ACCELERATOR SEMINAR

"Accelerator Production of the Medical Isotope ^{99m}Tc"

William T. Diamond

The isomer of the radioactive element technetium, (^{99m}Tc), is used in about 80% of the estimated 80,000 nuclear medicine procedures performed daily in North America. Most of the ^{99m}Tc is still produced from the decay of molybdenum-99, a fission product produced by one of a few aging (40 to 55 years old) research reactors throughout the world. The Nuclear Reactor Universal (NRU) reactor at Chalk River Laboratories in Canada at 54 years old is the oldest and still used for between 30 and 60 percent of that production. During a 16 month shut down for repairs (May 2009 until September 2010) a review of the production and distribution models was undertaken by most of the world users of the isotope. An important outcome of that review was the decision by the Canadian Government to notify customers that the NRU reactor would not provide medical isotopes after 2016. The Canadian Government also announced the Non-Reactor-Based Isotope Supply Program (NISP) in June, 2010. This program supports research, development, and demonstration of cyclotron- and linear-accelerator-based ^{99m}Tc production. It is the expectation of the government that these methods will be used to replace the Canadian demand for ^{99m}Tc by the end of 2016.

This talk will provide a broad overview of the present mode of production of ^{99}Mo and some details on the history of the developments noted above. The main part of the talk will focus on the production of ^{99}Mo or ^{99m}Tc with high-power accelerators. ^{99}Mo can be produced with an electron linac using the ^{100}Mo(γ,n)^{99}Mo reaction on a separated isotope ^{100}Mo target. ^{99m}Tc can be produced by using the ^{100}Mo(p,2n)^{99m}Tc reaction and typical medical cyclotrons with proton energies from about 16 to 25 MeV. A number of the technical challenges and the status of both projects will be reviewed.

Thursday, November 17, 2011

11:00 a.m.

CEBAF Center, Room F113

Coffee before seminar at 10:45 a.m.

Jefferson Lab

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