

**Purpose:** The purpose of this study is to demonstrate how to model a cone beam computed tomography (CBCT) beam into a treatment planning system (TPS).

**Methods:** An Elekta Synergy LINAC equipped with CBCT was used in this study. Profiles and depth dose curves were measured in a water tank with the kV source in the AP position. Monoenergetic energy deposition kernels from 20 to 110 keV were added to Philips Pinnacle Beta. An energy spectrum was imported to create a model for the scanned profiles for a CBCT beam with 120 kVp, 40 mA, and 10 ms/frame. Film, TLD, and ion chamber measurements were used to verify the model in a stack of water equivalent material at 100 SSD. TLDs were used to measure the dose within the complex geometry of an anthropomorphic phantom. Additionally, this research is being carried out on an Oncentra treatment planning system from Nucletron Corporation.

**Results:** The TPS model accurately represents the depth dose and profiles of the scanned CBCT beam. The dose that was predicted by the TPS versus absolute measurement with TLD and ion chamber were within 3% in tissue and tissue equivalent materials. However, it was not as accurate for heterogeneities such as bone anatomy.

**Conclusions:** The results show that a diagnostic beam modeled in the TPS can calculate the dose to a homogenous volume within 3%. However, further work is needed to accurately predict dose in a heterogeneous media and ultimately onto a patient.