

Overview of studies on the disparate levels of protective immunity elicited by porcine herpesvirus versus arterivirus vaccines

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The remarkable effectiveness attained experimentally with modified virus (MLV) vaccines against the porcine herpesvirus, Aujeszky's disease virus (ADV), has not been observed with the same type of vaccines against the porcine arterivirus, porcine reproductive and respiratory syndrome virus (PRRSV). In contrast to ADV, PRRSV exhibits a high level of genetic diversification, which results in antigenic variation that can be measured by both virus-specific humoral and cell-mediated immunity assays. A number of studies have shown that PRRSV MLV vaccines are effective at conferring appropriate levels of homologous protective immunity while affording variable and suboptimal degrees of protection against challenge by genetically divergent (heterologous) strains. It is conventional wisdom that the main issue responsible for the lack effectiveness of MLV vaccines against PRRSV is the antigenic variation exhibited by this virus. In opposition to this notion, a number of studies performed in our laboratory contradict this view. These studies include; 1) the ability of the same vaccine virus simply grown in two different types of cell lines, simian kidney cells vs. porcine macrophages, to elicit higher level of protective immunity by the latter; and 2) the ability of different attenuated strains of PRRSV to elicit disparate levels of protective immunity against the same heterologous wild-type strain of PRRSV. The observation that the strain of vaccine virus as well as the type of cell line used to grow the PRRS MLV vaccine can influence the level of protective immunity elicited by the vaccine against a genetically divergent virulent PRRS virus has significant implications for the prospect of developing a highly effective vaccine against this pathogen. Namely, the collective analysis of our results suggest that the effectiveness of a PRRS MLV virus vaccine is not only, as it is commonly believed, determined by the genetic similarity of the vaccine virus to the challenge virus, but is also influenced by how it is produced and/or by other, yet undetermined, intrinsic biological properties of the strain of vaccine virus. These observations provide reasonable hope that a more effective MLV vaccine against PRRS virus can be developed.