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Science commentary

Science commentary: Th1 and Th2 responses: what are they?

Cytokines are the hormonal messengers responsible for most of the biological effects in the immune system, such as cell mediated immunity and allergic type responses. Although they are numerous, cytokines can be functionally divided into two groups: those that are proinflammatory and those that are essentially anti-inflammatory but that promote allergic responses.

T lymphocytes are a major source of cytokines. These cells bear antigen specific receptors on their cell surface to allow recognition of foreign pathogens. They can also recognise normal tissue during episodes of autoimmune diseases. There are two main subsets of T lymphocytes, distinguished by the presence of cell surface molecules known as CD4 and CD8. T lymphocytes expressing CD4 are also known as helper T cells, and these are regarded as being the most prolific cytokine producers. This subset can be further subdivided into Th1 and Th2, and the cytokines they produce are known as Th1-type cytokines and Th2-type cytokines.

Th1-type cytokines tend to produce the proinflammatory responses responsible for killing intracellular parasites and for perpetuating autoimmune responses. Interferon gamma is the main Th1 cytokine. Excessive proinflammatory responses can lead to uncontrolled tissue damage, so there needs to be a mechanism to counteract this. The Th2-type cytokines include interleukins 4, 5, and 13, which are associated with the promotion of IgE and eosinophilic responses in atopy, and also interleukin-10, which has more of an anti-inflammatory response. In excess, Th2 responses will counteract the Th1 mediated microbicidal action. The optimal scenario would therefore seem to be that humans should produce a well balanced Th1 and Th2 response, suited to the immune challenge.

Many researchers regard allergy as a Th2 weighted imbalance, and recently immunologists have been investigating ways to redirect allergic Th2 responses in favour of Th1 responses to try to reduce the incidence of atopy. Some groups have been looking at using high dose exposure to allergen to drive up the Th1 response in established disease,¹ and other groups have been studying the use of mycobacterial vaccines in an attempt to drive a stronger Th1 response in early life.²

An additional strategy is being used to prevent the onset of disease; this involves the study of pregnancy and early postnatal life. Both of these states are chiefly viewed as Th2 phenomena (to reduce the risk of miscarriage, a strong Th2 response is necessary to modify the Th1 cel-

lular response in utero). The fetus can switch on an immune response early in pregnancy, and because pregnancy is chiefly a Th2 situation, babies tend to be born with Th2 biased immune responses. These can be switched off rapidly postnatally under the influence of microbiological exposure or can be enhanced by early exposure to allergens. It is also hypothesised that those who go on to develop full blown allergies may be those who are born with a generally weaker Th1 response, although it is now apparent that babies with allergies produce weak Th1 and Th2 responses.

Some people have suggested that immunisation programmes (and the subsequent reduction in microbiological exposure) are responsible for the increasing incidence of atopy. There is, however, no evidence that immunisation causes atopy. Moreover, this is not an argument that we should be exposing children to potentially fatal diseases again. If experiencing native diseases reduces the incidence of atopy, then the task of immunologists must be to develop vaccines that mimic the positive effects of infection.

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- 2 Jones CA, Holloway JA, Warner JO. Does atopic disease start in foetal life? *Allergy* 2000;55:2-10.

Corrections and clarifications

Cost effectiveness analysis of screening for sight threatening diabetic eye disease

In this paper by Marilyn James and colleagues (17 June, pp 1627-31), a confusion over job titles resulted in one of the authors being cited, wrongly, as a clinical assistant; Deborah M Broadbent is in fact an associate specialist.

Towards better treatment of glaucoma

Two vowels were transposed in the name of one of the authors of this editorial (17 June, p 1619-20). Her name is spelt Cordeiro, as her email address indicates.

Ectopic pregnancy

Two errors occurred in this regular review by J I Tay and colleagues (1 April, pp 916-9). The y axis of figure 3 was incorrectly labelled: the concentration should have ranged from 50 to 550 (not 500-5500) IU/l. The reference in the caption to figure 3 should read: "Braunstein et al 1976 [not 1996]."