

Fall 2008

A Complimentary Publication

## Gadolinium-Based Contrast Agents and Nephrogenic Systemic Fibrosis

Each year millions of people undergo MRIs to help diagnose or rule out medical conditions. Agents are used to enhance the contrast of images and to facilitate visualization of abnormal structures and lesions. Twenty to thirty percent of MRIs are enhanced with a contrast agent and it is estimated that over 100 million people have received such an agent.

Gadolinium is a element [a heavy metal] found naturally in the earth's surface. In its free form [Gd ion] it is highly toxic, depositing in bone and liver, and causing liver necrosis [cell death].

The body is protected from Gd's free form by a chemical process called chelation. In chelation the Gd is insulated by an organic complex. There are 2 types of chelation used with Gd: cyclic [where Gd is surrounded on all sides] and linear [surrounded on 2 sides].

Gd contrast is eliminated from the body through the kidneys; therefore, if someone with any type of kidney disease receives these agents it will remain in the body longer and will have longer to breakdown into its more toxic form.

There are 5 FDA approved Gd contrast agents:

- ◆ GE Healthcare, maker of Omniscan
- ◆ Bayer Healthcare, maker of Magnevist
- ◆ Mallinckrodt, maker of OptiMARK
- ◆ Bracco Diagnostics, maker of MultiHance and ProHance

Only the ProHance and MultiHance are made by cyclic chelation. Studies suggest that the cyclic molecules are less likely to release free Gd than linear molecules.

described in the literature in 2006. NSF involves thickening and hardening of skin and muscles, primarily of the limbs and trunk and flexion contractures of joints. The eyes and internal organs can also be affected. It is diagnosed by a full thickness skin biopsy. There is no known consistent treatment although phonophoresis [use of ultrasound to apply topical medications], steroids, and a few other drugs may help. The prognosis varies but it can be fatal.

### FDA ACTIONS OF SIGNIFICANCE

- **June 2006** - Public Health Advisory issued after FDA learns of 25 cases of NSF in acidotic renal failure patients following use of Omniscan.
- **December 2006** - Updated public health advisory issued after FDA receives reports of 900 patients with moderate to end-stage disease who developed NSF following use of various Gd agents.
- **May 23, 2007** - FDA requests black box warnings be placed on labeling of Gd agents for use in patients with severe kidney disease.

One study estimated the incidence of NSF on renally [kidney] impaired patients exposed to Gd agents to be 4.3 cases per 1000 patients. There have not been any cases of NSF in patients taking the Gd agents with normal kidney function.

The theory that has been used to explain why these agents are so toxic is called **transmetallation**. There are many metals that exist in the body and are necessary for normal cell metabolism and body function [zinc, copper, magnesium, calcium]. In those with decreased kidney function, this leads to increased retention of the Gd agent in the blood which leads to an increased potential for exchange of Gd ion [when broken down] for these naturally occurring and needed metals.

The main claim of these product liability cases are that drug manufacturers knew or should have known of the potential for this to occur from the inception of

product development and should have urged caution in patients with impaired kidney function from the beginning. Other theories of liability that have been brought are: that these agents were defectively designed and the manufacturers failed to warn of the dangers..

Possible responses to the transmetallation theory are: it is speculative and based on a temporal relationship, it was not foreseeable that it would cause NSF, a condition that was not even in existence when Gd agents were first introduced, and scientific studies even today are inconclusive.

Source: FDA.org and 2008 AALNC Conference Session

**Nephrogenic Systemic Fibrosis** [NSF] was first

## ACUTE ABDOMINAL PAIN

I attended a conference session recently that discussed acute abdominal pain and when to obtain a surgical consult. I have reviewed many cases over the years that involve acute abdominal pain that resulted in bowel perforations or ischemia from a decreased blood supply. There was usually a delay in diagnosis that frequently resulted in death or increased morbidity for the patient. The sooner a diagnosis is rendered and treatment is begun, frequently with surgery, the better the outcome for the patient.



It was the opinion of the speaker, a general surgeon, that if a patient **has more than 3 of the following**, they should have a surgical consult, because there is a high likelihood that there is a surgical cause for their pain.

- ◆ history of abdominal surgery
- ◆ nausea
- ◆ vomiting
- ◆ abdominal distension
- ◆ tenderness
- ◆ rigidity [firm, like a board]
- ◆ rebound tenderness [pain on removal of pressure rather than application of pressure to abdomen]
- ◆ elevated WBCs [white blood cell count]

- ◆ elevated amylase or lipase
- ◆ elevated lactate
- ◆ elevated LFTs [liver function tests]
- ◆ abnormal plain x-ray of abdomen
- ◆ abnormal abdominal CT

Source: 2008 AALNC conference session.

## INSURANCE COMPANIES DENY PAYMENT FOR AVOIDABLE MEDICAL ERRORS

Several large insurance companies {WellPoint and Cigna so far} have stated they will deny payment for avoidable medical errors. Last year the Center for Medicare Services implemented similar policies which took effect October 1, 2008. Situations for which they will not pay include the following:

- ◆ An object is left inside a patient during surgery.
- ◆ Air embolism or sudden artery blockage from air bubbles introduced during surgery.
- ◆ Use of the wrong blood type during transfusions.
- ◆ Infections from urinary catheters.
- ◆ Pressure ulcers or bed sores.
- ◆ Vascular catheter-associated infection.
- ◆ Mediastinitis, an often-fatal inflammation of the lung tissue.
- ◆ Hospital-acquired injuries such as fractures, dislocations and burns.

Source: [www.businessinsurance.com](http://www.businessinsurance.com)

& Associates  
**Sharon Scott**  
Legal Nurse Consultants



8105 Rancho Sueno Ct NW  
Albuquerque, NM 87120  
505-898-5854 or (Toll Free) 888-732-7779  
[www.SHARONSCOTTRN.COM](http://www.SHARONSCOTTRN.COM)  
[SHARONSCOTTRN@COMCAST.NET](mailto:SHARONSCOTTRN@COMCAST.NET)