

Contrast enhanced MRI/A and Nephrogenic Systemic Fibrosis

OUTPATIENTS:

- We consider **OUTPATIENTS** at very low or no risk for NSF. In **OUTPATIENTS**, we use MultiHance® if the patient has a history of renal disease, per the screening sheet. The case does not need to be discussed with the ordering physician. We do not require eGFRs on **OUTPATIENTS** and they are not screened with the **INPATIENT** questionnaire.

SCREENING INPATIENTS:

- Case-based clinical screening guidelines minimize the risk of NSF while continuing to provide the option of contrast enhanced magnetic resonance (CE-MR) imaging to patients. Below are the UWHC Department of Radiology current guidelines, as recently reviewed at the yearly MR Safety Committee meeting on April 1, 2009.
- Currently we only consider **INPATIENTS** at high risk only if they fail the below screening questionnaire:

UWHC Clinical NSF High Risk Screening Questionnaire:

1. Does the patient meet the following criteria:
 - a. **Inpatient** with kidney or liver transplant with eGFR <60?
 - b. **Inpatient** with native kidneys and eGFR <30?
 - c. **Inpatient** with acute renal failure?
2. Does the patient have a recent (1 month) history of:
 - a. Major infection (pneumonia/sepsis/osteomyelitis)?
 - b. Vascular ischemia of the extremities (arterial thrombosis/gangrene/amputation)?
 - c. Venous or arterial thrombosis (PE/hepatic artery thrombosis)?
 - d. Major surgery or vascular procedure (Vascular/CABG/Amputation/Transplantation)?
 - e. Multi-organ system failure?

In some clinical settings, the benefits of a CE-MRI/A with MultiHance® may outweigh the theoretical risk of NSF with MultiHance® and the **attending radiologist and patient's attending physician** may choose to proceed with the CE-MR examination in high risk **INPATIENTS**. In these cases, the ordering **attending physician** should discuss the theoretical risk of NSF with the patient and inform the patient that there are no reported cases of NSF with MultiHance®, here or elsewhere. Cases of NSF have been associated with other gadolinium based contrasts, including Omniscan®, which is not currently used at UWHC in patients with renal disease.

- **IF the exam is deemed medically necessary by the physician, and radiologist and the patient is on hemodialysis**, the patient should be **dialyzed promptly post-MRI/A**. If the patient is not on hemodialysis, the patient should not have dialysis. The radiologist approving the MR exam should ask the referring service to notify the dialysis unit that the patient will need dialysis after the CE-MR exam and that MR staff will help coordinate the timing of the CE-MRI/A and dialysis.

BETWEEN 7am – 6pm Mon-Sat:

The MR tech and/or floor nurse should call the dialysis unit charge nurse at 3-8748 to coordinate the dialysis session with the MR exam. If the MR exam is not emergent, scheduling the exam for the AM is preferable.

BETWEEN: 6pm–7am Mon-Sat and 7am Sun–7am Mon:

The MR tech and/or floor nurse should call the paging operator and have the dialysis nurse on call (pager 0029) and the nephrology fellow on call paged. When they return your call please coordinate the MR exam with the dialysis nurse and convey the patient name to the nephrology fellow.

If there are any questions after speaking with the fellow or staff on MRI, please page Drs. Liz Sadowski (9036), Aji Djamali (5091), Scott Reeder (6713), Fred Kelcz (9693), Howard Rowley (2518) or Michael Tuite (4167).

DATA FROM UWHC:

- Data acquired from June 2005 to July 2006 at the UW found a 6.5% incidence of NSF in **hospitalized** patients meeting high risk criteria, who received **Omniscan®** for CE-MRI/A (Figure 1). All patients had concurrent pro-inflammatory conditions including infection, arterial/venous thrombosis and/or major surgery.
- Data acquired from November 2006 to October 2008 at the UW revealed a decreased incidence in NSF in the **hospitalized** patients receiving **MultiHance® in place of Omniscan®** for CE-MRI/A. There are no reported cases of NSF in this time period (Figure 2) and there have been no reported cases to date at the UW since switching to MultiHance®.

Figure 1:

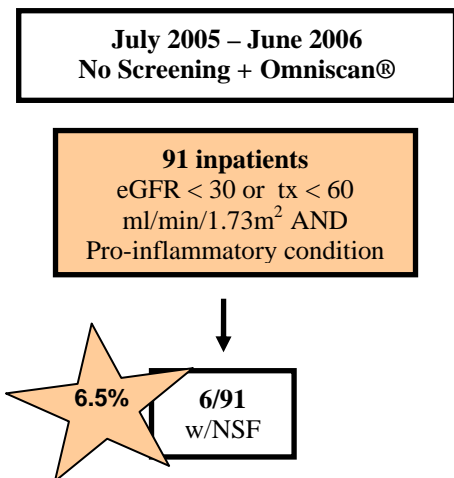
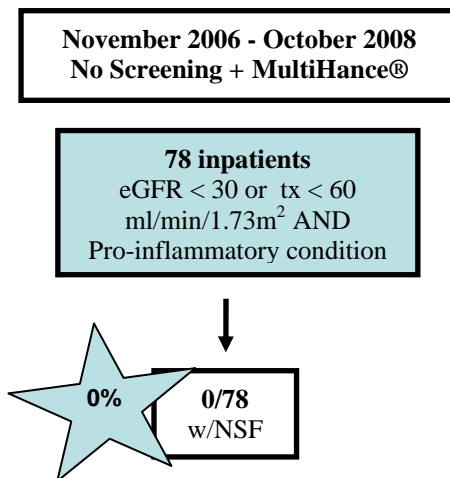


Figure2:



- NSF has exclusively occurred in patients who were hospitalized and very ill with co-existing pro-inflammatory conditions, in addition to renal disease and exposure to Omniscan®. To date there are **no document cases of NSF at our institution in outpatients or inpatients without pro-inflammatory conditions** receiving Omniscan® or MultiHance®.

DATA FROM FDA:

- The FDA placed a BLACK BOX warning on all gadolinium containing contrast agents in May of 2007. They did not distinguish among the different agents in regard to relative incidence of NSF. Documented NSF cases have been seen after administration of Omniscan®, Magnevist® and OptiMARK®. No cases of NSF have been seen solely attributed to the administration of MultiHance® or ProHance®, to date.

FDA warning: NSF has only been identified in patients with acute or chronic renal insufficiency (eGFR<30 ml/min/1.73m²) or in acute renal dysfunction due to hepato-renal syndrome or in the perioperative liver transplantation period. Avoid using a GBCA in patients with known risks for developing NSF unless the diagnostic information is essential and can not be obtained with non-contrast enhanced MRI or other diagnostic procedures.

- If only diminished renal function and gadolinium based contrast exposure are taken as risk factors (FDA warning), UWHC data acquired from November 2006 to November 2008 revealed no cases of NSF in 382 patient exams where MultiHance® was administered (Figure 3).

Figure 3:

