

AbstractID: 11749 Title: Development of a multi electrode well ionization chamber to be used in Nuclear Medicine.

Purpose: Development and perform preliminary test of a multi electrode well ionization chamber to be used in Nuclear Medicine.

Method and Materials: The well ionization chamber wall was constructed in stainless steel (ANSI 304). The well has 72mm-diameter and 238mm-height with a wall thickness of 0.5mm. The external dimensions are 168mm-diameter and 300mm-height. The sensitive volume is filled with high pure argon (0.3 Mpa). The electrodes are made with brass and have a multi-layer parallel configuration allowing low voltage saturation. Sources of ^{57}Co (~123MBq), ^{133}Ba (~8MBq) e ^{137}Cs (~7MBq) were used to study the variation of response with pressure of argon. ^{99}Tc (~1GBq) and ^{131}I (1GBq) sources were used to study response saturation with polarizing voltage (10 to 500V). Sensitivity and linearity of response with activity was studied for ^{99}Tc (60MBq to 7GBq) and ^{131}I (220MBq to 4GB). **Results:** The tests performed with ^{57}Co , ^{133}Ba and ^{137}Cs sources showed that a voltage of 100V already saturates the chamber response. Similar result was also found when ^{99}Tc and ^{131}I sources were used. The chamber response is linear ($r = 0.999$) as a function of activity for the sources and range of activities used. The response repetitivity was better than 99.6% for the activities measured for the ^{99}Tc and better than 95.2% for the ^{131}I source. The chamber response in A/MBq was found to be doubled for ^{131}I when compared to the ^{99}Tc source. Also the relative sensitivity for the ^{131}I source was found to be 1.56% the relative sensitivity for the ^{99}Tc source. **Conclusion:** The preliminary tests performed show that the response of the developed well ionization chamber is adequate to allow its use in Nuclear Medicine. Additional tests have still to be performed and Monte Carlo simulation will be used to study construction parameters to optimize its response.