The present trend is towards increased dose delivery with 3-D conformal radiation therapy. The increased doses place additional constraints on the accuracy of computed dose distributions due to the greater potential for complications. The accurac y of the delivery of a radiation dose is dependent on: the accuracy with which the beam can be calibrated in water, the accuracy with which the dose can be calculated in a non-homogeneous patient in relationship to the calibration dose, and the accuracy with which the calculated dose can be delivered to the patient. Historically, dose calculations were performed assuming that patients consisted of water-like tissues. With the advent of computerized tomography, *in vivo* and patient-specific density information became available and could be incorporated into the dose calculation process. However, in spite of the improved imaging and treatment planning software, many radiation therapy departments still do not use tissue inhomogeneity corrections. Some clinical trial groups demand that tissue inhomogeneity corrections not be used for specific studies. In this refresher course, the clinical need for inhomogeneity corrections will be addressed. The basic physics relevant to photon irradiations of the human body will be reviewed. Different methods of inhomogeneity corrections will be categorized according to the dimensionality of anatomy or the dimensionality of the scatter that is incorporated in the calculation. Practical methods of accounting for tissue inhomogeneities as implemented in current commercial treatment planning systems will be summarized. Benchmark data that can be used for comparing calculations against measurements will be provided. Finally recommendations will be given on the implementation and use of inhomogeneity corrections in clinical practice. The intent of this review is to provide guidance for the practising clinical physicist to discern the capabilities and limitations of commonly available inhomogeneity correction methods.

Objectives:

1. To review the clinical need for inhomogeneity corrections.
2. To review the basic physics of inhomogeneity corrections.
3. To review the practical inhomogeneity correction methods in current use in commercial treatment planning systems.
4. To review benchmark data available for testing inhomogeneity corrections.
5. To provide recommendations on the implementation and use of inhomogeneity corrections in clinical practice.