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European Biomedical Research Association

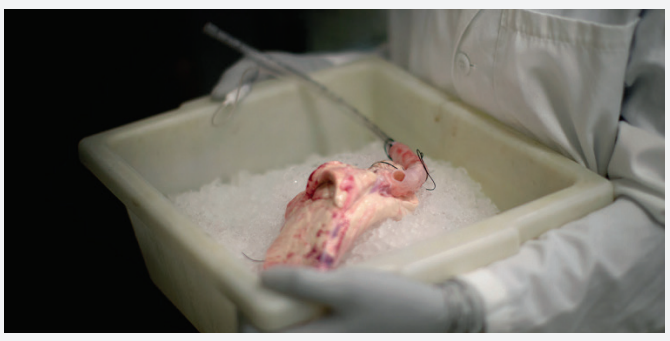
Presidente: Prof. Filippo Drago

Bollettino d'informazione scientifica

NEWS | NATURE

New life for pig-to-human transplants

Gene-editing technologies have breathed life into the languishing field of xeno transplantation.



Pale on its bed of crushed ice, the lung looks like offal from a butcher's counter. Just six hours ago, surgeons at the University of Maryland's medical school in Baltimore removed it from a hefty adult pig and, with any luck, it will soon be coaxed back to life, turning a rich red and resuming its work in the chest of a six-year-old baboon.

An assistant brings the lung to Lars Burdorf and his fellow surgeons, who currently have their hands in the baboon's splayed chest. The team then begins the painstaking process of connecting the organ to the baboon's windpipe and stitching together the appropriate arteries and blood vessels. But this 5-hour, US$50,000 operation is just one data point in a much longer experiment — one that involves dozens of labs and decades of immunological research and genetic engineering to produce a steady and safe source of organs for human transplantation. If the baboon's immune system tolerates this replacement lung, it will be a sign that the team is on the right track. Robin Pierson heads the Maryland lab, which has performed about 50 pig-to-primate transplants like this one to test different combinations of genetic modifications in the pig and immune-suppressing drugs in the primate.

Even so, the team has not had a primate survive for longer than a few days. The complexities of the immune system and the possibility of infection by pig viruses are formidable and drove large companies out of the field in the early 2000s.

That trend may now be reversing, thanks to improved immunosuppressant drugs and advances in genome-editing technologies such as CRISPR/Cas9. These techniques allow scientists to edit pig genes, which could cause rejection or infection, much more quickly and accurately than has been possible in the past. In October, eGenesis, a life-sciences company in Boston, Massachusetts, announced that it had edited the pig genome in 62 places at once.

Some researchers now expect to see human trials with solid organs such as kidneys from genetically modified pigs within the next few years (see 'Choice cuts'). United Therapeutics, a biotechnology company in Silver Spring, Maryland, has spent $100 million in the past year to speed up the process of making transgenic pigs for lung transplants — the first major industry investment in more than a decade.

It says that it wants pig lungs in clinical trials by 2020. But others think that the timeline is unrealistic, not least because regulators are uneasy about safety and the risk of pig organs transmitting diseases to immunosuppressed humans.

"I think we're getting closer, in terms of science," says transplant surgeon Jeremy Chapman of the University of Sydney's Westmead Hospital in Australia. "But I'm not yet convinced we've surpassed all the critical issues that are ahead of us. Xenotransplantation has had a long enduring reality that every time we knock down a barrier, there's another one just a few steps on."

RESEARCH | HIGHLIGHT

Science. 2015 Oct 16;350(6258):313-6. doi: 10.1126/science.aaa9306.

A skin-inspired organic digital mechanoreceptor.

Tee BC., Chortos A., Berndt A., Nguyen AK., Tom A., McGuire A., Lin ZC., Tien K., Bae WG., Wang H., Mei P., Chou HH., Cui B., Deisseroth K., Ng TN., Bao Z..

Abstract

Human skin relies on cutaneous receptors that output digital signals for tactile sensing in which the intensity of stimulation is converted to a series of voltage pulses. We present a power-efficient skin-inspired mechanoreceptor with a flexible organic transistor circuit that transduces pressure into digital frequency signals directly. The output frequency ranges between 0 and 200 hertz, with a sublinear response to increasing force stimuli that mimics slow-adapting skin mechanoreceptors. The output of the sensors was further used to stimulate optogenetically engineered mouse somatosensory neurons of mouse cortex in vitro, achieving stimulated pulses in accordance with pressure levels.

This work represents a step toward the design and use of large-area organic electronic skins with neural-integrated touch feedback for replacement limbs.

NEWS

WHO multi-country survey reveals widespreapublic misunderstanding about antibiotic resistance

Estratto dal sito della World Health Organization - News releases

16 NOVEMBER 2015 ¦ GENEVA - As WHO ramps up its fight against antibiotic resistance, a new multi-country survey shows people are confused about this major threat to public health and do not understand how to prevent it from growing.

Antibiotic resistance happens when bacteria change and become resistant to the antibiotics used to treat the infections they cause. Over-use and misuse of antibiotics increase the development of resistant bacteria, and this survey points out some of the practices, gaps in understanding and misconceptions which contribute to this phenomenon.

Almost two thirds (64%) of some 10 000 people who were surveyed across 12 countries say they know antibiotic resistance is an issue that could affect them and their families, but how it affects them and what they can do to address it are not well understood. For example, 64% of respondents believe antibiotics can be used to treat colds and flu, despite the fact that antibiotics have no impact on viruses. Close to one third (32%) of people surveyed believe they should stop taking antibiotics when they feel better, rather than completing the prescribed course of treatment.

http://who.int/mediacentre/news/releases/2015/antibiotic-resistance/en/

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A cura di:

GIAN MARCO LEGGIO, PHD

SALVATORE SALOMONE, MD

FILIPPO CARACI, MD

CLAUDIO BUCOLO, PHD

DARIO MOLINO (WEBMASTER)