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CARDIO 90° improves the cardiac SPECT capabilities of the MULTISPECT 3 gamma camera system. It consists of three collimators: two 15° slant hole (sh) collimators and one ultra high sensitivity parallel hole collimator. The benefit derived from this system is a reduction in scanning time for cardiac SPECT studies resulting in increased patient throughput.

CARDIO 90° optimizes the MULTISPECT 3 system by enabling it to acquire a 180° cardiac study by rotating only 90°. The slant hole collimators modify the performance of the MULTISPECT 3 system so that it operates as a dedicated cardiac SPECT system. The ultra high sensitivity parallel hole collimator acquires more counts faster, increasing the effectiveness of first pass studies.
Positions Available

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NUCLEAR PHARMACIST Independent nuclear pharmacy has positions immediately available in Evansville, IN and Paducah, KY. Interested candidates please send resumes to: Radiopharmacy, Inc., 600 N. Weinbach, Suite 910, Evansville, IN 47711. EOE.

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Position in full service nuclear lab (no P.E.T.) in well-equipped and staffed medium-size community hospital in Midwest. Will require ABM certification. Academic experience will receive additional consideration. Send CV to Box 602, The Society of Nuclear Medicine, 136 Madison Avenue, New York, NY 10016.

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The Dose Calibrator Shielded Work Platform is constructed of steel and provides a large, sturdy working surface with an opening for easy access to your dose calibrator. It can be easily mounted on standard nuclear medicine well chambers, and is specifically designed to increase technician safety and efficiency when working with radionuclide isotopes. Lead pigs containing the vial or syringe to be assayed can be placed on the working surface behind the leaded glass before opening, thus reducing technician exposure from isotopes during routine work. Spills can be reduced since vials are manipulated much closer to the dose calibrator. The glass is 10" high, 12" wide and 5/16" thick, equivalent to 2 mm of lead and can be ordered with a double pane of glass. The work platform is 10" deep, 14" wide and made of steel.

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Kai Lee, PhD

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- Methods of qualitative image analysis
- Quantitative image analysis
- Nuclear cardiology
- Quantitative data analysis
- Single-photon emission computed tomography
- Selecting a computer for nuclear medicine

The book is illustrated throughout to help the reader conceptualize the topics as they are discussed.

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- Compatible with all computers

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The AccuAmp 5, the 5 lead system available for AccuSync 5L, 6L, and 1L, transmits information through fiber optic link. Patient cables, lead wires, and BNC cables available for AccuSync models.

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- "Thallium and Sestamibi Breast Scintigraphy," Alan Waxman, Cedars-Sinai Medical Center, Los Angeles, CA.
- "Detection of Cerebrovascular Disease with Diamox/HMPAO Scintigraphy," Jack Juni, William Beaumont Hospital, Royal Oak, MI.
- "Double-Phase Tc-99m Sestamibi Parathyroid Scintigraphy," Raymond Taillefer, Hotel Dieu Hospital, Montreal, Quebec, Canada.
- "Combined Functional and Perfusion Myocardial Perfusion Imaging," Mark Wittry, St. Louis University Hospital, St. Louis, MO.

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Cardiolite®
Kit for the preparation of Technetium Tc99m Sestamibi

To reduce soft-tissue attenuation
Cardiolite comes through

Stress testing should be performed only under the supervision of a qualified physician in a laboratory equipped with appropriate resuscitation and support apparatus. There have been infrequent reports of signs and symptoms consistent with seizure and severe hypersensitivity after administration of Tc99m Sestamibi.

Please see brief summary of prescribing information on adjacent page. © 1994, DuPont Pharma
Brief Summary

**Cardiolite**
Kit for the preparation of Technetium Tc99m Sestamibi

**FOR DIAGNOSTIC USE**

**DESCRIPTION:** Each 5ml vial contains a sterile, non-pyrogenic, hypotonic mixture of:
- Tetrasodium Glycine (isotonic) (sodium)
- Copper (I) tetrafluoroborate - 1.0mg
- Sodium Citrate Dihydrate - 2.6mg
- L-Cysteine Hydrochloride Monohydrate - 1.0mg
- Mannitol - 20mg
- Stannous Chloride, Dihydrate, minimum (SnCl2·2H2O) - 0.025mg
- Sodium Chloride (0.9% solution) - 0.657mg
- Tin Chloride (Stannous and Stannic) Dihydrate, maximum (as SnCl2·2H2O) - 0.006mg

Prior to hypotization the pH is 5.3-5.9. The contents of the vial are hypotized and stored under nitrogen.

This drug is administered by intravenous injection for use after reconstitution with sterile, non-pyrogenic, ozonide free Sodium Pertechnetate Tc99m Injection. The pH of the reconstituted product is 5.5 (5.0-6.0). No bacteriostatic preservative is present.

The precise structure of the technetium complex is Tc99mMIBI, where MIBI is 2-isobutyryl-2-iminodiacetic acid.

**INDICATIONS AND USAGE:**

CARDIOLITE Kit for the preparation of Technetium Tc99m Sestamibi is in a myocardial perfusion agent that is used in the evaluation of ischemic heart disease. CARDIOLITE Kit for the preparation of Technetium Tc99m Sestamibi is useful in distinguishing normal from abnormal myocardium and in the localization of the abnormality, in patients with suspected myocardial infarction, ischemic heart disease or coronary artery disease. Evaluation of ischemic heart disease or coronary artery disease is accomplished using rest and stress techniques.

CARDIOLITE Kit for the preparation of Technetium Tc99m Sestamibi, is also useful in the evaluation of myocardial function using the first pass technique.

Rest-exercise imaging with Tc99m Sestamibi in conjunction with other diagnostic information can be used to evaluate ischemic heart disease and its localization.

In clinical trials, a template consisting of the anterior wall, infero-posterior wall and isolated apex, localization in the anterior or inferior-posterior wall in patients with suspected acute pectoris or coronary artery disease was shown. Disease localization isolated to the apex has not been established. Tc99m Sestamibi has not been studied or evaluated in other cardiac diseases.

It is usually not possible to differentiate recent from old myocardial infarction or to differentiate recent myocardial infarction from ischemia.

**CONTRAINDICATIONS:**

None known.

**WARNINGS:**

In studying patients in whom cardiac disease is known or suspected, care should be taken to assure continuous monitoring and treatment in accordance with safety, accepted clinical procedures. Infrequently, death has occurred 4 to 24 hours after Tc99m Sestamibi use and its usual association with exercise stress test (See Precautions).

**PRECAUTIONS:**

**GENERAL**

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 dose must be handled with care and appropriate safety measures should be used to minimize radiation exposure to clinical personnel. Also, care should be taken to minimize radiation exposure to the patient 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 Sestamibi imaging techniques involving deposition of the stannous ion in the red blood cells. Hence, Sodium Pertechnetate Tc99m Injection containing stannous ions should not be used.

Technetium Tc99m Sestamibi should not be used more than six hours after preparation.

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

Stress testing should be performed only under the supervision of a qualified physician in and a laboratory equipped with radiation safety and emergency equipment.

The most frequent exercise stress test endpoints, which resulted in termination of the test during controlled Tc99m Sestamibi studies (two-thirds were cardiac patients) were:

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

**Carcinogenesis, Mutagenesis, Impairment of Fertility**

In comparison with most other diagnostic technetium labeled radiochromatographs, the radiation dose to the ovaries (1.55 Gy (0.18 rad) at exercise) is high. Minimal exposure (ALARA) is necessary in women of childbearing capacity. (See Dosimetry subsection in DOSAGE AND ADMINISTRATION section.)

The active intermediate, (CoMIBI)BF4-, was evaluated for genotoxic potential in a battery of five tests. No genotoxic activity was observed in the Ames, CHO/HPTRT and sister chromatid exchange tests. At cytotoxic concentrations (2 0.45mg/ml), an increase in cells with chromosomal aberrations was observed in the in vitro human lymphocyte assay. CoMIBI-BF4- did not show genotoxic effects in the in vivo mouse micronucleus test at a dose which caused systemic and bone marrow toxicity (9mg/kg, > 600 x maximal human dose).

Pregnancy Category C

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.

**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 feedings.

**Pediatric Use**

Safety and effectiveness in children below the age of 18 have not been established.

**ADVERSE REACTIONS:**

During clinical trials, approximately 8% of patients experienced a transient metallic or bitter taste immediately after the injection of Technetium Tc99m Sestamibi. A few cases of transient headache, flushing and non-itching rash have also been attributed to administration of the agent. Cases of angina, chest pain, and death have occurred (See WARNINGS and PRECAUTIONS). The incidence of adverse reactions has been generally reported: signs and symptoms consistent with severe occurring shortly after administration of the drug; transient; and severe adverse reactions, which is characterized by dyspnea, hypotension, bradycardia, asthma and vomiting within two hours after a second injection of Technetium Tc99m Sestamibi.

**DOSE AND ADMINISTRATION:**

The suggested dose range for I.V. administration in a single dose to be employed in the average patient (70kg) is: 370-1110mBq (10-30mCi).

The dose administered should be the lowest required to provide an adequate study consistent with ALARA principles (see also PRECAUTIONS).

When used in the diagnosis of myocardial infarction, imaging should be completed within four hours after administration.

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

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

Store at 15-25°C before and after reconstitution.

**RADIATION DOSIMETRY:**

The radiation doses to organs and tissues of an average patient (70kg) per 1110mBq (30mCi) of Technetium Tc99m Sestamibi injected intravenously are shown in Table 4.

<table>
<thead>
<tr>
<th>Table 4. Radiation Absorbed Doses from Tc99m Sestamibi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organ</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Breasts</td>
</tr>
<tr>
<td>Gallbladder Wall</td>
</tr>
<tr>
<td>Small Intestine</td>
</tr>
<tr>
<td>Upper Large Intestine Wall</td>
</tr>
<tr>
<td>Lower Large Intestine Wall</td>
</tr>
<tr>
<td>Stomach Wall</td>
</tr>
<tr>
<td>Heart Wall</td>
</tr>
<tr>
<td>Lungs</td>
</tr>
<tr>
<td>Liver</td>
</tr>
<tr>
<td>Bone Surfaces</td>
</tr>
<tr>
<td>Thyroid</td>
</tr>
<tr>
<td>Ovaries</td>
</tr>
<tr>
<td>Testes</td>
</tr>
<tr>
<td>Urinary Bladder Wall</td>
</tr>
<tr>
<td>Total Body</td>
</tr>
</tbody>
</table>

**RADIOLABORATORY Internal Dose Information Center, July 1990, Oak Ridge Associated Universities, P.O. Box 117, Oak Ridge, TN 37831, (615) 576-3468.**

HOW SUPPLIED: DuPont Radiopharmaceuticals' CARDIOLITE® Kit for the Preparation of Technetium Tc99m Sestamibi, is supplied as a 5ml vial in kits of two (2), five (5) and thirty (30) vials, sterile and non-pyrogenic.

Prior to hypotization the pH is between 5.3-5.9. The contents of the vials are hypotized and stored under nitrogen. Store at 15-25°C before and after reconstitution. Technetium Tc99m Sestamibi contains no preservatives. Included in each (2) vial kit are one (1) package insert, six (6) vial seal labels and six (6) vial identity and 100 product labels. Included in each (5) vial kit are one (1) package insert, six (6) vial seal labels and six (6) radiation warning labels. Included in each (30) vial kit are one (1) package insert, thirty (30) vial seal labels and thirty (30) radiation warning labels.

The U.S. Nuclear Regulatory Commission has approved this reagent kit for distribution to persons licensed to use byproduct material. (See Title 10 CFR Part 30, §30.40(c) section 30.11). If the kits are obtained from the Title 10 CFR Part 35, to persons who hold an equivalent license issued by an Agreement State, and, outside the United States, to persons authorized by the appropriate authority.

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Billerica, Massachusetts 01821 USA

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All other business: 800-306-3968

(For International, call 617-350-9332)
Simultaneously targets all sites of metastatic bone pain.

LONG-TERM PALLIATION IN ONE CONVENIENT DOSE.

▼ Palliation of pain demonstrated in the majority of patients.¹²

▼ One dose of Metastron provides pain relief for an average of up to 6 months.¹

▼ As an adjunct to radiotherapy, 63.6% of patients receiving Metastron (10.8 mCi) had reduced pain at 6 months as compared to 35.0% of patients receiving placebo (n=42).³

▼ Preferentially incorporates into multiple sites of metastatic bone — the dose absorbed in metastatic deposits is approximately ten times that absorbed in normal bone marrow.⁴⁵
ADJUNCTIVELY DELAYS THE MEDIAN TIME TO PROGRESSION OF PAIN BY 28.1 WEEKS OVER RADIOThERAPY ALONE.

Median time to requirement for additional radiotherapy at new pain site.³

| METASTRON (10.8 mCi) + RADIOTHERAPY | PLACEBO + RADIOTHERAPY |

From a multicenter, double-blind study of 126 patients who received a single injection of either Metastron 400 MBq, 10.8 mCi or placebo with fractionated doses of local field radiotherapy (20-30 Gy).

HIGHLY EFFECTIVE NON-NARCOTIC THERAPY.

▼ Metastron may reduce or eliminate the need for dose escalation of narcotic analgesics.¹³

▼ Onset of pain relief is generally within 7 to 20 days — Metastron is therefore not recommended in patients with very short life expectancy.

GENERALLY WELL TOLERATED.

▼ A depression of white blood cell (20%) and platelet (30%) levels may occur in patients treated with Metastron — clinically significant toxicity is rare.

▼ Metastron should be used with caution in patients with significantly compromised bone marrow from previous treatment. Caution should also be used in patients with platelet counts below 60,000 or white blood cell counts below 2,400.

▼ Some patients have reported a transient increase in bone pain lasting 36 to 72 hours following an injection — this can usually be controlled with analgesics.

AN IMPROVED QUALITY OF LIFE FOR PATIENTS.

▼ Metastron may improve patient quality of life, as measured by assessments of mood, mobility, appetite, sleep pattern, and analgesic consumption.¹⁴

Please see following page for full prescribing information.

METASTRON®
(Strontium-89 Chloride Injection)

An effective way to manage metastatic bone pain.
**METASTRON**

**STRAWN-89 Chloride Injection**

DIRECTIONS: 

**Dilute with** physiological, non-fatiguing, aqueous solution of Strontium-89 Chloride for intravenous administration. The solution contains no preservatives.

**Each milliliter contains:** 

- Strontium Chloride
- Water for injection

**For injection:** q.s. to 1 mL.

- The radioactive concentration is 37 MBq/mL., 1 mCi/mL, and the specific activity is 2.96 - 6.17 MBq/mL, 80 - 160 mCi/mL.

**Physical Characteristics:** 

- Strontium-89 decays by beta emission with a physical half-life of 50.5 days. The maximum beta energy is 1.463 MeV (102%). The maximum average beta energy from Strontium-89 is 0.85 MeV. Radioactive decay factors to be applied to the stated value for radioactive concentration at calibration, when calculating injection volumes at the time of administration, are given in Table 1.

### Table 1: Decay of Strontium-89

<table>
<thead>
<tr>
<th>Day*</th>
<th>Factor Day</th>
<th>Day*</th>
<th>Factor Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.00</td>
<td>2</td>
<td>0.67</td>
</tr>
<tr>
<td>1</td>
<td>0.98</td>
<td>3</td>
<td>0.56</td>
</tr>
<tr>
<td>2</td>
<td>0.96</td>
<td>4</td>
<td>0.47</td>
</tr>
<tr>
<td>3</td>
<td>0.94</td>
<td>5</td>
<td>0.39</td>
</tr>
<tr>
<td>4</td>
<td>0.92</td>
<td>6</td>
<td>0.32</td>
</tr>
<tr>
<td>5</td>
<td>0.89</td>
<td>7</td>
<td>0.26</td>
</tr>
<tr>
<td>6</td>
<td>0.86</td>
<td>8</td>
<td>0.23</td>
</tr>
<tr>
<td>7</td>
<td>0.83</td>
<td>9</td>
<td>0.20</td>
</tr>
<tr>
<td>8</td>
<td>0.79</td>
<td>10</td>
<td>0.18</td>
</tr>
<tr>
<td>9</td>
<td>0.75</td>
<td>11</td>
<td>0.16</td>
</tr>
<tr>
<td>10</td>
<td>0.71</td>
<td>12</td>
<td>0.14</td>
</tr>
<tr>
<td>11</td>
<td>0.67</td>
<td>13</td>
<td>0.12</td>
</tr>
<tr>
<td>12</td>
<td>0.63</td>
<td>14</td>
<td>0.10</td>
</tr>
<tr>
<td>13</td>
<td>0.59</td>
<td>15</td>
<td>0.08</td>
</tr>
<tr>
<td>14</td>
<td>0.55</td>
<td>16</td>
<td>0.07</td>
</tr>
<tr>
<td>15</td>
<td>0.50</td>
<td>17</td>
<td>0.06</td>
</tr>
<tr>
<td>16</td>
<td>0.46</td>
<td>18</td>
<td>0.05</td>
</tr>
<tr>
<td>17</td>
<td>0.41</td>
<td>19</td>
<td>0.05</td>
</tr>
<tr>
<td>18</td>
<td>0.32</td>
<td>20</td>
<td>0.04</td>
</tr>
<tr>
<td>19</td>
<td>0.26</td>
<td>21</td>
<td>0.03</td>
</tr>
<tr>
<td>20</td>
<td>0.19</td>
<td>21</td>
<td>0.02</td>
</tr>
<tr>
<td>22</td>
<td>0.16</td>
<td>23</td>
<td>0.01</td>
</tr>
</tbody>
</table>

*Days before or after the calibration date stated on the vial.

**Clinical Pharmacology:**

- Following intravenous injection, soluble strontium compounds behave like their analogous, clearing rapidly from the blood and selectively localizing in bone mineral. Uptake of strontium by bone occurs preferentially in sites of active osteogenesis, thus primary bone metastases (blastic lesions) can accumulate significantly greater concentrations of strontium than surrounding normal bone.

- Strontium-89 chloride is retained in metastatic bone lesions much longer than in normal bone, where turnover is about 14 days. In patients with extensive skeletal metastases, whole body retention of strontium-89 can be observed for many years.

- Excretion pathways are two-thirds urinary and one-third fecal in patients with bone metastases. Urinary excretion is higher in people without bone disease. Urinary excretion persisted in the first two days following injection.

- Strontium-89 is a pure beta emitter and Strontium-89 chloride selectively localizes sites of primary and metastatic bone movement with minimal radiation of soft tissues distant from the bone lesions. (The maximum range in tissue is 8 mm, maximum energy is 1.463 MeV.). Mean absorbed radiation doses are listed under the Radiation Dosimetry section.

- Clinical trials have examined relief of pain in cancer patients who have received therapy for bone metastases (skeletal radiotherapy to indicated sites) but in whom persistent pain recurred. In a multi-center Canadian placebo-controlled trial of 125 patients, pain relief occurred in more patients treated with a single injection of Metastron than in patients treated with an injection of placebos. Results are given in the following tables.

### Table 2: Comparison of the effects of Strontium-89 and placebo, as adjoint to radiotherapy, on treatment outcome over time.

<table>
<thead>
<tr>
<th>Months Post-Treatment</th>
<th>Strontium-89</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>71.4%</td>
<td>58.8%</td>
</tr>
<tr>
<td>5</td>
<td>70.0%</td>
<td>57.9%</td>
</tr>
<tr>
<td>4</td>
<td>68.6%</td>
<td>56.6%</td>
</tr>
<tr>
<td>3</td>
<td>67.2%</td>
<td>55.4%</td>
</tr>
<tr>
<td>2</td>
<td>65.8%</td>
<td>54.2%</td>
</tr>
<tr>
<td>1</td>
<td>64.4%</td>
<td>53.0%</td>
</tr>
</tbody>
</table>

At each visit, treatment success, defined as a reduction in a patient’s pain score without any increase in analgesics intake and without any supplementary radiolocalization at the index site, was more frequent among patients assigned to Metastron than to placebo.

### Table 3: Comparison of the effects of Strontium-89 and placebo, as adjoint to radiotherapy, on radiation of pain scores and analgesics score to zero.

<table>
<thead>
<tr>
<th>Months Post-Treatment</th>
<th>Strontium-89</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>14.3%</td>
<td>13.2%</td>
</tr>
<tr>
<td>5</td>
<td>12.0%</td>
<td>12.2%</td>
</tr>
<tr>
<td>4</td>
<td>4.6%</td>
<td>4.8%</td>
</tr>
<tr>
<td>3</td>
<td>4.3%</td>
<td>4.5%</td>
</tr>
<tr>
<td>2</td>
<td>3.5%</td>
<td>3.2%</td>
</tr>
<tr>
<td>1</td>
<td>3.0%</td>
<td>2.9%</td>
</tr>
</tbody>
</table>

### References:

Introducing the newest way to visualize pheochromocytoma and neuroblastoma.

I-131 MIBG
Iobenguane Sulfate I-131 Injection
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Introducing I-131 MIBG, the first functional imaging agent for localization of pheochromocytoma and neuroblastoma. Now you can greatly enhance your capacity to detect these tumors of adrenergic tissues.

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Syncor

**Table 4: Estimated Absorbed Radiation Doses:**

<table>
<thead>
<tr>
<th>Organ</th>
<th>Adult</th>
<th>15 Years</th>
<th>10 Years</th>
<th>5 Years</th>
<th>1 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver</td>
<td>28.2</td>
<td>29.2</td>
<td>18.5</td>
<td>18.5</td>
<td>18.5</td>
</tr>
<tr>
<td>Spinal</td>
<td>28.2</td>
<td>29.2</td>
<td>18.5</td>
<td>18.5</td>
<td>18.5</td>
</tr>
<tr>
<td>Heart</td>
<td>14.1</td>
<td>14.1</td>
<td>9.1</td>
<td>9.1</td>
<td>9.1</td>
</tr>
<tr>
<td>Adrenal</td>
<td>0.7</td>
<td>0.7</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Thyroid</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Uterus</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Ovaries</td>
<td>0.2</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
</tbody>
</table>

**RADIATION DOSE:**
The estimated absorbed radiation doses to adults and children from an intravenous dose of Iobenguane Sulfate I-131 are shown in Table 4.

**Precautions:**
- Iobenguane Sulfate I-131 is contraindicated in patients with known hypersensitivity to Iobenguane Sulfate.
- Use with caution in patients with impaired renal function.

**Indications and Usage:**
- Iobenguane Sulfate I-131 is indicated as an adjunctive diagnostic agent in the localization of primary or metastatic pheochromocytoma and neuroblastoma.

**Contraindications:**
- Iobenguane Sulfate I-131 is contraindicated in patients with known hypersensitivity to Iobenguane Sulfate.

**Warnings:**
- As with other I-131 containing agents, in order to decrease thyroid accumulation of I-131, block the thyroid gland with iodine. (See Dosage and Administration section)

**Adverse Reactions:**
- Increased circulating imaging agents have been confirmed to cause anaphylactic reactions in patients with hypersensitivity to iodine, the incidence of hypersensitivity reactions to Iobenguane Sulfate is rare. Since hypersensitivity or immune reactions are not concentration-dependent, emergency treatment measures should be available.

**Cardiac:**
- Electrocardiographic (ECG) changes have been documented in dogs and patients after the administration of 18 mg I-131 per mg of the maximum human dose of Iobenguane Sulfate I-131. The maximum no observable effect level (NOEL) is not known. It is unknown if Iobenguane Sulfate I-131 can produce changes in ECG recordings in man.

**Drug Interactions:**
- There are literature reports about patients and about in vitro studies which suggest that the following drugs have the potential to decrease uptake of Iobenguane Sulfate I-131 in pheochromocytoma tumors and may lead to false negative results if administered concurrently: anti-hypertensives (labetalol, neoprenal, calcium channel blockers), amitryptiline and derivatives, imipramine and derivatives, doxepin, morphine, and naproxen, sympathomimetics (ephedrine, phenylephrine, phenylpropanolamine, pseudoephedrine, ephedrine) and cocaine. The clinical studies were not designed to show which drugs could cause false negative results. It is unknown if other drugs in the same classes have the same potential to inhibit the uptake of Iobenguane Sulfate I-131. Increasing the dose of Iobenguane Sulfate I-131 dose will not overcome any potential uptake-limiting effect of these drugs.

**Normal biodistribution and excretion of Iobenguane Sulfate I-131 leads to localization in adrenocorticogenic granules of the adrenal gland. It is also localized in salivary glands, liver, spleen and urinary bladder. As in all nuclear imaging procedures, careful positioning may be useful in distinguishing normal biodistribution of the agent from localization in sites of pathology.**

**References:**

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