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Assessment of oncolytic polioviruses in difference cell models in vitro and in vivo

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Treatment of cancer remains one of the most challenging tasks for most researches, as it still a main factor for many mortalities in humanity [1]. Traditional approaches including surgery, chemotherapy, radiotherapy, targeted therapy and other new immunotherapies approaches seek to eliminate malignant cancerous cells[2] .The introduction of a novel treatment based on the oncolytic viruses (OVs) is a recent addition to these approaches as it gives a rise in combating against cancer cells [3]. Oncolytic viruses use a bi-lateral mechanism consist of direct lysis of cancer cells and immunogenic effect that leads to the exposure of tumor antigens and results in the reinforcement of the immune response against cancer cells [4]. To assess the overall process of the oncolytic effect on different cell models, we tested several strains of polioviruses to evaluate their replication effectiveness using comparative mediums: DMEM and Human Plasma-Like Medium (HPLM) in vitro.We used a combination of poliovirus type 1, poliovirus type 2, Newcastle Disease virus, recombinant poliovirus type 3 (Russo). The cell models that were used are: HeLa cell line, Vero, 4T1 murine cell line, A172, U251, DBTRG and glioblastoma primary cell lines. Our results show significant difference in the cytopathic effect on both mediums, which means that the oncolytic activity of these viruses was less on HPLM than on DMEM. Further, we developed a murine tumor cell line 4T1 supplied with human poliovirus receptor to assess the effectiveness of these oncolytic polioviruses. We noticed a surprise result where these viruses have a real oncolytic effect on the mice tumors, that were shrunk by more than a half. We delivered these viruses to the mice using intratumoral and intravenous pathways. The obtained results indicate the effectiveness of oncolytic polioviruses and its tropism towards cancer cells in vivo, and that the results significantly differentiate between in vitro and in vivo studies. This study highlights the importance of developing 3D models for primary cancer cell lines in order to mimic the real effect in vivo, which we would further make in our study.