

Pig heart transplants may offer new options for patients

- 1 A team of surgeons from the University of Maryland School of Medicine(UMSOM) recently transplanted a genetically-modified pig heart into a 57-year-old male from Baltimore, Maryland on January 7th. ①The patient is doing well three days after the transplant surgery.
- 2 According to UMSOM, ②this procedure was the first time a genetically-modified animal heart replaced a human heart and was not rejected by the patient's body.
- 3 The patient David Bennett had terminal heart disease. He knew there was no guarantee the experimental surgery would work. The pig heart was "the only currently available option." He was deemed ineligible for a conventional heart transplant or an artificial heart pump after reviews of his medical records. "It was either die or do this transplant. I want to live. I know it's a shot in the dark, but it's my last choice," Bennett said before the surgery.
- 4 The practice of transplanting live organs, tissues, or cells between species is called ③xenotransplantation. Prior attempts at such transplants have failed, largely because patients' bodies rapidly rejected the animal organ. Notably, in 1984, Baby Fae, a dying infant, lived 21 days with a baboon heart.
- 5 But this time was different. The donor pig was provided by a US-based regenerative medicine company. ④Ten of its genes were altered to reduce the risk of rejection. Three genes that are responsible for rejection by human immune systems were removed from the pig, and one gene was taken out to prevent excessive pig heart tissue growth. Six human genes responsible for immune acceptance were inserted.

transplant 移植 surgeon 外科医 genetically-modified 遺伝子操作をした surgery 手術 procedure
手続き reject 拒否する terminal 末期の guarantee 保証 be deemed ~:~と思われる ineligible 資格
のない conventional 従来の shot in the dark 当てずっぽう tissue(細胞)組織 baboon マントヒヒ
regenerative 再生の gene 遺伝子 alter = change immune 免疫 insert 挿入する

Q1 下線①について: その患者の手術前の健康状態について説明しましょう。

Q2 下線②について、英文で説明しましょう。

Q3 もし下線②の手術を受けなかったとしたら、患者の David Bennett さんには、他にどんな手術を受ける選択肢がありましたか。3段落から2つ、抜き出しましょう。

Q4 What did David Bennett say before the surgery?

Q5 下線③の意味を日本語で説明しましょう。

Q6 下線③の手術が、これまで失敗してきたのは、なぜですか。

Q7 下線④とありますが、10の遺伝子はどのように操作されましたか。詳しく説明しましょう。

6 The possibility of xenotransplantation to meet the demand has long been considered, and using pig heart valves is already common. As ⑤ in structure, size and function, they have been used for a long time in order to study the anatomy of human hearts. Just like a human heart, a pig heart consists of four chambers: two atriums and two ventricles. Likewise, consistent with the structure of a human heart, it has four valves and an aorta. These similarities allow blood to flow through a pig's heart in the same way it flows through a human's heart.

7 In October 2021, New York University successfully transplanted a pig's kidney into a brain-dead person. At the time, the operation was the most advanced experiment in the field.

8 Dr. Bartley P. Griffith, one of the surgeons who performed the transplant surgery says, "I believe the transplant will offer new options to individuals in need of new organs. This surgery would bring the world one step closer to solving ⑥the organ shortage crisis." Currently 17 people die every day in the US waiting for a transplant, with more than 100,000 reportedly on the waiting list.

valve(心臓の)弁 anatomy 解剖 chamber 部屋 atrium 心房 ventricle 心室
consistent with ~: ~と調和して aorta 大動脈



Q8 下線⑤とありますが、人間の心臓と豚の心臓は何がどのように似ていますか。詳しく説明しましょう。

Q9 Last October, what kind of transplant surgery was carried out?

Q10 David Bennett さんに手術を行った Griffith 医師は、この手術についてどんな可能性を指摘していますか。

Q11 下線⑥について、詳しく説明しましょう。

★参考動画

	Man gets pig heart in world-first transplant - BBC News https://www.youtube.com/watch?v=42bwa85gIDM&t=2s BBC のニュース番組でこの移植手術について報じています (2 mins/English)
	First Ever Pig to Human Heart Transplant (Official Video) - University of Maryland Medicine メリーランド医科大学の公式動画 (5 mins/ English) https://www.youtube.com/watch?v=3VqxtG_7DIM

9 "This is significant for my dad, for the United States, for the world," said David Bennett Jr, the patient's son. "This is groundbreaking, this is a miracle. I myself have some heart issues at 37 years old, so my dad is certainly changing the future for even myself."

10 Meanwhile, on Thursday, the Washington Post reported that 34 years ago, Mr. Bennett was charged with a stabbing a young man and leaving him paralyzed. He was released from prison in 1994 after serving six years of a 10-year prison sentence.

11 In a statement, UMSOM said doctors were obligated to provide the best care for every patient, regardless of their background. "This patient came to us in dire need, and a decision was made about his transplant eligibility based solely on his medical records," the hospital said. "This patient made the extraordinary decision to undergo this groundbreaking surgery to not only potentially extend his own life but also for the future benefit of others."

groundbreaking 画期的な be charged with～:～で起訴される stab 刺す paralyzed(below the waist) 麻痺している・下半身不随の serve(刑期などを)務める prison sentence 実刑 be obligate to ～:～する義務がある regardless of ～:～に関係なく dire 差し迫った eligibility 適性 solely = only medical record 診療記録・病歴 undergo ～:(手術などを)受ける potentially 将来の実現可能性を求めて



Q12 What has David Bennett's son said about his father's surgery?

Q13 What was Mr. Bennett's charge 34 years ago?

Q14 ベネット氏に刺された被害者の家族は、「犯罪歴のある彼より、もっと助かるべき患者に心臓が提供されるべきではないか?」と述べました。これに対して、病院側はどのように回答しましたか。

Q15 UMSOM によれば、David Bennett さんはどんな目的で、この手術を受けることを決意したと言っていますか。
2つの目的を答えましょう。

Q16 Do you think we should continue to carry out the pig heart transplants? Why?

	<p>【参考記事】こちらの BBC の記事に、豚の心臓移植についての「(1) 安全面 (2) 動物の権利面 (3) 宗教的な観点」の3つの倫理的な問題が書かれています。 https://www.bbc.com/news/world-59951264</p>
	<p>【参考資料】ハーバード大学医学部のホームページより https://www.health.harvard.edu/blog/the-myth-of-the-hippocratic-oath-201511258447 ヒポクラテスの誓いの一部だと、よく勘違いされる「医者」の誓い</p> <ul style="list-style-type: none">treating all patients equally, regardless of ability to pay, social class, education, race, or suspicion of criminality

◆次の文を3回以上読んで、暗唱しましょう。

1. A team of surgeons succeeded in transplanting a genetically-modified pig heart into a 57-year-old man.
2. Prior attempts at such transplants have failed, largely because patients' bodies rapidly rejected the animal organ.
3. Pig hearts are very similar to human hearts in structure, size and function.
4. This surgery would bring the world one step closer to solving the organ shortage crisis.
5. (UMSOM says) doctors were obligated to provide the best care for every patient, regardless of their background.

(和訳)

1. ある外科医チームが、57歳の男性に、遺伝子操作をした豚の心臓を移植することに成功した。
2. 過去のそのような移植手術の試みは失敗してきた。その原因は大きくは、人間の患者の身体が動物の内臓に対して、ただちに拒絶反応を示したからである。
3. 豚の心臓は、構造・大きさ・機能が人間の心臓に非常によく似ている。
4. この手術は、臓器不足の問題の解決に向けて、世界を一步前進させるだろう。
5. 医者たちは、患者の背景（過去など）に関わらず、どんな患者に対しても最善の治療を提供することが義務付けられている。