The goal of stereotactic body radiotherapy (SBRT) is to deliver highly conformal larger biologically equivalent doses to tumors, while minimizing toxicity to normal structures. This goal is more easily achievable in parallel structures, e.g. lung and liver, by going to extreme measures to limit the volume of normal tissue exposed to a threshold dose. This high degree of conformality and sharp dose gradient necessary for SBRT are achieved through hypofractionated treatments, small margins, and a large number of non-coplanar beams.
SBRT has become a prominent treatment option for patients with inoperable Stage I non-small cell lung cancer and has shown high rates of local control. SBRT can also be used as a boost for post chemoradiation regiments if residual disease is present for stage II/III lung tumors. Because of the high conformality and sharp dose gradients achieved with SBRT, it is also used for spine lesions or for local control in asymptomatic spine lesions in our clinic. SBRT is only an option for patients with tumors smaller than 5cm in our clinic.
The biggest problem with lung and liver tumors is the effective and reproducible reduction of tumor motion during treatment. Tumor motion reduction in our clinic is mainly achieved by using abdominal compression to induce forced shallow breathing, when possible. For patient's where abdominal compression is not an option, maximum intensity pixel images for lung tumors (or minimum intensity pixel images for liver tumors) acquired through four dimensional computed tomography (4D CT) are used. To achieve the degree of safety and accuracy necessary to effectively deliver the large doses per fraction associated with SBRT, requires submillimeter accuracy in setup, treatment planning, and treatment delivery, which can only be accomplished through a dedicated team approach. In this presentation the University of Kentucky's approach will be discussed. The importance of reproducible and reliable setup during CT simulation and treatment will be discussed, as well as the importance of motion management for lung and liver tumors and daily image guidance. Implementation of guidelines of AAPM TaskGroup 101 and 142 reports, on stereotactic radiation therapy and machine QA respectively, in our clinic will also be discussed.

Educational objectives:

1. Understand the underlying principles of SBRT
2. Understand the essential requirements for successful SBRT treatments
3. Understand the planning process for SBRT treatments