Medicare Nuclear Medicine Reimbursement Information
HOPPS – Hospital Outpatient Prospective Payment System

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CPT® – Current Procedural Terminology
• American Medical Association’s five digit numeric codes used to report medical procedures and services.

HCPCS - Healthcare Common Procedure Coding System
  • Level II HCPCS codes alphanumeric five digit codes primarily to identify contrast agents, radiopharmaceuticals, supplies and devices.

Q-codes
• Temporary codes created by Medicare to identify items not assigned a CPT code. Many drugs, supplies and biologicals are assigned Q codes.

NDC codes – National Drug Code
• A unique numeric code to identify drugs. The first segment of numbers identifies the labeler or manufacturer, the second segment identifies the product, and the third identifies the package.

Questions regarding reimbursement for Lantheus Medical Imaging products?

Call Randy VanCoughnett at 978-436-7995 or email randy.vancoughnett@lantheus.com.
Three Basic Components of Reimbursement: Coding, Coverage and Payment.

1. **Coding:** There must be a CPT code or HCPCS code that accurately describes the service performed and/or the drugs provided.

2. **Coverage:** The existence of CPT and/or HCPCS codes used to report the services performed or items furnished does not guarantee coverage. Medicare only covers a procedure, drug or supply when it is medically necessary. Providers should obtain and follow the policies and guidelines published by Medicare in the Local and National Coverage Determinations.

3. **Payment:** If the proper codes exist and there is coverage established, Medicare must set a payment amount for the drugs, supplies and/or procedures in order for providers to receive payment. Most payment amounts are determined by CMS nationally. There are differences in procedure payment amounts from region to region to reflect geographic differences in provider costs.

**Documentation:** When radiopharmaceuticals or contrast agents are reported, providers must document in the medical record the name of the drug and the amount administered.

Lantheus Medical Imaging cannot guarantee coverage or payment for products or procedures. Payer policies can vary widely. For more specific information, contact the payer directly in order to obtain up to date coverage, coding and payment information.
2020 Medicare Reimbursement for Nuclear Medicine
Non-HEU Derived Tc-99m for Medicare Hospital Outpatients\textsuperscript{1,2}

For 2020, CMS will continue the $10 add-on payment for non-HEU derived Tc-99m for hospital outpatients.

The United States government has established an agenda to eliminate domestic reliance on Tc-99m derived from nuclear reactors using Highly Enriched Uranium (HEU). CMS recognizes that Tc-99m derived from a non-HEU source may have a higher cost. In response, CMS will reimburse providers $10 per non-HEU derived Tc-99m dose in the hospital outpatient setting in addition to the payment for the imaging procedure.

Under this policy, hospitals report HCPCS code Q9969 (Tc-99m from non-highly enriched uranium source, full cost recovery add-on, per study dose) once per dose along with any diagnostic scan or scans furnished using Tc-99m as long as the Tc-99m doses used can be certified by the hospital to be at least 95 percent derived from non-HEU sources.

1. CMS created HCPCS code Q9969 to report non-HEU Tc-99m doses.

\textbf{HCPCS Descriptor}

\textit{Q9969 Tc-99m from non-highly enriched uranium source, full cost recovery add-on, per study dose}

2. CMS will reimburse $10 per dose for Q9969 in addition to the imaging procedure.

3. Hospital reports token $1 charge per dose for Q9969.

Hospitals do not indicate a dose is from a non-HEU source on their claim form. They simply report HCPCS Q9969 for each non-HEU dose. If asked, a hospital has three options to document a dose was derived from a non-HEU source\textsuperscript{2}.

1. Produce invoices, patient dose labels or tracking sheets that indicate that a dose was produced from non-HEU sources.

2. Produce documentation that an entire batch of Tc-99m doses were derived from a non-HEU source for a specified period of time that a single non-HEU generator was in use or manufacturer attestation that a generator is non-HEU generator.

3. If the manufacturer has labeled a generator or a dose attesting to it being derived from a non-HEU source.

If a hospital has any questions about whether they are receiving Tc-99m derived from a non-HEU source, they should contact their radiopharmacy or the generator manufacturer.

For more information, please see Federal Register / Vol. 78, No. 237 / Tuesday, December 10, 2013 p.75002-75003 or Federal Register / Vol. 77, No. 221 / Thursday, November 15, 2012 / p. 68316-68317 or contact your local radiopharmacy or your Tc-99m generator manufacturer.
**Medicare Hospital Outpatient**

For 2020, CMS continues to package the payment for diagnostic radiopharmaceuticals, the exercise stress test, CPT 93017, and all pharmacologic stress agents with the SPECT Myocardial Perfusion Imaging (MPI) procedure, CPT 78452, into one single packaged payment.

If a non-HEU derived Tc-99m dose is used, providers can receive a separate add on payment of $10 per dose by reporting HCPCS code Q9969.

### Packaged components of HOPPS SPECT Multiple Myocardial Perfusion CPT 78452

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>2020 payment</th>
<th>2019 payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>78452 SPECT MPI Multiple</td>
<td>$1272.05</td>
<td>$1229.38</td>
</tr>
<tr>
<td>93017 Exercise test packaged with 78452</td>
<td>$0 packaged with 78452</td>
<td>$0 packaged with 78452</td>
</tr>
<tr>
<td>Jxxxxx Pharmacologic stress agent</td>
<td>$0 packaged with 78452</td>
<td>$0 packaged with 78452</td>
</tr>
<tr>
<td>A9500 Tc-99m sestamibi</td>
<td>$0 packaged with 78452</td>
<td>$0 packaged with 78452</td>
</tr>
<tr>
<td>Q9969 non-HEU source Tc-99m per dose</td>
<td>$10 paid separately</td>
<td>$10 paid separately</td>
</tr>
</tbody>
</table>

### Selected 2020 payment Medicare Hospital Outpatients and Physician Office

<table>
<thead>
<tr>
<th>CPT</th>
<th>Descriptor</th>
<th>APC</th>
<th>Payment HOPPS</th>
<th>Payment Non Hospital Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>78071</td>
<td>Parathyroid planar imaging (including subtraction, when performed); with tomographic (SPECT)</td>
<td>5591</td>
<td>$368.08</td>
<td>$365.23</td>
</tr>
<tr>
<td>78452</td>
<td>Myocardial Perfusion imaging multiple SPECT</td>
<td>5593</td>
<td>$1272.05</td>
<td>$484.68</td>
</tr>
<tr>
<td>78582</td>
<td>Pulmonary ventilation (e.g. aerosol or gas) and perfusion imaging</td>
<td>5592</td>
<td>$471.93</td>
<td>$344.29</td>
</tr>
<tr>
<td>78803</td>
<td>Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (SPECT), single area single day. 78205, 78206, 78320, 78607, 78647, 78710 have been deleted AMA CPT recommends to use 78803 instead.</td>
<td>5593</td>
<td>$1272.05</td>
<td>$401.32</td>
</tr>
</tbody>
</table>

Global Physician Payment amounts as of January 1, 2020. National average payments based on Medicare Conversion factor of $36.0896 and January, 2020 Medicare Addendum B relative value units. Diagnostic and therapeutic radiopharmaceuticals are reimbursed separately in the non-hospital / office setting based on AWP or invoice. Check with your local Medicare contractor for local payment methodology.
Lantheus Medical Imaging 2020 HCPCS and NDC Information

QUADRAME® HCPCS code A9604 - NDC 11994-016-01
Samarium 153 lexidronam therapeutic, per treatment dose, up to 150 millicuries.

Medicare Hospital Outpatients
- QUADRAME® - Therapeutic radiopharmaceuticals reimbursed at 106% of ASP.
- Medicare Hospital Outpatient Payment Q4 2019 - A9604, $16,040.56 per dose.
- Latest payment amount can be seen in Addendum B at:
  https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HospitalOutpatientPPS/Addendum-A-and-Addendum-B-Updates.html

Medicare non hospital physician offices / IDTFs
- QUADRAME® - Reimbursement based on AWP or invoice, check local Medicare contractor for local payment amount.

<table>
<thead>
<tr>
<th>Product</th>
<th>HCPCS</th>
<th>NDC codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiolite® Kit for the Preparation of Technetium Tc-99m Sestamibi for Injection</td>
<td>A9500</td>
<td>NDC 11994-001-20 (20 vials one box)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NDC 11994-001-52 (2 vials one box)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NDC 11994-001-55 (5 vials one box)</td>
</tr>
<tr>
<td>Kit for the Preparation of Technetium Tc-99m Sestamibi for Injection</td>
<td>A9500</td>
<td>NDC 11994-003-20 (20 vials one box)</td>
</tr>
<tr>
<td>Thallous Chloride Thallium 201 Injection</td>
<td>A9505</td>
<td>NDC 11994-427-11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NDC 11994-427-15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NDC 11994-427-19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NDC 11994-427-24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NDC 11994-427-26</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NDC 11994-427-28</td>
</tr>
<tr>
<td>Gallium Citrate Ga-67 Injection</td>
<td>A9556</td>
<td>NDC 11994-121-06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NDC 11994-121-08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NDC 11994-121-13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NDC 11994-121-19</td>
</tr>
<tr>
<td>NEUROLITE® Kit for the Preparation of Technetium Tc-99m Bicisate for Injection</td>
<td>A9557</td>
<td>NDC 11994-006-02 (2 kits one package)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NDC 11994-006-05 (5 kits one package)</td>
</tr>
<tr>
<td>Xenon Xe-133 Gas</td>
<td>A9558</td>
<td>NDC 11994-127-11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NDC 11994-127-15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NDC 11994-127-21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NDC 11994-127-25</td>
</tr>
<tr>
<td>Tc-99m from non-highly enriched uranium source, full cost recovery add-on per study dose</td>
<td>Q9969</td>
<td>Paid $10 per dose for Tc-99m doses derived from ≥ 95% non-HEU for HOPPS in addition to APC payment for imaging procedure</td>
</tr>
</tbody>
</table>
Appropriate Use Criteria for Advanced Diagnostic Imaging Services

For 2021 Medicare will require physicians to report their consultation of Appropriate Use Criteria (AUC). 2021 claims that fail to append this information on the claim form will not be paid. This applies to CT, PET, MRI and Nuclear Medicine procedures.

During 2020 the program is operating under a voluntary participation period during which consultations with AUC may occur and may be reported on furnishing professional and facility claims.

At the time a practitioner orders an advanced diagnostic imaging service for a Medicare beneficiary, he/she, or clinical staff acting under his/her direction, will be required to consult a qualified Clinical Decision Support Mechanism (CDSM).

The CDSM provides a determination of whether the order adheres to AUC, or if the AUC consulted was not applicable. A consultation must take place at the time of the order. Ultimately, practitioners whose ordering patterns are considered outliers will be subject to prior authorization.

This program impacts all physicians and practitioners (as defined in 1861(r) or described in 1842(b)(18) (C)), that order advanced diagnostic imaging services and physicians, practitioners and facilities that furnish advanced diagnostic imaging services in a physician’s office, hospital outpatient department (including the emergency department), an ambulatory surgical center or an independent diagnostic testing facility (IDTF) and whose claims are paid under the physician fee schedule, hospital outpatient prospective payment system or ambulatory surgical center payment system.


MLN Matters has an AUC educational document, MM 11268, that explains how to use the modifiers and G codes to report consultation of AUCs at: https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNMattersArticles/downloads/MM11268.pdf
HIGHLIGHTS OF PRESCRIBING INFORMATION

Before administering CARDIOLITE® patients should be asked about the possibility of injection site inflammation, dry mouth, fever, pruritis, rash, urticaria and fatigue.

The following adverse reactions have been reported in adults undergoing the preparative procedure.

10. OVERDOSAGE

11. DESCRIPTION

11.1 Physical Characteristics

11.2 External Radiation

12. CLINICAL PHARMACOLOGY

12.1 Mechanism of Action

12.3 Pharmacokinetics

12.3.1 Metabolism

12.3.2 Elimination

13. NONCLINICAL TOXICOLOGY

13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

14. CLINICAL STUDIES

15. REFERENCES

16. HOW SUPPLIED/STORAGE AND HANDLING

17. PATIENT COUNSELING INFORMATION

*Sections or subsections omitted from the full prescribing information are not listed.

1. INDICATIONS AND USAGE

Myocardial Imaging: CARDIOLITE® Kit for the Preparation of Technetium Tc99m Sestamibi for Injection, is a myocardial perfusion agent indicated for:

-  evaluating myocardial function and developing information for use in patient management decisions.

- For Myocardial Imaging: The suggested dose range for I.V. administration of MIRALUMA® is a single dose of 740 - 1110 MBq (20 - 30 mCi).

- For Breast Imaging: The recommended dose range for I.V. administration of MIRALUMA® is a single dose of 740 - 1110 MBq (20 - 30 mCi).

- In one study of 46 subjects who received CARDIOLITE® administration, the testes had a mean radioactivity of 0.3  3.4 Bq/g.

- Radiosynthesis calculations performed by Radiation Internal Dose Information Center, Oak Ridge Institute for Science and Education, PO Box 117, Oak Ridge, TN 37831-0117.

2. DOSAGE AND ADMINISTRATION

For Myocardial Imaging: The suggested dose range for I.V. administration of CARDIOLITE® in a single dose to be employed in the average patient (70 Kg) is 370 - 1110 MBq (10 - 30 mCi).

For Breast Imaging: The recommended dose range for I.V. administration of MIRALUMA® is a single dose of 740 - 1110 MBq (20 - 30 mCi).

2.1 Image Acquisition

2.2 Radiation Dosimetry

The radiation doses to organs and tissues of an average patient (70 Kg) per 1110 MBq (30 mCi) of Technetium Tc99m Sestamibi injected intravenously are shown in Table 1.0.

Table 1.0. Radiation Absorbed Doses from Technetium Tc99m Sestamibi

<table>
<thead>
<tr>
<th>Organ</th>
<th>Radiation Absorbed Dose</th>
<th>REST</th>
<th>2.0 hour void</th>
<th>4.8 hour void</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30 mCi</td>
<td>1110 MBq</td>
<td>30 mCi</td>
<td>1110 MBq</td>
</tr>
<tr>
<td>Breasts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gallbladder Wall</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Small Intestine</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Upper Lower Intestine Wall</td>
<td>5.4</td>
<td>55.5</td>
<td>54.5</td>
<td>55.5</td>
</tr>
<tr>
<td>Gallbladder Wall</td>
<td>3.9</td>
<td>40.0</td>
<td>42.1</td>
<td>41.1</td>
</tr>
<tr>
<td>Stomach Wall</td>
<td>0.6</td>
<td>6.1</td>
<td>0.6</td>
<td>5.8</td>
</tr>
<tr>
<td>Heart Wall</td>
<td>0.5</td>
<td>5.1</td>
<td>0.5</td>
<td>4.9</td>
</tr>
<tr>
<td>Kidneys</td>
<td>2.0</td>
<td>20.0</td>
<td>2.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Liver</td>
<td>0.6</td>
<td>5.8</td>
<td>0.6</td>
<td>5.6</td>
</tr>
<tr>
<td>lungs</td>
<td>0.3</td>
<td>2.8</td>
<td>0.3</td>
<td>2.7</td>
</tr>
<tr>
<td>Bowel Structures</td>
<td>0.7</td>
<td>6.8</td>
<td>0.7</td>
<td>6.4</td>
</tr>
<tr>
<td>Thyroid</td>
<td>0.7</td>
<td>7.0</td>
<td>0.7</td>
<td>7.0</td>
</tr>
<tr>
<td>Ovaries</td>
<td>1.5</td>
<td>15.5</td>
<td>1.6</td>
<td>15.5</td>
</tr>
<tr>
<td>Testes</td>
<td>0.3</td>
<td>3.4</td>
<td>0.4</td>
<td>3.9</td>
</tr>
<tr>
<td>Red Marrow</td>
<td>0.5</td>
<td>5.1</td>
<td>0.5</td>
<td>5.0</td>
</tr>
<tr>
<td>Urinary Bladder Wall</td>
<td>2.0</td>
<td>20.0</td>
<td>2.0</td>
<td>21.0</td>
</tr>
<tr>
<td>Total Body</td>
<td>0.5</td>
<td>4.8</td>
<td>0.5</td>
<td>4.8</td>
</tr>
</tbody>
</table>

3. DRUG INTERACTIONS

Specific drug-drug interactions have not been studied.

4. USE IN SPECIFIC PATIENTS

4.1 Pregnancy

4.2 Nursing Mothers

8
Radiochemists should be used only by physicians who are qualified by training and experience in the safe use and handling of radiopharmaceuticals and whose experience and training have been approved by the appropriate government agency authorized to license the use of radiopharmaceuticals.

Stress testing should be performed only under the supervision of a qualified physician and in a laboratory equipped with appropriate resuscitation and support apparatus.

The most frequent exercise stress test endpoints sufficient to stop the test reported during controlled studies (two-thirds were cardiac patients) were:

- Fatigue 35%
- Dyspnea 17%
- Chest Pain 16%
- ST-depression 7%
- Arthymia 1%

ADVERSE REACTIONS

Adverse events were evaluated in 3741 adults who were evaluated in clinical studies. Of these patients, 3068 (77% men, 22% women, and 0.7% of the patient's genders were not recorded) were in cardiac clinical trials and 673 (100% women) in breast cancer imaging trials. Cases of angina, chest pain, and death have occurred (see Section 5). Adverse reports evaluated at a rate of 0.5% or greater after receiving Technetium Tc99m Sestamibi administration are shown in the following table:

<table>
<thead>
<tr>
<th>Adverse Reaction</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrhythmia</td>
<td>1%</td>
</tr>
<tr>
<td>Chest Pain/Angina</td>
<td>1%</td>
</tr>
<tr>
<td>Headache</td>
<td>1%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1%</td>
</tr>
<tr>
<td>Nausea</td>
<td>1%</td>
</tr>
<tr>
<td>Rash</td>
<td>1%</td>
</tr>
<tr>
<td>Fatigue</td>
<td>35%</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>17%</td>
</tr>
<tr>
<td>Chest Pain</td>
<td>16%</td>
</tr>
<tr>
<td>ST-depression</td>
<td>7%</td>
</tr>
<tr>
<td>Arthymia</td>
<td>1%</td>
</tr>
</tbody>
</table>

In the clinical studies for breast imaging, chest pain was reported in 12 (1.7%) of the patients. In 11 of these patients the pain appears to be associated with biopsy/surgical procedures.

The following adverse reactions have been reported in a 0.5% of patients: signs and symptoms consistent with sepsis occurring shortly after administration of the agent: transient arthritis, angioedema, arthralgia, dizziness, syncope, abdominal pain, vomiting, and severe hypersensitivity characterized by dyspnea, hypotension, bradycardia, asthma, and vomiting within two hours after a second injection of Technetium Tc99m Sestamibi. A few cases of flushing, edema, injection site inflammation, dry mouth; fever; pruritis, rash, urticaria and fatigue have also been attributed to administration of the agent.

DRUG INTERACTIONS

Specific drug-drug interactions have not been studied.

USE IN SPECIFIC PATIENTS

8.1 Pregnancy

Animal reproduction and teratogenicity studies have not been conducted with Technetium Tc99m Sestamibi. It is also not known whether Technetium Tc99m Sestamibi can cause fetal harm when administered to a pregnant woman or can affect reproductive capacity. There have been no studies in pregnant women. Technetium Tc99m Sestamibi should be given to a pregnant woman only if clearly needed.

8.3 Nursing Mothers

Technetium Tc99m Pertechnetate is excreted in human milk during lactation. It is not known whether Technetium Tc99m Sestamibi is excreted in human milk. Therefore, formula feedings should be substituted for breast feeding.

8.4 Pediatric Use

Safety and effectiveness in the pediatric population have not been established.

No evidence of diagnostic efficacy or clinical utility of CARDIOLITE® scan was found in clinical studies of children and adolescents with Kawasaki disease.

A prospective study of 445 pediatric patients with Kawasaki disease was designed to determine the predictive value of CARDIOLITE® rest and stress myocardial perfusion imaging to define a pediatric population with Kawasaki disease that was at risk of developing cardiac events. Of developing cardiac events were defined as cardiac death, MI, hospitalization due to cardiac etiology, heart failure, CAGB or coronary angioplasty. The standard of truth was defined as cardiac events occurring 6 months following the administration of CARDIOLITE®. Only three cardiac events were observed at six months in all three cases, the scan was negative. No clinically meaningful measurements of sensitivity, specificity or other diagnostic performance parameters could be demonstrated in this study.

An ten year retrospective case history study of pediatric Kawasaki disease patients who completed CARDIOLITE® myocardial perfusion imaging and who had coronary angiography within three months of the CARDIOLITE® scan was designed to measure sensitivity and specificity of CARDIOLITE® scan. Out of 72 patients who had both evaluable CARDIOLITE® scans and evaluable angiographic images, only one patient had both an abnormal angiogram and an abnormal CARDIOLITE® scan. No clinically meaningful measurements of sensitivity, specificity or other diagnostic performance parameters could be demonstrated in this study.

11.1 Physical Characteristics

Technetium Tc99m decays by isomeric transition with a physical half-life of 6.02 hours. Photons that are useful for detection and imaging studies are listed below in Table 3.0.

Table 3.0. Principal Radiation Emission Data

<table>
<thead>
<tr>
<th>Energy (MeV)</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>140.5</td>
<td>89.07</td>
</tr>
</tbody>
</table>

The clinical consequences of overdosing with CARDIOLITE® are not known.

11.5 Stability

Technetium Tc99m Sestamibi is formulated to be stable for six hours at room temperature. The stability of Technetium Tc99m Sestamibi is not affected by dilution in saline or similar physiologic solutions.

18.0 OVERDOSE

This drug is administered by intravenous injection for diagnostic use after reconstitution with sterile, non-pyrogenic, oxoidant-free Sodium Pertechnetate Tc99m Injection. The pH of the reconstituted product is 5.0 to 6.0. No bacteriostatic preservative is present.

The precise structure of the technetium complex is Tc99m(MIBI)+, where MIBI is 2-methoxyisobutylisonitrile.

11.6 Toxicology

Technetium Tc99m Sestamibi and are not to be administered directly to the patient without adequate shielding of the final product.

6.2 Nursing Mothers

Technetium Tc99m Sestamibi should be given to a pregnant woman only if clearly needed. It is not known whether Technetium Tc99m Sestamibi is excreted in human milk. Consequently, formula feedings should be substituted for breast feeding.

The contents of the vial are intended only for use in the preparation of Technetium Tc99m Sestamibi and are not to be administered directly to the patient without first undergoing the preparatory procedure.

Radioactive drugs must be handled with care and appropriate safety measures should be used to minimize radiation exposure to clinical personnel. Also, care must be taken to minimize radiation exposure to the patients consistent with proper patient management.

Contents of the kit before preparation are not radioactive. However, after the Sodium Pertechnetate Tc99m Injection is added, adequate shielding of the final preparation must be maintained. The components of the kit are sterile and non-pyrogenic. It is essential to follow directions carefully and to adhere to strict aseptic procedures during preparation.

Technetium Tc99m labeling reactions depend on maintaining the stannous ion in the reduced state. Hence, Sodium Pertechnetate Tc99m Injection containing oxidants should not be used.

Technetium Tc99m Sestamibi should not be used more than six hours after preparation.
Fraction  Fraction
12.3 Pharmacokinetics
findings has not been determined.
mitochondria as a result of electrostatic interactions, the clinical relevance of these
suggest that Tc99m Sestamibi cellular retention occurs specifically within the
the sodium pump mechanism is inhibited. Although studies of subcellular
Technetium Tc99m Sestamibi is a cationic Tc99m complex which has been
7.447
6.501
2.794
1.891
1.0
0.5
7.068
3.708
3.388
3.251
2.501
2.477

12.3.1 Metabolism
Infarct up to four hours post dose.
Definitive human studies to demonstrate possible redistribution have not been
infarction model reported that the drug showed no redistribution of any consequence.

12.3.2 Elimination
injection about 8% of the injected dose remains in circulation. There is less than 1% protein binding of Technetium Tc99m Sestamibi in plasma. The
myocardial biological half-life is approximately six hours after a rest or exercise injection. The biological half-life for the liver is approximately 30 minutes after a rest or exercise injection. The effective half-life of clearance (which includes both the biological half-life and radiodecay) of the heart is approximately 3 hours, and for the liver is approximately 30 minutes, after a rest or exercise injection. The ideal imaging time reflects the best compromise between heart count rate and surrounding organ uptake.

Myocardial uptake which is coronary flow dependent is 1.2% of the injected dose at rest and 1.5% of the injected dose at exercise. Table 6.0 illustrates the biological clearance as well as effective clearance (which includes biological clearance and radiodecay) of Tc99m Sestamibi from the heart and liver.

12.3.3 Metabolism
The agent is excreted without any evidence of metabolism.

12.3.4 Elimination
The major pathway for clearance of Tc99m Sestamibi is the hepatobiliary system. Activity from the gall bladder appears in the intestines within one hour of injection. Twenty-seven percent of the injected dose is excreted in the urine, and approximately thirty-three percent of the injected dose is cleared through the bile.

12.4.1 Clinical Pharmacology

12.4.2 Nonclinical Toxicology

12.4.3 Clinical Studies

MYOCARDIAL IMAGING: In a trial of rest and stress CARDIOLITE® imaging, the relationship of normal or abnormal perfusion scans and long term cardiac events was evaluated in 521 patients (511 men, 10 women) with stable chest pain. There were 73.9% Caucasians, 25.9% Blacks and 0.2% Asians. The mean age was 59.6 years (range to 24 years). All patients had a baseline rest and exercise CARDIOLITE® scan and were followed for 1.2 to 4.8 months (range 1 to 24 months). Images were correlated with the occurrence of a cardiac event (cardiac death or non-fatal myocardial infarction). In this trial as summarized in Table 7.0, 24/251 (4.8%) had a cardiac event.

Table 7.0  Cardiac Events

Table 8.0  Biological and Effective Clearance

Table 9.0  Degree of MIRALUMA® Breast Imaging Uptake in Comparison to Histopathology Results in Patients with Mammaryographically Detected Non-Palpable Lesions (Study A)

Table 10.0  Degree of MIRALUMA® Breast Imaging Uptake in Comparison to Histopathology Results in Patients with Palpable Lesions* (Study B)

* Median finding for 3 blinded readers
** Includes benign tissue, fibroadenoma, benign intramammary nodules, radial scar.

An estimate of the likelihood of malignancy based on the MIRALUMA® uptake score in combination with the mammographic score has not been studied. In these two studies approximately 150 additional, non-biopsied lesions were found to be positive after MIRALUMA® imaging. These lesions were identified in sites that did not physically correlate with identified entry criteria mammographic lesions and these lesions were not palpable. These lesions were not biopsied. Whether these lesions were benign or malignnant is not known. MIRALUMA® uptake can occur in both benign and malignant tissue. The CLINICAL USEFULNESS OF A POSITIVE MIRALUMA® IMAGE IN THE ABSENCE OF AN ABNORMAL MAMMGRAM OR A PALPABLE LESION IS NOT KNOWN.

15. REFERENCES
Not applicable.

16. HOW SUPPLIED/STORAGE AND HANDLING
CARDIOLITE®, Kit for the Preparation of Technetium Tc99m Sestamibi for Injection was supplied as a 5.0 mL vial in kits of 5 (NDC #11994-001-50 and twenty (20) vials (NDC #11994-001-20, sterile and non-pyrogenic). The patient dose should be measured by a suitable radioactivity calibration system immediately prior to patient administration. Radiochemical purity should be checked prior to patient administration.

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

Prior to lyophilization the pH is between 5.3-5.9. The contents of the vial are lyophilized and stored under nitrogen. Store at 15-25°C (99-77°F) before and after reconstitution.

Technetium Tc99m Sestamibi contains no preservatives. Included in each five (5) vial kit is one (1) package insert, six (6) vial shield labels and six (6) radiation warning labels. Included in each twenty (20) vial kit is one (1) package insert, twenty four (24) vial shield labels and twenty four (24) radiation warning labels. This reagent kit is approved for distribution to persons licensed pursuant to the Code of Massachusetts Regulations 105 CMR 120.500 for the uses listed in 105 CMR 120.547 or 120.552, or under equivalent regulations of the U.S. Nuclear Regulatory Commission, Agreement States or Licensing States.

17. PATIENT COUNSELING INFORMATION
CARDIOLITE® and MIRALUMA® are different names for the same drug. Patients should be advised to inform their health care provider if they had an allergic reaction to either drug or if they had an imaging study with either drug.

For Ordering Tel: Toll Free: 800-299-5431
All Other Business: 800-362-2668

(For Massachusetts and international call 978-667-9531)
Citations


2. Federal Register / Vol. 77, No. 221 / Thursday, November 15, 2012 p. 68316


NDC codes can be researched at http://www.accessdata.fda.gov/scripts/cder/ndc/
For all your nuclear medicine needs, visit www.lantheus.com