Abstract Title: BPV-1 L1 VLP Vaccination protects horses from experimental BPV-1 Infection

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Objectives
Bovine papillomavirus types 1 and 2 (BPV-1/-2) are chiefly involved in the pathogenesis of common equine skin tumours termed sarcoids. Recently we have shown that intramuscular immunisation of horses with BPV-1 L1 VLPs is safe and highly immunogenic. We have further demonstrated that BPV-1 and BPV-2 are closely related serotypes. We then established a robust BPV-1 challenge model based on intradermal inoculation of horses with cow wart-derived wild type BPV-1 virions that resulted in the development of transient pseudo-sarcoids. Based on these data, we addressed the protective potential of BPV-1 L1 VLPs in horses.

Method
The trial involved 21 BPV-free horses. On days 1 and 28, 14 animals were immunised with 100 µg of BPV-1 L1 VLP in Aluminium Hydroxide as adjuvant, whilst 7 horses served as non-vaccinated controls. On day 42, all horses were intradermally inoculated on their neck with 5x10^7 BPV-1 virions per wheal (10 wheals per horse). The Horses were then closely monitored for adverse reactions and pseudo-sarcoid development. Blood was taken on days 0 and 42 and subjected to a pseudovirion neutralisation assay for the determination of antibody titres.

Results
Intramuscular vaccination had no side effects. All control horses developed pseudo-sarcoids at every inoculation site (10/10). Tumours reached sizes of up to 16 mm in diameter and persisted for a minimum of 13 weeks. In stark contrast, immunisation with BPV-1 L1 VLPs resulted in complete protection in 13 of 14 horses, with serum antibody titres ranging between 6.400 and 25.600. One vaccinated horse developed 7 tumours, which reached a maximum size of 2 mm and completely regressed within 5 weeks, with serum antibody titres amounting to 800. From two control sera tested thus far (day 156), one horse developed an antibody titre of 3200. – However, this horse developed tumours at all inoculation sites, albeit with a three-week delay when compared to the other control horses.

Implications and Impact
Immunisation of 14 horses with BPV-1 L1 VLPs conferred protection from experimental infection with BPV-1 virion in 13 cases, and led to a milder form of disease in one of the older horses. The old age of this individual may account for the poor immune response to vaccination. Provided that the upcoming BPV-2 challenge will yield similar results, BPV-1 L1 VLP may be used for routine immunisation of equids for the prevention of BPV-1/-2 infection and associated disease.