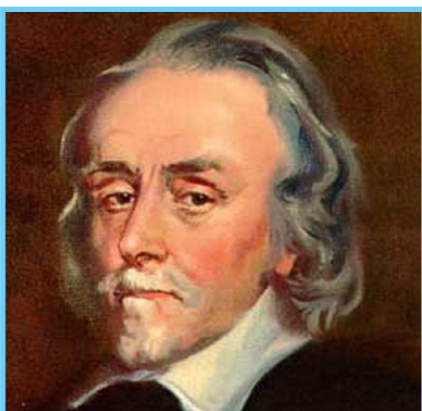


Science, Health and Biomedical Engineering Technology

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At the introductory stage of western medicine, it was similar to Greek medicine. Later it transformed into the allopathic system of medicine. This system got connected to science after Willian Harvey (ia 1628 in UK) explained the process of blood circulation in the human body. As a consequence, to a certain extent a scientific understanding was created of not only the human body, its various systems and organs, but also of the complications and of diseases. Biomedicine began in order to produce relief to patients in respect of three aspects. The three aspects are diagnose of diseases, treatment and investigations.



Willian Harvey

Another beginning which cannot be overlooked was the invention of an instrument which could measure blood pressure. This instrument measures the pressure with which blood flows through the blood vessels or systolic pressure (the pressure with which blood is sent out of the heart) and the diastolic pressure (the pressure in the blood vessels when the heart is filling with blood). The first measurement is the pressure in the arteries. Today the mercury pressure meter (the sphygmomanometer invented by the French National Eliene Jules Murray in 1860) helps medical doctors to diagnose various disease conditions in a large number of organs including blood vessels, heart and the brain. Today this instrument has developed to digital pressure meters.

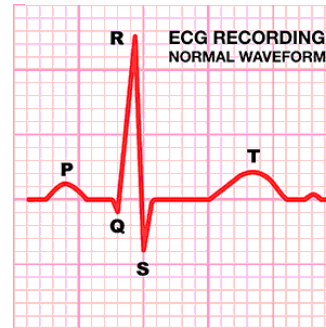
Cardiac diseases are the main causes of death in Sri Lanka. The E.C.G machine which provides

the first clue regarding a heart attack was invented by the Dutch national Vilem Iyanthowan in 1903. The start or the beginning of this discovery was that when he immersed his hands in a basin filled with salt water he felt as if some electricity escaped from his hands.



Digital blood pressure meter

This led to the situation where the electrical activity of the heart can be measured. Because parallel to this electrical activity of the heart the physical activity also takes place, it is possible to get a clue regarding a heart attack through electrocardiograph or ECG. The ECG can also help to identify various defects and abnormalities regarding the heart beat.



E.C.G

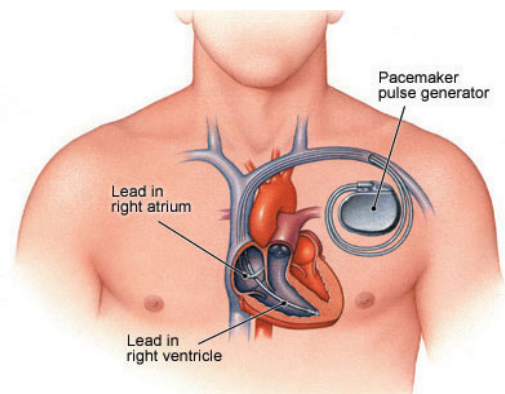
by laparoscopy have revolutionized the medical treatment. Another great achievement is solving the problems that arise due to the halting of heart activity during heart surgery by using

Another important invention associated with biological medicine is the pulseoximeter invented by a Japanese scientist. This instrument which measures the extent of oxygen saturation in blood help doctors to make observations regarding diseases. This instrument is of a great help to doctors when treating patients who have met with accidents, subjected to bleeding or having breathing difficulties. Capnograph indicates the amount of carbon dioxide in the final breath of the exhaled air. Through this measurement it is possible to assess the acid-base equilibrium in the blood and there by decide whether it is necessary to administer oxygen to a patient. Another important instrument associated with biomedicine is the nebulizer. This instrument can supply drugs in minute quantities (less than five microns) directly into the lungs very efficiently, with ease and with minimum of side effects.

Because the drug is administered directly into the alveoli of the lungs, not only are the benefits obtained more quickly, but also the side effects and complications of other organs minimized.

It is already possible to conveniently obtain the information regarding the biological activities (such as heart beat, blood pressure) of a patient in the intensive care unit using a smart phone via the wifi gateway or technology. Another biological achievement is the dialysis machine (the blood ultra-filtration machine) which artificially maintains the activity of the kidney until the kidney transplant of kidney patient. Conducting heart operations and treating without opening the thoracic cavity and the surgery done to remove stones in the gall bladder

the heart-lung machine (John H.Gibbon 1953 America). The iron lung machine (which you would have heard of very often) which maintains the respiratory system of polio patients, can be mentioned with pride (Phillip P.Dinker). The Continual Renal Replacement Therapy makes it possible to give relief continuously to patients and to people whose kidneys have stopped functioning due to serpent bites. It is possible to use the pacemaker either externally, or insert it internally specially for people





whose heart rhythm is not normal or for those who have irregular heart activity. It is also possible to save the lives of people whose hearts have been affected by toxic substances such as those in Nerine (Oleander) seeds. Here a pacemaker has to be used for about two days.

Manual massaging by hands has been used by doctors in order to resuscitate the heart which has stopped working in a patient who has suffered a heart attack. But to day the defibrillator (Clandus Paheter Ben - America) machine is used for this purpose. It is this defibrillator machine that is employed to revive heart activity after stopping heart activity to carryout open heart surgery. It is possible to treat a person who has got a sudden heart attack by using improved automatic defibrillator machine, until medical treatment is given. This machine can be used anywhere. Besides its use does not require a great deal of training. Cobalt-60 ray treatment has been used in the past to treat cancers. However, now the linear accelerator is used for this purpose. Another achievement in technology is the “Brachytherapy” machine which

provides treatment for cancer of the cervix. We cannot forget about X-rays when talking about ray treatment. With the discovery of the x-ray radiations by the German national William Conrad Rontgen in 1895, the

examination and treatment of patients has been revolutionized. It is still being improved. x-rays do not form reflections of soft tissues. However the



Fluoroscopy machine helps to locate even a tumor or cyst in the intestine.

The well known developments or improvements such as the CT scan, MRI scan, ultra sound scan, the Gamma camera, PET scan *etc.* are also achievements of Biomedical engineering.

The surgical procedures for the eye and dental health have been made easy by the use of instruments in these fields. For example, today the

removal of cataracts of the eye is done without general anaesthesia. Similarly immense progress has taken place in the fields of Physiotherapy, mental treatment, sports medicine by the inventions of Biomedical Engineering through engineering, electronics and digital technology.

The electron microscope is a machine that is essential today. It helps to identify most of the viruses that keep spreading today. The technology of Biomedical Engineering has reached even homes, going beyond the limits of hospitals. The digital pressure meter, blood glucometer, nebulizer and the dialysers used by some in their homes or bed rooms are evidence for this. Similarly it is possible to be informed of the rate of contraction of the heart rate of respiration, Body Mass Index (BMI), Blood cell count *etc.* through the applications that can be connected to the modern smart phones. It is imminent to be able to know the quality of calories and proteins we consumed in a meal on a given day through the use of a mobile smart phone in to which an application has been installed. Not only this it will record the calories that one burnt during exercise or while being engaged in a sport.

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