IN THE NEWS

Sex is good for you! **Recreational sex — sex with no procreational purpose — might have a positive role in conception. Research from the University of Adelaide in South Australia shows that plenty of sex with the same man — even a year before conception — can increase the chance of a healthy pregnancy, reducing the risk of miscarriage, still births and pre-eclampsia.**

An article in *New Scientist* discusses that these fertility problems might occur due to "the reluctance of the mother's immune system to accept the fetus and placenta", which both express foreign proteins from the father's genes. "Sex, early and often, and with the intended father, may help overcome that reluctance".

As a report from ABC NewsOnline explains, "The more accustomed the woman's immune system is to the man's sperm, the less likely her body will be to reject the fetus". Repeated exposure to the man's semen, and the foreign proteins it contains, might help the mother-to-be to develop tolerance to them. Gustaaf Deekker from the University of Adelaide said, "If there's repeated exposure to that signal, then eventually when the woman conceives, her [immune] cells will say 'we know that guy, he's been around a long time, we'll allow the pregnancy to continue'".

The Adelaide group has also identified the cytokine transforming growth factor (TGF)-β as a component of semen, which they believe is also important for tolerance, and might represent a new treatment for women who repeatedly suffer pregnancy failures.

Jenny Buckland

REGULATORY T CELLS

Back in fashion

Although the concept of T-cell-mediated suppression went out of favour for a while during the 1980s, by the mid-1990s regulatory T cells were back in vogue. Much has been learned in recent years, but the nature of the antigens recognized by regulatory T cells and the factors controlling their induction *in vivo* remain unknown. Reporting in the *Journal of Experimental Medicine*, Kingston Mills' group now report for the first time the induction of pathogen-specific regulatory T cells and show that this is a mechanism used by *Bordetella pertussis* to subvert the protective T helper 1 (T_H1) response.

B. pertussis is a pathogen of the respiratory tract. Recovery from infection is dependent on the development of *B. pertussis*-specific T_H1 cells, although the T_H1 response is suppressed during the acute phase of infection. Previous work by Mills *et al.* has shown that the *B. pertussis* virulence factor filamentous haemagglutinin (FHA) can inhibit lipopolysaccharide (LPS)-stimulated interleukin-12 (IL-12) production by macrophages. In the present study, the role of FHA in suppression of T_H1 responses by induction of regulatory T cells was examined.

The authors first looked at the effect of FHA on cytokine production by immature bone-marrow-derived dendritic cells (DCs). FHA stimulated IL-10 production by DCs and suppressed LPS- and interferon-γ (IFN-γ)-induced production of IL-12. Because IL-10 seems to be required for the induction of T regulatory 1 (Tr1) cells, the authors next looked for evidence of Tr1 induction during the acute phase of responses to *B. pertussis*, when T_H1 responses are suppressed. Tr1-like lines and clones were derived from the lungs of mice acutely infected with *B. pertussis* by culturing lung T cells with antigen-presenting cells (APCs) and FHA (which stimulates IL-10 production by the APCs). The Tr1 clones secreted high levels of IL-10 and IL-5 and moderate levels of transforming growth factor-β, but little or no IFN-γ, IL-2 or IL-4.

So can these Tr1 clones suppress T_H1 responses to *B. pertussis*? The effect of Tr1 cells was examined *in vivo* using adoptive transfer experiments in sublethally irradiated mice. Adoptive transfer of *B. pertussis*-specific T_H1 cells into infected mice induced IFN-γ production and bacterial clearance by 3 weeks. By contrast, co-transfer of Tr1 cells suppressed IFN-γ production and delayed bacterial clearance. *In vitro* experiments suggested that the mechanism of suppression was via soluble IL-10, which induces the differentiation of Tr1 cells.

The results show that FHA interacts with DCs to promote the production of IL-10 and induce the development of regulatory T cells. Analogous to IL-12 for T_H1 cells, IL-10 seems to be an essential differentiation, but not growth, factor for Tr1 cells. The induction of pathogen-specific Tr1 cells is a novel strategy for the evasion of protective immune responses.

Elaine Bell

References and links

ORIGINAL RESEARCH PAPER McGuirk, P., McCann, C. & Mills, K. H. G. Pathogen-specific T regulatory 1 cells induced in the respiratory tract by a bacterial molecule that stimulates interleukin 1 production by dendritic cells: a novel strategy for evasion of protective helper type 1 responses by *Bordetella pertussis*. *J. Exp. Med.* **195**, 221–231 (2002).
FURTHER READING Read, S. & Powrie, F. CD4(+) regulatory T cells. *Curr. Opin. Immunol.* **13**, 644–649.
WEB SITE
Kingston Mills' lab: http://www.tcd.ie/Biochemistry/sfi-mills.html