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Exercise

Muscle fibres warp as we get older, but we can restore them

Michael Le Page

AS WE age, our muscle fibres become misshapen, but resistance training seems to at least partially restore them.

Casper Søndenbroe at Copenhagen University Hospital in Denmark and his colleagues have looked at samples taken from the thigh muscles of about 200 people aged between 20 and 97. The researchers gave the muscle fibres a score based on how much their cross-sectional shape deviated from a circle. Healthy muscle fibres deviate slightly because they have a pentagonal or hexagonal shape, scoring about 1.2.

Misshapen fibres may have an elongated or "squashed" shape, with extremely askew ones scoring around 1.9. For each sample, the scores of fibres were averaged to get an overall figure.

In the slow-twitch muscle fibres used for endurance activities, there was a small, gradual increase in misshapenness with age, the team found. In the fast-twitch muscles used for powerful movements, such as lifting weights, there was a bigger increase, rising from 1.4 around age 20 to 1.6 by age 90.

Misshapenness correlated with muscle performance as well or better than muscle size did, measured by the cross-sectional area of muscle fibres, says Søndenbroe.

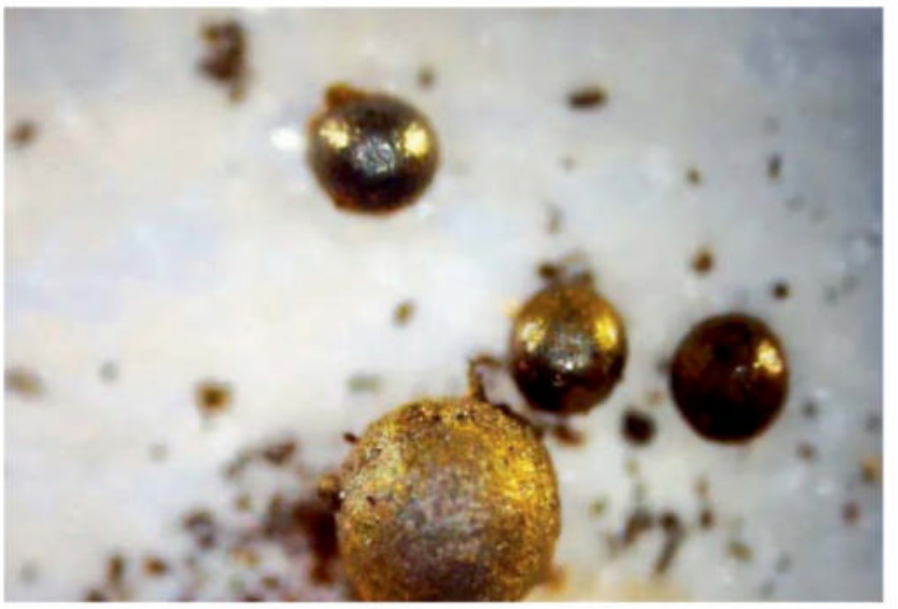
He and his colleagues then got about 60 of the people to do at least three months of heavy resistance training three times per week.

Afterwards, the researchers took further muscle samples and found a decrease in misshapenness in fast-twitch fibres in both younger (aged 20 to 36) and older (aged 60 to 80) volunteers. In the older group, the average score fell from around 1.5 to 1.45, for instance. The results have been posted as a preprint, but aren't yet peer reviewed (bioRxiv, doi.org/khf4). ▮

Space

Are these the remains of an interstellar meteor?

Leah Crane



AVI LOEB

A microscope image showing some spherules found in the Pacific

TINY flecks of an interstellar meteor may have been found at the bottom of the ocean. Researchers mounted an expedition to the Pacific Ocean just north of Papua New Guinea to hunt for fragments of the meteor, which entered Earth's atmosphere in 2014, and they say their search has been successful – but other scientists remain sceptical.

Avi Loeb and Amir Siraj at Harvard University identified the meteor as potentially interstellar in 2019 based on its recorded velocity, which they claimed was fast enough to indicate that it hurtled into our solar system from interstellar space. The data they used came from classified US government sensors, so there wasn't enough information to prove their claim, but the government released a statement confirming the high velocity. The pair nicknamed the object Interstellar Meteor 1, or IM1, although many astronomers remain unconvinced that it is truly interstellar.

2014

When "Interstellar Meteor 1" entered Earth's atmosphere

Using the sparse data the government did release, Loeb and Siraj traced the area where the meteor exploded in the atmosphere, and Loeb and his colleagues headed out on a privately funded voyage.

They dragged the sea floor under the area using a magnetic sled to pick up bits of iron, as well as a sieve similar to those used to pan for gold, and they have found 40 of what they say are fragments of IM1.

The fragments are in the form of tiny iron spherules, each less than a millimetre across.

This in itself isn't particularly surprising. "Micrometeorites should be found all across the sea floor due to their constant accumulation by the Earth, so if you're thorough enough, you're bound to find something," says Alan Fitzsimmons at Queen's University Belfast in the UK, who wasn't involved with this work.

However, Loeb says that they only found these spherules in the area under where the explosion is thought to have happened, not in the other spots they visited as controls.

He also claims to have found strange compositions upon preliminary analysis.

"The composition didn't look like anything that is Earth-like – I will not go into detail until we do the complete analysis on land, but we find composition patterns that deviate from what was reported in the past," Loeb told *New Scientist*. "Some elements are abundant that are extremely rare, and some are not present at all."

One of the elements that seems to be missing is nickel, which usually makes up between about 5 and 10 per cent of iron meteorites. That may be unusual, but it isn't enough to convince some astronomers that the spherules are interstellar.

"The allusion is that it's not like the other spherules, but we don't know that yet – and, in fact, there's a big dispersion in nickel abundance in the others, especially those in the ocean," says David Jewitt at the University of California, Los Angeles.

Loeb and his colleagues plan to do a more detailed analysis of the spherules as soon as they get back from their expedition, so there should be results within weeks.

If they show that these tiny marbles have a very different make-up to those from within the solar system, or that they are far older than the solar system, that could finally be conclusive proof that IM1 truly is interstellar – and that these are the first fragments of an interstellar rock ever recovered. ▮