Soccer rivals ally over biotech

Argentina, Brazil and Uruguay have set aside their sports rivalry and joined forces to ramp up biotech expertise across Latin America. In December 2020, the three neighboring nations formed the Latin American Center of Biotechnology (CABBIO).

CABBIO aims to facilitate South America's economic recovery after the COVID-19 pandemic by building its biotech capabilities and funding projects. To receive CABBIO support, biotech projects must be developed jointly by member countries. In 1986 Argentina and Brazil formed the first official alliance, with Uruguay entering as an informal participant in 2011. With Uruguay now becoming a full member, all South American nations are being encouraged to join.

CABBIO has financed 140 trinational scientific and biotech projects since its inception. The projects span microbiology/genetics (22%), plant biotech (22%) and industrial development (13%). Now, in response to COVID-19, CABBIO will apportion a larger fraction to antiviral medicine.

CABBIO also sponsors educational exchanges, courses and joint projects, which already engage countries across the continent. The organization has so far taught over 490 courses and trained over 6,500 Brazilian, Argentinian and other Latin American scientists and entrepreneurs.

Books and other publications from CABBIO's courses are produced in Spanish and Portuguese, and serve to document and spread biotech information in Latin America. Some of CABBIO's publications are being adopted in graduate courses across the continent.

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If Astellas and Iota are successful with NeuralDust-like implants, even in the peripheral nervous system, it would move the BMI field forward, says Shenoy. The hope is that in the next few years one of these technologies gains US Food and Drug Administration approval.

BCIs include cortical implants, such as the ones used in research, which are positioned close enough to brain tissue to capture signals from groups of individual neurons. Another type of interface—less invasive, but also less precise—is the electrocorticography (ECoG) grid system that reads the average signal from a larger number (hundreds to thousands) of neurons. Clinicians temporarily place these on the surface of the brain under the dura to identify where seizures might originate, and researchers collect brain data by testing those patients. The invasive BCI field remains far from commercial prime time compared with external neurostimulatory devices, such as cochlear implants and Bioness's spinal cord stimulator, or wearables such as the wristwatch-based surface electromyography device from Facebook and CTR-Labs. But interest is growing in devices that can read brain or muscle neural signals when placed outside the body.

The only FDA-approved cortical implant is the Utah grid, formally known as the NeuroPort Array, from Blackrock Microsystems. The 4-millimeter-square chip with 100 tiny electrode protrusions is implanted into the surface of the brain and records from neurons 1.5 millimeters deep. It is sold for research use only, but can be used in clinical trials under an Investigational Device Exemption.

Researchers have used Utah Grid implants to enable people to control prosthetic robotic arms in three dimensions, pick up objects, and even feel those objects through sensors that measure force and then stimulate the brain, says Shenoy. By adding tiny electrodes implanted in the muscles, these implants can control paralyzed limbs, he says.

Two companies, Neuralink and Paradromics, are working on cortical implants for the commercial market. Neuralink, funded by entrepreneur Elon Musk's deep pockets, is aiming to put multiple electrodes along single wires to record at different depths so that more information can be collected from each probe. DARPA-funded Paradromics is working on a cortical implant that has 1,600 platinum–iridium microwires and onboard signal processing to compress the data it sends, says Angle. The company is aiming for a human feasibility study in the next three years, he adds.

> A system that records anywhere in the body "potentially opens up the number of applications for this technology."

Another company, Synchron (formerly the startup SmartStent) is taking a different approach: threading a stent that contains electrodes through the body's circulatory system into the fine vessels that feed the target neurons. The question with this technology is how practical it is to safely use the circulatory system to position the arrays, says Shenoy.

As the field of neural interface devices continues making progress in demonstrating clinical outcomes and technology continues to develop, Gilja thinks corporate interest will continue to grow. For now, Iota's path from academia to acquisition is a measure of success. "I am confident that other companies will follow," he says. ❐

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