BBC

A PSYCHOLOGIST'S GUIDE TO BEATING THE BURNOUT

Science Focus

MEANING OF LIFE NOT INCLUDED

How to start
STARGAZING AT HOME

Discovering the
SEASONS OF THE HUMAN BODY

Finding answers to
VACCINE SAFETY MYTHS

MYSTERIES OF THE UNIVERSE

Why are monster black holes at the heart of every galaxy?
Why is there something rather than nothing?
Where is two thirds of the Universe?
Why haven't we seen alien life?
What is dark matter?
Does time exist?

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Caenorhabditis elegans **roundworms share many characteristics of human biology, making them useful in scientific research**

BIOLOGY

Living in low gravity can alter DNA, study in worms suggests

Living for periods at low gravity may alter your DNA, according to a new study of nematode worms aboard the International Space Station (ISS).

The *Caenorhabditis elegans* worms – animals with a length of 1mm and a life expectancy of two weeks – showed alterations in an estimated 1,000 genes. While most changes were subtle, scientists noticed microgravity had a stronger effect on genes associated with the nervous and immune systems.

"These changes might help explain why the body reacts badly to spaceflight. It also gives us some therapy targets in terms of reducing these health effects, which are currently a major barrier to deep-space exploration," said the University of Exeter's Dr Timothy Etheridge, one of the lead researchers on the new project. "Our findings should provide foundations for a better understanding of spaceflight-induced health decline in mammals and, eventually, humans."

After being hatched on the ISS, the tiny worms were kept in flasks of liquid (containing food) for 4 or 10 days. They were then frozen and examined after their return to Earth using DNA microarray tools, which scan a collection of genes.

Spending long periods in microgravity has previously been shown to drastically alter the human body. Although they dedicate several hours of their day to exercise, astronauts can lose up to 40 per cent of their muscle mass after 180 days on the ISS. This is a significant problem, particularly for future exploration, as it could take a crew 10 months to reach the surface of Mars.

During the acceleration of lift-off and landing, astronauts are also briefly exposed to hypergravity – forces of gravity greater than those found in normal Earth conditions. By placing more worms in a centrifuge, the new study indicated that spending four days in gravity 15 times stronger that of Earth could alter around 1,360 genes. Similar to microgravity, genes impacting the immune system were most affected.

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Fortunately, astronauts are unlikely to spend several days in such levels of hypergravity, unless flying close to objects such as the Sun or sharply accelerating for long periods.