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Gadolinium is detectable within the tissue of patients with nephrogenic systemic fibrosis

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Background

Nephrogenic systemic fibrosis (NSF) is a disease of unknown etiology that affects a subset of patients with renal insufficiency. Recent publications suggested an association between exposure to gadolinium-containing contrast agents and subsequent development of NSF. We sought to detect gadolinium within the skin and soft tissue of patients with NSF who were exposed to gadolinium-based contrast.

Methods

Paraffin-embedded skin and soft tissue from NSF patients exposed to gadolinium, and from negative controls, was provided by the NSF Registry (New Haven, Conn). The tissue was searched for metals using a field emission scanning electron microscope that was equipped with energy dispersive spectroscopy. The presence of gadolinium and other metals was verified through identification of unique and requisite X-ray emission spectra.

Results

Gadolinium was detected in 4 of 13 tissue specimens from 7 patients with documented NSF who were exposed to gadolinium-based radiographic contrast. No gadolinium was detected in a paraffin-embedded specimen from a negative control. Based upon the known exposure history of patients with detectable gadolinium, a tissue residence time of 4 to 11 months was observed.

Limitations

As this was a pilot investigation, only a single control specimen and a single histological section from each block of tissue were utilized.

Conclusion

In this pilot investigation, gadolinium was detected in the tissue of a number of patients with NSF. Although neither dispositive of a pathophysiologic mechanism, nor proof of causation, the detection of gadolinium within tissue of NSF patients is supportive of an epidemiologic association between exposure to gadolinium-containing contrast material and development of disease.

Abbreviations used: ACE, angiotensin-converting enzyme, EDS, energy dispersive spectroscopy, MRI, magnetic resonance imaging, NSF, nephrogenic systemic fibrosis

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