Tomorrow's vaccines today

André Habel
Themis Bioscience GmbH

Dublin, ESOF, 14th July 2012
THEMIS BIOSCIENCE GmbH

- Founded end 2009 in Vienna/Austria
  - Currently five employees
- AWS seed funding
- €5 MIO VC
- Technology:
  - Recombinant Measles virus vaccine as a vector developed at Institut Pasteur
  - License for: DEN; CHIK, YFV, JEV, WNV
Measles live attenuated vaccine

- Live attenuated measles virus (MV) vaccines were obtained after serial passages on CEF cells

- Several attenuated strains are available;
  
  » One injection given at 9-16 months, $10^3$-$10^4$ TCID$_{50}$
  
  » Lifelong protective immunity (AB + CD8/CD4)
  
  » Safety and efficacy track record in hundreds of millions of children vaccinated with Schwarz vaccine
  
  » Low cost of production
TECHNOLOGY

- Vector based on Schwarz strain of (MV) vaccine
- Two novel antigen insert sites engineered into vector (↓)

- Tangy et al. EP-02291551.6, filed May 2002
- Tangy et al. EP-02291550.8, filed June 2003
- Tangy et al. EP-06292025.1, filed December 2008
- Combredet et al. 2003, JVI, 77, 11546-554
MV-CHIK Vaccine

MV-CHIKUNGUNYA (designated MV-CHIK) encoding CHIK antigens

CHIK ... CHIK antigen
hh ... hammerhead ribozyme
hδh ... Hepatitis D virus ribozyme
T7/T7t ... T7 polymerase promoter/terminator

ESOF 2012
## IMMUNOGENICITY MV-CHIK

<table>
<thead>
<tr>
<th>VIRUS</th>
<th>ELISA d30</th>
<th>ELISA d60</th>
<th>PRNT&lt;sub&gt;50&lt;/sub&gt;</th>
<th>PRNT&lt;sub&gt;90&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>MV-Schw</td>
<td>&lt;100</td>
<td>&lt;100</td>
<td>&lt;50</td>
<td>&lt;50</td>
</tr>
<tr>
<td>MV-CHIK</td>
<td>4,000</td>
<td>&gt;12,000</td>
<td>1,350</td>
<td>150</td>
</tr>
<tr>
<td>α-CHIK HMAF* (contr.)</td>
<td>ND</td>
<td>ND</td>
<td>4,050</td>
<td>450</td>
</tr>
</tbody>
</table>

« Full protection against lethal wild type CHIK challenge

*HMAF = Hyper-immunised Mouse Acidic Fluids (positive control)
NEXT STEPS FOR MV-CHIK

» Vector construction

» Characterisation *in vitro* & *in vivo*

» Mouse challenge experiments for proof of concept (2011)

» cGMP production of MV-CHIK (2012)

» Toxicology program (H4 2012)

» Start of clinical phase I clinical trial (2013)
• Strong collaboration with Institut Pasteur
  – Vector construction
  – POC/ preclinical animal experiments
  – Transfer to Themis

• THEMIS:
  – Stock characterisation and production
  – Transfer to CMO for cGMP production of tox. and clinical lots
  – CRO for formal tox
  – CRO for phase I clinical trial

• Managing all:
  – CMO/CROs
  – CMC related activities
  – Regulatory activities
  – Clinical activities
Access to services - TRANSVAC

• First call for applications (1101-1)
  – Access to ILLUMINA Deep Sequencing, Helmholtz Centre for Infection Research, Germany
    ➢ For a single tetravalent live attenuated recombinant Measles Virus Vaccine against DENGUE – MVDVAX

• First Modular Course on Practical Approaches to Vaccine Development
  ➢ One staff member selected
Summary/Conclusions

• Very broad activities
  – R&D (including immunology)
  – Manufacturing (CMOs)
  – Regulatory (Nat. & international agencies)
  – Clinical

–> NETWORK…–> absolute requirement..!
  • Constantly “on top” of R&D/GMP/REG