

Effect of Electronics in Medical Domain

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“A Large number of electronic equipments are being used in hospitals for patient care and diagnosis or carry out advanced surgeries”

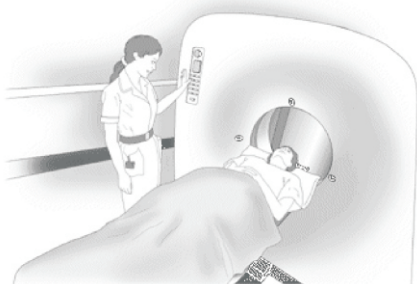
Electronics technology has certainly enhanced the effectiveness of medicines, and it continues to make an astonishing impact in the medical field. Medical Electronics is a branch of electronics in which electronic instruments and equipment are used for such medical applications as diagnosis, therapy, research, anesthesia control, cardiac control, and surgery. Medical electronics has given birth to an entire biomedical industry, which incorporates sophisticated diagnostic, treatment, and surgical systems that are pretty much helpful for healthcare.

There are clear and defined areas where electronics has made tremendous effect. They are no more confusing to the general public, for, they have developed their own niche in working and effectiveness. Some of these areas are:

- Telemedicine
- Drug Delivery
- Imaging Techniques
- Implantable devices and applications
- Electronic Instrumentation

Telemedicine

Telemedicine is a developed part that incorporates the use of telecommunication technology for medical diagnosis and patient care when the provider and the client are separated by distance. The field of telemedicine may include pathology, radiology, and patient consultation from the distance. This field has developed very recently and even off-shoring has been made possible to cope the demands of the work.



Imaging techniques

Imaging techniques are one of the oldest applications of electronics and computer science in medical treatment. However, the need of advanced systems and instruments has always propelled the researchers to keep it developing. No wonder that the medical field, without the help of imaging techniques, finds itself like a crippled person unable to walk or make progress such is the impact of imaging techniques and equipments on healthcare!

Some of the famous imaging techniques that are used in medical electronics are:

- **Computed Tomography (CT):** A CT (Computerized tomography) scan takes a series of x-rays which build up a three-dimensional picture of the inside of the body. The scan is painless but takes from 10 to 30 minutes. CT scans use a small amount of radiation, which is unlikely to harm you and will not harm anyone you come into contact with. You will be asked not to eat or drink for at least four hours before the scan. You may be given a drink or injection of a dye called contrast which allows particular areas to be seen more clearly. For a few minutes, this may make you feel hot all over. If you are allergic to iodine or have asthma you could have a more serious reaction to the injection, so it is important to let your doctor know beforehand. You will probably be able to go home as soon as the scan is over.

- **Spiral or Helical CT:** Some hospitals use low-dose spiral CT scans (helical CT scans). A CT scanning machine rotates rapidly around the body, taking more than one hundred pictures in sequence. The scan can detect smaller lung tumors than a conventional CT scan and takes only a few minutes. Spiral CT scans are quite new and you may have to travel to a specialist hospital to have one. They are not always necessary, but you can discuss with your doctor whether one would be useful in your case.

- **Electron beam tomography (EBT):** It is a specific form of computed tomography (CAT or CT) in which the X-ray tube is not mechanically spun in

order to rotate the source of X-ray photons. This different design was explicitly developed to better image heart structures which never stop moving, performing a complete cycle of movement with each heart beat.

- **Magnetic Resonance Imaging (MRI):** This test is similar to a CT scan but uses magnetism instead of x-rays to build up a detailed picture of areas of your body. Before the scan you may be asked to complete and sign a checklist. This is to make sure that it's safe for you to have an MRI scan (because the scanner is a powerful magnet). The checklist asks about any metal implants you may have, for example a pacemaker, surgical clips, bone pins etc.
- **Ultrasound:** An ultrasound may be used if the doctors think the cancer may have spread to the liver or other parts of the abdomen (tummy). Ultrasound uses sound waves to look at the liver and the other organs in the upper part of the abdomen. It is the same sort of scan that pregnant women have. Once you are lying comfortably on your back, a gel is spread on to the area to be scanned.
- **Nuclear Medicine Imaging:** In nuclear medicine imaging, radiopharmaceuticals are taken internally, for example intravenously or orally.

Then, external detectors (gamma cameras) capture and form images from the radiation emitted by the radiopharmaceuticals.


Implantable devices and applications

Implantable devices and application area is still developing to grow to its full potential. It is believed that in the coming two years, implantable devices would be able to treat and cure millions of patients, who are suffering from complications such as Parkinson's disease, sleep apnea, limb paralysis, strokes, epilepsy, and urinary incontinence. Research is also underway to get implantable chips that can be used in brain and thus, making neuroscience more effective to the common diseases like Retinitis Pigmentosa, Macular Degeneration, and Alzheimer's disease, etc.

Electronics Instrumentation

Medical electronics has long been supplemented by many electronic instruments that are not diagnostic in their nature, but help in various body functions of the patient's hearing aids and pacemakers. These instruments have aptly served the needs of many patients at different levels of complications. ■

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