

BIOTECHNOLOGY

Portable way to make proteins

Freeze-dried pellets of cellular proteins can be mixed with DNA sequences to produce vaccines, antibodies and other therapeutics without the need for specialized equipment.

Engineered living cells are commonly used to mass-produce drugs, but the techniques involved are hard to perform in remote areas. To create a portable, cell-free platform, James Collins at the Massachusetts Institute of Technology in Cambridge and his colleagues freeze-dried the cellular machinery needed to make RNA and proteins from DNA to form 'reaction pellets'. The team combined these with genetic sequences that encode proteins or peptides required for various vaccines and antimicrobials, added water and stirred them, then incubated them at certain temperatures. This method yielded, among other things, a diphtheria vaccine that effectively immunized mice.

The pellets could be mixed with sequences for other proteins to make a range of therapeutics without refrigeration, the authors say. *Cell* <http://doi.org/bqzc> (2016)

EPIGENETICS

CRISPR edits gene methylation

The CRISPR gene-editing tool has been modified so that it can add or remove methyl groups at specific positions on DNA, allowing researchers to test how such changes affect gene expression.

DNA methylation helps to regulate gene expression, but its role at specific sites has been difficult to determine. Rudolf Jaenisch and his colleagues

at the Whitehead Institute for Biomedical Research in Cambridge, Massachusetts, altered the Cas9 enzyme — which can be programmed to bind to and cut specific regions of DNA — so that it would bind to DNA without cutting it. The team then fused the disabled Cas9 to enzymes that either add or remove methyl groups.

The authors found that removing methyl groups from two specific regions induced the expression of certain genes. The approach worked both in cultured mouse cells and in live mice.

Cell <http://doi.org/bqzj> (2016)

STEM CELLS

Targeting pain of spinal-cord injury

Neurons derived from human embryonic stem cells can reduce pain and other effects of spinal-cord injury in mice.

Persistent nerve pain and loss of bladder control often follow spinal-cord injury, and may be linked to reduced signalling by the inhibitory neurotransmitter GABA. Thomas Fandel and his colleagues at the University of California, San Francisco, grew the stem cells so that they developed into precursors of

neurons that produce GABA, and transplanted them into the injured spinal cords of mice. Six months later, the precursor cells had developed into GABA-producing neurons that formed working connections with existing spinal-cord neurons. Animals that had received the transplants also showed improved bladder function and reduced signs of pain.

The results could point to therapeutic strategies for human spinal-cord injuries in the future, the authors suggest. *Cell Stem Cell* <http://doi.org/bqzd> (2016)



ASAHI SHIMBUN/GETTY

GLACIOLOGY

Greenland ice loss underestimated

Greenland's glaciers could be shrinking more in response to climate warming than scientists had thought.

Shfaqat Khan of the Technical University of Denmark in Lyngby and his colleagues used data from a network of Global Positioning System stations across Greenland (pictured) to measure the rise of land resulting from ice loss and estimated changes since the last ice age. The uplift observed — more than 12 millimetres per year in some regions — exceeded

model-derived rates by several millimetres on average. Previous satellite measurements have not accurately accounted for the response of solid Earth to ice-load changes, and thus underestimate current ice-mass loss by some 17 billion tonnes per year, the authors conclude.

The new data suggest that ice loss from Greenland has caused 4.6 metres of sea-level rise — 44% more than previously estimated — since the last ice age.

Sci. Adv. 2, 1600931 (2016)