CT Radiation Exposure: How Bad Is It, and How Can It Be Reduced in Practice?
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CT has greatly advanced our diagnostic capabilities throughout all areas of medicine. These diagnostic benefits have combined with widespread availability and rapidity of scanning to produce tremendous increases in CT utilization, currently estimated at approximately 70 million CT scans per year in the US. However, rapidly increasing utilization has heightened concerns about the collective radiation exposure to the population as a whole [1], and about the high levels of cumulative exposure that may occur in patients undergoing recurrent imaging for chronic conditions or persistent complaints [2,3].

Radiation risks have been alternately downplayed and exaggerated in the literature and lay media, resulting in great confusion about the magnitude of these risks. While conventional x-ray, fluoroscopy, and nuclear medicine studies also expose patients to ionizing radiation, CT has appropriately received the greatest scrutiny because of the relatively high radiation dose per exam – although it comprises about 15% of all medical imaging procedures, it produces approximately half of the population’s medical radiation exposure [4].

The objective of this talk is to convey some understanding about the approximate levels of risk imparted by CT, and the factors influencing these risks, to encourage a more rational decision making process by enabling risk estimates to be weighed against the perceived benefits of imaging. I will review common radiation terminology, typical dose values for common CT exam types [5], and technology and patient factors that influence dose. I will describe the most commonly used Linear-No-Threshold risk model of the BEIR-VII report [6] and demonstrate how it may be used to easily make order of magnitude cancer risk estimates.

Finally, we will explore practical opportunities to reduce radiation exposure [7], including CT technique optimization, utilization control, and potential opportunity areas where MRI may play a role if the common challenges of access, exam duration, and technical complexity can be overcome.

References:
Synopsis:

The objective of this talk is to convey some understanding about the approximate levels of risk imparted by CT, and the factors influencing these risks. I will review common radiation terminology, typical dose values for common CT exam types, and technology and patient factors that influence dose. I will demonstrate how to make order of magnitude cancer risk estimates using the most common Linear-No-Threshold risk model. Finally, we will explore practical opportunities to reduce radiation exposure, including potential opportunity areas where MRI may play a role if the common challenges of access, exam duration, and technical complexity can be overcome.