Chimeric Virus-like Particles as Vaccines

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December 13th, 2011

Gateway to Discovery, Innovation, and Products.
Opportunity

• Gardasil (Merck)
  – VLP vaccine for HPV prevention
  – 3 doses over 6 months
  – Sales of $1.3B in 2010

• Chimeric VLP vaccines
  – Improved VLP vaccine
  – Contains both antigen and adjuvant
  – Safe and highly immunogenic vaccines which are highly protective
Current Influenza Vaccine

- Delays in producing vaccine (up to 9 months)
- Inadequate capacity for vaccine production (pandemic surge capacity)
- Lack of cross protection
- Flu vaccine market - $3.5B in 2010
Technology

Baculovirus vector

HA (Hemagglutinin protein)
M1 (Matrix protein)
F1 (Flagellin protein)

cVLP

VLP

HA (Hemagglutinin protein)
M1 (Matrix protein)
Influenza cVLPs induce strong antibody response
Influenza cVLPs provide broad protection

Mice immunized with H1N1 cVLP vaccine develop protection against H3N2 flu strain
cVLP Vaccine Advantages

• Influenza chimeric VLP immunization provides broad spectrum immunity

• Manufacturing benefits (more reliable, flexible, and expandable than egg-based methods)

• Antigen flexibility (rapid response to emerging flu strains)
R&D Status and Intellectual Property

• Conduct protection studies of influenza Chimeric VLPs in ferret model

• “Chimeric Virus-Like Particles as Vaccine Antigen”
  • US application pending (filed April 4th, 2006)
  • EPO patent (issued November 24th, 2010)

• “Virosomes, Methods of Preparation, and Immunogenic Compositions.”
  • US and EPO applications pending (filed July 12th, 2007)