Evaluation of Phage Therapy for the Treatment of Burn Wound Infection

Jérôme Gabard, Ph.D.
CEO, Pherecydes Pharma
France – Romainville/Paris
• SA (Société Anonyme) with management and supervisory boards,
  – Young Innovative Company (JEI), SME
  – Funded via private and public funds (BPI, DGA-Rapid)
• Founded in December 2006, 2 key shareholders:
  – ACE Management
  – BioModeling-Systems
• 7 employees: 100 % in R&D
• Bacteriophage (phage) therapy for clinical testing
Bacteriophages

• Bacteriophage: Natural bacteria killer virus
• Discovered in 1915/17 by Twort/d’Herelle
• Empirically used in Western Europe countries until AB advent
  – Commercialized by Lilly in USA in the forties
  – Commercialized in France until 1978 by Robert&Carrière
• Currently used in Eastern Europe countries
  – Sold in Russian drugstores (Microgen)
  – Sold by G. Eliava Institute related companies in Georgia
• Renewal of interest in Europe and USA with AB MDR rise
• Project initiated on June 1st 2013
• Grant of €3.85 M, Total Budget: €4.9 M.
• Treatment of infected areas:
  – in the burn wound
  – in the donor skin site
  – on the grafted skin
• Two products
  – PP0121 against *Escherichia coli* infections (including ESBL strains)
  – PP1131 against *Pseudomonas aeruginosa*
• FP7 partners and project participants
PARTICIPANTS

A mix of public/private and Military/Civil organizations
WP1 - Bioproduction of 2 phage cocktails under GMP conditions

Clean Cells and Pherecydes Pharma

**Milestone 1**
Clinical batches ready for treatment

WP2 - Setting up of clinical phase I-II trial

Regulatory filing EMA

Pherecydes Pharma, Clinician task force and STATITEC

**Milestone 2**
1st patient included

WP3 - Clinical trial

Percy H., St. Luc/St. Joseph H., CHUV Lausanne, Queen Astrid Nantes CHU, Liege CHU, Loverval CH

WP4 - Biological analysis

Hospital biology labs and Pherecydes Pharma

**Milestone 3**
Ending of raw data collect

WP5 - clinical and biological data analysis

All participants under STATITEC lead

**Milestone 4**
Clinical trial data

WP7 - writing and publications

All

**Milestone 5**
Scientific papers

**Milestone 6**
Phase III filing

WP6 - Administration, finances and project UE reporting

France-Europe Innovation

QA/QC
Clean Cells

QA/QC
Clean Cells

QA/QC
STATITEC
Ethics committee
Clear the regulatory road

- A « New product » category...
  - a mix of several active entities (up to 15 phages) GMP produced
  - that fit in QC/QA framework of biologics and/or vaccines
  - But considered as a fixed product like chemical AB’s

- ...that can adapt to emerging bacterial strains...
  - Example: adapting flue vaccine valence is a fact
  - Giving the possibility for a phage mix to evolve is a must

- ...and could become an *individualized* treatment!
  - According to a given AB-MDR patient strain
  - And/or to control MDR bugs in a hospital ICU
Clinical trial

- Primary endpoint: Bacterial efficacy of PP0121 against *E. coli* infections and of PP1131 against *P. aeruginosa* (including ESBL strains)
- Multicentric (7 sites), international: France, Belgium and Switzerland
- Randomized
- Controlled versus current standard-of-care treatment
- Assessor blinded
## Expected achievements

<table>
<thead>
<tr>
<th>Measurable and verifiable milestone end points</th>
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</thead>
<tbody>
<tr>
<td><strong>1</strong> Bioproduction of two drugs (phage cocktails): anti <em>E. coli</em> and anti <em>P. aeruginosa</em> phage cocktails, according to Good Manufacturing Practices (GMP)</td>
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<td><strong>2</strong> Preparation, implementation &amp; coordination of a phase I-II multicentre clinical trial</td>
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<td><strong>3</strong> Proof of safety and local tolerance of the phage cocktails</td>
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<tr>
<td><strong>4</strong> Proof of efficacy of the phage cocktails as topical agents for the treatment of <em>E. coli</em> and <em>P. aeruginosa</em> burn wound infections, including MDR germs (ESBL...)</td>
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<td><strong>5</strong> Continuation of the Phase I-II trial towards Phase III right after project completion</td>
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</tbody>
</table>
| **6** Contribution towards standardizing phage therapy at a regulatory level (EMA)  
Contribution to adapting regulatory guidelines to an adaptive product class |
| **7** Registration and exploitation of both phage cocktails |
| **8** Contribution to a patient phage therapy register |
Conclusions

• Keep in touch with us

  http://www.phagoburn.eu/

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# Annex 1

<table>
<thead>
<tr>
<th>Group N°1</th>
<th>Organisation</th>
<th>Organisation</th>
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<tbody>
<tr>
<td>Burn Unit</td>
<td><strong>Army Health Service – Percy Military Hospital</strong></td>
<td>P. Jault</td>
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<tr>
<td>Company</td>
<td><strong>Pherencydes Pharma SA</strong></td>
<td>J. Gabard</td>
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<td>Company</td>
<td>Clean Cells SAS</td>
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<td>Burn unit</td>
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<td>S. Jennes</td>
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<td>Burn Unit</td>
<td><strong>Vaudois University Hospital Center</strong></td>
<td>Y. A. Que</td>
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<thead>
<tr>
<th>Group n°2</th>
<th>Organisation</th>
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<tbody>
<tr>
<td>Burn unit</td>
<td><strong>Saint-Joseph /Saint Luc Hospital Center</strong></td>
<td>F. Ravat</td>
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<td>Burn unit</td>
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<td>A. F. Rousseau</td>
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<td>Burn unit</td>
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<td>Burn Unit</td>
<td>Hôpital Loverval</td>
<td>J.-P. Fauville</td>
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<td>Non-Profit</td>
<td>PHAGESPOIRS, AFB...</td>
<td>J. Larché</td>
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<tr>
<td>CRO</td>
<td>STATITEC</td>
<td>G. Thezé</td>
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<tr>
<td>Consultant</td>
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<td>O. Degrand</td>
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<tr>
<td>University</td>
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<td>G. Resch</td>
</tr>
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</table>

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