**Helicobacter pylori**


No effective vaccine available.

**Vaccine required**

Effective vaccine must activate:
- **Adaptive immunity** (antibodies, T-cells)
- **Innate immunity** - adjuvants, bacterial, and viral components – “immunologists’ dirty little secret”

Eradicate *Helicobacter pylori*!

**Synthetic subunit vaccines** are safer than attenuated microbes.

**Immunobricks**

- **Chimeric flagellin**
  - Make flagellin of *H. pylori* visible to the immune system
- **Implementation**
  - Designed synthetic multiepitope
  - Chimeric flagellin was implemented as a vaccine in three different ways.

Reengineer TLR signaling network

- Couple TLR activation to antigen processing

**Registered “Immuno”Biobricks**

We have contributed 132 new constructs to the registry, which represents an “initial library” for the design of synthetic vaccines and engineering of TLR signaling.

**The REAL test: vaccine in mice**

Chimeric flagellins were prepared, expressed in bacteria and purified. Protein is internalized by cells expressing TLR5 and in contrast to the original *H. pylori* FlaA activates TLR5 signaling.

**Beyond iGEM**

- Vaccine against bacteria that have TLR5 unresponsive flagellin (*Bartonella, Campylobacter, Brucella...*)
- Potentially universally applicable principle to synergistically activate several signaling networks, also for tumor vaccines

**Serum of mice immunized with CF-muti (after only 3 weeks) reacts with antigen and also with live H. pylori.**

**Secreted chimeric flagellin activates neighboring cells expressing TLR5.**

**Antigen-TLR fusions activate signaling and their localization can be selected by the type of TM segment.**

**Fluorescent multi-TMTIR4_GFP is expressed in electroporated murine leg.**