



The Royal College of **Pathologists**
Pathology: the science behind the cure

Focus on

**pathology for
undergraduates**



What is **pathology**?

Pathology is the study of disease. It is the bridge between science and medicine and underpins every aspect of patient care.

From investigating infertility to researching neurological disorders, pathology careers are incredibly diverse. Each focuses on a different area of prevention, diagnosis and treatment of disease.

Pathologists are medically or scientifically qualified and work in hospitals and laboratories with other doctors and healthcare professionals. Every blood test, biopsy sample, cancer screening test or search for infection will involve a pathology team.

Many also conduct research, lead on training and education, and act as expert advisors to healthcare organisations and the government.

Did you know?

Pathologists have been behind some life-saving discoveries including the role of human papilloma virus (HPV) in causing cervical cancer, gene therapy treatments for the blood-clotting disorder haemophilia, and DNA finger-printing.

Both medically-qualified doctors and clinical scientists work in pathology. They tend to specialise in particular areas.

The four most common specialist areas are:

→ **tissues and cells**, studied by cellular pathologists, including histopathologists, who play a key role in diagnosing or excluding cancer, and are the only pathologists to carry out post mortems

→ **blood**, studied by haematologists, who diagnose and treat people with blood disorders

→ **the chemistry of the body**, studied by chemical pathologists, who help diagnose and plan the treatment of diseases such as diabetes

→ **infection**, studied by medical microbiologists and virologists, who work together to diagnose and manage infections in patients and communities.

Other pathologists work in smaller, but no less important, fields, e.g. focusing on immunity, genetics and reproduction, toxins and animal disease. There are actually 17 pathology specialties in total, offering a diverse array of career options.

Find out more in this booklet and at **www.rcpath.org/careers**

Who works in pathology?

There are teams of medical staff and scientists whose job it is to study samples from a person's body to understand what's making them unwell.

These teams are made up of pathologists, who are either doctors with specialist laboratory training, or scientists with specialist clinical training, biomedical scientists and support staff.

Key skills

Patient diagnosis, treatment and care is central to pathologists' day to day work, so empathy and compassion are important. Other clinicians and healthcare professionals rely on the expertise of medically-qualified pathologists and clinical scientists for accurate diagnosis and treatment recommendations, particularly for complex medical problems.

Pathologists need to have a broad knowledge of disease and be able to build a good rapport with clinical teams, laboratory colleagues, and healthcare professionals, as well as with patients.

Choosing your role

When choosing what you'd like to do it's worth considering which are your best subjects and skills, what you find interesting and whether you'd prefer to become a doctor or a scientist.

Medicine or science?

Many people working in pathology start out as either a doctor or a scientist – which is why many describe pathology as the bridge between medicine and science.

If you are excited about the prospect of working in a laboratory and on the ward with the patient at the centre of your work, you might want to consider choosing pathology as a career. This leaflet tells you about some of the medical and scientific careers in pathology and you can find out more at **www.rcpath.org/careers**.



Become a histopathologist

Whenever tissue is taken from a person's body to be examined, a histopathologist is responsible for interpreting the sample and returning a diagnosis. Hospitals process tens of millions of histopathological slides and images every year.

What will I do?

Histopathologists are responsible for studying and diagnosing disease in tissues and organs. They reach their diagnoses by examining samples of tissue, usually biopsies, to identify illness-causing changes – an important role is in diagnosing cancer. Histopathologists work as part of a multidisciplinary team with other doctors, nurses and healthcare professionals to work out the best treatment for the patient based on the precise diagnosis the histopathologist has made.

Much of their work is carried out using a traditional microscope and a trained eye. But the invention and development of digital pathology – where samples can be scanned,

magnified thousands of times over and shared at the click of a button – is transforming the way histopathology samples are reported. Molecular techniques, particularly DNA sequencing, are also helping to advance the work of histopathologists in new and exciting ways.

Histopathologists may carry out post mortems in the case of sudden and unexplained deaths.

They also get involved in teaching and research in their area of expertise.

Histopathology is one area of cellular pathology, which also encompasses forensic pathology, neuropathology, pre-natal, perinatal and paediatric pathology, and oral pathology.

Dr Kavitha Krishna Pai Trainee Histopathologist



“There's so much diversity to histopathology – you see slides, cut specimens, perform autopsies, teach undergraduates and biomedical science staff... there's scope for research. The list is endless. It's a multi-faceted and challenging job – that's what makes it so rewarding.”



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Become a haematologist

Every 14 minutes in the UK, someone is diagnosed with blood cancer or a related disorder. That's almost 38,000 people every year. In each and every case, haematologists play a vital role in the care of these patients.

What will I do?

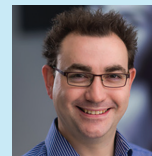
Haematologists are doctors who are experts in blood. They investigate and treat illnesses involving blood cells, such as leukaemia, and deal with abnormalities of the blood coagulation system, like haemophilia.

Haematologists work in wards, clinics, day units and laboratories, and are involved in a patient's care from their first blood test through to diagnosis and treatment. Often, the haematologist who looks after you in

the clinic or on the ward will be the same person who has examined your blood or bone marrow under the microscope.

As well as having their own patients, haematologists are a frequent source of advice for GPs and other hospital specialists. Many work at the forefront of scientific advancements: some have expertise in blood and marrow stem cell transplantation and others in modern genetic testing for inherited types of anaemia.

Dr Joel Newman Consultant Haematologist



“What many people don't realise is the extent to which other specialties rely on us for advice – one of the privileges of being a haematologist is that we're often asked by our colleagues for advice when their patients present with unusual symptoms. It's a challenging and mentally stimulating job.”

Become a chemical pathologist

Chemical pathology (or clinical biochemistry) involves monitoring bodily fluids like blood and urine to detect important changes in the body's chemistry. Pathologists in this area play a key role in diagnosing and monitoring patients with a wide variety of illnesses – from high cholesterol to rare genetic diseases.

What will I do?

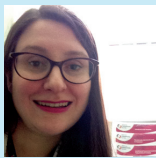
Chemical pathologists interact with patients at several different points through their investigation and treatment. They oversee their test results and often meet patients in outpatient clinics to support their on-going treatment.

They oversee various outpatient clinics in hospital, like lipid clinics and metabolic bone clinics. Outside of patient work, they often advise GPs and hospital doctors on abnormal

biochemistry test results. They don't always work in the laboratory, but do work closely with clinical scientists to monitor how technical tools and processes used by their scientist counterparts affect results.

With faster, more effective tests being developed all the time, chemical pathologists are usually the first to trial new diagnostic tools and witness the benefits for patients first-hand. Training is also part of their role, and some have opportunities to be involved in research projects.

Dr Kate Earp Consultant Chemical Pathologist



“ I first came across chemical pathology when I was at medical school – we were looking at blood test results and using them to make a diagnosis. I found it fascinating and have done ever since. My role is really exciting – it's a good balance between seeing patients and thinking about the scientific details of the tests. ”

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Become a **medical microbiologist**

With the seemingly endless growth of superbugs and other antibiotic-resistant bacteria, medical microbiologists are vital in healthcare today – both for treating infections and for fighting the spread of disease.

What will I do?

Medical microbiologists support and oversee the prevention, diagnosis and treatment of illness caused by microorganisms (viruses, fungi and parasites). They identify the best treatment for particular infectious diseases and monitor patients following treatment.

They work closely with other healthcare professionals – such as biomedical scientists, GPs and infection control nurses – as part of multidisciplinary teams. They give

advice on the best samples to collect to diagnose an infection, such as a swab, blood test or urine test. They then work with scientists in the laboratory to discover what's causing the infection, and give advice about how to treat it.

Medical microbiologists play a key role in making sure that antibiotics and antiviral drugs are prescribed and used appropriately by advising on patient management and producing treatment guidelines for a variety of conditions.

Dr Aiden J Plant Specialty Registrar in Medical Microbiology



“ A microbiologist can be needed at virtually any part of the hospital, which means I never have a dull day. I might be in the lab, in the neonatal unit seeing the youngest patients or the oldest in elderly care... or even in the boardroom, responding to a viral outbreak. ”

Find out more at
www.rcpath.org/careers

Other careers in pathology

There are actually 17 pathology specialties. This means pathology offers a diverse array of career options for medical and science undergraduates.

Other pathology specialties you could work in include:

→ **Virology.** Medical doctors and scientists who oversee the diagnosis, management and prevention of infections caused by viruses are called virologists. Virologists are responsible for diagnosing viral infections and also investigate how viruses respond to drugs. They mix their time between working at the bench in laboratories and providing advice to staff across many different areas of the human and animal health service sectors. Some virologists carry out research to better understand viruses and how to prevent and treat them.

→ **Immunology.** Most immunologists have a dual role as both a scientist in the laboratory and a clinical pathologist. Immunologists investigate and treat diseases of the immune system, which can be over or under-active. Some work primarily as academics pursuing research careers, while others may be scientists who do not see patients directly.

→ **Veterinary pathology** involves the diagnosis of individual pets and farm animals, and supporting farmers in keeping their flocks and herds healthy.

They are also involved in surveillance for new infections in the food chain and for links to human health.

→ **Oral and maxillofacial pathology.** Some dentists go into pathology to diagnose diseases of the head, neck and mouth (oral) or jaws and face (maxillofacial).

→ **Cellular pathology** is a broad area of work that includes histopathology and a number of other specialties:

- **Neuropathology** involves the study of diseases in the central (brain and spinal cord) and peripheral nervous systems, and skeletal muscle. Neuropathologists spend most of their time making diagnoses of tumours, inflammatory disorders and infections.
- **Paediatric** and perinatal pathology is the specialty that focuses on diseases of children and newborn babies.
- **Forensic pathology.** Pathologists who specialise in performing post mortems for legal purposes, to understand the cause and manner of death are called forensic pathologists. They may follow a case from a crime scene through to giving evidence in criminal court.



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How to train in pathology

There are two main training routes into a career in pathology – becoming a medical doctor or becoming a clinical scientist. Both focus on prevention, diagnosis and treatment of disease.

The route you take will shape the roles you're able to work in. People who study medicine and qualify as a doctor can become consultant pathologists, working across laboratories and in clinical settings. Those who study and train as scientists can become consultant clinical scientists, who manage laboratories. Both pathologists and consultant clinical scientists provide expert advice to the medical teams treating patients, and are involved in organisational management and research.

The medical route

To start training to be a pathologist, you need to be accepted onto a course at medical school. You can also enter some postgraduate medical degree courses later in your education.

Each specialty has its own curriculum, which is delivered via local training programmes around the UK.

A typical medical training pathway

Medical school

4–6 years

UK Foundation Training Programme

2 years

Core training

2 years

Specialty pathology training

5 years approx

Find out more at
www.rcpath.org/careers

The science route

To become a consultant clinical scientist in any specialty, you need a strong educational background in science. You need to complete a science degree then start on a graduate-entry training programme.

Like doctors, clinical scientists train in local programmes, so what you'll do and when may vary. However, all trainees follow the same overall curriculum.

A typical clinical scientist training pathway

Undergraduate or postgraduate study

3+ years

Scientific Training Programme

3 years

Higher Specialist Scientist Training

5 years

About The Royal College of Pathologists

The Royal College of Pathologists is a professional membership organisation with charitable status, concerned with all matters relating to the science and practice of pathology. The College staff, based in London, support trainees, qualified pathologists and clinical scientists, who work across 17 different specialties. The majority of the 11,000 College members are doctors and scientists working in hospitals and universities in the UK. The College also engages with diverse public audiences and stakeholders, to raise awareness and understanding of the role of pathology in providing patient care.

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Find out more

Visit www.rcpath.org/careers to find out more about the breadth and diversity of careers in pathology. You'll find information on what training involves, as well as testimonials from consultant pathologists and clinical scientists.

Avril Wayte

Consultant Clinical Scientist
in Clinical Biochemistry



“ I really enjoy my job, even after 30 years. I love the detective work of undertaking tests to make a diagnosis. There are also great opportunities to become part of a multi-professional team, attending ward rounds and clinics along with doctors and other clinicians, and using the knowledge I've gained to make a difference to patient care.



#pathologycareers