

Research highlights

MISSING LINK FOUND AS CABLES CONNECT QUANTUM NETWORKS

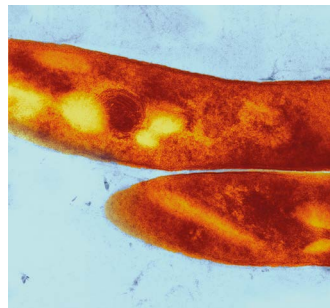
High-quality cables have been developed that could pave the way for large-scale quantum computing.

Quantum computers rely not on standard memory bits but on the quantum analogue, the qubit. One promising type of quantum computer implements qubits using superconducting circuits on a slice of silicon called a wafer. But these devices' practicality is hindered by the fact that a wafer can support only a limited number of qubits. One solution is to build many such computers and then link them together through cables that do not disturb the quantum properties of the devices.

Suitable cables have now been developed by Jingjing Niu at the Southern University of Science and Technology in Shenzhen, China, and her colleagues. The information loss in these cables is extremely low and similar to that in optical fibres – the connections that form the basis of global telecommunication networks. The team used the cables to make a 20-qubit quantum-computer processor comprising five 4-qubit modules.

The researchers say that their cables might find applications in fields ranging from quantum optics to radio astronomy, as well as quantum computing.

Nature Electron. <https://doi.org/jxtk> (2023)



ANTIBIOTIC GETS AN UPGRADE TO FIGHT DRUG-RESISTANT TB

A designer antibiotic successfully treats tuberculosis (TB) in mice and can also kill drug-resistant tuberculosis bacteria growing in laboratory dishes.

When it was discovered more than 50 years ago, the naturally occurring antibiotic sequanamycin A demonstrated potential against *Mycobacterium tuberculosis* (pictured), the bacterium that causes TB. The compound's instability, however, prevented its development into an oral drug.

Jidong Zhang at the pharmaceutical company Sanofi in Vitry-sur-Seine, France, and his colleagues made a series of synthetic modifications to sequanamycin A's structure, resulting in a compound called SEQ-9 that is much more stable. It's also easily absorbed and metabolized, which are useful attributes in an oral drug.

The team tested SEQ-9 in mice that had either rapidly growing or stable levels of TB bacteria in their lungs. The compound lowered viral levels in the lungs of mice in both groups, and prevented deaths in the first group. SEQ-9 was also effective in combination with other antibiotics.

Cell <https://doi.org/jxtj> (2023)

STRONG AND SUPPLE SYNTHETIC TENDON RIVALS REAL THING

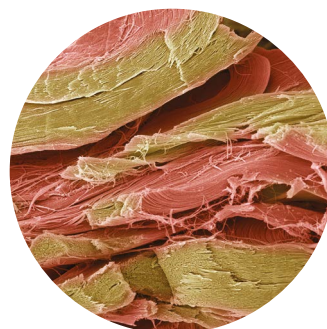
A gel with similar strength and elasticity to tendons could be useful for tendon repair, prosthetics and robotic limbs, as well as for scaffolding to support tissue growth.

Tendons (pictured) connect muscles to bones, and flex repeatedly while bearing weight. Their strength and flexibility come from a complicated arrangement of stiff, parallel collagen fibres intertwined with soft, water-trapping polymers. Efforts have been made to replicate this structure with hydrogels – squishy materials made of waterlogged polymer networks – but have not produced a material that is as strong as natural tendons, or that stretches and bends so easily.

Mingze Sun at the University of Hong Kong and colleagues made composite hydrogels by combining the flexible polymer polyvinyl alcohol with tiny fibres of aramid polymer, also known as Kevlar. When the team stretched and dried the hydrogel, bonds between the polymers aligned the aramid fibres without breaking, replicating the microstructure of natural tendons.

Once rehydrated, the hydrogel was 60% water, just like natural tendons, and had matching mechanical properties.

Sci. Adv. **9**, eade6973 (2023)



MILLIONS AT RISK OF POVERTY AS ENERGY COSTS SOAR

As many as 141 million people worldwide could be forced into extreme poverty as a result of the energy crisis exacerbated by the Russia–Ukraine war.

Yuru Guan at the University of Groningen, the Netherlands, and her colleagues used models to gauge the impact of the increased prices of coal, oil and natural gas on households in 116 countries. The researchers examined the impact of both increases in direct costs – how much a household's fuel bill rose – and the surge in indirect costs, or how much extra money was spent on goods and services.

The authors found that global energy costs, per household, would rise by 62.6–112.9%, which is equal to a 2.7–4.8% rise in household spending. Much of the increase was from indirect costs and was mainly driven by the escalating prices of crude oil and petroleum products.

The crisis shows that heavy reliance on fossil fuels increases the risk of energy insecurity, the researchers say.

Nature Energy. <https://doi.org/grs7zq> (2023)