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Original Article

Neonatal Chlamydial Infection Induces Mixed T-Cell Responses That Drive Allergic Airway Disease

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Rationale: Chlamydial lung infection has been associated with asthma in children and adults. However, how chlamydial infection influences the development of immune responses that promote asthma remains unknown.

Objectives: To determine the effect of chlamydial infection at various ages on the development of allergic airway disease (AAD).

Methods: Mouse models of chlamydial lung infection and ovalbumin-induced AAD were established in neonatal and adult BALB/c mice. Neonatal or adult mice were given a chlamydial infection and 6 weeks later were sensitized and subsequently challenged with ovalbumin. Features of AAD and inflammation were compared between uninfected or unsensitized controls.

Measurements and Main Results: Mild *Chlamydia*-induced lung disease was observed 10–15 days after infection, as evidenced by increased bacterial numbers and histopathology in the lung and a reduction in weight gain. After 6 weeks, infection and histopathology had resolved and the rate of weight gain had recovered. Neonatal but not adult infection resulted in significant decreases in interleukin-5 production from helper T cells and by the numbers of eosinophils recruited to the lung in response to ovalbumin exposure. Remarkably, the effects of early-life infection were associated with the generation of both type 1 and 2 ovalbumin-specific helper T-cell cytokine and antibody responses. Furthermore, although neonatal infection significantly attenuated eosinophilia, the generation of the mixed

T-cell response exacerbated other hallmark features of asthma: mucus hypersecretion and airway hyperresponsiveness. Moreover, infection prolonged the expression of AAD and these effects were restricted to early-life infection.

Conclusions: Early-life chlamydial infection induces a mixed type 1 and 2 T-cell response to antigen, which differentially affects the development of key features of AAD in the adult.

Key Words: asthma • infection • immunity • *Chlamydia* • T cells

AT A GLANCE COMMENTARY

Scientific Knowledge on the Subject
Chlamydial infection is clinically associated with the onset and exacerbation of asthma in adults and children. However, it is unknown how this Th1-inducing infection is linked with Th2-driven asthma.

What This Study Adds to the Field
Chlamydia infection in early life can differentially drive key features of allergic airway disease. The effects of infection are associated with the generation of both Th1 and Th2 responses to an unrelated Th2-inducing antigen.

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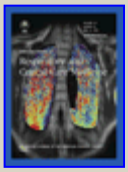

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