

The Spark

Magazine

PUZZLES, QUIZZES, EXPERIMENTS



**ISSUE
No25**

WHAT IS

**HEALTHCARE
TECHNOLOGY?**

HOW ARE

**DRONES HELPFUL
FOR HEALTHCARE?**

PERSONALISED

MEDICINES

MAKE YOUR OWN

ROBOT HAND!

MEET A

SOFTWARE ENGINEER



GLASGOW
**SCIENCE
CENTRE**

Registered Scottish charity SC030809

HELLO!

Welcome to the autumn edition of The Spark magazine, where we'll take a look at some ways that technology is used in healthcare. We'll find out about brilliant modern prosthetics, the tech caring for our teeth and the different ways doctors can see inside the body.

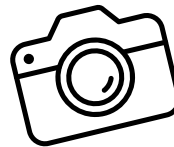
We'll meet a scientist who is using artificial intelligence in medical scans, and we'll find out how medicine can be tailored to us!

We've got puzzles, activities and our Bright Spark quiz too! Time to dive into this exciting edition of The Spark.

Best wishes,
Glasgow Science Centre



SHARE YOUR PICS WITH US



If you try any of our activities, please show us how they turned out! Send your favourite pictures to CLDteam@gsc.org.uk or share with us @TheBothyGSC on X.

MINI PUZZLE

Can you find all the words hidden below?

E	O	A	D	T	I	E	C	I	D	O	R	T	C
T	L	N	T	M	O	Y	B	R	D	H	I	E	I
O	S	A	A	D	S	A	S	C	D	E	O	C	T
B	D	Y	B	R	T	R	A	I	G	A	S	H	E
D	S	D	D	O	I	X	O	R	E	L	L	N	H
L	E	T	R	O	R	A	H	I	O	T	O	O	T
E	E	N	A	O	D	A	R	L	X	H	S	L	S
I	T	E	T	T	N	D	T	A	T	E	O	O	O
E	N	H	C	I	N	E	A	O	O	C	R	G	R
G	O	C	O	O	S	H	S	B	R	A	A	Y	P
Y	T	B	E	H	O	T	E	B	R	Y	T	C	T
T	Y	E	S	T	O	B	O	R	T	L	T	I	Y
R	E	B	D	O	H	D	O	C	T	O	R	O	C
T	L	I	Y	E	M	E	D	I	C	I	N	E	L

- dentist
- doctor
- drones
- health
- laboratory
- medicine
- prosthetic
- robots
- technology
- xray



Meet Peter Cannon

who is working on medical technology!

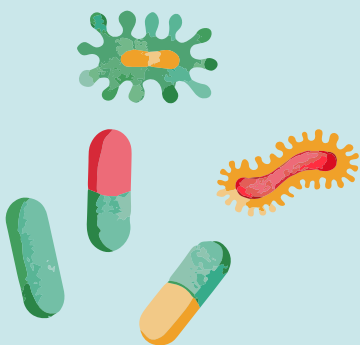
What is Healthcare Technology?

Today, technology plays an important part in medicine and healthcare. Let's explore a few different examples.



Robotic arms with cameras and surgical instruments help doctors see better and be very precise with their movements during surgery. This helps patients to recover faster and with less risk of infection.

Artificial intelligence can save time by looking at scan images and making decisions on what the scan shows. This lets doctors spend more time with patients.



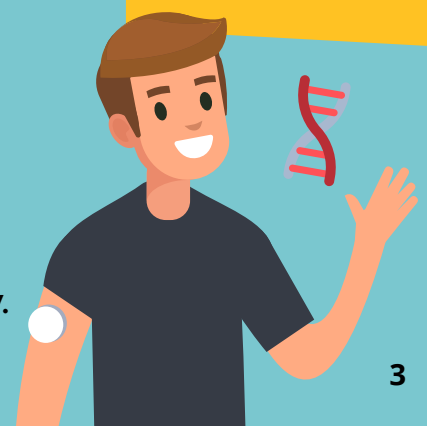
Precision medicine is one amazing use of artificial intelligence. Everyone is different, and people react to medicines differently, but precision medicine takes information on a patient's lifestyle, genes and environment and suggests the best medicine for that specific person!



Find out more about these on page 11 - 13!

For many people, healthcare technology is a part of their everyday lives. Keeping an eye on your blood sugar or blood pressure at home is easy with small monitors.

Some people even have technology inside their bodies! For example, pacemakers which help their heart to beat normally.



Prosthetics

Prosthetics are medical devices that replace a part of the body that is missing or not working properly.



Prosthetics can be used for many parts of the body:



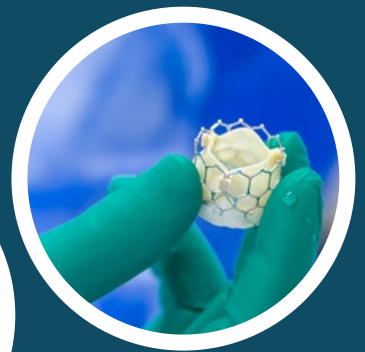
Legs



Arms



Eyes

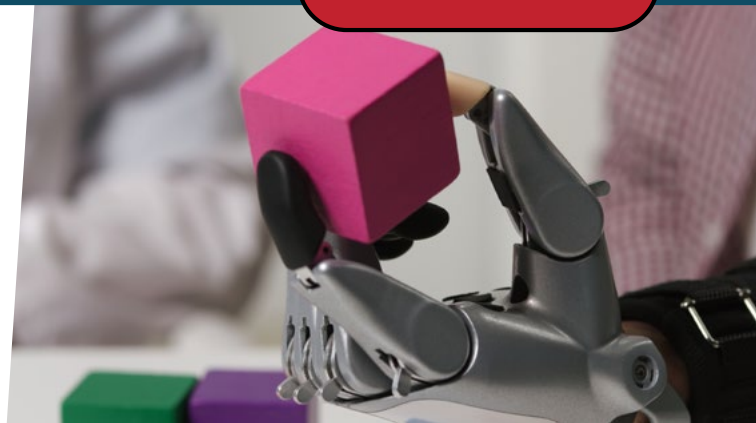


Heart Valve

And more!

Some prosthetics are designed to look like the missing body part, while others are designed to work and move like it.

Some prosthetics are even controlled by the user's brain! These devices detect electrical signals from nearby muscles and translate the signals into movement.



ACTIVITY

Untangle the electrical signals to tell the prosthetic hand what to do next!

Grab with every finger!

Point the index finger!

Give a thumbs up!



DID YOU KNOW?

The oldest known prosthetic was a toe made by the ancient Egyptians!



Make Your Own Robotic Hand!

The most advanced prosthetics use clever robotics. Have a go at making your own simple robot hand!



What will you need?

- Adult supervision
- Sheet of card or thick paper
- Paper straws
- Thread or wool
- Sticky tape
- Scissors
- Pencil

Our robotic hand is made of paper, but modern prosthetics are usually made from titanium or carbon fibre.



What to do

Step 1. Draw around your hand onto the card. Carefully cut out this shape.

Step 2. Cut the paper straws so you have 14 small pieces of straw, no more than 2 centimetres long.

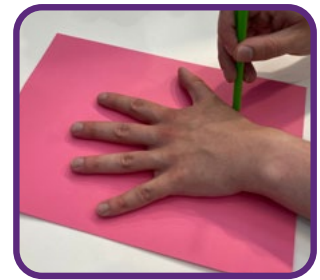
Step 3. Use sticky tape to attach the pieces of straw to the hand to create the parts of each finger.

Step 4. Cut and stick down 5 more pieces of paper straw on the palm of the hand.

Step 5. Trim any parts of straw that hang over the edge of the hand.

Step 6. For each finger, tie thread or wool around the straw at the very top. Thread this down through every section of straw on the finger, as well as the corresponding straw on the palm.

Step 7. Pull the threads to make the hand move!



Why don't you try using different coloured threads for each finger so you can easily control each one?

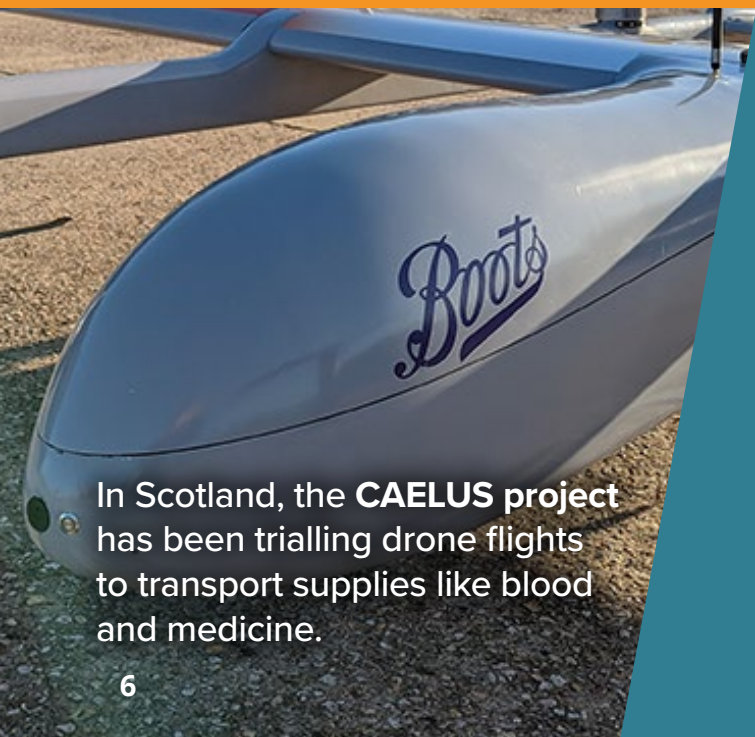
Drone deliveries

Across the planet, drones are being used to deliver medical supplies quickly to where they're needed.

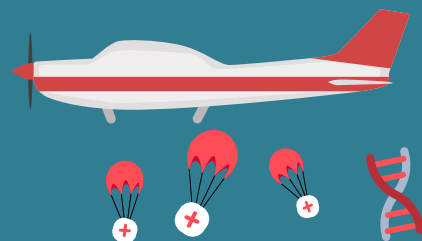
Drones are flying vehicles that don't have a pilot on-board. They're normally controlled by someone on the ground.



Drones are helpful because they can travel to hard-to-reach places, such as islands, much faster than travelling by land and boat. For example, in a drone trial, cancer patients on the Isle of Wight were able to have treatment delivered to them in 30 minutes. This journey would have normally taken roughly 4 hours.



In Scotland, the **CAELUS** project has been trialling drone flights to transport supplies like blood and medicine.



A company called **Zipline** has changed how blood donations and vaccines are transported across Ghana, Rwanda, Nigeria and other nations with remote communities. These supplies would normally travel by road and in hot conditions. But Zipline drones make delivery faster and keep the cargo at the correct temperatures.

Fly Your Own Paper Drone!

ACTIVITY

What will you need?

- Adult supervision
- Drone template
- Scissors
- Paper clip
- Fan or hairdryer



Why don't you try attaching a small object, such as a penny or a few more paper clips, to the drone? Does it still fly?

What to do

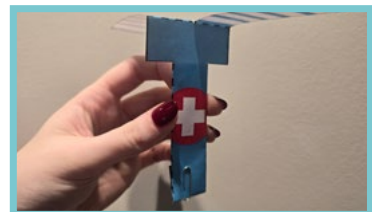
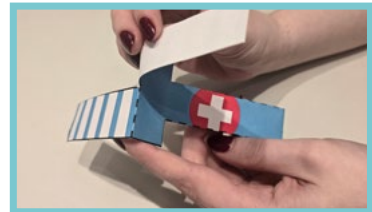
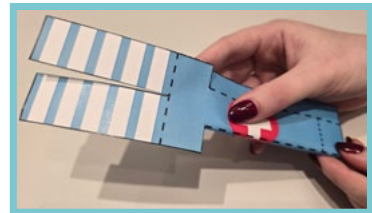
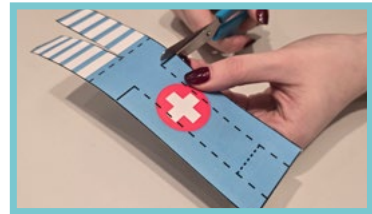
Step 1. Cut out the paper drone at the bottom of this page.

Step 2. Cut along the solid lines.

Step 3. Fold along the dotted lines, creating 2 propellor blades.

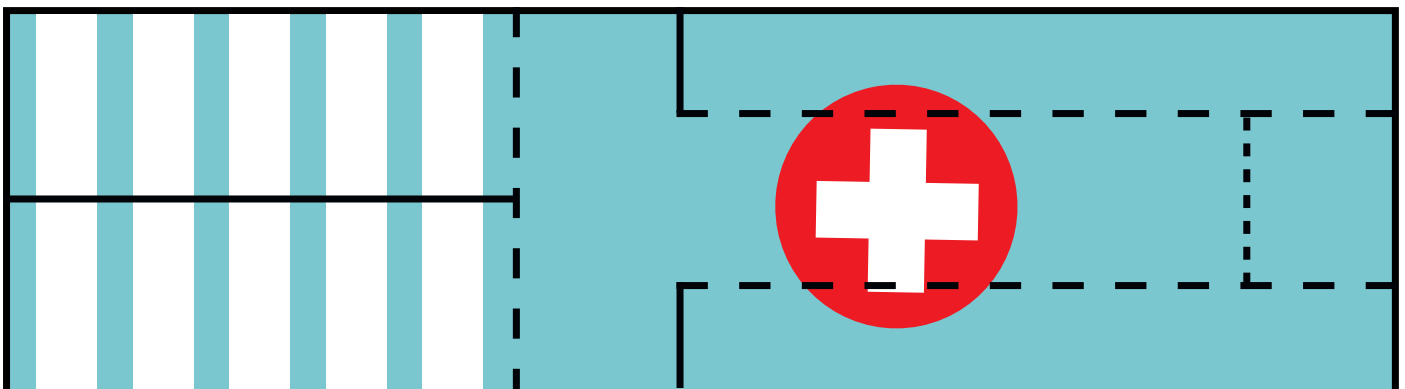
Step 4. Use a paper clip to secure the folds at the bottom of the drone.

Step 5. Hold the drone up in the air, let it go and watch it fly! Use a fan or hairdryer to keep it in the air for longer.



Drones have limits on how much weight they can carry. If their cargo is too heavy, it can be unsafe for them to fly.

How much weight can your paper drone carry?

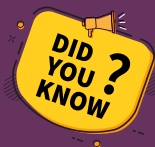
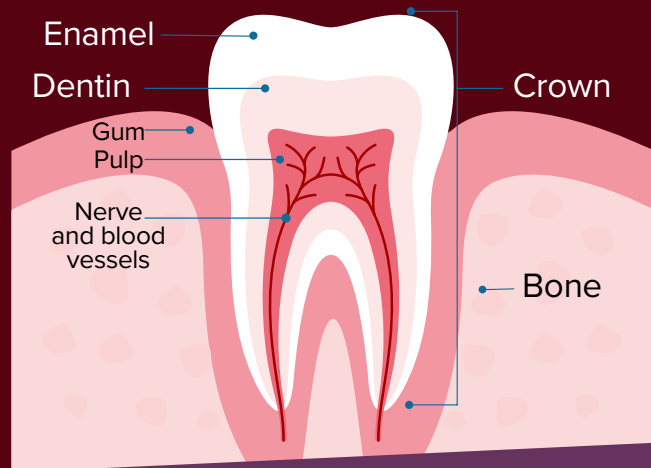


Dazzling Dentistry

Let's find out how technology can help look after your teeth!

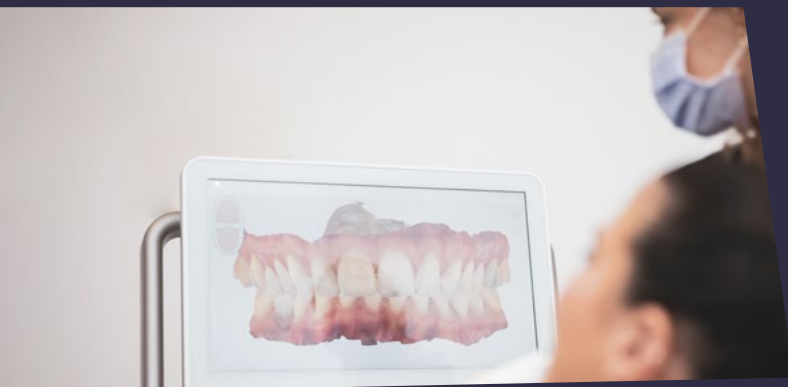
Our teeth are made up of lots of different parts. Dentists train for years to specialise in treating them. For example:

- **Orthodontists** are experts in the position of your teeth and jaw.
- **Endodontists** treat the pulp inside your teeth.
- **Periodontists** specialise in looking after your gums.



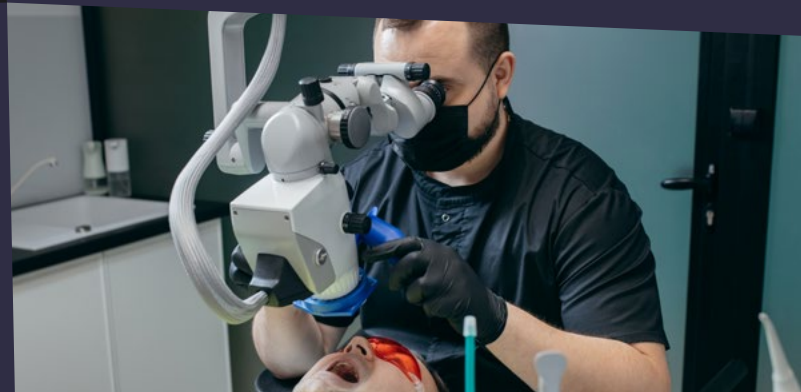
Back in the Middle Ages, people thought that cavities and toothache were caused by worms wriggling around inside your teeth! We know today that this isn't true. They can be caused by bacteria damaging your teeth – this is why it's so important to brush and floss.

How do dentists use technology?



3D dental scanners can take thousands of pictures every second to make a 3D image of your teeth and gums. Dentists can use them to give a patient an idea of what their teeth might look like after braces!

Operating microscopes: It might come as a surprise that microscopes are used by dentists! This equipment lets dentists see your teeth in much more detail.



Healthy teeth

What will you need?

- Adult supervision
- An egg, hard boiled by an adult
- Cola
- Cup
- Old toothbrush
- Toothpaste



What to do

Step 1. Place the egg in the cup and pour enough cola into the cup to cover the egg. Your egg might float a little bit so the top isn't completely covered – this is normal.

Step 2. Leave the egg in the cola overnight.

Step 3. Carefully remove the egg from the cola. What has happened?

Step 4. What happens when you use the toothbrush and toothpaste to brush the eggshell?



You might think it's amazing how quickly brushing the egg is able to remove the stains... but what you're actually doing is brushing away the top layer of the egg's hard surface which has been weakened by the acidic fizzy drink.

While our teeth are tougher than eggshells, brushing them too soon after having fizzy drinks can cause a similar thing to happen. This damages our teeth's enamel and makes them weaker over time.

Remarkable Radiology

Medical imaging technologies allow healthcare scientists to look inside our bodies and find out more information to diagnose and treat illnesses. This information can be life-saving, and we wouldn't be able to find it without these wonderful inventions!



Ultrasound

Ultrasound technology can create pictures of muscles, organs, or growing babies! A small scanner produces sound waves, which bounce and echo off organs and muscles so the scanner can build up a picture.

Can you see the baby in the picture?

MRI

Magnetic Resonance Imaging machines use a powerful magnet and radio waves to create an image in a computer. MRIs can scan most parts of the body, like the brain, bones, the heart and other internal organs. MRI scans can take up to an hour.



X-Ray

You might have had an x-ray if you've ever broken a bone! X-rays are a type of radiation like microwaves or radio waves. The x-rays are targeted at the specific area of the body that we want to scan. Hard materials, like bone, block lots of the x-rays, meaning bones appear lighter in the final image. Softer parts of our bodies, like fat, let lots of x-rays through and appear darker!



Look at the x-ray above – can you see where the break in the bone is?

Meet a Software Engineer

Peter Cannon from Canon Medical

My work is about using artificial intelligence (AI) in medical scanners, so patients are exposed to less radiation. Depending on which part of your body needs scanned, we can use this technology to predict and adjust the amount of radiation used. For example, we would use more radiation to scan your chest and less radiation to scan your head. This protects patients and helps doctors scan more people in hospital. This is because doctors can spend less time telling the scanner what to do, as it can make decisions about how much radiation to use at each body part.

Have you always wanted to do the job you have now?

No. I went from wanting to be an archaeologist, to a geologist, to a game developer, and I ended up in programming in medical research.

What do you wish people knew about your job?

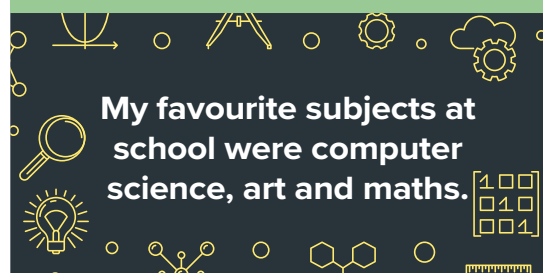
That anyone can do something like this. You don't need to have an easy or privileged start in life to have a job you love and that makes you want to go in to work every day.

The **Living Laboratory** helps hospitals, universities, and businesses work together to create new healthcare ideas around precision medicine. The project is a partnership between the University of Glasgow and the NHS, and much of the work takes place at the Queen Elizabeth University Hospital in Govan.

Precision medicine finds treatments and medications that are fitted to individual patients, looking at unique factors like their genes, environment, or lifestyle. This helps people to get better faster, and means they spend less time in hospital or visiting doctors, which saves money for the NHS. By developing these ideas right here in Glasgow, the Living Laboratory brings businesses to the city, which generates exciting job opportunities for the future.



A fun fact about me is that I like drawing. Mainly drawing people!



My favourite subjects at school were computer science, art and maths.



Find out more about the Living Laboratory here:



Healthcare Innovations

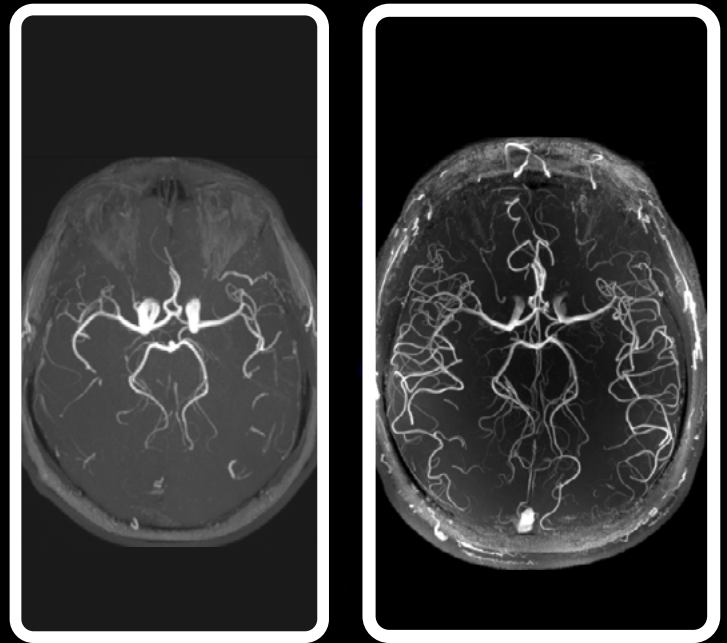
Technology is always changing and improving, and healthcare technology is no exception. Let's find out about some of the important work being done by the Living Laboratory researchers!

The images on the right and left are both scans of the same person's brain, made during an MRI scan. MRI scanners use radio waves and magnets to create an image from inside the human body. In this case, showing blood vessels in the brain.

Can you see the difference between them?

Usually, MRI scanners use a magnet with a maximum strength of 1.5T or 3T – the number indicates how strong the magnet is. The second image here was taken using a 7T magnet – a much stronger one!

This is a brilliant healthcare innovation as scientists can see details that they couldn't see before! This could be life-saving as scientists might see signs of illnesses, like epilepsy and tumours, much earlier.



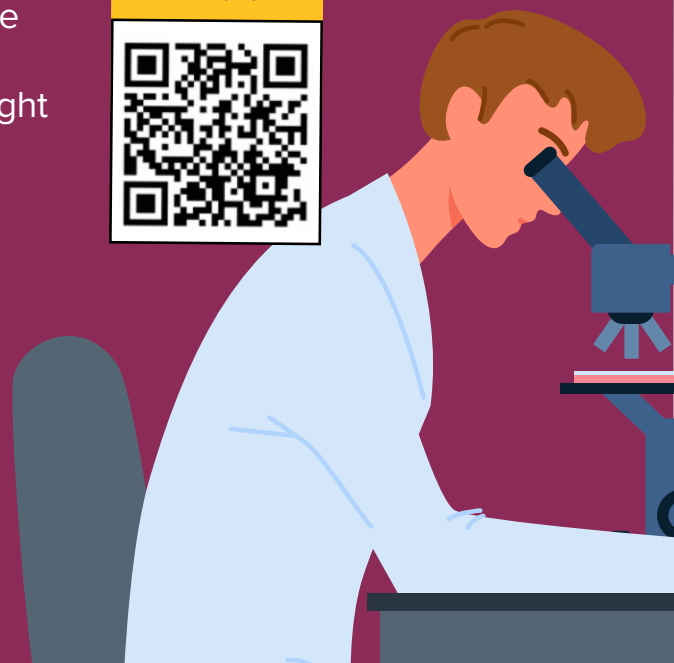
Reference: Graeme A. Keith et al. (2024). IPEM-Translation. Thanks for the above images goes to Professor Keith Muir, Professor David Porter, Dr Graeme Keith, Mrs Tracey Hopkins and Professor Natasha Fullerton. If you would like to find out more, please visit: www.gla.ac.uk/colleges/mvls/ice/

Precision Medicine

Usually, patients with the same symptoms or disease are given the same treatment. This treatment might work for some patients, do nothing for others, or might even have a negative effect. Everyone is unique, so everyone responds to treatment differently.

In **precision medicine**, healthcare scientists can gather information about the individual patient and tailor their treatment so it is the most effective, while at the same time possibly reducing side-effects.

Scan to learn more about precision medicine



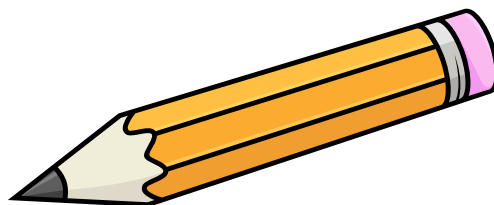
Try your hand at precision medicine!

ACTIVITY

What will you need?

- Coloured pencils

Precision medicine looks at different parts of a patient's health story, such as their lifestyle, genetics, environment, and health history to decide the best treatment for them.



Step 1. In the table below, each row has a repeating pattern which represents a different part of the patient's health story. Colour in the rest of each pattern to get the full picture of the patient's health story. The first row has been completed for you.

Lifestyle	Red	Yellow	Red	Yellow	Red	Yellow	Red	Yellow
Genetics	Blue	Blue	Green					
Environment	Yellow	Green	Red	Blue				
Health History	Green	Yellow	Blue	Blue				

Step 2. Look at patterns A, B and C below. Each treatment is best suited to patients with that pattern in their health story. Which pattern can you spot in the patient's health story above? That will decide which treatment to try!



A



Antibiotics

B



Trial
medicine

C



No
treatment



Check the back page to see if you chose the best treatment!

Scientists can use artificial intelligence to look for patterns in a patient's health story. It can compare these patterns to similar patients to decide which treatment they might respond to best.



BRIGHT SPARKS!

Are you a bright spark? Test your knowledge with our tricky questions! Check your answers on the back page.

Drones have a pilot on-board.

- True
- False

1

Which of these magnet strengths would give the clearest MRI images?

- A) 1.5T
- B) 3T
- C) 7T

2

Why are drones used in healthcare?

- A) To do cool tricks
- B) To transport medical supplies
- C) To tell jokes

3

Dental scanners can take how many pictures a second?

- A) Hundreds
- B) Thousands
- C) Millions

4

What type of dentist looks after your gums?

- A) Orthodontist
- B) Endodontist
- C) Periodontist

5

Why is medical imaging useful?

- A) It lets us see outside the body
- B) It lets us see inside the body
- C) It lets us see inside computers

6

X-rays are a type of radiation.

- True
- False

7

How many pieces of this DNA are hidden throughout this magazine?

- A) 4
- B) 5
- C) 6

8

What is precision medicine?

- A) Giving everyone the same treatment
- B) Giving everyone no treatment
- C) Giving people treatment that is personalised to them

9

Toothworms cause cavities and toothaches.

- True
- False

10



Who made the oldest known prosthetic?

- A) The ancient Romans
- B) The ancient Greeks
- C) The ancient Egyptians

11

We should brush our teeth straight away after having a fizzy drink.

- True
- False

12

Ultrasounds use which of the following to scan inside the body?

- A) Sound waves
- B) Radio waves
- C) Magnets

13

Brushing our teeth is important for removing which of the following?

- A) Food and plaque
- B) Fun and play
- C) Feet and paws

14

In precision medicine, what does artificial intelligence look for in a patient's health story?

- A) Pottery
- B) Pens
- C) Patterns

15

Some prosthetics can detect electrical signals from nearby muscles.

- True
- False

16

Some people use technology to help their heart beat normally.

- True
- False

17

What are modern prosthetics often made from?

- A) Paper
- B) Titanium
- C) Wood

18

Which of the following is an advantage of medical drone deliveries?

- A) Drones keep the delivery at the wrong temperature
- B) Treatments can be delivered faster
- C) It takes longer for treatment to arrive

19

What are modern prosthetics often made from?

- A) Paper
- B) Titanium
- C) Wood

18

Which of these is **not** part of our teeth?

- A) Pulp
- B) Enamel
- C) Muscle

20

Answers on back page

I scored

.....



ABOUT US

Glasgow Science Centre is a 5-star visitor attraction located beside the River Clyde. We are home to hundreds of interactive exhibits where you can discover how the world works.

Glasgow Science Centre is a registered Scottish charity SC030809.

For more information and bookings, visit: glasgowsciencecentre.org

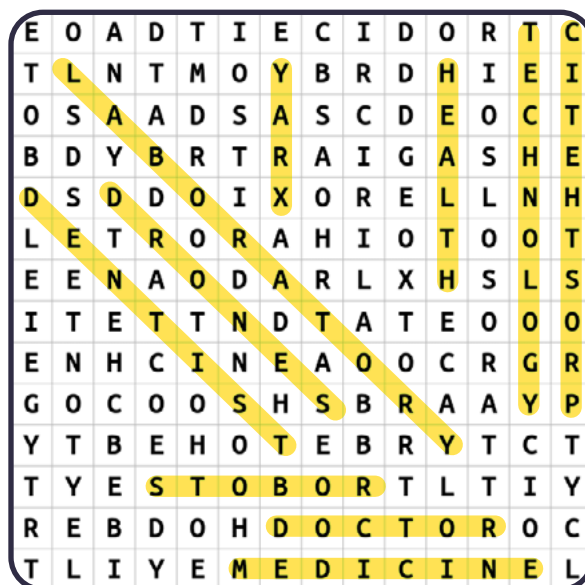
Bright Spark QUIZ ANSWERS



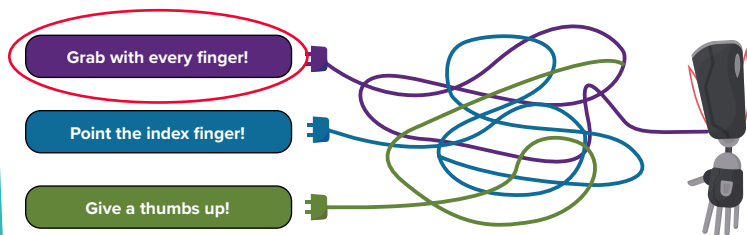
- False** Drones are flying vehicles that don't have a pilot on-board.
- C** MRI machines using 7T magnets can help create clear MRI images.
- B** Drones can transport medical supplies to hard-to-reach places.
- B** 3D dental scanners can take thousands of photos a second.
- C** Periodontists specialise in looking after the gums.
- B** Medical imaging is useful because it lets us look inside the body.
- True** X-rays are a type of radiation.
- C** There are 6 pieces of DNA hidden in this magazine! Did you find them all?
- C** Precision medicine personalises the treatment people are given.
- False** Bacteria cause cavities and toothaches.
- C** The oldest known prosthetic is a toe made by the ancient Egyptians!
- False** Brushing your teeth too soon after a fizzy drink can damage them.
- A** Ultrasounds use sound waves to scan inside the body.
- A** Brushing our teeth is important for removing food and plaque.
- C** Artificial intelligence looks for patterns in health stories to aid precision medicine.
- True** Some prosthetics can detect electrical signals from nearby muscles to move!
- True** Pacemakers are pieces of technology in the heart that help it beat normally.
- B** Modern prosthetics are often made from light-weight materials like titanium or carbon fibre.
- B** Drones are useful in healthcare because treatments can be delivered faster to rural places.
- C** Muscles are not part of our teeth.

PUZZLE SOLUTIONS

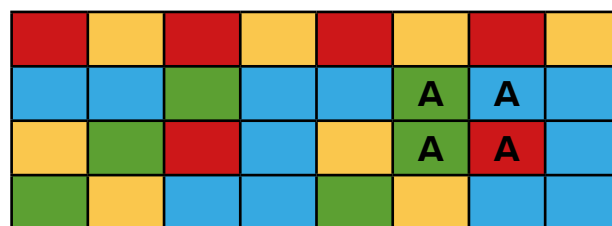
Mini Puzzle



Page 5



Page 13: Answer A) Antibiotics



WE WANT YOUR FEEDBACK

We would love to hear what you think!

We hope you liked this issue, but if you didn't, what could we change? What other things would you like to see? What topics are you most interested in?

You can scan this QR code to share your feedback.



KEEP IN TOUCH



0141 420 5000 | glasgowsciencecentre.org
50 Pacific Quay, Glasgow G51 1EA

GLASGOW
**SCIENCE
CENTRE!**

Glasgow Science Centre is a registered Scottish charity SC030809