New exciting Shenzhou-20 Scientific Experiments.

The Shenzhou-20 mission, launched on April 24, 2025, is conducting a series of groundbreaking scientific experiments aboard China's Tiangong Space Station. The crew, consisting of astronauts Chen Dong, Chen Zhongrui, and Wang Jie, is focusing on life sciences, microgravity physics, and space technology, with several innovative studies underway. Below is a detailed overview of the key experiments:

1. Life Science Experiments

(a) *Zebrafish Study on Protein Homeostasis*

Objective: Investigate how microgravity affects protein homeostasis in higher vertebrates, particularly its role in bone loss and cardiovascular dysfunction—critical challenges for long-duration spaceflight.

Method: Builds on the zebrafish–Elodea (hornwort) ecosystem established during the Shenzhou-18 mission. The study monitors zebrafish in a controlled aquatic environment, tracking physiological changes under weightlessness.

Progress: Initial data shows the zebrafish and their habitat are in good condition, with key parameters (oxygen, temperature, pressure) stable.

(b) *Planarian Regeneration Experiment*

Significance: China's first space-based study on planarian (flatworm) regeneration, leveraging their ability to regrow organs, including brains.

Focus: Examines how microgravity and radiation impact regeneration of head, middle, and tail segments. Findings may aid in treating space-related injuries and aging-related degeneration on Earth.

Status: Planarians are observed in a "relaxed state," and the experiment is progressing as planned.

(c) Streptomyces Research

Goal: Study how space conditions alter the expression of bioactive compounds and enzymes in Streptomyces bacteria, which are vital for soil health and plant growth.

Applications: Could support future space agriculture and microbial technologies for extraterrestrial habitats (e.g., Mars).

Update: Microscopic imaging and sample calibration are complete, with the bacteria in good condition.

2. Cytology (Cell Science) Experiments

The mission includes pioneering cell biology studies, such as:

Thrombosis Mechanisms: Co-culturing cardiac muscle cells and endothelial cells to observe microgravity's impact on blood clot formation.

Brain Organoid Research: First-ever tri-brain-region organoid (cortex, thalamus, cerebellum) to study neural interactions under weightlessness.

Traditional Medicine Trials: Testing classical herbal formulas to assess their effects on memory improvement in space.

3. **Additional Experiments**
The crew is also conducting 59 other projects, including:

Microgravity Physics:
> Soft Matter Dynamics: Studying non-equilibrium behaviors of colloids and fluids 16.
> High-Temperature Superconductors: Fabricating advanced materials in space 46.

Space Technology Tests:
> Vascularized Brain Organoid Chips: Cultivating 3D artificial neural tissues for medical research.
> Space Debris Protection: Installing shielding devices on the station's modules.

4. Mission Progress & Updates (Status June 2025)
The crew completed handover procedures with Shenzhou-19 and began experiments within days of arrival.
Extravehicular activities (EVAs) were performed in May 2025, including equipment maintenance, and regular health checks (ECG, ultrasounds, lung function tests) ensure crew well-being.
Scientific breakthroughs are expected in areas such as the cultivation of brain-like mini-organisms (organoids) with blood vessels, the investigation of non-equilibrium dynamic processes in soft matter, and the production of high-temperature superconductors in space. [1]

References

[1]. China Rundschau (www.chinarundschau.com)
2. Chat DeepSeek https://chat.deepseek.com