## LONG SHELF-LIFE $^{99m}$Tc-MAA LUNG PARTICLE KITS

Although a welcome innovation, the "instant" $^{99m}$Tc-MAA kit preparation as described in the literature (*1,2*) proved to have two disadvantages when performed in this and another laboratory (*3*).

First, the particles are not actually preformed but must be adjusted before injection by ramming them through a small bore needle. This both necessitates microscopic assay and creates a broad particle distribution range. Second, the refrigerated particles aggregate with time and become difficult to size suitably for injection.

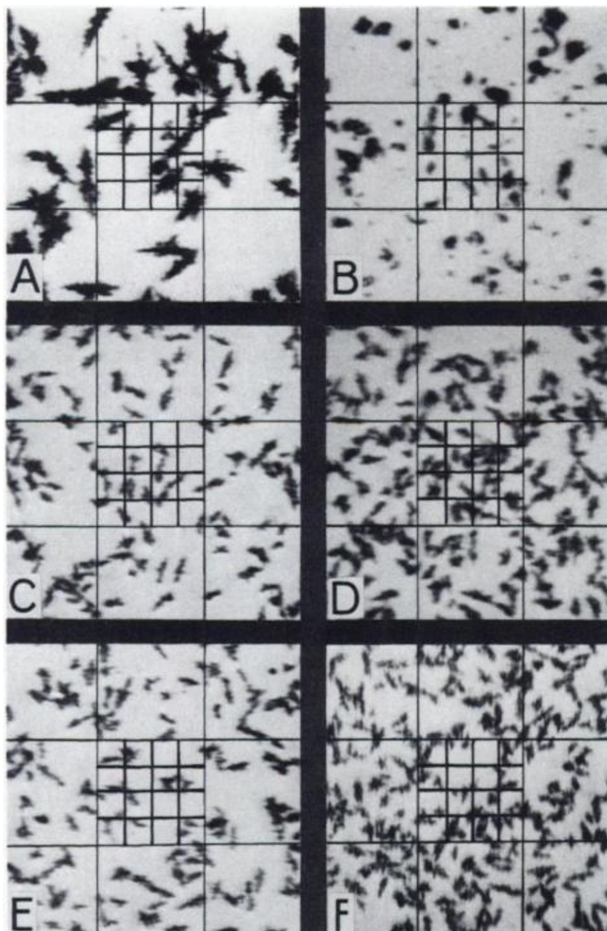


**FIG. 1.** (A) Particles produced without surfactant after being stored at 4°C for 2 weeks. (B) Heterogenous array of particles produced after ramming particles shown in (A) through small bore needle. (C) Particles at time of production using surfactant. (D) Same particles as in (C) after 4 months storage at 4°C. (No differences were noted in clinical image quality when using particles ranging from 1 day to 4 months after production.) (E) Same particles as in (C) after 1 month frozen storage. (F) Reconstituted particles produced with surfactant after lyophilization.

These disadvantages can be remedied by adding a small amount of nonionic surfactant, polysorbate-80 USP, to the preparation. This affords a 100% preformed particle stable for more than 4 months, comparable tissue distribution and biological half-times with those described (*1*), and decreased sensitivity of agitation and thermal incubation steps, resulting in greater batch reproducibility.

To produce the particles, a 30-ml vial containing a 1-in. bar magnet is affixed to a rectangular-based stand on top of an inexpensive, immersible, pneumatic stirrer. Five milliliters of a 1.0% HSA and 10% sodium acetate solution along with 19 ml water for injection are aseptically transferred into the vial. After these solutions are mixed, 1.0 ml of 0.5% stannous chloride in 1.0 *N* HCl is added. This solution is mixed for 2 min, after which 1.5 ml of 10% polysorbate-80 solution is added.

The stand is then lowered into a constant-temperature water bath (80 ± 1°C) until one-fifth of the vial is immersed. The solution is stirred at maximum for 12 min. The stand is removed and the particles mixed for 5 min more.

The particles are assessed and dispensed in 1-ml lots into 10-ml sterile vacutainer tubes. These tubes are then refrigerated (the most convenient), frozen, or lyophilized before use. The particles should be both macro- and microscopically examined until the investigator has documented his particle preparation for stability and particle reproducibility.

To label the refrigerated particles, add from 10–20 mCi $^{99m}$Tc-pertechnetate solution. Shake particle solution for 30 sec before administration.

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REFERENCES

*1.* SUBRAMANIAN G, ARNOLD RW, THOMAS FD, et al: Evaluation of an instant $^{99m}$Tc-labeled lung scanning agent. *J Nucl Med* 13: 790, 1972

*2.* SUBRAMANIAN G: *$^{99m}$Tc Labeled Radiopharmaceuticals a Compilation of Procedures.* Syracuse, NY, Upstate Medical Center

*3.* COLE C: Presidio, San Francisco, Calif, Letterman General Hospital, 1973: Personal communication