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A RAPID RELIABLE METHOD OF LABELING Sn-MAA WITH $^{113m}InCl_3$

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A rapid method of labeling ^{113m}In to preprepared Sn-MAA for myocardial perfusion imaging has been presented. This material has proved safe for use in both animals and humans. The advantages of this method are that the Sn-MAA particles can be prepared in advance allowing for rigorous quality-control testing and the subsequent labeling procedure is simple and rapid.

The assessment of myocardial perfusion has been performed by several techniques. In our laboratories the intracoronary injection of Sn-MAA (macroaggregated human serum albumin containing stannous ion) labeled with both ^{99m}Tc-pertechnetate and $^{113m}InCl_3$ has proved useful (*1–3*).

In this communication a method of labeling Sn-MAA with $^{113}InCl_3$ is presented.

METHODS

Sn-MAA particles of 30-micron size are prepared in kit form according to previously reported procedures (*4*). For myocardial perfusion studies the Sn-MAA particles are dispensed in sterile 10-ml Evacutainers®, each of which contains approximately 50,000 particles suspended in 1 ml of sterile saline. Random samples are tested for apyrogenicity and sterility prior to labeling with ^{113m}In and patient use.

The following procedure is used to label Sn-MAA with $^{113m}InCl_3$ and requires about 10 min:

1. Aseptically add 1–6 ml of $^{113m}InCl_3$ from a ^{113}Sn-^{113m}In generator to the suspension of Sn-MAA particles.
2. Adjust the pH of the particle suspension to 3 with sterile 0.4 *M* Na_2HPO_4 solution.
3. Gently agitate the suspension in an 80°C shielded water bath for 1 min.
4. Cool the suspension for 30 sec in cold water and centrifuge at 3000 rpm for 3 min.
5. Aseptically remove the supernatant and resuspend the particles in 1–2 ml of sterile saline and assay for ^{113m}In activity.

RESULTS

Using this method, which is a modification of previously used procedures, 1–5 mCi of ^{113m}In activity per 50,000 particles is routinely achieved (*6–8*). This represents about 30% incorporation of the ^{113m}In label in the Sn-MAA particles. When 1×10^6 particles are used 80–90% of the ^{113m}In label was incorporated. Labeling efficiencies were determined by centrifugation of the particles and assaying the supernatant for ^{113m}In activity. A bioassay in rabbits was performed with the labeled Sn-MAA particles by external whole-body photoscintigraphy. This indicated greater than 95% of the label was initially trapped in the lungs.

Myocardial toxicity of particles after coronary artery injection is well documented (*9–13*). In dog toxicity studies performed in our laboratories up to 1.5×10^6 Sn-MAA particles were injected before signs of myocardial toxicity occurred (*14*). In these studies a decrease in coronary artery blood flow measured with an electric flow meter was the first sign of toxicity. Considerably larger doses of particles ($2–3 \times 10^6$ particles) caused a decrease in

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coronary artery pressure and ECG changes consistent with myocardial ischemia. The injection of 50,000 Sn-MAA particles into the coronary arteries, 20–30 micron size, in humans appears quite safe. In 100 patients studied to date no adverse reactions have been observed with either ^{99m}Tc-Sn-MAA or ^{113m}In-Sn-MAA.

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