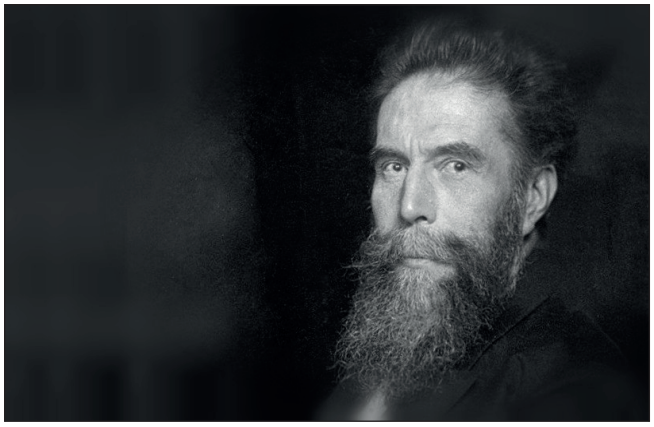
Curiositas

QUIZ 1



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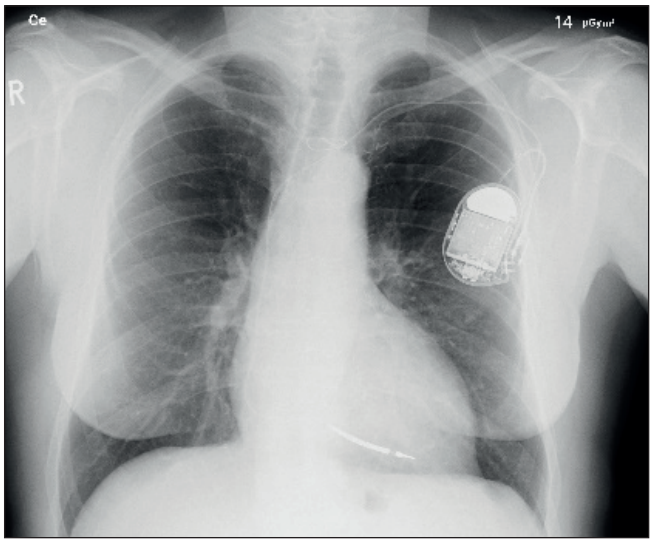
1. Who is this person?
2. What did they discover?

Aaron Vage (PhD Student, Centre for Medical Education, Queen's University Belfast), Andrew D Spence (Clinical Lecturer, Centre for Medical Education, Queen's University Belfast).

QUIZ 2



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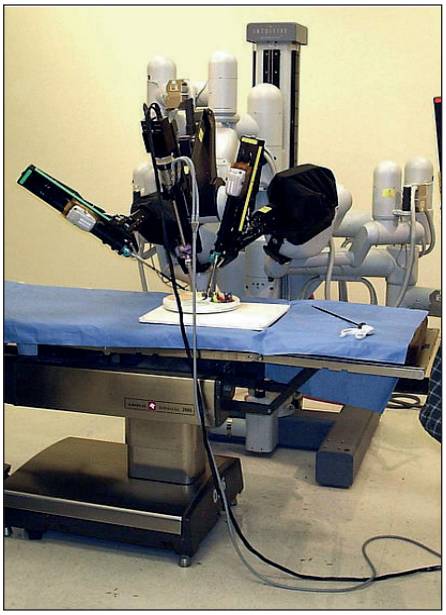
1. What is this device?
2. When was it first engineered?

Aaron Vage (PhD Student, Centre for Medical Education, Queen's University Belfast), Andrew D Spence (Clinical Lecturer, Centre for Medical Education, Queen's University Belfast).

QUIZ 3



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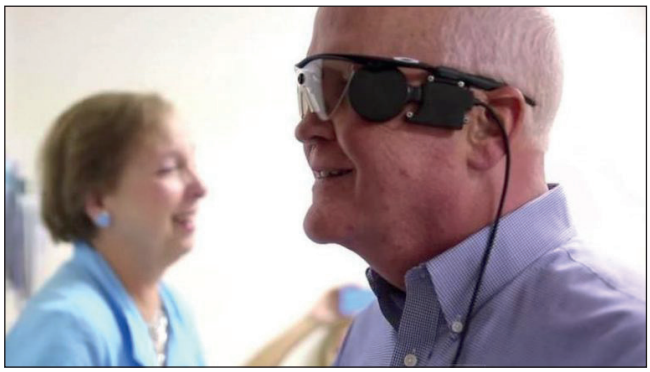
1. What is this machine?
2. What was the first of its kind called?

Aaron Vage (PhD Student, Centre for Medical Education, Queen's University Belfast), Andrew D Spence (Clinical Lecturer, Centre for Medical Education, Queen's University Belfast).

QUIZ 4



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1. What is this device?
2. What condition was it used to treat in 2015?

Aaron Vage (PhD Student, Centre for Medical Education, Queen's University Belfast), Andrew D Spence (Clinical Lecturer, Centre for Medical Education, Queen's University Belfast).

CONSIDER CONTRIBUTING TO CURIOSITAS?

Please refer to *'Curiositas: Guidelines for contributors'* http://www.ums.ac.uk/curiositas.html and email curiositas@ums.ac.uk with your ideas and submissions.

Curiositas: Answers

QUIZ 1

1 & 2. In 1895, the German physicist, Willhelm Conrad Roentgen, accidentally stumbled upon X-rays whilst investigating the ability of cathode rays to move through glass panels.[1] During one such cathode ray experiment, Roentgen's attention was drawn to a green glow coming from a fluorescent screen at the other side of the lab. As the cathode tube was encapsulated in thick black card, Roentgen was mystified as to the origin of the glow. Finally concluding that the cathode rays colliding with a solid target was the cause, Roentgen decided upon the name "X-rays" to represent their then unknown capabilities.[2] Today we have a more complete understanding of both the beneficial and adverse effects of X-ray radiation – several radiographic protocols have been developed to lessen exposure time. Whilst X-rays continue to be a popular tool in the medical sphere, their advent has accelerated the development of a variety of other imaging techniques such as computed tomography, echocardiography, and magnetic resonance imaging.

1. Columbia Surgery. History of medicine: Dr. Roentgen's accidental X-Rays [Internet]. New York: Columbia University Department of Surgery: 2023. [cited 2023 Nov 29]. Available from: https://columbiasurgery.org/news/2015/09/17/history-medicine-dr-roentgen-s-accidental-x-rays.

2. Sky H2 History. This Day In History. German scientist discovers X-rays [Internet]. UK: AETN Networks EMEA; 2023. [cited 2023 Nov 29]. Available from: https://www.history.com/this-day-in-history/german-scientist-discovers-x-rays.

QUIZ 2

1 & 2. Dr. Albert Hyman developed the first iteration of a cardiac pacemaker in 1932. Hyman engineered his device with technical precision – an intricate system of centrifugal weights governing the velocity of a spring motor that ultimately delivered an electrical power source by turning a magneto-generator[1]. However, whilst Hyman's pacemaker was technically brilliant for its time, it encountered many issues in terms of efficiency and safety. One such example is that to deliver an external electrical current to the heart, Hyman insisted that a bipolar needle should be inserted into the right atrium of the heart by puncturing a patient's chest wall. This apparently outrageous idea did not gain traction with the American Medical Association, who dismissed Hyman's work as, "gadgetry" at best and the work of the devil at worst[2]. As Hyman's work slipped into obscurity, the Swedish duo of Ake Senning and Rune Elmqvist finally developed a transistor-based pacemaker in 1958, that could be placed within the epigastrium – leading to the first human transplant, occurring in the same year.

1. Azo Sensors. An AZo Network Site. Editorial feature: a history of Pacemakers. [Internet]. Manchester: AZo Network UK Ltd.: 2023. [cited 2023 Nov 29]. Available: https://www.azosensors.com/article.aspx?ArticleId=10
2. Aquilina O. A brief history of cardiac pacing. *Images Paediatr Cardiol*. 2006;8(2):17-81.

QUIZ 3

1 & 2. Hailed as the first surgical robot, "Arthrobot" was created in the early 1980's by Dr James McEwen and Geof Auchinlek, of the University of British Columbia, to improve orientation accuracy of the femur for total hip arthroplasty[1]. Under the command of the orthopaedic surgeon, Dr. Brian Day, Arthrobot's first surgical foray was in 1983. The voice-controlled bot's ability to position a patient's limbs, select specialist equipment, and communicate with the surgical team took the medical world by storm – National Geographic went on to produce a robotics documentary starring none other than Arthrobot[2]. The landscape of medical robotics has changed considerably over the last four decades. Today the da Vinci surgical system, an advanced master-slave system controlled remotely by a surgeon from a console, is one of the most popular surgical robots on the market. As technology continues to advance, we could eventually see robots perform lab tests without human intervention, remove plaque from arteries, take tissue biopsies, or attack cancerous tumors[3].

1. Smith JA, Jivraj J, Wong R, Yang V.. 30 Years of Neurosurgical Robots: review and trends for manipulators and associated navigational systems. *Ann Biomed Eng*. 2016;44(4):836–46.
2. Guinness World Records. First Robotic Surgery [Internet]. London: Guinness World Records Limited; 2024. [cited 2023 Nov 29]. Available from: https://www.guinnessworldrecords.com/world-records/512174-first-robotic-surgery.
3. Beasley RA. Medical robots: current systems and research directions. *J Rob*. 2012:401613. doi: 10.1016/j.robot.2021.103902.

QUIZ 4

1 & 2. The first bionic eye transplant to treat age-related macular degeneration (AMD) occurred in July 2015, at the hand of Professor Paula Stanga – the term "bionic eye" is often used to describe the implantation of an artificial retina. Stanga used the "Argus II" implant, manufactured by the US company Second Sight, during his seminal procedure at Manchester Royal Eye Hospital [2]. Argus II had previously been used by researchers to restore limited vision to patients with retinitis pigmentosa, however, before 2015 it had never been used to tackle AMD [3]. Since Stanga's landmark procedure, ocular technology has seen a number of advances. For example, a recent study led by Michiko Mandai at the RIKEN Center for Biosystems Dynamics Research in Japan [4] has used genetic modification to enhance human-derived retina transplants grown in the lab. Researchers transplanted these modified retinal sheets into damaged mouse retinas and removed certain cells from the grafts at specific times. This allowed better connections to host retinas, resulting in more responsiveness to light in the damaged eyes. Since the retinal sheets were generated from stem cells of human origin, this represents one of the final steps necessary before this technique can be tested in human clinical trials for repairing retinal degeneration.

1. Havas Lynx Group. 2023. Prof. Paulo Edwardo Stanga – The man behind the world's first bionic eye transplant [Online]. Available: https://havaslynx.com/blog/prof-paulo-edwardo-stanga-the-man-behind-the-worlds-first-bionic-eye-transplant/ [Accessed 29/11/2023].

2. BBC News. 2023. Bionic eye implant world first [Online]. Available: https://www.bbc.co.uk/news/health-33571412 [Accessed 29/11/2023].

3. The University of Manchester. Manchester professor conducts world's first bionic eye implant [Internet]. Manchester: University of Manchester; 2015. [cited 2023 Nov 29]. Available from: https://www.manchester.ac.uk/discover/news/manchester-professor-conducts-worlds-first-bionic-eye-implant/

4. Yamasaki S, Tu HY, Matsuyama T, Horiuchi M, Hashiguchi T, Sho J, *et al*. A Genetic modification that reduces ON-bipolar cells in hESC-derived retinas enhances functional integration after transplantation. *iScience*. 2021;25(1):103657. doi: 10.1016/j.isci.2021.103657

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