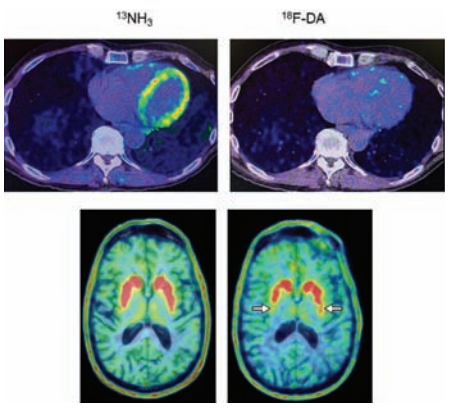
Trends & Technology

Trends

Norepinephrine deficiencies could reveal likelihood of Parkinson's and Lewy body dementia

In a recent National Institutes of Health (NIH) study, researchers utilized positron emission tomography (PET) scans of the heart to identify individuals at risk of developing Parkinson's disease or Lewy body dementia. Scientists at the National Institute of Neurological Disorders and Stroke conducted the trial over approximately seven years and focused on 34 people with Parkinson's risk factors. PET scans assessed levels of the neurotransmitter norepinephrine, which is derived from dopamine, a substance deficient in the brains of those with Parkinson's. The study revealed that individuals with preclinical Lewy body diseases exhibited cardiac abnormalities before the onset of visible motor symptoms. These findings suggest that PET scans of the heart could serve as a valuable tool for detecting the preclinical stages of these neurodegenerative diseases. The study's scans successfully distinguished individuals who later developed Parkinson's or Lewy body dementia. Notably, low 18F-dopamine-derived radioactivity in the heart was associated with a significantly higher likelihood of future diagnoses. Early identification may enable testing of preventative interventions, including lifestyle modifications, dietary supplements, or medications, potentially prolonging the time before symptomatic manifestation and providing a window for intervention.

Source: **asamonitor.pub/47HwjKC**



Heart and brain PET scans from a study participant who developed Parkinson's disease support a "body first" progression. The top pair of PET scans show low 18F-dopamine-derived radioactivity in the heart (right) and a normal 13N-ammonia PET scan (left), which preceded a loss of dopamine-producing neurons and symptom onset. Photo credit: Goldstein lab, NINDS.

Vaccine approval for chikungunya virus

The U.S. Food and Drug Administration (FDA) has granted approval to Ixchiq, marking the first vaccine for chikungunya virus. Designed for individuals aged 18 and older at an elevated risk of chikungunya virus exposure, the vaccine addresses an emerging global health threat with over 5 million reported cases in the past 15 years. Chikungunya, primarily transmitted by infected mosquitoes, poses a significant risk in tropical and subtropical regions globally. The safety of Ixchiq, administered as a single-dose injection into the muscle, was assessed in two clinical studies involving over 3,500 participants, with common side effects including headache, fatigue, and joint pain. Ixchiq's approval is based on immune response data, with almost all vaccine recipients achieving the protective antibody level. The Accelerated Approval pathway was utilized, allowing approval based on evidence of effectiveness predicting clinical benefit. Confirmatory clinical studies are required as a condition for approval. Severe chikungunya-like adverse reactions occurred in 1.6% of Ixchiq recipients. Due to the serious risk of severe chikungunya-like adverse reactions, the FDA is mandating a postmarketing study. Additionally, the vaccine's potential transmission from pregnant individuals to newborns is a consideration, and health care providers are advised to assess individual risk factors.

Source: **asamonitor.pub/3GtRIRa**

Severity of tuberculosis in patients with type 2 diabetes

A collaborative study between A*STAR Infectious Diseases Labs and the University of Massachusetts Chan Medical School reveals that elevated glycerol levels contribute to increased severity of tuberculosis (TB) in experimental models with type 2 diabetes. TB caused 1.3 million deaths globally in 2022. Type 2 diabetes is associated with higher mortality rates due to TB, and patients with type 2 diabetes have a higher chance of TB relapse after treatment. The study found that type 2 diabetes led to more bacteria, tissue damage, and deaths when infected with Mycobacterium tuberculosis (Mtb), the pathogen causing TB. Elevated blood glycerol emerged as a crucial factor in the TB-type 2 diabetes interaction. Blocking Mtb's ability to use glycerol for metabolism decreased lung damage severity, indicating that Mtb utilizes glycerol to drive TB disease severity in type 2 diabetes. This could pave the way for developing innovative therapeutics targeting elevated glycerol in TB patients with type 2 diabetes, addressing their heightened susceptibility to TB, particularly in the face of increasing drug resistance. The study identifies Mtb's glycerol kinase as a potential TB drug development target.

Source: **asamonitor.pub/46DNP1e**

Technology

Microscopic robots heal neural tissue

Researchers at Tufts University and Harvard University's Wyss Institute have developed microscopic biological robots, called Anthrobots, from human tracheal cells. These robots, ranging from the width of a human hair to the point of a sharpened pencil, are created to self-assemble and have demonstrated a healing effect on other cells. In the current study, the Anthrobots were constructed from adult human cells without any genetic modification. The researchers envision using patient-derived biobots as therapeutic tools for regeneration, healing, and disease treatment. The

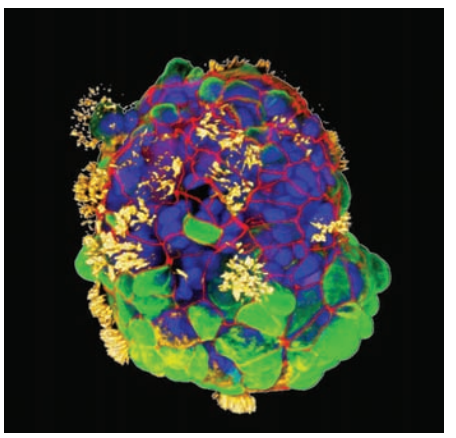


Photo courtesy of Gizem Gumuskaya, Tufts University.

Anthrobots, made from cells on the surface of the trachea, are covered with cilia. The study demonstrated different shapes and types of movement, showcasing their potential in diverse applications. Anthrobots don't require shaping with tweezers or scalpels, and they can be made from adult cells, making them fully scalable. The researchers suggest that swarms of these bots could be produced in parallel, offering a promising start for developing therapeutic tools. The study also explored Anthrobots' ability to heal wounds, with the bots triggering substantial regrowth of neurons in a lab dish. While the exact mechanism is not yet clear, the unmodified Anthrobots demonstrated efficient healing of live neural tissue. This breakthrough could lead to various applications, such as clearing plaque buildup in arteries, repairing spinal cord or retinal nerve damage, recognizing bacteria or cancer cells, and delivering drugs to targeted tissues.

Source: **asamonitor.pub/4a30GNn**

Microarray patch for Zika virus

Researchers are developing a needle-free vaccine patch to protect against the Zika virus. The prototype utilizes the University of Queensland's high-density microarray patch (HD-MAP), delivering a vaccine developed by the University of Adelaide and generating an effective immune response in mice. The HD-MAP is described as a pain-free, simple-to-apply, and easy-to-store vaccination method, delivering the vaccine to immune cells beneath the skin's surface with microprojections. In preclinical trials, the vaccine provided rapid protection against live Zika virus, targeting a crucial protein called NS1. The vaccine's unique targeting of the NS1 protein inside the virus minimizes the risk of enhancing symptoms in people vaccinated against closely related viruses like dengue fever. Targeting a protein crucial to the replication of flaviviruses, the approach has the potential to extend to other flaviviruses like dengue or Japanese encephalitis. The vaccine patch evoked T-cell responses about 270% higher than traditional needle or syringe delivery methods. The HD-MAP platform also offers vaccine stability at elevated temperatures, retaining potency even when stored at 40° Celsius for up to four weeks. This is significant for vaccine distribution in low- and middle-income countries where refrigeration may be a challenge. ■

Source: **asamonitor.pub/3Gynrek**

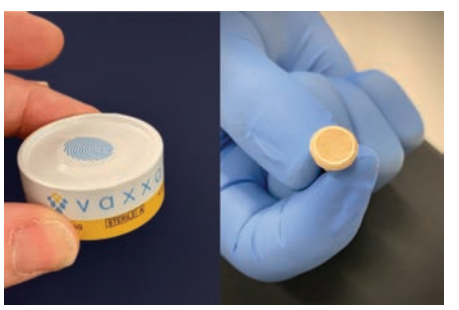


Photo courtesy of University of Queensland.