

RADIATION DOSE TO BREAST-FEEDING CHILD

AFTER MOTHER HAS ^{99m}Tc-MAA LUNG SCAN

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The administration of radiopharmaceuticals to nursing mothers requires consideration of radioactivity received by the infant. Following administration of 2 mCi of ^{99m}Tc-macroaggregated albumin, estimations of radioactivity in breast milk indicate that nursing could be resumed after 24 hr.

A 21-year-old female whose history was suggestive of pulmonary embolism was referred for a lung scan. Because she was nursing her 6-month-old child, the radiation dose to the child from ^{99m}Tc in the ingested breast milk required consideration. Vagenakis, et al (1) showed that after the injection of pertechnetate for a brain scan, discontinuation of breast feeding for 24–48 hr was sufficient to minimize ingestion of ^{99m}Tc by the infant. No data, however, were given for ^{99m}Tc-MAA.

Our patient was injected with 2 mCi of ^{99m}Tc-MAA, and the lung scan was completed (it was normal). She was instructed not to breast feed the child for 24 hr. She was asked to use a breast pump during the child's regular feeding times and to return the milk samples to our laboratory for analysis. Four samples were returned.

Samples were collected in 15-cc counting vials 4, 8, 12, and 18 hr after injection of the radiopharmaceutical. Counting was carried out with a 4 × 4-in. NaI(Tl) crystal and a multichannel analyzer and compared with a standard consisting of a similar counting vial containing 8 μCi of ^{99m}Tc in 15 ml of solution. By comparison with the standard, the activity of each sample was calculated and corrected for decay in order to determine the activity of each sample at the time of collection (Table 1). Since it was estimated that each feeding would consist of approximately 8 oz of milk, the total activity in that volume is also estimated. Since it was not known in what chemical form the technetium appeared,

chromatograms of the milk samples were made. The chromatograms showed the activity to be free pertechnetate.

DISCUSSION

Whole-body counting data obtained in our laboratory from five children who had received ^{99m}TcO₄⁻ for brain scanning showed that a 6-month-old child would receive 0.081 mrad/μCi to the whole body and 1.63 mrad/μCi to the thyroid assuming 1% uptake (2). From the data of Hine, et al (3), of absorbed doses from radionuclides for adults, the intravenous administration of pertechnetate yields a total-body dose of 0.01–0.02 mrad/μCi and the dose to the thyroid is approximately 20 times greater. Since this child's weight (16 lb) is about 10% that of a standard man, concentration is increased by that factor. These values are in good agreement with our own data. Assuming no significant difference between orally and intravenously administered pertechnetate, the total-body and thyroid doses that the

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TABLE 1. LEVELS OF ^{99m}Tc IN MATERNAL MILK

Sample No. (15 ml/sample)	Interval from injection to collection (hr)	Activity at time of counting (μCi)	Activity/8 oz feeding at time of collection (amount which would have been received by infant) (μCi)
1	4	0.45	7.2
2	8	0.15	2.3
3	12	0.057	0.9
4	18	0.014	0.2

TABLE 2. ESTIMATED RADIATION DOSE TO INFANT*

	Total-body dose per feeding (mrad)	Cumulative total-body dose (mrad)
If feeding begun:		
4 hr after injection	0.6 -1.2	1 -2
8 hr after injection	0.2 -0.4	0.35-0.7
12 hr after injection	0.1 -0.2	0.12-0.24
18 hr after injection	0.02-0.04	0.02-0.04

* Assuming infant had nursed.
Thyroid dose is approximately 20 times total-body dose.

child would have received if feedings were resumed and continued are shown in Table 2.

It is clear that there is no significant hazard to

the child from the milk even if feeding is begun soon after completion of the study. The external hazard is, in fact, greater. If the child remains in close contact with the mother from the time of injection for one half-life, the child would receive about 10-20 mrad which, although small, is still greater than would be received from the milk.

From these data we were able to inform the mother that she could safely resume breast feeding her child after 24 hr.

REFERENCES

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