

**Purpose:** To quantify and compare the dose delivered to multiple organs-at-risk (OARs) in a female patient undergoing Xofigo Axxent electronic (KVB) and high-dose rate Ir-192 (IBB) intracavitary balloon brachytherapy for breast cancer. **Materials and Methods:** A previous study has indicated that the dose to OARs such as the lungs and heart play a critical role in treatment planning. The anatomy of a female patient was represented by an adult female computational phantom which consists of over 140 organs. A balloon was inserted into a lumpectomy cavity in the left breast of the virtual patient. The Monte Carlo N-Particle eXtended (MCNPX) code was used to simulate photon transport through the patient for hypothetical KVB and IBB scenarios. MCNPX's F6 tally was used to calculate the absorbed dose in organs distant from the treatment site. **Results:** In general, the KVB organ doses were more than a factor of 2 smaller than those of IBB because the low-energy x-rays are less penetrating. The distribution of organ doses shows a profound pattern depending on the distance, location, and organ shape. The largest doses were observed for organs such as the left lung and heart which are closest to the radiation source. For KVB, the doses received by the left lung and heart wall were 9.0% and 5.5% of that received by the planning target volume. These values were 11.0% and 11.3% for the IBB scenario. **Conclusions:** This paper reports, for the first time, a systematic comparison of multiple organ doses received from KVB and IBB. KVB may have safety advantages because its dose rate falls off faster than for IBB. As a previous clinical study found the target dose to be similar for these two methods, information on how healthy organs are irradiated will help decide when each modality is appropriate.