

LIPIODOL[®]

(Ethiodized Oil) Injection

Lymphography in Adult and Pediatric Patients

IMPORTANT SAFETY INFORMATION¹

**WARNING: FOR INTRALYMPHATIC, INTRAUTERINE AND SELECTIVE HEPATIC
INTRA-ARTERIAL USE ONLY**

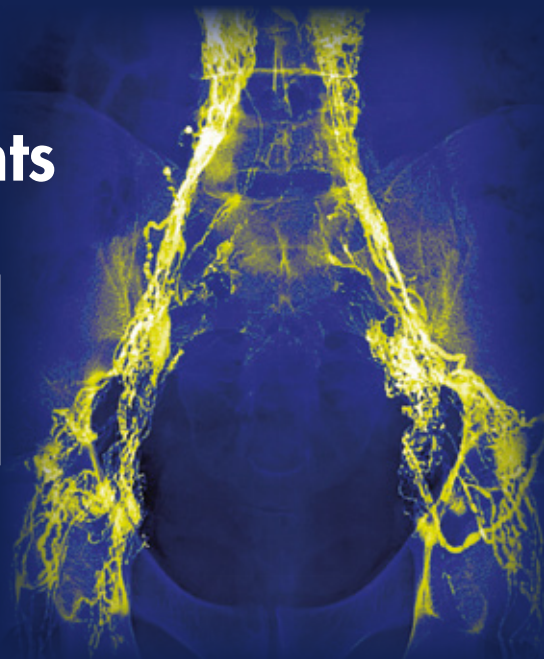
See Full Prescribing Information for complete Boxed Warning.

Pulmonary and cerebral embolism can result from inadvertent intravascular injection or intravasation of Lipiodol. Inject Lipiodol slowly with radiologic monitoring; do not exceed recommended dose.

Please see additional Important Safety Information on the back page.
For more information on Lipiodol[®], please see Full Prescribing Information

Guerbet | 

COMMITTED



Colorized image



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The Lymphatic System & Lymphography

The Lymph (lymphatic) System:

A network of organs, lymph nodes, lymph ducts, and lymph vessels that make and move lymphatic fluid from tissues to the bloodstream. The lymph system is a major part of the body's immune system.²

Lymphangiography /Lymphography:

The visualization of lymphatics (lymphangiography) lymph nodes (lymphadenography), or both by radiography following the intralymphatic injection of a contrast medium, usually an iodized oil.³

- Using an iodized oil allows for additional imaging to be performed months, or sometime years, allowing one to evaluate the effects of treatment or progression of disease.⁴

Reasons for performing lymphography include⁴:

Chylous Syndromes

- Chylous Ascites
- Chylothorax
- Chyluria
- External Genital lymphedema
- Lymphatic leaks in the chest or abdomen

Obstruction and Collateral Flow

- Lympholymphatic and Lymphovenous Anastomoses
- Perineural and Perivascular Spaces
- Lymphocele and Lymphatic Fistula



Use of Lipiodol® (Ethiodized Oil) Injection in Lymphography

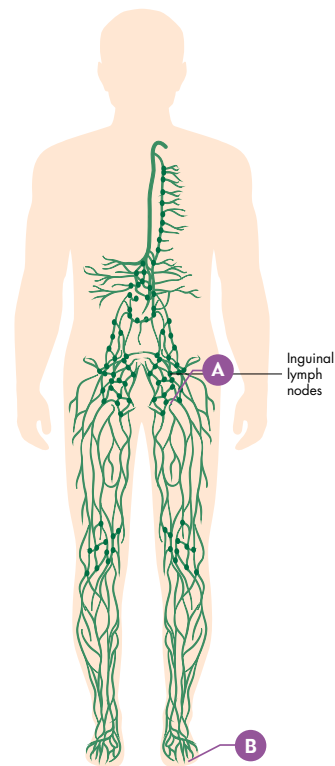
Indication

Lipiodol is an oil-based radiopaque contrast agent indicated for lymphography in adult and pediatric patients¹

Dosage and Administration¹

Inject Lipiodol® into a lymphatic vessel under radiologic guidance to prevent inadvertent venous administration or intravasation.

Adults	Pediatric Patients
Unilateral lymphography of the upper extremities: 2 to 4 mL	Inject a minimum of 1 mL to a maximum of 6 mL, according to the anatomical area to be visualized. Do not exceed 0.25 mL/kg
Unilateral lymphography of the lower extremities: 6 to 8 mL	
Penile lymphography: 2 to 3 mL	
Cervical lymphography: 1 to 2 mL	



Methods of Injection: Either Intranodal (A) or Transpedal (B) Lymphangiography^{5,6}

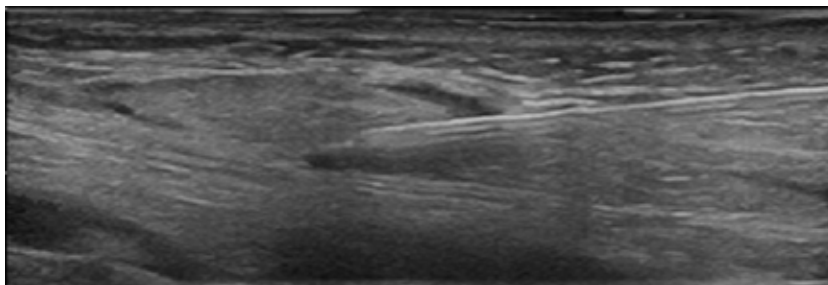
Lipiodol Lymphography is contraindicated in patients with a right to left cardiac shunt, advanced pulmonary disease, tissue trauma or hemorrhage advanced neoplastic disease with expected lymphatic obstruction, previous surgery interrupting the lymphatic system, radiation therapy to the examined area.¹



Lipiodol® (Ethiodized Oil) Injection in Lymphography: Intranodal Lymphangiography⁵

Intranodal Lymphangiography: Inject Lipiodol into an inguinal lymph node

Volume of Lipiodol®	Approximately 6-10 mL per node ⁵ (Maximum = 20 mL) ¹
Injection Rate	Lipiodol® was injected manually at an injection rate of 0.1 mL/min on one side ⁵ ; not to exceed 0.2 mL per min ¹
Needle	Ultrasound guidance using a 25-gauge needle ⁵
Operation	Needle tip was positioned in the transitional zone between the cortex and hilum of the inguinal lymph node under sonographic guidance ⁵



Sonographic intrainterventional image of needle positioning within an inguinal lymph node⁵



Lipiodol® (Ethiodized Oil) Injection in Lymphography– Transpedal Lymphangiography^{1,5}

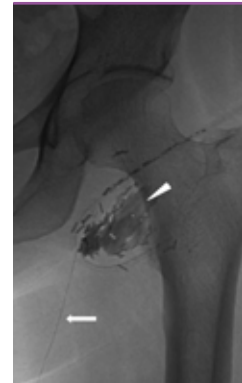
Pedal Lymphangiography:

Inject Lipiodol® into isolated vessel on the dorsum foot below the ankle

Volume of Lipiodol®	6-12 mL ⁵ (Maximum = 20 mL) ¹
Injection Rate	Not to exceed 0.2 mL per min ¹
Needle	21-25 gauge cannula ⁵
Operation	Superficial lymph ducts at arch of foot identified, dissected and punctured ⁵



Typical radiographic images during transpedal lymphangiography with Lipiodol propagation up to inguinal (A) and retroperitoneal lymph nodes/vessels with opacification of the thoracic duct (B).



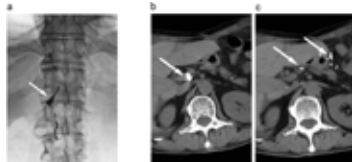
Radiographic image during transpedal lymphangiography in a patient after surgery in the groin demonstrating an opacified lymphatic vessel (arrow) with extensive leakage (arrow head); contrast run-off in drain.



Clinical Cases: Chylothorax: Post-Esophagectomy⁷

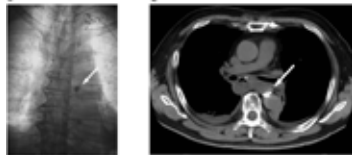
Ultrasound-guided intranodal lymphangiography (LAG): Reduced technical difficulty and shorter duration as compared to pedal LAG⁷

CASE 1



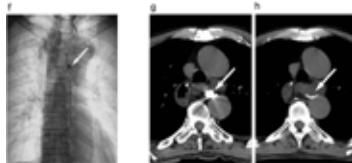
Case 1: 67-yr old male (a) Ultrasound guided intranodal LAG demonstrating lipiodol leakage behind the common hepatic arterial trunk (white arrow). (b) Plain CT image obtained after the intranodal Lipiodol LAG providing more detailed information about the leak point (white arrow). (c) Plain CT image obtained 1 day after the intranodal lipiodol LAG showing that the leaked lipiodol near the leak point diffused to the surrounding (white arrow). Surgical ligation of leaking lymph vessel was performed. Patient discharged.⁷

CASE 2



Case 2: 59-yr old male (d) Ultrasound-guided intranodal LAG demonstrating lipiodol leakage at the level of the sixth thoracic vertebra (white arrow). (e) Plain CT image obtained after the intranodal lipiodol LAG providing more detailed information about the leak point (white arrow). Surgical ligation of thoracic duct performed. Patient discharged.⁷

CASE 3



Case 3: 75-yr old male (f) Ultrasound-guided intranodal LAG demonstrating lipiodol leakage on the left side of the fifth thoracic vertebra level slightly higher than tracheal bifurcation (white arrow). (g) Plain CT image obtained after the intranodal lipiodol LAG providing more detailed information about the leak point (white arrow). (h) Plain CT image obtained 2 days after the intranodal lipiodol LAG showing remained lipiodol near the leak point (white arrow). Drainage reduced, did not increase, and patient discharged.⁷

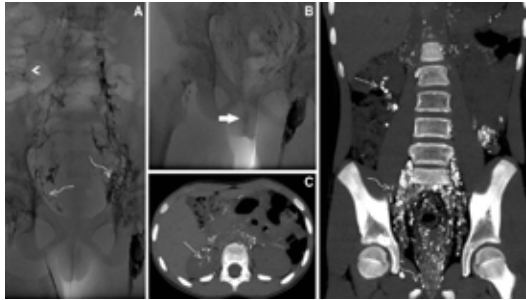
Conclusion: “Ultrasound-guided intranodal Lipiodol® (Ethiodized Oil) Injection LAG is a minimally invasive and easily performed procedure with high diagnostic and therapeutic value for postoperative chylothorax.” If Lipiodol still remains near the leak point, next therapeutic strategy can be decided more reasonably.⁷

*Liu et al. International Journal of Surgery Case Reports. 20 (2016) 103-107



Clinical Cases: Lymphedema: Genital Lymphedema⁸

FIGURE 1



Case 1: 8-yr old female with sudden-onset genital lymphedema and lymphorrhage. Bi-lateral transnodal lymphangiography performed. Figure 1: (A) Lymphangiography image at 30 min showing lymphatic hyperplasia in the pelvis (curved arrows) and lymphaticoplevic fistula (arrowhead). (B) Lymphangiography image at 45 min demonstrating vaginal leak (arrow). (C) CT scan 24 h after lymphangiography depicting lipiodol within the parenchyma of the kidney indicating lymphaticoplevic fistula (arrow). (D) Coronal reconstruction of the same CT scan showing lipiodol within the kidney parenchyma due to lymphopelvic fistula (arrow) and lymphatic hyperplasia in the pelvic organs (curved arrows).

FIGURE 2



Case 2: 31-yr old male with genital persistent lymphedema. Bilateral transnodal lymphangiography performed. Figure 2: (A) Left Lipiodol reflux to the scrotum after direct transnodal lymphangiography 3 min after injection (arrow) (B) Three-dimensional cone-beam CT reconstruction showing left lipiodol reflux to the scrotum after direct transnodal lymphangiography (arrow).

IMPORTANT SAFETY INFORMATION CONTINUED¹

Safety Profile

Common adverse events may include fever, abdominal pain, nausea, and vomiting; other reactions include hepatic ischemia, liver enzymes abnormalities, transitory decrease in liver function, liver decompensation and renal insufficiency. Procedural risks include vascular complications and infections.

Indication and Usage

LIPIODOL® (Ethiodized Oil) Injection is a prescription oil-based radio-opaque contrast agent indicated for:

- Hysterosalpingography in adults
- Lymphography in adult and pediatric patients
- Selective hepatic intra-arterial use for imaging tumors in adults with known hepatocellular carcinoma (HCC)

Contraindications

LIPIODOL® is contraindicated in patients with hypersensitivity to LIPIODOL®, hyperthyroidism, traumatic injuries, recent hemorrhage or bleeding.

- LIPIODOL® Hysterosalpingography is contraindicated in pregnancy, acute pelvic inflammatory disease, marked cervical erosion, endocervicitis and intrauterine bleeding, in the immediate pre-or postmenstrual phase, or within 30 days of curettage or conization.
- LIPIODOL® Lymphography is contraindicated in patients with a right to left cardiac shunt, advanced pulmonary disease, tissue trauma or hemorrhage, advanced neoplastic disease with expected lymphatic obstruction, previous surgery interrupting the lymphatic system, radiation therapy to the examined area.
- LIPIODOL® Selective Hepatic Intra-arterial Injection is contraindicated in the presence of dilated bile ducts unless external biliary drainage was performed before injection.

Warnings and Precautions

- Pulmonary and cerebral embolism may occur immediately or after a few hours to days from inadvertent systemic vascular injection or intravasation of LIPIODOL®. Avoid use in patients with severely impaired lung function, cardiorespiratory failure or right-sided cardiac overload.
- Anaphylactoid and anaphylactic reactions with cardiovascular, respiratory or cutaneous manifestations, ranging from mild to severe, including death, have uncommonly occurred following LIPIODOL® administration. Avoid use in patients with a history of sensitivity to other iodinated contrast agents, bronchial asthma or allergic disorders because of an increased risk of a hypersensitivity reaction to LIPIODOL®.
- LIPIODOL® hepatic intra-arterial administration can exacerbate chronic liver disease.
- Iodinated contrast media can affect thyroid function because of the iodide content and can cause hyperthyroidism or hypothyroidism.

Adverse Reactions

- Hysterosalpingography – Abdominal pain, foreign body reactions, exacerbation of pelvic inflammatory disease, salpingitis or pelvic peritonitis have been reported after the examination in case of latent infection.
- Lymphography – Lymphangitis, thrombophlebitis, edema or exacerbation of preexisting lymphedema, dyspnea and cough, iodism, allergic dermatitis lipogranuloma, delayed healing at the site of incision.
- Selective Hepatic Intra-arterial Injection – Abdominal pain, nausea, and vomiting are the most common reactions; other reactions include hepatic vein thrombosis, hepatic ischemia, liver enzymes abnormalities, transitory decrease in liver function, liver decompensation and renal insufficiency. Procedural risks include vascular complications and infections.

Use in Specific Populations

- Pregnancy: The use of LIPIODOL® before or during pregnancy may interfere with thyroid function in both the pregnant woman and her fetus and may affect fetal development. Untreated hypothyroidism in pregnancy is associated with adverse perinatal outcomes, such as spontaneous abortion, preeclampsia preterm birth, abruptio placentae, and fetal death. The use of LIPIODOL® before or during pregnancy causes iodide transfer across the placenta which may interfere with fetal thyroid function and may affect fetal development. Untreated hypothyroidism is also associated with increased fetal risk of low birth weight, fetal distress, and impaired neuropsychological development. Consider thyroid function testing during pregnancy if a woman was exposed to LIPIODOL® either before or during pregnancy, and also in infants whose mothers were exposed to LIPIODOL® before and during pregnancy or if clinically indicated.
- Pregnancy Testing: Confirm that the patient has a negative pregnancy test within 24 hours before LIPIODOL® administration for hysterosalpingography.
- Lactation: The use of LIPIODOL® may increase the concentration of iodide in human milk and may interfere with the thyroid function of the breastfed infant. Consider thyroid function testing in a breastfed infant whose mother was exposed to LIPIODOL® or if clinically indicated.
- Pediatric: For lymphography use a dose of minimum of 1 mL to a maximum of 6 mL according to the anatomical area to be visualized. Do not exceed 0.25 mL/kg. Administer the smallest possible amount of LIPIODOL® according to the anatomical area to be visualized.
- Geriatric: There are no studies conducted in geriatric patients.
- Renal Impairment: Prior to an intra-arterial administration of LIPIODOL® screen all patients for renal dysfunction by obtaining history and/or laboratory tests. Consider follow-up renal function assessments for patients with a history of renal dysfunction.

You are encouraged to report negative side effects of prescription drugs to the FDA. Visit www.fda.gov/medwatch or call 1-800-FDA-1088.

LIPIODOL® is a registered trademark of Guerbet and is available by prescription only.

Please see the full prescribing information for additional important safety information.

References 1. Lipiodol Full Prescribing Information, Revised June 2020 2. Lymph system. 2012. Access at: <https://medlineplus.gov/ency/article/002247.htm> 3. Medical Dictionary for the Health Professions and Nursing © Farlex 2012 4. Guerhazi et al. Lymphography: An Old Technique Retains Its Usefulness. Radiographics 2003; 23:1541-1560 5. Pieper et al. Back to the Future Lipiodol in Lymphography—From Diagnostics to Theranostics. Investigative Radiology 2019; DOI 10.1097/RLI.0000000000000578 6. Human Anatomy, Lymphatic System, Medical Illustration. <https://www.shutterstock.com/image-vector/>



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