13. **Herth FJF,** Ernst A, Eberhardt R, *et al*. Endobronchial ultrasound-guided transbronchial needle aspiration of lymph nodes in the radiologically normal mediastinum. *Eur Respir J* 2006;**28**:910–4.
14. **Skwarski KM,** McCafferty J, Wood F, *et al*. Minimally invasive staging in lung cancer by real time endobronchial ultrasound FNA (EBUS). *Chest* 2007;**132**:591–2.
15. **Yasufuku K,** Chiyo M, Koh E, *et al*. Endobronchial ultrasound guided transbronchial needle aspiration for staging of lung cancer. *Lung Cancer* 2005;**50**:347–54.
16. **Rintoul RC,** Skwarski KM, Murchison JT, *et al*. Endobronchial and endoscopic ultrasound-guided real-time fine-needle aspiration for mediastinal staging. *Eur Respir J* 2005;**25**:416–21.
17. **Yasufuku K,** Nakajima T, Motoori K, *et al*. Comparison of endobronchial ultrasound, positron emission tomography, and CT for lymph node staging of lung cancer. *Chest* 2006;**130**:710–8.
18. **Okamoto H,** Watanabe K, Nagatomo A, *et al*. Endobronchial ultrasonography for mediastinal and hilar lymph node metastases of lung cancer. *Chest* 2002;**121**:1498–506.
19. **Pierard PE,** Faber J, Bauwens O, *et al*. Evaulation of a new tool in mediastinal staging of lung cancer: real-time guided needle aspiration using endobronchial ultrasound (EBUS-NA). *Chest* 2006;**130**:146S.
20. **Gould M,** Kuschner WD, Rydzak C, *et al*. Test performance of positron emission tomography and computed tomography for mediastinal staging in patients with non-small-cell lung cancer. *Ann Intern Med* 2003;**139**:879–92.
21. **Kanoh K,** Miyazawa T, Kurimoto N, *et al*. Endobronchial ultrasonography guidance for transbronchial needle aspiration using a double-channel bronchoscope. *Chest* 2005;**128**:388–93.

Lung alert

Asthma: a disease of the innate and adaptive immune systems?

The paradigm that asthma is a disease solely of the adaptive immune system is gradually being challenged. This study adds weight to the suggestion that the innate immune system may play an equally pivotal role in its pathogenesis.

Using chimeric mice, the authors offer a mechanism by which exposure of the airway epithelium to house dust mite allergen might result in both forms of the immune response. Having demonstrated that the Toll-like receptor 4 (TLR4) which recognises molecular patterns found in both microbial pathogens and allergens is preferentially expressed on epithelial and dendritic cells as opposed to T cells, the group then show that expression of the receptor on the epithelial cell surface is the key determinant to generating activated dendritic and T helper (Th2) cells. Subsequent exposure of these TLR4-positive epithelial cells to house dust mite not only yields a rise in the Th2-associated cytokines interleukin (IL)5 and IL13, but also generates IL25 and IL33. These cytokines are traditionally associated with an innate immune response. Furthermore, this coincides with clinical evidence of airway hyper-responsiveness, a response not seen when epithelial cells lack TLR4. Equally consistent is the fact that administration of a TLR4 receptor antagonist in the presence of house dust mite and TLR4-positive epithelial cells produces neither a clinical nor a biochemical response consistent with active airway inflammation.

Undoubtedly an exquisite piece of science, a number of questions remain. Foremost is the problem arising from previous studies which have attempted to correlate polymorphisms of the TLR4 gene locus and clinical susceptibility, only to find a highly variable relationship. Equally challenging is extrapolation of the data from mice to humans in order to identify a new therapeutic target.

► Hammad H, Chieppa M, Perros F, *et al*. House dust mite allergen induces asthma via Toll-like receptor 4 triggering of airway structural cells. *Nat Med* 2009;**15**:410–6.

O Mukhtar

Correspondence to: Dr O Mukhtar, Specialist Registrar, King's College Hospital, London, UK; om1979@hotmail.com

Provenance and peer review: Not commissioned; not externally peer reviewed.

Thorax 2009;**64**:762. doi:10.1136/thx.2009.121004