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Understanding mechanism of action of neutralizing antibodies helps guide virus-like particle construction

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The life cycle of human enteroviruses generates several different particle types including the procapsid, the infectious particle, and the expanded particle. All these particles are immunogenic but understanding the mechanism, by which antibody neutralization takes place, is crucial to predicting whether the particles will be protective. We present two different neutralizing antibodies against human enterovirus 71 (EV-A71) that recognizes epitopes comprising more than one capsid protein in a quarternary structure. The footprint of each antibody on the virion is demonstrated using cryo EM. The antibodies were used to characterize and purify virus-like particles that were effectively procapsids, generated using recombinant baculoviruses. In both mouse and non-human primate studies, the purified particles were shown to elicit strong neutralizing antibodies against EV-A71. An assay to identify and quantify these particles is described.

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Global vaccine supply: The increasing role of manufacturers from middle income countries

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As the causative agents of human infectious diseases have been discovered over the years, and approaches to their diagnosis and prevention developed, great progress for disease control has followed. A hallmark date in the history of infectious disease control using vaccines was October 1977. That was the onset of the last case of community-acquired smallpox in the world. For this disease, the protection of humans by inoculating them with cowpox had been discovered almost 200 years before. But it was the technologic advances of vaccine production, developed in the mid-1900s, which gave public health the tool that enabled the world to eradicate the disease. These advances enabled production of a low cost, heat stable vaccine that was easy to reconstitute and deliver. The supply of millions of doses of this highly effective vaccine enabled the successful eradication of this deadly disease. A second hallmark era occurred between 1950 and 1970 with the development and delivery of large numbers of additional childhood vaccines. During this period, great advances were made in growing and safely and effectively inactivating microorganisms. And a slew of safe and effective vaccines emerged. A third hallmark was the licensure in 1986 of the first recombinant protein vaccine for hepatitis B virus. Since then there has been a veritable rush of new, safe and effective vaccines that take advantage of a wide variety of new technological advancements for development, production and delivery of vaccines. These advances have led to the licensure of vaccines for meningitis, pneumonia, haemophilus influenza B, hepatitis B, typhoid, hepatitis A, rotavirus, HPV (cervical cancer), Japanese encephalitis and more. Importantly, the decreases in the burden of diseases resulting from the application of these vaccines have not been limited to the wealthy residing in the industrialized nations of the world. Indeed, with concerns for disease occurrence in all corners of the world, nations and wealthy, socially conscious organizations have put resources into vaccine development, purchase and delivery so that children in all corners of the world could realize the benefits. Here a forth hallmark is emerging as more and more of the world's vaccine supply is now increasingly being produced in high-tech facilities in middle income countries (MICs). Not only have many of these countries become self-sufficient in vaccine production, but many are now supplying high quality vaccines to their neighbors.

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