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Journal club

Lectin-mediated innate defences are important in limiting disease in influenza

The innate immune system is an important defence against previously unencountered pathogens. It recognises surface glycans through cell-associated and soluble lectin-mediated defences. This study investigates the effect of blocking these defences on antiviral activities and disease severity in influenza infection.

Mice were infected with two influenza viruses that differ in the degree of glycosylation of the surface glycoprotein haemagglutinin. Infection with the poorly glycosylated H1N1 virus PR8 resulted in rapid weight loss and a 100% 5-day mortality, whereas the highly glycosylated PR8 reassortant BJx109 resulted in no significant weight loss and a 0% 10-day mortality. This result was replicated in knockout mice with impaired B and T cell function demonstrating that the innate immune system was sufficient to limit disease.

In vitro only the highly glycosylated BJx109 (H3N2) virus infected airway macrophages to high levels and was neutralised by mouse bronchoalveolar lavage and a soluble lectin present in respiratory secretions. These antiviral activities were blocked through preincubation with the polysaccharide mannan indicating that they are lectin mediated. In vivo, blocking these lectin-mediated defences with intranasal mannan led to increased clinical disease as measured by weight loss and 10-day mortality and increased pathological airway disease as measured by virus titres, immunopathology scoring and bronchoalveolar lavage protein levels. Mannan treatment had no effect on antiviral activities or disease severity in PR8 virus infection.

This study demonstrates that surface glycosylation affects the ability of a virus to evade innate lectin-mediated defences, contributing to the degree of clinical and pathological disease caused.

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Published Online First 6 May 2011

Thorax 2012;**67**:163. doi:10.1136/thoraxjnl-2011-200358