



人體試換豬腎 異種移植大突破

Successful pig kidney transplant in human makes breakthrough in xenotransplantation

原文

下文摘錄自香港《文匯報》10月21日：

將動物器官移植至人體一直是醫學界的重點研究方向，美國紐約市 (New York City) 一間醫院上月試驗將一頭經基因改造 (genetically modified) 豬隻的腎臟 (kidney)，移植至一名腦死亡 (brain-dead) 病人身上，該名病人接受手術後，免疫系統 (immune system) 並未出現即時排斥反應，是全球首次成功試驗將豬腎移植人體。雖然試驗只維持了3天，仍被視為異種移植 (xenotransplantation) 的一大突破，有望紓緩可供移植器官短缺問題。

此次試驗由紐約大學朗格尼醫院 (New York University Langone Health Medical Centre) 進行，該名腦死亡病人此前出現腎功能衰竭症狀，家屬同意在撤除維生儀器前，讓病人接受試驗。醫生將一頭基因改造豬隻的腎臟，接上移植者的血管，並放在體外觀察3天。領導今次試驗的該院移植研究所所長蒙哥馬利 (Robert Montgomery) 表示，在連接血管後，豬腎立刻開始運作，過濾血液中的雜質和製造尿液 (urine)，並且沒有出現排斥 (rejection) 反應，豬腎產生的尿液量，跟移植人類腎臟所預期的尿液量一樣，病人原本因腎功能衰退導致肌酸酐 (creatinine) 水平異常，在手術後也恢復正常水平。

人體接受器官移植後產生排斥反應，是將動物器官移植到人體面對的最大困難。蒙哥馬利團隊此次使用由美國醫療公司 Revivicor

培育的「GalSafe」基因改造豬隻，這些豬隻經基因改造後，組織中不再含有生產可引起排斥反應聚糖分子 (glycan molecule) 的基因 (gene)，因此移植者的免疫系統沒有對「GalSafe」的豬腎出現即時排斥反應。

美國每年有近10.7萬人等候器官移植，當中超過9萬人等候移植腎臟，腎臟移植平均等候時間達3年至5年，平均每天都有12人因未能等到合適的腎源而死亡。過去專家亦曾進行異種移植試驗，包括在1960年代將黑猩猩 (chimpanzee) 腎臟移植至人體，但大部分移植者都在接受手術不久後死亡；1983年也有一名女嬰接受狒狒 (baboon) 心臟 (heart) 移植，但也在20天後死亡。

分析指出，若要將動物器官移植至人體，豬隻會較靈長類動物 (primate) 更合適，原因是豬隻原本便是人類食用的動物，因此較少出現道德爭議。此外，豬隻較易養殖，繁殖速度 (reproductive rate) 快，器官也與人類的相似，加上已有將豬隻心臟瓣膜 (heart valve) 和皮膚 (skin) 移植至人體的案例，有專家相信此次試驗成功，為其他器官移植鋪路。蒙哥馬利表示，此類基因改造豬隻也許能成為一個可持續的 (sustainable) 移植器官來源。

美國食品及藥物管理局 (U.S. Food and Drug Administration) (FDA) 去年12月已批准將「GalSafe」豬隻用於食用和醫療方面，但從豬隻身上開發的醫藥產品在用於人類之前，仍需取得 FDA 的特別批准 (special approval)。



● 美國成功試驗將豬腎移植人體。圖為醫生檢查豬腎的情況。

資料圖片

Q&A

- 異種移植最早可追溯至哪年？
- 承上題，全球首宗異種移植手術是由哪位醫生進行？
- 相對於異種移植，同種器官移植的英語是？
- 本港已登記捐贈器官的人數目前約有多少？
- 本港最先進行器官移植的人體組織是什麼？

ANSWER

1. 1906年 2. 法國外科醫生 Alexis Carrel 3. Allograft 4. 遺傳 5. 跟母體 (Cormeae)

譯文

Transplanting animal organs into humans has always been a research priority in the medical community. A medical centre in the U.S. New York City tried transplanting a genetically modified pig's kidney into a brain-dead patient last month without triggering immediate rejection of the recipient's immune system, making it the first successful surgery in the world for pig kidney transplant in a human. Although the organ was attached for only 3 days, it is considered a breakthrough in xenotransplantation, hoping to alleviate the shortage of human organs for transplant.

The experiment was carried out at the New York University Langone Health Medical Centre. The recipient was a brain-dead female patient with signs of kidney dysfunction, whose family had given consent to the surgery before she was due to be taken off of life support. The new kidney was attached to her blood vessels and maintained outside her body for 3 days. Dr. Robert Montgomery, director of the Transplant Institute at the centre who led the study, said that the pig kidney functioned normally after connecting with the blood vessels, filtering impurities in the blood and producing urine without evidence of rejection. While the expected amount of urine made by the pig

kidney was comparable to that of a transplanted human kidney, and the recipient's abnormal creatinine level due to kidney dysfunction also returned to normal after the operation.

Rejection is the biggest difficulty facing animal organ transplants into the human body. The genetically altered pig dubbed "GalSafe" used by Montgomery's team this time was developed by the U.S. medical company Revivicor, whose tissues no longer contain genes that produce glycan molecules leading to immediate rejection, therefore, rejection to the GalSafe kidney by the recipient's immune system has been prevented.

In the U.S., nearly 107,000 people

are presently waiting for organ transplants, including more than 90,000 awaiting a kidney, with average waiting time from 3 to 5 years. Sadly, 12 die every day while waiting. Experts had also performed xenotransplantation in the past, including transplanting chimpanzee kidneys into humans in the 1960s, but most recipients died shortly after the operation. In 1983, an infant girl also died 20 days after a baboon heart was transplanted into her body.

According to analysis, for live-saving transplants using animal organs, pigs have advantages over primates because they are produced for food, so using them for organs would raise fewer ethical concerns. Besides, they are easier to

breed, have a high reproductive rate and organs comparable to humans, coupled with the previous cases of transplanting pig heart valves and skin into humans, making experts believe that the successful surgery this time would help pave the way for other organ transplants. Montgomery also told that such genetically engineered pigs could potentially be a sustainable source of organs.

The U.S. Food and Drug Administration approved the use of GalSafe pigs for food and medical purposes in December last year, but medical products developed from the pigs would still require specific FDA approval before being used in humans.

恒大英萃

隔星期一見報

科學與文明墮落的勾連，以及現代人對自然的浪漫想像這兩大命題，反覆出現於不少現當代西方科幻及推想小說。觀乎近年的推想文學，對科學則有更多角度的思考，如曾獲普立茲獎的理查德·鮑爾斯 (Richard Powers) 剛出版的《困惑》 (Bewilderment, 2021)，雖繼承了西方浪漫主義傳統，流露着對自然穹蒼的嚮往，但同時帶出人在宇宙的渺小，一方面批判資本主義政治對科學研究的蔑視，另一方面藉主角透過科技借助逝去妻子的情感圖譜去治療患有亞氏保加症的兒子，探討科學與生命及情感的關係，突破了科學即理性對立於自然與感性的舊有思維。

反思科學自然對立

而兩位推想小說界新星、華裔英語作家劉宇昆及姜峯楠的創作，則更早地為反思科學與自然、人與物、主體與客體的二元對立，提供了新的線索。今次先談談劉宇昆。

劉宇昆因英譯劉慈欣的《三體》等暢銷中文科幻小說而開始為人所認識。與姜峯楠一樣作為曾獲英文科幻文學雨果獎和星雲獎的得主，劉宇昆的推想短篇不少都寫得十分出色。收錄於他首部短篇小說集的《好獵》 ("Good Hunting", 2012) 被改編為 Netflix 的奇情動畫系列《愛、死亡與機械人》 (Love, Death & Robots, 2019) 中的一個故事。

原著起首有着聊齋的氛圍，講述男主角自小隨父斬

科幻小說奇情 改造機械狐女

殺狐妖，但對狐妖的遺孤有着惻隱之情。及後父親去世，男主角離鄉赴現代化的香港打工，成為維修山頂纜車的技工，重遇困於人形的狐女，但狐女此時已淪為蘇絲黃般的妓女。

不過比蘇絲黃不幸，包養狐女的洋人將她變成半人半機械的浪慾工具。最後男主角利用一己機械知識，將狐女改造為機械狐，讓她以另一方式做回自己。

改編變成復仇結局

改編將原著詮釋為批判殖民主義和富女性主義色彩的寓言，以狐女復仇洋男作結，錯過了原著的重要命題——現代科技有被濫用的惡，但也有着能轉化的善，或能與人情、自然結合昇華。

原著沒有復仇的結局，而是以男主角目送機械狐返歸自然作結，故事設置於港英時期的香港，帶有魔幻現實主義的色彩。

狐女是文學中典型的他者，既是父權社會的受壓迫者，也是次人類一等的動物，更被進一步物化，淪為半機械人。

有別於改編以他者復仇作結，在性別議題上，原著似乎更想引導讀者去思考在傳統 (男主角父親) 及現代 (香港洋男人) 的父權底下，男主角不一定會成為其中一方的共謀者。

藉着狐女這角色，作者對現代科技文明作出另類的反思——狐女淪為半人半金屬的妓女後，不能回到過去，將來亦前路茫茫，男主角竟用最違反自然的方法透過科技助狐女重拾本性，復返自然。

人與獸與機器的分野，科技與自然的對立，男女的性別角力，都在原著故事的結尾消融瓦解了。

趣談英語

逢星期一見報



LearnEnglish Teens

Reading skills practice: A train timetable

1. Check your understanding: true or false

Circle True or False for these sentences.

- The ticket is for trains to Oxford. True False
- All trains leave from platform 1. True False
- The first train leaves Oxford at 10:43. True False
- The 10:43 train from Oxford takes 58 minutes to get to London. True False
- You don't have to change trains if you take the 11:01 train. True False
- The 11:16 train from Oxford arrives in London on platform 3. True False
- The ticket is for a single journey only. True False
- With this ticket you can go to any station in London. True False

UK TRAINS mini-timetable					
Departure	From	To	Arrival	Duration	Charger
10:43	Oxford Platform 1	London Paddington Platform 11	11:54	1h 11m	1
11:01	Oxford Platform 1	London Paddington Platform 2	11:59	58m	0
11:07	Oxford Platform 1	London Paddington Platform 3	12:14	1h 07m	1
11:16	Oxford Platform 1	London Paddington (PAD) Platform 4	12:23	1h 07m	1

UK TRAINS		CLASS		TICKET TYPE		PASSENGER TYPE	
DATE	VALID	STD	RETURN	ADULT	TICKET NUMBER	PRICE	FARE
22 JULY 2012					124466 9001273		
FROM OXFORD (OXF)	##					£22.50	
TO LONDON (all stations)	##						

Discussion

How often do you take a train?

Answers 1. Check your understanding: true or false

2. True; 3. True; 4. False; 5. True; 6. False; 7. True; 8. True

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· 公民與社會 / 品德學堂
· 趣學英文

星期二

· 通識博客 / 通識中國

星期三

· 中文星級學堂
· 百科啓智

星期四

· 趣學英文

星期五

· 知史知天下