Walks in the Gardens of Science Briefing

27 August 2022

Implant to Localise Drug Delivery in the Fight Against Pancreatic Cancer

Celine Raphael, H3
Source: MIT News
Link: https://news.mit.edu/2016/implantable-device-targets-pancreatic-cancer-0414

Only 11% of the patients diagnosed with pancreatic cancer will survive beyond 5 years compared to breast cancer which has a survival rate of more than 90%.
Researchers at MIT and the Massachusetts General hospital have made localised drug delivery a reality. They embedded the drugs into an implant which is a transparent, thin, polymer film that can be rolled up and inserted via a catheter. Once the film reaches the pancreatic tumour, it unfolds and wraps the tumour. The drugs embedded in the film are then released from its tumour-facing side only, which reduces systemic toxicity. The implant also physically prevents the metastasis of the tumour and is biodegradable, so it starts dissolving once implanted in the body.
In pre clinical studies the researchers demonstrated that this localised drug delivery is able to improve, by upto 12 times the response to treatment of pancreatic cancer.

Wearable bioadhesive ultrasounds

Vedant Shekhar Jha, F3
Source: MIT News
Link: https://news.mit.edu/2022/ultrasound-stickers-0728

MIT engineers have developed a wearable, ultrasound sticker — a stamp-sized device that sticks to skin and can provide continuous ultrasound imaging of internal organs for 48 hours. The researchers aim to make this technology wireless and also integrate AI algorithms in the future which could revolutionise imaging technology and open new avenues in developing accessible, and sustainable technologies.

Slime Mould grows just like Tokyo railway system

Yash Vashishth, H3
Source: Wired.com
Link: https://www.wired.com/2010/01/slime-mold-grows-network-just-like-tokyo-rail-system/

Talented and dedicated engineers spent countless hours designing Japan's rail system to be one of the world's most efficient. Could have just asked a slime mold.When presented with oat flakes arranged in the pattern of Japanese cities around Tokyo, brainless, single-celled slime moulds construct networks of nutrient-channelling tubes that are strikingly similar to the layout of the Japanese rail system. A new model based on the simple rules of the slime mould's behaviour may lead to the design of more efficient, adaptable networks, the team contends.

Treatment of human liver diseases using cells grown outside in laboratories

Roopika Rama Lakshmi Peela, H3

Link- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5479436/

NIHR national institute for health and care research -supported researchers have shown that a new technique to grow 'mini bile ducts' in a lab can be used to repair damaged human donor livers. In the future this new technique could potentially help treat patients whose own livers are not functioning correctly.

NIHR Cambridge Biomedical Research institute grew cholangiocytes from the gallbladder using a technology known as 'organoids' – small groups of cells that mimic the organ's function – in the lab. And using the perfusion system, the researchers injected these organoids into a damaged donor liver.

This is the first time that a procedure of this kind has been used on human donor organs. It could also increase the number of livers that are considered suitable for organ transplantation and ultimately save more lives.

The research provides a proof-of-principle for the development of new cell-based therapies and this approach could be applied to a range of organs and diseases to accelerate more cell-based therapy research.

How Halicin was discovered

S.Kishore, H3

Link- https://news.mit.edu/2020/artificial-intelligence-identifies-new-antibiotic-0220

Using a machine-learning algorithm, MIT researchers have identified a powerful new antibiotic compound.
The computer model, which can screen more than a hundred million chemical compounds in a matter of days, is designed to pick out potential antibiotics that kill bacteria using different mechanisms than those of existing drugs.
The researchers tested it against dozens of bacterial strains isolated from patients and grown in lab dishes, and found that it was able to kill many that are resistant to treatment, including Clostridium difficile, Acinetobacter baumannii, and Mycobacterium tuberculosis.
"When you're dealing with a molecule that is likely associated with membrane components, a cell can't necessarily acquire a single mutation or a couple of mutations to change the chemistry of the outer membrane.
In this study, the researchers found that E. coli did not develop any resistance to halicin during a 30-day treatment