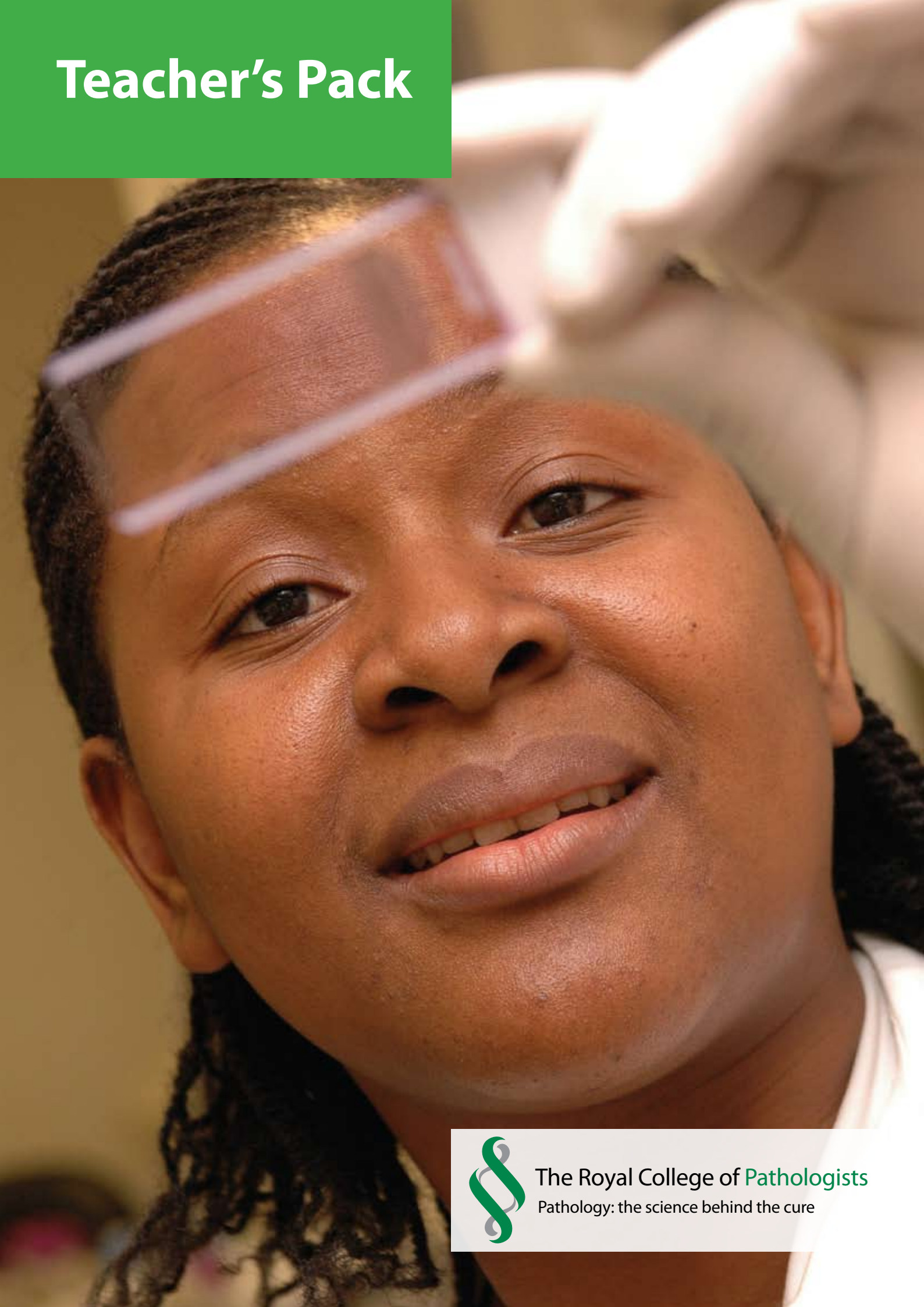
Teacher's Pack



The Royal College of Pathologists

Pathology: the science behind the cure

How to use this pack

This teachers pack is part of a pilot outreach project from the Royal College of Pathologists. This pack accompanies the half day outreach session "Pathology: the science behind the cure". We know that teachers dip in and out of packs and are keen to make this one as user friendly as possible. This page tells you what the pack contains as well as some of the logistics of the session and who to contact with your feedback. We would love to know what sections of this pack you did and did not use, what else you would like to have included in the pack and how you used the pack in general.

"Pathology: the science behind the cure" is a half day session designed to introduce some of the ideas in pathology to Key Stage five students. It has been designed to fit within the National Curriculum. This pack should cover everything you need to know before the session, as well as extra support materials for you and your students. The session comprises of an introduction to pathology, an introduction to a pathologist, the "Disease Detectives" exercise and the "Your body, your consent" discussion. It has been designed to have a break between "Disease Detectives" and "Your body, Your consent". We are aware that running the "Disease Detectives" exercise without the support of a pathology lab will be very difficult, but we have tried to design "Your body, Your consent" as an activity that can be run with other student groups without external support. Again, any feedback on whether you think this has worked would be really useful for developing future outreach resources.

This pack contains

- National Curriculum links for "Pathology: the science behind the cure"
- What is pathology?
- Teachers guide to the student resources
- Student resources: Disease Detectives patient case notes
  Disease Detectives student information sheet
  Your body, Your consent? Discussion cards
- Discussion facilitation skills for teachers
- Careers in Pathology
- Pathology Glossary

Who's who?

The session will be facilitated by Emily Dawson. A local pathologist from the College will take part in the visit supporting students through the activities and talking to them about being a pathologist. Also present will be Ruth Semple, the Outreach Project Manager for the College. Ruth will evaluate the pilot outreach sessions.

She will take part in the sessions and be the point of reference for teachers and students. Any feedback you have about the session or this teaching pack would be really appreciated. Ruth can be contacted at: **Ruth.Semple@rcpath.org**.

National Curriculum Links

What will your students learn?

These resources are intended to support the delivery of the A-Level Edexcel Biology Curriculum (KS5) through subjects relevant to pathology.

Curriculum Content Links

Pathology subject focus	Topics covered
Histopathology	1.3 Cellular organisation and microscopy
Histopathology	1.4 The cell cycle
Biochemistry	2B.1 Digestion and absorption
Haematology	2B.2 Blood and bodily fluids
Histopathology	2H.2 The circulatory system
Microbiology	A.1 Bacteria, fungi, viruses, culturing
Microbiology	A.3 Medical application
Biochemistry	B.1 Food and diet
Histopathology	C.1 Body systems
Histopathology	C.3 Human disorders

Curriculum practical skills. Students will:

- Learn how to use common laboratory equipment, such as microscopes, slides, etc.
- Learn some core histopathology skills like visual pattern recognition and problem solving.
- Take part in group activities that will develop teamwork and communication skills.
- Think critically and rationally through different challenges.
- Take part confidently in discussions with others about issues involving science and medicine.

Life skills. Students will:

Be creative. Use imaginative and empathetic thinking to understand other people's motives and experiences. (i.e. Why some people may feel differently about dissection than others).

Develop sensitivity. Encourage understanding and respect for people with different values and opinions. (i.e. A range of views exist on the topic of organ donation, why might some people not donate their organs?)

Develop critical awareness. Stimulate debate on difficult issues. (i.e. The Human Tissue Act 2004 and the need for 'consent').

Develop independent learning. Activities that encourage students to ask their own questions. (i.e. classroom based practical work to explore different tissues, for example, examining slides using a microscope to develop an understanding of how pathologists explore disease).

Link science to issues relevant to students' own lives. Developing an understanding of health issues related to students life experiences. (i.e. Pathology is involved in almost every medical test, from cervical smear tests to blood tests.)

What is Pathology?

Is it the work you see in TV programmes like *Silent Witness* and *CSI*? Well, you're not alone if you think this. A recent survey found that 60% of people believe that pathologists only cut up dead people and less than 33% know that pathologists diagnose diseases of living people.

Pathology is the branch of medicine involved with the study and cure of disease. Recognising the patterns that disease takes allows us to understand what's at the root of a problem, enabling accurate diagnosis. Building on this understanding of what has gone wrong helps treatments to be devised and preventative measures to be put in place.

The science of pathology permeates all branches of medicine. The doctors in a surgery or clinic all depend on the knowledge, diagnostic skills and advice of some of the 4000 pathologists working in the UK. Whether it's a GP arranging a pregnancy test or a surgeon wanting to know the nature of the lump removed at an operation, the definitive answer is usually provided by a pathologist.

Pathology is involved in 70% of all diagnoses made in the NHS. If you have had a blood test, a cervical smear or perhaps you or someone you know is being treated for cancer, you will have had contact with a pathologist.

Because a lot of pathology work is done behind the scenes, many people are unaware of its vital contribution to modern medicine. Increasingly, pathologists are responsible for the care of patients, for example those with anaemias or immune and metabolic disorders. Without the detective work of pathologists investigating disease, there could be no firm answers, and improving or even maintaining the quality of medical care would be impossible.

Pathologists are experts in disease. Their training bridges the scientific and medical worlds, making them the natural leaders of progress in medicine.

The five main specialties

Clinical biochemistry
Knowing the contents of your body fluids can help your doctor make a diagnosis or indicate which body organ is not working properly. Body fluids such as blood, urine, saliva and spinal fluid are tested in Clinical Biochemistry laboratories. Clinical Biochemists can be either Chemical Pathologists (doctors that study Clinical Biochemistry) or Clinical Scientists (Science graduates that train to be Clinical Biochemists). Clinical Biochemists spend time looking at patient test results to see what is normal and what is abnormal.

Haematology
Many diseases involve blood cells such as anaemias, leukaemias and bone marrow diseases. The clotting system ensures blood flows freely and forms clots when vessels are damaged and defects can lead to thrombosis or bleeding. Haematologists investigate, diagnose and treat patients with diseases of the blood as well as supervising blood transfusions.

Histopathology
Histopathology is the study of disease in human tissue. A histopathologist examines tissues and cells removed from patients in the clinic or during an operation, using microscopes and a trained eye to discover if a disease is present and what course of action needs to be taken. The tissue is examined first with the naked eye to look for any visible abnormalities and to select pieces to examine in more detail. These small pieces are processed so that very thin slices can be cut. The slices are then looked at under a microscope and the histopathologist tells the patient's doctor what is wrong and often provides information about the correct treatment. Histopathologists are the people who diagnose cancers and other serious illnesses but they also often have good news, discovering that a lump or mole is completely benign and is nothing to worry about. Some histopathologists also carry out post mortems to work out why someone has died.

Medical microbiology
Medical microbiology used to be a mainly lab-based speciality but now microbiologists are out on the wards seeing patients and advising on the treatment and investigation of all types of infection (viral, bacterial, fungal and parasitic). Medical microbiologists also give advice about many infection control issues, trying to keep patients safe from acquiring new infections while they are in hospital.

Immunology
An immunologist is involved in the management of allergic diseases such as asthma, hay fever or food allergies and in the development of vaccines. They will also provide advice on the complexities of the immune system to other doctors. Some will run their own clinic to treat patients where the main disease is in the immune system.

Teachers guide to student resources

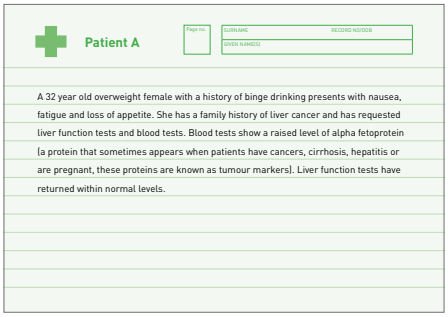
Disease detectives: the liver

This hands-on exercise is designed to develop students' practical skills. The "Pathology: the science behind the cure" session will involve specially made slides produced by the Royal College of Pathologists with human liver tissue samples in three different states: healthy, liver cancer and cirrhosis. Due to the Human Tissue Act 2004 schools will not be able to retain slides for future use or obtain further human tissue slides. One aspect of the pilot we would like to discuss after the session is whether you feel aspects of this exercise might be replicable, for example, using vegetable slides in the future?

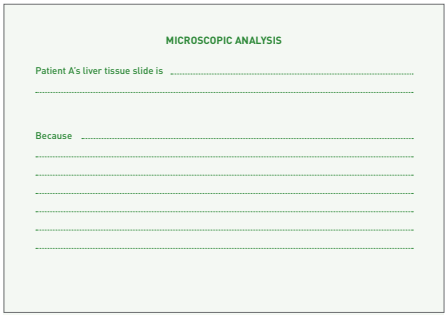
Exercise outline

The facilitator will introduce this team exercise. Background covered will include the role played by pathologists in diagnosing disease, the role of the liver in the human body and some pattern recognition exercises. The exercise involves three 'patient case note' cards. Each card covers a different patients medical history. The patients have undergone various liver function tests, resulting in liver tissue being taken for analysis in a hospital pathology lab. The resulting slides have been made, stained and delivered to pathology teams for diagnosis.

Each team will receive three slides to examine with their microscope and an information sheet covering what the slides should look like. The sheet describes what a slide should look like with normal liver tissue, cancerous liver tissue and liver tissue with cirrhosis. Teams will then match the patients with the slides, using their information sheets, case notes and the expertise of a visiting pathologist. Since the slides are real, each slide will be different, however, all the cancerous liver tissue slides came from one patient, as did the normal liver tissue slides and the slides with cirrhosis of the liver. Teams will include four to five students and will receive one set of materials each. This exercise should take around 50 minutes to complete.

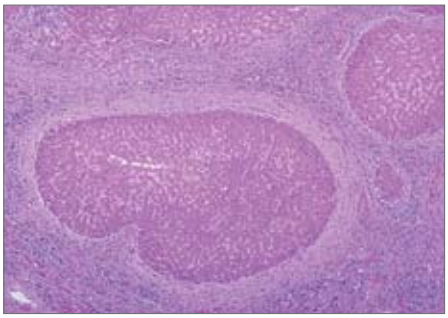

Patient A

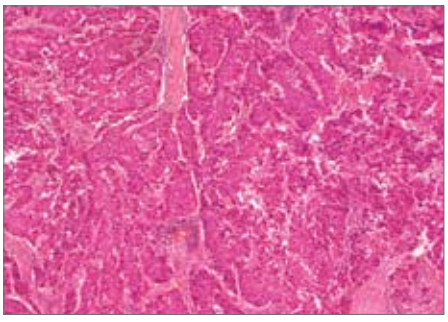
A 32 year old overweight female with a history of binge drinking presents with nausea, fatigue and loss of appetite. She has a family history of liver cancer and has requested liver function tests and blood tests. Blood tests show a raised level of alpha fetoprotein (a protein that sometimes appears when patients have cancers, cirrhosis, hepatitis or are pregnant, these proteins are known as tumour markers). Liver function tests have returned within normal levels.


MICROSCOPIC ANALYSIS

Patient A's liver tissue slide is .....

Because .....





Liver: general pathology related background

The human liver, the largest glandular organ in our bodies, is a spongy looking red-brown colour and is found under the diaphragm. The bulk of the liver is on the right hand side of our bodies, but reaches across our bodies because of its size. About 60% of your liver tissue is made up of Hepatic cells, these carry out the majority of the nutrient processing undertaken by the liver. The other interesting cells in a liver are the Kupffer cells which process damaged blood cells and destroy microbes. The liver has many functions including filtering toxins out of the blood, producing cholesterol, urea and bile, storing vitamins and minerals, converting glucose to glycogen and maintaining the level of glucose in the blood. As a direct result of the many roles played by the liver, we would die in 24 hours without it! Unfortunately many diseases affect the liver including hepatitis (A, B and C), cancer, cirrhosis, hemochromatosis and fatty liver. These diseases often go undiagnosed, as patients may not experience symptoms until the disease reaches an advanced stage. Jaundice (yellow coloured skin) is one of the main symptoms of liver disease, when the liver stops breaking down blood cells properly. This exercise focuses on a healthy liver, liver cancer and cirrhosis of the liver due to alcohol abuse.

Teachers guide to student resources

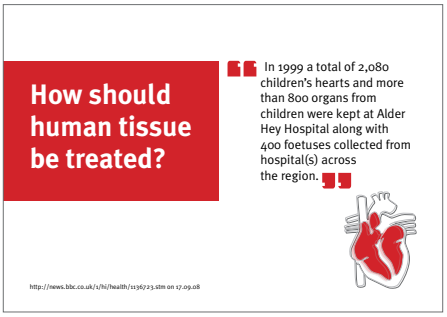
Your body, your consent? Human Tissue Act discussion

This discussion focuses on the different aspects of the new Human Tissue Act of 2004. The main issue at the heart of the changes to the Human Tissue Act are around consent, which is also the focus of the discussion. The Royal College of Pathologists are keen to explore the views of young people on this controversial issue, in order to feed back to the college and its members. We would welcome feedback on whether you feel this part of the session would be replicable without external support.

The discussion process and materials

This part of the session takes the form of a discussion. The facilitator will introduce the discussion and students will be grouped into teams for a facilitated small group discussion. The discussion will be concluded by teams feeding back to each other in a final whole group discussion. The introduction will cover the background to the 2004 Human Tissue Act as well as how the discussion will work.

The students will be grouped into teams of between four and five. A member of the outreach team or the teacher will facilitate each team where possible. The teams will receive two discussion cards each. There are eight different discussion cards covering themes of consent, tissue donation, medical research, commercialisation of human tissue,



autopsy, legislation and historic perspectives. Each card has been designed to cover multiple themes so that during the final large group discussion, which rounds off the whole session, groups will have a range of similar and different stimulus to talk through. The cards contain one real main quote on the front, and four related quotes from different perspectives on the back. These different perspectives have been taken from a range of sources and are meant to represent different points of view from individuals within the public, pathology or media, they are not representative of whole groups, simply starting off points for discussion.

The 2004 Human Tissue Act

In 2004 the Human Tissue Act changed considerably from its previous 1961 incarnation. These changes were in response to the organ scandals of the late 1990's, when a number of hospitals were found to be storing human tissue removed during operations or autopsies, without the knowledge, or importantly, the consent, of patients or relatives. A couple of cases of organ retention were highlighted in the media, notoriously at the Bristol Royal Infirmary and Alder Hey Hospital in Liverpool. This led to a nation wide investigation where such practices were found to be wide spread.

The legal cases arising from the situations in Bristol and Liverpool found the pathologists involved 'not guilty' since they were acting within the codes of practice set out in the 1961 Human Tissue Act. What these cases brought to light was that public opinion on medical use of human tissue had changed considerably since the '60s. The 1961 act assumed consent unless explicit objection was made by patients or their families. The 2004 act instead specified that 'informed consent' has to be sought from patients or families for the retention of any human tissue, outside of that used for diagnosis and treatment of the patient. All premises carrying out autopsies or work with human tissue also now have to be licensed.

Pathologists have radically changed their consent related practices for research, archiving and teaching, as well as diagnosis, including a total shift in thinking about consent ethics. While concerns remain about the increase time required in standard research practices, pathologists have been involved at the heart of the changes in the 2004 Human Tissue Act.

Discussion Facilitation Skills for Teachers

These discussion skills cover both ideas to think about when preparing for the 'Pathology: the science behind the cure' outreach session, and future classroom discussions. As a result some points will be immediately relevant and others will be of use in the future, we would also welcome feedback on this document.

1. Introducing the topic and format

Explain the format of the discussion as clearly as possible and emphasize the roles of students and facilitator. Provide background on the topic of discussion (you can use a range of media to do so) and present a context (social or personal) for both the topic and the discussion, which students can identify with. The facilitator might be another student, or in large group discussion may be you, the teacher. In the 'Pathology: the science behind the cure' session you may be asked to facilitate one of the small groups during the 'Your body, Your consent' discussion, but the discussion will be introduced by the session facilitator.

2. Familiarity with the topic

Familiarise yourself with the topic of discussion, the social and personal controversies that it raises and your own thoughts about these controversies. Exploring your own perspective is vital; if you find that your feelings/opinions on the matter are very strong it may not be appropriate for you to facilitate a discussion on this particular topic. When you take on the role of the facilitator you need to remain as objective as possible. Remember, you are not there to inform but to help explore the subject, it is therefore important not to prepare answers but prompts.

3. Rule Setting

Discussion rules vary according to your students. When working with younger students it helps to make the rule setting stage obvious. It is an opportunity to allow them to set their own rules so you can refer back to them with confidence. With older students rules are often set more discretely, for instance during the introduction.

Some essential discussion rules:

- everyone is entitled to an opinion,
- there are no right or wrong answers.
- respect everyone's contributions,
- listen to each other and don't interrupt.
- focus on the topic of discussion, call on facilitator for help at any point.

4. Group sizes

Discussion group sizes need to be considered carefully. Smaller groups (5-7 people) support more in-depth discussions, are easier to facilitate and allow more contributions from 'quiet participants'. Large group discussion requires a very accessible format. Test discussion formats with different group sizes and find out what works for you and your students.

5. Negotiating controversial opinions and possible conflict

Do not fear controversial opinions, frequently they serve as prompters 'to think outside the box' and challenge common perspectives. However, they can create conflict between different students so be prepared to deal with them. Common strategies include:

- consider what is being said and make sure you understand, if not, ask them to elaborate and explain their statement more fully for the group. Ask for everyone's thoughts on the statement without discomforting the contributor.

Discussion Facilitation Skills for Teachers

•play the devil's advocate or provide a realistic scenario that negates their views and allows them a chance to re-interpret.

•if the statement is inappropriate (i.e. racist, sexist, insulting to other participants) you will need to clarify the 'rules' of discussion, that respect is essential to the process.

6. Handling non-contributors

There are many reasons why certain students may not be contributing:

•genuine dislike for public speaking and a lack of confidence.

•feel they are not informed enough to contribute.

•intimidated by other student's knowledge or confidence.

•have lost track of the discussion.

There are different ways in which 'quiet' students can be encouraged to contribute, (but remember, you are there to encourage, not to bully people into contributing):

•making eye contact, smiling and giving encouraging 'silent' cues.

•refer to questions or contributions provided by the rest of the group and ask the quiet ones for their thoughts on the matter.

•if you can see someone thinking but struggling to speak do not immediately feel you need to fill the 'awkward silence', 'awkward silence' often impels speech.

7. Being Encouraging

As a facilitator you are there to lubricate the flow of the discussion, to enable students to share as much as possible:

•ask open questions, i.e. questions that can't be answered with no and yes.

•repeat what students have said and refer back to comments made earlier in the discussion. This emphasises that their contributions are being taken into consideration.

•try and promote discussion between students and avoid 'question and answer'.

8. Personal information management

If your students share personal anecdotes it probably means that you have done a good job of facilitating and creating an open and safe environment. Personal anecdotes are another form of expertise and can provide great insight to your discussion topic since they provide a real context.
If a student is clearly upset, try and steer the discussion back to less sensitive topics.

9. Conclusion

When concluding the discussion, summarise student's ideas to remind them of the different perspectives on the topic. Provide extra 'food for thought', such as a few extra questions to think about. Remind students of the context of the discussion again, its relevance to them and others. And, most importantly, thank everyone for their valuable contributions.

Careers in Pathology

There are three main types of careers in pathology.

1. Pathologists are doctors who specialise in one of the pathology specialties after completing their basic medical training at medical school and as a junior hospital doctor.

2. Clinical scientists work alongside pathologists and provide scientific leadership in laboratories. Clinical scientists can work at consultant level, running laboratories in specialties such as virology and clinical biochemistry.

3. Biomedical scientists provide and develop technical aspects of the pathology laboratory and can go on to senior management positions.

I want to be a pathologist. What qualifications do I need?
To become a pathologist you need to go to medical school for five or six years first. You will need good A-level results to get into medical school. Most students take a combination of maths, chemistry, physics and biology and obtain A grades. After medical school, you will need to specialise in a pathology discipline. Most people take at least 12 years to qualify as a pathologist after leaving school.

I want to be a clinical scientist. What qualifications do I need?
Clinical scientists take a degree in a subject such as biochemistry and often go on to do a PhD. You usually then undertake a three-year paid programme of basic training, followed by four or five years of specialist training. So it takes at least 10 years to become a fully-fledged clinical scientist, and often longer than that.

I want to be a biomedical scientist. What qualifications do I need?
Biomedical scientists usually enter pathology training after their first degree. Training takes up to two years after that. An alternative route into the profession is to begin training after A levels and study for a degree on a day-release basis. This takes a bit longer but gives trainees an opportunity to learn on the job – and to earn some money while they're studying.

I don't want to spend six years at medical school. What else could I do in pathology?
You could work as a laboratory assistant laboratories alongside scientists and pathologists. Examples of jobs a laboratory assistant might do are taking blood from patients for testing or booking specimens in when they arrive. There are no particular qualifications needed to be a laboratory assistant but GCSEs are an advantage. Training is provided and most people take NVQs (national vocational qualifications) while working.

Pathology Glossary

A

Allergy – a reaction in the body to a substance, which itself is usually not harmful (e.g. pollen, peanuts, pets). The doctors who specialise in the diagnosis and treatment of allergies are immunologists who are pathologists, although other specialties such as dermatologists have expertise in allergies affecting their organ of interest. Although approximately 11% of GP prescriptions are for allergies, there are very few immunologists in the UK.

Antibiotics – a group of drugs that kill bacteria and some other infective organisms but have no effect on viruses, which cause the common cold and 'flu'. Examples of antibiotics include penicillin, cephalexin, ciprofloxacin, trimethoprim and tetracycline. Examples of infections that can be treated with antibiotics include some kinds of meningitis, pneumonia and urinary infections. Alexander Fleming who discovered penicillin in 1928 would have been a microbiologist.

B

Bacteria – bacteria are tiny organisms that are present almost everywhere on earth; in our guts, in the soil, in the sea. Not all bacteria cause disease but some do, for example those that are responsible for pneumonia. Meningitis is usually caused by a viral or bacterial infection. A microbiologist will know whether meningitis is caused by a virus or bacterium and this is important because the severity of illness and the treatment differ.

Biochemistry – also called clinical biochemistry, the pathology specialty that is concerned with the analysis of body fluids such as blood and urine. Clinical biochemists can diagnose, treat and monitor diseases by interpreting the level of different chemicals in samples.

Biomedical scientist – these science graduates are not medically qualified and work in laboratories in pathology specialties including haematology and histopathology.

C

Cancer – diseases that develop when the body's cells grow without the normal control. Cancers can form lumps (tumours) and can spread to distant parts of the body. There are lots of types of cancer, for example, lung cancer, breast cancer, liver cancer, lymphoma, sarcoma.

Cellular Pathology – this term describes the group of pathology specialties that look at changes in cells and tissues using a microscope to make a diagnosis. The tissue might come from a biopsy, a smear or from a post mortem examination. The branches of cellular pathology include histopathology, forensic pathology, paediatric pathology, neuropathology, and cytology. Cellular pathology now also includes 'molecular pathology' which involves looking at the DNA and proteins that make up a tissue to work out what disease is present and how to treat it.

Cervical Sample - a test performed to look for changes on the cervix (neck of the womb) that might turn into cancer if left untreated. A thin scraping of cells is taken from the cervix with a small brush and the cells are rinsed into a vial of liquid, then filtered onto a slide and stained. A biomedical scientist looks at all the cells on the sample and reports negative samples. If a possible abnormality is found, a cytopathologist, a doctor who specialises in looking at cytology samples, examines the slide under the microscope to look for any abnormal cells. There are thousands of cells on every smear, so it takes a very sharp eye and great patience to pick up abnormalities.

Chromosome – a long molecule of DNA made up of many genes. Humans have 23 pairs of chromosomes in each cell, which carry all the genetic material required to build a person. In pathology, a great deal of chromosome research happens, for example, researchers believe that genetic diseases might one day be treated by adding an entirely new chromosome to people's cells.

Cirrhosis - Cirrhosis is a serious condition that destroys healthy tissue, leaving scar tissue, which blocks the flow of blood through an organ. It is usually associated

Pathology Glossary

with the liver, but can also affect other organs in the body. Cirrhosis progresses slowly, and gradually causes a decline in the function of the liver. In the early stages of the disease, there may not be any symptoms, but as the condition of the liver deteriorates, serious problems can develop. For example, the liver will fail to control infection and blood clotting, and prevent bile from passing into the small intestine. In the UK, heavy alcohol consumption and hepatitis C are the most common causes of cirrhosis.

D

Diagnosis – working out what a disease is and what caused it. Diagnosis describes both the process that is followed (what the pathologist does) and the final answer (what the pathologist thinks the disease is).

DNA - Deoxyribonucleic acid. The information molecule containing hereditary information that is passed from one generation of cells to the next and from an individual to his or her offspring. DNA carries the information about genetic predispositions to certain diseases. DNA discovery has allowed researchers to identify the genetic basis for many diseases. In doing so, the path has been paved for new treatments and enhanced knowledge for preventing disease.

F

Fine needle aspirate (FNA) - this is a process where where cells are sucked up through a small needle, transferred onto a glass slide and examined by a cytopathologist (pathologist who specialises in looking at cells). This technique is often used to diagnose cancer, for example by looking at cells from a lump in the breast or neck.

Forensic pathology – this is the branch of pathology in which doctors examine people who have died, usually when there is concern that the cause of death was unnatural (i.e. not due to an illness). Forensic pathologists often give evidence in court, for example in murder trials. Although this is a branch of pathology that many people have heard of, it is one of the smallest specialties – it accounts for less than 1% of the pathology workforce.

G

Gene – a unit of heredity: a length of DNA that contains instructions for making a specific protein. Genes are found in succession along the length of chromosomes. Humans have around 20,000 to 25,000 genes. Projects such as the Human Genome Project, where genes and proteins are studied, are leading to new diagnostic tools that can help detect disease earlier and with greater specificity.

Genetics - the branch of pathology that studies heredity and variation. Geneticists provide patients and their families with accurate testing and prenatal diagnosis, which they can use to make critical choices about their lives and the planning of their families. They can now even identify genes which cause diseases such as breast cancer and diabetes. New tests are appearing rapidly, largely because of the Human Genome Project.

H

Haematology – the pathology discipline involved in the care and treatment of patients with blood disorders such as anaemia or leukaemia.

Hepatitis C - a blood-borne viral infection. Drug users sharing needles are particularly at high risk, but also anyone whose blood has come into contact with the blood of someone infected with hepatitis C. The virus is not transmitted through normal social contact, such as hugging, kissing, sharing kitchen utensils, or via a toilet seat. Approximately 20% of people will fight the infection and naturally clear it from their bodies within two to six months. Of the rest some will remain well, and never develop liver damage but many will develop mild to moderate liver damage (with or without symptoms). A further 20% will progress to cirrhosis (scarring of the liver) over a period of 20-30 years. Excessive drinking of alcohol is often associated with increased likelihood

Pathology Glossary

of progression to severe liver complications. There is no vaccine to prevent hepatitis C but treatment can clear the infection in approximately half those infected.

Hepatology - is the branch of medicine that incorporates study of liver, gallbladder, and pancreas, as well as management of their disorders. Pathologists work in multidisciplinary teams, for example, when diagnosing a liver disease, they would work with hepatologists and radiologists.

Histocompatibility and Immunogenetics - the study of organ transplantation and tissue matching. These pathologists make sure that transplanted organs are suitable for the recipient to try and avoid the organ being rejected.

Histopathology – the branch of pathology that involves looking at tissue under the microscope to diagnose disease. If you have a mole or a breast lump removed, the histopathologist will examine it to work out what it is.

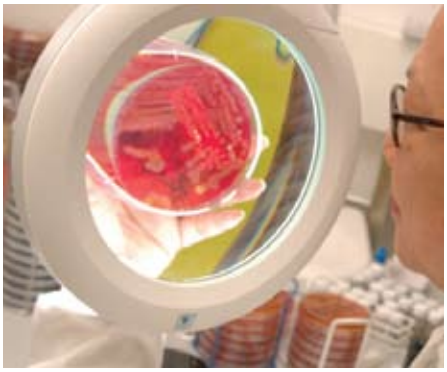
Human Tissue - group of associated, similarly structured cells that perform specialised functions. Healthy tissue can be transplanted from a donor to a recipient to treat certain diseases e.g. bone marrow transplantation to treat patients with leukaemia, kidney transplantation to treat patients with kidney failure.

Human Tissue Act - the Human Tissue Act replaces the Human Tissue Act 1961, the Anatomy Act 1984 and the Human Organ Transplants Act 1989. It aims to make consent a fundamental principle underpinning the use and storage of human tissue. This means that the following actions will be illegal: removing, storing or using human tissue without consent; DNA "theft" - taking and testing DNA without consent; organ trafficking; storing tissue or organs for a purpose not stated. The penalties range from a fine to three years imprisonment, or both.

Human Tissue Authority – the Human Tissue Act is overseen by the Human Tissue Authority (HTA), who regulate the removal, storage, use and disposal of human bodies, organs and tissue. In practice, this means the HTA issue licences and carry out inspections for the following practices: anatomical examinations; post-mortem examinations; removal of post-mortem material; storage of post-mortem material; storage of anatomical specimens; storage of material from a living person; public display of a body or material from a deceased person. The HTA will also regulate transplants, working with UK Transplant.

I

Immunology - the science of disorder of the immune system. Doctors who specialise in the diagnosis and treatment of disorders of the immune system are called Clinical Immunologists. They often also run the specialist laboratories that provide testing for immunological disorders as well as looking after people with autoimmunity, immune deficiency and allergies.



Infection Prevention and Control - the collection of practices that are designed to minimise the risk of spread of infections from person to person, environment to person and animal to person. It seeks to break the chain of transmission of microorganisms through important measures such as hand washing.

L

Laboratory – the room where scientific testing is performed on fluids and tissues removed from patients. Modern laboratories usually contain large machines and lots of chemicals. Laboratories are not usually open to the public.

Liver - The liver carries out many important functions. It stores glycogen, breaking it down into glucose that is then released into the bloodstream, providing energy. It also processes fats and proteins from digested food, produces essential blood clotting substances, removes poisons and toxins, such as alcohol, from the body, and produces bile that passes into the gut and helps digest fats.

Pathology Glossary

M

Medical microbiology - the branch of pathology which deals with the investigation, treatment and monitoring of infections in humans.

Microscopy - using microscopes to view samples or objects. Histopathologists use microscopes daily to view slides in order to diagnose disease.

P

Pathology - Pathology is concerned with the scientific study and cure of disease, and is one of the foundations of medical science and practice. There are pathology laboratories in every hospital; in fact, 70% of diagnoses are made by pathologists. If a pathology lab had to shut down, the hospital would also have to shut down: that's how vital it is to medical treatment. The five main specialties are: Histopathology, Haematology, Medical Microbiology, Clinical Biochemistry and Immunology.

Paediatric pathology – the branch of pathology concerned with diseases and disorders of babies and children, including foetuses. Paediatric pathologists look at samples under the microscope and also perform post mortem examinations following the death of a foetus or child.

Post mortem – also called an autopsy, a post mortem is an examination of the body after death. Post mortems are performed if the cause of death is not known or if there are any unusual circumstances. Information obtained from a post mortem often helps bereaved families understand what happened to their loved one as well as helping doctors learn about how diseases can affect the body.

R

Radiology - is the medical specialty directing medical imaging technologies to diagnose and sometimes treat diseases. Pathologists work in multi-disciplinary teams, for example, when diagnosing a liver disease, they would work with radiologists and hepatologists.

S

Screening - in the UK there are several screening programmes for cancer, including cancers of the breast, cervix (neck of the womb) and bowel. These are highly organised programmes involving many clinical, supporting and administrative staff. All screening programmes aim to pick up disease early, when treatment will be more effective. For example, there are pathologists involved in breast, cervical, prostate and bowel cancer screening.

T

Toxicology – the branch of pathology concerned with the study of drugs and poisons and their effects on the body, for example, the effects of alcohol on the liver.

V

Veterinary pathology – the branch of pathology concerned with diseases of animals. Veterinary pathologists train as vets first, not doctors.

Virus - these microorganisms are smaller than bacteria and cause a wide range of disease in humans. They cause illnesses from the common cold and chicken pox to cancer (e.g. cervical cancer can occur due to chronic infection with human papilloma virus). Viruses are not able to multiply outside living cells so do not exist in the environment; however they can infect any living cell whether plant or animal. Among many other things, Virologists will develop treatments and vaccines for colds, influenza and other respiratory viruses.