

The integration of MR imaging into the treatment planning process has provided the ability to improve the identification of tumor boundaries, soft tissue interfaces, organ functioning, and tumor and normal tissue motion. Selecting and optimizing the MR imaging sequence is challenging. Sub-optimal imaging sequences may reduce the efficacy of the MR images or increase the time required to obtain the images. Research has been underway to optimize these sequences and adapt sequences developed in diagnostic MR imaging for radiotherapy requirements. MR contrast techniques, the optimization of SNR and slice thickness, and the evaluation of differences between commonly used sequences and techniques will be presented for anatomical imaging. Functional imaging for tumors and normal tissues will be discussed, including optimizing time and resolution and the trade-offs that must be made between them. For MR imaging of tumor and normal tissue motion, different cine imaging techniques will be presented as well as the optimization of frequency and resolution in these techniques.

The educational objectives include:

1. Understand techniques and sequences used for anatomical imaging, including tumor definition, contrast enhancement, and organ identification.
2. Explore techniques to perform functional imaging to evaluate tumor and normal tissue capabilities for integration into treatment planning.
3. Understand techniques to optimize speed of imaging and cine sequences for evaluating tumor and normal tissue motion. Both 2D and 3D sequences will be discussed.