DEPARTMENT OF HEALTH AND HUMAN SERVICES

Food and Drug Administration
Silver Spring MD 20993

NDA 21-711/S-003

SUPPLEMENT APPROVAL

Lantheus Medical Imaging, Inc.
Attention: Mary E. Taylor
Vice President Global Regulatory Affairs
331 Treble Cove Road
North Billerica, MA 01862

Dear Ms. Taylor:

Please refer to your Supplemental New Drug Application (sNDA) dated October 7, 2010, received October 8, 2010, submitted under section 505(b) of the Federal Food, Drug, and Cosmetic Act (FDCA) for Ablavar® (gadofosveset trisodium) Injection.

We acknowledge receipt of your amendment dated November 23, 2010.

We also refer to our letter dated September 8, 2010, notifying you, under Section 505(o)(4) of the FDCA, of new safety information that we believe should be included in the labeling for Ablavar® (gadofosveset trisodium) Injection. This information pertains to the risk of nephrogenic systemic fibrosis (NSF) associated with the use of gadolinium-based contrast agents.

This supplemental new drug application provides for revisions to the labeling for Ablavar® (gadofosveset trisodium) Injection. The agreed upon changes to the language included in our September 8, 2010 letter and the text emailed November 17, 2010 that was discussed during our November18, 2010 teleconference are as follow (additions are noted by underline and deletion are noted by ~~strikethrough)~~.

The final label further revises the last bullet in the boxed warning of the full prescribing information section and a sentence in the Nephrogenic Systemic Fibrosis section (5.1); both revisions address re-administration.

1. BOXED WARNING within HIGHLIGHTS as follows (modify the font to maintain consistency with other text within the section):

~~**WARNING: NEPHROGENIC SYSTEMIC FIBROSIS (NSF)**~~

~~**See full prescribing information for complete boxed warning**~~

~~**Gadolinium-based contrast agents increase the risk for nephrogenic systemic fibrosis (NSF) in patients with:**~~

- ~~**acute or chronic severe renal insufficiency (glomerular filtration rate <30 mL/min/1.73m^2), or**~~
- ~~**acute renal insufficiency of any severity due to the hepato-renal syndrome or in the perioperative liver transplantation period.**~~

~~**In these patients, avoid use of gadolinium-based contrast agents unless the diagnostic information is essential and not available with non-contrast enhanced magnetic resonance imaging (MRI). NSF may result in fatal or debilitating systemic fibrosis affecting the skin, muscle and internal organs. Screen all patients for renal dysfunction by obtaining a history and/or laboratory tests. When administering a gadolinium-based contrast agent, do not exceed the recommended dose and allow a sufficient period of time for elimination of the agent from the body prior to any readministration [*see Warnings and Precautions (5.1)*]**~~

WARNING: NEPHROGENIC SYSTEMIC FIBROSIS (NSF)
See full prescribing information for complete boxed warning

Gadolinium-based contrast agents (GBCAs) increase the risk for NSF among patients with impaired elimination of the drugs. Avoid use of GBCAs in these patients unless the diagnostic information is essential and not available with non-contrasted MRI or other modalities.

- **The risk for NSF appears highest among patients with:**
  - **chronic, severe kidney disease (GFR < 30 mL/min/1.73m^2), or**
  - **acute kidney injury.**
- **Screen patients for acute kidney injury and other conditions that may reduce renal function. For patients at risk for chronically reduced renal function (e.g. age > 60 years, hypertension or diabetes), estimate the glomerular filtration rate (GFR) through laboratory testing (5.1).**

2. Add a RECENT MAJOR CHANGES section within HIGHLIGHTS as follows (modify the font to maintain consistency with other text within the section):

Boxed Warning	12/2010
Warnings and Precautions (5.1)	12/2010
Patient Counseling Information (17)	12/2010

3. Revise the WARNINGS AND PRECAUTIONS section (first bullet) within HIGHLIGHTS as follows (modify the font to maintain consistency with other text within the section):

- ~~Nephrogenic Systemic Fibrosis may result from administration of gadolinium-based contrast agents to certain patients (5.1).~~

- Nephrogenic Systemic Fibrosis has occurred in patients with impaired elimination of GBCAs. Higher than recommended dosing or repeated dosing appears to increase the risk. (5.1)

4. Within the full prescribing information, revise the BOXED WARNING as follows:

WARNING: NEPHROGENIC SYSTEMIC FIBROSIS (NSF)

~~Gadolinium-based contrast agents increase the risk for nephrogenic systemic fibrosis (NSF) in patients with:~~

- **~~acute or chronic severe renal insufficiency (glomerular filtration rate <30 mL/min/1.73m^2), or~~**
- **~~acute renal insufficiency of any severity due to the hepato-renal syndrome or in the perioperative liver transplantation period.~~**

~~In these patients, avoid use of gadolinium-based contrast agents unless the diagnostic information is essential and not available with non-contrast enhanced magnetic resonance imaging (MRI). NSF may result in fatal or debilitating systemic fibrosis affecting the skin, muscle and internal organs. Screen all patients for renal dysfunction by obtaining a history and/or laboratory tests. When administering a gadolinium-based contrast agent, do not exceed the recommended dose and allow a sufficient period of time for elimination of the agent from the body prior to any readministration [*see Warnings and Precautions (5.1)*].~~

Gadolinium-based contrast agents (GBCAs) increase the risk for NSF among patients with impaired elimination of the drugs. Avoid use of GBCAs in these patients unless the diagnostic information is essential and not available with non-contrasted MRI or other modalities. NSF may result in fatal or debilitating fibrosis affecting the skin, muscle and internal organs.

- **The risk for NSF appears highest among patients with:**
  - **chronic, severe kidney disease (GFR < 30 mL/min/1.73m^2), or**
  - **acute kidney injury.**
- **Screen patients for acute kidney injury and other conditions that may reduce renal function. For patients at risk for chronically reduced renal function (e.g. age > 60 years, hypertension or diabetes), estimate the glomerular filtration rate (GFR) through laboratory testing.**
- **For patients at highest risk for NSF, do not exceed the recommended Ablavar dose and allow a sufficient period of time for elimination of the drug from the body prior to re-administration [*see Warnings and Precautions (5.1)*].**

5. Within the full prescribing information, revise subsection 5.1 of the WARNINGS AND PRECAUTIONS section as follows:

5.1 Nephrogenic Systemic Fibrosis (NSF)

~~Gadolinium-based contrast agents increase the risk for nephrogenic systemic fibrosis (NSF) in patients with acute or chronic severe renal insufficiency (glomerular filtration rate <30 mL/min/1.73 m^2) and in patients with acute renal insufficiency of any severity due to the hepato-renal syndrome or in the perioperative liver transplantation period. In these patients, avoid use of gadolinium-based contrast agents unless the diagnostic information is essential and not available with non-contrast MRI. For patients receiving hemodialysis, physicians may consider the prompt initiation of hemodialysis following the administration of a gadolinium-based contrast agent in order to enhance the contrast agent's elimination. The usefulness of hemodialysis in the prevention of NSF is unknown [*see Boxed Warning and Clinical Pharmacology (12.3)*].~~

~~Among the factors that may increase the risk for NSF are repeated or higher than recommended doses of a gadolinium-based contrast agent and the degree of renal function impairment at the time of exposure.~~

~~Post-marketing reports have identified the development of NSF following single and multiple administrations of gadolinium-based contrast agents. These reports have not always identified a specific agent. Where a specific agent was identified, the most commonly reported agent was gadodiamide (Omniscan™), followed by gadopentetate dimeglumine (Magnevist®) and gadoversetamide (OptiMARK®). NSF has also developed following sequential administrations of gadodiamide with gadobenate dimeglumine (MultiHance®) or gadoteridol (ProHance®). The number of post-marketing reports is subject to change over time and may not reflect the true proportion of cases associated with any specific gadolinium-based contrast agent.~~

~~The extent of risk for NSF following exposure to any specific gadolinium-based contrast agent is unknown and may vary among the agents. Published reports are limited and predominantly estimate NSF risks with gadodiamide. In one retrospective study of 370 patients with severe renal insufficiency who received gadodiamide, the estimated risk for development of NSF was 4% (J Am Soc Nephrol 2006; 17:2359). The risk, if any, for the development of NSF among patients with mild to moderate renal insufficiency or normal renal function is unknown.~~

~~Screen all patients for renal dysfunction by obtaining a history and/or laboratory tests. When administering a gadolinium-based contrast agent, do not exceed the recommended dose and allow a sufficient period of time for elimination of the agent prior to any readministration [*see Clinical Pharmacology (12) and Dosage and Administration (2*].~~

<u>Gadolinium-based contrast agents (GBCAs) increase the risk for nephrogenic systemic fibrosis (NSF) among patients with impaired elimination of the drugs. Avoid use of GBCAs among these patients unless the diagnostic information is essential and not available with non-contrast enhanced MRI or other modalities. The GBCA-associated NSF risk appears highest for patients with chronic, severe kidney disease (GFR < 30 mL/min/1.73m^2) as well as patients with acute kidney injury. The risk appears lower for patients with chronic, moderate kidney disease (GFR 30 - 59 mL/min/1.73m^2) and little,</u>

if any, for patients with chronic, mild kidney disease (GFR 60 - 89 mL/min/1.73m^2). NSF may result in fatal or debilitating fibrosis affecting the skin, muscle and internal organs. Report any diagnosis of NSF following Ablavar administration to Lantheus Medical Imaging (1-XXX-XXX-XXXX) or FDA (1-800-1088 or www.fda.gov/medwatch).

Screen patients for acute kidney injury and other conditions that may reduce renal function. Features of acute kidney injury consist of rapid (over hours to days) and usually reversible decrease in kidney function, commonly in the setting of surgery, severe infection, injury or drug-induced kidney toxicity. Serum creatinine levels and estimated GFR may not reliably assess renal function in the setting of acute kidney injury. For patients at risk for chronically reduced renal function (e.g., age > 60 years, diabetes mellitus or chronic hypertension), estimate the GFR through laboratory testing.

Among the factors that may increase the risk for NSF are repeated or higher than recommended doses of a GBCA and the degree of renal impairment at the time of exposure. Record the specific GBCA and the dose administered to a patient. For patients at highest risk for NSF, do not exceed the recommended ABLAVAR dose and allow a sufficient period of time for elimination of the drug prior to readministration. For patients receiving hemodialysis, physicians may consider the prompt initiation of hemodialysis following the administration of a GBCA in order to enhance the contrast agent's elimination. The usefulness of hemodialysis in the prevention of NSF is unknown [*see Clinical Pharmacology (12) and Dosage and Administration (2*].

6. Within the full prescribing information, revise the PATIENT COUNSELING INFORMATION as follows:

17 PATIENT COUNSELING INFORMATION

Instruct patients receiving Ablavar Injection to inform their physician or healthcare provider if they:

- are pregnant or breast feeding
- have a history of an allergic reaction to contrast media, a history of bronchial asthma or allergic respiratory disorder
- have a history of kidney and/or liver disease
- have recently received a gadolinium-based contrast agent
- have a history of heart rhythm disturbances, or cardiac disease
- are taking any prescription or over-the counter medications

~~Gadolinium-based contrast agents, including Ablavar, increase the risk for NSF in patients with severe renal insufficiency or acute renal insufficiency of any severity due to the hepato-renal syndrome or in the perioperative setting of liver transplantation. Patients with less severe renal insufficiency who receive repetitive administrations of a gadolinium-based contrast agent may have an increased risk for the development of NSF, especially if the time interval between the administrations precludes clearance of the~~

~~previously administered contrast agent from the body. If Ablavar is administered in these situations, instruct patients to contact their physician or healthcare provider if they develop signs or symptoms of NSF, such as burning, itching, swelling, scaling, hardening and tightening of the skin, red or dark patches on the skin, stiffness in joints with trouble moving, bending or straightening of the arms, hands, legs, or feet, pain deep in the hip bones or ribs, or muscle weakness [*see Warnings and Precautions (5.1)*].~~

GBCAs increase the risk for NSF among patients with impaired elimination of the drugs. To counsel patients at risk for NSF:

- Describe the clinical manifestations of NSF
- Describe procedures to screen for the detection of renal impairment

Instruct the patients to contact their physician if they develop signs or symptoms of NSF following Ablavar administration, such as burning, itching, swelling, scaling, hardening and tightening of the skin; red or dark patches on the skin; stiffness in joints with trouble moving, bending or straightening the arms, hands, legs or feet; pain in the hip bones or ribs; or muscle weakness.

Inform patients that they may experience:

- reactions at the injection site, such as: redness, mild and transient burning or pain or feeling of warmth or coldness
- side effects of itching or nausea

7. Additionally the Division accepted your change proposed within the CLINICAL PHARMACOLOGY section, revise 12.3 Pharmacokinetics as follows:

12.3 Pharmacokinetics

Excretion: Gadofosveset is eliminated primarily in the urine, with between 79% and 94% (mean of 83.7%) of an injected dose recovered in the urine. Of the total gadofosveset recovered in urine, 94% is recovered within the first 72 hours.~~Gadofosveset is eliminated primarily in the urine with approximately 83.5% of an injected dose excreted in the urine over 14 days. Ninety-four percent (94%) of urinary excretion occurs in the first 72 hours.~~ A small portion of gadofosveset dose is recovered in feces (approximately 4.7%).

We have completed our review of this supplemental application, as amended. It is approved, effective on the date of this letter, for use as recommended in the enclosed, agreed-upon labeling text.

PROMOTIONAL MATERIALS

You may request advisory comments on proposed introductory advertising and promotional labeling. To do so, submit the following, in triplicate, (1) a cover letter requesting advisory comments, (2) the proposed materials in draft or mock-up form with annotated references, and (3) the package insert(s) to:

Food and Drug Administration
Center for Drug Evaluation and Research
Division of Drug Marketing, Advertising, and Communications
5901-B Ammendale Road
Beltsville, MD 20705-1266

You must submit final promotional materials and package insert(s), accompanied by a Form FDA 2253, at the time of initial dissemination or publication [21 CFR 314.81(b)(3)(i)]. Form FDA 2253 is available at http://www.fda.gov/opacom/morechoices/fdaforms/cder.html; instructions are provided on page 2 of the form. For more information about submission of promotional materials to the Division of Drug Marketing, Advertising, and Communications (DDMAC), see http://www.fda.gov/AboutFDA/CentersOffices/CDER/ucm090142.htm.

All promotional materials that include representations about your drug product must be promptly revised to be consistent with the labeling changes approved in this supplement, including any new safety information [21 CFR 314.70(a)(4)]. The revisions in your promotional materials should include prominent disclosure of the important new safety information that appears in the revised package labeling. Within 7 days of receipt of this letter, submit your statement of intent to comply with 21 CFR 314.70(a)(4) to the address above or by fax to 301-847-8444.

Please submit one market package of the drug product when it is available.

LETTERS TO HEALTH CARE PROFESSIONALS

If you decide to issue a letter communicating important safety-related information about this drug product (i.e., a “Dear Health Care Professional” letter), we request that you submit, at least 24 hours prior to issuing the letter, an electronic copy of the letter to this NDA to the following address:

MedWatch Program
Office of Special Health Issues
Food and Drug Administration
10903 New Hampshire Ave
Building 32, Mail Stop 5353
Silver Spring, MD 20993

REPORTING REQUIREMENTS

We remind you that you must comply with reporting requirements for an approved NDA (21 CFR 314.80 and 314.81).

If you have any questions, call James Moore, Regulatory Project Manager, or Rene' Tyson, Safety Project Manager at (301) 796-2050.

Sincerely,

{See appended electronic signature page}

Rafel Rieves, M.D.
Director
Division of Medical Imaging Products
Office of Drug Evaluation IV
Center for Drug Evaluation and Research

ENCLOSURE(S):
Content of Labeling

This is a representation of an electronic record that was signed electronically and this page is the manifestation of the electronic signature.

/s/

RAFEL D RIEVES
12/20/2010