AbstractID: 8337 Title: A Simple Method to Determine Couch and Collimator Angles in 3-Field Breast Irradiation

Purpose: In 3-field breast irradiation, it is essential to ensure field match between tangential and supraclavicular fields. A perfect field match can be easily accomplished with single-isocenter technique, no couch or collimator rotations. For tangential field length larger than 20cm, symmetric tangential fields are used and thus appropriate couch and collimator rotations are needed to avoid field overlapping due to beam divergence. There are various methods to determine the couch and collimator angles, from rigorous geometric coordinate transformations to empirical approximations, each having advantages and shortcomings. The purpose of this study is to develop a lookup table method that is both accurate and easy to use. **Method:** Assuming symmetric tangential fields Y1=Y2=Y/2, couch and collimator angles needed to achieve a perfect field match are calculated using Siddon's formulae: $\sin(\theta_{couch})=\sin(\beta)/\sin(\theta_{gantry})$, $\sin(\theta_{collimator})=\tan(\beta)/\tan(\theta_{gantry})$, where $\tan(\beta)=Y2/SAD$. A lookup table of couch and collimator angles as a function of θ_{gantry} and Y2 is then created for future easy access. **Results:** The lookup table helps determine appropriate couch and collimator angles during simulation and planning. For example, for $\theta_{gantry}=55°$, Y=20cm, it can be easily found from the table that $\theta_{couch}=7°$ and $\theta_{collimator}=4°$. The couch and collimator angles increase with increasing field length and decreasing gantry angle. The collimator angle can also be expressed as a fraction of the couch angle. In most cases the ratio of $\theta_{collimator}$ to θ_{couch} ranges from 0.3 to 0.6. **Conclusion:** We have developed a lookup table method to help determine precisely the couch and collimator angles to achieve geometric match in 3-field breast irradiation. The table is simple and easy to use. It eliminates the need for a calculator or computer program. It becomes a handy tool for dosimetrists, physicists and radiation oncologists. Similar lookup tables can be created for head & neck and craniospinal irradiations.