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The Production of ^{125}Xe for Medical Use by the ^{3}He Bombardment of Natural Tellurium *

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^{133}Xe (5.3 d, β^-) has been extensively used to measure the ventilation of the lungs and blood flow to many organs and tissues. However, its physical properties are not optimal for *in vivo* studies. Recently, Hines *et al.* have compared ^{133}Xe and ^{125}Xe and have concluded that the half-life (17h), the decay mode (EC 100%), and the 188 keV and 284 keV γ-rays of ^{125}Xe make it a particularly useful diagnostic scanning agent, giving a much lower radiation dose rate for a given count rate than the more readily available ^{133}Xe. The production method proposed by Hines *et al.* produces ^{125}Xe in a yield of 11 mCi/μAh. However, for satisfactory yields this method requires bombardment by 31 MeV protons, which are not attainable with the compact medical cyclotrons suitable for routine production. In this work, in order to find out the optimum bombardment conditions for α and ^{3}He reactions producing ^{125}Xe, the authors have measured the excitation functions and thick-target yield curves from natural tellurium. The Te (^{3}He, xn) ^{125}Xe and the Te (α, xn) ^{125}Xe reactions have cross section peaks of 117 and 51 mb at 35 and 40 MeV, respectively. The thick-target yields of ^{125}Xe at 40 MeV ^{3}He and α were 280 and 40μCi/μAh, respectivrly. That is to say, for the productiou of ^{125}Xe, the ^{3}He bombardment is more advantageous than α bombardment. The bombardment of natural ellurium with 40 MeV ^{3}He particles also produced ^{123}Xe, ^{128}I and ^{130}I in yields of 220, 85 and 213μCi/μAh, respectively. When ^{125}Xe was produced for medical application, therefore, a 21-hr cooling period was required before the ^{125}Xe separation to allow the ^{123}Xe to decay. The advantages of the proposed method are that usable quantities of ^{125}Xe can be produced with a relatively low bombardment energy and an inexpensive natural tellurium target.

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