Graduate Schools
Infection Immunity and Cancer, UniGe & UniL: CUS
Biology & Medicine, CMU

Seminar in Microbiology

Monday, 9th November, 2015

Salle de séminaire E07.3347.a (ex 7172), CMU

11:30 – 12:30

Stefan KEMMLER

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A Novel Bioconjugate Vaccine to Prevent *Staphylococcus aureus* Infection

Chemically synthesized complexes of polysaccharides and proteins have been successfully used as conjugated vaccines to protect against a number of bacterial infections. This report describes a novel bioengineering approach to produce immunogenic conjugated vaccines that provides advantages over classical chemical conjugation methods. This has been first applied to the development of a *Shigella dysenteriae* O1 glycoconjugate vaccine, using genetically engineered *E. coli* with simple fermentation and purification methods. The innovative proprietary technology is based on the discovery that *Campylobacter jejuni* contains a general N-linked protein glycosylation system that can be functionally expressed in *Escherichia coli* {Wacker, 2002}. Various proteins of *C. jejuni* have been shown to be modified by a heptasaccharide that is pre-assembled on the carrier lipid, undecaprenyl pyrophosphate and transferred to asparagine (Asn) residues of a specific consensus sequence by the oligosaccharyltransferase PglB {Kowarik, 2006}. Since the specificity of PglB for the lipid-linked sugar substrate is low, the enzyme is capable of transferring different antigenic polysaccharides from undecaprenyl pyrophosphate to a protein carrier {Feldman, 2005}.
Using this technology, antigenic polysaccharides of *S. aureus* were expressed in *E. coli* and conjugated to two different protein carriers *in vivo*. Both bioconjugates elicited a specific IgG response against the polysaccharide. A highly efficient production process has been developed that can be used for industrial scale preparations in a cost-efficient process. This novel cost efficient bioengineering approach to produce glycoconjugates can now be applied to other conjugates. It may considerably simplify the production of several bacterial vaccines with high reproducibility and a potentially reduced risk of lot failures.

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Sandwiches will be offered after the seminar