

following modifications were applied; 1) The tube line for carrying produced radioactive xenons was exchanged from teflon to SUS 316 because radioactive xenons were significantly absorbed on the teflon tube. 2) Immediately after the irradiation, the NaI target was dissolved with distilled water. Radioactive xenons remained in the target were purged off by bubbling a He gas into the solution. The yield of ^{123}I treated by the above procedure was increased up to 5.8 mCi/ $\mu\text{A}\cdot\text{h}$. (Max.; 7.5 mCi/ $\mu\text{A}\cdot\text{h}$).

For a clinical diagnosis the chemical forms of ^{123}I are very important. The effect of trapping materials on the final chemical forms of ^{123}I was therefore studied with liq. chromatograph. The radiochemical purity of $^{123}\text{I}^-$ was 85% with unused glass trap. But the value was gradually decreased to 26%, repeating the applications of the glass for trapping radioactive xenons. Coating the inner

part of the used glass trap with H_3PO_2 or H_3PO_4 , the value was increased to 67% and 54% respectively. In any cases the radiochemical purity of iodide treated by these methods is not enough for the clinical usages. The best way to obtain the highest purity of $^{123}\text{I}^-$ is as follows; 1) Purge out the undecayed radioactive xenons with a He gas and recover them into a balloon. 2) Elute the radioactive iodides from the trap with 1 ml of 0.02N-NaOH. 3) Add 5 μ mole of sodium thiosulfate into the eluate. 4) Heat gently the solution until the volume of the solution is reduced to one-half. The solution obtained in this way contained 99.6% of $^{123}\text{I}^-$.

At the same time ^{125}Xe was recovered with the yield of 8.4 mCi/ $\mu\text{A}\cdot\text{h}$ at the end of bombardment. Clear images of phantom containing ^{125}Xe could be obtained.

Clinical Uses of I-123 Produced by ^{127}I (p, 5 n) ^{123}Xe to ^{123}I Reaction in NIRS

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I-123 has been currently supplied on commercial bases by The Nihon Medi-physics Company using $^{122}\text{Te}(\text{d}, \text{n})^{123}\text{I}$ reaction. It was however reported that several radio-impurities were inevitable in minute amounts with this reaction. In recent, National Institute of Radiological Sciences (NIRS) in Japan has experimentally produced I-123 using high energy proton beams above 50 MeV and $^{127}\text{I}(\text{p}, 5\text{n})^{123}\text{Xe}$ and $^{123}\text{Xe} \rightarrow ^{123}\text{I}$ reaction.

The purpose of this study is to examine physical properties and radio-impurities in I-123 products using both reactions and to evaluate their clinical advantages. The methods used composed of gamma-ray spectrometry and scintigrams of the thyroid phantom and the patient. NIRS I-123 showed no discernible radio-impurity except

I-125 in 0.5% on a calibration time. Nihon Medi-physics I-123, however, revealed radio-impurities of I-124, I-125, I-126, I-130, and I-131. Increases of radio-impurities of long half-lives result in enhancement of radiation exposure to a patient administered. The absorbed dose in thyroid with both I-123 products was calculated as 1.3 times in NIRS and 5 times in Nihon Medi-physics more than that of pure I-123. The absorbed dose of total body also calculated as 1.09 and 1.5 times respectively. The thyroid scintigram, however, did not show perceptible differences between both I-123 products except a slight increase of body background counts seen in those of Nihon Medi-physics. This brought an impression of slightly better quality of scintigram with NIRS products.