

In CT imaging, materials having different chemical compositions can be presented by the same, or very similar, CT numbers, making the differentiation and classification of different types of tissues extremely challenging. In dual-energy CT, an additional attenuation measurement is obtained at a second energy, allowing the differentiation of the two materials. Previously implemented in the 1980s, dual-kV techniques are again available on clinical CT systems, accomplished with either slow or fast tube potentials switching or dual-source methods. The fundamental principles of dual-kV techniques and their relative strengths and weaknesses will be reviewed. Clinical applications of dual-kV CT imaging will be described, including: 1) automatic removal of bony anatomy, including calcified plaque, from a CT dataset; 2) semi-quantitative indication of the perfused blood volume in lung parenchyma or the myocardium; 3) removal of the iodine signal from contrast-enhanced CT data, which may allow for the elimination of the non-contrast scan phase in some exams; and 4) characterization of tissue by its chemical composition, as in the discrimination of uric acid from calcium-containing renal stones.

Attendees of this presentation can expect to learn about:

- 1) the technical approaches to dual-kV, dual-energy CT currently implemented or under investigation on commercial CT systems,
- 2) the technical strengths and weaknesses of each approach, and
- 3) what clinical applications are currently in use or under investigation.