

## DISEASE WATCH | IN THE NEWS

**Swine flu causes 'super immunity'**

Analysis of antibodies isolated from patients infected with pandemic H1N1 influenza virus has revealed that some patients produce highly unusual antibodies that are effective against multiple influenza strains, raising hopes for the development of a universal influenza vaccine. Research published in the *Journal of Experimental Medicine* showed that some swine flu patients produced antibodies that are broadly cross-reactive against epitopes in the head domain and the stalk of haemagglutinin (HA) from multiple flu strains, in contrast to antibodies generated in response to seasonal influenza, which tend to have more specific affinities. The antibodies identified in the study were produced by pre-existing memory B cells that had gone through affinity maturation to produce antibodies with greater specificity to the H1N1 strain. These antibodies prevented infection and could also be used as treatment in mice infected with multiple influenza strains. Isolation of broadly effective monoclonal antibodies could be hugely useful in the development of a flu vaccine, hopefully replacing the current practice, which is for vaccine developers to predict which flu strain will be prevalent in the coming winter. *J. Exp. Med./BBC*

**New vaccine hope for tuberculosis**

A new approach to making a tuberculosis vaccine has shown promise in early testing. A new vaccine, termed H56 and developed by researchers at the Statens Serum Institut in Copenhagen, Denmark, differs from other vaccines (including the only approved vaccine, the Bacille Calmette–Guérin (BCG) vaccine), as it includes antigens that are made at late stages of the infection in addition to antigens that are made at early stages. These antigens are administered as a fusion protein that includes the early antigens Ag85B and ESAT6 together with Rv2660c, which is produced throughout the entire infectious cycle. The effectiveness of this approach was indicated by the finding that, although the bacterial loads of mice vaccinated with H56 or BCG were similar less than 4 weeks after exposure to *Mycobacterium tuberculosis*, the mice vaccinated with H56 had significantly lower bacterial loads 24 weeks after exposure than mice vaccinated with BCG. Clinical trials are slated to start in South Africa later this year. *BBC/Nature Med.*

**New drugs for chronic hepatitis C**

Two drugs that target hepatitis C virus (HCV) are expected to be approved for use this summer by the US Food and Drug Administration, and this may dramatically improve cure rates. Approximately 3.2 million people in the United States are chronically infected with HCV, leading to 12,000 deaths each year. The current treatment regimen (a year-long course of ribavirin and pegylated interferon- $\alpha$ ) cures only 40% of individuals infected with the most common form of the virus. Recent studies have shown that when either of the two new drugs, telaprevir (VX-950; Vertex) or boceprevir (Merck & Co.), are administered together with the current treatment regimen, the cure rate can rise as high as 75%. Furthermore, the length of the treatment regimen can be halved to just 6 months, thus lessening the length of time that patients have to endure the sometimes gruelling side effects of treatment.

HCV infections can often go undetected for many years, leading to calls for increased screening to maximize the benefit of these new drugs. *Washington Post*

**The aging of *Streptococcus***

A new study has revealed how the pathogen *Streptococcus pneumoniae* evolves as it adapts to antibiotic treatment and vaccinations. By sequencing 240 strains of the PMEN1 lineage of antibiotic-resistant *S. pneumoniae* that were isolated between 1984 and 2008, the researchers obtained a detailed view of the changes that occurred in this lineage as different drugs were applied and new vaccines were introduced. *S. pneumoniae* takes up DNA quite readily, and most of the changes that were detected were found to be the result of horizontal gene transfer, the movement of prophages or the transmission of conjugative elements. In total, 74% of all the bases in the genomes of these strains were changed in at least one strain, indicating the tremendous plasticity of the *S. pneumoniae* genome. Furthermore, it was found that there were recombination hot spots in genes that encode important antigens for vaccine development. *Science/New York Times*

**RNA chimaera vs HIV**

A new drug for the treatment of HIV infections has been shown to work in mice. The drug is an RNA hybrid molecule made



out of a small interfering RNA (siRNA) that triggers degradation of certain HIV-1 RNAs, and an aptamer (a nucleic acid that is selected from a random sequence pool by a screen for specific binding to a target molecule) with high binding affinity to the gp120 envelope protein of HIV-1. The drug was tested in RAG-hu mice, which, following transplantation with human haematopoietic stem cells, can mount human-like immune responses and support productive HIV-1 infection. The RNA drug suppressed HIV-1 replication by several orders of magnitude and prevented the viral-induced decline in helper CD4<sup>+</sup> T cells. The antiviral effect lasted several weeks beyond the last injected dose.

This technology could potentially be adapted to fight viral resistance using a cocktail of aptamers of various specificities in combination with siRNAs directed against different mRNA targets. *Sci. Transl. Med./Nature News*

**Outbreak news**

**Polio.** Pakistan was the only country to report an increase in polio cases in 2010, according to figures from the WHO. The country has the highest incidence of polio in the world. Eradication of polio is an achievable goal but requires a comprehensive eradication campaign. Unfortunately, military action, mostly near the Afghan border, makes it impossible for the vaccine to reach those whose infections could otherwise be easily prevented. *Washington Post/WHO*

*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 our Twitter page (@NatureRevMicro).