

Medical imaging modalities: Prevention of unnecessary orders and non-optimized radiation exposure

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Editorial

INTRODUCTION

Magnetic resonance imaging (MRI) uses a constant magnetic field and radio waves, a non-invasive method for examining tissues, organs and the skeletal system. Advantages and disadvantages of MRI are not fully understood; however, it has been commonly used in the diagnosis of skeleton and bone diseases (such as disk and spinal disorders, joint disorders (arthritis), bone tumours and tissues), cardiovascular diseases (e.g., heart wall thickness and motion, inflammation and blockage in the blood vessels, injuries occurred due to heart attack and heart disease) as well as tumours of the uterus, ovary, prostate, spleen and so on.

In the computerized tumour (CT) scan, as an invasive method, the x-rays of the body are used for tomography; different x-ray attenuation coefficient in tissues as well as reconstruction of images could have an effect on the scanning of the patient and the received amount of radiation by the patient. CT imaging is capable of identifying vascular problems/diseases, gastrointestinal, infectious diseases, trauma and musculoskeletal problems. In addition, it is

the preferred tool in detection of most cancers, such as lung, liver, and pancreatic cancer. In fact, it allows physicians for better diagnosing of the tumour size, accurate positioning and development of tumours compared to adjacent tissue diagnosis. Therefore, CT scan is a very important tool to examine, diagnose and treat spinal injuries changed to damages to the hands, feet and skeletal structure. CT imaging can also measure the bone mineral density and osteoporosis. Furthermore, in the case of bruising, CT scan could recognize the potential damages to the liver, spleen, kidney, or any other organ very fast.

However, compared to the other radio graphical diagnostic methods, CT scan could lead to the exposure of the patients to substantial radiation dosage; this may have several radiobiological effects such as delayed effects of radiation which could result in variety of cancers, chromosomal failures and potential genetic abnormalities in the future generations. According to the international commission of radiation protection (ICRP) recommendations with regard to the

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principles of: as low as reasonably achievable (ALARA) as well as the maximum permissible dose (MPD) (maximum dose of the population), the unnecessary imaging should be avoided, in order to reduce the acquired radiation dose by the public community.

Moreover, according to the recent reports on the effects of the three waves of MRI machines and CT scan imaging dose's effects as well as huge number of imaging tests around the world (20 million a year, over 50 thousand tests daily MRI),¹ and also unnecessary increase in the requests of MRI for patients,² it is recommended that these tests should be prescribed for patients with greater accuracy and caution; with application of magnetic dosimeter for

monitoring exposure of people who work with MRI (as its application for X-ray and CT scan).³

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