Towards malaria vaccine development –how basic researchers open the door to product development?—

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The first malaria vaccine to reduce infection: RTS,S

40% reduction in malaria episode. The effects are affected by polymorphisms in CSP.

An improved infection inhibition strategy is urgently required!
Basic research to elucidate parasite infection

Migration towards hepatocytes

SPECT, SPECT2, CelTOS

Conserved mechanisms of invasion

P36 & P36p

Hepatocyte recognition

RON2, RON4, RON5, RON11, RON12

Target for infection blocking

Development inside hepatocytes

LISP1, LISP2

Target for infection blocking

Ookinete development and migration

MAOP, CDPK3, CelTOS, CPWWPC-1, CryPH, PSOP1

Flagella release

MiGS
Huge amount of basic research required in order to identify vaccine candidates.

Clinical study, Phase I/II

Further clinical study, Phase III

Product development
Huge amount of basic research required in order to identify vaccine candidates.
## The history of collaboration with PDPs

<table>
<thead>
<tr>
<th>Year</th>
<th>Partners</th>
<th>Objectives/Approach</th>
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<tbody>
<tr>
<td>2014</td>
<td>PATH-MVI</td>
<td>Evaluating Pf75 as a transmission blocking vaccine target</td>
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<tr>
<td>2016</td>
<td>PATH-MVI</td>
<td>Dissecting Pfs230 for functional subdomain for transmission blocking vaccine</td>
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<tr>
<td>2019</td>
<td>PATH-MVI, SUNY</td>
<td>Evaluating codelivery of Pfs230 and CSP with CoPoP for transmission &amp; infection blocking vaccine</td>
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<td>2020</td>
<td>PATH-MVI, Sumitomo Dainippon Pharm</td>
<td>Evaluate full-length CSP formulated with SA-1, in comparison with RTS,S/AS01 as a benchmark</td>
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<td>2019</td>
<td>Mahidol University, University of Pennsylvania</td>
<td>Development of a novel Pvs25 nucleoside-modified mRNA vaccine that induces potent and long-lasting transmission blocking immunity</td>
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Catalyzed by
GHIT Fund
Global Health Innovative Technology Fund
Dissecting Pfs230 for functional subdomain (T2016-207)

Protein production (Pfs230)

Pfs230: a promising target for transmission blocking vaccine

Outcome of Partnership
• Miura et al., 2022, NPJ Vaccines
• Tachibana et al., 2019, Vaccine
• Continuation to next GHIT project (G2019-111)
Co-delivery of Pfs230C1 and CSP with CoPoP for multistage malaria vaccine (G2019-111)

70-80% reduction in the parasite burden in the liver!!

Outcome of Partnership
- Huang *et al.*, under review
- Continuation to next GHIT project
Lessons learned, challenges and impact to our organization from the partnership

Important for the partnership
• Common goal, vision, and passion
• Complementary skill sets and strengths
• Clear partner role and responsibility
• Respect each partner

Impact from the partnership
• Meet more collaborators with similar aims
• Start new projects with new approaches
• Find new demands of basic research for vaccine development
Thank you!