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Editorial: State of the Art CT and Image Quality, Radiation and Contrast Dose

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Abstract

A special issue of the journal *Dose-Response* entitled "State of the Art CT and Image Quality, Radiation and Contrast Dose" is proposed. Technological improvements on CT scanners have the potentiality to reduce the issues related to ionizing radiation administration, opening new insights toward innovative applications also thanks to the contamination of other research fields like artificial intelligence algorithms and additive manufacturing technologies. In order to approach these new research directions, a multidisciplinary team becomes needed, overcoming the clinical and radiological point of view and enriching the workflow with different contributes. The real weight of these afferents on patient's management remains to be assessed and characterized. The main topics will be related to innovative CT applications able to improve patient management and treatment assessment and reduce patients risks due to radiation exposure and iodinated contrast injection.

Keywords

hole-body imaging, low-dose CT protocols, iodinated contrast agent, quantitative imaging, surgical planning, AI algorithms

Editorial

Since the introduction of CT in the early 1970s, new technologies and approaches have been continuously implemented to reduce the radiation footprint and enhance the image quality. Hardware developments, such as large detectors and dual-source technique, significantly decreased the required radiation dose and substantially increased the image quality as reported in literature. Important determinants in radiation dose and image quality are detector efficiency, tube potential, tube current, scanned area, and usage of post processing denoising technique, such as iterative reconstruction. In this context, artificial intelligence algorithms have been recently applied to *a-posteriori* improve images signal-to-noise ratio, even with suboptimal acquisition parameters, or minimal iodinated contrast agent concentrations. The challenge to acquire diagnostic low-dose datasets has paved the way for the use of CT scans as a screening tool in specific contexts, or to achieve perfusion quantitative parameters at rest and after pharmacological/physical stimuli.

Furthermore, the introduction of spectral imaging techniques and dual energy CT protocols have widened the quantitative possibilities of CT diagnostics, shifting from attenuation and Hounsfield units measures to the estimation of *in vivo* tissue molecular composition and concentration (e.g., iron, fat, and iodinate).

Based on these considerations, we proposed this special issue of the journal *Dose-Response* entitled "State of the Art CT and Image Quality, Radiation and Contrast Dose." The aim is to describe new potential applications for state of the art CT scanners in different clinical conditions and how different research fields can be implemented in CT diagnostics to foster its clinical power.

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The articles in this issue are reviewed by leading experts researching on the disciplines of radiology, surgery, physics, medicine, and engineering. We are grateful to the experts who have contributed to this exciting issue and to the reviewers for their insights and suggestions.

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