July 1, 2013

Dear Healthcare Professional,

Due to the current critical shortage of ETHIODOL®, Brand of Ethiodized Oil Injection, Guerbet is coordinating with the FDA to increase the availability of the ethyl esters of iodized fatty acids of poppy seed oil product.

Guerbet has acquired the Ethiodol® NDA from Nycomed US Inc. effective May 7, 2010 and is working with the FDA to resume manufacturing of Ethiodol in the near future to ensure continued availability for the US patients. During this interim period, Guerbet, in conjunction with the FDA, is initiating a temporary importation of LIPIODOL® ULTRA-FLUIDE, ethyl esters of iodized fatty acids of poppy seed oil, to the United States market. LIPIODOL® ULTRA-FLUIDE contains the same drug components as ETHIODOL®, Brand of Ethiodized Oil Injection, (previously manufactured and marketed in the United States by Savage Laboratories, a subsidiary of Nycomed). LIPIODOL® ULTRA-FLUIDE is manufactured in compliance with European Good Manufacturing Practice (GMP) regulations by Delpharm Tours (France) for Guerbet.

At this time, no other entity except Guerbet is authorized by the FDA to import or distribute LIPIODOL® ULTRA-FLUIDE. Any sales of LIPIODOL® ULTRA-FLUIDE ampoules from any entity other than Guerbet will be considered in violation of the Federal Food, Drug and Cosmetic Act and may be subject to enforcement action by the FDA.

Effective immediately, Guerbet will offer the following version:

<table>
<thead>
<tr>
<th>LIPIODOL® ULTRA-FLUIDE</th>
<th>48% Iodine w/vol (i.e 480 mg Iodine/mL) (ethyl esters of iodized fatty acids of poppy seed oil)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10mL glass ampoule</td>
<td>Authorization# 306 216.0 Box of 1 ampoule</td>
</tr>
</tbody>
</table>

LIPIODOL® ULTRA-FLUIDE formulation is similar to ETHIODOL®.

The active substance of LIPIODOL® ULTRA-FLUIDE and ETHIODOL is the same (ethyl esters of iodized fatty acids of poppy seed oil, stabilized with 1% of poppy seed oil). It is important to note that there are some key labeling differences between the international marketed LIPIODOL® ULTRA-FLUIDE and the United States marketed ETHIODOL® that you need to be aware:

- The difference in label claim is due to the unit used to express the Iodine content: the unit for ETHIODOL® is 37% Iodine w/w = weight/weight, while the unit for LIPIODOL ULTRA-FLUIDE® is 48% Iodine w/vol= weight/volume. When converting one unit to another (w/w or w/vol), the Iodine content of ETHIODOL® and LIPIODOL® ULTRA-FLUIDE are similar.

The barcode used on LIPIODOL® ULTRA-FLUIDE is an international pharmaceutical manufacturing code and will likely not be recognized by scanning systems used in the United States. Institutions should confirm that barcode systems do not provide incorrect information when the product is scanned. Alternative procedures should be followed to assure that the correct drug product is being used and
administered to individual patients.

For questions regarding LIPIODOL® ULTRA-FLUIDE in the United States, please contact Guerbet LLC at 1-877-729-6679 between the hours of 8 a.m. and 5 p.m. (EST), or email at info-us@guerbet-group.com.

The product comparison table below also highlights the differences between LIPIODOL® ULTRA-FLUIDE and ETHIODOL®.

Please click here for package inserts: Guerbet LIPIODOL® ULTRA-FLUIDE (Patient Information Leaflet and/or Summary of Product Characteristics) and Savage Laboratories ETHIODOL®.

- Customers can order directly from Guerbet LLC by contacting Customer Service at 1-877-729-6679 between the hours of 8 a.m. and 5 p.m. (EST).
- LIPIODOL® ULTRA-FLUIDE is not refundable and not for resale.

Guerbet will make reasonable attempts to fill your orders. Guerbet will be closely monitoring the distribution of LIPIODOL® ULTRA-FLUIDE to help manage the supply.

If you have additional questions, please contact Customer Service at 1-877-729-6679, Monday through Friday, between the hours of 8 a.m. and 5 p.m. (EST), or email customer.service-us@guerbet-group.com. This communication and updated product information is available on the Guerbet website at http://www.guerbet-us.com as well as on the FDA Drug Shortage website at http://www.fda.gov/Drugs/DrugSafety/DrugShortages/default.htm.

To report adverse events among patients administered, please call 1-877-729-6679 between the hours of 8 a.m. and 5 p.m. (EST), or email medical.liaison@guerbet-group.com.

Alternatively, any adverse events that may be related to the use of these products should be reported to the FDA's Med Watch Program by fax at 1-800-FDA-0178, by mail at Med Watch, HF-2, FDA, 5600 Fishers Lane, Rockville, MD 20852-9787, or on the Med Watch website at http:www.fda.gov/safety/medwatch/default.htm.

We urge you to contact our Medical Information Department at 1-877-729-6679 between the hours of 8 a.m. and 5 p.m. (EST), or email medical.liaison@guerbet-group.com if you have any questions about the information contained in this letter or the safe and effective use of LIPIODOL® ULTRA-FLUIDE.

Sincerely,

Corina Harper
Director North America Medical & Regulatory Affairs, Guerbet LLC
## Comparison Table

<table>
<thead>
<tr>
<th>LIPIODOL® ULTRA-FLUIDE (ampoule)</th>
<th>ETHIODOL® (ampoule)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LIPIODOL® ULTRAFLUIDE</strong> 10 ml</td>
<td><strong>ETHIODOL®</strong> Brand of Ethiodized Oil</td>
</tr>
<tr>
<td>Esters éthylliques d’acides gras iodés de l’huile d’oéillelette</td>
<td>NOT FOR INTRAVASCULAR, INTRATHECAL OR INTRABRONCHIAL USE</td>
</tr>
<tr>
<td>Ethyl esters of iodized fatty acids of poppy seed oil</td>
<td>Sterile solution for injection for hysterosalpingography or lymphography. Ethyl ester of iodized fatty acids of poppy seed oil, containing 37% iodine (4.75 mg/mL)</td>
</tr>
<tr>
<td>Solution injectable</td>
<td>Stabilized with poppyseed oil, 1%.</td>
</tr>
<tr>
<td>Solution for injection</td>
<td>USUAL DOSAGE: See package insert.</td>
</tr>
</tbody>
</table>

**Guerbet** 211923

<table>
<thead>
<tr>
<th>LIPIODOL® ULTRA-FLUIDE (carton)</th>
<th>ETHIODOL® (carton)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LIPIODOL® ULTRAFLUIDE</strong> 10 ml</td>
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<td>Ethyl esters of iodized fatty acids of poppy seed oil</td>
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</tr>
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<td>USUAL DOSAGE: See package insert.</td>
</tr>
</tbody>
</table>

**Guerbet** 211923
| **LIPIODOL® ULTRA-FLUIDE**  
(ethyl esters of iodized fatty acids of poppy seed oil) | **ETHIODOL®**  
(ethyl esters of iodized fatty acids of poppy seed oil) |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Iodine label claim</strong></td>
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</tr>
<tr>
<td>48% w/vol Iodine (480 mg/mL)</td>
<td>37% w/w Iodine (475 mg/mL)</td>
</tr>
<tr>
<td><strong>Indications and contraindications</strong></td>
<td><strong>Indications and contraindications</strong></td>
</tr>
<tr>
<td>See package insert</td>
<td>ETHIODOL® is indicated for use as a radio-opaque medium for hysterosalpingography and lymphography.</td>
</tr>
<tr>
<td><strong>Please note: see package insert sections 4.2 Method of administration, 4.3 Contraindications, and 4.4 Special warning and precautions for use.</strong></td>
<td>See package insert for contraindications.</td>
</tr>
<tr>
<td><strong>Barcode</strong></td>
<td><strong>Barcode</strong></td>
</tr>
<tr>
<td>Barcode use by LIPIODOL® ULTRA-FLUIDE may not register accurately in the United States scanning systems. Alternative procedures should be followed to assure that the correct drug product is being used and administered to individual patients.</td>
<td>A unit of use barcode is on individual ampoules.</td>
</tr>
<tr>
<td><strong>How supplied</strong></td>
<td><strong>How supplied</strong></td>
</tr>
</tbody>
</table>
| Box of 1 ampoule  
Authorization# 306 216.0 | Box of 2 ampoules  
NDC# 0281-7062-37 |
| **Additional information** | **Additional information** |
| Contains a patient information leaflet | N/A |
LIPIODOL ULTRA-FLUIDE (480 mg I/ml), solution for injection.

**Composition**
Ethyl esters of iodized fatty acids of poppy seed oil* qs ad for one ampoule
* Iodine content: 48 %, i.e. 480 mg per ml.
Solution for injection in 5 ml or 10 ml ampoules.

**Pharmaco-therapeutic class**
Contrast agent.

**Guerbet**
BP 57400
95943 ROISSY CdG Cedex - FRANCE

When to use this medicinal product (therapeutic indications)
This medicinal product is an iodinated contrast agent. It has been prescribed to you for a radiological examination which is to be performed for diagnostic purposes or during a surgical procedure. It can also be used to prevent iodine deficiency disorders when iodization of salt or drinking water cannot be undertaken.

**WARNINGS !**
When not to use this medicinal product (contraindications)
In radiology
This product MUST NOT BE ADMINISTERED by general intra-arterial, intravenous or intrathecal injection (injection of the product via the same route as for lumbar puncture).

In the treatment of iodine deficiency
This medicinal product MUST NOT BE USED in the following situations:
- if you suffer from hyperthyroidism,
- if you have a large, multinodular goiter and are aged over 45 years, due to the high risk of hyperthyroidism,
- if you are breastfeeding.

Special warnings
In diagnostic or interventional radiology
You should inform the doctor who is to perform the injection if you have or have had any problems of an allergic nature:
• allergic reactions to iodinated products, particularly during previous radiological examinations with contrast agents,
• food or drug-related allergies,
• urticaria,
• eczema,
• asthma,
• hay fever.
- Or if you suffer from cardiac or respiratory insufficiency.
- Or if you have a liver (cirrhosis) or thyroid disorder.

In iodine deficiency
Do not associate with other methods of iodine supplementation (iodization of salt or drinking water) which could increase the risk of hyperthyroidism.
It is advisable to avoid using this medicinal product in persons over the age of 45 years.

**Pregnancy - Lactation**
In iodine deficiency
If you are pregnant, your doctor may prescribe you iodine supplementation. Due to the risk of hypothyroidism in neonates, Lipiodol is contraindicated during breastfeeding.

IF IN DOUBT, ASK YOUR DOCTOR OR PHARMACIST FOR ADVICE
AS A GENERAL RULE, IF YOU ARE PREGNANT OR BREASTFEEDING, YOU SHOULD ALWAYS ASK THE ADVICE OF YOUR DOCTOR OR PHARMACIST BEFORE TAKING ANY MEDICINAL PRODUCT.

HOW TO USE THIS MEDICINAL PRODUCT
Dosage
Dosage varies according to the indication and is determined by the doctor performing the injection.

Method and route of administration
This product must be administered using a glass syringe.

In diagnostic radiology
Lymphography: intralymphatic injection only
Diagnosis of liver lesions: selective intra-arterial injection only

In interventional radiology
Embolization with surgical glues: selective intra-arterial injection only

In iodine deficiency
Intramuscular injection only

Duration of treatment
This medicinal product will be administered to you in a single dose.

**UNDESIRABLE EFFECTS**
As with all active products, this medicinal product may cause some undesirable effects of variable intensity in certain persons:
possible onset of allergic reactions.

In diagnostic radiology
You may experience transient fever during the first few hours following the examination.
You may experience gastrointestinal disorders (nausea, vomiting or diarrhoea)

In iodine deficiency
You may present signs of hyperthyroidism (weight loss, accelerated heart rate, increased intestinal transit rate, anxiety, insomnia, etc.).

PLEASE REPORT ANY UNDESIRABLE EFFECT WHICH IS NOT MENTIONED IN THIS LEAFLET TO YOUR DOCTOR OR PHARMACIST.

**STORAGE**
Do not use the product after the expiry date indicated on the outer packaging.
Special precautions for storage
Store protected from light.

**DATE LEAFLET LAST REVISED**
03/11/2005.
APPENDIX I

SUMMARY OF PRODUCT CHARACTERISTICS

1. NAME OF THE MEDICINAL PRODUCT

LIPIODOL ULTRA-FLUIDE (480 mg I/ml), solution for injection.

2. QUALITATIVE AND QUANTITATIVE COMPOSITION

Ethyl esters of iodized fatty acids of poppy seed oil * qs ad for one ampoule

* Iodine content: 48 %, i.e. 480 mg per ml.

3. PHARMACEUTICAL FORM

Solution for injection.

4. CLINICAL PARTICULARS

4.1. Therapeutic indications

In diagnostic radiology

- Lymphography

- Diagnosis of liver lesions

- Diagnosis of the spread of malignant lesions, whether hepatic or not, by selective hepatic arterial injection.

In interventional radiology

- Embolization with surgical glues

In association with surgical glues during vascular embolizations.

In endocrinology

- Prevention of iodine deficiency disorders.

This treatment should only be used when other methods of supplementation, particularly iodization of salt and/or drinking water, cannot be undertaken.
4.2. Posology and route of administration

In diagnostic radiology

- Lymphography

5 to 7 ml by intralymphatic injection only for opacification of a limb (the dose being adapted to the height of the patient), i.e. 10 to 14 ml for bilateral pedal lymphography.

- Diagnosis of liver lesions

Intra-arterial route only.

The standard dose depends on lesion size and can vary from 2 to 10 ml per patient. LIPIODOL ULTRA-FLUIDE is sometimes mixed with small amounts of water-soluble iodinated contrast agents. The CT scan should be performed 7 to 15 days after the selective injection to allow the LIPIODOL ULTRA-FLUIDE to be eliminated from the non-tumoral liver tissue.

In interventional radiology

- Embolization with surgical glues

Selective arterial catheterization only.

The dose of LIPIODOL ULTRA-FLUIDE administered at each embolization session depends on lesion size. The Lipiodol and liquid embolizing agent mixture may vary from 20 to 80% but usually consists of a 50/50 mixture. The volume injected should not exceed 15 ml.

In endocrinology

Intramuscular injection only.

- Adults and children aged over 4 years: 1 ml every 3 years.
- Children aged under 4 years: 0.5 ml every 2 years without exceeding 3 ml.

In patients with thyroid nodules, the dose is 0.2 ml.
This product must be administered using a glass syringe.

4.3. Contraindications

In diagnostic radiology

This product must not be administered by intra-arterial, intravenous or intrathecal injection. In the diagnosis of liver lesions, there are no particular contraindications to the examination, apart from those associated with selective arteriography.

In interventional radiology
- Embolization with surgical glues

There are no particular contraindications apart from those related to embolization, in particular the presence of portal thrombosis.

In endocrinology

This medicinal product is CONTRAINDICATED in the following situations:
- hyperthyroidism,
- large, multinodular goiters in persons aged over 45 years, due to the high risk of hyperthyroidism,
- during breast-feeding.

4.4. Special warnings and special precautions for use

This medicinal product should be used with caution in patients with a history of allergy.

Care should be taken to avoid vascular structures due to the risk of fat embolisms and not to inject the product into an area affected by haemorrhage or trauma, except in the specific cases described below:

In diagnostic radiology

- lymphography

Intralymphatic injection only.

After chemotherapy or radiotherapy, the lymph nodes decrease substantially in size and only retain small amounts of contrast agent. The dose injected must therefore be reduced.

Overdoses can be avoided by radiological or radioscopic monitoring during the injection.

In subjects with cardiorespiratory failure, particularly elderly patients, the doses should be adapted or the examination itself cancelled, since a portion of the product will temporarily embolize the pulmonary capillaries.

Any thyroid explorations should be performed before the radiological examination, as lymphography saturates the thyroid with iodine for several months.
- Diagnosis of liver lesions

Intra-arterial injection only

Special care should be taken in cirrhotic patients. The examination should only be performed if it contributes to therapeutic decision-making.

In interventional radiology

- Embolization with surgical glues

Selective arterial catheterization only

Vascular embolization with liquid agents is a complex and delicate technique which should only be performed by trained physicians in an appropriate medicosurgical setting.

A premature polymerisation reaction may exceptionally occur between Lipiodol Ultra-Fluide and certain glues or batches of glues. Prior to any use of new batches of Lipiodol Ultra-Fluide or glue, it is mandatory to verify in vitro the compatibility between the glue used and Lipiodol Ultra-Fluide.

In endocrinology

Intramuscular injection only.

Do not associate other methods of iodine supplementation. The risk of thyrotoxicosis is increased if the treatment is associated with other methods of iodine supplementation, particularly iodization of foodstuffs.

Because of the risk of hyperthyroidism:

- it is advisable to avoid administering this treatment to subjects over the age of 45 years,
- and to reduce the dose in patients with thyroid nodules (see Posology and Route of Administration).

4.5. Interactions with other medicinal products and other forms of interaction

Associations requiring precautions for use

* Beta-blockers

In the event of shock or hypotension due to iodinated contrast agents, reduction of compensatory cardiovascular reactions by treatment with beta-blockers. Treatment with beta-blockers should be stopped, whenever possible, before the radiological investigation. When continuation of treatment is essential, adequate resuscitation equipment must be available.

* Diuretics
In the event of dehydration provoked by diuretics, the risk of acute renal failure is increased, especially when high doses of iodinated contrast agents are used. Precautions for use: re-hydration before administration of the iodinated contrast agent.

* Metformin

Lactic acidosis triggered by impaired renal function induced by the radiological investigation in diabetic patients. Treatment with metformin must be suspended 48 hours before the investigation and only restarted 2 days after the radiological examination.

Associations to be taken into account

* Interleukin II

The risk of developing a reaction to the contrast agents is increased in the event of previous treatment with interleukin II (IV route): skin rash or, more rarely, hypotension, oliguria, or even renal failure.

4.6. Pregnancy and lactation

In endocrinology

It appears that in populations with moderate to severe iodine deficiency, it can be beneficial for pregnant women to receive iodine supplementation.

This medicinal product is highly concentrated in the maternal milk. Due to the risk of hypothyroidism in neonates, Lipiodol is contraindicated during breast-feeding.

4.7. Effects on ability to drive and use machines

Not applicable.

4.8. Undesirable effects

Allergic-like reactions may occur.

In diagnostic radiology

- Lymphography

A fever of 38-39°C may be observed in the 24 hours following the examination. A transient lipiodol miliary is often observed on radiological images, particularly following a high or inappropriate dose. This usually remains clinically silent. In exceptional cases, pulmonary or cerebral embolism may be observed. Spinal cord accidents are rare.
- Diagnosis of liver lesions

Fever is often observed. Other rarer complications may occur: nausea, vomiting and diarrhoea.

In interventional radiology

- Embolization with surgical glues

No undesirable effects directly related to LIPIODOL ULTRA FLUIDE have been specifically described.

In endocrinology

Hyperthyroidism (see Precautions for use).

4.9. Overdose

In radiology

Following intralymphatic injection, cardiorespiratory and central venous complications are proportional to the dose of LIPIODOL ULTRA-FLUIDE injected.

5. PHARMACOLOGICAL PROPERTIES

5.1. Pharmacodynamic properties

NON-WATER-SOLUBLE CONTRAST AGENTS, Code ATC: V08AD01
(V: Other)

5.2. Pharmacokinetic properties

After intralymphatic injection

Lipiodol is released into the blood, taken up by the liver and lungs where the oily droplets are degraded in the pulmonary alveoli, spleen and adipose tissue.

After being taken up by the tissues and storage organs, reabsorption of Lipiodol occurs over a period lasting from a few days to several months or years. This is continuous and regular and the presence of iodides in the urine can be detected as long as contrast material is visible on the images.
**After intramuscular injection**

A portion of the oil accumulates in the muscle and adjacent tissues. Another portion is deiodinated via the metabolic route, the iodine being used to compensate for the iodine losses of the thyroid.

Urinary iodine excretion is massive and occurs rapidly (within the first few hours after the injection) but continues over the following months.

Urinary iodine excretion falls to 50 µg/day in adults within 3 to 5 years.

**After selective intra-arterial injection**

The iodine is eliminated mainly in the urine. The iodinated contrast agent is significantly more concentrated in the tumour than in the surrounding tissue, especially in the case of hepatocellular carcinomas.

**5.3. Preclinical safety data**

Not applicable.

**6. PHARMACEUTICAL PARTICULARS**

**6.1. Incompatibilities**

Plastic is not suitable for the storage of LIPIODOL ULTRA-FLUIDE. In the absence of any specific compatibility studies, plastic containers and syringes should not be used.

**6.2. Shelf-life**

3 years.

**6.3. Special precautions for storage**

Store protected from light.

**6.4. Nature and contents of container**

5 ml or 10 ml type I glass ampoule.
7. PRESENTATION AND MARKETING AUTHORISATION NUMBERS

306 217.7 - 5 ml glass ampoule, box of 4
306 216.0 - 10 ml glass ampoule, box of 1
560 350-7 - 5 ml glass ampoule, box of 100
560 351-3 - 10 ml glass ampoule, box of 50

8. LEGAL STATUS

Not applicable.

9. MARKETING AUTHORISATION HOLDER

Guerbet
BP 57400
F-95943 Roissy CdG cedex
FRANCE

10. DATE OF REVISION

November 3, 2005
DESCRIPTION: Ethiodol, brand of ethiodol oil, is a sterile injectable radio-opaque diagnostic agent for use in fluoroscopy and angiography. It contains 35% iodine (45 mg/I) suspended in a refined poppyseed oil base, and is alkalized with sodium hydroxide. Ethiodol is sterile, pyrogen-free, and free from fungicidal and bactericidal properties of the base. It is colorless in the fluid state, and is a light yellow, thick, viscous, non-Newtonian liquid at 45°C (113°F) which yields a viscosity of 0.5 - 1.0 poise. This high fluidity provides a high viscosity for radiographic exploration.

CLINICAL PHARMACOLOGY: There has been little detailed investigation of the metabolic fate of Ethiodol in either man or animals. However, the fat, or Ethiodol-bearing lymph node in the lymphangiography patient, remains hypertrophied for many months. This is thought to be due to the slow elimination of unopposed iodine from the lymphatics. The injected activity was fairly uniformly distributed throughout the body. Urinary excretion in the form of intact Ethiodol was noted in the urine for 45 days. An average of 50% was recovered from the lungs. They found the remainder of injected activity was fairly uniformly distributed throughout the body. This is consistent with the clinical observation that much iodine is radio-opaque, and remains within the lymphatic system even in cases of lymphatic obstruction.

CONTRAINdications: Ethiodol is contraindicated in patient hypersensitivity to it. Ethiodol should not be injected intrathecally or intravascularly, or used in angiography. A history of sensitivity to any part of the crutch does not exclude the possibility of a similar type of reaction in a patient who has previously had a diagnostic or therapeutic procedure with Ethiodol, although no patient has actually had a reaction. Patients with a history of sensitivity to contrast materials, radiation, or a history of anaphylactic or other severe reaction to a previous diagnostic or therapeutic procedure, should not be given triatopaque Ethiodol.

WARNINGS: Ethiodol is not intended for use in bronchography, and therefore, it is not to be introduced into the bronchial tree. A history of sensitivities to iodine or to other contrast materials is no contraindication to the use of Ethiodol. However, all patients are advised to discontinue the use of thyroid hormones for at least three days prior to the administration of Ethiodol into the lymphatics. Patients with a history of hyperthyroidism, or signs of pre-existing thyroid disease, should not be given Ethiodol as PBI determination of thyroid uptake studies should be carried out prior to the lymphographic procedure. Clinical evidence of such embolization is infrequent and is usually of a transient nature. The use of intralymphatic Ethiodol presents a significant hazard in patients with pre-existing pulmonary disease characterized by a decrease in pulmonary diffusing capacity and/or pulmonary blood flow. A history of sensitivity to Ethiodol, although rare, has occurred in patients without evidence of pre-existing pulmonary disease. The safety of intralymphatic Ethiodol has not been established in pregnant women, and accordingly, its use should be restricted to such situations where the benefits outweigh the risks.

PRECAUTIONS: Although subclinical pulmonary embolization occurs in a majority of patients following lymphography, clinical evidence of such embolization is infrequent and is usually of a transient nature. Such clinical manifestations are usually innocuous, but may be delayed from a few hours to days. It would appear that it is advantageous to use the smallest volume of Ethiodol necessary for radiographic visualization. For this reason, radiographic monitoring of patients is recommended during the injection of Ethiodol. The timing and choice of anesthesia following Ethiodol injection may be influenced by consideration of the above noted increase in pulmonary and capillary blood flow and diffusing capacity. It should be noted that although an average of 2 to 3 days is required for complete resolution of pulmonary embolization, asymptomatic, long-standing pulmonary emboli may require up to 12 days to return to baseline values.

REFERENCES: The authors of this publication have no financial interests in the commercial sale of Ethiodol. Moreover, the authors consider all patients to have an equal right to access Ethiodol lymphography, clinical evidence of such embolization is infrequent and is usually of a transient nature. Such clinical manifestations are usually innocuous, but may be delayed from a few hours to days. It would appear that it is advantageous to use the smallest volume of Ethiodol necessary for radiographic visualization. For this reason, radiographic monitoring of patients is recommended during the injection of Ethiodol. The timing and choice of anesthesia following Ethiodol injection may be influenced by consideration of the above noted increase in pulmonary and capillary blood flow and diffusing capacity. It should be noted that although an average of 2 to 3 days is required for complete resolution of pulmonary embolization, asymptomatic, long-standing pulmonary emboli may require up to 12 days to return to baseline values.

ADVERSE REACTIONS: This occasional observation of pulmonary Ethiodol embolization (interstitial or pulmonary or both) in patients has been made in our experience. This was noticed more frequently when obstructive resection of the trachea or bronchi were performed. The symptoms were noted in the thoracic duct or the presence of lymphatic obstruction is noticed. The occurrence of pulmonary embolization may be minimized if subclavian catheterization is avoided or until the patient's limit of tolerance to discomfort is reached. Few patients will complain of dyspnea of the lungs or hypoxic symptoms.

TREATMENT: Therapy consists of restoring cardiac output and of sustaining arterial pressure by means of counter shock, if necessary. Treatment should be aimed at overcoming any specific cause of the established or until the patient's limit of tolerance to discomfort is reached. Few patients will complain of dyspnea of the lungs or hypoxic symptoms.
This method applies for both the upper and lower extremities.

With a 27 or 30 gauge extrafascial plane. The deeper lymph trunks will be easier to cannulate.

The cut-down and injection instruments and materials include the following:

- Sterile pediatric cut-down set
- Sterile towels for draping, sponges, etc.
- Local anesthetic, such as procaine hydrochloride, and a syringe
- Sterile pediatric cut-down set
- 20 mL syringe containing 15 mL of Ethiodol with an 18 inch catheter to which is affixed a 27 or 20 gauge needle.

Under local infiltration anesthesia, a transverse, subcutaneous small skin incision should be made near the ankle or wrist (just lateral) and distal to the first metatarsal head on the dorsum of the foot, or just over the "sinuation" in the distal part of the hand.

Upon superficial dissection (but not penetrating the subcutaneous layer of tissue), lymph vessels will be noted in the immediate subcutaneous tissue, while larger lymph vessel trunks are found in the extralimbic plane. The deeper lymph trunks will be easier to cannulate.

One lymph vessel is then exposed, avoiding circumferential dissection. The less manipulation performed, the better the results that will be obtained. The lymphatic, thus cannulated, is then cannulated in the usual manner, and the fluid is injected slowly. The length and diameter of the vessels will be noted.

It is rarely possible to cannulate with a needle greater than 27 gauge. Insertion of the needle through the skin may foreshadow cannulating the subcutaneous tissue or reducing the movement of the needle within the vessel. Additional security of the needle in the lymphatic is obtained by strapping, with sterile tape, the polyethylene tubing to the patient's foot.

The injection should be started at a slow rate, i.e., 0.1 mL to 0.2 mL per minute. Radiographic monitoring or serial radiographic guidance of patients is recommended during the injection process. If in those cases in which extreme caution should be exercised, lymphography is still necessary, a smaller dose of oily contrast medium with protracted injection time with less pressure and careful monitoring is required.

3. Side leading should be done on all patients before submitting them to lymphography. The awareness of possible hypersensitivity to local anesthetics and skin disinfectants, careful history taking is important.

4. Techniques of cannulation extravasation to be avoided and/or detected early. The injection site should be included on the "scout film" or observed under image amplification fluoroscopy. The needle tip must remain visible in the incision wound.

5. Only contrast material once opened, ampules should be discarded. Ampules of Ethiodol should not be used. If the color has decreased or particulate matter is present. The average dose for lymphography is 1 to 2 mL. The amount for the upper extremity will suffice to demonstrate the axillary and supraclavicular nodes. In penile lymphography approximately 2 to 3 mL of Ethiodol is required. In infants and children, a minimum of 1 mL to a maximum of 15 mL should be employed.


Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration, whenever solution and container permit. Ethiodol brand of ethiodized oil for injection is stored at amber color under normal conditions. (See DESCRIPTION).

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SUMMARY OF STEPS TO AVOID COMPLICATIONS IN LYPHOMGRAPY

1. Contraindications: a patients:
   - A. With a known hypersensitivity to Ethiodol
   - B. With a right to left cardiac shunt
   - C. With advanced pulmonary disease, especially those with alveolar-capillary block
   - D. With treated radiotherapy to the lungs

2. Proceed with caution:
   - A. Patients having markedly advanced neoplastic disease with expected lymphatic obstruction.
   - B. Patients having undergone previous surgery interrupting the lymphatic system.
   - C. Patients having had deep radiation therapy to the examined area.

3. In those cases in which extreme caution should be exercised, lymphography is still necessary, a smaller dose of oily contrast medium with protracted injection time with less pressure and careful monitoring is required.