



## Research brief

For more on a **freeze-dried polio vaccine** see *MBio* 2018; 9. DOI:10.1128/mBio.02287-18

For more on **prion diseases** see *PLoS Pathog* 2018; 14: e1007424. DOI:10.1371/journal.ppat.1007424

For more on **TarP and MRSA** see *Nature* 2018; 563: 705–09. DOI:10.1038/s41586-018-0730-x

For more on **plasmodium reproduction** see *Nat Microbiol* 2018; published online Nov 26. DOI:10.1038/s41564-018-0291-7

For more on **HIV vaccine development** see *Science Advances* 2018; 4: eaau6769. DOI:10.1126/sciadv.aau6769

For more on **hantaviruses** see *Nature* 2018; 563: 559–63. DOI:10.1038/s41586-018-0702-1

For more on the **entry of HIV to the nucleus** see *PLoS Pathog* 14: e1007408. <https://doi.org/10.1371/journal.ppat.1007408>

### Wherefore art thou, polio?

This month sees another twist in this millennia's biggest epidemiological will-they-won't-they story. Researchers have developed a freeze-dried polio vaccine that could lead to eradication of the disease. Eradication has been thwarted by—civil strife aside—difficulties in transporting polio vaccine along cold chains in low-resource countries. By cycling through different combinations of formulations, researchers have identified one formulation that, when given to mice, gave full protection after storage at room temperature for 4 weeks. The researchers are now hoping that a philanthropic foundation or company will take over the project to pay for human studies.

### The Kuru-ious case of prion transmission

Prion diseases, or transmissible spongiform encephalopathies, can be transmitted by eating food containing misfolded proteins called prions. Prion diseases include neurodegenerative diseases such as kuru and variant Creutzfeldt-Jakob disease. That prions can be detected in blood suggests that the blood-brain barrier could be a route of infection to the brain, but new findings suggest this not to be the case. Mice modified to have a permeable blood-brain barrier were shown to have the same survival rates as unmodified mice after experimental infection, suggesting an alternative route of cerebral infection, most likely through the peripheral nervous system.

### MRSA: TarP plays a part

Findings from experiments in mice have unearthed a previously unknown bacterial surface protein that allows methicillin-resistant *Staphylococcus aureus* (MRSA) to evade the immune system. The protein, called teichoic acid ribitol P (TarP), alters the pattern of carbohydrate molecules on the pathogen's surface in an as-yet unknown way to make it invisible to

the immune system. The scientists who discovered the protein have posited that this camouflage mechanism might be an evolutionary battle scar—the result of previous reprogramming from a phage. The study's subsequent high-resolution structural analyses of TarP might form the basis of future work to target it as a treatment against MRSA.

### Even parasitic protozoans do it

To be transmitted from people to mosquitoes, at least some plasmodium parasites must take time out from asexual reproduction to reproduce sexually. This important juncture in the parasite's lifecycle is a potential target for treatment to prevent onward transmission. With little known about the molecular steps involved in why, how, and what triggers a parasite to undergo sexual reproduction, researchers fluorescently labelled a protein known to be activated before sexual reproduction happens. Contrary to previous understanding that a full asexual cycle is needed after this protein has been expressed, the new findings show that, in some instances, the parasite can go straight into sexual reproduction. Such express routes to sexual reproduction could help the parasite escape targeted drug treatment.

### HIV vaccine hints via UFO

The surface of HIV is studded with envelope proteins called Env, which play a crucial role in infectivity and entry into host cells. These proteins are thus an ideal candidate for immunisation against infection, but previous efforts have been foiled by the fact that they change shape often. Therefore, previous experimental vaccines targeting Env have worked against only a few strains. Now, researchers have used an “uncleaved prefusion-optimised” (generously abbreviated as UFO) approach to stabilise the protein by partly modifying a springy section of it called HR1. The Env-based vaccine that they developed produced robust

anti-HIV responses in mice and rabbits. Researchers are testing other candidate vaccines in monkeys.

### Where the squeaks have no name

Experiments in hamsters have identified protocadherin-1 (PCDH1), a protein associated with asthma in people, as being crucial for the transmission of zoonotic hantaviruses such as Sin Nombre virus and Andes virus. In laboratory studies in epithelial cells, scientists showed that cells without PCDH1 were not susceptible to four strains of hantavirus. The researchers identified extracellular repeat domains of PCDH1 as being a target for the virus, developing monoclonal antibodies against the domains that stopped viral entry. 18 of 21 hamsters without PCDH1 were resistant to Andes virus infection. However, some hamsters were still susceptible, which suggests the existence of other routes of infection.

### If your name's not on the list...

The human protein myxovirus resistance 2 (MX2) can prevent HIV-1 from infecting cells. New research has elucidated the mechanisms by which it does this and could help to find new effective treatments against the virus. MX2 is situated at the cytoplasmic face of the nuclear envelope and blocks the virus from entering the nucleus and therefore integrating its DNA into the host's genetic material and machinery. Findings from laboratory screening and RNA-silencing experiments now show that MX2 is positioned on the nuclear envelope thanks to interactions with several proteins. These mediating proteins include proteins in the nuclear core complex, which is a gateway between the cytoplasm and nucleus, and nuclear transport receptor transportin-1, a component of the nuclear import pathway.

Dara Mohammadi