D V Giri, J Bioengineer & Biomedical Sci 2016, 6:5 (Suppl)
http://dx.doi.org/10.4172/2155-9538.C1.013

3rd International Conference on

Medical Physics & Biomedical Engineering

November 07-08, 2016 Barcelona, Spain

D V Giri

University of New Mexico, USA

Therapeutic and diagnostic uses of electromagnetic energy and emerging medical technologies from an engineering perspective

In this paper, we wish to review the medical uses of electromagnetic energy both in diagnosis and therapy. The electromagnetic (EM) spectrum ranging from DC to gamma rays and beyond is a vast natural resource that has been very valuable for mankind. With the rapid advances of medical technology, radio frequency (RF) techniques are becoming increasingly popular for a variety of applications such as non-invasive diagnosis, continuous monitoring of physiological data, communication between implanted devices, and communication to external devices. In this paper, we have reviewed the medical uses of EM energy. Therapeutic applications of EM energy can be broadly classified into two groups as (1) conventional and (2) emerging therapies. Examples of conventional therapies are: a) hyperthermia (thermal therapy); b) MRI; c) X-ray; and d) CT scan. In the emerging category are THz imagery and implantable devices. Examining the EM spectrum one can observe a dichotomy at about 1015 Hz to delineate non-ionizing and ionizing radiation. At f=1015 Hz, the quantum of energy associated with the EM radiation is E=hf ~ 4 eV where 'h' is the Planck's constant. Medical applications are possible at many frequencies such as DC, RF, microwave, X-rays and gamma rays. In the past decade, there have been some remarkable strides made by electromagnetic applications implemented in medical technologies. With the rapid advances in the electronic and digital technologies, some very interesting electromagnetic biomedical applications are being pursued by several researchers. Most of the work is still in the clinical trial stages. The challenges are primarily because of well- known competing technologies. The objective of this paper is to summarize some significant developments with electromagnetics in emerging medical technologies.

Biography

D V Giri has completed his PhD in 1975 from Harvard University. He has over 40 years of work experience in the field Applied Electromagnetics. He is a Life Fellow of IEEE, and International Chairman of Commission E, URSI. He has co-authored a book titled "High-Power Microwave Systems and Effects" published by Taylor and Francis in 1994. He is a co-recipient of the IEEE Antennas and Propagation Society's 2006 John Kraus Antenna Award. His second book titled "High-Power Electromagnetic Radiators: Nonlethal Weapons and Other Applications" has been published by Harvard University Press in 2004. He has also published over 150 papers, reports, etc. He is a recipient of 2006 John Kraus Antenna Award by IEEE Antennas and Propagation Society

giri@dvgiri.com