Automatic kV Selection for Radiation Dose Reduction in CT: How Does it Work and What Can it Do?

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Introduction

Concerns with the potential risk of cancer induction resulting from the radiation dose of computed tomography (CT) scans have grown with the dramatically increased use of CT. Although the existence of such risk remains controversial for the issue of radiation dose, heavy media and public attention should receive radiation dose as a new radiation risk (5). A commonly used method to reduce radiation dose in clinical settings is adaptive kV selection, which automatically adapts the tube current to the patient attenuation. This technique also helps to achieve the best image quality at a lower dose. Another important technique is to adjust tube potential (kV). Many researchers have studied this technique. A common critical consideration in these studies is the appropriateness of using lower kV in highly attenuation (body size and body habitus) patients, especially those aged 50% or even higher. But for bigger patient sizes and other exam types, the image quality may become unacceptable if using the lower kV.

Basic Principles of Optimal kV Selection

Tube current and tube voltage are the main factors that affect radiation dose and image quality. The tube current can be adjusted according to the patient attenuation, represented in terms of CTDIvol. The CTDIvol at the same kV was lowest when the tube current was adjusted according to the patient attenuation level. Patient lateral width at each scan position was measured using the Mayo software in 29 CTA exams and (b) 91 abdomen-pelvis scans, respectively. The CTA exams were considered to have acceptable quality in terms of diagnostic confidence.

Clinical Implementation of Optimal kV

A common way is to implement adaptive kV to one patient weight-size based on kV chart, which specifies the tube current and tube potential for different patient weight-to-size ranges. The image quality and radiation dose can be tailored by adjusting the kV and current. We developed an automatic kV technique that is implemented in a clinical radiographic test, which relies on a fixed kV and tube current to ensure matched the iodine CNR and noise. The amount of radiation dose required to meet the desired image quality, such that the selected radiation dose is optimal for the given image quality metric, xC is-

Important Considerations of Automatic kV Selection

Automatic kV selection can be a useful method to reduce the radiation dose in CT scans. However, the image quality and diagnostic performance can be affected by the trade-off between radiation dose and image quality. In the future, we will continue to investigate the potential of automatic kV selection to improve the diagnostic performance in clinical settings.