

BIOTECHNOLOGY

Gene therapy halts type 1 diabetes

Transferring part of an insulin gene into liver cells triggers a specific immune response that protects mice from one form of diabetes.

Type 1 diabetes occurs when T cells target and kill insulin-producing islet cells in the pancreas. Maria Grazia Roncarolo of Stanford University in California and her team transferred a gene fragment encoding some of the insulin B chain into the livers of mice engineered to develop this disease, and monitored the effects. Islet cells lived for up to 33 weeks after treatment of animals in a prediabetic state. In untreated mice, around 80% of insulin-producing cells were destroyed. The transfer, in combination with an antibody, reversed symptoms in mice that had developed diabetes.

The gene fragment stimulated regulatory T cells that are specific for insulin, suppressing the insulin-attacking T cells.

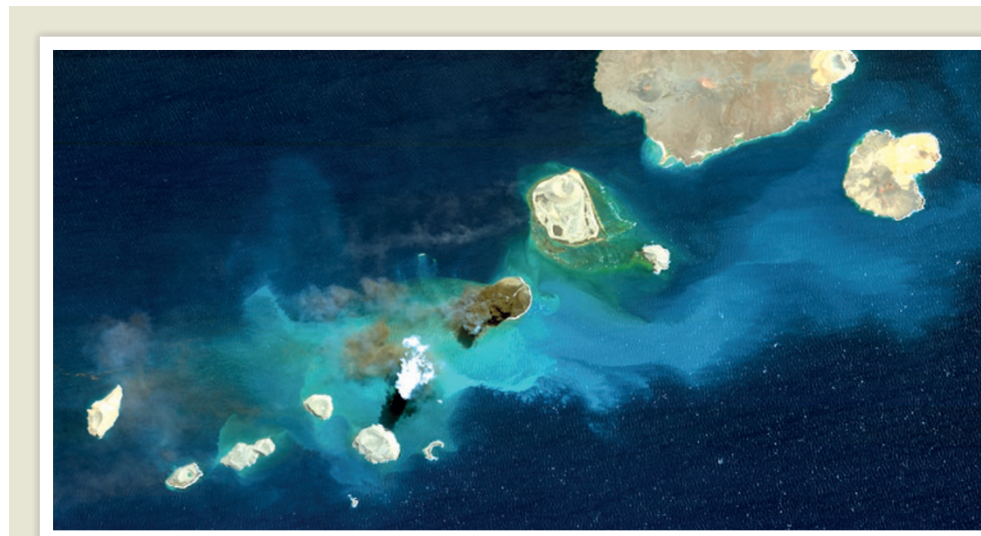
Sci. Transl. Med. 7, 289ra81 (2015)

MATERIALS

Memory metal sets flex record

An alloy that can bend and return to its original shape at least 10 million times could prove useful in applications including medical devices and refrigeration.

Bending a 'shape-memory alloy' changes its crystal structure from one phase to another, whereas applying heat reverses that transition. But structural damage causes these materials to lose their shape memory within a few thousand cycles. A team led by Eckhard Quandt at the University of Kiel, Germany, and Manfred



VOLCANOLOGY

New islands reveal Red Sea rifting

Two volcanic islands that have emerged in the southern Red Sea suggest that the area is more geologically active than was thought.

Sholan Island surfaced in December 2011 and Jadid Island appeared in October 2013, forming part of the Zubair archipelago (pictured). Seismic data and satellite radar measurements show that both islands were created by magma squirting up along north-south fractures under the sea floor,

says a team led by Sigurjón Jónsson of the King Abdullah University of Science and Technology in Thuwal, Saudi Arabia. The area is seeing a decades-long episode of rifting, in which one plate of Earth's crust pulls apart from another.

Observing newly formed islands in such detail is rare, and the islands will probably remain above water despite erosion, say the authors.

Nature Commun. 6, 7104 (2015)

Wuttig at the University of Maryland, College Park, has now created a titanium-nickel-copper alloy (Ti₅₄Ni₃₄Cu₁₂) that averts this memory loss. Layers of Ti₂Cu in the material act as templates that guide the complete transition between the two crystal phases.

This template approach could offer a way of creating better shape-memory alloys. *Science* 348, 1004-1007 (2015)

PALAEOCLIMATOLOGY

Tropics feel effect of iceberg thaw

Prehistoric icebergs in the North Atlantic had a greater influence on tropical climate than was previously thought.

Rachael Rhodes of Oregon State University in Corvallis and her colleagues constructed a 60,000-year methane record from a west Antarctic ice core. They found elevated methane levels during cold periods, which seemed to coincide with 'Heinrich events' — the breaking off of icebergs from Greenland glaciers on a massive scale. The team suggests that fresh water flooding into the Atlantic from the thawing icebergs helped to cool the Atlantic region, which contributed to the slowing down of ocean circulation. This led to increased rainfall in the tropics, where wetlands grew and produced more methane.

The climatic impact of some Heinrich events lasted for

up to 1,500 years, suggesting that Atlantic circulation was weakened for much longer than the thaw periods.

Science 348, 1016-1019 (2015)

CHEMICAL BIOLOGY

Antifungal drug dodges resistance

A yeast-killing compound evades drug resistance and is less toxic than a related drug used in the clinic.

The antifungal drug amphotericin B (AmB) does not typically result in resistant fungi, but it kills human cells so can be used only at low doses. To create AmB derivatives that are less toxic to humans and do not cause resistance, Susan