**Poster 06**

**Title:** Chlamydial Type III Secretion Proteins as Novel Vaccine Candidates

**Authors:** David Bulir¹; Christopher Stone¹; Steven Liang¹; James Mahony¹

**Institutions:** ¹McMaster University

### [Description]

**Background:** Chlamydial infection represent a significant disease burden worldwide. *C. trachomatis* infection can lead to PID (pelvic inflammatory disease), salpingitis, and infertility in women and epididymitis and infertility among men. Furthermore, upwards of 70% of females and 50% of males infected with *C. trachomatis* are asymptomatic. The major outer membrane protein (MOMP) has been the primary target for the development of a chlamydial vaccine, but has had limited success in providing protection from infection or PID. In the absence of more robust public health screening strategies and to prevent the subsequent sequelae associated with *C. trachomatis*, a novel vaccination strategy is warranted.

**Objectives:** Since *Chlamydia* spp. are believed to use a conserved, surface exposed type III secretion (T3S) system to cells, the T3S proteins may represent a novel target for vaccination against *Chlamydia* infection. Our objective was to explore whether components of the T3S machinery could be used to produce a neutralising antibody response to *Chlamydia* infection.

**Methods:** A bioinformatic analysis using Kyte-Doolittle plots and TMpred was used to examine a pair of T3S translocator proteins, Chlamydia outer protein (Cop) B and CopD, and a type III associated protein, Cpn0803. Peptide fragments of the hydrophilic domains identified in the analysis of the translocator proteins and full-length Cpn0803 were then used to immunise rabbits and mice. Affinity purified immunoglobulins were then preincubated with *Chlamydia* at varying concentrations and infection was performed using established protocols. At approximately 40 hours post infection, chlamydial inclusions were stained with the Pathfinder Chlamydia detection reagent (BioRad) and multiple, random, fields of view were visualized.

**Results:** Using a mouse model of *C. trachomatis* infection, vaccination of mice with Cpn0803, followed by challenge with *Chlamydia*, an 80% reduction of infection was observed. Antibodies generated to the translocator proteins, CopB and CopD, were able to inhibit *Chlamydia* infection by 98% compared to control antibodies. Mice immunised with a CopB-CopD-Cpn0803 fusion protein were able to generate a neutralising immune response.

**Conclusion:** The T3S system of the *Chlamydia* spp. is an essential, surface exposed component required for intracellular invasion and replication. Translocator proteins and other T3S proteins have been used as vaccine candidates for other Gram-negative bacteria, such as *Shigella*, *Salmonella*, and *Yersinia*. Given the significant reduction of infection, upwards of 98%, with each of the different antibodies (CopB, CopD, and Cpn0803), type III secretion proteins may represent a novel class of vaccine candidates to target chlamydial infections.

### Presenter

**Name:** David Bulir

**E-mail:** bulirdc@mcmaster.ca

**Institution** McMaster University