In CT imaging, materials having different chemical compositions can be represented 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 potential 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 data set; 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.