

DMSA**Kit for the Preparation of****Technetium Tc99m Succimer Injection****DIAGNOSTIC - FOR INTRAVENOUS USE**

DESCRIPTION: Each vial contains a sterile, pyrogen-free freeze-dried mixture of 1.0 mg dimercaptosuccinic acid, 0.42mg stannous chloride dihydrate [0.38 mg (minimum) stannous chloride dihydrate (SnCl₂-2H₂O) and 0.46 mg (maximum) total tin expressed as stannous chloride dihydrate (SnCl₂-2H₂O), 0.70 mg ascorbic acid, and 50.0 mg inositol. After freeze-drying, vials are sealed under a nitrogen atmosphere with a rubber closure. Sodium hydroxide and hydrochloric acid have been used for pH adjustment. When sterile, oxidant-free, pyrogen-free sodium pertechnetate Tc99m injection in isotonic saline is combined with the vial contents, following the instructions provided with the kit, a complex is formed. After 10 minutes incubation the reconstituted solution is ready for intravenous injection.

Chemical Name: meso-2,3-dimercaptosuccinic

STRUCTURAL FORMULA

SH SH

HOOC - C - C - COOH

H H

The succimer component of DMSA consists of more than 90% meso isomer and less than 10% d,l isomer.

PHYSICAL CHARACTERISTICS: Technetium Tc99m decays by isomeric transition with a physical half-life of 6.02 hours¹. The principal photon that is useful for detection and imaging studies is listed in Table 1.

Table 1. Principal Radiation Emission Data¹

Radiation	Mean %/Disintegration	Mean Energy (keV)
Gamma-2	89.07	140.5

¹Kocher, David C., "Radioactive Decay Data Tables," DOE/ TIC-11026. 108(1981).

External Radiation: The specific gamma ray constant for Tc 99m is 0.78 R/hr-mCi at 1 cm. The first half-value layer is 0.017 cm of Pb. A range of values for the relative attenuation of the radiation emitted by this radionuclide that results from interposition of various thicknesses of Pb is shown in Table 2. For example, the use of a 0.25 cm thickness of Pb will attenuate the radiation emitted by a factor of 1,000.

Table 2. Radiation Attenuation of Lead (Pb) Shielding

Shield Thickness (Pb)cm	Coefficient of Attenuation
0.017	0.5
0.08	0.1
0.15	0.01
0.25	0.001
0.33	0.0001

TABLE 3

Physical Decay Chart: Tc 99m half-life 6.02 hours			
Hours	Fraction Remaining	Hours	Fraction Remaining
0	1.000	5	0.562
1	0.891	6	0.501
2	0.794	8	0.398
3	0.708	10	0.316
4	0.631	12	0.251

CLINICAL PHARMACOLOGY: After intravenous administration, technetium Tc99m succimer injection is distributed in the plasma, apparently bound to plasma proteins. There is negligible activity in the red blood cells. The activity is cleared from the plasma with a half-time of about 60 minutes and concentrates in the renal cortex. Approximately 16% of the activity is excreted in the urine within two hours. At six hours about 20% of the dose is concentrated in each kidney.

INDICATIONS AND USAGE: Technetium Tc99m succimer injection is to be used as an aid in the scintigraphic evaluation of renal parenchymal disorders.

CONTRAINDICATIONS: None known.

WARNINGS; None.

PRECAUTIONS:

General: As in the use of any radioactive material, care should be taken to minimize radiation exposure to the patient consistent with proper patient management and to ensure minimum radiation exposure to occupational workers.

DMSA should be used between 10 minutes and 4 hours following reconstitution (see "Preparation" section). Any unused portion should be discarded after that time.

Some patients with advanced renal failure may exhibit poor renal intake of Tc99m DMSA. It has been reported that satisfactory images may be obtained in some of these patients by delaying imaging for up to 24 hours.

The contents of the kit vials are intended only for use in the preparation of technetium Tc99m succimer and are not to be directly administered to the patient.

The contents of the kit vials are not radioactive. However, after Tc99m is added, adequate shielding of the final preparation must be maintained.

Carcinogenesis, Mutagenesis, Impairment of Fertility: No long term animal studies have been performed to evaluate carcinogenic potential, mutagenic potential, or whether technetium Tc99m succimer injection affects fertility in males or females.

Pregnancy Category C: Animal reproduction studies have not been conducted with technetium Tc99m succimer injection. It is also not known whether technetium Tc99m succimer injection can cause fetal harm when administered to a pregnant woman or can affect reproduction capacity. Technetium Tc99m succimer injection should be administered to a pregnant woman only if clearly needed.

Ideally, examinations using radiopharmaceuticals, especially those elective in nature, of a woman of child bearing capability should be performed during the first few (approximately 10) days following the onset of menses.

Nursing Mothers: Technetium Tc99m is excreted in human milk during lactation; therefore, formula feedings should be substituted for breast feedings.

Pediatric Use: Safety and effectiveness in children have not been established.

Radiopharmaceuticals should be used only by physicians who are qualified by training and experience in the safe use and handling of radionuclides and whose experience and training have been approved by the appropriate government agency authorized to license the use of radionuclides.

ADVERSE REACTIONS: Rare instances of syncope, fever, nausea and maculopapular skin rash have been reported.

DOSAGE AND ADMINISTRATION: The suggested dose range for slow I. V administration to be employed in the average patient (70 kg) for renal parenchymal imaging is 74-222 MBq, 2-6 mCi technetium Tc99m succimer injection.

The product must be used between 10 minutes to 4 hours following preparation (see "Preparation" section). Acceptable renal images may be obtained beginning 1 to 2 hours post injection. Any unused portion should be discarded after that time.

The patient dose should be measured by a suitable radioactivity calibration system immediately prior to administration.

Do not use after the expiration date stated on the label. The components of the kit are supplied sterile and pyrogen-free. Aseptic procedures normally employed in making additions and withdrawals from sterile, pyrogen-free containers should be used during addition of sodium pertechnetate Tc99m injection solutions and during the withdrawal of doses for patient administration.

Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration.

Radiation Dosimetry: The estimated absorbed radiation doses^{2,3} to an average patient (70 kg) are shown in Table 4.

Table 4. Absorbed Radiation Dose

Organ	mGy/222 MBq	rads/6 mCi
Bladder Wall	4.2	0.42
Kidneys (total)	37.8	3.78
Renal Cortices	51.0	5.10
Liver	1.9	0.19
Bone Marrow	1.3	0.13
Ovaries	0.8	0.08
Testes	0.4	0.04
Total Body	0.9	0.09

²Method of Calculation: A schema for Absorbed Dose Calculations for Biologically Distributed Radionuclides, Supplement 1, MIRD Pamphlet No. 1, J Nucl Med, p. 7, 1968

³Biological Data: Arnold, RW, Subramanian, G, MaAfee JG, Blair RJ, Thomas FD: Comparison of Tc99m complexes for renal imaging. J Nucl Med, 16 pp. 357-367, 1975.

HOW SUPPLIED:

Kit Contents

5 Vials containing a freeze-dried mixture of 1.0 mg di-mercaptosuccinic acid, 0.42 mg stannous chloride dihydrate [0.38 mg (minimum) stannous chloride dihydrate (SnCl₂·2H₂O) and 0.46 mg (maximum) total tin expressed as stannous chloride dihydrate (SnCl₂·2H₂O)], 0.70 mg ascorbic acid, and 50.0 mg inositol.

5 Labels

1 Package Insert

NDC 017156-525-01

Storage

Store the kit at 2-8 °C, 36-46 °F and protect from light.

Preparation

The following directions must be carefully followed for optimum preparation of technetium Tc99m succimer injection:

Note; Use aseptic procedures throughout and take precautions to minimize radiation exposure by the use of suitable shielding. Waterproof gloves should be worn during the preparation procedure.

1. Place one of the vials in a suitable shielding container and swab the closure with a bacteriostatic swab.
2. Using a 10 mL sterile syringe, inject an appropriate amount (see notes 1 and 2) of the eluate from a Tc99m generator into the shielded vial. Before removing the syringe from the vial withdraw an equivalent volume of nitrogen from the space above the solution to normalize the pressure in the vial.
3. Carefully invert the vial a few times until the powder is completely dissolved.
4. Assay the total activity, complete the label provided and attach to the vial.
5. Incubate the vial for at least 10 minutes at room temperature.
6. Use the preparation between 10 minutes and 4 hours following reconstitution.

Note

- 1) Not more than 1.48 GBq, 40 mCi technetium-99m in a volume of 1-6 mL should be added to the vial.
- 2) Before reconstitution, the eluate may be adjusted to the correct radioactive concentration by dilution with preservative-free, non-bacteriostatic saline for injection.
- 3) The use of technetium-99m solution complying with the specifications prescribed by the USP Monograph on Sodium Pertechnetate (^{99m}Tc) injection will yield a preparation of an appropriate quality.
- 4) It is recommended that with proper shielding and equipment, the final formulation be tested for radiochemical purity. If radiochemical purity is not adequate, discard the finished drug.

DISPOSAL: Any unused portion of the Tc99m-labeled kit must be stored and disposed of in accordance with the conditions of NRC radioactive materials license pursuant to 10 CFR Parts 20 and 35 or equivalent conditions pursuant to Agreement state regulation, or other regulatory agency authorized to license the use of radionuclides.

The unlabeled residual materials may be discarded in ordinary trash, provided that the vials and syringes read background with an appropriate low-range survey meter. It is suggested that all identification labels be destroyed before discarding.

This reagent kit is approved for use by persons licensed by the Illinois Department of Nuclear Safety pursuant to 32 Ill. Code Adm. Section, Section 330.260(a) and 335.4010 or under equivalent licenses of the U.S. Nuclear Regulatory Commission, or an Agreement State.

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