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4-6-2022

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DEVELOPMENT OF AFFORDABLE RECOMBINANT GLYCOCONJUGATE VACCINES IN BACTERIAL CELLS

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This lecture will describe the origin of the production of recombinant glycoconjugate vaccines developed through the functional characterization of an *N*-linked OTase general glycosylation system from the enteric pathogen *Campylobacter jejuni*. It will describe how these basic studies were used to re-constitute the glycosylation system in *E. coli*, which allowed for the first time the production of recombinant glycoproteins through a process termed Protein Glycan Coupling Technology (PGCT). The major application of PGCT is in the construction of affordable recombinant glycoconjugate vaccines. The glycoconjugates are made in *E. coli* (or other bacterial cells) that act as a mini cell factory for the production of vaccines. To date, the technology has been used to produce novel recombinant *Campylobacter*, *Shigella*, *Streptococcus pneumoniae*, *Francisella*, *Burkholderia pseudomallei*, *E. coli* and MRSA glycoconjugate vaccines. These have been shown to be protective and some are in clinical trials.

I will describe the applications and limitations of PCGT for the construction of low-cost recombinant glycoconjugate vaccines in three areas; (i) designing novel vaccines against pathogens where no current vaccine exists (eg *Francisella tularensis*), (ii) improving existing glycoconjugate vaccines (eg pneumococcal vaccine), and (iii) affordable glycoconjugate vaccines for the veterinary market (eg poultry).

From a One Health perspective, low-cost glycoconjugate vaccines for animals not only adds to economic prosperity but can reduce animal suffering and the zoonotic transmission of disease to humans. Furthermore, it will reduce usage of antibiotics in the livestock industry and the subsequent spread of antimicrobial resistance.