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NOVEL PURIFICATION STRATEGIES FOR INFLUENZA NEURAMINIDASE-VLPs

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Conventional Influenza virus vaccines reduce the risk of flu illness by between 40% and 60% among the overall population. They are all standardized based on the influenza hemagglutinin (HA) content and focus on the induction of HA-specific neutralizing antibodies. However, in contrast to natural infection, seasonal vaccination fails to induce an efficient immune response to the Influenza virus neuraminidase (NA), the second most abundant viral glycoprotein. A potential solution to this problem would be to supplement current vaccines with a correctly folded, tetrameric recombinant NA protein, or alternatively, with bio-nanoparticles that display the tetrameric NA on an outer membrane. Vaccines that incorporate standardized amounts of NA might lead to broader and longer-lasting protection against influenza infection.

In our current project, we aim to compare the efficacy of NA supplementation (N1, N2 and B), either as soluble, tetrameric protein or incorporated into virus like particles (VLPs), to conventional influenza vaccines in the mouse model (Fig. 1). VLPs and recombinant NAs are expressed using the highly suitable baculovirus expression vector system using a novel *T.ni* insect cell line (*Tnms*42). Pre-clinical studies with VLPs have so far commonly employed crude VLP material, still containing a high concentration of baculovirus and extracellular vesicles (EVs). Yet, we aimed to establish novel downstream procedures to yield immunogens of highest purity standards. To achieve this goal, we tested a sequence of chromatographic steps (Fig.1) that allowed us to highly enrich VLPs and reduce particulate impurities in the preparation and to yield adequate material for animal studies. This platform is a highly promising and novel strategy for making modern universal flu vaccines.

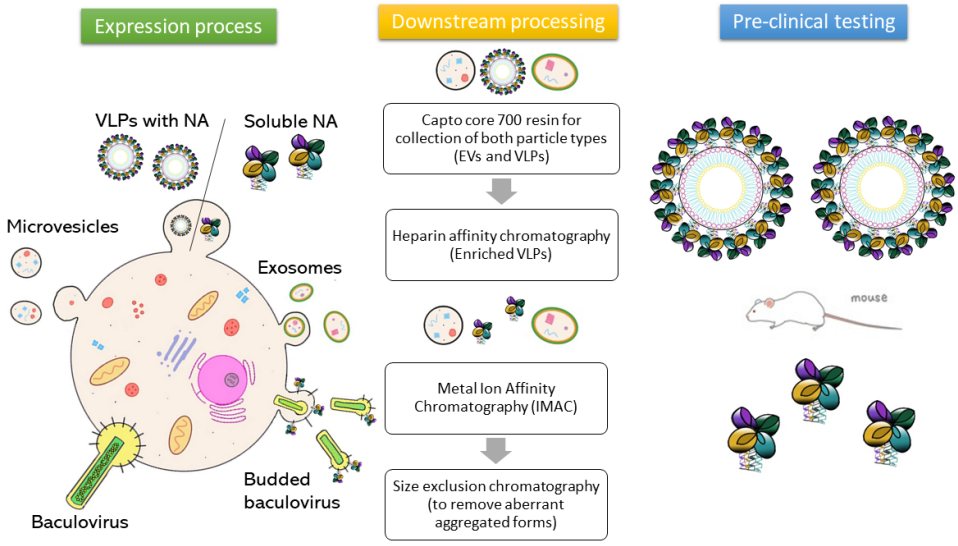

Figure 1 – Work flowchart. From genetic engineering, purification and analytics to a high quality material for pre-clinical studies.