Asthma patients hospitalized with influenza lack mucosal and systemic type 2 inflammation

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Background: Asthmatic persons tend to suffer from severe influenza, but the reasons for enhanced severity are unknown.

Objectives: To determine the clinicopathological correlates of this susceptibility, we examined nasal and systemic immune responses in adults admitted to hospital with influenza-like illnesses.

Methods: We studied 210 patients admitted with influenza-like illness at 11 hospitals in the UK across 2 winter seasons (2009/10 and 2010/11). Of these, 133 (63%) had confirmed influenza and 40/133 (30%) were asthmatic. We measured a panel of cytokines and chemokines in serum and nasal mucosal lining fluid and compared results in asthmatics, non-asthmatics and healthy control volunteers.
**Results:** Asthma patients were more often female than non-asthmatics (70% vs 39% respectively), required less mechanical ventilation (15% vs 37.6%) and had shorter hospital stays (mean 8.3 vs 15.3 days, all \( P < 0.05 \)). Despite having equivalent nasopharyngeal influenza viral load, asthmatics had higher serum IFN-\( \alpha \) levels but lower serum TNF-\( \alpha \), IL-5, IL-6 and CXCL8 (all \( P < 0.05 \)). In the nasal mucosa, asthmatics and non-asthmatics had comparable levels of soluble mediators. In particular, asthmatics showed no evidence of increased type 2 inflammation (IL-5 and IL-13) or deficient interferon responses.

**Conclusions:** Adult asthmatics hospitalised with influenza show a propensity to be female with markedly reduced morbidity and systemic inflammation than non-asthmatics. Against expectation, asthmatics did not have increased type 2 inflammation. This study highlights the importance of defining underlying immune responses to infection in individual patients to enable future delivery of personalized therapy.