4/9/24; The man with a pig kidney

[HALF SECOND OF SILENCE]

[BILLBOARD]

SEAN RAMESWRAM (host): In January of 2022 we brought you an episode of *Today, Explained* titled “The man with a pig heart.”

<CLIP> OPERATION AMBI UP

KELLY SERVICK (Reporter, Science Magazine): Yeah. So I understand it was an eight hour operation. And the surgeons were quite straightforward with Mr. Bennett beforehand that they really couldn't guarantee even that he was going to wake up from that surgery. But he did wake up from that surgery, with the pig heart beating in his chest.

<CLIP> HEARTBEAT

SEAN: And a few days later, he was off the heart lung machine breathing on his own.   
  
 <CLIP HEARTBEAT> [runs under track]

KELLY: He's able to talk. His recovery is expected to be very slow because of his prior condition, but he continues to be monitored in the hospital.

<CLIP> HEARTBEAT

SEAN: Today, we’re bringing you a sequel of sorts: The man with a pig kidney.

*<CLIP>Good Morning America, 1st patient with pig kidney transplant discharged from hospital*

*Reporter: Rick Slayman is waking up in his own bed after receiving the world's first successful transplant of a genetically modified Pig's kidney into a human.*

SEAN: Whether pig kidneys could save millions of lives, and whether we really need the pigs at all, coming up on *Today, Explained*.

[THEME]

SEAN: Dylan Matthews, senior correspondent at Vox, also with Future Perfect. We just had you on the show to talk about taxes, but now you're back to talk about pigs??

DYLAN MATHEWS (Senior Correspondent, Vox,com): Pigs and pig kidneys and my interest is more in the kidneys than in the pigs.

SEAN: Okay. What's going on with kidneys?

DYLAN: So for, for many years now, scientists have in, in their scientist way been trying to figure out how to take kidneys from pigs and put them in humans, you know, like you do. And this has been a challenge because there are a bunch of things on pig organs, they're these molecules called antigens that the human immune system reacts very violently to. And so you try to put a kidney from a pig into a human, human does not like it, bad things happen. And the big breakthrough was that for the first time, they put a kidney from a pig in a living human. And it worked. It didn't reject, um as of our conversation right now, it seems to be going well.

*<CLIP> WCVB CHANNEL 5 BOSTON REPORTER: There was a complication after rick Slayman received that genetic edited pig kidney, but his doctors say he rebounded well and today he’s back home and no longer needing to schedule dialysis treatments.*

*<CLIP> WCVB CHANNEL 5 BOSTON DOCTOR: We’re going to keep watching him closely. three times a week. initially, blood work and seeing him in clinic.*

SEAN: And I'm sure there are people out there who are not familiar with, like, pig organ transplant procedure. How does it work? Is it like in *Face/Off* where they put, you know, Nick Cage right next to John Travolta except this time it's like a dude and a pig and they just open them up and swap?

DYLAN: Nic cage is usually there, but that's unrelated, he’s just interested…

SEAN: <<laughs>>

*<CLIP> FACEOFF*

*Nicholas Cage: I’d like to take his face… off…*

DYLAN: There are special farms. There's a few companies that do this. There's one called EGenesis, there's one called Revivacore that specialize in genetically engineering pigs, specifically for transplant. And so what they're doing is they're trying to design pigs that, do not have the antigens that cause humans to reject. And so they have these specialized farms where they raise these pigs up, they will slaughter the pig. They don't just take the kidney and then send them off to a nice farm. They, they take the kidney, transport it in cold storage, and then it's, transplanted the way, human kidney would be transplanted. What's new is just who the, the kidney is coming from.

SEAN: And why a pig?

DYLAN: So pigs are a lot like humans just biologically, in terms of sort of species that outside apes and monkeys – and especially among species that we have a lot of experience growing at large scale, in, in farms and such – much closer to pigs than to cows or to other kinds of livestock. And that makes them very appealing as a potential source for, for organs like this.

Just to give a little bit of a pre-history…since 2021, versions of this experiment have been happening.

SCORING IN <These boops remain neutral, BMC>

DYLAN: There's a team at NYU that's been doing a lot of studies.

*<CLIP> DR. ROBERT MONTGOMERY: The pig kidney appears to replace all of the important tasks that the human kidney manages.*

DYLAN: Their studies involved brain dead patients. So they would have someone who… heart was still working, they were still breathing. They had a sort of biologically functioning body, but they had no consciousness. They were legally dead. And the families of these people consented to have pig organs transplanted into them.

*<CLIP> NBC NEWS, SISTER OF FIRST PIG KIDNEY RECIPIENT*

*Sister: It is only fitting that his final act he will be helping so many in the need through this innovative medical advancement.*

DYLAN: And they found a lot of success doing that. But it was also an unusual case. The idea was that you want to be able to do this with people who aren't brain dead, and and see how long it works and how… what kind of life it enables them to live. And so, Rick Slayman, who was the, recipient in this case, who was a 62 year old Massachusetts man, he's from Weymouth …

*<CLIP> RICK’S DOCTOR: He saw this as not only a way to improve his own personal life, but a way to provide hope to the thousands of people who need a transplant to survive.*

DYLAN: He was the first person to be alive and not brain dead and actually got one of these. And he got it at Mass General…

*<CLIP> RICK’S DOCTOR: My deepest gratitude… goes to our MGH team……. <<crying>> <<applause>>*

DYLAN: It seems to be working out well. The thing you worry about with any transplant is rejection – is, is the immune system rebelling and attacking the organ. And he seems to be in good health. The kidney is producing urine, which is what kidneys are supposed to do. And it seems to be successful so far.

SCORING OUT

SEAN: And how big a deal is this scientific breakthrough-wise, like scale of 1 to 10?

DYLAN: I would say this is like in 8 or 9.

SEAN: Wow.

DYLAN: We had good reason to believe this would work, but I think the social ramifications of it working are pretty enormous. So about 120,000 people every year get diagnosed with what's called end stage renal disease or kidney failure. Their kidneys don't work anymore. And once you get to that point, you need to replace the function of your kidney somehow. One way of doing it is dialysis. This is how most people do it. It will keep you alive for for a few years but the majority of people on it die within five years. What you really want is a transplant, and there aren't enough human kidneys. They're about in the range of 20 to 25,000 transplants a year in the US. Compare that to the people being newly diagnosed every year, almost all of whom would benefit from getting a kidney transplant. So in an ideal world, dialysis wouldn't exist. It's a really crappy substitute for having a kidney. But there have not been enough human kidney donors so far, so we've had to rely on it. What this is sort of opening the possibility to is that we could grow enough kidneys in pigs, and transplant those and have that be our first line of treatment for kidney failure as opposed to relying on dialysis.

SEAN: Do we know how long this guy who got the kidney from the pig will live?

DYLAN: We don't have any information about, how long pig kidneys can last just because it's never happened before. We do have a lot of information on human kidneys and how long they can last. So a kidney from a living donor lasts about 12 to 20 years. So it can last a very, very long time. A kidney from a deceased donor lasts maybe 8 to 12 years. So much less time. It's much worse to get a kidney from a deceased donor than from a living donor. We don't know how pigs are going to stack up. If they're going to be worse than either of them, if they're going to be somewhere in the middle. Maybe they're better than either of them. Maybe the pigs are up to something that we don't understand, but that's just something we don't have data for right now.

SEAN: Okay, so this isn't a guaranteed, you know, path to another ten, 20 years of life yet. However, what's the deal? Are people dying to get one of these pig kidneys, you think? And if so, how long until this can scale up?

DYLAN: I think if you talk to anyone with kidney failure who's currently on dialysis, like they will do almost anything, to get a kidney from whatever source. It is it is the difference between life and death. Is the difference in the near term between life, where you often have to go to a dialysis center 3 or 4 times a week and wait for hours for a machine to, to process your blood, and are left exhausted and unable to, to do your job or sort of engage in daily life and being more or less back to normal life with a transplant. People are very, very desperate for these things. And in terms of how long it's going to take. Tissues, like organs are treated by the FDA, sort of like a drug. And drugs before they're available have to be tested for safety and effectiveness. And so this was a very early pilot study, with one person. They're going to need to do, phase three, real sort of at scale studies, on a number of people, to make sure that these, these kidneys work. And after that, I think it's going to take some time to ramp up to the point where there's enough supply to meet the demand, because the demand, not just in the US, but internationally, is, is enormous.

SEAN: Okay. So the machinery is ramping up. The science is ramping up. The world is taking note. But I hear, Dylan, that you think we shouldn't even need pigs’ kidneys.

DYLAN: So I want to be clear on this. I think this is a great step forward. I admire everyone who worked on it. I think they're, they're doing something that will save lives, given the reality of the world we live in. They're heroes.

SCORING IN < SHU MU, BMC>

DYLAN: It irritates me a little. In part because I donated my kidney many years ago, and it's not that hard. And it's something that a lot of people could do, and almost no one does it. And we could live right now in a world where enough people are donating their kidneys, that this isn't even necessary. There are more than enough people walking around with two healthy kidneys who could donate one and save someone's life. To clear this backlog, it's just not happening. And so there's a part of me that looks at the situation and asks, like, why are we forcing pigs to do this thing just because, like, we don't have the stones to do it ourselves.

SCORING BUMP

SEAN: Dylan makes his case that we shouldn’t need the pigs when we return on *Today, Explained*.

[BREAK]

*<CLIP> “Kidney Now” - 30 Rock*

*Lyrics: This country has 600-million kidneys and we only really need half. That leaves about 300-million kidneys. Do the math.*

SEAN: *Today, Explained* is back, still with Dylan Matthews from Vox, who recently revealed that he has donated one of his kidneys. So, Dylan, you're talking to me right now with just one kidney.

DYLAN: I am, and I've had just one kidney since August 22nd, 2016. So it's been over seven years. And coming up on my, my eighth anniversary. Humans don't really need more than one kidney. If you donate one, the other one grows to, to pick up the slack. I got checked up with my doctor, and my kidney function is totally normal. I promise I can still produce urine.

SEAN: <laughs>

*<CLIP> Kool & The Gang - Celebration*

*Lyrics: CELEBRATION!*

DYLAN: Yeah, it's it's totally fine. It was an intense experience at the time, and I think I got through sort of the initial sort of pain and discomfort of the surgery with the help of my now wife and my dad, and I don't want to underplay that, but it's also over in a couple of weeks. After those couple of weeks, it doesn't affect your life more or less at all. You are at slightly elevated risk of kidney failure decades in the future, but that's about it.

SEAN: I think I met you after you had donated your kidney Dylan, but, but I know that in the six years I've known you, you've always had healthcare and a good job and lots of support from your colleagues. Does saying that more people should just be donating their kidneys sort of negate the fact that there are a lot of Americans and a lot of people on this planet who don't have the level of comfort and security that we have.

DYLAN: If you're interpreting what I'm saying as literally every human on the earth, regardless of circumstance, should go out and have kidney surgery that's not what I'm saying. What I'm saying is that I know a lot of other healthy people who have jobs and health care and paid leave and do not have small children who they would need to get sort of special care arrangements for while they donate, who absolutely could donate, and for whom it would be every bit as easy or easier than it was for me and still aren't doing that. And I think that's it's both a personal annoyance to me. But it's also, I think, like a major policy issue, and I think the past few decades have made it clear we're never going to get enough people stepping up to donate just from pure altruism. People just won't behave that way. You need to figure out some way to to get them to donate at scale if we're going to solve this problem.

SEAN: When did humans start donating and transplanting kidneys? Long before this pig stuff?

DYLAN: The first successful kidney transplant was, December 23rd, 1954, and it was on identical twins.

SCORING IN <Brightly-Colored Ships Go By (minimal kick, shaker, slow attack synth, cello and viola pizzicatos, organ, relaxed, moving forward)>

*<CLIP> NPR*

*DR. JOSEPH MURRAY: Oh no we didn’t think we made history. We didn’t even think of history. We thought we were gonna save a patient.*

DYLAN: So Ronald Herrick gave his kidney to his identical twin, Richard Herrick.

*<CLIP> NPR*

*Ronald Herrick: It’s just one of those things that was kind of out of this world. I thought. And it’s something that hadn’t been done before, you knew nothing about it. So I thought about it a long time…*

DYLAN: And Richard died eight years later. But the kidney worked.

SEAN: Mmm.

*<CLIP> NPR*

*DR. JOSEPH MURRAY: Oh gee, we knew immediately. It was marvelous. It poured out urine all over the floor. Actually the nurses or the orderlies had to keep it mopped up. But it was reassuring i’ll never forget it, because it just pinked up the way we wanted. Little pumped up blood vessels all over the surface there. It was snug as a bug in the rug. <laughs>*

DYLAN: And the reason they kind of had to do it with identical twins is, every previous attempt to do something like this had run into the problem of organ rejection. So we talked about this with pigs. But humans also don't like it when organs from other humans get put in them. And the theory of the surgeons in that case was if we use identical twins, you have generally identical DNA. Anyway, we're not going to run into that issue. And they were right. It worked pretty well, for for identical twins. So in the subsequent few decades, it kind of ramped up, but was understood as something that had a really high failure rate and also was best done between very close relatives, because you had this fear of of organ rejection.   
  
SEAN: Hm.

*<CLIP> NPR*

*DR. JOSEPH MURRAY: It just seemed almost impossible that you’d have twins – one dying of kidney disease, and another healthy.*

SCORING OUT

DYLAN: Where we get sort of the modern organ transplant world and organ transplant economy is in the 1980s, when a really effective immunosuppressant becomes available, at mass for, for the first time. And an immune suppressant is a drug that, weakens your immune system, which might not sound like something you want, but if your immune system is trying to, to kill this new organ, that it's been implanted into you, it's something you very much want. And so the the availability of, an effective immunosuppressant meant that about 40 years ago, doctors started to be able to to transplant kidneys from from cadavers, from non-family members and have very high confidence that it would work.

SEAN: And how does this progress over the decades? I mean, how many kidneys are being donated now and who's donating them? Do we know?

DYLAN: So the most recent year we have data for, is 2021. That year, about 25,500 kidney transplants were performed in the US. That's a pretty good number. It's 25,000 people who got a new lease on life from donations.

SEAN: Mm.

DYLAN: The vast majority of those, about 19,500 were from deceased donors. So they were recovered from recently dead people were found healthy enough to to be used in implantation and transplanted to patients. Only about 6000 were from living donors, and so were from people like me and, other folks who've undergo surgery while alive and donate one of their organs.

SEAN: Would more people be donating? If you could just sell them because you can't sell them, right? At least in this country?

DYLAN: No, there's a there's a law called the National Organ Transplant Act…

SCORING IN <Microgreens - STBB 542 Instrumental (harp, hip hop beat, micro sampling, chops, glitch, peaceful, friendly, relaxed)>

DYLAN: … that was pushed by a young congressman named Al Gore.

SEAN: Ah! The guy who invented the internet?

*<CLIP> FORMER VICE PRESIDENT AL GORE: So I took the initiative in creating the internet.*

DYLAN: <laughs> he invented the internet and single handedly identified global warming.

SEAN: <laughs>

*<CLIP> FORMER VP GORE: "Last month right here in this place I announced that the first six months of the year: January through June - each set new records for high global temperatures.*

DYLAN: But he also helped craft this law to, to shut down markets and kidneys.

SEAN: Wow.

*<CLIP> NEWS REPORT: It imposes penalties up to $50,000 and five years in prison for the buying or selling of organs. Congressman Gore says those penalties are needed to prevent what has already become a problem in some countries.*

DYLAN: And I think people's intuitions about that are reasonable, that I think people have this image of, if you're allowed to sell your kidney, that this would be a way that people preyed upon the poor.

*<CLIP> FORMER VP GORE: In Brazil, it’s quite common for the Sunday newspapers to carry classified ads from poor people wanting to sell their kidneys and their eyes. While they’re still alive. We have already had classified advertisements in the United States.*

DYLAN: There's a lot of illegal kidney sales anyway, and those markets are, in fact, very exploitative.

SEAN: Huh.

DYLAN: There's one country on earth where you can sell your kidney, which is Iran.

SEAN: Huh!

DYLAN: And there's been a lot of interesting research suggesting that that people who sell their kidneys there are sort of shamed and marginalized.

SEAN: Hm.

DYLAN: But also, it's the only country on earth that doesn't have a kidney shortage. The market clears. They they charge enough for the kidney that their people are not dying of kidney failure in Iran the way they are here.

SCORING OUT

SEAN: <chortles> Is anyone looking at Iran and saying, <chortles> why don't we take a page off their book?

DYLAN: It's not the best spokesperson– like if I had to pick a country…  
  
SEAN: <laughs>  
  
DYLAN: They also have a universal basic income. And like UBI, people don't bring it up for some reason.

SEAN: Huh. Look at Iran.

DYLAN: It's a weird place.   
  
SEAN: <laughs>  
  
DYLAN: But, the proposals that I've heard from people in the US are less– They're marketed as sort of person to person, like a person who needs a kidney can buy it from someone who has a kidney. I think the opportunities for exploitation there are really high, and people have a reasonable aversion to it. What people are proposing in the US is a system where living donors’ organs would be distributed the way they are now, based on need. People could not pay more to get an organ faster, but people who donate would be compensated at the very least for costs they incur, like not being able to work or sort of pain and suffering.

SEAN: Hm.

DYLAN: But preferably just as compensation for the labor that they're performing.

SEAN: But it's unlikely the United States is going to replicate Iran any time soon, and it seems unlikely that people are just going to start donating their kidneys more often. Is it possible that this development with the pigs fills the void?

DYLAN: Yeah. I think if I'm looking at my crystal ball and trying to say what will happen in the next ten years, my guess would be that the status quo when it comes to kidney compensation continues. And it's a status quo that, like, genuinely, deeply angers me. You you've had me on the show before, and I like to think I keep my cool generally, but I'll lose my cool here for a second.

SEAN: Okay.

SCORING IN <Clutch Blackwater (noir, seedy, breakbeat, synth, old timey brass stabs, menacing, dark)>

DYLAN: When I donated my kidney, everyone got paid. My transplant surgeon got paid. The transplant surgeon who implanted the kidney got paid. My anesthesiologist got paid. His anesthesiologist got paid. The person who flew the plane transporting my kidney from my hospital, his hospital got paid. All of our nurses got paid. All of the social workers who arranged the chain, because we sort of set off a chain where I donated to him. His daughter donated to somebody, and on on a lot of people worked hard to get that set up, and they they all got paid. I was the only person in that whole system who was not compensated at all for the work I was doing.

SEAN: Huh

DYLAN: And I think that mostly enrages me, because it's part of a system that is killing tens of thousands of people every year for no reason. But it also enrages me because kidney donors are doing something important. And I think if you're doing important work, you deserve to be compensated for it in some way. And it truly pisses me off when opponents of compensation are like: ‘But it's like a beautiful, selfless, altruistic …’ Like, shut up!

SEAN: <laughs> Hm!

DYLAN: Pay people for their work.

SEAN: Hm.

DYLAN: It's like your, your gratitude is not going to save these people's lives.

SCORING BUMP

SEAN: And is that how you think we really fix this?

DYLAN: I think in a good world we would fix it that way. I think in the world we live in, we're going to wait for the pig kidneys to be ready in maybe 10 or 15 years. And I think hundreds of thousands or millions of people are going to die who don't have to die. And I think we're going to shift to the pig system. People will get pig kidneys. We will all be very happy at this scientific advance. And people will mostly not look back and ask themselves how many people we let die, because we didn't want to compensate donors fairly.

SCORING BUMP

SEAN: Dylan Matthews. Vox dot com. That’s where you can read his piece all about his experience donating a kidney. He’s got a piece called “Why I gave my kidney to a stranger — and why you should consider doing it too.” His latest is titled “Pig kidney transplants are cool. They shouldn’t be necessary.”

Our program today was produced by Victoria Chamberlin and Hady Mawajdeh, edited by Amina Al-Sadi, fact-checked by Anouk Dussaud, and mixed by David Herman.

I’m Sean Rameswaram. This is *Today, Explained*.

[10 SECONDS OF SILENCE]