AbstractID: 11866 Title: Proton Physics and Technology

The dose localization advantages of proton beams derive primarily from the Bragg peak in the proton stopping distribution. Therefore, the potential clinical gains expected form proton beams are based on physical, rather than biological, considerations. The rationale for proton therapy is based on the hypothesis that the superior dose distributions of proton beams will lead to increased local control; increased disease-free survival; decreased treatment-related morbidity; and improved quality of life. The degree to which each of these end-points can be changed by proton therapy will depend upon the particular disease site, patient population, and other factors. In the last few years there has been a significant increase in interest in proton therapy and as a consequence, many new facilities are being planned and built. There are currently over 25 institutions worldwide treating patients with proton beams and over 55,000 patients have been treated. There are at least 25 new facilities in various stages of planning and building. We will discuss the rationale for proton therapy, the current status of proton therapy, proton physics and dosimetry, and technology for the acceleration and delivery of proton beams. We will also discuss new developments in proton therapy accelerators and treatment delivery systems. Technologies for carbon ion therapy will also be discussed. We will address issues related to the cost of proton treatments relative to the cost of photon treatments and discuss various ways in which the cost of proton therapy can be decreased.

Educational Objectives:
Understand

1. rationale for proton therapy;
2. current status of proton therapy;
3. physical characteristics of proton beams;
4. beam production and treatment delivery technology for proton beams;
5. acceptance testing and clinical commissioning of proton therapy beams; and
6. QA for proton treatments