

- 4 **Martindale S**, McNeill G, Devereux G, *et al.* Antioxidant intake in pregnancy in relation to wheeze and eczema in the first two years of life. *Am J Respir Crit Care Med* 2005;**171**:121–8.
- 5 **Devereux G**, Litonjua AA, Turner SW, *et al.* Maternal vitamin D intake during pregnancy and early childhood wheeze. *Am J Clin Nutr* 2007;**85**:853–9.
- 6 **Shaheen SO**, Newson RB, Henderson AJ, *et al.* Umbilical cord trace elements and minerals and risk of early childhood wheezing and eczema. *Eur Respir J* 2004;**24**:292–7.
- 7 **Litonjua AA**, Rifas-Shiman S, Ly NP, *et al.* Maternal antioxidant intake in pregnancy and wheezing illnesses at 2 years of age. *Am J Clin Nutr* 2006;**84**:903–11.
- 8 **Farchi S**, Forastiere F, Agabiti N, *et al.* Dietary factors associated with wheezing and allergic rhinitis in children. *Eur Respir J* 2003;**22**:772–80.
- 9 **Antova T**, Pattenden S, Nikiforov B, *et al.* Nutrition and respiratory health in children in six Central and Eastern European countries. *Thorax* 2003;**58**:231–6.
- 10 **Forastiere F**, Pistelli R, Sestini P, *et al.* Consumption of fresh fruit rich in vitamin C and wheezing symptoms in children. *Thorax* 2000;**55**:283–8.
- 11 **Gilliland FD**, Berhane KT, Li Y, *et al.* Children's lung function and antioxidant vitamin, fruit, juice, and vegetable intake. *Am J Epidemiol* 2003;**158**:576–84.
- 12 **Hodge L**, Salome C, Peat J, *et al.* Consumption of oily fish and childhood asthma risk. *Med J Aust* 1996;**164**:137–40.
- 13 **Wijga AH**, Smit HA, Kerkhof M, *et al.* Association of consumption of products containing milk fat with reduced asthma risk in pre-school children: the PIAMA birth cohort study. *Thorax* 2003;**58**:567–72.
- 14 **Tabak C**, Wijga AH, de Meer G, *et al.* Diet and asthma in Dutch school children (ISAAC-2). *Thorax* 2006;**61**:1048–53.
- 15 **Bolte G**, Frye C, Hoelscher B, *et al.* Margarine consumption and allergy in children. *Am J Respir Crit Care Med* 2001;**163**:277–9.
- 16 **Pistelli R**, Forastiere F, Corbo G, *et al.* Respiratory symptoms and bronchial responsiveness are related to dietary salt intake and urinary potassium excretion in male children. *Eur Respir J* 1993;**6**:517–22.
- 17 **Asher MI**, Anderson HR, Beasley R, *et al.* International Study of Asthma and Allergy in Childhood (ISAAC): rationale and methods. *Eur Respir J* 1995;**8**:483–91.
- 18 **Masson LF**, McNeill G, Tomany JO, *et al.* Statistical approaches for assessing the relative validity of a food frequency questionnaire: use of correlation coefficients and the kappa statistic. *Public Health Nutr* 2003;**6**:313–21.
- 19 **Craig LCA**, McNeill G. Relative validity of a food frequency questionnaire for pre-school children compared with a 4-day diet diary. *Proc Nutr Soc* 2006;**65**:39A.
- 20 **Salam MT**, Li Y, Langholz B, Gilliland FD. Maternal fish consumption during pregnancy and risk of early childhood asthma. *J Asthma* 2005;**42**:513–8.
- 21 **Dunstan JA**, Mori TA, Barden A, *et al.* Fish oil supplementation in pregnancy modifies neonatal allergen-specific immune responses and clinical outcomes in infants at high risk of atopy: a randomized, controlled trial. *J Allergy Clin Immunol* 2003;**112**:1178–84.
- 22 **Henderson L**, Irving K, Gregory J, *et al.* *The National Diet and Nutrition Survey: adults aged 19–64 years*. London: HMSO, 2003. <http://www.food.gov.uk/multimedia/pdfs/ndns3.pdf> (accessed January 2007).
- 23 **Boyer J**, Liu RH. Apple phytochemicals and their health benefits. *Nutr J* 2004;**3**:5.
- 24 **Knekt P**, Kumpulainen J, Jarvinen R, *et al.* Flavonoid intake and risk of chronic diseases. *Am J Clin Nutr* 2002;**76**:560–8.
- 25 **Tabak C**, Arts ICW, Smit HA, *et al.* Chronic obstructive pulmonary disease and intake of catechins, flavonols, and flavones. *Am J Respir Crit Care Med* 2001;**164**:61–4.
- 26 **Shaheen SO**, Sterne JA, Thompson RL, *et al.* Dietary anti-oxidants and asthma in adults. *Am J Respir Crit Care Med* 2001;**164**:1823–8.
- 27 **Woods R**, Walters E, Raven J, *et al.* Food and nutrient intakes and asthma risk in young adults. *Am J Clin Nutr* 2003;**78**:414–21.
- 28 **Butland B**, Fehily AM, Elwood PC. Diet, lung function and lung function decline in a cohort of 2512 middle aged men. *Thorax* 2000;**55**:102–8.
- 29 **Nair MPN**, Kandaswami C, Mahajan S, *et al.* The flavonoid, quercetin, differentially regulates Th-1 (IFN $\gamma$ ) and Th-2 (IL4) cytokine gene expression by normal peripheral blood mononuclear cells. *Biochim Biophys Acta* 2002;**1593**:29–36.
- 30 **Department of Environmental Farming and Rural Affairs**. *National Food Survey. Trends in household nutrient intake*, <http://statistics.defra.gov.uk/esg/publications/efs/2005/chapter5.pdf> (accessed January 2007).
- 31 **Thomas D**. A study on the mineral depletion of the foods available to us as a nation over the period 1940 to 1991. *Nutr Health* 2003;**17**:85–115.
- 32 **Thien FCK**, Woods RK, De Luca S, *et al.* Dietary marine fatty acids (fish oil) for asthma in adults and children (review). *Cochrane Database Syst Rev* 2002;(2):CD0011283.
- 33 **Schachter HM**, Reisman J, Tran K, *et al.* *Health effects of omega-3 fatty acids on asthma*. Ottawa, Canada: University of Ottawa Evidence-Based Practise Center, 2004.
- 34 **Cheung YB**. Adjustment for selection bias in cohort studies: an application of a probit model with selectivity to life course epidemiology. *J Clin Epidemiol* 2001;**54**:1238–43.
- 35 **Black PN**, Sharpe S. Dietary fat and asthma: is there a connection? *Eur Respir J* 1997;**10**:6–12.
- 36 **Seaton A**, Godden DJ, Brown K. Increase in asthma: a more toxic environment or a more susceptible population? *Thorax* 1994;**49**:171–4.
- 37 **Devereux G**, Seaton A. Diet as a risk factor for atopy and asthma. *J Allergy Clin Immunol* 2005;**115**:1109–17.

## LUNG ALERT

### Severe infantile lower respiratory tract illness may be characterised by a reduced, rather than increased, immune response

▲ Welliver T, Garofalo R, Hosakote Y, *et al.* Severe human lower respiratory tract illness caused by respiratory syncytial virus and influenza virus is characterized by the absence of pulmonary cytotoxic lymphocyte responses. *J Infect Dis* 2007;**195**:1126–36.

The pathogenesis of severe infantile respiratory illness due to respiratory syncytial virus (RSV) and influenza virus is not fully understood. Some evidence suggests there is an increased T lymphocyte and cytokine response to infection. However, this cross-sectional study found otherwise.

Nasopharyngeal secretions from 72 infants <12 months' of age, who had survived infection with RSV (n = 36) or influenza virus (n = 36), were examined for cytokine content. Post mortem lung specimens from 20 infants who had died of bronchiolitis caused by RSV (n = 9) or influenza virus (n = 11) underwent immunohistochemical staining to look for evidence of an immune response. In those who survived RSV infection, there was a significantly reduced immune response with regard to the classical T lymphocyte cytokines, compared with infants who had had influenza virus infection (interleukin 2 (IL2), p = 0.04; IL4, p = 0.0001; interferon  $\gamma$ , p < 0.0001; and IL17, p < 0.0001). Results from the group who had died from infection showed that there were substantially reduced amounts of CD4, CD8 and CD56 antigen-positive lymphocytes regardless of the infecting virus.

This study suggests that failure to develop a cytotoxic T lymphocyte immune response is key in the pathogenesis of viral respiratory illness in infants. These findings may be important in the development of possible treatments.

J Carter

Senior House Officer, University Hospital of North Tees, Teesside; jeicarter@hotmail.com