

DISEASE WATCH | IN THE NEWS

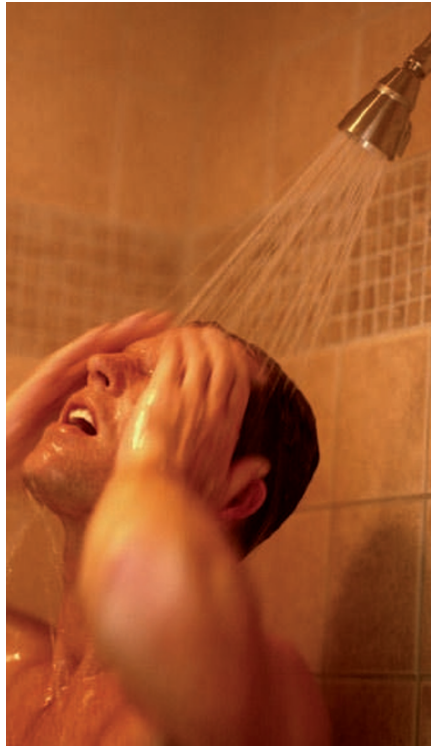
CEACAM6 and Crohn's Disease

Investigators have found that expression of human carcinoembryonic antigen-related cell adhesion molecule 6 (CEACAM6) makes mice susceptible to infection by adhesive and invasive *Escherichia coli* (AIEC), which has been linked to Crohn's disease in humans. Crohn's disease is thought to be caused either by normal gut microbiota, in response to misexpressed CEACAM6 in the gut, or by changes in the gut flora. When the investigators infected mice that express human CEACAM6 and other CEACAMs, the mice became sick and harboured higher levels of AIEC in their stool than wild-type controls, an effect that could be reduced by the administration of CEACAM6-specific antibodies. The transgenic mice showed signs of colitis and contained higher levels of interleukin-1 β (IL-1 β), IL-6 and IL-17 than wild-type controls. Infection and colitis depended on the presence of type 1 pili on the bacteria; mice infected with a type 1 pilus mutant had normal colonic structures and lower bacterial loads, lost less weight and had a higher survival rate than mice infected with wild-type AIEC. These results show that CEACAM6 plays an important part in Crohn's disease. *J. Exp. Med.*

Host genetics blocks HCV treatment

Three research groups report the presence of a link between the interleukin-28B gene (*IL28B*) and the lack of response to hepatitis C treatment. Hepatitis C virus (HCV) infection is the leading cause of liver cirrhosis and hepatocellular carcinoma and the main cause of liver transplants. The current treatment, a 48-week course of pegylated interferon- α and ribavirin, fails in 42–52% of patients and can have serious side effects. All three studies searched genome wide for markers that correlated with a lack of response to HCV treatment, and identified markers near *IL28B*. *IL-28B* has been shown to be upregulated following virus infection and to have anti-viral activity. In one study, researchers discovered two changes in *IL-28B* that were highly associated with the variation who was seen in individuals who did not respond to treatment. In the other two studies, the blood level of *IL28B* mRNA was found to be significantly lower in patients who carried the marker associated with a lack of response to treatment than in those individuals that did not carry the

marker. These markers may become part of a screen that identifies individuals with high probabilities of treatment failure and success. *Nature, Nature Genet.*

Pathogens lurk in shower heads

Shower heads are filled with biofilms that harbour many different bacteria, researchers from the University of Boulder, in the USA, have found. They sampled shower head biofilms in rural and urban areas and determined their microbial compositions by 16S ribosomal RNA sequencing. The composition of the flora displayed a low diversity, possibly reflecting the low level of nutrients in the water, and was more than 99% bacterial. Although the composition varied by location, the predominant species detected in most cases were non-tuberculous *Mycobacterium* species, primarily *Mycobacterium gordonae* and *Mycobacterium avium*. Sampling over time detected changes in the distribution of the numbers of each individual species but did not detect a gain or loss of species, indicating that the flora in the shower head appears to be stable. The bacteria detected in the aerosols produced during showering were similar to those found in the feed water, although dilution of the biofilm organisms may have caused them not to be detected. None of the species detected are

common pathogens for immunocompetent individuals, but *M. avium* can cause severe infections in immunocompromised people. *NY Times, Proc. Natl Acad. Sci. USA*

Positive news from HIV vaccine trial

The results of the RV144 HIV vaccine phase III trial in Thailand, sponsored by the US Army Surgeon General, show that people who were given the vaccine had a 31.4% lower rate of becoming HIV positive than subjects who received a placebo. The volunteers were heterosexual and at no elevated risk of contracting the disease. The vaccine consists of two vaccines that had shown no protective effect on their own. One, ALVAC, was used as a primer and the other, AIDSVAX, was used as a booster. These were administered over the course of 6 months and the subjects were followed for 3 years. Although modest, these are the first positive results for an HIV vaccine. "These results show that development of a safe and effective preventive HIV vaccine is possible," according to Colonel Nelson Michael, Director of the Division of Retrovirology, Walter Reed Army Institute of Research and Director of the US Military HIV Research Program. *Nature News, NY Times, The Times*

New antigens for urinary tract infection vaccine

A new study identifies surface-exposed proteins involved in iron uptake as vaccine targets for urinary-tract infection caused by uropathogenic *Escherichia coli* (UPEC). Investigators at the University of Michigan Medical School, USA, screened the genome of UPEC for proteins that adhered to the criteria for antigens, including surface exposure, conservation among UPEC strains and previous demonstration of antigenicity. This strategy identified six proteins that are involved in iron uptake. When tested in a mouse model, nasal administration of three of these proteins resulted in decreased colonization following bacterial challenge. As iron is often a limiting factor in the growth of pathogens, proteins involved in iron acquisition may be vaccine targets for a wide range of pathogens. *PLoS Pathog.*

In the News was compiled with the assistance of David Ojcius, University of California, Merced, USA. David's links to infectious disease news stories can be accessed on Connotea (<http://www.connotea.org>), under the username NatureRevMicrobiol.