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Hot Topics

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This edition’s Hot Topics series looks to Sweden to find out what is going on in the field of research into the justification of contrast media in high-risk patients. Having studied with the inventor of non-ionic contrast media, Prof. Torsten Almén, who later collaborated with GE Healthcare, as well as Profs. Sundgren and Leander are carrying on this work by focusing on patient safety. Here they tell us why they were inspired to work in this field, and discuss the fall out from the highly publicised discovery of the potential toxicity of contrast media in certain groups of high risk patients.

Can you tell us a little bit about how you were first drawn to research in contrast media, and what the environment was like for you when you were in training?

Sundgren: Both Associate Prof. Leander and I were trained in the department at Malmö in Sweden, where there is a long tradition of contrast media research. Its former professor, Torsten Almén was our leading star. As the inventor of nonionic radiographic contrast media and a part of a profound research collaboration with the, at that time Norwegian company Nycomed, which later became part of GE Healthcare, he supervised many PhD students in this area. After writing my PhD thesis in dysphagia I started to work with Prof. Almén and performed animal and clinical studies on new contrast media and neurotoxicity. The past 10 years I have focused on neuroradiology, but maintained my interest in contrast media and published papers on the use of MR contrast media in paediatrics as well as lecturing at ISMRM on the topic of MR contrast media in pregnant woman. After nine years in the U.S. at the University of Michigan, I am back in Sweden as Professor of Diagnostic Radiology at the department of radiology at Lund University.

Leander: I also studied at the abovementioned department in Malmö, where my PhD subject explored liver-specific contrast media for both radiography and MRI. I have maintained my interest in contrast media work and am a member of a Swedish network for MRI contrast media that is also responsible for issuing national guidelines.
What prompted you to get involved in research in the field of imaging and the administration of contrast media?

**Sundgren:** Both of us were trainees in a particularly inspiring environment, at the Department in Malmö, which fostered our early interest.

What are the current known risks of gadolinium based contrast media, to high-risk patients such as children?

**Sundgren:** It is always difficult to carry out research on the administration of gadolinium-based contrast media in children. However I have previously looked into some retrospective studies on the use of gadolinium based contrast media in children and written a few papers describing the overuse of contrast media and suggested guidelines for those cases when contrast media would be beneficial in the diagnosis of certain conditions and situations when no need for contrast enhancement exists.

**Leander:** However, there were no specific studies performed in our department concerning children.

What was your opinion on the handling of the diagnosis of nephrogenic systemic fibrosis (NSF) as a result of contrast media administration in high-risk patients, several years ago, and are safety guidelines in this area now sufficient?

**Leander:** It was a shock for the radiological world. MRI contrast media was considered as a safe diagnostic tool and had, at the time the first NSF cases arose, been in use for almost 20 years, in millions of patients. Its safety had been rigorously examined. For example, in the early era of gadolinium-based contrast media usage there were concerns about chelate-stability. For example, there were studies performed on the product Omniscan® by its inventors, Salutar. These studies of its stability were initiated, as there was a concern about the trans-metallation of zinc and the symptoms associated with this. This was shown not to be problematic and these studies were not referred to for almost two decades. As we were aware of the situation with NSF in Sweden and the Skåne Region, we immediately issued guidelines that advocated practitioners not to administer gadolinium contrast media in patients with severely impaired renal function. At that time, in the Skåne Region one of the cyclic chelates was a first choice gadolinium contrast medium. In addition, a search was initiated for cases of NSF in Sweden and none have been found so far. A particular search that was carried out in the hospital in Malmö resulted in a publication.

What sort of safety guidelines are implemented for high risk patients in Sweden for administration of gadolinium contrast media, and are they in concurrence with the European ones at large?

**Leander:** The Swedish Society of Radiology publishes guidelines on both radiographic and MRI contrast media. It is our impression that departments in Sweden are well aware of these guidelines for the safe administration of contrast media and methods to avoid adverse events. These national guidelines are in concurrence with the European ones at large. There are also Swedish radiologists participating in the development of European guidelines under the auspices of the European Society of Uroradiology (ESUR / www.esur.org).
What role does the Swedish Society of Radiology play in the education of its members on these important safety issues?

Sundgren: The annual meeting of the Swedish Society of Radiology (dubbed “Roentgen-week”) arranges regular symposia on the topic of contrast media. Its homepage also publicises these guidelines and updates members and non-members alike on developments in the safety and administration of contrast media.

Is the government in Sweden actively liaising with leaders in medical imaging to discuss patient safety issues? Is this a topic that is discussed at a national level?

Sundgren: I cannot say that contrast media are, in particular, often on the national agenda.

Leander: I agree. However, when the European Medicines Agency (EMA) published new directives concerning gadolinium contrast media and NSF, the Swedish Medical Product Agency (MPA) provided that information to the professional community, so activities in this area are taking place at an international level.

What advice would you give to other radiologists in guiding the safe administration of contrast media?

Sundgren: We would urge our colleagues to read the European guidelines published by ESUR and to follow them.

What other imaging exams could potentially be prescribed instead of contrast media involved exams, that might adequately illuminate a diagnosis without adding a high risk for the patient's health? Is contrast media too often or unnecessarily used?

Sundgren: It is important to understand that under normal conditions in a healthy patient, contrast media do not add a higher risk for the patient. The problem arises when you have a patient with reduced kidney function. Routine guidelines are followed in those cases. Alternatively, MR without contrast administration can be used and is satisfactory in some cases. For lesions in the brain, ultrasound is not an option as it might be in certain circumstances in, for example, the abdomen.

Leander: This is hard to answer. Many times MRI without contrast medium is satisfactory. Other choices may be ultrasound in some parts of the body.

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