

**AbstractID: 6511 Title: A new table-top system for extended characterization of brachytherapy radioactive seed batches.**

**Purpose:** To improve the quality control of brachytherapy radioactive seeds.

**Method and Materials:** It is estimated that almost 10 million brachytherapy sources for implants ( $^{125}\text{I}$ ,  $^{103}\text{Pd}$ ,  $^{131}\text{Cs}$ ) are produced every year all over the world. Source manufacturing is a complex process due to the combination of the small size of the sources and their sophisticated design. Quality control of the seeds is therefore an important issue. The control should first include calibration but several other tests such as a check of the actual internal structure of the seed is relevant.

An innovative system (patents pending) has been developed in order to fully characterize a batch of sources. It is a compact table-top device which is able to perform the following tests for each source: visual inspection, source calibration (through low energy x-ray spectrometry), monitoring of radiochemical impurities (*e.g.*  $^{126}\text{I}$  or  $^{137}\text{Cs}$ ) by  $\gamma$  spectrometry, control of the internal structure of the seed (dimensions, presence of high-Z markers) by micro-radiography, control of the distribution of radioactive material by autoradiography and possible control of materials purity by XRF analysis.

**Results:** A prototype instrument has been built. A source can be fully characterized within 30-40 s and sorted according to the results delivered by the various instruments. All tests are performed without any user's radiation exposure.

**Conclusion:** This automated system allows a better characterization of large batches of sources and can possibly lead to improvement of the manufacturing processes. A simplified version of the instrument could be implemented at the end-user's level allowing therefore a fast automated 100% assay of sources prior to implantation.

**Conflict of Interest (only if applicable):**