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Biological evaluation of natural extracts versus poxviruses

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Vaccinia Virus (Poxvirus family) is closely related to other viruses in the Orthopoxvirus genus, e.g. Variola Virus, Monkeypox and Cowpox [1], and can be used as a surrogate model of Orthopoxvirus infection in antiviral studies at BSL2. Vaccinia WR is associated with Postvaccinial Encephalitis, a rare but severe complication of Smallpox vaccination with replicating viruses [2]. Encephalitis was regularly observed in Smallpox cases.

In this project we have used fully replication competent Vaccinia Virus strain WR to test the antiviral activity of natural plant extracts prepared in the laboratory of Les Baillie, School of Pharmacy and Pharmaceutical Sciences in Cardiff.

A luciferase-expressing vaccinia virus WR (v3- LUC240) was used to both investigate the capability of the substances to prevent the early stage of infection (virus entry; at 4 hours p.i.- reporter activity) and the later stage of infection (at 3 days p.i.- viability assay; at 5 days p.i.- plaque reduction assay). The extracts were screened at a single concentration; the activity and toxicity spectra of effective extracts were further characterized. The clinically approved drug Cidofovir (CDV) and the experimental autophagy inhibitor cf2642 were used as inhibition controls.

Organotypic cell lines A549 (human alveolar epithelial cell; lung), HUH-7 (human hepatoma; liver), and DBTRG (human glioblastoma; brain) were used. From preliminary data, we have found that Taraxacum officinale (Dandelion) extract fraction 9 (BB4-D9) tested at 6.4ug/mL had an efficacy comparable to CDV at 10µ M in A549. Further subfractions of BB4-D9 are to be tested to identify the active component of Taraxacum officinale plant extract.