

INITIATIVE FOR OPTIMIZING IMAGE QUALITY AND RADIATION DOSE

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ABSTRACT. Medical imaging has become one of the most effective non-invasive diagnostic tools for the precise result. Since, it has grown to be the most demanding in the field of medicine, it also carries higher health risk due to the long exposure of ionizing radiation. For a very long time, it was believed that increasing radiation exposure was the only way to improve image quality. Since its introduction in the early 1970s, CT has had a dramatic evolution that has greatly improved its diagnostic performance in many clinical scenarios and vastly broadened its field of application. As a result, it has become crucial to balance radiation exposure while also optimizing the image quality of the diagnosis.

АБСТРАКТ. Медицинская визуализация стала одним из наиболее эффективных неинвазивных диагностических инструментов для получения точного результата. С тех пор как она стала наиболее востребованной в области медицины, она также несет повышенный риск для здоровья из-за длительного воздействия ионизирующего излучения. Очень долгое время считалось, что увеличение радиационной нагрузки - единственный способ улучшить качество изображения. С момента своего появления в начале 1970-х годов КТ претерпела драматическую эволюцию, которая значительно улучшила ее диагностические характеристики во многих клинических сценариях и значительно расширила область ее применения. В результате стало крайне важно сбалансировать лучевую нагрузку и одновременно оптимизировать качество изображения при диагностике.

Tibbiy ko‘rish aniq natija uchun eng samarali invaziv bo‘lmagan diagnostika vositalaridan biriga aylandi. Tibbiyot sohasida eng talabchan bo‘lib ulg‘ayganligi sababli, u uzoq vaqt ionlashtiruvchi nurlanish ta‘sirida sog‘liq uchun yuqori xavfga ega. Uzoq vaqt davomida radiatsiya ta‘sirining kuchayishi tasvir sifatini yaxshilashning yagona usuli ekanligiga ishonilgan. 70-yillarning boshlarida paydo bo‘lganidan beri, KT dramatik evolyutsiyaga ega bo‘lib, ko‘plab klinik stsenariylarda diagnostika ko‘rsatkichlarini sezilarli darajada yaxshilagan va uni qo‘llash sohasini sezilarli darajada kengaytirgan. Natijada, radiatsiya ta‘sirini muvozanatlash va tashxisning tasvir sifatini optimallashtirish juda muhim bo‘ldi.

KEYWORDS: Medical imaging, ionizing radiation, optimizing image quality, CT scan, reducing radiation exposure

INTRODUCTION: Radiation exposure is a critical issue in multidetector CT (MDCT) particularly since fast MDCT scanners have become widely available, and the method has been proposed as a noninvasive diagnostic tool for an increasing number of clinical applications. Additional features of MDCT imaging affecting individual dose are related to the inappropriate use of scanners caused by practices such as scanning beyond the area of interest or acquiring unnecessary multiphase image sets. Several strategies have been implemented over the last few years which are based on X-ray emission or optimization of scanning parameters (i.e. mAs, kV, pitch, collimation) or

which take account of the individual patient's characteristics (automatic exposure control systems and ECG-pulsing techniques for ECG-gated acquisitions). Even if CT represents only 11% of radiologic procedures, it accounts for as much as 70% of the total effective dose from all diagnostic radiologic studies. However, despite clear evidence that CT can provide fundamental information for diagnosis and patient care, the risk of malignancy induced by ionizing radiation from CT examinations must be carefully considered. One of the main obstacles to reducing radiation dose is image noise. Noise in CT has two principal sources: quantum noise and electronic noise. These strategies allow optimization of image quality while keeping individual exposure at the lowest level.

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