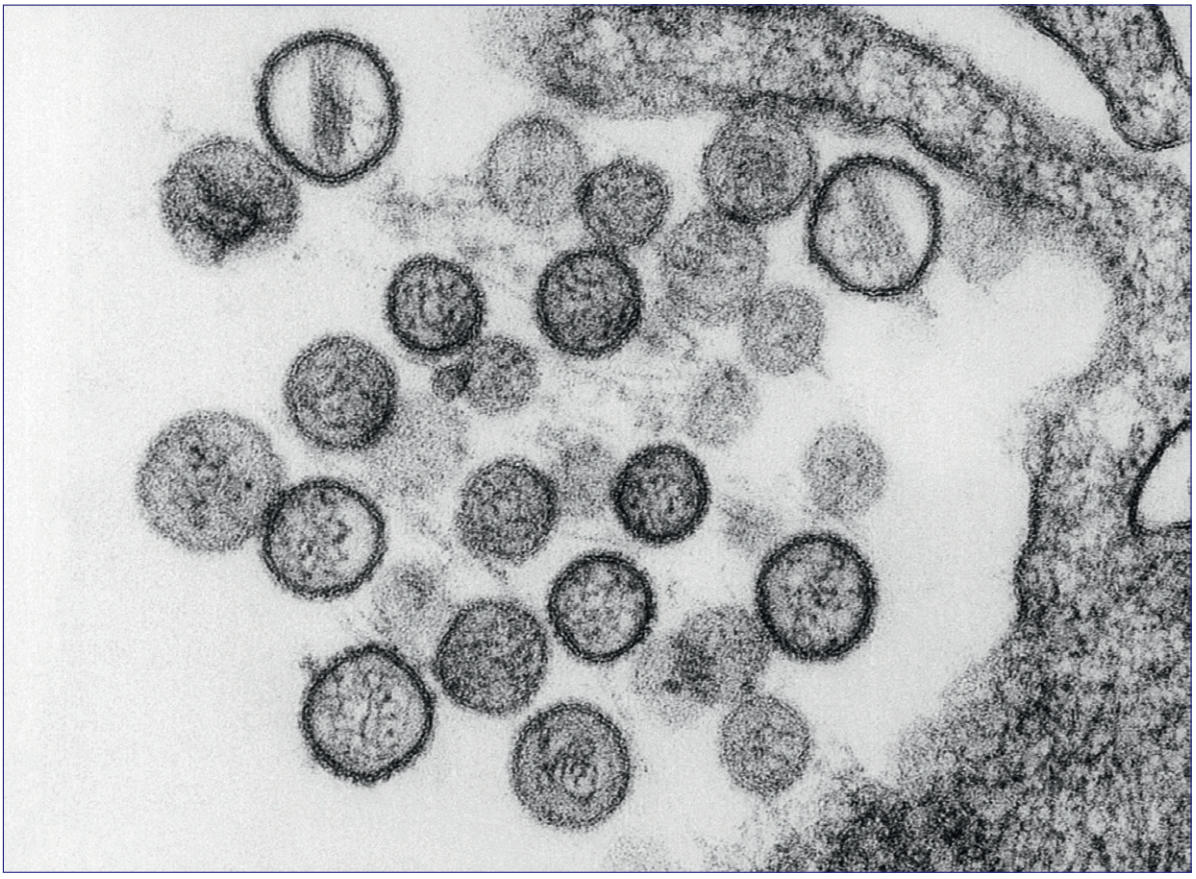


A transmission electron micrograph reveals the ultrastructural appearance of a number of virus particles, or virions, of a hantavirus known as the Sin Nombre virus. Three people in the US state of Washington have died from Sin Nombre virus infection since February 2017, with two others hospitalised, in the worst outbreak of the disease in 18 years. The disease has been found to be transmitted to humans from deer mice.

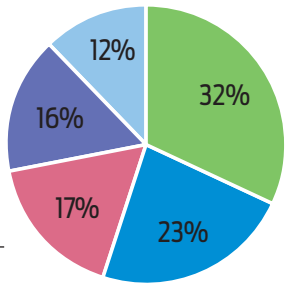
Picture: Centers for Disease Control and Prevention/ Reuters

MJA InSight Poll

I am more convinced about the benefits of medicinal cannabis than I was 6 months ago.

Total votes = 190

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree



Take part in next week's poll on: www.mja.com.au/insight

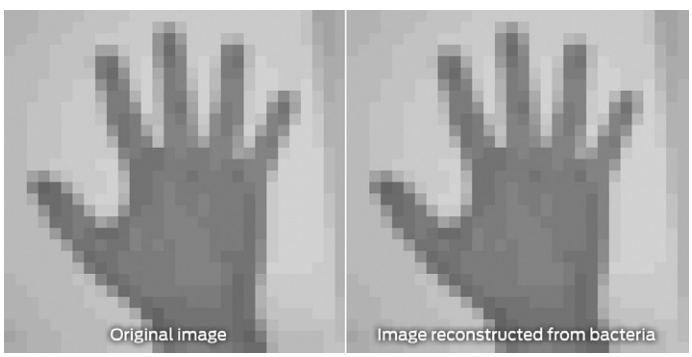
MJA Podcasts

Robert Ellis is a Masters and PhD candidate at the Centre for Kidney Disease Research at the University of Queensland's Diamantina Institute. He discusses his co-authored narrative review, published in this issue, on optimising assessment of kidney function when managing localised renal masses.

Dr Belinda O'Sullivan is a research fellow at the School of Rural Health at Monash University. She talks about specialist outreach services in regional and remote Australia, to accompany her co-authored perspective in this issue.

Professor Geoffrey Isbister is clinician researcher in clinical toxicology at the University of Newcastle. He discusses the Australian Snakebite Project, to accompany his co-authored research article in this issue.

Podcasts are available at www.mja.com.au/podcasts and from iTunes.



Storing data in living cells using CRISPR

US scientists have taken images and a short movie from Eadweard Muybridge's *Human and animal locomotion* and encoded them into the DNA of bacteria using the CRISPR (clustered regularly interspaced short palindromic repeats) system. This achievement, **reported in *Nature***, expands on previous demonstrations that DNA provides a promising medium for storing digital data in living cells. Recent work has indicated that information could be transferred into living cells using the CRISPR system, which uses two proteins to insert genetic code into the DNA of target cells. Seth Shipman and colleagues from Harvard Medical School demonstrated this ability by using the CRISPR system to encode images and a short GIF file (five frames of the mare 'Annie G.' galloping from *Human and Animal Locomotion* at 36×26 pixels) in *Escherichia coli*. They used nucleotides, the building blocks of DNA, to produce a code that related to the individual pixels of each image. For the GIF, sequences were delivered frame-by-frame over time to living bacteria, where they were inserted into the genome in the order in which they were delivered. Once inserted into the genome of *E. coli*, the data could then be retrieved by sequencing the DNA, and the images reconstructed by reading the pixel nucleotide code, which was achieved with about 90% accuracy. In addition to establishing that the CRISPR system may enable the recording of practical amounts of data in living cells, the study also reveals new insights into the functioning of the CRISPR system. For example, the authors determined which sequences are best for transferring data into the genome, which could also guide other applications of the CRISPR system.

http://www.nature.com/nature/journal/vaop/ncurrent/full/nature23017.html

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Treatment breakthrough for viruses

Scientists from RMIT University in Melbourne have discovered that a 1.5 billion-year-old cell biological process found in plants, fungi and mammals, promotes virus pathogenicity in mice and is a potential target for viral strain-independent treatments which could alleviate some of the most devastating viruses worldwide. The researchers identified a protein, NOX2 oxidase, that is activated by a range of viruses that enter cells via the endocytic pathway, including influenza, rhinovirus, dengue and HIV. Once activated, NOX2 oxidase suppresses the body's key antiviral reaction and its ability to fight and clear the viral infection, which, in mice, results in a stronger or more virulent disease. The study, **published in *Nature Communications***, also investigated a new prototype drug to treat these debilitating viral diseases. The researchers found that the NOX2 oxidase protein activated by the viruses is located in cell compartments called endosomes. They synthesised a molecule that delivers a NOX2 oxidase inhibitor directly to endosomes to disrupt the viral signaling platform. In mice, the customised drug was very effective at suppressing disease caused by influenza infection. "Current treatment strategies are limited as they specifically target circulating viruses and have either unknown or very little effect against new viruses that enter the human population. We have identified a protein of the immune system that contributes to the disease caused by flu viruses irrespective of their strain. We also developed a novel drug delivery system to target this protein, which drastically alleviated the burden of viral disease," said senior author Stavros Selemidis.

https://www.nature.com/articles/s41467-017-00057-x

Cate Swannell doi: 10.5694/mja17.n0708