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ROLE OF PHYSICS IN MEDICAL SCIENCE

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ABSTRACT :

This paper focuses on the latest advancements in the medical sciences that have accompanied recent physical developments. Medical physics is the application of the laws of physics to medicine or health care. It's essentially a way to use our understanding of physics to build tools and treatments that help people live longer and be healthier.

KEYWORDS : *Physics, Medical, Medical Science, Science.*

INTRODUCTION

Latest development of interdisciplinary studies has significantly emphasized that physics has substantial function to play in medical biology. In speculation to clinical science, physics and its guidelines teach us a way to perceive a human frame on molecular stage. Clinical physics is characterized because the utility of physical concepts, theories, and techniques inside the field of medication or healthcare.

Recently within the present day length, the physicist advanced the advanced strategies and contraptions frequently used in medical technological know-how. They also delivered into the medical domain severa improvements, including x-rays, nuclear magnetic resonance (NMR), ultrasound, particle accelerators, and radioisotope labeling and detection strategies. There are different improvements i.e. Mri, ct scanning, tomography for nuclear remedy and numerous kinds of radiotherapy remedy are the groundbreaking techniques that evolved and identified the technique of imaging human illnesses.

The clinical field has many packages of physics. Examples consist of x-ray crystallography that enables analyze virus systems, that could assist classify parasites. The x-rays penetrate the human body and are released and registered on a photographic film after touch with the internal organs of the human body, representing a bone shape and densities of tissues.

Likewise, techniques which includes electro cardiogram (ECG) and electro encephalogram (EEG) play a giant function in scientific studies. While a heart beats and a brain works, a kind of protein inner a cellular is created. Thanks to the activities of these materials, the electro cardiogram (ECG) and electro there, biophysicists have developed operational strategies for how they devise electrical alerts, and this facts has further helped to generate remedy and drug ranges. Likewise, ionization radiation turned into used for half a century while the life of the pink cells become measured and regularly used to determine whether or not anemia is resulting from output declines or rises in destruction of blood cells[1].

APPLICATIONS IN MEDICAL SCIENCE:

Body at Molecular Level

The inspiration of medical exercise lies in an appreciation of the way the body features. Body works by way of aggregating the organic molecules collectively. At the extent of the molecular structure and its features physics has applied. Proteins are, for instance, giant molecules which provide inner mechanical aid for cells. They are also responsible for the middle of existence and all of the chemical methods. Knowledge the protein structure is prime to knowledge its capabilities. Cells incorporate tiny molecular cars that are the family of proteins that help the cellular journey from one position to any other or the cloth within the cell. The maximum common example of such engines is muscle contraction and heart pumping. For the task the cells do, molecular motors are vital.[2]

The coronary heart beating and brain characteristic require another form of protein which produces electrical sign within the cell. The electro cardiogram (ECG) and electro encephalogram (EEG) are manifestations of protein operations and are used for cardiac and neurological disorder diagnostics. Biophysicists have determined how those proteins produce their electrical alerts and this records has given us many treatments starting from opioid remedy to abnormal coronary heart beats to epilepsy remedy.

Diagnosis

In prognosis physics is playing an increasingly more essential position. Over more than half of a century the use of ionizing radiation has been essential therapeutically. The marking of red blood cells with radioactive chromium isotopes allows for calculation of the lifespan of those cells, and this approach may be used to evaluate if anemia is the end result of decreased improvement or elevated lack of red blood cells.

A cutting-edge method of automatic axial tomography (cat scanning) for x-ray imaging in the United States of America and Britain at some point of the 1970s tests the attenuation of x-rays that attain the frame from several specific angles. Cormak acquired the 1979 Nobel Prize for automated tomography increase, the usual technique for extracting three dimensional records from dimensional projections. A gadget reconstructs the organs below research from these measurements in a sequence of pass segment or planes. This method makes strong separation of gentle tissues, consisting of liver and kidney, within the pc-reconstructed images.[FIG.1] This method provides considerable quantities of the scientific details that general x-rays might provide. Cat scanners are now used as fashionable device for extracting 3-dimensional records from two-dimensional projections in lots of hospitals and medical facilities global[3-4].

Figure 1: MRI Instrument

A diagnosis, in the context of a diagnostic procedure, can be considered as an attempt to classify the condition of a person into separate and distinct categories which allow medical decisions to be made about treatment and prognosis. A medical opinion is subsequently also defined in terms of an illness or other disorder. (In the case of a wrong diagnosis, however, the individual's actual disease or condition is not the same as the individual's diagnosis.)

Different health-care professionals such as a physician, physiotherapist, dentist, podiatrist, optometrist, nurse practitioner, health-care scientist or physician assistant may conduct a diagnostic procedure. The article uses diagnostic as any of these types of individuals.

A diagnostic technique (as well as the opinion thus reached) does not necessarily entail elucidating the disease etiology or conditions of concern, i.e. what caused the disease or condition. Such elucidation can be useful for improving diagnosis, further determining the prognosis or for avoiding potential recurrence of the disease or condition.

The main role to perform a diagnostic test is to identify a medical sign. Guidelines include:

- Detection of any deviation from what is considered to be normal, as can be defined in terms, for example, of anatomy (the structure of the human body), physiology (how the body works), pathology (what can go wrong with anatomy and physiology), psychology (thought and behavior) and human homeostasis (mechanisms for keeping the body systems in balance). Awareness of what is normal and assessment of the current state of the patient against these norms will help to assess the specific departure of the patient from homeostasis and the degree of departure which can in effect help to calculate the reason for further diagnostic care.
- A complaint expressed by a patient.
- The fact that a patient has found a medical practitioner may itself be an indicator that a diagnostic test can be performed. For instance, in a doctor's appointment, the doctor could already begin conducting a diagnostic procedure by monitoring the patient's gait from the waiting room to the doctor's office even before she or he has started to raise any concerns.

Also during a diagnostic procedure which is already underway, there may be an indication to conduct another, different, diagnostic procedure for another, possibly concomitant, disease or disorder. It can result from an accidental discovery of a sign that is unrelated to the parameter of interest, as may occur in comprehensive tests such as radio logical studies Such as magnetic resonance imaging or blood test panels which often involve blood tests not appropriate for ongoing diagnosis. [3]

Also used in the diagnosis are radioisotopes, the isotopes which radiate radioactive radiation. Use of radio isotopes in medicine began after E had discovered artificial radioisotopes. Fermi dated from 1935. Fermy was awarded the Nobel Prize for that discovery in 1938. A radioisotope is inserted into the body by isotope testing, usually by intravenous injection. The isotope is then taken up by various organs in varying quantities. Its distribution can be determined by monitoring the radiation that it releases and by adjusting its frequency, the presence, size and shape of the different anomalies in body organs can also be identified. The released radiation is measured by a scintillation meter, which is rotated back and forth over the scanned organ. Those texts can then be registered and analyzed electronically by the clinicians. The isotope typically has a short half-life and hence completely decays until its radioactivity can cause some harm to the body of the patient [4].

Therapy

The most common application of nuclear science in medicine is radiation therapy, the use of radiation sources in the treatment or relief of diseases (H. Bacquerel, M. Curie and P. Curie received the Nobel Prize in Science in 1903 for discovering radioactivity). Radiation treatment nearly always uses ionizing radiation, rays entering the deep tissue, Which can respond physically and chemically to the destruction of the diseased cells. Radiation therapy is used to treat cancer and blood disorders including leukemia.

Figure 2: Radiation therapy

In 1960 T Maiman's discovery of LASER added another layer to the drug. Since one year of its invention in 1961, LASER has been used to destroy a retinal tumor. Ophthalmology is the most gained area where both LASER and surgical remedies are used for diagnosis. This helps doctors to vaporize or form a tissue preciously, if they wish. A prime example of this is LASER surgery where LASER is used for corneal reshaping. LASER is used to crush the kidney stone in bloodless way. This is also used for the diagnosis of both skin tumors and untreated brain tumors. Laser therapy is ultrasound or ultrasound is one of physics' non-invasive diagnostic devices that has found an important place as a non-chirurgical treatment of kidney stones and cleaning of surgical instruments.[FIG-2] This has been used to alleviate pain caused by arthritis and neurological discomfort, to recover the contracting arm, to perform bloodless surgery, to remove broken teeth and to loosen scar tissue. Ultrasonic waves are also used in sterilization of milk and water.[5-6].

CONCLUSION:

Physics contributes directly to medical treatment by supplying modern analytical tools and diagnostic methods for the body's information at the molecular level. It also contributes directly to the quality of medical care by introducing new analytical methods, diagnostic strategies, and treatments, in addition to basic research

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