminish the rate of tumor recurrence. Furthermore, implantable nanofibers can lessen the systemic exposure and toxicity of the chemotherapeutics, while providing high concentrations of them at the tumor vicinity and thereby elevating the therapeutic efficacy. In this study, PLGA nanofibers (NFs, avg. diameter 170 ± 57 nm) containing salinomycin (Sali), as a chemotherapeutic agent, were fabricated by electro spinning. Salinomycin was sustainably released from the nanofibers in a 2-week period. The NFs+Sali was found to be effective induce over 50% apoptosis in human glioblastoma U-251 cells and effectively decrease their proliferation upon a 48-hour treatment. Moreover, analysis of surviving U251 cells indicated the NFs+Sali had upregulated expression of Rbl1 and Rbl2 tumor suppressor genes as well as caspase 3, which can lead to caspase-dependent apoptosis. In conclusion, the results indicated higher anti-tumor activity of the NFs+Sali in comparison to free salinomycin which can be attributed to the gradual release of the drug from the nanofibers. This suggests potential applications of the NFs+Sali as implantable drug delivery systems in the brain upon surgical resection of the tumor.

Biography

Mohammad Norouzi obtained his M. Eng. in 2012 and he studies his Ph.D. in biomedical engineering at university of Manitoba. His research activities have been mainly focused on novel drug delivery systems for cancer therapy as well as tissue engineering. He has also presented over 30 scientific papers in peer-reviewed journals and conferences worldwide.

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