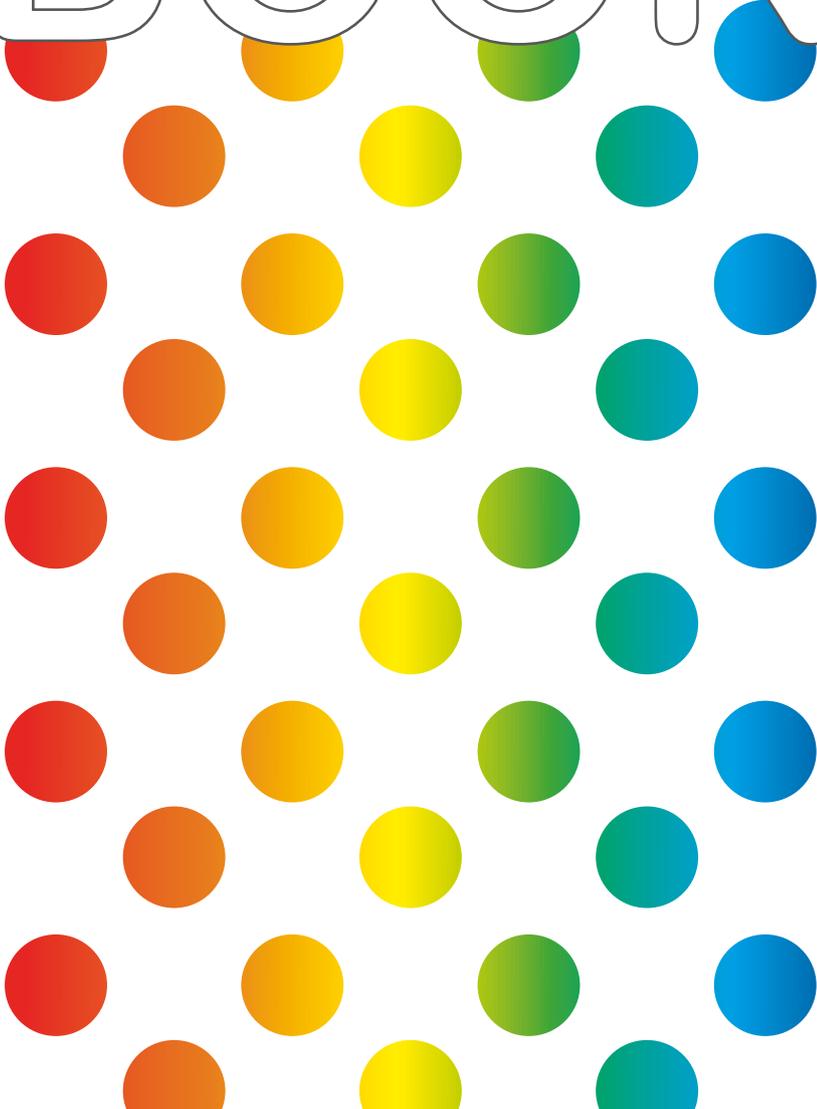


MRC
CAMBRIDGE
ACTIVITY
BOOK



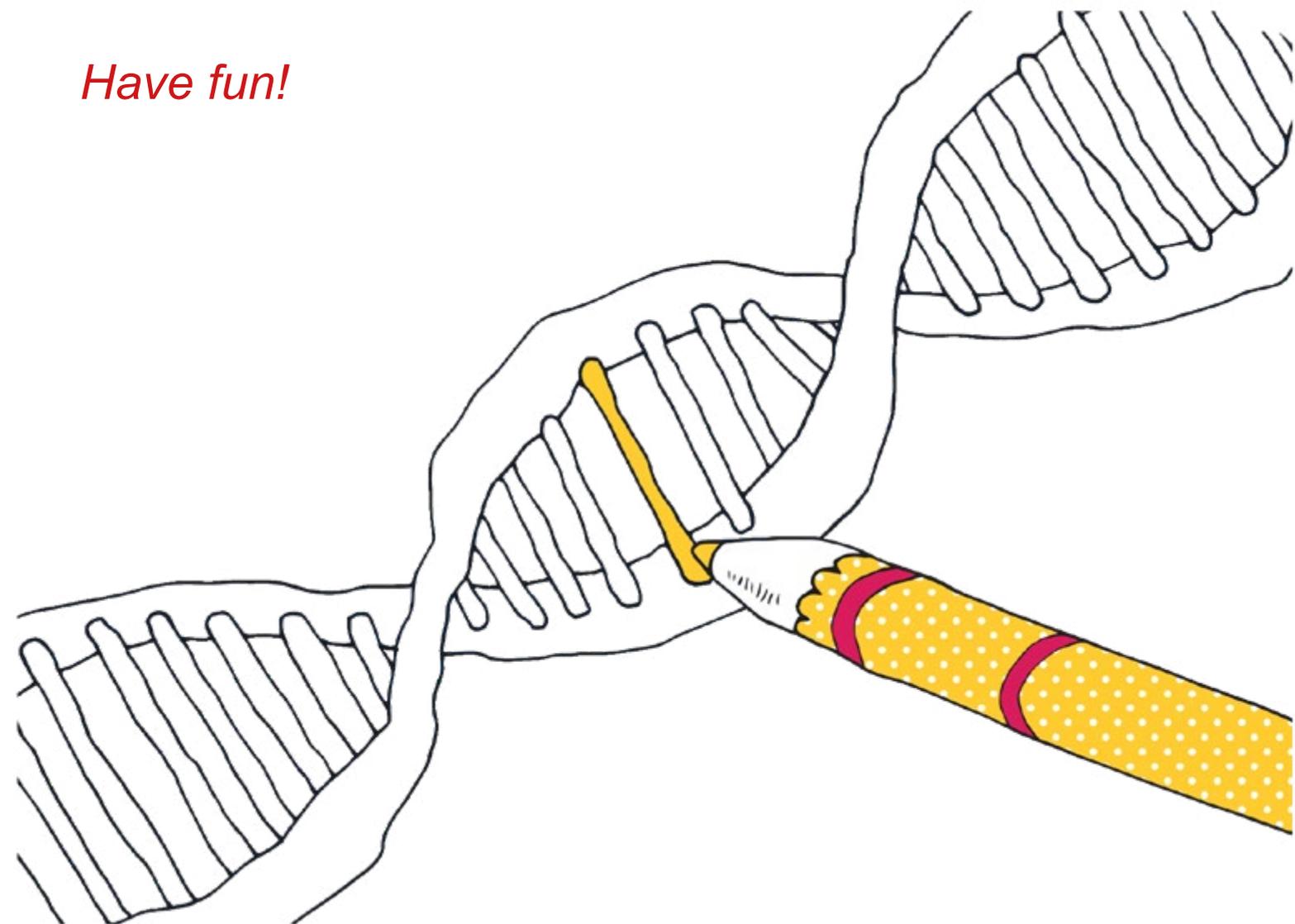
Introduction

UKRI Medical Research Council (MRC) scientists in Cambridge are studying all the different ways that medical science can help protect our health and improve our lives.

This activity book is for people of all ages to explore the variety of MRC-funded work that takes place in Cambridge. Our work involves examining everything from the cells and organs in our bodies, all the way up to the places where live... and all the things in between! Many of our scientists are currently extending this expertise into research on coronavirus.

We hope that it will get you and our researchers talking, and inspire you to learn more about our science.

Have fun!



The MRC is the UK publicly funded organisation that invests in medical research to improve health. Our research has resulted in life-changing discoveries for over 100 years. The MRC is part of UK Research and Innovation (UKRI).

For further information visit www.mrc.ukri.org / Twitter: [@The MRC](https://twitter.com/TheMRC)

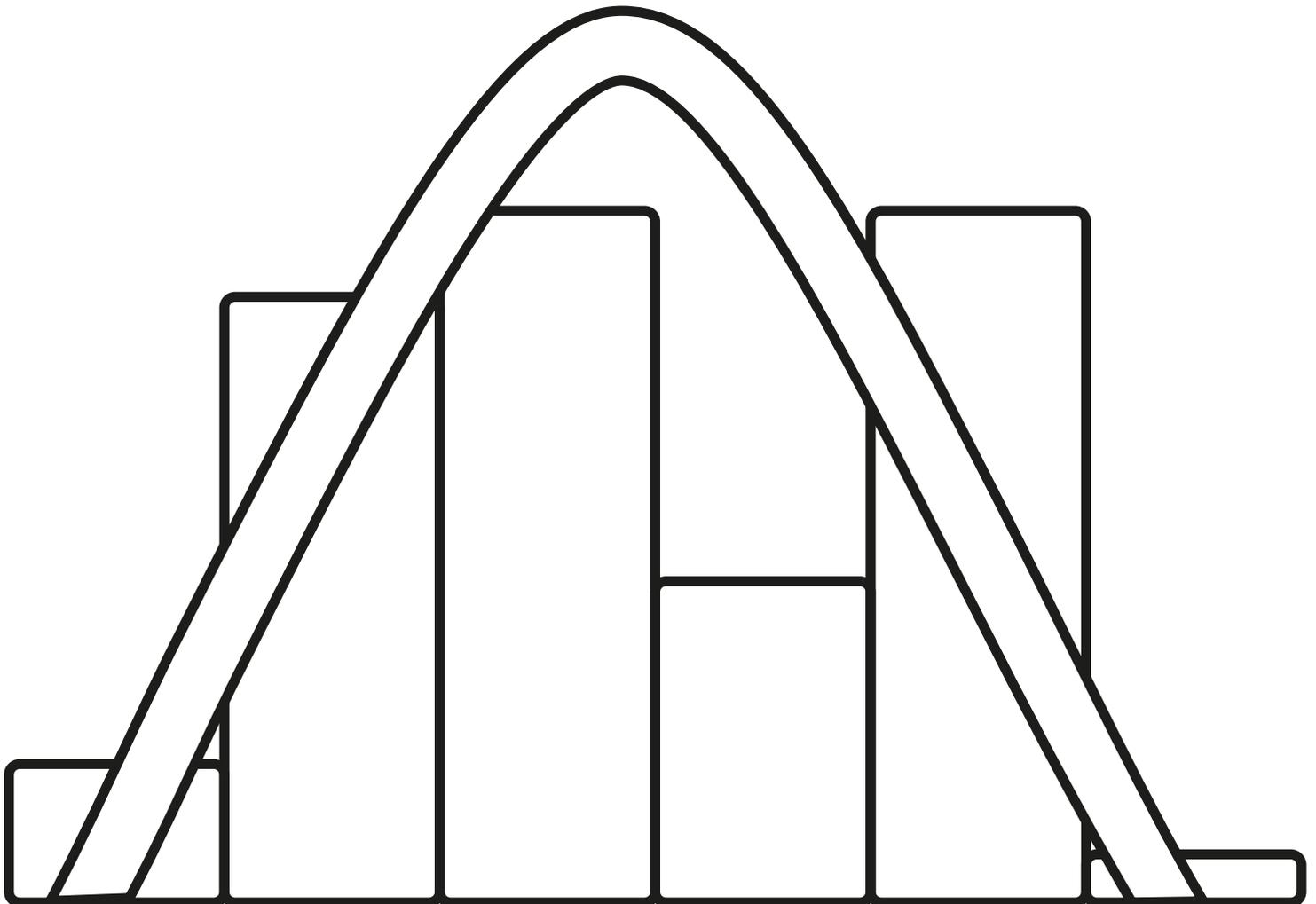


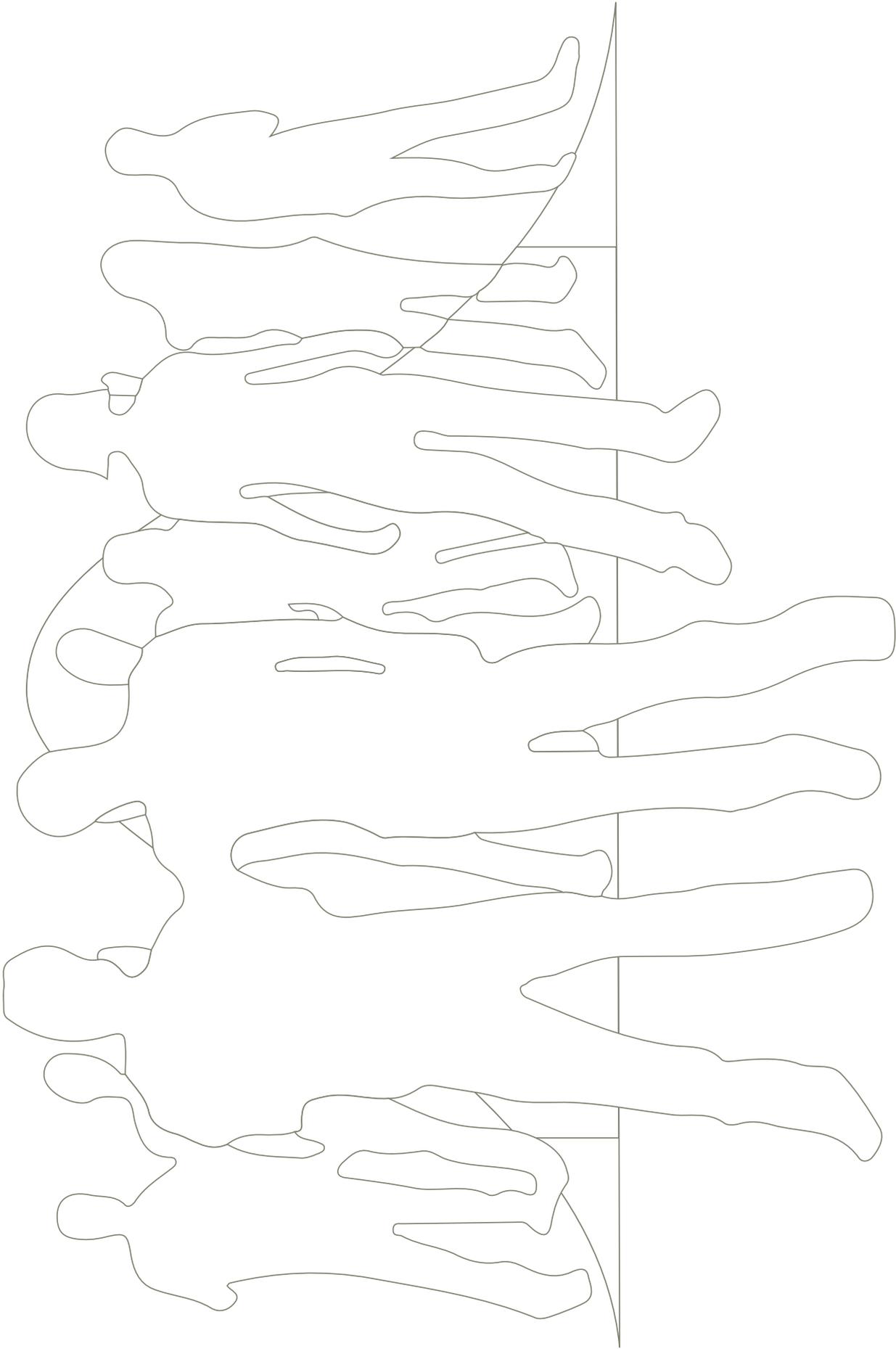
MRC Biostatistics Unit

The MRC Biostatistics Unit (BSU) is one of the largest groups of biostatisticians in Europe. Biostatisticians work with data to help make important discoveries in clinical medicine which impact public health. One example of the BSU's work is analysing data to understand the progression of diseases such as flu and the coronavirus.

The Unit was founded in 1913 at the same time as the Medical Research Council. It is well known internationally for the strength of its pioneering research, statistical training, and communication of evidence.

www.mrc-bsu.cam.ac.uk / Twitter: [@MRC_BSU](https://twitter.com/MRC_BSU)



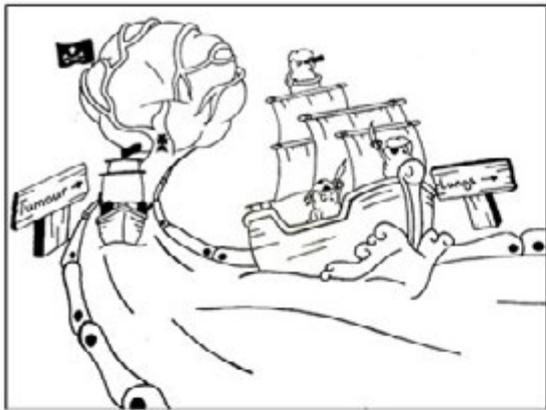


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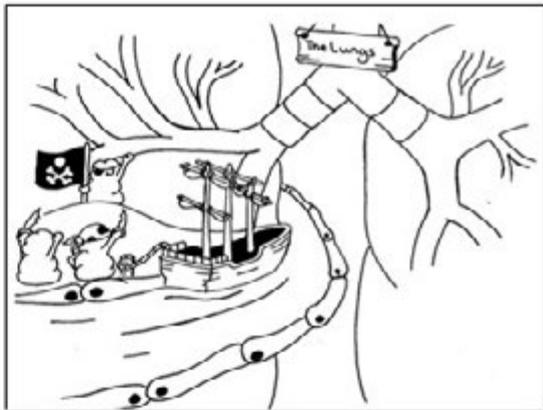
Share a photo of your colouring in on twitter with the hashtag #MRCCambridge!

Cancers arise due to uncontrolled growth of abnormal cells. There are many kinds of cancers, named according to their sites of origin, but often, cancerous cells from one part of the body will invade other organs and tissues causing the cancer to spread or undergo metastasis. However, if we can detect cancers early enough, in the right patient groups with the right kind of early treatment, we can prevent this spread from happening.

www.mrc-cu.cam.ac.uk / Twitter: [@MRC_CU](https://twitter.com/MRC_CU)

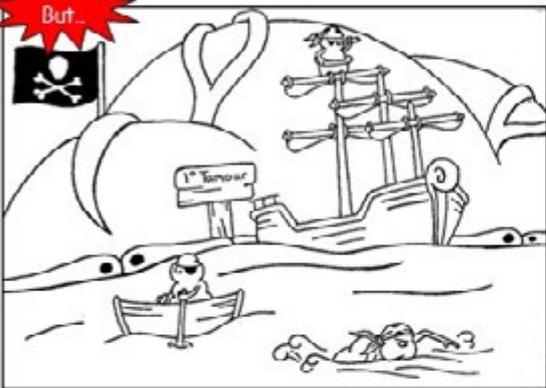


Cancer cells leave the primary tumour and enter the blood stream...

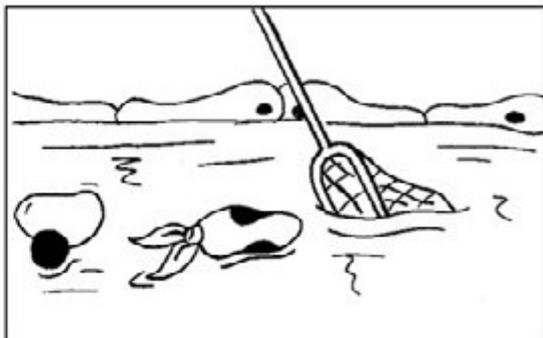


... to invade different organs and build a new home! This process is called metastasis.

But



While the primary tumour is growing and before the cells take off...



...scientists can fish them out, in loads of clever ways.



This means we can detect tumours early, and in the right patients...

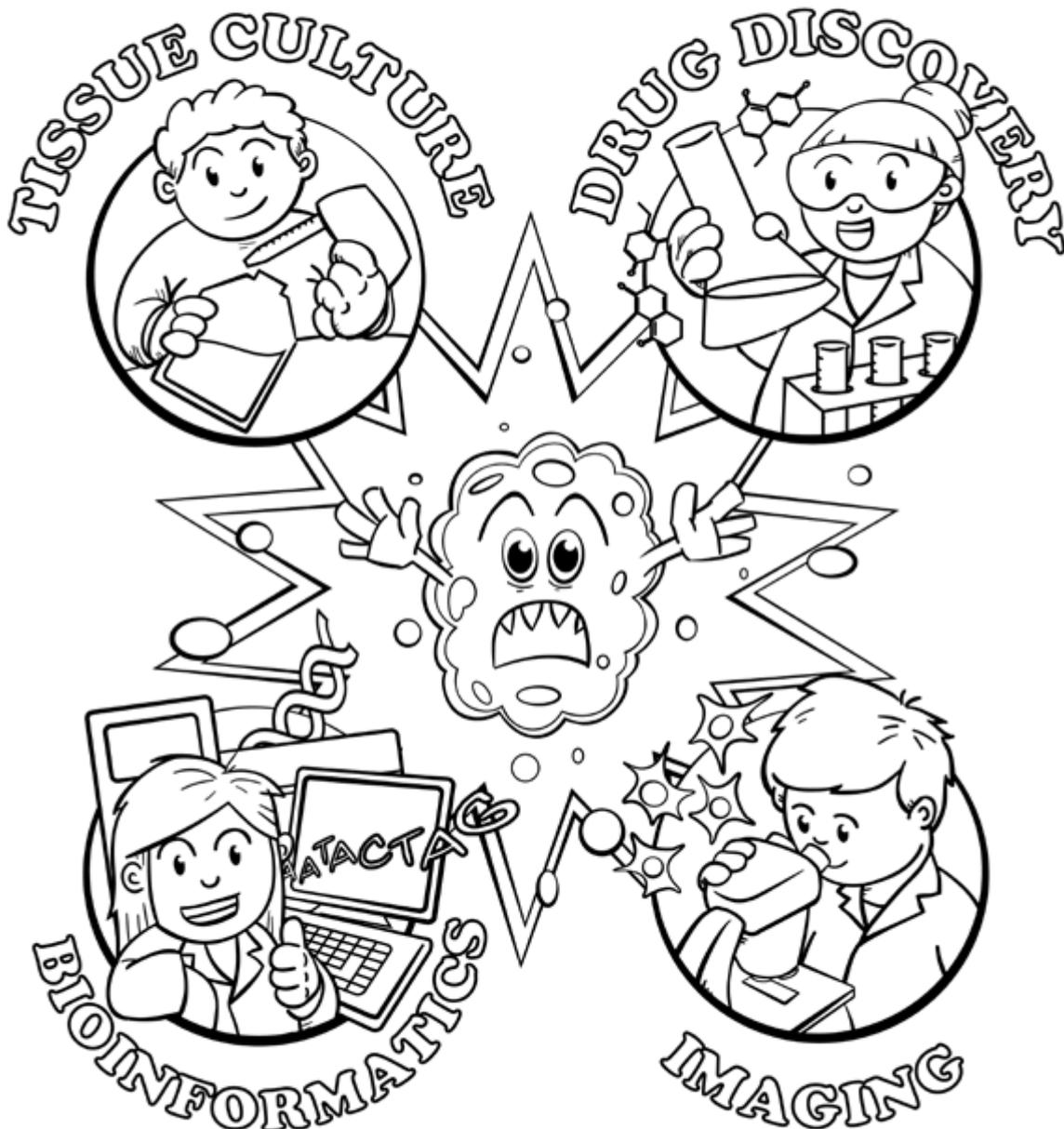


... so that we can get down to destroying them, before they metastasise.

Game Set Match!

The **MRC Cancer Unit**'s goal is to study the *earliest* steps in the development of cancer. Our researchers work on different types of cancers and use different techniques to study the disease, but all with the central aim of (1) early detection, (2) early identification of those most at risk of developing cancer and (3) developing ways of early intervention. We believe that this is the most effective way of combating this disease.

WE'VE GOT CANCER UNDER ATTACK..



..IN LOADS OF CLEVER WAYS!

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MRC

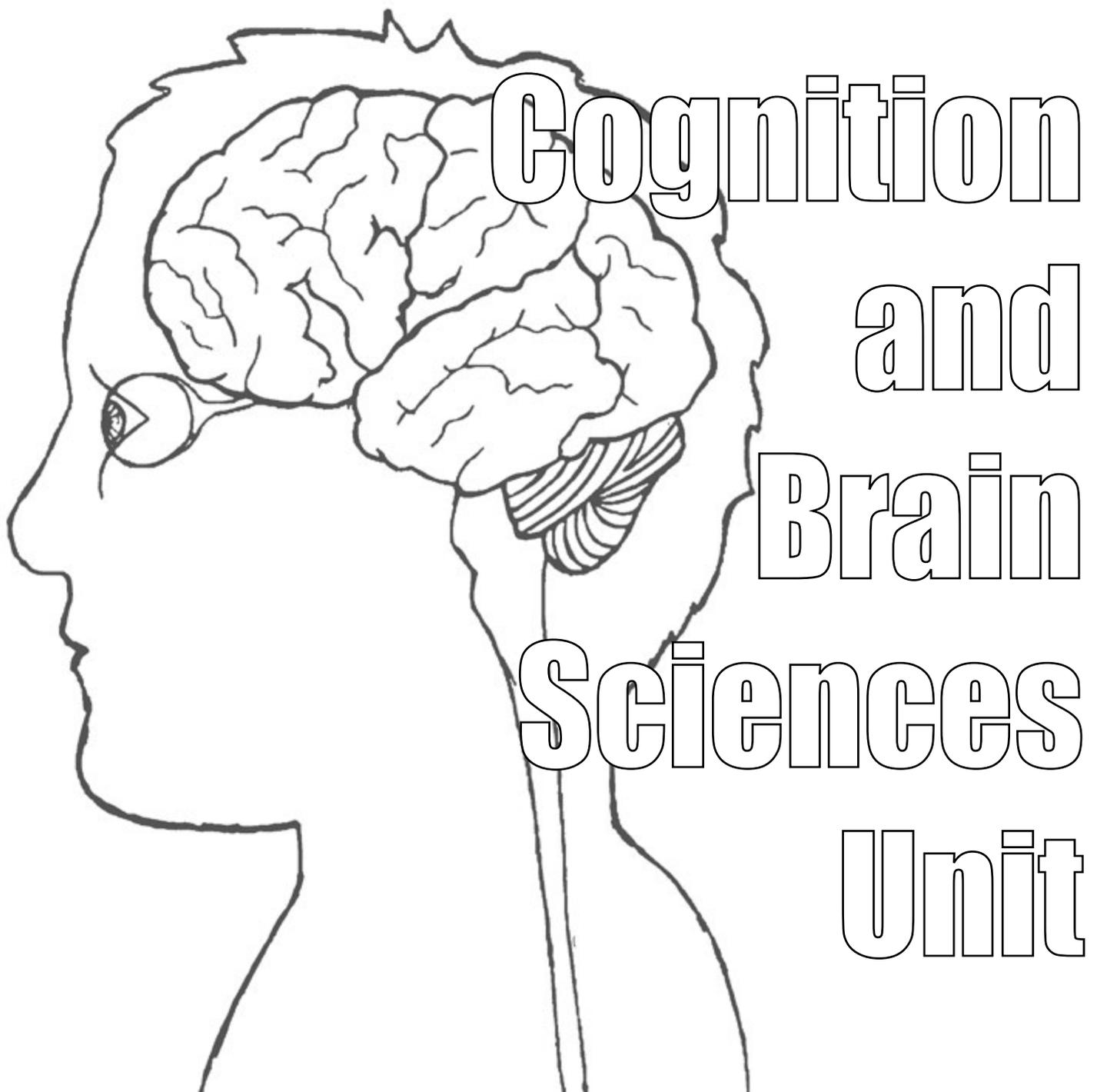
Cognition and
Brain Sciences Unit



UNIVERSITY OF
CAMBRIDGE

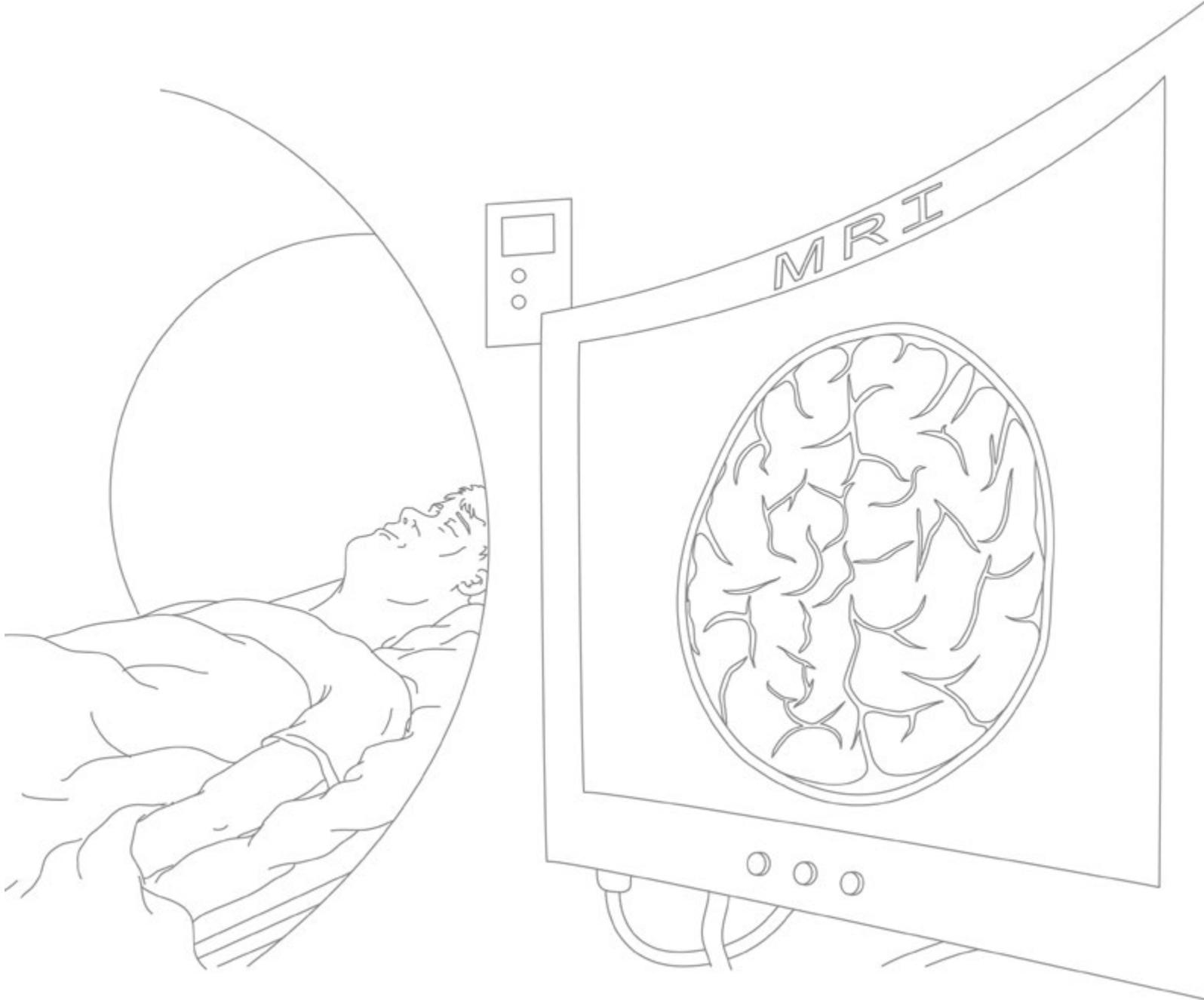
At the **MRC Cognition and Brain Sciences Unit (CBU)** we study how the brain is involved in making us think and feel. The Unit has over 90 scientists investigating topics such as attention, emotion, language and memory. For example, we are developing new treatments for depression, improving hearing through cochlear implants, and helping children to overcome memory problems. As well as our excellent research, our Unit supports the careers of scientists at all stages of their careers.

www.mrc-cbu.cam.ac.uk / *Twitter:* [@mrccbu](https://twitter.com/mrccbu)



MRI image

MRI means Magnetic Resonance Imaging. It is done by a machine that takes lots of pictures of the brain that we can study. Our MRI research is used by a number of different research programmes at CBU.



www.mrc-cbu.cam.ac.uk / Twitter: [@mrccbu](https://twitter.com/mrccbu)

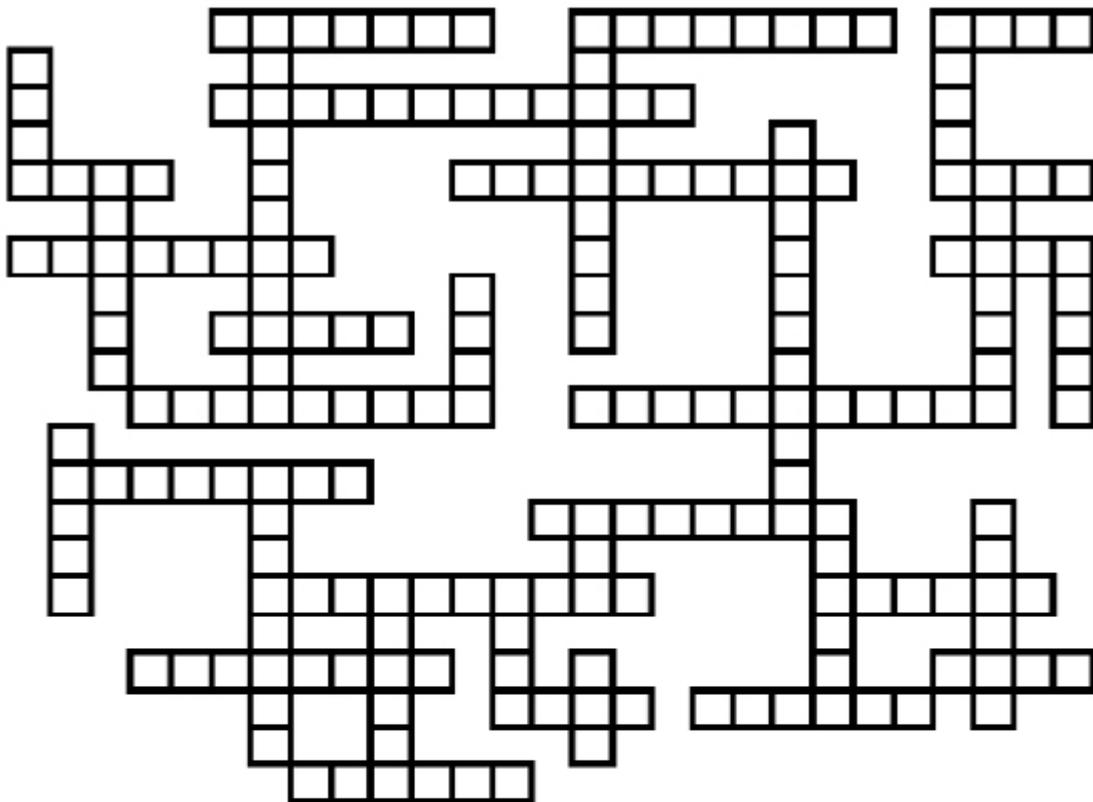
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At the **MRC Epidemiology Unit**, scientists study how the genes we inherit, our upbringing and the places we live affect our chances of becoming overweight and developing type 2 diabetes and other diseases.

www.mrc-epid.cam.ac.uk / **Twitter: @MRC_Epid**

How do we know how accurate measures of food intake are?

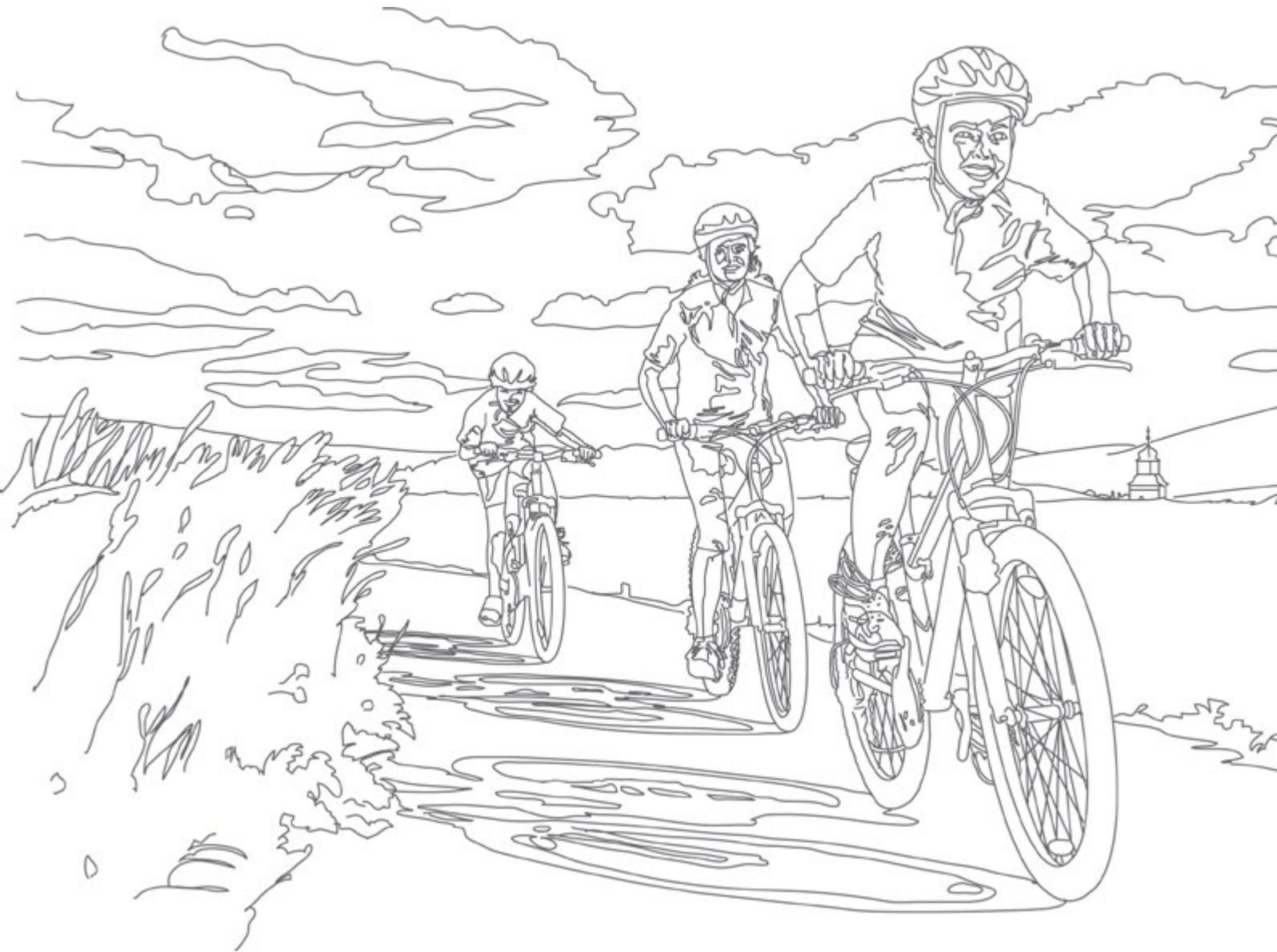
At the MRC Epidemiology Unit, we have collected information on food intake for the UK National Diet and Nutrition Survey. The survey assesses the dietary habits and nutritional status of adults and children in the UK. To understand the accuracy of our measure of food intake, we use stable isotopes to measure energy expenditure and compare the data. Why not try our energy expenditure word puzzle and see if you can solve it?



Can you fit all the listed word into the correct places in the grid?

- | | | | | |
|-------------------|------------------|-------------------|-------------------|------------------|
| 3 letters | 4 letters | 5 letters | 6 letters | 7 letters |
| FAT | ATOM | BLOOD | ENERGY | ISOTOPE |
| ION | BODY | DIARY | METHOD | NEUTRON |
| 9 letters | DIET | HUMAN | MODELS | 8 letters |
| NUTRITION | DOSE | WEIGH | OXYGEN | ANALYSIS |
| SCIENTIST | FOOD | 11 letters | PROTON | ELECTRON |
| 10 letters | LEAN | COMPOSITION | SAMPLE | HYDROGEN |
| EXPERIMENT | MASS | EXPENDITURE | STABLE | NITROGEN |
| VALIDATION | MEAL | INVESTIGATE | 12 letters | RESEARCH |
| | TEST | | SPECTROMETRY | VITAMINS |

Unfortunately the number of people becoming overweight and getting diseases such as type 2 diabetes is increasing across the world. By understanding more about how and why these diseases affect different individuals and groups, we can help more people stay healthy, and improve treatment for those who need it.



These children have somewhere safe and convenient to cycle, helping them get plenty of exercise. Our scientists are finding out how exercise affects our health, as well as discovering ways that the world around us can help us stay active.

www.mrc-epid.cam.ac.uk / Twitter: [@MRC_Epid](https://twitter.com/MRC_Epid)

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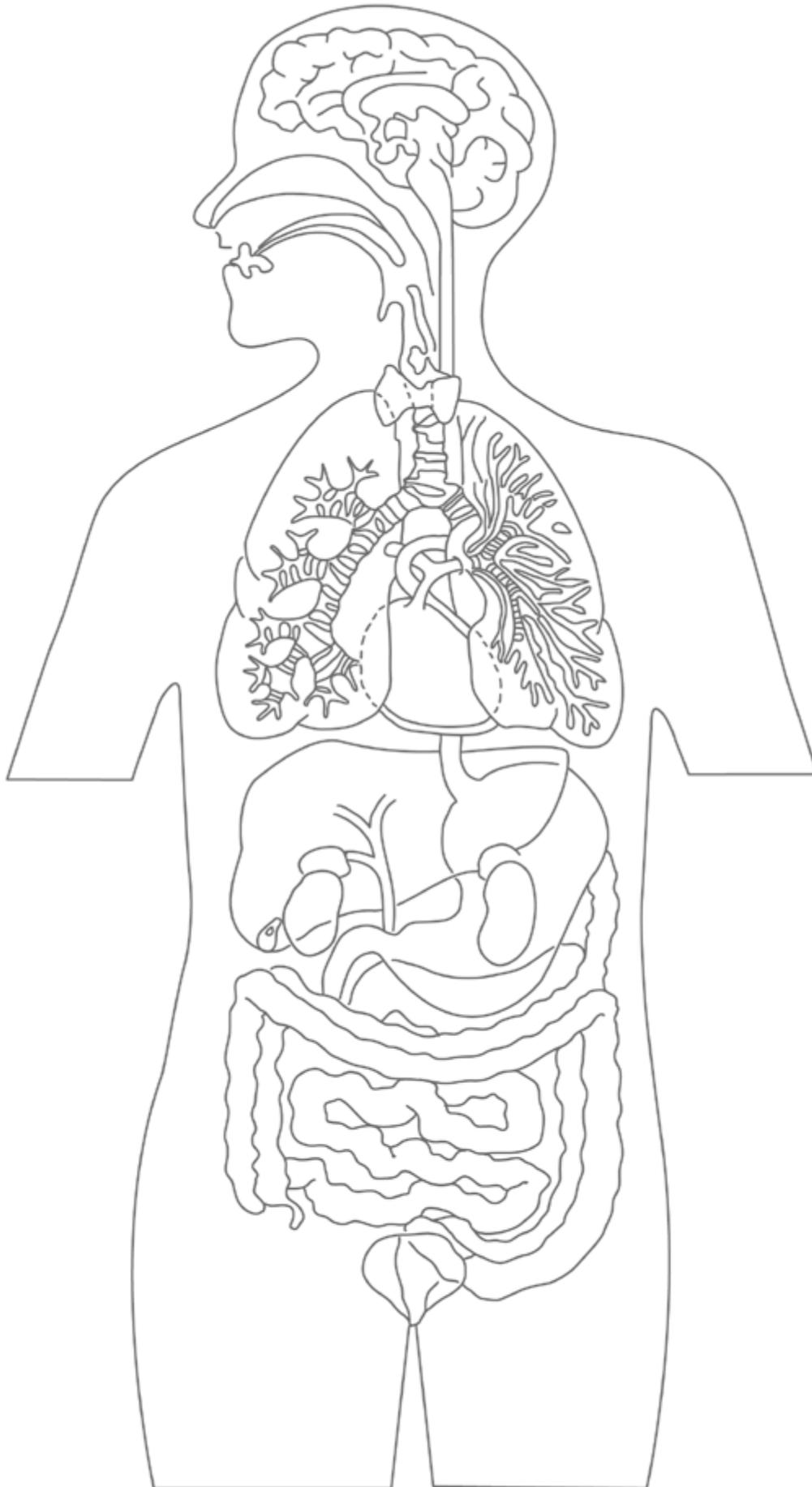


Research at the **MRC Metabolic Diseases Unit** is improving our understanding of why some people are more likely than others to become obese. The research is also telling us why obesity causes some people to develop conditions such as type 2 diabetes when others do not.

www.mrl.ims.cam.ac.uk/mrc-metabolic-diseases-unit / **Twitter: @MRL_Cam**



Our goal is to turn scientific discoveries into practical solutions to prevent and treat these conditions.



www.mrl.ims.cam.ac.uk/mrc-metabolic-diseases-unit / Twitter: [@MRL_Cam](https://twitter.com/MRL_Cam)

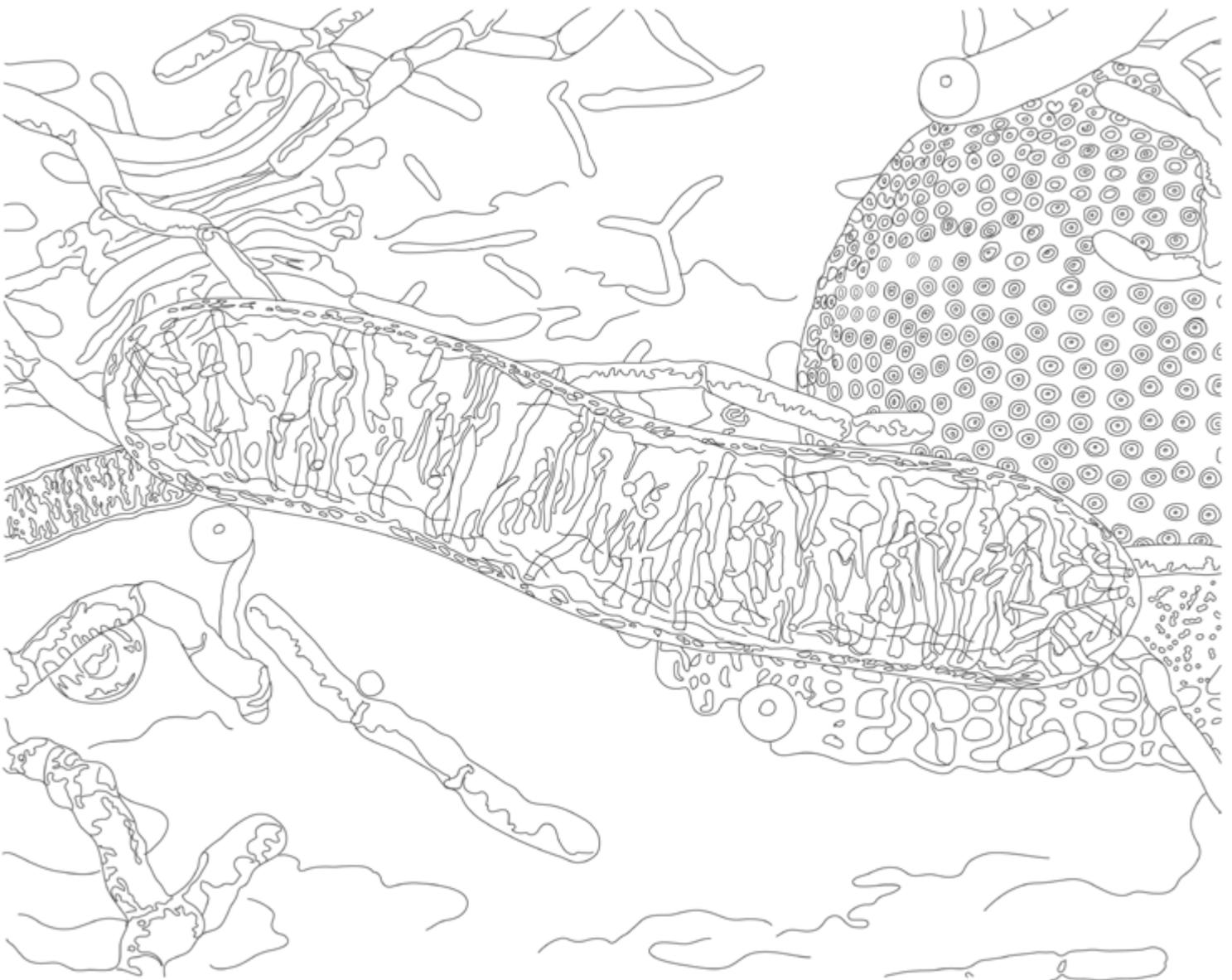
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Research at the **MRC Mitochondrial Biology Unit (MBU)** is focused on an important part of cells called mitochondria. These mitochondria play a part in a large number of human diseases, and may also be involved in the process of ageing.

Our scientists are working to understand the fundamental processes taking place in mitochondria, and how these processes are involved in human disease. This will allow us to develop new treatments and therapies.

www.mrc-mbu.cam.ac.uk / Twitter: [@MRC_MBU](https://twitter.com/MRC_MBU)

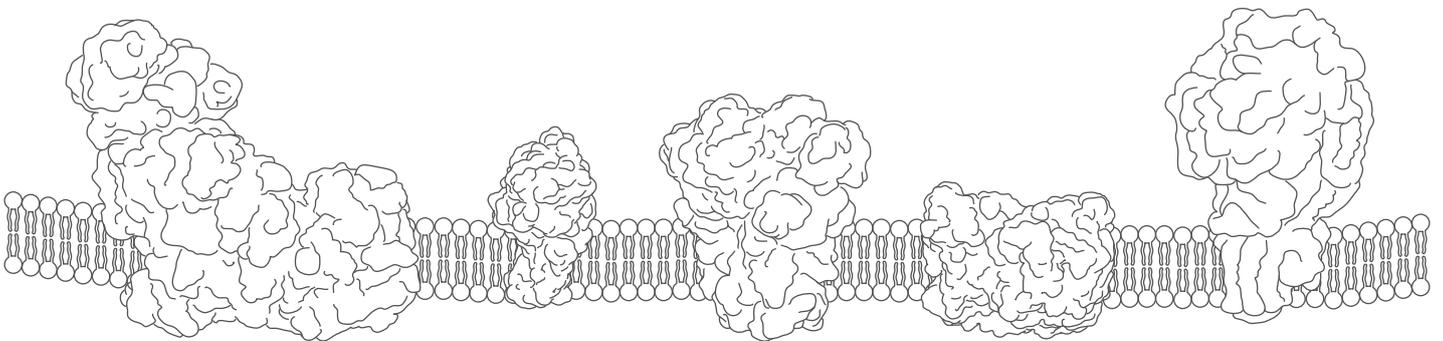


Mitochondria

These are the “powerhouses of the cell”. They are responsible for turning energy from sugars and fats that we eat into a chemical called ATP. This energy can then power the body so that we can do all the things we need to do to keep living.

K A Y M I N L E M P L U E W S W E C H S S Q W M B
 S M G G D O C G H X P M B P P F L Y F C O D T H J
 Y T S H R T X Y W I D A M Y K A T U I I E F D D C
 O Q A R H E S X P M I K S U J F Y T O E X G K R I
 N U J C E I N E J R E B M B S O E V G N B G W W F
 A O A G O I T E D S S U I S I N E S S C I F H A M
 Z R I L G T R N D E W O C T E A P X C E G H U Q H
 P X O T E L O R T V Q H R G N U U D I T P H K T E
 E G G E A H I V A H C Q O A S A H O T R A P K E K
 Y G J S C R K D J C V F S V R K A O A V T J G J U
 R F T O B U E E Y E N I C I D E M F M E R X J E F
 X S T J I I B N F S I J O G B Z D E R U H W E M Q
 U I T G G N O W E Z F W P G F O R R O T U O L P G
 M N T A U L L L X G U U E Z U E D T F G S A W W K
 G E N O M I C S O O E N N G N V C Q N I F D E N K
 O G X W P C N M J G B D X C X U A Q I X I B X L C
 P L N K N H H L N H Y R O I T G C J O E A Y O Y I
 A T P S Y N T H A S E F P R Q I K L I L N O B U P
 H K I L P D H N X W G I T U U J O R B P C S Z V L
 L J M F X P X T F K N A F C A E G N O M F F K H S
 U F U N P E D S J N F M K L L A N J B O H N A C K
 P R T E S A E S I D C X T R D S U J T C X M V X C
 D G U H G D Q J L S S C Q J O L H P N W G A N F M
 T C L I Y P Z U P U D F S O W G M Y O U D K K R J
 J V A V W C H D S I K Q T S C F F Y P G S Y M C Z

ATPSYNTHASE
 BIOINFORMATICS
 BIOLOGY
 CARRIERS
 COMPLEXI
 COOL
 DISEASE
 DYSFUNCTION
 ENERGY
 FOOD
 FUN
 GENETICS
 GENOMICS
 MEDICINE
 MICROSCOPE
 MITOCHONDRIA
 NEURODEGENERATION
 PHYSIOLOGY
 PIPETTE
 SCIENCE



Five key protein complexes

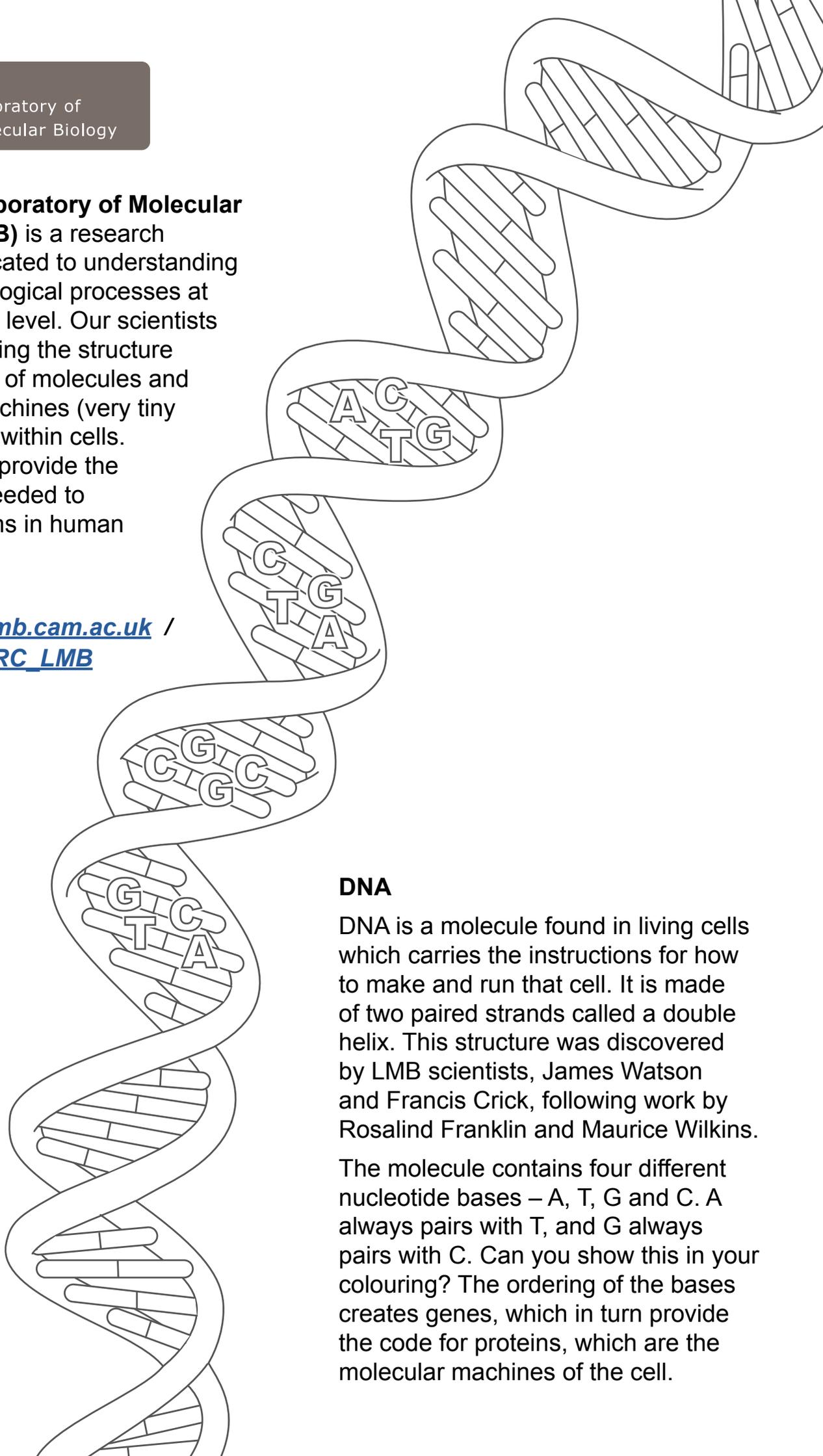
These proteins, known as the respiratory chain, are embedded in a lipid layer (a kind of fat). The proteins perform part of the process to release energy in cells. The proteins need the oxygen that we breathe to complete their job. If the oxygen that is supplied by the blood is stopped, for example during a heart attack or stroke, then mitochondria can no longer do their job. This can damage organs such as the brain and heart. A respiratory chain that works properly is essential to sustain human life.

www.mrc-mbu.cam.ac.uk / Twitter: [@MRC MBU](https://twitter.com/MRC_MBU)

Share a photo of your colouring in on twitter with the hashtag #MRCCambridge!

The **MRC Laboratory of Molecular Biology (LMB)** is a research institute dedicated to understanding important biological processes at the molecular level. Our scientists are investigating the structure and functions of molecules and molecular machines (very tiny components) within cells. Our aim is to provide the knowledge needed to solve problems in human health.

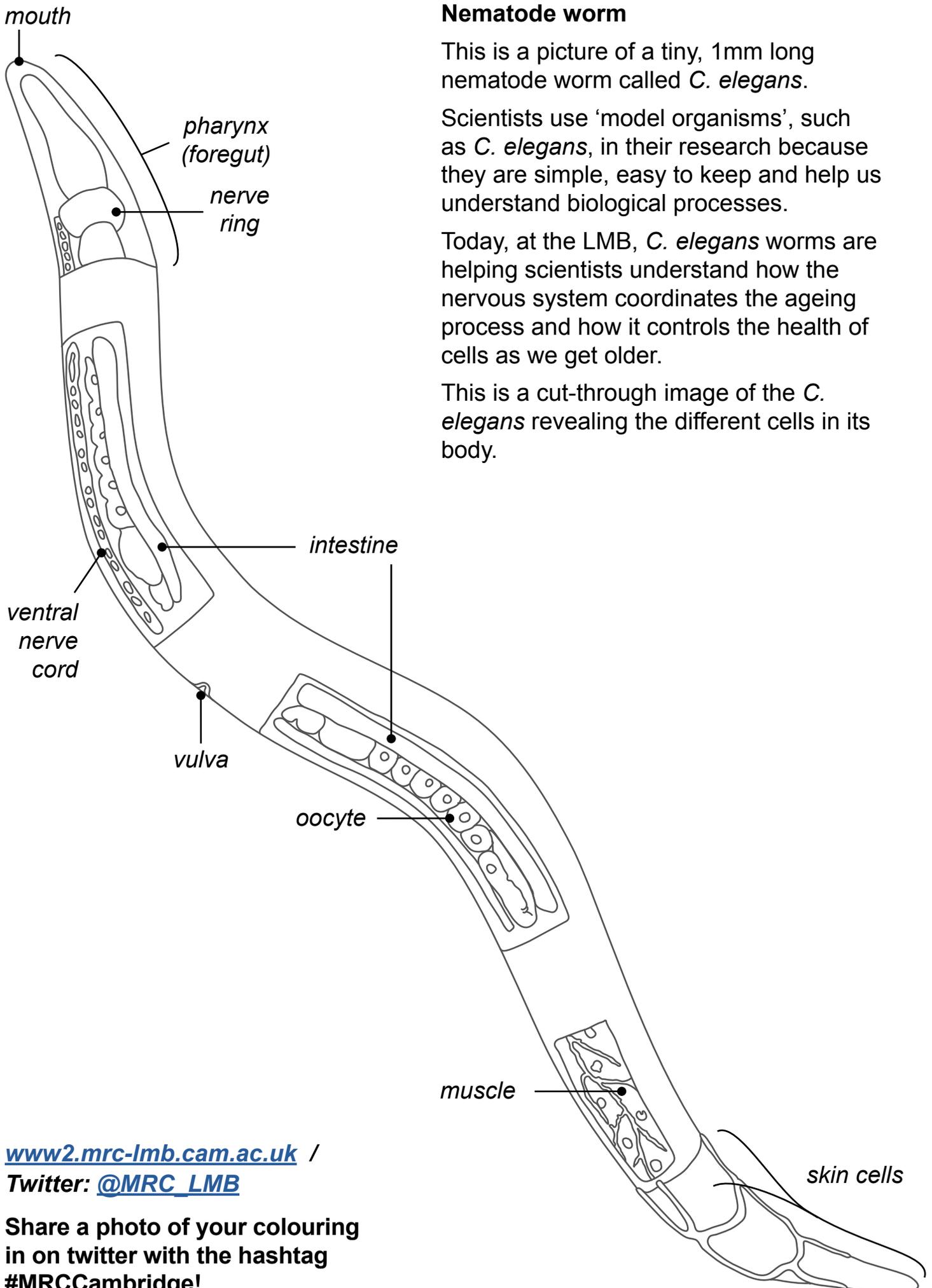
www2.mrc-lmb.cam.ac.uk /
Twitter: [@MRC_LMB](https://twitter.com/MRC_LMB)



DNA

DNA is a molecule found in living cells which carries the instructions for how to make and run that cell. It is made of two paired strands called a double helix. This structure was discovered by LMB scientists, James Watson and Francis Crick, following work by Rosalind Franklin and Maurice Wilkins.

The molecule contains four different nucleotide bases – A, T, G and C. A always pairs with T, and G always pairs with C. Can you show this in your colouring? The ordering of the bases creates genes, which in turn provide the code for proteins, which are the molecular machines of the cell.



Nematode worm

This is a picture of a tiny, 1mm long nematode worm called *C. elegans*.

Scientists use 'model organisms', such as *C. elegans*, in their research because they are simple, easy to keep and help us understand biological processes.

Today, at the LMB, *C. elegans* worms are helping scientists understand how the nervous system coordinates the ageing process and how it controls the health of cells as we get older.

This is a cut-through image of the *C. elegans* revealing the different cells in its body.

www2.mrc-lmb.cam.ac.uk /

Twitter: [@MRC_LMB](https://twitter.com/MRC_LMB)

Share a photo of your colouring
in on twitter with the hashtag
#MRCCambridge!

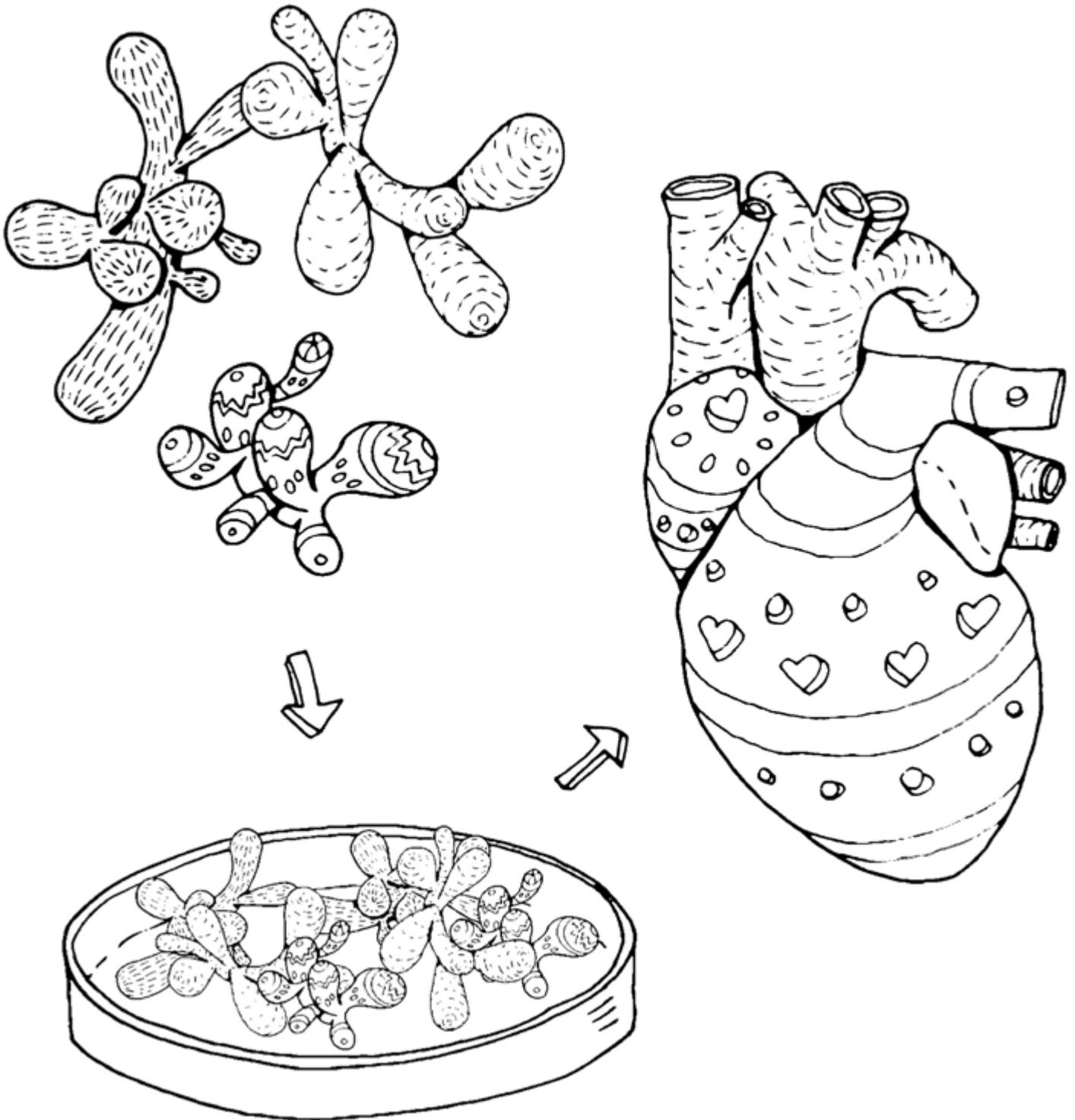
The **Cambridge Stem Cell Institute** is a centre of excellence in stem cell biology and regenerative medicine – the process of replacing, engineering or regenerating human cells and tissues. The Institute is supported by **Wellcome** and the **Medical Research Council**. The Institute has over 300 scientists who are working to understand more about diseases by learning about stem cells.

These are a type of cells that act as a repair system for the body or produce many different kinds of new cells through a process called differentiation. By understanding more about these cells we may be able to prevent and treat more diseases.

www.stemcells.cam.ac.uk / **Twitter: @SCICambridge**



Scientists at the Cambridge Stem Cell Institute try to better understand disease by growing and studying mini versions of the body's organs in the lab. They also turn cells from patients back into stem cells to understand how their diseases developed in the first place.



www.stemcells.cam.ac.uk / Twitter: [@SCICambridge](https://twitter.com/SCICambridge)

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