The Scientists

Clinical Scientists have a wide range of duties. These include performing clinical measurements on patients, interpreting and reporting on the data measured, training and teaching other clinical staff and developing training materials. They are responsible for service management and development, ensuring the health and safety of all measurements, acceptance testing and quality assurance. They also initiate and support research and innovation.

Clinical technologists perform clinical measurements on patients, help with the training of other clinical staff, carry out acceptance testing and regular maintenance of medical equipment, and undertake data input and associated administrative work.

Physiological measurement services are often multi-disciplinary, with physiologists, nurses and doctors working with Clinical Scientists and clinical technologists to manage these services. With active research and development, new measurements and applications of measurements are being found all the time.

This series of leaflets highlights the science and the scientists behind some widely used medical techniques.

They are produced by the Institute of Physics and Engineering in Medicine. To find out more about Medical Physics or Clinical or Biomedical Engineering, or to request free leaflets or posters in this series, contact us:

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The techniques described in this leaflet are only suitable in certain cases and some are not yet widely available. If you need physiological measurement, your doctor will advise you.

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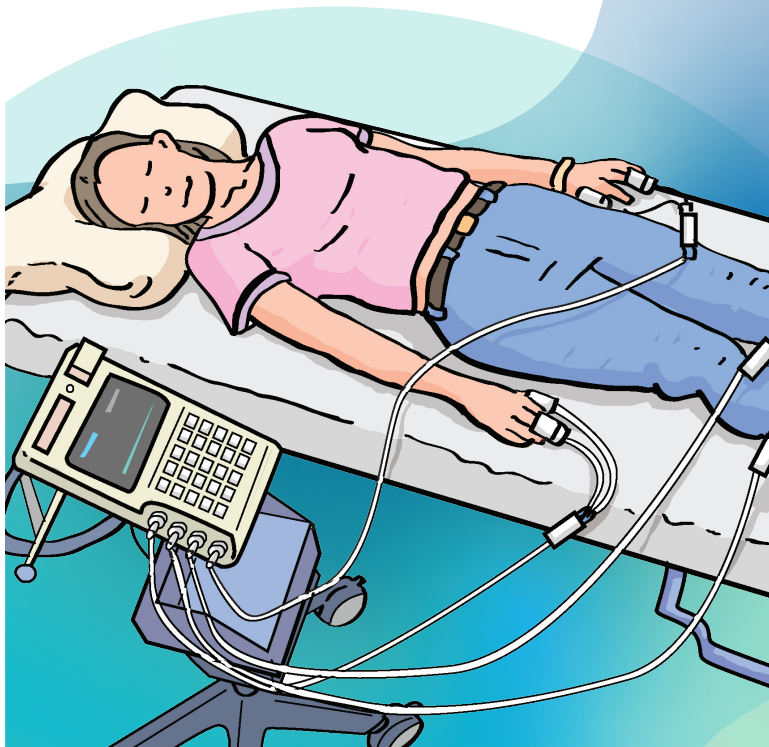
The Science & The Scientists

Assessing the body with physiological measurement

Physiological measurement is the science of transforming physiological information into meaningful data to contribute to diagnosis or treatment.



The Science

The scope of physiological measurement is very wide and varied as there are several physiological parameters that can be monitored and measured as part of patient care.

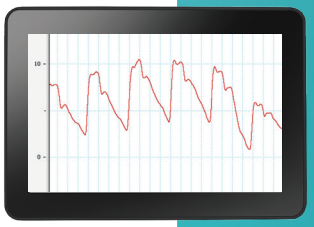
Intracranial pressure monitoring involves measuring the pressure in the head using a small transducer placed through a hole in the skull. The results of this monitoring can be used to help direct treatment for some patients, for example, patients who have cerebral fluid flow disorders or those who have had a head injury.

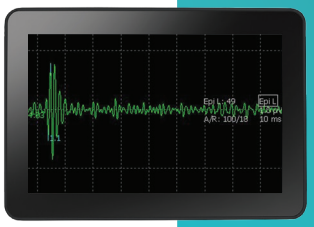
Spinal cord monitoring uses specialised equipment to monitor electrical signals passing through the spinal cord. This is used in some high-risk spinal surgeries so that any potential issues can be noticed early and corrective action can be taken.

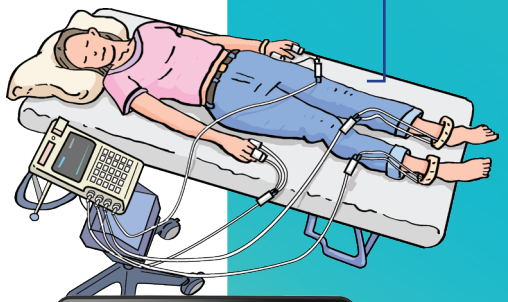
Microvascular measurement assesses the skin / tissue blood flow using a range of modalities including thermal imaging, laser Doppler imaging, and nailfold capillaroscopy. These are particularly useful for assessing burn wound depth and tissue viability and patients with Raynaud's phenomenon / connective tissue disease.

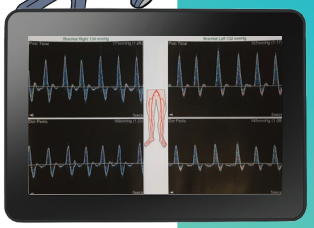
Body composition measurement quantifies the proportions of fluid, fat and bone in body tissues using methods like bio impedance, plethysmography, MRI etc. This test is very useful in nutritional studies, sports science and other clinical applications.

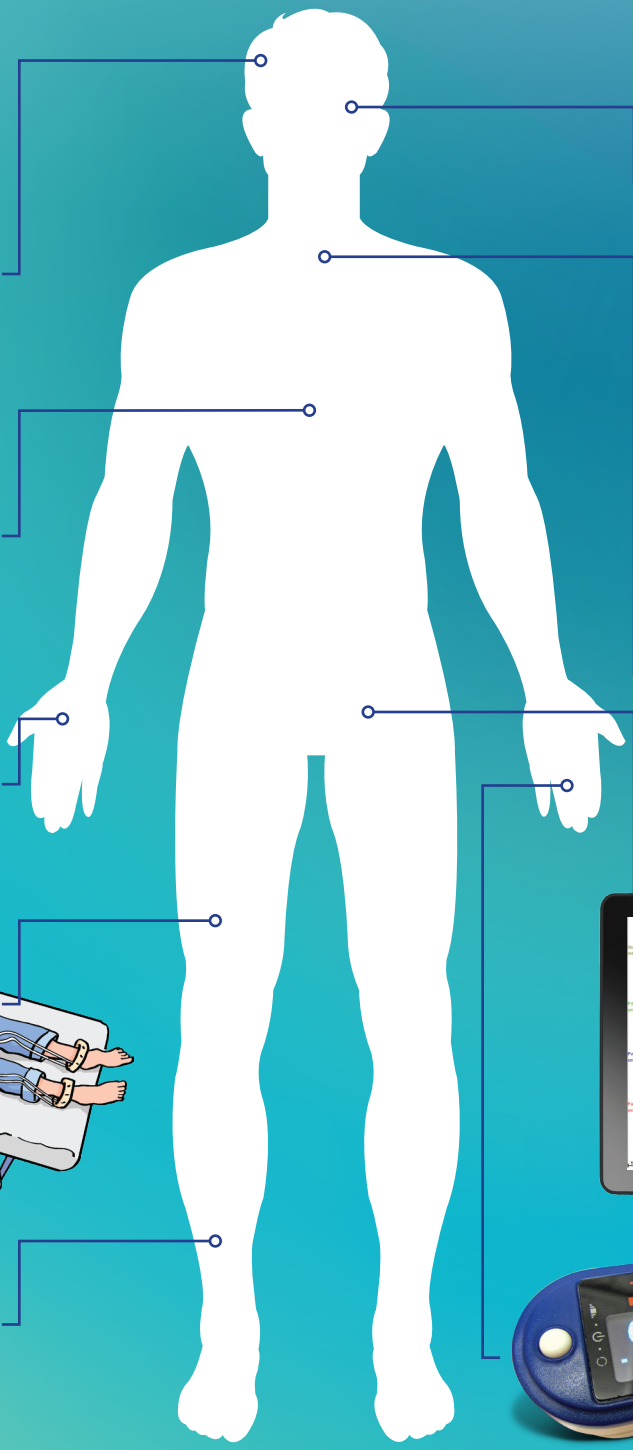
Macrovascular measurement investigates the blood flow in the arteries and veins using Doppler Ultrasound. This type of testing is useful in determining if there is a narrowing or occlusion in key blood vessels such as those linked to stroke, heart attack, painful legs on walking / leg ulcers, and diabetes.



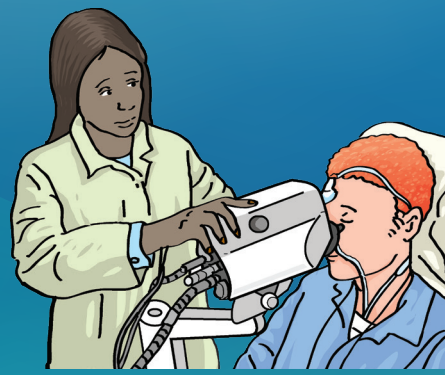




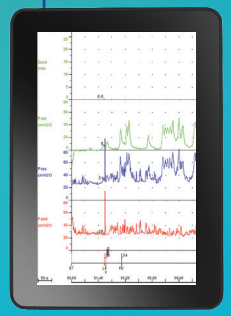




Visual electrophysiology measures the electrical signals produced in the retina that travel along the optic nerves to the brain in reaction to specific light and pattern stimuli using specialised electrodes. These tests of retinae and optic nerve function assist in the assessment of a number of ophthalmic conditions including unexplained visual problems and inherited or inflammatory diseases.



Upper Gastro-Intestinal physiology measures the strength and integrity of the sphincter muscle that guards the stomach, the oesophageal muscle motility during swallowing and the acid reflux in patients using pressure and pH sensors. These tests are useful to assess patients with suspected gastric reflux disease and patients who experience difficulty in swallowing.



Urodynamics measures the pressure, volume and flow in the lower urinary tract using urinary catheters, pressure sensors and flowmeters. It helps to distinguish problems that have similar symptoms. For example, incontinence can be related to problems with bladder contractions or the muscle keeping the bladder closed.

Pulse oximetry measures the oxygen saturation using light, that is, how much oxygen the blood is carrying as a percentage of its possible maximum. This is important for indicating whether the cells and tissues of the body are getting enough oxygen.