Characterizing antigen-adjuvant interactions using novel spectroscopic techniques

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Most vaccine antigens are not immunogenic enough to provoke an adequate immune response unless formulation with an adjuvant. Common adjuvants such as aluminum salts or oil/water emulsions scatter light, rendering several key protein characterization spectroscopic techniques ineffective. Antigen-adjuvant interactions will be further investigated using two spectroscopic techniques, ultraviolet resonance Raman (UVRR) and integrating cavity absorption UV spectroscopy, which are both effective in the presence of light scatter. UVRR will be employed to give secondary and tertiary structure information about protein antigens in the presence of adjuvants. Thermal melt second derivative integrating cavity UV spectroscopy will be used to interpret the microenvironments of three aromatic amino acids (tyrosine, tryptophan and phenylalanine) as adsorbed proteins thermally unfold. Adsorption to adjuvants may alter protein structure, though it is still unclear. Differential scanning calorimetry (DSC) has shown decreased thermal stability of proteins adsorbed to aluminum adjuvants. Comparing UVRR and second derivative UV thermal melts to currently employed characterization techniques will give a clearer picture of the interactions between antigens and adjuvants.