Innovation in Healthcare without borders

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During the last 30 years, several new technologies made possible vaccines that were previously impossible.

- **Empirical Approach**
  - Diphtheria, Tetanus, Pertussis, Rabies, Influenza, Smallpox, Polio, BCG

- **Recombinant DNA**
  - Hepatitis B, Acellular Pertussis, Lyme, Human papillomavirus

- **Glycoconjugation**
  - MenACWY, S. pneumoniae, Hib, GBS, S. aureus

- **Reverse Vaccinology**
  - MenB, GBS, GAS, E. coli, S. aureus, C. difficile

- **Next Generation Technologies**
  - Structural Vaccinology
  - Synthetic Biology/RNA
  - Adjuvants/Human Immune Response

- **Isolate**
- **Inactivate**
- **Inject**
  the causative organism
Most Successful Vaccines developed in Europe

- Vaccines represent a strategic knowledge-based industry for Europe
  - 2/3 of vaccine R&D is based in Europe
  - 90% of vaccine production is in Europe
  - 2/3 of vaccine employees are in Europe
  - although only 1/3 of the market is in Europe

*EVM
New technologies to accelerate vaccine development
Systems Biology, Human Immunology, Co-Clinical
New technologies for a new society

*With an aging society, we need a new model for health care*
Vaccines for every age

Pregnancy
- CMV
- Flu
- GBS
- HBV
- Men
- Pertussis
- RSV
- Tetanus

Infants & Children
- Diphtheria
- Flu
- GAS
- HAV
- HBV
- Hib
- IPV
- Men
- Pertussis
- Pneumococcal
- Rotavirus
- RSV
- Tetanus

Adolescents
- CMV
- dTAP boost
- EBV
- Flu
- HSV
- HPV
- Men

Adults
- Diphtheria
- Flu
- HBV
- Men
- Pertussis
- RSV
- Tetanus

Elderly
- Flu
- GBS
- Men
- Pneumococcal
- RSV
- Zoster
- Candida
- C. difficile
- E. coli
- Klebsiella
- P. aeruginosa
- Staph
- Breast Cancer
- Colorectal Cancer
- Prostate Cancer

MONTHS+ YEARS
Vaccines for poverty, emerging infections and special populations

<table>
<thead>
<tr>
<th>Poverty</th>
<th>Emerging infections</th>
<th>Travelers</th>
<th>Patients with Chronic diseases</th>
<th>HIV infected people</th>
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Vaccines against poverty
A major challenge for developing countries in the 21st century

- Infectious diseases, in addition to causing morbidity and mortality, are a major contributor to poverty.

- In developing countries “they extract a huge toll from the income of each family and throw them into a downward spiral of poverty” (Leslie Roberts, Science 2008)

- Vaccination can control many of the infectious diseases.
Public-private collaborations
An Institute to address the gaps in vaccine development

In the recent past, no mechanism was in place to develop vaccines needed only in developing countries

Novartis Vaccines Institute for Global Health (NVGH)
A new non-profit initiative to develop effective and affordable vaccines for neglected infectious diseases of developing countries

- Legal entity started in Feb 2007
- Allan Saul hired as CEO Sept 2007
- Inauguration Feb 22, 2008
Maurice Hillemann (1919-2005): One man, eight vaccines that practically every child gets.

Measles, mumps, Hepatitis A, hepatitis B, chickenpox, meningitis, pneumonia, and H. influenzae
Today Vaccine development
a multidisciplinary enterprise

- Discovery
- Animal models & immunology
- Private partners, pilot plant
- Epidemiology & Public Health
- Clinical trials
- Systems biology
- Training
- Human immunology
ADITEC: High impact project on Advanced Immunization Technologies

ADITEC role is to develop the next generation technologies

**EU contribution**: 29,980,670.00

**Starting date**: 1st October 2011

**Duration**: 5 years

**Participants**: 42 from 13 countries

**Industry participation**: 13 SMEs and 2 large pharma
The European commission-sponsored ADITEC project brings together some of the leading laboratories to the common goal to accelerate the development of new tools and concepts needed for vaccine development and vaccination strategies.