Quicklook books

Know the basics in 90 minutes

Quicklook at **Medicine**

About Quicklook at Medicine

MEDICINE is important to us all, throughout our lives. This short, easy to read, guide for the layman covers the main areas.

We learn about how the human body works. We see how the medical professions developed, from ancient beginnings through to the advanced and highly specialised world of modern practice. The main specialisations are explained and the roles of GP's, physicians, surgeons, nurses and other experts are clarified. We look at alternative medicine and the drug industry.

Medicine is a vital and challenging profession. We discover how doctors and nurses train and qualify and how their careers can progress.

The National Health Service is well established, but constantly changing and often in the news. We see how it has developed and consider what might happen in the future.

Above all, medicine is about people and their health. We consider the doctor-patient relationship. We put you in the chair of a busy GP dealing with a challenging working day.

Quicklook at

Medicine

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Chapter One

What is medicine?

MEDICINE is a caring profession dedicated to maximising patient health. In the UK the governing body for doctors, The General Medical Council ("GMC") released a statement following consultation on the modern roles of a doctor. Key features include taking responsibility for difficult treatment decisions, even in conditions of uncertainty, having good communication skills, being trustworthy and assisting with training. Patients are where possible to be able to make informed decisions about their own care. In a world where the capacity to treat is increasing but finance is limited, doctors are expected to use resources wisely, in the context of the need to promote health in the community as a whole.

The man often credited as the father of medicine, Hippocrates, came to similar conclusions. The "Hippocratic Oath" attributed to him, dating back to the 5th Century BC, requires the healer to help the sick to his best ability and judgement and not to do harm. There is emphasis on the duty of confidentiality and the requirement of trust. There must be no sexual or other abuse of patients. He was committed to teaching. Modern doctors do not actually take the Hippocratic Oath, the original of which makes appeal to the God Apollo, but its ethical force is such that its main principles continue to guide proper practice.

Since medicine sometimes involves life or death decisions and in other ways has great impact on the way people can lead their lives, it is one of the most responsible and potentially stressful occupations. As we shall see, it has vast scope and is rapidly changing.

This book approaches medicine from the perspective of practice in the UK, but much of it is of general relevance.

Chapter Two

The body

The human body can be viewed as the most remarkable thing on the planet. Every cell contains the DNA which operates as the entire, unique, blueprint for the individual. This is a lot of blueprints: the body contains many trillions of cells. Every type of cell dies during the life of an individual, and is usually replaced by a healthy replica. Different types of cell have different life expectancies. For example there is very little cell turnover in the complex structures associated with vision. Once established, these are largely fixed for life. Brain cells do reproduce, but unless stimulated they can die again. The rate of cell reproduction throughout the body diminishes with age and can be affected by diet, exercise and general health.

The body grows until adulthood when growth stops but the ability to generate new tissue remains. It has enormous powers of self repair. It can fight off a whole range of diseases. It provides a safe home for the cleverest thing we know: the human brain.

The brain and nervous system

The brain has immense processing power. Its workings are by no means fully understood, but it is thought to act much like a computer. It contains over a hundred billion neurons, each of which connects with thousands of other neurons via many trillions of connections called synapses. Electro chemical signals pass through these networks to transmit thoughts and control the operation of the body. The range of connections possible is in every sense mind boggling. If the brain is damaged as a result of injury, or a stroke, functionality can often return over time as new connections are found. Memory is stored in different ways in different parts of the brain.

Higher mental functions, which distinguish humans from other species, are controlled by the frontal lobes, where intellectual activity and the

thoughts that give people their personality are located.

Many of the brain's functions operate without conscious thought. The mid brain controls bodily functions, such as breathing and the beating of the heart. If an individual starts to do something strenuous, such as run, this part of the brain increases the rate at which the heart beats and prompts deeper and more frequent breathing. Many actions are involuntary, such as the normal blinking of the eyelids. Some of these can be easily overridden by conscious thought. It is easy to blink or breathe in deliberately. Other actions are more difficult, if not impossible, to consciously control (such as heart rate or the operation of internal organs).

The brain can suffer physical degeneration and damage, e.g. as a result of the ageing process. It is thought that some types of dementia have physical causes.

The central nervous system, which includes the brain, sends signals to it in relation to all higher functions via twelve cranial (in the head) nerves. These cover all the senses and the control of facial expressions. The spinal cord completes the central nervous system.

The peripheral nervous system communicates with the brain via the spinal cord. There are nerves in almost all parts of the body. The nervous system can be compared to a particularly extensive railway network, serving all areas. The brain, consciously or otherwise, is able to monitor and control all functions, from the movement of muscles, the sense of touch, and pain, to regulation of blood pressure, bladder function and much else.

The senses

These all depend on inputs into the nervous system and their subsequent interpretation by the brain.

Sight Eyes receive light via a lens system involving the cornea and a lens within the eye. The amount of light admitted can be regulated by the iris (i.e. the coloured part) expanding or retracting so as to make the black part in the centre of the eye (the pupil) larger or smaller. This changes the focus between close and distant objects. The process can also be very expressive, because pupil dilation can indicate interest, perhaps in a lover. Hence the

fascination, and sensitivity, associated with looking someone in the eye.

The eye operates like a camera. Light travels through the eyeball, which is filled with a transparent fluid and hits the retina at the back. This has an area of about five square centimetres. It sends a signal via the optic nerve to the brain, which perceives that as what we know as vision.

The lens can become cloudy over time, creating cataracts. Nowadays this problem is readily treatable, usually under local anaesthetic, by replacement by an artificial lens. Less serious sight conditions can be dealt with by opticians prescribing glasses, or laser surgery, which corrects the shape of the cornea by shaving bits off it. As with all surgery, there is some risk attached to this procedure.

Hearing The outer ear is shaped to capture sound, which travels to the mid ear via a canal. Between this and the middle ear the sound is magnified by the ear drum, a membrane which operates a bit like a speaker in an audio system. The resultant vibrations are picked up by small, flexible bones in the middle ear and transferred to the brain via the auditory nerve. As people age, flexibility diminishes and hearing deteriorates. Deafness can arise if the nerve ceases to function due to illnesses (such as Meniere's disease) and various infections. These include "glue ear", usually in children, which is a treatable condition.

The ears control balance as well as hearing, via semi circular fluid filled canals which detect movement. This is picked up by tiny hairs within the canals, which are very sensitive to motion. Diseases of the ear can cause dizziness, sometimes associated with strange electrical hums or other noises (tinnitus).

Taste is picked up by buds on the tongue and communicated to the brain via the nervous system. All taste is derived from four primary sensations: sweet, sour, bitter and salty. In addition to being potentially pleasurable, taste is functional in that things which taste bad may be bad for you. This is not an infallible test: it would rule out many medicines.

Smell, the weakest of the senses in humans, is closely associated with taste and probably has a similar practical function: to warn of potentially bad food. Sometimes this is all too apparently the case. Food that may look

good to eat may be rotten. By the time it has been tasted it may be too late. Bad food is a major cause of digestive problems.

Touch is experienced all over the skin, where it is felt through the tiny nerves just under the surface. It can be immensely sensitive, enabling blind people to read in braille, entirely through the nerves of the fingers.

The nerves which provide the sense of touch can also pick up the signals we know as pain. This is a sensory response to a harmful stimulus, often producing a quick, involuntary reaction, such as pulling a hand away from something hot.

The perception of pain varies between individuals and according to circumstances. Some people are much more tolerant of it than others. Generally, women are better at coping with it than men.

If an individual feels aggression, or fear, this can trigger the release of adrenaline (which is a natural stimulant) and endomorphins (natural pain relievers). This is part of the body's "fight or flight" reaction to a perceived crisis. The sensation of pain can be greatly reduced. This explains how athletes can achieve apparently superhuman performances sometimes. Their activity makes them less vulnerable to the effects of pain or fatigue.

The cardio-vascular system

This is concerned with the circulation of blood. If the nervous system is to be regarded as the body's rail network, veins and arteries are its roads. There are about 60,000 miles of them.

Blood is critical to the functioning of the body. It delivers the energy needed to power it, in the form of glucose (a sugar). It also conveys oxygen to all cells, which need it in order to sustain metabolic activity (i.e. the bio-chemical processes which keep them alive). The body is not capable of storing oxygen for long. Without a new supply, death follows in a very few minutes.

Blood conveys impurities to central organs for processing and subsequent elimination. Blood pumped from the left side of the heart has a high oxygen content. Oxygen consumption by the various parts of the body increases if it is working hard as a result of physical activity. Fit people are more efficient at extracting oxygen from the blood than others. Blood returns to

the right side of the heart and is then sent to the lungs for oxygenation. The lungs remove carbon dioxide, which is expelled as a person breathes out.

There are about five litres of blood in the body. Significant blood loss causes faintness and in extreme cases death. Blood can be replenished. Normally the body contains more than it needs in order to function properly. Following blood loss, blood volume is initially restored by fluid, absorbed from the gut.

Red blood cells, which transport oxygen and white blood cells, important in combating disease, are manufactured inside bone marrow: one example of the body's wonderful power of repair and renewal. These cells are suspended in blood plasma, which is a fluid consisting mainly of water which also contains dissolved glucose and other substances beneficial to life. These include hormones, which are chemicals released by cells which can affect the operation of other cells and enzymes, which are chemicals which promote metabolic activity. The biochemistry of the body is complex and its operation dependent on the circulation of the blood.

As a result of genetic diversity in the population, there are many different blood groups. The system of classification of blood types continues to develop, but it has long been recognised that incompatible blood will be rejected by the recipient's immune system. It is accordingly important to test a person's blood before a transfusion is administered.

Blood tests can reveal a lot about the functioning of the body and can identify a variety of conditions, including, anaemia (a shortage of red blood cells) various infections indicated by the presence of antibodies and changes in viscosity arising from inflammation.

The heart is often thought of as central to life. Despite romantic notions to the contrary, it is not the seat of human emotions. It is however vital. It drives the all important blood round the body, thereby servicing everything else, not stopping, day and night, throughout a lifetime of up to a hundred years or so. It has been estimated that there are roughly 250,000,000 heartbeats in the course of the average life. Unlike some other important parts of the body (such as eyes, ears and kidneys) there is only one heart. It has something of its own life force. A heart removed from the body will continue to beat almost indefinitely at its natural rhythm of about thirty beats per

About the author

Born in Wales, Ian lived in France from the age of six until he was twelve, making him bilingual. He joined St George's Hospital (then at Hyde Park Corner in the building now occupied by the Lanesborough Hotel) for his clinical studies. He did pre clinical training at Kings College, London and gained the qualifications MRCS/LRCP and MBBS London.

Upon qualification he worked as a Houseman at St George's Hospital, where he spent nine months in casualty and time working in obstetrics and gynaecology.

Having become interested in anaesthetics he decided to join a GP's practice in Chippenham. In those days this busy market town had a number of hospitals, staffed by GP's and a number of visiting consultants in addition to a permanent nursing staff. It was therefore possible to combine general practice with work as an anaesthetist in the local hospitals.

Ian remained with Chippenham's largest general practice for the rest of his career, rising to senior partner. He played an active role in advising health authorities on issues concerning general practice and was accordingly involved in significant changes to the way in which the National Health Service has been restructured over the years.

A keen sportsman himself, Ian was for six years medical adviser to Bath Rugby Club – now a leading Premiership side.

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No other book covers this vital subject so briefly and clearly. We learn how the body works, how the medical professions developed and how they function today. The main specialisations are explained, including nursing and complementary professions. We look at alternative medicine and the drug industry.

We see how the NHS came into being and how it is changing now. We discover how doctors and nurses train and how their careers can progress.

- We consider the doctor-patient relationship and spend a day as a busy GP.

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About the author

Ian Grandison had a long career as a GP in a large practice in Wiltshire, rising to senior partner. For a time he combined this with work as an anaesthetist in hospitals.

Ian played an active role in advising health authorities and was closely involved in significant changes to the health service over the years.

A keen sportsman, Ian was for six years medical adviser to Bath Rugby Club.

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