The assessment of gadolinium in post mortem tissue and special considerations in pediatrics

Donna Roberts, MD
Associate Professor
Department of Radiology and Radiological Science
Medical University of South Carolina
Charleston, SC

Clay Davis, PhD
National Institute of Standards and Technology
Charleston, SC
Conflicts of Interest

Guerbet: scientific advisory board, consultant, research support.
1. Knowledge Gap: Comprehensive Tissue Databank
(all agents, timing, dose, tissue types, human and animal)
National Institute of Standards and Technology

- Cryogenic Storage (-150 °C) for sample stability/security
- Standardized protocols for collection, processing and archival of samples; including chain of custody and tissue access policies
- 24/7 computerized monitoring of freezers/room conditions
- Specimen tracking and freezer inventory database
- ISO Certified Clean Rooms

NIST Biorepository

Archival • Sample • Research

Analytical Core Capabilities

• High resolution ICP-MS
• Laser ablation ICP-MS
• LC-ICP-MS
• High resolution MS

Total Gd Determination
– Yes / No

Elemental Speciation
– fate and form of Gd (small molecule)

Metalomics – fate and form of Gd (macromolecule)

Protein Function

Elemental Imaging - distribution of Gd bioaccumulation in tissues
A patient with dx GBM underwent 61 MRI scans over 11 years from age 19 until 30 with multiple contrast agents: gadobenate dimeglumine, gadopentetate dimeglumine (Magnevist), gadodiamide (Omniscan), and gadoteridol.
2. Knowledge Gap: Vulnerability of Pediatric Patients

- Vulnerability of the Pediatric Brain
  - The developing pediatric brain is known to be sensitive to metals and other man-made chemicals in very small amounts (lead toxic threshold of 10 μg/dL)\(^1\)

- Active skeletal formation
  - Fusion of secondary ossification centers of the human femur 11-18 years females; 14-19 years males\(^2\)
  - 23 X higher levels in bone than brain\(^3\)

- Neonatal Renal Function Immaturity
  - Normal term newborn mean GFR = 39 mL/min/1.73 m\(^2\) (range 11-15)\(^4\)

- Gadolinium MRI at any time during pregnancy is associated with an increased risk of rheumatological, inflammatory, or infiltrative skin conditions and for stillbirth or neonatal death.\(^5\)

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