BIOMEDICINE

India pushes for animal alternatives in research

Technologies that model human disease are fast improving.

GAYATHRI VAIDYANATHAN

India has become the latest nation to explore using emerging technologies such as organs-on-a-chip to replace animals in research. Last month, the national regulator for biomedical research recommended fast-tracking investments in technologies that can replace animals. Some Indian scientists have welcomed the plan, but they say that alternatives for drug toxicity and efficacy tests are not yet sufficient to replace animals.

They also note that a move towards alternative technologies will require a costly overhaul of the drug-approval process in India, which requires medicines to be tested in animals.

Emerging technologies that model complex human physiology — such as organoids and organs-on-a-chip, which are laboratory-grown versions of human tissues — are starting to rival, and in some cases outperform, animals in their ability to model human disease, according to the Indian Council of Medical Research (ICMR).

In a discussion paper (S. Swaminathan, V. Kumar & R. Kaul *Indian J. Med. Res.* **149**, 584–592; 2019), a team representing the ICMR that includes Soumya Swaminathan, the council's former director-general and now deputy director-general at the World Health Organization, argue that such technologies, and others including computer models that simulate drug toxicity, are more cost-effective and humane than animal testing. They are calling for the government to establish centres of excellence for developing such approaches, and to increase funding and collaborations for alternative technologies.

The United Kingdom and the United States have road maps for developing non-animal technologies, and in September the US Environmental Protection Agency stated plans to limit the use of animals in toxicity tests.

The paper notes that after two decades of drug-discovery research using animals, India has not developed a single new drug that has made it to market. This is because molecules that were safe and efficacious in animals were later found to be toxic or ineffective in humans, says Swaminathan.

Some researchers,including Thomas Hartung, director of the Center for Alternatives to Animal Testing at Johns Hopkins University in Baltimore, Maryland, say there are technologies that provide reliable ways of testing for toxicity. He has developed an algorithm that has successfully predicted the toxicity of tens of thousands of chemicals in human tissue — and in some cases has outperformed animal tests in terms of reliability.

But Addicam Jagannadha Rao, an emeritus biochemist at the Indian Institute of Science in Bengaluru, says that studying disease or toxicity in a dish does not show how drugs are metabolized in the whole body. "I am for the judicious use of animals," says Rao.

Amit Misra, a pharmacokinetics researcher at the Central Drug Research Institute in Lucknow, India, acknowledges that animal toxicity studies do not always translate well in humans. But he doesn't think organs-on-a-chip or disease-in-a-dish models will be any better. Instead, he thinks toxicity studies in a small number of consenting patients should replace animal studies. ■

ASTRONOMY

China's gigantic telescope opens to the world

Astronomers around the globe can use data from the super-sensitive radio telescope.

BY ELIZABETH GIBNEY

The world's largest single-dish radio observatory is preparing to open to astronomers around the world, ushering in an era of exquisitely sensitive observations that could help to hunt for gravitational waves and probe the mysterious fleeting blasts of radiation known as fast radio bursts (FRBs).

The Five-hundred-meter Aperture Spherical Radio Telescope (FAST) in southern China has just passed a series of technical and performance assessments, and the Chinese government is expected to give the observatory the final green light to begin full operations at a review meeting scheduled for this month. "We do not see any roadblocks for the remaining transition," says Di Li, the chief scientist of FAST. "I feel both excited and relieved."

The complex project has not been without challenges — it has a radical design and initially struggled to attract staff, in part because of its remote location. But the pay off for science will be immense. FAST will collect radio waves from an area twice the size of the next-largest single-dish telescope, the Arecibo Observatory in Puerto Rico.

The Chinese observatory's massive size means that it can detect extremely faint radio waves from sources across the Universe, such as the spinning cores of dead stars, known as pulsars, and hydrogen in distant galaxies. It will also explore a frontier in radioastronomy — the use of radio waves to locate exoplanets, which might harbour extraterrestrial life.

Since testing began in 2016, only Chinese scientists have been able to lead projects studying the telescope's preliminary data. But now, observation time will be accessible to researchers from around the world, says Zhiqiang Shen, director of the Shanghai Astronomical Observatory and co-chair of the Chinese Academy of Sciences' FAST supervisory committee.

"I'm super excited to be able to use the telescope," says Maura McLaughlin, a radio-astronomer at West Virginia University in Morgantown, who wants to use FAST to study pulsars that are too faint to see with current telescopes, including those in galaxies outside the Milky Way.

During the testing phase, the telescope discovered more than 100 pulsars.

EYE IN THE SKY

The 1.2-billion-yuan (US$171-million) telescope, also known as Tianyan or 'Eye of Heaven', took half a decade to build in