



INFECTION INFECTION TIME FOR DETECTION

Explore the role
of microbiology
within the

NHS



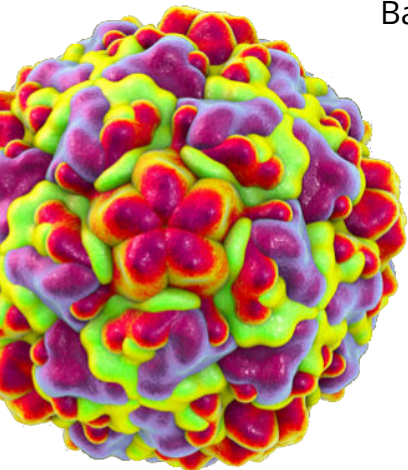
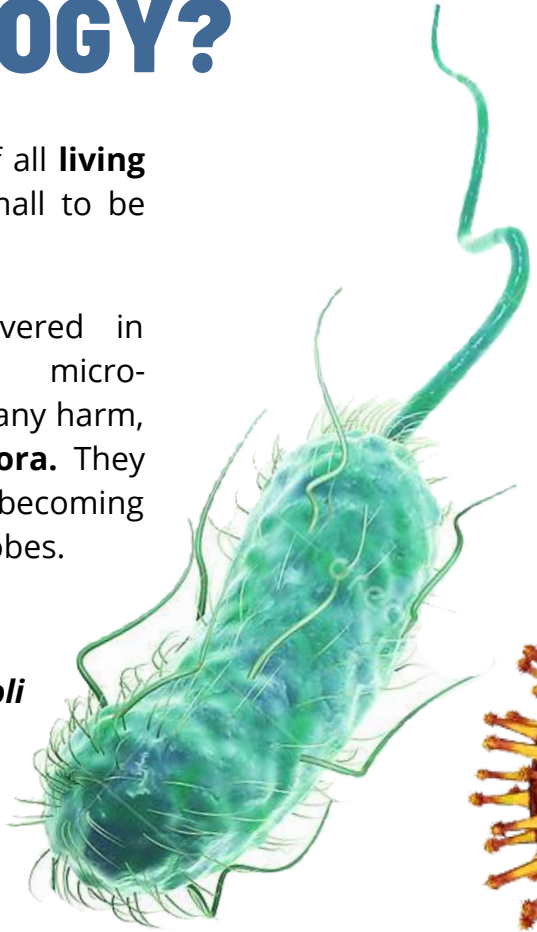
WHAT IS MICROBIOLOGY?

Microbiology is the study of all **living organisms** that are too small to be visible with the naked eye.

The human body is covered in millions of individual micro-organisms that don't do us any harm, known as **normal body flora**. They help to protect us from becoming infected with **harmful** microbes.

Escherichia coli

Bacteria



Common Cold

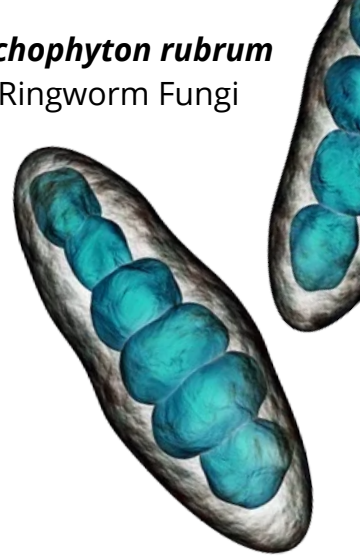
Rhinovirus

However, a few harmful microbes (such as some **bacteria**, **viruses**, and **fungi**) can invade our body and make us ill. Microbes that cause disease are called **pathogens**. How many do you know of?

To cause an infection, pathogens must enter our bodies. Pathogens can enter the body through the **respiratory tract** (mouth and nose, e.g. influenza virus which causes the flu), the **gastrointestinal tract** (mouth oral cavity, e.g. *Vibrio cholerae* which causes cholera), the **urogenital tract** (e.g. *Escherichia coli* which causes cystitis), or through **breaks in the skin** surface (e.g. *Clostridium tetani* which causes tetanus).

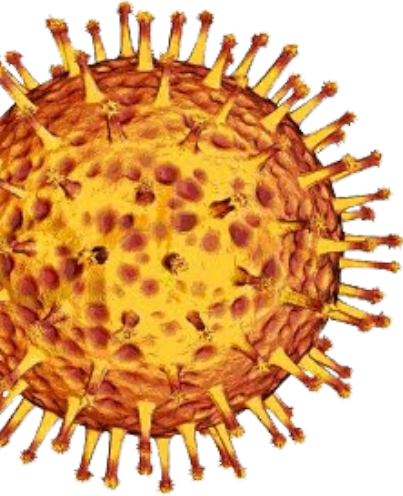
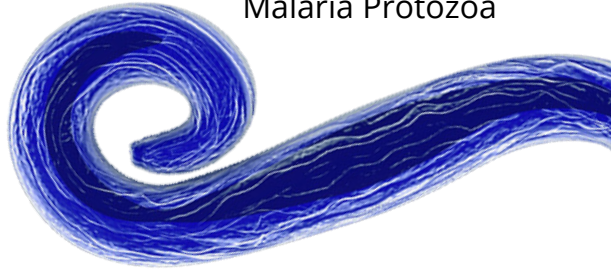
Richophyton rubrum

Ringworm Fungi



Plasmodium falciparum

Malaria Protozoa

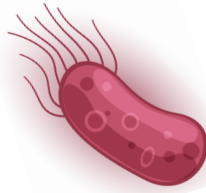


Measles

Rubella Virus

Different pathogens require different treatments. For example, bacteria can be treated with **antibiotics**, but viruses can't. Taking antibiotics when they are not needed causes more harm than good, and can result in **antibiotic resistance**.

Correct treatment relies on correct **diagnosis**. This is carried out by a sample given to microbiologists working within the NHS.



THE JO

FROM SAMPLE

A patient goes to his local NHS doctors' surgery complaining of pain when urinating. The doctor takes a urine sample and performs a **dipstick** test.

1

The sample is picked up by a medical microbiologist - a biomedical scientist within the NHS who specialises in **bacterial** diseases.

2

3

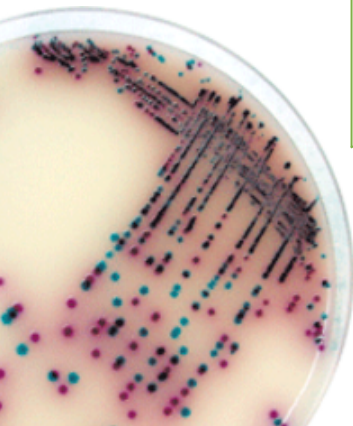
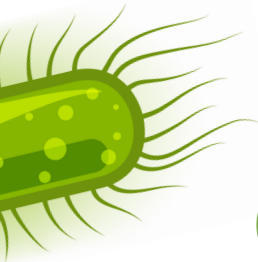
On this occasion, the doctor cannot confirm an accurate diagnosis, so the sample is sent the local NHS hospital.

4

The microbiologist spreads the sample onto a **chromogenic agar plate**, and incubates it at 37°C overnight.

5

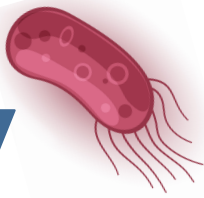
In the morning, the the plate is analysed for **colour** and **growth**.



NHS

URNEY

TO DIAGNOSIS



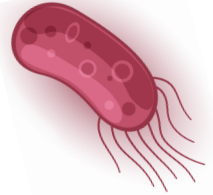
The patient pays a small **contribution** towards the antibiotics, but the rest is heavily subsidised by the NHS. After completing the **full course**, the patient's treatment is complete.

In the morning, the results are analysed to identify which antibiotic has the **best effect** on the bacteria.

NHS

8

10

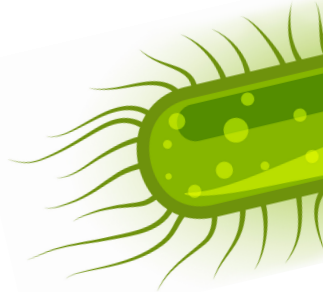


9

The medical microbiologist informs the doctor of which antibiotic to **prescribe** to the patient.

7

The bacteria is turned into a solution and different types of **antibiotics** are dotted around it. It is placed back in the incubator at 37°C overnight.



6

Using **mass-spectrometry**, the sample is analysed further to identify the species of bacteria.

A technique that measures the molecules present in a sample.



MICROBIOLOGY IN BIOMEDICAL SCIENCE

Any samples taken by doctors or nurses are usually sent to an **NHS pathology laboratory** to be analysed by a biomedical scientist.

There are different disciplines of biomedical science, including genetic pathology, cell sciences, blood sciences, and **infection sciences**. Microbiologists and virologists are the scientists behind infection sciences.

Microbiologists working in biomedical science identify bacteria, fungi, and parasites and test their sensitivity to specific antibiotics. Whereas **virologists** focus upon viruses, such as measles and HIV, and are involved in monitoring the effects of vaccines.

Every year in the UK, biomedical scientists handle over **150 million** samples, and over **70%** of medical diagnoses are based on their test results. Without a biomedical scientist, diagnosis and treatment would be less effective.

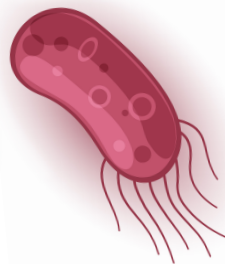


The Institute of Biomedical Science is the **leading** professional body in the field of biomedical science.

Biomedical Scientist is a protected title, and those practicing must meet certain criteria.

#AtTheHeartOfHealthcare

IS MICROBIOLOGY FOR YOU?



If you're interested in a career as a microbiologist you'll need a university degree. To get onto a degree in microbiology you will usually need five GCSEs (A-C), including science, English and maths, as well as at least two A levels, including **biology** and preferably **chemistry**, or a BTEC Extended Diploma in applied sciences or medical sciences.



After university, you may find employment in these areas:

- **Biomedical science** as a medical microbiologist working for the **NHS** (An accredited degree in Biomedical science is required to become a practicing biomedical scientist in microbiology)
- **Research** scientist in industrial or medical microbiology
- **Environmental** and agricultural microbiologist
- **Food processing** microbiologist including brewing
- Education as a **teacher** or after further studies as a **University Academic**



To learn more about biochemistry careers, scan the QR code with your smart phone camera, or visit [microbiologysociety.org/careers.html](https://www.microbiologysociety.org/careers.html)

NOTES



