

Understanding how we test samples for infection in our laboratories: information for families

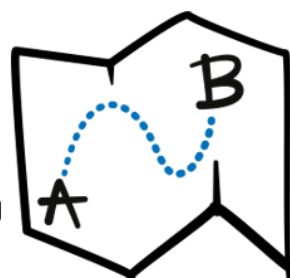
When someone has an infection, germs including bacteria, viruses or fungi invade the body, causing signs like fever and chills, aches and pains, and feeling generally unwell. Bacteria, viruses and fungi can show up in body fluids, such as blood, urine (wee), faeces (poo), sputum (spit), cerebrospinal fluid (CSF) bone marrow and skin cells. By taking a sample of these fluids, we can test them in our laboratory to find out the exact type but also see which medicines are most likely to work to destroy them. This information sheet from Great Ormond Street Hospital (GOSH) explains how we test samples for infection in our laboratories. An Easy Read information sheet is included for your child.

Germs – bacteria, viruses and fungi – are all around us wherever we go. They don't always cause problems – we also have 'good bacteria', which keeps everything in balance in our digestive system so we can keep well. There are good fungi too – especially the sort that make blue cheese such as stilton. Viruses are often used in developing immunisations or treatment. However, sometimes germs cause us problems – especially if we are unwell or our immune system doesn't work properly.

There are four main types of germ: bacteria, viruses, fungi and protozoa. They each work in a different way and have different effects. None of them are visible unless you use a microscope to look at them.

- **Bacterium (plural = bacteria)** – A bacterium is a single cell that lives off wherever it is present. There are good bacteria that live in our digestive system but bacteria can cause problems if they are where they're not supposed to be.

- **Virus (plural = viruses)** – A virus is even smaller than a bacterium and are made up of genetic material inside a protein. They can't survive for long without a host to enable them to multiply which is why handwashing with soap and water and disinfecting surfaces is so important to prevent viral infections.
- **Fungus (plural = fungi)** – A fungus is like a mushroom that lives off wherever it is present, particularly in dark and damp places. If you are otherwise healthy, a fungal infection shouldn't cause any problems but if you already have a weak immune system, they can be more serious.
- **Protozoa** are also made of one cell, like bacteria, but they bigger and are more like other cells, with a nucleus (centre) and other structures. Protozoa thrive in damp places and some types live off wherever it is present. Some protozoa have a hard shell so they can live on for ages away from a host.



How are samples of body fluids taken for testing?

This depends on the sample needed for testing – here’s a short description of how samples are collected, in some cases, more detailed information is available on our website at www.gosh.nhs.uk.

- **Blood samples** – These are taken from a vein usually in the hand or arm using a small needle. We always offer children and young people local anaesthetic cream or cold spray before we take a blood sample. This makes their skin numb so they don’t feel the blood test so much. Read our Easy Read information *Having a blood test with your child* to know what will happen.
- **Urine (wee) samples** – These are collected in a pot or tube while weeing. It is important to wash between the legs first, then let a bit of wee out first, then start to collect it. Sometimes, the doctor might be able to do simple tests straightaway, using a dipstick, but others need to be sent to the laboratory. Most of the time, our laboratories don’t need much wee – a test tube or specimen pot is enough.
- **Faeces (poo) samples** – This is collected by catching the poo in a container before it goes in the toilet to be flushed away. Again, our laboratories won’t need all the poo so you can put a small amount in the specimen pot with a spoon (which is usually provided in the sample container).
- **Sputum (spit) samples** – This is collected by coughing mucus or phlegm into a specimen pot. The laboratories won’t need much sputum so one big cough is usually enough to get the sample.
- **Cerebrospinal fluid (CSF) samples** – CSF is the watery liquid that surrounds the brain and spinal cord, acting as a cushion. A sample of CSF is collected using a procedure called a lumbar puncture (LP). This involves inserting a

needle into the space between the backbones and letting some flow into a test tube. Children and young people often have an anaesthetic or sedation for the procedure.

- **Bone marrow samples** – Some bones in the body, such as the pelvis (hip) or femur (thighbone) contain bone marrow inside them. Bone marrow is where blood cells are formed as stem cells, before they turn into the type of blood cell needed and released into the bloodstream. An aspirate is a liquid sample of bone marrow but a trephine or biopsy is a core of bone marrow. Taking a bone marrow sample from children and young people is usually done under anaesthetic or sedation.
- **Skin cells** – Some infections can be collected from the skin using a swab (large cotton bud) wiped on the area then put in a test tube to go to the laboratories. We can also use a swab to collect samples from mucous membranes, such as up the nose, inside the mouth or at the back of the throat. Taking a swab may tickle but it shouldn’t hurt.

What happens to the samples when they’ve been taken?

The person collecting the sample will put a label on each test tube or specimen pot with your child’s details so we can track it throughout the laboratory and can make sure the results are added to your child’s medical record.

They will usually put the test tubes in a plastic bag and then either use our pneumatic tube system or call a porter to take them to our laboratories.

The laboratory staff register the samples when they arrive and then use them to carry out the tests required. This usually involves using complicated and expensive machinery that can analyse samples more quickly and accurately than a human.



What sort of tests are done for infection?

There are hundreds of different tests available to look for infection – some are more specialised than others. The most commonly ordered ones at GOSH include:

- **Blood cultures (BC)** are taken to detect the presence of bacteria or fungi in the blood. Samples are put onto a plate of medical jelly (agar) and kept in a warm environment for a few days to see what micro-organisms grow. The agar plate can then be used to work out which medicines get rid of the bacteria or fungi.



An agar plate growing a bacterium or fungus

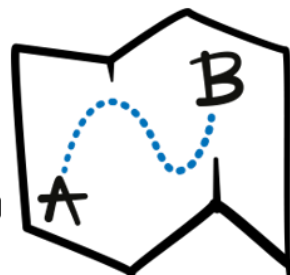
- Antibody testing for viruses also use **blood samples**. When we first get a virus, the body make antibodies against it. Each type of virus has its own antibodies. These stay in our bloodstream for a while so we might not get the same virus again. If it tries to invade, the antibodies recognise it and fight it. It takes specialised machines to look for antibodies in the blood.
- **Urine samples** are also wiped on the surface of an agar plate and kept in a warm environment to grow to identify what sort of bacterium or fungus is present, how many there are and which medicine will work against it.
- **Faeces samples** can also be wiped on the surface of an agar plate and incubated to grow

bacteria or fungi. Otherwise, a tiny amount can be put on a glass slide and examined under a microscope to look for specific substances. Poo samples may go for a special test call Polymerase Chain Reaction (PCR) to detect genetic material which will show the presence of viruses.

- **Sputum samples** can be broken up using mucolyse that makes sure the bacteria or fungi are all through the sample. It can then be wiped on the surface of an agar plate and incubated to grow bacteria or fungi. It will show the sort of bacterium or fungus that is present, how many there are and which medicine will work against it.
- **CSF samples** are put on a glass slide and examined under a microscope to look for certain substances, such as protein or glucose, or its general appearance, cloudy or clear. It can also be wiped on the surface of an agar plate and incubated to grow bacteria or fungi.
- **Bone marrow samples** are put on a glass slide and examined under a microscope to count the number of each type of blood cell in a sample and whether there is more of one type than another. Sometimes a 'stain' might be added to the sample so different things can be identified.
- **Skin and mucous membrane samples** are wiped on the surface of an agar plate and incubated to grow bacteria or fungi. This can show if someone is 'colonised' with bacteria or fungi, meaning it is present on their skin or in one part of the body but has not spread elsewhere to cause a more widespread infection.

When do we get the results?

Many of the tests can be done quickly but others take a little longer. Test results are reported back to your doctor and added to your child's patient



record ready for discussion at their next clinic appointment.

Some test results are available for you to see using MyGOSH once you have signed up – details are at www.gosh.nhs.uk/your-hospital-visit/mygosh. If the doctor needs to speak to you before then, they will contact you.


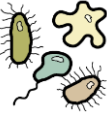






What happens to the samples when all the tests are done?

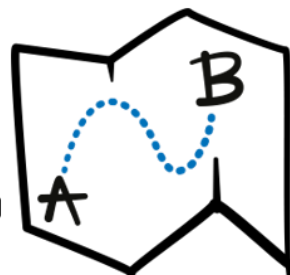
Once enough of the sample has been wiped onto a glass slide or agar plate, the rest is disposed of if it isn't needed according to the laboratory's clinical waste policy. Once the tests have been completed, the glass slides and agar plates are disposed of in the same way.

Further information and support

Please ask your doctor or nurse for details of which tests have been requested and why.

Testing for bugs

	We have good and bad bugs in the body. If they are out of balance, we can get ill.
	There are lots of different bugs. The main ones are bacteria, viruses and fungi.
	They each do different things and affect you in lots of ways.
	Scientists can do lots of tests in our laboratories to find out what bug you have.
	They need to have a small sample of fluid from your body to test.
	They need different samples depending on the tests they are doing.
	Samples of blood are taken from a vein, usually in your hand or arm.
	Samples of wee and poo are collected when you use the toilet.





Samples of mucus are collected when you spit into a container.



Samples of cerebrospinal fluid (CSF) are taken with a lumbar puncture.



This is usually done when you are asleep under anaesthetic or sedation.



Samples of bone marrow are taken from your hip or leg with a needle.



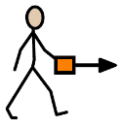
This is usually done while you are asleep under anaesthetic.



Samples from your skin, mouth or nose are collected by wiping a swab (large cotton bud) over the surface.



When the sample has been collected, a label is put on it with your name and date of birth on it.



It is then taken to the laboratories, either by our porters or using an air tube.



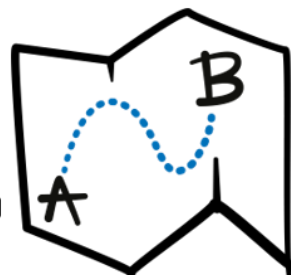
When it gets to the laboratories, scientists record that it has arrived and plan what tests the doctors have ordered.



Some samples are put on a glass plate of jelly then put somewhere warm to grow bugs.



Others are put on a glass slide so the scientists can look at them closely using a microscope.





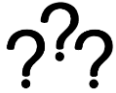
Some samples are put in a machine that does the tests. Different machines do different things.



When the scientist has the test results, they are put on your medical record on the computer.



Your doctor can look at the results to decide what to do next.



Please ask us if you have any questions.

