Investigating the Effect of Berberine and a Nanoparticle Delivery System on Epstein Barr Virus Replication and Infectivity: A Potential Therapeutic Approach

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Epstein Barr Virus (EBV) is a gammaherpesvirus infecting 90% of adults, and is associated with various diseases, including infectious mononucleosis, Hodgkin lymphoma, Burkitt lymphoma, and Nasopharyngeal carcinomas (NPC). There is no current treatment for EBV or associated diseases, though berberine has shown promising potential because of its effect on EBV+ malignancies. Berberine is a natural compound found in medicinal plants with various pharmacological effects, including being anti-inflammatory, anti-oxidant, anti-microbial, and anti-tumor in some studies. Berberine has low bioavailability and a nanoparticle formulation has been engineered with the hope of improving dissolution and solubility. This research aimed to determine which of 3 berberine formulations had the strongest inhibitory effects at the lowest concentration. Cell viability assays analyzed the toxicity and replication of 293 EBV+ cells treated with increasing concentrations of berberine and 2 nanoparticles. Flow cytometry and qPCR were used to determine changes in EBV infectivity and genome copy number after being treated with the compounds. Results showed that all compounds were too toxic at 20 μM, whereas 2, 5, and 10 uM did not inhibit growth, meaning they could be used for infectivity assays. Infectivity was inhibited at concentrations of 5 and 10 μM. These results can be applicable to generate more knowledge on the effect of berberine and its nanoparticles on EBV or other herpesvirus. Next steps would be to test the compounds on the different stages of EBV, more specifically the reactivated virus, and expand the experiment to cover a wider range of B-cell lines.

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