

## CURRICULUM VITAE

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### Part I: General Information

Name: **Mitchell S. Albert**  
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Place of Birth: New York, NY  
Citizenship: United States  
Canadian Permanent Resident

### Education:

1985 B.S. State University of New York, Purchase, NY (Experimental Psychology)  
1993 Ph.D. State University of New York, Stony Brook, NY (Physical Chemistry)

### Postdoctoral Training:

1993-1994 Research Fellow in Radiology, University Hospital at Stony Brook, NY

### Academic Faculty Appointments:

1994-1995 Instructor of Research in Radiology, University Hospital at Stony Brook, NY  
1995-1997 Instructor in Radiology, Harvard Medical School, Boston, MA  
1998-2004 Assistant Professor of Radiology, Harvard Medical School, Boston, MA  
Associate Professor of Radiology, Harvard Medical School, Boston, MA  
2006-2011 Professor of Radiology, University of Massachusetts Medical School, Worcester, MA  
2011- Research Chair in Molecular Imaging and Advanced Diagnostics, Lakehead University, Thunder Bay, ON  
2011- Professor of Chemistry, Lakehead University, Thunder Bay, ON  
2011- Research Chair, Thunder Bay Regional Health Research Institute, Thunder Bay, ON  
2011- Scientist, Thunder Bay Regional Health Research Institute, Thunder Bay, ON  
2012- Adjunct Professor of Physics, Lakehead University, Thunder Bay, ON  
2012- Adjunct Professor of Biotechnology, Lakehead University, Thunder Bay, ON

- 2012- Adjunct Professor of Health Sciences, Lakehead University, Thunder Bay, ON
- 2014- Adjunct Professor of Biology, Lakehead University, Thunder Bay, ON
- 2016 - Adjunct Professor of Medical Sciences, Northern Ontario School of Medicine, Thunder Bay, ON

Hospital or Affiliated Institution Appointments:

- 1994-1995 Research Associate in Radiology, University Hospital at Stony Brook, NY
- 1995-2006 Research Associate in Radiology, Brigham and Women's Hospital, Boston, MA  
Assistant Professor of Radiology, Harvard Medical School, Boston, MA  
Director, Hyperpolarized Noble Gas MRI Laboratory, Brigham and Women's Hospital, MA
- 1999- Member, Center for Photonics, Boston University, Boston, MA
- 2004-2006 Associate Professor of Radiology, Harvard Medical School, Boston, MA
- 2006-2011 Professor of Radiology, University of Massachusetts Medical School, Worcester, MA
- 2006-2011 Director of MRI Research, University of Massachusetts Medical School, Worcester, MA
- 2006-2011 Director of Advanced MRI Center, University of Massachusetts Medical School, Worcester, MA
- 2006-2011 Director, Hyperpolarized Gas MRI Laboratory, University of Massachusetts Medical School, Worcester, MA
- 2011- Research Chair, Thunder Bay Regional Health Research Institute, Thunder Bay, ON
- 2011- Scientist, Thunder Bay Regional Health Research Institute, Thunder Bay, ON
- 2011- Director, MRI Research Program, Thunder Bay Regional Health Research Institute, Thunder Bay, ON
- 2012- Adjunct Professor of Physics, Lakehead University, Thunder Bay, ON
- 2012- Adjunct Professor of Biotechnology, Lakehead University, Thunder Bay, ON
- 2012- Adjunct Professor of Health Sciences, Lakehead University, Thunder Bay, ON
- 2014- Adjunct Professor of Biology, Lakehead University, Thunder Bay, ON
- 2016 - Adjunct Professor of Medical Sciences, Northern Ontario School of Medicine, Thunder Bay, ON

Other Professional Positions:

- 1985-1987 Research Assistant, Bourne Laboratory, Cornell Medical Center, NY
- 1995 Visiting Scientist, Lawrence Berkeley Laboratory, Berkeley, CA
- 1996-1997 Visiting Scientist, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA

- 1996-1997 Harvard University Tutor, Cabot House, Harvard University, Cambridge, MA
- 1998- Scientific Advisor, Ministry of International Trade and Industry, Japan

Memberships in Professional Societies:

- 1987-1994 Student Member, Society of Magnetic Resonance in Medicine
- 1989-2000 Member Sigma XI, The Scientific Research Society
- Member, International Society of Magnetic Resonance in Medicine
- 2001-2004 Member, Publications Committee, International Society of Magnetic Resonance in Medicine
- Member, Electronic Publications Committee, International Society of Magnetic Resonance in Medicine
- 2011- Committee Member, TBRHRI MRI Research Committee, Thunder Bay Regional Research Institute
- 2011- International Workshop of Pulmonary Functional Imaging (IWPMI)
- 2012- 2012 Committee Member, TBRHSC MRI Purchase Committee, Thunder Bay Regional Health Sciences Centre
- 2013- 2013 Chair, TBRHRI Steering Committee Director of Research Operations, Thunder Bay, Regional Research Institute
- 2013- Board member, International Workshop of Pulmonary Functional Imaging (IWPMI)
- 2013- Committee Member, Lakehead University Senate Undergraduate Studies Committee, Lakehead University
- 2013- Committee Member, Lakehead University Animal Care Committee, Lakehead University
- 2013- Committee Member, International Workshop of Pulmonary Functional Imaging Committee, International Workshop of Pulmonary Functional Imaging
- 2017- Director of Lakehead University Animal Satellite Facility Located at TBRHRI
- 2020- Member, International Society of Magnetic Resonance in Medicine (ISMRM)

Leadership in Professional Societies:

- 1998 Session Chair, ISMRM, “Hyperpolarized Noble Gas and Other Nuclei” Scientific Session
- 2001 Founder and Chair, "Hyperpolarized Noble Gas MRI Study Group" International Society of Magnetic Resonance in Medicine
- Session Chair, ISMRM, “MR Imaging of Pulmonary Ventilation”, Scientific Session
- Session Chair, ISMRM, “Hyperpolarized Gas Imaging”, Scientific Session
- 2009- Associate Editor and Editorial Board Member, North American Journal of Medicine and Science

	Co-chair, Imaging Core Resources Committee, UMass Medical School
2010-2011	MRI Advisory Committee, UMass Medical School
2011-2012	MRI Purchase Committee, TBRHRI
2012-	MRI Research Committee, Chair, TBRHRI
2013-	International Workshop of Pulmonary Functional Imaging (IWPMFI) Committee, Board member
2014-	Co-Chair of the Summer School of Medical Imaging at Lakehead University, Thunder Bay, ON
	Magnetic Resonance in Medicine Journal Reviewer
	Journal of Magnetic Resonance Imaging Reviewer
	Medical Research Council Grant Reviewer (UK)
	ISMRM Abstract Reviewer
2018	NSERC Grant Reviewer, Medical Physics
2019	NIH Grant Reviewer, IPCA Study Group
2022	Associate Editor, Frontiers in Oncology or the American Journal of Medicine and Science

#### Scientific Review Panels:

	The Burroughs Wellcome Trust Review Panel
1997-	National Science Foundation, Biomedical Engineering and Research to Aid Persons with Disabilities Program Panel
1995-	Magnetic Resonance in Medicine Journal Reviewer
	International Society of Magnetic Resonance Scientific Meeting Reviewer
	Journal of Magnetic Resonance Reviewer
	National Science Foundation, Biomedical Engineering, Faculty Early Career Development Program Review Panel
	Journal of Magnetic Resonance Imaging Reviewer
	Israel Science Foundation Reviewer
1998	Concepts in Magnetic Resonance Reviewer
	Proceedings of the National Academy of Science Reviewer
	National Science Foundation, Atomic and Molecular Physics, Reviewer
2001	Medical Physics Journal Reviewer
2007	Journal of Magnetic Resonance Imaging Reviewer
	National Institutes of Health, Proposal Review Panel
	Philip Morris External Research Review Panel
	NMR in Biomedicine Reviewer
	NIH S10 Grant Review Panel
	NIH S10 Grant Review Panel
2009	NIH S10 Grant Review Panel
	NIH Ancillary Clinical Studies Grant Review Panel
2010	NIH Ancillary Clinical Studies Grant Review Panel

2011 Magnetic Resonance in Medicine Reviewer  
 Natural Sciences and Engineering Research Council of Canada Review Panel  
 Chest (Journal) Reviewer

2012 Magnetic Resonance in Medicine Journal Reviewer

2013 Magnetic Resonance in Medicine Journal Reviewer  
 Chest Journal Reviewer  
 Natural Sciences and Engineering Research Council of Canada Review Panel  
 National Institutes of Health P41 Grant Review Panel and Center of Excellence Site Evaluation

2014 Magnetic Resonance in Medicine Journal Reviewer  
 NMR in Biomedicine Journal Reviewer  
 Medical Research Council (MRC), in partnership with the Department of Health, Wellcome Trust, Cancer Research UK, British Heart Foundation, Arthritis Research UK and UK Research Councils, Grant Reviewer

2015 Magnetic Resonance in Medicine Journal Reviewer  
 UK Research Council, Grant Reviewer  
 International Society of Magnetic Resonance in Medicine abstract reviewer

2016- National Institute of Health Grant Reviewer  
 Magnetic Resonance in Medicine Journal Reviewer  
 Journal of Magnetic Resonance Imaging Reviewer  
 Natural Sciences and Engineering Research Council of Canada Grant Reviewer  
 Medical Research Council Grant Reviewer (United Kingdom)

2019 National Institutes of Health Imaging Probes and Contract Agents (NIH IPCA) Study Section Review Panel Member

Awards and Honors:

1985 Honors Graduated in Experimental Psychology, State University of New York, Purchase, NY

1997 US Delegate for NSF, Korea-US Joint Biomedical Engineering Seminar, Seoul, Korea

1998- Scientific Advisor, Ministry of International Trade and Industry, Japan

1998-2002 Partners in Excellence Award, Innovation and Leadership, Partners Health Care System, Boston, MA

**1999 United States Presidential Early Career Award for Scientists and Engineers (PECASE)**

2000 Thomas Alva Edison Patent Award in Emerging Technologies, Princeton University, Princeton, NJ

2001-2007 National Science Foundation CAREER Award

2001-2003 Thomson Leadership Award nomination, Brigham and Women's Hospital

2006-2009 GAANN Fellowship, State University of New York, Stony Brook, NY

2017 Lakehead University Merit Award for Extensive Contribution to Research

2020	Lakehead University Faculty Innovation Award
2020	ISMIRM Summa Cum Laude Merit Award (Award to Yurii Shepelytskyi-PhD Student)
	Silver Medal from Hyperpolarized Media Study Group (Award to Yurii Shepelytskyi-PhD Student)
	Invitation to NeuroHighlights session (Award to Yurii Shepelytskyi-PhD Student)
	Ontario Graduate Fellowship Award (Award to Yurii Shepelytskyi-PhD Student)
2021	Lakehead University Merit Award
	Lakehead University Distinguished Researcher Award
2023	NSERC Conference Travel Fund (2023 ISMRM & ISMRT Annual Meeting & Exhibition)

### **Patents:**

1. Albert MS, Balamore D, Cates GD, Driehuys B, Happer W, Saam B, Wishnia A. Magnetic resonance imaging using hyperpolarized noble gases. United States Patent 5,545,396. 1996 Aug 13. (Awarded)
2. Albert MS, Balamore D, Cates GD, Driehuys B, Happer W, Saam B, Wishnia A. Magnetic resonance imaging using hyperpolarized noble gases. United States Patent 5,785,953. 1998 Jul 28. (Awarded)
3. Albert MS, Balamore D, Cates GD, Driehuys B, Happer W, Saam B, Wishnia A. Magnetic resonance imaging using hyperpolarized noble gases. United States Patent 5,789,213. 1998 Aug 4. (Awarded)
4. Albert MS, Venkatesh A, Balamore D, Low-Field MRI. United States Patent 6,845,262. 2005 January 18. (Awarded)
5. Albert MS, Balamore D, Cates GD, Driehuys B, Happer W, Saam B, Wishnia A. Magnetic resonance imaging using hyperpolarized noble gases. United States Patent 6,123,919. 2000 Sep 26. (Awarded)
6. Albert MS, Ward C, Venkatesh AK, Method and apparatus for delivering a measured amount of gas. United States Patent 6,467,479 B1. 2002 Oct 22.
7. Albert MS, Spiegelman J, Venkatesh AK, Method and apparatus for delivering and recovering gases. United States Patent 6,471,747 B1. 2002 Oct 29. (Awarded)
8. Albert MS, Balamore D, Cates GD, Driehuys B, Happer W, Saam B, Wishnia A. Magnetic resonance imaging using hyperpolarized noble gases. United States Patent 6,593,144. 2003 Jul 15. (Awarded)

9. Albert MS, Balamore D, Cates GD, Driehuys B, Happer W, Saam B, Wishnia A. Apparatus for magnetic resonance imaging using hyperpolarized noble gases. European Patent, 1,873,544 A3. 2008 Apr 6. (Awarded)
10. Albert MS, Balamore D, Cates GD, Driehuys B, Happer W, Saam B, Wishnia A. Magnetic resonance imaging using hyperpolarized noble gases. European Patent, 0,754,009 B1. 2009 Nov 25. (Awarded)
11. Zheng S, Albert MS, Relaxation-Corrected ECG-Triggering and Navigator-Gating Technique. United States Patent 0,051,979. 2014 Feb 20.
12. Albert MS, Hane FT. *In vivo* Detection of a Xenon-Binding Cage Molecule. US, Canada, Europe. US2017/0348439 A1. 20162017 Dec 7. (Awarded)
13. Patent Submitted: Albert MS. Use of HP Xenon-129 MRI to Measure Xenon Signal Changes in the Brain Tissue Over a Period to Quantitatively Evaluate the Condition of CBF in an Individual. US, Canada, Europe. US 16/388218 (Pending)
14. Albert MS, Hane FT, Shepelytskyi Y, Li T. A method to detect brain functional activities using hyperpolarized 129Xe MR. US 16/747221 (Pending)
15. Albert MS, Shepelytskyi Y, Hane FT, Li T. Use of Octafluorocyclobutane for Lung Imaging. US 62/897,517 (Pending)
16. Albert MS, Hane FT., Shepelytskyi Y., Li T., Grynko V. A method to detect brain functional activities using hyperpolarized 129Xe Time-of-Flight (TOF) Magnetic Resonance Imaging. US 63/062640 (*pending*)
17. Shepelytskyi Y., Albert MS., Hane FT., Li T., Grynko O., Reznik A., Zavislyak IV. X-ray and photodetection using photoinduced magnetoelectric effect. US 63/225,102. (*withdrawn*).
18. Albert MS, Hane FT, Shepelytskyi Y, Li T, Grynko V. A method to detect perfusion and brain functional activities using hyperpolarized 129. Canada. 2020/08/07. (*pending*)
19. Albert MS. A method to detect altered cerebral blood flow in patients with Alzheimer's disease using hyperpolarized 129Xe MR. Canada. 2018/04/19. (Pending)
20. Albert, MS, Shepelytskyi Y., Hane FT., Li T., Grynko O., Reznik A., Zavislyak IV. Barium Hexaferrite X-ray Detector. (Pending)

**Most Significant Scientific Contributions:**

**I. Co-Invention of Hyperpolarized Noble Gas MRI.** With colleagues from Stony Brook University and Princeton University, Dr. Albert created an entirely new field of MR imaging by integrating hyperpolarization of noble gases by spin-exchange optical pumping with in vivo MR imaging. He reported this invention in *Nature* in 1994, a seminal paper that has been cited over 835 times in the literature. HP gas MRI is a non-invasive technique that provides high-resolution images, and provides data on physiological function. This groundbreaking integrative advance has led to the development of many important applications, including those listed below, and it has already been successfully translated for clinical research use for specific conditions.

**II. Development of Pulmonary Functional Imaging Using HP Gas MRI.** Dr. Albert developed, and continues to refine, the technique of pulmonary functional imaging using HP gas MRI, which caused a paradigm shift in imaging the lungs (e.g., Venkatesh et al. 2003; Tzeng et al. 2007, 2008, 2009; Campana et al. 2009; Lee et al. 2009; Mullaly et al. 2009; Sun et al. 2009). HP gas MRI provided, for the first time, a technique that could image the functional ventilation of the periphery of human lungs, something other imaging modalities cannot do. Furthermore, it does so without radiation, which is particularly important for pediatric imaging, and imaging patients repeatedly over time. Recent improvements Dr. Albert developed include advanced techniques to quantify ventilation distribution and heterogeneity throughout the static  $^3\text{He}$  MR image, and a technique to provide information about the percent ventilation in specific regions of the lungs.

**III. Development of Pulmonary Airway Imaging using Dynamic HP Gas MRI.** Standard HP gas MRI of the lungs images the periphery of the lungs. Dr. Albert also developed dynamic airway HP  $^3\text{He}$  MRI, which is able to image the *airways* of the lungs (Booker et al. 2003, Lewis et al. 2005). He achieved this discovery by using fast-gradient-echo pulse sequences when a subject was inhaling gas. He was able to image human lung airways down to the seventh generation.

**IV. Development of Ischemic Stroke Imaging Using HP Noble Gas MRI.** Dr. Albert developed HP xenon MRI for imaging stroke, which has the potential to produce a rapid and accurate picture of stroke damage by non-invasively tracing where blood flows in the brain. His group has demonstrated that in vivo HP  $^{129}\text{Xe}$  MRI is able to detect, with great anatomical specificity, an area of decreased cerebral blood flow induced by experimentally induced stroke in rats. His results demonstrated the feasibility of detecting stroke using HP  $^{129}\text{Xe}$  MRI (Zhou et al. 2011). HP  $^{129}\text{Xe}$  MRI may be valuable for stroke imaging by providing a complimentary technique that is simpler, more direct, and faster than proton MRI techniques. Faster imaging could help improve clinical outcomes for people suffering an ischemic stroke, where rapid treatment is vital.

**V. Development of Functional Imaging of Cerebral Activity Using HP Noble Gas MRI.** In preliminary research on using HP xenon MRI for imaging cerebral activity, Dr. Albert imaged a pain response in the cerebral cortex of rats, evoked by injection of capsaicin into the forepaw, which produces a pain stimulus. He demonstrated the first-ever use of HP  $^{129}\text{Xe}$  MRI for functional brain imaging of cerebral activity, detecting a significant increase in activity in a part of the brain associated with forepaw stimulation (Mazzanti et al. 2011). Importantly, he was able to detect this increase *with a single set of images* (BOLD proton fMRI requires many subjects and many signal averages), and he observed a much higher percent increase in signal over baseline than is possible with BOLD fMRI. This could be an important breakthrough, because HP  $^{129}\text{Xe}$  MRI provides very high signal in a single-shot experiment.

**VI. Development of  $^{19}\text{F}$  Inert Fluorinated Gas Lung MRI.** Dr. Albert is developing the use of inert fluorinated gases such as perfluropropane (PFP) and sulfur hexafluoride ( $\text{SF}_6$ ) for pulmonary functional imaging (Couch et al. 2014). This technology provides similar SNR and



resolution to hyperpolarized gas MRI but does not require the use of an expensive polarizer and expensive enriched isotopes. This technology has the potential to revolutionize the field of lung imaging.

**VII. Development of Hyperpolarized  $^{129}\text{Xe}$  Biosensor Molecular MR Imaging.** Dr. Albert is developing the use of hyperpolarized  $^{129}\text{Xe}$ , in combination with chemical exchange saturation transfer (CEST), to perform HyperCEST MR imaging. HyperCEST can enhance the  $^{129}\text{Xe}$  MR signal up to a billion times compared to thermally polarized  $^{129}\text{Xe}$ . This technology can potentially provide the resolution provided by PET imaging with the superior spatial resolution of MRI. We recently obtained the first ever *in vivo* images of supramolecular cucurbituril cages in the blood vasculature system of a rodent model (manuscript submitted to *Nature Scientific Reports*). This technology has the potential to revolutionize the field of molecular imaging of disease in the body.

**VIII. Development of Hyperpolarized  $^{129}\text{Xe}$  Functional MRI.** For the first time ever, human volunteers have been imaged with Hyperpolarized  $^{129}\text{Xe}$  functional MRI (fMRI). Preliminary results have shown that the HP  $^{129}\text{Xe}$  fMRI has significant signal enhancement above the conventional proton bold MRI. In addition, for the first time ever, a participant with Alzheimer's disease has been imaged with HP  $^{129}\text{Xe}$  fMRI and HP  $^{129}\text{Xe}$  MRI. Slower perfusion has been observed in Alzheimer's participants relative to healthy volunteers; this could have important implications in the diagnosis and treatment of Alzheimer's and other neurological diseases.

#### **Leadership and Administration:**

- Establishment and Director of the Center of Small Animal MRI Research at the Harvard Medical School, a multi-user MRI facility available to the entire Harvard Medical School and interfacing medical community.
  - Raising substantial funding to upgrade the Center's MRI equipment and infrastructure through an NIH-supported Shared Instrumentation Grant, matching funds from Harvard Medical School, and through a partnership with the Neurobiology Department at Harvard.
  - Recruitment and training of users at this MRI facility.
- Secured a 0.2 T Profile MRI system, donated by General Electric Medical Systems.
- Established a Research Agreement with General Electric Medical Systems for pulse sequence development.
- Established a Research Agreement for funding, and an Equipment Loan Agreement, with Amersham Health Inc. for a polarizer for xenon for conducting hyperpolarized gas MRI in small animals.
- Founder and Director of Hyperpolarized Noble Gas MRI Laboratory. This includes assembling and interdisciplinary group of scientists in engineering, physics, chemistry and medicine.
- Founder and Chair of Hyperpolarized Noble Gas MRI Study Group at the International Society of Magnetic Resonance in Medicine (ISMRM). This study

group brings together leading scientists from countries all over the world to meet annually to discuss and plan future developments in the sub-field of hyperpolarized gas MRI research.

- Received funding from Philips Medical Systems for Multi-Nuclear Spectroscopy system and other MRI hardware and software upgrades.
- Supervised Advanced MRI Center construction upgrade.
- MRI safety evaluation for Advanced MRI Center with Emanuel Kanal.
- MRI shielding evaluation for Advanced MRI Center with Dennis Presky, MRA, Inc.
- Recruited and trained MR Physicist for Advanced MRI Center.
- Initiated clinical MRI trial with Bracco Diagnostics.
- Co-Chair, Imaging Core Resources Committee, University of Massachusetts Medical School.
- Established industry collaboration and funding from Sepracor Pharmaceuticals and directed clinical trial on testing efficacy of Brovana for COPD using hyperpolarized helium MRI.
- Established industry collaboration and funding from Vertex Pharmaceuticals and directing clinical trial on the repeatability of using hyperpolarized helium MRI for imaging cystic fibrosis.
- Director and establishment of the Advanced MRI Center for research at UMass Medical School.
  - Supervision of siting, power-up, and acceptance testing of the Philips 3T Achieva MRI system for research.
  - Established multi-nuclear imaging and interface on Philips 3T MRI.
  - Developed fMRI program and installed fMRI stimulus hardware and interface.
  - Developed cardiac imaging program.
  - Developed exam cards and MRI protocols for a multitude of imaging applications on the Philips 3T MRI.
- Attracted international scholars from around the world and established international medical fellow and student training program with, and hosted scholars from:
  - Qinghai Medical School and Affiliated Hospital, China
  - Beijing University of Traditional Chinese Medicine, China

- Seoul University, Korea
- Tsukuba University, Japan
- China Academy of Sciences, Wuhan, China
- Director and establishment of the Research MRI Program at the Thunder Bay Regional Research Institute.
  - Supervision of artifact removal renovation of the Philips 3T Achieva MRI system for research.
  - Established multi-nuclear imaging and interface on Philips 3T MRI.
  - Developed fMRI program and installed fMRI stimulus hardware and interface.
  - Developed exam cards and MRI protocols for a multitude of imaging applications on the Philips 3T MRI.
- Member of Senate Undergraduate Studies at Lakehead University
- Member of Animal Care Committee at Lakehead University
- Chair of MRI Research Committee at TBRHRI
- Member of MRI Purchase Committee at Thunder Bay Regional Health Science Center
- Member of Research Operations Selection Committee, TBRHRI

Major Research Interests:

1. Invention and development of Hyperpolarized Noble Gas Magnetic Resonance Imaging
  2. Development of materials science applications using hyperpolarized xenon and helium
  3. Morphology and functional lung and brain imaging
  4. Magnetic resonance imaging methods
  5. Molecular imaging using hyperpolarized xenon-129 biosensors for detection of disease
- MRI assessment of a murine model of recessive polycystic kidney disease
  - Exploratory MR assessment of multiple sclerosis in the mouse brain
  - Cardiac MRI
  - Brain fMRI
  - Interventional MRI
  - Imaging pulmonary disorders using hyperpolarized gas MRI
  - Molecular imaging using hyperpolarized xenon biosensors for cancer detection and other diseases

- Imaging pulmonary disorders using inert fluorinated gas MRI

## Part II: Research, Teaching, and Clinical Contributions

### A. Research Narrative:

Dr. Albert is the co-inventor of hyperpolarized gas MRI and the pioneering scientist who obtained the first ever hyperpolarized noble gas images, of xenon in mouse lungs. He published these groundbreaking results in *Nature* in 1994; this paper has received 497 citations. Dr. Albert received a U.S. Presidential Award and 9 patents for his work in this area.

Dr. Albert established the Hyperpolarized Noble Gas MRI laboratory, and assembled a multidisciplinary research team at the Brigham and Women's Hospital in 1995 that included engineers, physicians, computer scientists, graduate students, post-doctoral fellows, medical students, and undergraduate students. They have achieved numerous milestones and have become one of the world leaders in this field.

- measured the T1 of  $^{129}\text{Xe}$  in blood using hyperpolarized xenon, revealing a value of 4.2 s in venous blood, which increases to 13.5 s in oxygenated blood
- investigated the dynamics of xenon exchange and accumulation in the pulmonary tissues, in live rats
- obtained the first human hyperpolarized noble gas images
- performed extensive investigations to optimize pulse sequences for imaging with hyperpolarized noble gases
- developed a dynamically adaptive MRI method with zoom-in capability and acquired real-time images of the dynamics of gas flow in the lungs of rats
- performed lung imaging experiments using hyperpolarized  $^3\text{He}$  in human subjects patients,
- developed and implemented a method to measure blood flow in the rat brain using hyperpolarized xenon
- conducted hyperpolarized xenon chemical shift imaging in the rat brain, and
- obtained the first in vivo hyperpolarized helium and xenon images of the lung in rats and humans at the very low magnetic field strength of 15 millitesla
- implemented solid-state diode lasers for converting the polarization apparatus from a laboratory technique into reliable clinical equipment
- obtained the first human airway images by implementing dynamic lung projection imaging
- directly observed bronchoconstriction and airway closure in asthmatics for the first time using this airway imaging technique after a methacholine challenge
- in collaboration with Kenneth Lutchen at Boston University, we used hyperpolarized  $^3\text{He}$  MRI to image the airways and ventilation in a clinical trial of asthmatic patients
- obtained hyperpolarized  $^3\text{He}$  ventilation and airway images of a patient with emphysema that had undergone a lung transplant
- in collaboration with Dr. David Sugarbaker at BWH, we used hyperpolarized  $^3\text{He}$  MRI to explore the disease and treatment progression in mesothelioma patients
- in collaboration with Dr. Edward Lee at Children's Hospital Boston, we used hyperpolarized  $^3\text{He}$  MRI to study asthmatic children

- in collaboration with Dr. Aaron Allen at the Dana Farber Cancer Institute, we used hyperpolarized  $^3\text{He}$  MRI for radiation oncology treatment planning in patients with lung cancer
- used hyperpolarized  $^{129}\text{Xe}$  to perform brain functional imaging of hypercapnia in a rat model
- demonstrated the first use of HP  $^{129}\text{Xe}$  MRI for functional brain imaging of a stimulus evoked pain response in the cerebral cortex of the rat

Upon coming to the University of Massachusetts Medical School in 2006, Dr. Albert again assembled an expert multidisciplinary research group to focus on clinical applications of hyperpolarized noble gas MRI. We are presently:

- imaging stroke using hyperpolarized  $^{129}\text{Xe}$  MRI in a rat model in collaboration with Dr. Marc Fisher at UMMS
- in collaboration with Alex Pines at UC Berkeley and Brenton Debouf at the University of Rhode Island, we are developing hyperpolarized xenon biosensors as a molecular imaging agent to detect atherosclerosis, dopamine brain receptors, and cancer
- in collaboration with Mark Madison and Steve Krinzman in the Pulmonary Medicine Division, we are imaging patients with COPD before and after treatment with bronchodilators
- in collaboration with Dr. Brian O'Sullivan in Pediatric Medicine, we are imaging patients with cystic fibrosis before and after treatment with antibiotics and hypertonic saline
- in collaboration with Kenneth Lutchen at Boston University and Mark Madison at UMMS, we are imaging asthmatics before and after acute hospitalization
- in collaboration with Sepracor, Inc., we are exploring the use of hyperpolarized helium to stage the progress of drug treatments for patients with COPD
- in collaboration with Vertex Pharmaceuticals, we are exploring the repeatability of using hyperpolarized helium MRI for imaging cystic fibrosis
- in collaboration with Vertex Pharmaceuticals, we are exploring the use of hyperpolarized xenon MRI for functional imaging of regional brain activation in response to pain

Upon joining the Thunder Bay Regional Research Institute and Lakehead University:

- in collaboration with Dr. Birubi Biman (Respirologist), performed clinical research trials on hyperpolarized gas MRI pulmonary imaging of asthma, COPD, asbestosis, bronchiectasis, and pulmonary infection at the Thunder Bay Regional Research Institute
- in collaboration with Dr. Birubi Biman (Respirologist), developed inert fluorinated gas MRI research trials at the Thunder Bay Regional Research Institute,
- developed and performed inert fluorinated gas MRI on animal models of lung inflammation.
- conducted clinical studies with both hyperpolarized Helium gas and inert fluorinated gases, obtained clinical data for comparison of the two lung imaging techniques.
- developed protocols of brain imaging using HP xenon MRI for rats, and conducted extensive animal experiments to develop this technique.

- initiated HP xenon human brain imaging clinical trials, in order to develop a novel technique that is superior in diagnosing early onset of Alzheimer’s disease. To our knowledge, we have
  - obtained the world’s first HP xenon brain image from AD patients;
  - potentially discovered a difference in time for xenon to wash out from the brain in healthy subject and AD patient. This difference, possibly due to degraded perfusion in AD patient’ brain, has the potential to be devolved into a powerful tool for early brain abnormality diagnosis and stage evaluation.
  - preliminary results have been analyzed and have been published at the 2017 ISMRM international conference.
  - obtained the world’s first xenon fMRI images from healthy subjects by direct measuring of the HP Xe wash-in dynamics. Three stimuli were tested using this technique: two rotating colorful visual stimuli, and the fist-clenching motor stimulus.
- conducted successful *in vivo* HyperCEST experiment in rats, and to our knowledge, obtained world’s first *in vivo* images of the CB6 biosensors.
- conducted successful detection of colorectal tumor resistivity to 5-fluorouracil using <sup>19</sup>F CSI imaging in a rat model.

B. Funding Information:

**Past:**

1993-1994	Research Grant, National Science Foundation (SGER), Co-P.I., "Magnetic Resonance Imaging with Hyperpolarized 129Xe"
1994-1995	Research Grant, Center for Biotechnology, SUNY Stony Brook, (Innovative Technology Grant), P.I., "Magnetic Resonance Imaging Using Hyperpolarized 129Xe"
1996-1997	Research Grant, NASA/Smithsonian Astrophysics Lab, P.I., "Hyperpolarized Noble Gas MRI and Spectroscopy of Porous Media"
1998-2000	Research Grant, National Science Foundation, P.I., "Magnetic Resonance Imaging and Spectroscopy of Laser-Polarized Noble Gases for Biomedical Geophysics and Materials Science Investigations"
1998-2000	Research Grant, National Institutes of Health (R21), P.I., "Hyperpolarized 129Xe MRI of Brain Function and Pathology".
1998-2000	Research Grant, NSF, “Development of a hyperpolarized 129Xe generation system for enhanced biological MRI”.
1998-2000	Biomedical Engineering Research Grant (Whitaker Foundation), P.I., "Magnetic Resonance Imaging Using Hyperpolarized 129Xe"
1-2004	Research Grant, NSF, “RF Equipment for Hyperpolarized 129Xe and 3He MRI at Low Field”.
1998-2002	Research Grant, NASA, (97-HEDS) P.I., “Hyperpolarized 129Xe MRI of the lungs, brain, and plants”. Research Grant, NIH R01, P.I., “Enhanced Physiological MRI Using Hyperpolarized 129Xe”.

- 2000-2004 Research Grant, NSF, P.I., "Large volume production of hyperpolarized noble gas for biological magnetic research".
- 2000-2004 Research Grant, NIH STTR, "Lung RF coils for hyperpolarized gas lung MRI".
- 2000-2001 Shared Instrumentation Grant, NIH, Co-P.I., "Upgrade of a 4.7T small animal MRI".
- 2001-2004 Research Grant, NIH, R21, P.I., "Very low-field hyperpolarized gas magnetic resonance imaging".
- 2001-2004 Research Grant, Whitaker Foundation, Co-PI, "Assessment of novel delivery methods for the treatment of malignant gliomas by magnetic resonance imaging".
- 2001-2007 NSF, CAREER Award, P.I., "Very low-field hyperpolarized gas magnetic resonance imaging".
- 1998-2008 Amersham Health, P.I., "Hyperpolarized xenon MRI of the brain".
- 2008-2009 Research Grant, Bracco Diagnostics, P.I. "A Phase III, Multi-Center, Open-Label Study to Evaluate Safety and Efficacy Of Multihance at the Dose Of 0.10 Mmol/Kg in Magnetic Resonance Imaging of the Central Nervous System in Pediatric Patients".
- 2008-2009 Research Grant, NIH-NIDA, R03, Co-investigator. "Imaging of nicotine sensitization in humans: a translational application of fMRI".
- 2009-2011 Co-Investigator  
Hyperpolarized 129-Xenon-based MRI Probes for Brain Injury  
Project Description: The goal is to synthesize probe molecules that can be used in conjunction with MRI to image the distribution of peripheral benzodiazepine receptors (PBR) in the brains of living animals  
University of Rhode Island
- 2010-2011 Co-Investigator  
RF Interface System and Coil for Multi-Nuclear Lung MR Imaging at 3T  
Project Description: Recruit subjects ranging from smallest to largest sized lungs to assess extent of coverage of RF coils. Coils to be tested in a clinical setting for electrical  
National Institute of Health
- 2010-2011 Principal Investigator  
Assessing the longer-term stability and quantification of lung ventilation phenotype in cystic fibrosis patients by hyperpolarized helium-3 magnetic resonance imaging  
Project Description: The major goals of this study are to longitudinally assess changes in the pattern of lung ventilation in cystic fibrosis patients over 28 days by means of hyperpolarized helium-3 magnetic resonance imaging, and to evaluate multiple means of quantifying these images  
Vertex Pharmaceuticals Incorporated
- 2013 – 2015 Principal Applicant Comparison of the Effects of a Small Particle Corticosteroid, Alvesco®, to a Larger Particle Corticosteroid on the Small Airway Physiology of Asthmatic Subjects by Hyperpolarized Helium-3 MRI

2013 – 2015	Sunovion Pharmaceuticals, Inc. Clinical Trial Total Funding - 314,944 (United States dollar) Portion of Funding Received - 314,944
2012 – 2013	Principal Investigator Hyperpolarized Gas MRI for Collaborative Studies on Asthma Funding Sources:
2012 - 2013	Canada Foundation for Innovation/ Ontario Research Fund – MEDI Leaders Opportunity Fund Total Funding - 310,318 (Canadian dollar) Portion of Funding Received - 310,318
2012 – 2013	Principal Investigator Xemed xenon polarizer Funding Sources:
2012 - 2013	Ontario Research Fund Research Excellence Funding Total Funding - 1,000,000 (Canadian dollar)

  

NAG9-1469 (Albert)	09/18/07-09/17/09	1.2 calendar months
NASA	\$463,302 Direct Costs/ \$719,424 Total Costs	
Hyperpolarized Noble Gas Magnetic Resonance Imaging		
The major goal of this project is to propose ground-based biomedical studies using a new diagnostic technology: magnetic resonance imaging (MRI) and spectroscopy of hyperpolarized noble gases.		

  

R33 EB001689 (Albert)	05/15/03-04/30/10	3.60 calendar months
NIH	\$1,527,140 Direct Costs/ \$2,232,214 Total Costs	
Development of Airway Imaging Using HP 3HeMRI		
The major goal of this project is to establish HP 3HE MRI as a clinically safe imaging modality that enables us to visualize airway dimensions.		

  

NAG9-1041 (Albert)	09/18/07-09/17/09	1.80 calendar months
NASA	\$501,359 Direct Costs/ \$660,213 Total Costs	
Hyperpolarized 129XE MRI of the Brain, Heart, Lung (Augmented with Presidential Award)		
The major goal of this project is to use this novel imaging and spectroscopy methodology for studying basic morphology and function of the brain, heart and lungs, with the eventual goal of testing the feasibility of using HypX-MRI for diagnostic purposes.		

  

Pilot Research Prog. (Albert)	10/1/07 – 09/31/09	
UMASS-WPI	\$200,000 Direct costs	
Establishing New Avenues for Excellence in Stroke Imaging, Diagnostics, and Staging.		
The major goal of this project is to use hyperpolarized xenon MRI to develop imaging for diagnosis and staging of stroke in animal models.		

  

ASRC954/CT80024 Albert (PI)	05/27/08-12/31/09	1.20 calendar months
Sepracor	\$385,822 Direct Costs/ \$488,636 Total Costs	
Assessment of (R3,R)-Formoterol and (S,S)-formoterol (Brovana) for COPD using hyperpolarized 3He MRI.		



To provide a highly sensitive, yet safe, method for establishing the clinical efficacy of the pulmonary pharmaceuticals using HP Gas MRI as the standard.

R01HL076778-04 (Lutchen) 12/01/04 – 01/31/10 1.20 calendar months  
BU/NIH \$1,758,936 Direct Costs, \$2,206,587 Total Costs  
Subcontract (Sun) \$1,023,050 Total Costs

Airway Reactivity and Heterogeneity in Asthma

We propose to establish HP <sup>3</sup>He MRI as a clinically safe imaging modality that enables us to visualize ventilation function and airway constriction.

Role: Co-investigator

CCTS Pilot Project Program (Albert) 05/1/08 – 06/30/10  
UMASS \$150,000 Direct costs  
A New Technique for the Understanding and Diagnosis of Chronic Obstructive Pulmonary Disease (COPD):

Hyperpolarized <sup>3</sup>He MR Imaging

The major goal of this project is to perform translational research for the understanding, diagnosis and staging of COPD using hyperpolarized helium MRI

R43 NS065773-01A1 (Celver) 09/01/09- 08/31/11 0.6 calendar months  
URI/NIH \$313,201 Direct Costs/ \$393,501 Total Costs  
Subcontract (Albert) \$60,852 Direct Costs/ \$100,000 Total Costs

Hyperpolarized <sup>129</sup>Xenon-based MRI Probes for Brain Injury

The goal is to synthesize probe molecules that can be used in conjunction with MRI to image the distribution of peripheral benzodiazepine receptors (PBR) in the brains of living animals.

Role: Subcontract PI

VERTEX (Albert) 10/1/09-09/30/10 1.20 Calendar months  
Vertex Pharmaceuticals \$66,667 Direct Costs/ \$90,000 Total Costs  
Hyperpolarized Xenon functional magnetic resonance imaging in evaluating the perception of pain and analgesia in rats.

Investigator will construct apparatus and conduct Xe fMRI of rats to establish patterns of pain, analgesia and naïve administration of analgesic to determine if fMRI can be used as a quantitative measure for pain and analgesia, as judged by dose responsiveness of HP-Xe fMRI patterns.

R21 EB007767 (Gounis) 08/01/2007-07/31/10 0.24 calendar months  
NIH \$746,475 Direct Costs/ \$1,213,023 Total Costs

Mechanical Clot Obliteration for the Treatment of Stroke

The major goal of this project is to develop and characterize a medical device intended to treat acute ischemic stroke outside of the 3-hour window for pharmacological treatment. Experiments in this work aim to develop an ultrasonic thrombectomy wire that produces cavitation streaming leading to obliteration of the fibrin matrix that binds occlusive clots.

Role: Co-investigator

VERTEX (Albert) 06/27/2010-06/26/2011 1.20 Calendar months

Vertex Pharmaceuticals \$109,000 Direct Costs/ \$137,340 Total Costs  
Assessing the longer-term stability and quantification of lung ventilation phenotype in cystic fibrosis patients by hyperpolarized helium-3 magnetic resonance imaging  
The major goals of this study are to longitudinally assess changes in the pattern of lung ventilation in cystic fibrosis patients over 28 days by means of hyperpolarized helium-3 magnetic resonance imaging, and to evaluate multiple means of quantifying these images.

NIH (SBIR-Hashoian) 08/01/10-07/31/11 1.20 calendar months  
Clinical MR Solutions \$62,341 Direct Costs/ \$160,000 Total costs  
RF Interface System and Coil for Multi-Nuclear Lung MR Imaging at 3T  
We will recruit subjects ranging from the smallest to the largest size lungs to assess the extent of coverage of the RF coils, to ensure proper coverage for hyperinflated lungs. The coils will be tested in the clinical setting for electrical performance, SNR, and image quality. We will evaluate the quality of the hyperpolarized noble gas lung images resulting from the coils and score them by lung region for overall image quality, based upon visual appearance of resolution, clarity, and homogeneity.  
Role: Subcontract PI

Title of Grant: Hyperpolarized Xenon MRI Biosensors Development Program

Source: NSERC: Discovery

Dollars Awarded: \$205,000 total

Name of P.I.: Mitchell Albert

Project Objective: we seek to develop, validate, and optimize HP  $^{129}\text{Xe}$  biosensor MRI to achieve the equivalent sensitivity of PET imaging, but with the improved spatial and temporal resolution of MRI, and without the ionizing radiation of PET.

We will pursue our objectives with the four following projects:

Project 1: We will synthesize and study a series of novel cryptophane-cage molecules.

Project 2: We will optimize xenon-cage cryptophane molecules for HyperCEST MR imaging using in vitro studies.

Project 3: We will synthesize cryptophane-affinity peptide conjugates to act as xenon imaging biosensors of HER2 status, and we will optimize these conjugates using in vitro studies.

Project 4: We will test HP xenon biosensor MRI in vivo using breast cancer cell lines.

Dates of Approved Project: 2012-2017 (5 years)

HQP Overlap: 0%

Budgetary Overlap: 0%

Grant Manager: Andrew Hacquoil

Title of Grant: Hyperpolarized Gas MRI for Collaborative Studies on Asthma

Source: Canada Foundation for Innovation/ Ontario Research Fund – Ministry of Economic Development and Innovation

Dollars Awarded: \$ 310,318 total

Name of P.I.: Mitchell Albert

Project Objective: The objectives of this research program are to use the combined technologies of hyperpolarized (HP)  $^3\text{He}$  MRI, made possible by the requested equipment, and Selected Ion Flow Tube Mass Spectrometry (SIFT-MS), to achieve the following: perform direct functional

ventilation imaging of the lungs to assess the efficacy of hydrogen sulfide (H<sub>2</sub>S) therapy for asthma and (2) identify breath H<sub>2</sub>S level as a novel biomarker for early diagnosis and monitoring of asthma. No other research group in the world is presently capable of pursuing these objectives.

Dates of Approved Project: 03/2012-02/2013 (1 year)

HQP Overlap: 0%

Budgetary Overlap: 0%

Grant Manager: Andrew Hacquoil

Title of Grant: Comparison of the Effects of a Small Particle Corticosteroid, Alvesco®, to a Larger Particle Corticosteroid on the Small Airway Physiology of Asthmatic Subjects by Hyperpolarized Helium-3 MRI

Source: Sunovion Pharmaceuticals, Inc.

Dollars Awarded: \$ 314,944 total

Name of P.I.: Mitchell Albert

Project Objective: Because HP <sup>3</sup>He MRI can measure even small changes in regional ventilation, we hypothesize that this technique will be more sensitive than spirometry in objectively detecting the beneficial effects of ciclesonide on small airway physiology of asthmatic subjects.

Furthermore, we predict that the superiority of Alvesco to another larger particle inhaled corticosteroid will be evident using this technique.

Dates of Approved Project: 05/2013-04/2014 (1 year)

HQP Overlap: 0%

Budgetary Overlap: 0%

Grant Manager: Andrew Hacquoil

Title of Grant: NSERC CREATE in Medical Imaging Detector Technologies

Source: NSERC Collaborative Research and Training Experience (CREATE) (Co-Investigator)

Dollars Awarded: \$1,647,075 total, \$200,000 total (Albert funded portion)

Name of PI: Alla Reznik

Project Objective: To develop a training program for graduate students in medical imaging technologies, and a summer school of medical imaging (SSMI) for undergraduates.

Dates of Approved Project: 2012-2018 (6 years)

HQP Overlap: 0%

Budgetary Overlap: 0%

Grant Manager: Andrew Hacquoil

Title of Grant: Using 19F MRI for 5FU of Tumours

Source: Northern Ontario Academic Medicine Association (NOAMA) (Co-investigator)

Dollars Awarded: \$50,000

Name of PI: Eric Davenport

Project Objective: To use 19F MRI for detection of tumor implants in a murine model of colorectal cancer and for monitoring of treatment using 5-FU.

Dates of Approved Project: 2014-2015

HQP Overlap: 0%

Budgetary Overlap: 0%

Title of Grant: Sputum Analysis in Asthma

Source: Northern Ontario Academic Medicine Association (NOAMA) (Co-investigator)

Dollars Awarded: \$70,000

Name of PI: Birubi Biman

Project Objective: To develop and conduct sputum analysis for biomarkers of inflammation in patients with asthma and to correlate these findings with the results of hyperpolarized gas MRI lung ventilation studies.

Dates of Approved Project: 2014-2015

HQP Overlap: 0%

Budgetary Overlap: 0%

Title of Grant: Xemed xenon polarizer

Source: Ontario Research Fund for Research Excellence Funding

Dollars Awarded: \$1,000,000 total

Name of P.I.: Mitchell Albert

Project Objective: To revolutionize diagnostic imaging and position Ontario as the global leader in hyperpolarized noble gas MRI thereby advancing our province's research and innovation agenda.

Dates of Approved Project: 03/2012-02/2013 (1 year)

HQP Overlap: 0%

Budgetary Overlap: 0%

Grant Manager: Murray Plitcha

Title of Grant: Development of hyperpolarized  $^{129}\text{Xe}$  gas magnetic resonance imaging based Alzheimer's disease early detection molecular probe

Source: BrightFocus Foundation (Postdoctoral Fellowship Award)

Dollars Awarded: \$100,000

Name of P.I.: Francis Hane

Name of Mentor: Mitchell Albert

Project Objective: To develop HP  $^{129}\text{Xe}$  biosensor MRI for detecting and quantifying amyloid oligomers to clarify mechanisms of AD progression and facilitate development and repositioning of effective drugs for treating AD.

Dates of Approved Project: 06/2015-05/2017 (2 years)

HQP Overlap: 0%

Budgetary Overlap: 0%

Grant Manager: Andrew Hacquoil

**Title of Grant:** Novel technology for early detection of Alzheimer's disease - clinical prototypes

**Source:** Weston Brain Institute - Transformational Research

**Dollars Awarded:** \$ 286,510 (awarded)

**Name of P.I.:** Mitchell Albert

**Project Objective:** To develop HP  $^{129}\text{Xe}$  functional MR brain imaging for humans to provide enhanced sensitivity (relative to traditional proton-based MR brain imaging methods) for assessment of neural function in patients with Alzheimer's Disease to evaluate the efficacy of drug treatments.

**Dates of Project:** 05/2017 – 08/2017

**HQP Overlap:** 0%

**Budgetary Overlap:** 0%

Grant Manager: Andrew Hacquoil

**Title of Grant:** Testing of Hyperpolarized (HP) Gas MRI-based Xenon Cage Amyloid Ligand (XCAL) Biosensor on Alzheimer's Disease Model

**Source:** NOAMA AHSC AFP Innovation Fund 2015

**Dollars Awarded:** \$48,970

**Name of P.I.:** Ayman Hassan

**Project Objective:** To image amyloid oligomers in animal model of AD using HP <sup>129</sup>Xe MRI-based biosensors

**Dates of Approved Project:** June 1, 2016 - June 1, 2018

**HQP Overlap:**0%

**Budgetary Overlap:**0%

**Grant Manager:** Terry Fode

**Title of Grant:** Comparison of Xenon-129 MRI and Inert Fluorinated Gas MRI in COPD

**Source:** NOAMA AHSC AFP Innovation Fund 2015

**Dollars Awarded:** \$49,265

**Name of P.I.:** Birubi Biman

**Project Objective:** To directly compare hyperpolarized gas and inert fluorinated gas MRI in participants with COPD

**Dates of Approved Project:** April 1, 2016- April 1, 2018 (Extend to Sept 30, 2020)

**HQP Overlap:**0%

**Budgetary Overlap:**0%

**Grant Manager:** Terry Fode

**Title of Grant:** Hyperpolarized Noble Gas MRI Detection of Radiation Induced Lung Injury

**Source:** NOAMA Clinical Innovation Fund

**Dollars Awarded:** \$49,573

**Name of P.I.:** Dr. Kevin Ramchandrar

**Project Objective:** Develop an imaging technology called HP <sup>129</sup>Xe MRI for delineating regions of the lung in humans that are non-functional versus those that are viable to better inform beam-planning strategies, in an attempt to reduce Radiation Induced Lung Injury in lung cancer patients

**Dates of Approved Project:** May 1, 2016 – November 1, 2017 (Extend to June 30, 2020)

**HQP Overlap:** 0%

**Budgetary Overlap:** 0%

**Grant Manager:** Terry Fode

**Title of Grant:** CIHR post-doctoral fellowship

**Source:** Canadian Institutes for Health Research (CIHR)

**Dollars Awarded:** \$135,000

**Name of P.I.:** Francis Hane

**Project Objective:** Development of hyper-polarized <sup>129</sup>Xe gas magnetic resonance imaging based Alzheimer's disease early detection biosensor

**Dates of Approved Project:** July 2017 – July 2020

**HQP Overlap:** 0%

**Budgetary Overlap:** 0%  
**Grant Manager:** Lakehead University

**Title of Grant:** Advanced Materials and Technologies for Medical Imaging Detectors and Techniques

**Source:** Mathematics of Information Technology and Complex Systems (MITACS)

**Program:** MITACS Accelerate

**Dollars Awarded:** \$373,333, \$10,000 (Albert funded portion)

**Name of P.I.:** Dr. Alla Reznik

**Dates of Approved Project:** 2018 – 2020

**Title of Grant:** Hyperpolarized Xenon-129 Functional Magnetic Resonance Imaging of Healthy Volunteers and Participants with Alzheimer's Disease

**Source:** NOAMA

**Dollars Awarded:** \$49,812/ 2 years

**Name of P.I.:** Dr. Ayman Hassan

**Dates of Approved Project:** March 1, 2018 – March 1, 2020 (Extended to July 30, 2021)

**Grant Manager:** TBRHRI

## **CURRENT**

**Title of Grant:** NSERC Discovery Grant - Hyperpolarized Xenon MRI Biosensors Development Program

**Source:** NSERC

**Dollars Awarded:** \$225,000

**Name of P.I.:** Dr. Mitchell Albert

**Project Objective:** The aims of our objectives are to perform the basic research and engineering required to develop a series of novel functionalized supramolecular-cage molecules that are specifically functionalized for binding to disease tissue and test them first in vitro, and then in vivo in live animals.

**Dates of Approved Project:** April 2017 to April 2022

**HQP Overlap:** 0%

**Budgetary Overlap:** 0%

**Grant Manager:** Lakehead University

**Title of Grant:** Ontario Network of Excellence for Translation of Hyperpolarized MRI Technologies

**Source:** Ontario Research Fund – Research Excellence

**Dollars Awarded:** \$2,415,470.00

**Name of PI:** Dr. Mitchell Albert (Co-PI) with Dr. Charles Cunningham

**Dates of Approved Project:** April 1, 2017 – March 31, 2023

**Grant Manager:** Lakehead University

**Title of Grant:** Hyperpolarized and Inert Gas MRI Study to Evaluate the Structure and Function of Lungs in Individuals Post-COVID-19 Infection

**Source:** Lakehead University SRC CIHR COVID19 Strategic Research Development Fund

**Dollars Awarded:** \$ 10,000 (awarded)

**Name of P.I.:** Mitchell Albert

**Project Objective:** Investigating the effects of COVID-19 in patients with chronic lung disease including asthma and COPD will help to establish more effective strategies of treatment.

**Dates of Project:** 07/2020 – 03/2021 (Extended to June 30<sup>th</sup>, 2021)

**HQP Overlap:** 0%

**Budgetary Overlap:** 0%

**Grant Manager:** Lakehead University

**Title of Grant:** Lung Structure-Function in Survivors of Mild and Severe COVID-19 Infection: Xe MRI and CT for Rapid Evaluations and Next-wave Healthcare Planning

**Source:** Ontario Ministry of Health

**Dollars Awarded:** \$ 730,000

**Name of P.I.:** Dr. Mitchell Albert (Co-PI) with Grace Parraga

**Project Objective:** novel MRI and CT images of COVID-19 survivors across five centres of excellence in Ontario to quantitatively evaluate post-infection lung abnormalities. This research will shed light on the long-term effects of COVID-19 to assist with planning for the health services needs of COVID-19 survivors.

**Dates of Project:** 04/2020 – 04/2022

**HQP Overlap:** 0%

**Budgetary Overlap:** 0%

**Grant Manager:** Lakehead University

**Title of Grant:** Hyperpolarized 129Xe Cerebral Perfusion MRI imaging Development, Fellowship  
**Source:** Mathematics of Information Technology and Complex Systems (MITACS) Elevate Fellowship.

**Total Funding - 120,000 Portion of Funding Received - 120,000 Funding Competitive?:** Yes

**Name of P.I.:** Dr. Mitchell Albert

**Dates of Project:** July 2021 to July 2023

**Title of Grant:** The Canadian Respiratory Research Network Long COVID-19 Study

**Source:** CIHR Operating Grant: Emerging COVID-19 Research Gaps and Priorities Funding Opportunity

**Dollars Awarded:** \$ 500,000

**Name of P.I.:** Dr. Mitchell Albert (Co-PI) with Dr. Andrea Gershon

**Dates of Project:** 1 year (start date TBD)

**Title of Grant:** Enhanced Sensitivity HP-gas MRI/PET Dual Modality Imaging for Alzheimer's Disease Detection

**Source:** NSERC Alliance

**Dollars Awarded:** \$230,000

**Name of P.I.:** Dr. Alla Reznik

**Date of Approved Project:** January 2022 to January 2025

**Grant Manager:** Lakehead University

**Title of Grant:** Functional and Molecular Imaging using Hyperpolarized Xenon- 129 Magnetic Resonance Imaging

**Source:** Mitacs Accelerate

**Dollars Awarded:** \$720,000.00

**Name of P.I:** Dr. Mitchell Albert

**Date of Approved Project:** October 24, 2022 to December 23, 2025

**Grant Manager:** Lakehead University

**Title of Grant:** Vascular Cognitive Impairment Detection Using Hyperpolarized Xenon-129 Brain MRI Imaging

**Source:** NOAMA- CIOF

**Dollars Awarded:** \$49,036.00

**Name of P.I:** Dr. Ayman Hassan

**Date of Approved Project:** March 30, 2023 to March 30, 2025

**Grant Manager:** Lakehead University

**Title of Grant:** Investigation of the novel photoinduced magnetoelectric effect in magnetic material, Grant

**Source:** NSERC RTI

**Dollars Awarded:** \$152,703.00

**Name of P.I:** Dr. Mitchell Albert

**Date of Approved Project:** April 2023 to March 30, 2024

**Grant Manager:** Lakehead University

#### **D. Report of Teaching:**

##### 1. Local Contributions:

###### Hospital Courses:

	Lecturer in Magnetic Resonance Imaging Using Hyperpolarized Xenon, Technologists Training Program, Continuing Education Seminar for Radiographers, Brigham and Women's Hospital, Boston, MA
2000	Lecturer in MR Physics Review, Residents Review for Board Exams, University of Massachusetts Medical School
2009	Lecturer in MR Physics Course, Residents Review for Board Exams, University of Massachusetts Medical School
2010	Lecturer in MR Physics Course, Residents Review for Board Exams, University of Massachusetts Medical School

###### Local Universities/Colleges:

1987-1988	Teaching Assistant, Department of Chemistry, State University of New York, Stony Brook, NY
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- 1992 Teaching Assistant, Department of Chemistry, State University of New York, Stony Brook, NY
- 1993
- Physics/Engineering/Technology, Nassau Community College, NY
- 1994 Lecturer in Electricity and Magnetism to Undergraduate Students in Physics, State University of New York, Purchase, NY
- 1994 Lecturer in Magnetic Resonance Imaging to Undergraduate Students in Chemistry, State University of New York, Purchase, NY
- 1996 Tutor in Chemistry, Physics and Pre-Medicine, Harvard and Radcliffe Cabot House, Harvard University, Cambridge, MA
- 2011-2012 Professor of MRI Physics and Medical Applications, Chemistry Department, Lakehead University, Thunder Bay, ON.
- 2012 Professor of Introduction to Medical Imaging, Chemistry Department, Lakehead University, Thunder Bay, ON.
- 2013-present Professor of CHEM 4516/5516 MRI Physics and Medical Applications, Chemistry Department, Lakehead University, Thunder Bay, ON.
- 2013-present Professor of CHEM 4515/5515 Introduction to Medical Imaging, Chemistry Department, Lakehead University, Thunder Bay, ON.
- 2020-present Professor of CHEM4111 Research Seminars, Chemistry Department, Lakehead University, Thunder Bay, ON.
- 2020-present Professor of CHEM4901 Honours Thesis, Chemistry Department, Lakehead University, Thunder Bay, ON.

Invited Teaching Presentations:

Hospital:

- 1995 Lecturer, Department of Radiology, Brigham and Women's Hospital MR Physics Research Seminar Series, "Hyperpolarized Xenon Magnetic Resonance Imaging"
- 1999 Lecturer, Center for Engineering in Medicine, Harvard Medical School, Boston, MA
- 2001 Department of Radiology, First Monday Seminars, "The Hype in Hyperpolarized Gas MRI: Dynamic Imaging of the lungs and Brain"; Harvard Medical School, Boston, MA, Neuroscience Retreat, "Hyperpolarized Xenon MRI of the Brain"  
Brigham and Women's Hospital, Department of Radiology, "Hyperpolarized Gas MRI of the Lungs and Brain"
- 2006 University of Massachusetts Medical School, Department of Radiology, "Hyperpolarized Noble Gas MRI of the Lungs and Brain"
- 2007 University of Massachusetts Medical School, Department of Radiology, "Hyperpolarized Gas MRI for Pulmonary and Neuro Imaging"  
Brigham and Women's Hospital, Department of Radiology, "Hyperpolarized Gas MRI of the Lungs"

- University of Massachusetts Medical School, Department of Radiology,  
"Pulmonary and Neuro-Imaging Using Hyperpolarized Gas MRI"
- 2011 Thunder Bay Regional Research Institute, "Hyperpolarized Gas MRI of the lungs and Brain"
- 2012 Thunder Bay Regional Research Institute, "Hyperpolarized Gas MRI of the lungs and Brain"
- 2013 Lakehead University, "Hyperpolarized Gas MRI of the lungs and Brain"  
Thunder Bay Regional Research Institute, "Hyperpolarized and Inert Gas MRI of the lungs and Brain"
- Lakehead University, "Hyperpolarized and Inert Gas MRI of the lungs and Brain"
- 2014 Thunder Bay Regional Research Institute, "Hyperpolarized and Inert Gas MRI of the lungs and Brain"
- Lakehead University, "Hyperpolarized and Inert Gas MRI of the lungs and Brain"
- 2015 Lakehead University, "Hyperpolarized and Inert Gas MRI of the lungs and Brain"
- 2017 Thunder Bay Regional Health Research Institute Monthly Seminar Series, "Hyperpolarized Noble Gas Applications and In Vivo Xenon-129 Biosensor Detection"
- Lecturer at Jagiellonian University, Krakow, "Hyperpolarized and Inert Gas MRI and Xenon Molecular MRI"
- Lecturer at Masaryk University in Brno, CZ with the Central European Institute of Technology (CEITEC), "Hyperpolarized and Inert Gas MRI and Xenon Molecular MRI"
- 2018 Lecturer at Jagiellonian University, Krakow, "Hyperpolarized and Inert Gas MRI and Xenon Molecular MRI"

Advisory and Supervisory Responsibilities:

- 1999- Mentoring fellows, graduate and undergraduate students (Biomedical Engineering) in the Hyperpolarized Noble Gas Laboratory, 10 h/week

Names of advisees or trainees

Undergraduate Senior Thesis Research Student Supervision (n = 43):

Duration Of Training (years)	Name	Current Position
1	Anastasia Bilek,	Graduate Student
1	Ramon Carpentar,	Graduate Student
1	Rosalynn Avakian,	Graduate Student
1	Malik A. King,	Graduate Student
1	Sumit Jerath,	Graduate Student

1	David Bakhsh,	Graduate Student
1	Chang K. Suh	Graduate Student
1	Gabriel Anderson	Graduate Student
1	Linh Le	Software Engineer, Mathworks, MA
1	Jose Otero	Graduate Student
1	Luke Tomycz	Medical School Student
1	Carol Pestien	Graduate Student
1	Eugene Lim	Graduate Student
1	Angela Tooker	Graduate Student, Cal Tech
1	Tina Lewis	Graduate Student
1	Jason Light	Medical School Student
1	Michael Stais	Graduate Student
1	Ajna Borogovac	Graduate Student
1	Chang W. Foo	Graduate Student
1	Sameer Doshi	Medical School Student, Rutgers
1	Ling Chen	Dental School Student
1	Allsion Bell	Graduate Student

At Lakehead University and TBRHRI

1	Hanna Aalto	Undergraduate Student
2	Camryn Newman	Undergraduate Student
3	Braeden Prete	Undergraduate Student
2	Ashlyn Kopanski	Undergraduate Student
1	Mehran Masoom	Undergraduate Student
3	Peter Smylie	Undergraduate Student
3	Krista Dowhouse	Undergraduate Student
2	Jordan Lovis	Undergraduate Student
2	Jordan Wentzell	Undergraduate Student
2	Thomas Sitter	Undergraduate Student
1	Christine Boissy	Undergraduate Student
2	Andrew Templeman	Undergraduate Student
3	Chris Viel	Undergraduate Student
1	Chris Syposz	Undergraduate Student
2	Steven Engler	Undergraduate Student
1	Laura Omeljaniuk	Undergraduate Student
1	Christian Mauro	Undergraduate Student
1	Stefanie Perrier	Undergraduate Student
1	Zachary Cordingley	Undergraduate Student
2	Sarah Yeo	Undergraduate Student
1	Skye Dusolt	Undergraduate Student

1 Mihnea Constantin Undergraduate Student

Graduate Student Dissertation Research Supervision (n = 24):

Duration Of Training (years)	Name	Current Position
2	Daniel Kacher, M.S.	Clinical Engineer, MRI Division, BWH
4	Lei Zhao, Ph.D.	Vice President, MRI Scanner Company, China
4	Arvind Venkatesh, Ph.D.	Electrical Engineer, Custom One Design, MA
2	Peter Velikin, M.S.	Electrical Engineer
2	Gabriel Gomez, M.S.	Electrical Engineer, Teradyne, MA
2	Adelaide Zhang, M.S.	Electrical Engineer, Motorola, WI
2	Masaki Horii, M.S.	Ph.D. Graduate Student
2	Angela Tooker, M.Eng.	Ph.D. Graduate Student, CalTech
1	Erin McKinstry, M.S.	Biomedical Engineer
2	Yang-Sheng Tzeng, Ph.D.	R&D Scientist, Innov-X Systems
2	James Chen, M.S.	Ph.D. Graduate Student, MIT
3	Ronn Walvick, Ph.D.	Ph.D. Graduate Student, WPI
3	Ali Bourisly, Ph.D.	Ph.D. Graduate Student, WPI
2	Paul Desari, Ph.D.	Ph.D. Graduate Student, WPI
1	Linxi Shi, M.S.	M.S. Graduate Student, WPI

At Lakehead University and TBRHRI

1	Vira Grynko (Current)	Ph.D. Graduate Student, LU
3	Yurii Shepelytskyi	Ph.D. Graduate Student, LU
1	Kyle Fediuk	MSc. Graduate Student, LU
2	Alanna Wade	MSc. Graduate Student, LU
2	Marcus Couch	Ph.D. Graduate Student, LU
2	Sana Albhari	MSc. Graduate Student, LU
2	Tao Li	MSc. Graduate Student, LU
1	Gowthan Gadjuwada	MSc. Graduate Student, LU
1	Avner Fitter	MSc. Graduate Student, LU

Postdoctoral Research Fellow Supervision (n = 17):

Duration	Name	Current Position Of Training (years)
2	Kuniyoshi Sakai, Ph.D.	Associate Professor, Tokyo University, Japan
1	Toru Inomata, Ph.D.	Research Associate, Osaka University, Japan
1	Luping Li, Ph.D.	Research Fellow, Northwestern University, IL
1	Chih-Liang Chin, Ph.D.	Sr Research Scientist, Abbott Pharmaceuticals
1	Svetlana Egorova, Ph.D.	Research Fellow, MRI Division, BWH
1	Lyubov Kubatina, M.D.	Nurse Assistant, MacLean Hospital
2	Kwan-Soo Hong, Ph.D.	Professor, Korea Science Institute

3	Mary Mazzanti, Ph.D.	MR Technologist
3	Xin Zhou, Ph.D.	Research Fellow, UC Berkeley
3	Xiangzhi Zhou, Ph.D.	Research Fellow, Northwestern University, IL
2	Haihua Bao, M.D.	Professor of Radiology, Qinghai Univ, China
1	Guoen Jin, M.D.	Professor of Medicine, Qinghai Univ, China
1	Guoyuan Li, M.D.	Medical Oncologist, Qinghai Hospital, China

At Lakehead University and TBRHRI

1	Viktoriia Batarchuk (Current)	Postdoctoral Fellow, Lakehead University
1	Yurii Shepelytskyi (Current)	Postdoctoral Fellow, Lakehead University
1	Nedal Al Taradeh (Current)	Postdoctoral Fellow, Lakehead University
2	Iain Ball, Ph.D.	Postdoctoral Fellow, TBRHRI
3	Matthew Fox, Ph.D.	Postdoctoral Fellow, TBRHRI
1	Karen Davenport, Ph.D.	Postdoctoral Fellow, TBRHRI
4	Francis Hane, Ph.D.	Postdoctoral Fellow, Lakehead University

Associate Scientist Supervision (n = 1):

1	Alexei Ouridov	Associate Scientist, TBRHRI
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2. Regional, National, and International Contributions:

Invited Presentations:

Regional (n = 48):

1995	Brigham and Women's Hospital, MRI Division, Boston, MA, "Hyperpolarized <sup>129</sup> Xe MRI".
1996	Children's Hospital, Department of Radiology, Boston, MA, "MRI of Hyperpolarized Xenon: Forging a New Diagnostic Tool".
1997	Massachusetts General Hospital, NMR Imaging Center, Charleston, MA, "MRI with Hyperpolarized Noble Gases: Prospects for Brain Imaging"  Massachusetts General Hospital, Neuroradiology Department, Boston, MA, "MRI with Hyperpolarized Noble Gases: Prospects for Brain Imaging".
1998	Beth Israel Deaconess Medical Center, Department of Radiology, "Hyperpolarized Noble Gas Lung MRI".
1999	Brigham and Women's Hospital, Department of Radiology, "Dynamically adaptive Hyperpolarized Noble Gas MRI".

- Harvard Medical School, Department of Medicine, "Dynamic Hyperpolarized Noble Gas MRI".
- 2000 Harvard Medical School, Department of Medicine, "Hyperpolarized Noble Gas MRI".
- 2001 Harvard Medical School, Department of Medicine, "Hyperpolarized Noble Gas MRI".
- 2002 Boston University, Department of Biomedical Engineering, "Hyperpolarized Noble Gas MRI".
- University of Massachusetts, Department of Radiology, "Magnetic Resonance Imaging of Hyperpolarized Gases".
- 2003 WBZ Ch.4 news, "New Lung MRI", Boston, MA
- 2004 Beth Israel Deaconess Medical Center, Department of Radiology, "Hyperpolarized Noble Gas MRI of the Lung".
- 2005 Center for Neurological Imaging, University of Massachusetts, "Hyperpolarized Gas MRI of the Lungs and Brain".
- 2006 Harvard Medical School, Boston, MA, Neuroscience Retreat, "Hyperpolarized Xenon MRI of the Brain".
- 2006 Brigham and Women's Hospital, Department of Radiology, "Hyperpolarized Gas MRI of the Lungs and Brain".
- University of Massachusetts Medical School, Department of Radiology, "Hyperpolarized Noble Gas MRI of the Lungs and Brain".
- 2007 University of Massachusetts Medical School, Department of Radiology, "Hyperpolarized Gas MRI for Pulmonary and Neuro Imaging".
- 2007 Brigham and Women's Hospital, Department of Radiology, "Hyperpolarized Gas MRI of the Lungs".

- 2008 University of Massachusetts Medical School, Department of Radiology, "Hyperpolarized Gas MRI for Pulmonary and Neuro Imaging".
- 2009 University of Massachusetts Medical School, Department of Radiology, "Pulmonary and Neuro-Imaging Using Hyperpolarized Gas MRI".
- 2011 Thunder Bay Regional Research Institute, "Hyperpolarized Noble Gas MRI of the Lungs and Brain".
- 2012 Thunder Bay Regional Research Institute, "Hyperpolarized Noble Gas MRI of the Lungs and Brain".
- Lakehead University, "Hyperpolarized Noble Gas MRI of the Lungs and Brain".
- 2013 Thunder Bay Regional Research Institute, "Hyperpolarized Noble Gas MRI of the Lungs and Brain".
- Lakehead University, "Hyperpolarized Noble Gas MRI of the Lungs and Brain".
- 2014 Thunder Bay Regional Research Institute, "Hyperpolarized Noble Gas and Inert Gas MRI of the Lungs and Brain".
- Lakehead University, "Hyperpolarized Noble Gas and Inert Gas MRI of the Lungs and Brain".
- Lakehead University Gairdner Lecture High School Series Speaker, "Hyperpolarized Noble Gas and Inert Gas MRI of the Lungs and Brain".
- Confederation College, "Pulmonary Functional Imaging Using Hyperpolarized and Inert Gas MRI".
- Invited lecture at Lakehead Chapter of the Professional Engineers Ontario, 52<sup>nd</sup> Engineering and Technology Conference, "Hyperpolarized and Inert Gas MRI of the Lungs and Brain".
- 2015 Lakehead University Gairdner Lecture High School Series Speaker, "Hyperpolarized Noble Gas and Inert Gas MRI of the Lungs and Brain".
- 2016 Lakehead University Research & Innovation Week - IGNITE, Pecha Kucha Series "Hyperpolarized Gas Magnetic Resonance Imaging".

- Lakehead University Gardiner Lecture High School Series Speaker,  
“Hyperpolarized Noble Gas and Inert Gas MRI of the Lungs and Brain”
- Thunder Bay Regional Research Institute Research and Innovation Week -  
“Hyperpolarized and Inert Gas MRI and Xenon Biosensor Molecular MR  
Imaging”
- 2017 Lakehead University Research and Innovation Week - Celebrating our  
Authors Presentation “Hyperpolarized and Inert Gas MRI: Theory and  
Applications in Research and Medicine”
- 2018 Invited Speaker at Lakehead Neuroscience Interest Group (NeuRIG) –  
February 15, 2018; *Neuroimaging with Hyperpolarized Xenon and Xenon  
Biosensor Molecular MRI*
- Invited Speaker at Lakehead Biology Seminar Series – March 2, 2018;  
*Biological Applications of Hyperpolarized Gas MRI*
- 2019 Invited Speaker for the Lakehead University Pre-Med Society – November  
21 2019; *Pulmonary and Neuro Imaging with Hyperpolarized Xenon and  
Xenon Biosensor Molecular MRI*
- 2020 Fort William First Nation Reserve Community Information Session – March  
2, 2020; *Pulmonary Imaging with Hyperpolarized and Inert Gases*
- Lakehead University Gairdner Foundation Day Lecture High School Series  
Speaker – March 5, 2020; *Hyperpolarized Noble Gas and Inert Gas MRI of  
the Lungs and Brain*
- 2021 CBC News Interview, Thunder Bay. Making the invisible, visible: Ont.  
researchers use new imaging technique to see COVID-19 impact on lungs.  
January 25, 2021.
- Invited speaker for the Lakehead Association of Biology Students Club at  
Lakehead University – January 27, 2021; *Hyperpolarized Xenon of the  
Lungs and Brain; and Xenon Biosensor MRI*
- Invited speaker for Lakehead University Let’s Talk Science “Let’s Talk  
Brains” High School Series event – February 19 2021; *Neuroimaging with  
Hyperpolarized Xenon*
- Invited seminar speaker for the Lakehead University Department of Physics  
– March 5, 2021; *Pulmonary and Neuro Imaging Using Hyperpolarized Gas  
MRI*



Lakehead University Gairdner Foundation Day Lecture High School Series  
Speaker – March 16, 2021; *Hyperpolarized MRI of the Lungs and Brain*

- 2022 Invited Speaker at Lakehead Biology Seminar Series – January 28, 2022;  
*Pulmonary and Neuro Imaging using Hyperpolarized Gas MRI*
- 2023 Invited Speaker at Soring Chapter event, Diagnostic Imaging Education day,  
Confederation College, Ontario, Canada- April, 2023 *MRI with  
Hyperpolarized and Inert Gas Contrast Agents and Xenon Biosensor  
Molecular MRI*, Ontario Association of Medical Radiation Sciences.

National (n = 56):

- 1997 Society of Magnetic Resonance in Medicine, Ninth Annual Meeting, New  
York, NY, August 18-24, 1990. "23Na MRS of the Rat Brain In Vivo at 9.4  
T: On the Permeability of the Blood-Brain Barrier to Shift Reagent.
- 1993 Gordon Conference on Magnetic Resonance, Brewster Academy,  
Wolfeboro, NH, "Biological Magnetic Resonance Imaging Using  
Hyperpolarized 129Xe".
- Stony Brook University Colloquium, Stony Brook, NY, "Development of  
Magnetic Resonance Imaging Using Hyperpolarized Xenon".
- State University of NY, Chemistry Society, Purchase, NY, "Developing  
New Imaging Modalities: "MRI Using Hyperpolarized 129Xe".
- University Hospital at Stony Brook, Department of Radiology, Stony Brook,  
NY, "Magnetic Resonance Imaging Using Hyperpolarized 129Xe".
- 1994 Grumman Aerospace Corporation, Bethpage, NY, "New Developments in  
Medical Imaging Technology: HypX-MRI".
- General Electric Corporation, Schenectady, NY, "MRI Using  
Hyperpolarized 129Xe".
- Invited Lecture, Experimental Nuclear Magnetic Resonance Conference,  
Asilomar, California, April 10-15, 1994. "Hyperpolarized 129Xe Magnetic  
Resonance Imaging."
- 1995 Fox Chase Cancer Institute, Philadelphia, PA, "Hyperpolarized 129Xe-  
MRI".
- National Institutes of Health, Heart Lung and Blood Division, Bethesda,  
MD, "MRI Using Laser-polarized Xenon".

- Lawrence Berkeley Laboratory, Berkeley, CA, "A New Imaging Modality: HypX-MRI".
- Yale University, Diagnostic Radiology, New Haven, CT, "MRI Using Hyperpolarized  $^{129}\text{Xe}$ ".
- Johns Hopkins Medical School, Department of Neuroradiology, Baltimore, MD, "A New Imaging Modality Using Hyperpolarized  $^{129}\text{Xe}$ -MRI".
- 1996 Mallinkrodt Medical, Inc., St. Louis, MO, "Hyperpolarized  $^{129}\text{Xe}$  Magnetic Resonance Imaging".
- 1997 University of Pennsylvania, Department of Radiology, Philadelphia, PA, "Hyperpolarized Xenon MRI".
- University of New Hampshire, Department of Physics, Durham, NH, "Hyperpolarized Noble Gas MRI: Development and Biomedical Applications".
- Schlumberger-Doll Research, Ridgefield, CT, "Hyperpolarized Gas MRI".
- 1999 Rice University, Department of Biomedical Engineering, Houston, TX, "Dynamically Adaptive Hyperpolarized Noble Gas MRI".
- 2001 Pacific Northwest National Laboratory (PNNL), "Hyperpolarized Noble Gas MRI studies of the Lung".
- Radiologic Society of North America, Chicago, IL, "Measurement of Cerebral Blood Flow Using Hyperpolarized  $^{129}\text{Xe}$  MR".
- 2001 Universities Space Research Association, Houston, TX, "Hyperpolarized  $^{129}\text{Xe}$  MRI of the Brain and Lungs".
- 2002 University of Pennsylvania, Philadelphia, PA, "Hyperpolarized Noble Gas MRI: History and Applications".
- 2003 Discoveries & Breakthroughs Inside Science on local TV news across the country, "Helium MRI of the lung".
- 2004 University of Pennsylvania, Philadelphia, PA, "Basics of Hyperpolarized Noble Gas MR Imaging".
- 2005 GE Healthcare, Princeton, NJ, "Hyperpolarized Noble Gas MRI of the Lungs and Brain: Present Progress".

- 2006 The 2006 International Functional Lung Imaging Workshop at Penn, University of Pennsylvania, Philadelphia, PA, "Evaluating Ventilation Heterogeneity in Asthmatics Using Hyperpolarized  $^3\text{He}$  MRI".
- 2008 Hyperpolarized Gas MRI of the Lungs and Brain, Radiology Dept, UMMS  
Hyperpolarized  $^3\text{He}$  MRI of Asthma, ISMRM, Toronto  
Pulmonary and Neuro Imaging Using Hyperpolarized Helium, Keystone Symposium, Lake Tahoe  
Hyperpolarized  $^3\text{He}$  MRI, Vertex, Cambridge, MA  
Hyperpolarized  $^3\text{He}$  MRI, Centocor, Radmore, PA
- 2009 Hyperpolarized Noble Gas MRI of the Lungs and Brain, Vertex, Cambridge, MA
- 2010 Hyperpolarized Noble Gas MRI of the Lungs and Brain, Lung Imaging Symposium, Vertex, Cambridge, MA
- 2011 The 2011 International Functional Lung Imaging Workshop at Penn, University of Pennsylvania, Philadelphia, PA, "Pulmonary Functional Imaging Using Hyperpolarized gas MRI".
- 2012 The 2012 International Functional Lung Imaging Workshop at Penn, University of Pennsylvania, Philadelphia, PA, "Pulmonary Functional Imaging Using Hyperpolarized gas MRI".
- 2013 The 2013 International Functional Lung Imaging Workshop at Penn, University of Pennsylvania, Philadelphia, PA, "Pulmonary Functional Imaging Using Hyperpolarized and Inert Gas MRI".
- 2014 University of Manitoba, "Hyperpolarized and Inert Gas MRI of the Lungs and Brain".  
University of Regina, "Hyperpolarized and Inert Gas MRI of the Lungs and Brain".  
University of Saskatchewan, "Hyperpolarized and Inert Gas MRI of the Lungs and Brain".
- 2015 University of Alberta, "Hyperpolarized and Inert Gas MRI of the Lungs and Brain".

- Lethbridge University, “Hyperpolarized and Inert Gas MRI of the Lungs and Brain”.
- University of Victoria, “Hyperpolarized and Inert Gas MRI of the Lungs and Brain”.
- 2016 World Molecular Imaging Conference, “HyperCEST MRI Detection of the Cucurbit[6]uril Xenon Cage in the Rat Abdomen in vivo”, New York City, USA.
- Brain Mapping, “Hyperpolarized xenon brain functional MRI and inert gas imaging”, Miami, USA.
- World Chemistry 2016, “Advances in MRI Using Hyperpolarized and Inert Gases and Molecular MR Imaging”, Toronto, Canada.
- 2017 International Conference on Magnetic Resonance Microscopy August 13-17, “Hyperpolarized and Inert Gas MRI Physics and Medical Applications”, Halifax, Nova Scotia.
- Polarization in Noble Gases Conference, *Medical Applications of Hyperpolarized Noble Gases Including in vivo HyperCEST detection*. Park City, Utah, USA, October 8-14, 2017.
- 2018 University of Pennsylvania. *Advances in hyperpolarized xenon-129 magnetic resonance imaging*. XeMat Conference. May 4-9, 2018.
- 2019 International Workshop on Pulmonary Imaging (IWPI), Philadelphia, PA, USA, February 28-March 2, 2019.
- International Society for Magnetic Resonance in Medicine (ISMRM), Montreal, QC, Canada, May 11-16, 2019.
- National Institutes of Health (NIH) 2019 Conference, San Diego, CA, USA, June 6-7, 2019.
- International Workshop on Pulmonary Functional Imaging (IWPF), “Current Progress in <sup>19</sup>F Lung MRI”, New Orleans, LA, USA, October 18-20, 2019.
- 2022 Imaging Network Ontario Symposium
- 2023 International Society for Magnetic Resonance in Medicine (ISMRM) and International Society for MR Radiographers & Technologist (ISMRT) Annual Meeting & Exhibition, Toronto, Canada (2023)

International (n = 67):

- 1992            Society of Magnetic Resonance in Medicine, Eleventh Annual Meeting, Berlin, Germany, August 8-14, 1992. "Susceptibility-Induced Contrast Enhancement During the Rapid Repetition of Dilution Bolus Injections."
- Society of Magnetic Resonance, Third Scientific Meeting, Nice, France, August 19-25, 1995. "Measurement of  $^{129}\text{Xe}$  T1 in Blood to Explore the Feasibility of Hyperpolarized  $^{129}\text{Xe}$  MRI."
- International Workshop on Perspectives of MR Imaging Using Polarized Gases, Les Houches, France, "Temporal Dynamics of Hyperpolarized  $^{129}\text{Xe}$  Resonances in living rats".
- Invited Lecture, HELION97, Polarized  $^3\text{He}$  Beams and Gas Targets and Their Application, Kobe, Japan, "Development of Hyperpolarized Noble Gas MRI".
- 1998            Invited Lecture, US Delegate selected by the National Science Foundation, Korea-US Joint Biomedical Engineering Seminar, Seoul, Korea, "Dynamic hyperpolarized noble gas MRI: Development and biomedical applications".
- Plenary Speaker, Sixth Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Sydney, Australia, "Airway Disease: Hyperpolarized Gas MRI" and "Dynamic *in vivo* studies using hyperpolarized gases".
- Plenary Speaker, Japanese Society for Magnetic Resonance in Medicine (JSMRM), 26th Annual Meeting, Kyoto, Japan, September, 1998, "Hyperpolarized Gas Imaging".
- Invited Lecture, Niels Bohr Institute, Copenhagen, Denmark, November, 1998, "Hyperpolarized Noble Gas MRI".
- Invited Lecture, Rigshospitalet Medical Center, Copenhagen, Denmark, November, 1998, "Hyperpolarized Noble Gas MRI".
- Invited Lecture, Lund University, Sweden, November, 1998, "Imaging using hyperpolarized noble gas"

- 1999 Invited Lecture, Hong Kong University Symposium on MRI, Hong Kong, China, "Dynamic Functional MRI Using Hyperpolarized Noble Gases: Development and Applications"
- Plenary Speaker, Japanese Society for Magnetic Resonance in Medicine (JSMRM), 26th Annual Meeting, Kyoto, Japan, "Hyperpolarized Gas Imaging".
- Invited Lecture, Second International Symposium on Ultra-fast Magnetic Resonance Imaging in Medicine (ISUM), Kyoto, Japan, January, 1999, "Fast Dynamic MRI Using Hyperpolarized Noble Gases".
- Invited Lecture, Matsuyama Prefecture, Ehime University, Tsukuba, Japan, January, 1999, "Lung Imaging Using Hyperpolarized Noble Gases".
- Invited Lecture, Sapporo Medical University, Sapporo, Japan, "MRI Studies Using Hyperpolarized Noble Gases".
- Invited Lecture, Wuhan Technical Institute of Physics and Mathematics, The Chinese Academy of Sciences, Wuhan, China, "Hyperpolarized Noble Gas Dynamic MRI".
- Invited Lecture, Tongji Medical University, Wuhan, China, "Clinical MRI using Hyperpolarized Noble Gases".
- Invited Lecture, Seventh Annual Meeting of the International Society of Magnetic Resonance in Medicine (ISMRM), Philadelphia, PA, "Resolving the Conflict over the  $T_1$  Values of  $^{129}\text{Xe}$  in Blood".
- Hyperpolarized gases in magnetic resonance: biomedical investigations and clinical applications, Les Houches, France, "Dynamically adaptive hyperpolarized noble gas MR imaging using spatially selective RF pulse encoding".
- Hyperpolarized gases in magnetic resonance: biomedical investigations and clinical applications, Les Houches, France, "Dynamic uptake of hyperpolarized  $^{129}\text{Xe}$  in the rat brain".
- 2000 Invited Lecture, BIOS2000, Technology Transfer Forum, Boston, MA, "Hyperpolarized Noble Gas Delivery System and Applications".
- 2002 Plenary Lecture, Japanese Society of Magnetic Resonance in Medicine, Tokyo, Japan "Hyperpolarized noble gas MRI in the brain and lungs".
- Invited Lecture, GE Medical Systems, Shanghai, China, "Hyperpolarized noble gas MRI in the brain and lungs".

Invited Lecture, Ryukyu University, Okinawa, Japan, "Hyperpolarized noble gas imaging of the lungs and brain".

Invited Lecture, Nagasaki University, Nagasaki, Japan, "Hyperpolarized noble gas imaging of the lungs and brain".

Invited Lecture, Yamaguchi University, Yamaguchi, Japan, "Hyperpolarized noble gas imaging of the lungs and brain".

Invited Lecture, Ehime University, Ehime, Japan, "Hyperpolarized noble gas imaging of the lungs and brain".

Invited Lecture, National Cardiovascular Center, Osaka, Japan, "Hyperpolarized noble gas imaging of the lungs and brain".

- 2003      Eleventh Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Canada, "Hyperpolarized  $^3\text{He}$  Imaging of human respiratory airways and quantification of airway diameters".
- 2004      Twelfth Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Kyoto, Japan, "Functional Brain Imaging Using Hyperpolarized  $^{129}\text{Xe}$ ".
- Twelfth Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Kyoto, Japan, "MRI Characterization of Kidney Lesions in Tuberous Sclerosis Mouse Model".
- Twelfth Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Kyoto, Japan, "MRI Assessment of Treatment of Tuberous Sclerosis Kidney with Rapamycin and IFN-g in a Mouse Model".
- The 2<sup>nd</sup> International Workshop on Pulmonary Functional Imaging, Hyogo Japan, "Basics of Hyperpolarized Noble Gas MR Imaging".
- 2006      3<sup>rd</sup> International Workshop of Pulmonary Functional Imaging, Heidelberg, Germany, "Quantification of Ventilation Heterogeneity Changes in Asthmatic and Non-Asthmatic Lungs Using Hyperpolarized  $^3\text{He}$  MRI".
- Invited Lecture, Mainz University, Mainz, Germany, "Hyperpolarized Gas MRI of the Lungs and Brain".

- The 2006 International Functional Lung Imaging Workshop at Penn, University of Pennsylvania, Philadelphia, PA, "Evaluating Ventilation Heterogeneity in Asthmatics Using Hyperpolarized  $^3\text{He}$  MRI".
- 2008      Hyperpolarized Helium MRI of the Lungs, Qinghai University, China
- 3T MRI Applications and Hyperpolarized Helium MRI of the Lungs, Qinhai Medical School, China
- Hyperpolarized  $^3\text{He}$  MRI of Asthma, ISMRM, Toronto
- 2010      Hyperpolarized Gas MRI of the Lungs, Beijing University of Chinese Medicine, Beijing, China
- 2011      Hyperpolarized Gas MRI of Asthma and COPD, Fifth International Workshop of Pulmonary Functional Imaging, Awaji, Japan.
- 2012      Hyperpolarized Xenon MRI of the Brain, Xemat Conference, Dublin, Ireland.
- 2013      Hyperpolarized and Inert Gas Pulmonary Functional Imaging, Sixth International Workshop of Pulmonary Functional Imaging, Madison, WI.
- 2014      Hyperpolarized and Inert Gas MRI of the Lungs and Brain, Invited speaker at Central European Institute of Technology (CEITEC), Brno, Czech Republic
- Hyperpolarized Xenon Biosensor MRI for Detection of Lung Cancer, Invited speaker at Jagiellonian Centre of Experimental Therapeutics (JCET), Krakow, Poland
- 2015      Advancing Hyperpolarized and Inert Fluorinated Gas MRI Technology, BIT World Gene and Technology Conference, (keynote address) Qingdao, China, November 2015
- Functional MR Imaging of the Lungs Using Hyperpolarized and Inert Gas, Guandong General Hospital Guangzhou, China, November 2015
- Functional MR Imaging of the Lungs Using Hyperpolarized and Inert Gas, Guangzhou Medical University, Guangzhou, China, November 2015
- Functional MR Imaging of Lungs and Brain Using Hyperpolarized and Inert Gas, Institution for Physics and Mathematics, Chinese Academy of Science, Wuhan, China, November 2015



MRI Enabled Contrast Agents - <sup>19</sup>F, International Workshop on Pulmonary Functional Imaging Edinburg, United Kingdom, October 2015.

Xenon Biosensor Molecular MR Imaging with Surface Absorption Rate using Cucurbit[6]uril based Biosensors, World Molecular Imaging Conference, Honolulu, Hawaii, USA.

- 2016 Keynote Presentation: New advances in hyperpolarized xenon-129 biosensor MR molecular imaging, Molecular Biomarkers 2016, Berlin, Germany, September 2016
- 2017 Comparing Hyperpolarized and Inert Fluorinated Gas MRI of the Lungs and Xenon-129 Biosensor Molecular MRI, 2017 International Workshop on Pulmonary Imaging, University of Pennsylvania, Philadelphia, United States, March 2017
- Hyperpolarized xenon functional MRI of the brain, 14<sup>th</sup> Annual World Congress Society for Brain Mapping & Therapeutics, Los Angeles, United States, April 2017
- Hyperpolarized and Inert Gas MRI and Xenon Molecular MRI - Jagiellonian University, Krakow, Poland, October 18 2017
- Red Hot <sup>19</sup>F Human Lung MRI with Inert Fluorinated Gases - Red Hot MRI Symposium, Berlin, Germany, October 15-16 2017
- Medical Applications of Hyperpolarized Noble Gases Including in vivo HyperCEST detection. Polarization in Noble Gases 2017, Utah, USA, October 8-14, 2017
- 2018 Guangzhou, China. Advances in fluorine magnetic resonance imaging. July 9, 2018.
- 2019 Jagellonian University Physics Institute, *Hyperpolarized gas MRI for the lungs and brain and Xenon Biosensor MR Molecular Imaging*, Krakow, Poland.
- John Paul II Hospital, *Pulmonary and Neuro Imaging with Hyperpolarized Xenon MRI*. Krakow, Poland
- Hannover Medical School, *Pulmonary and Neuro Imaging with Hyperpolarized and Inert Gases and Xenon Biosensors Molecular MRI*, Hannover, Germany
- ISMRI Members Initiated Symposium, *Current progress in <sup>19</sup>F Lung MRI Imaging*, Paris, France.

- 2020 Nominated presentation, Hyperpolarized Media Study Group, International Society for Magnetic Resonance in Medicine (ISMRM) Conference. (Yurii Shepelytskyi-PhD Student received Silver medal Award).
- Invited presentation, Neuro-Highlights session, International Society for Magnetic Resonance in Medicine (top 6 ISMRM abstracts selected in technical development in neuroimaging).
- 2021 Polarization in Noble Gases (PiNG) Workshop, *Hyperpolarized 129Xe Brain MR Imaging and HP 129Xe Molecular Biosensor Imaging*, Virtual Meeting
- 2023 Hyperpolarized 129Xe Brain MR Imaging and HP 129Xe Biosensor Molecular MR Imaging. Study group for Quantum Hyperpolarization for medical use on JSMRM, Japan Invited?: Yes, Keynote?: No
- 19F Lung Imaging with Octafluorocyclobutane , Albert M, International Workshop on Pulmonary Imaging. Perelman School of Medicine, University of Pennsylvania (Upenn), United States of America. (invited Speaker-Attended virtually), 2023

### Part III. Bibliography

#### Original Reports:

1. Smith GP, Albert MS, Shindledecker RD, Jerome C, Ackerman SH. Ingestion of Sucrose Increases Hypothalamic Dopaminergic Activity. *Am J Physiol* 1992; 262:R624-627.
2. Albert MS, Huang W, Balschi JA, Springer CS. Aqueous Shift Reagents for High Resolution Cation NMR. *NMR in Biomed* 1993;6:7-20.
3. Albert MS, Huang W, Lee JH, Patlack CS, Springer CS. Susceptibility changes following bolus injections. *Magn Reson Med* 1993;29:700-708.
4. Driehuys B, Cates GD, Happer W, Mabuchi H, Saam B, Albert MS, Wishnia A. Spin transfer between laser-polarized 129Xe and surface protons. *Phys Lett A* 1993;184: 88-92.

5. Albert MS, Cates GD, Driehuys B, Happer W, Saam B, Springer CS, Wishnia A. Biological magnetic resonance imaging using hyperpolarized  $^{129}\text{Xe}$ . *Nature* 1994; 370:199-201. (This paper received 248 citations.)
6. Albert MS, Balamore D, Kornhauser SH. Magnetic resonance imaging using hyperpolarized  $^{129}\text{Xe}$ . *Am J Electromedicine* 1994; 150:72-80.
7. Albert MS, Schepkin VD, Budinger TF. Measurement of  $^{129}\text{Xe}$  T1 in blood to explore the feasibility of hyperpolarized  $^{129}\text{Xe}$  MRI. *J Comp Assist Tomogr* 1995;19(6):975-978.
8. Albert MS, Tseng CH, Williamson D, Oteiza ER, Walsworth RL, Kraft B, Kacher D, Holman BL, Jolesz FA. Hyperpolarized  $^{129}\text{Xe}$  MR imaging of the oral cavity. *J Magn Reson B* 1996;111: 204-207.
9. Sakai K, Bilek AM, Oteiza E, Walsworth RL, Balamore D, Jolesz FA, Albert MS. Temporal dynamics of hyperpolarized  $^{129}\text{Xe}$  resonances in living rats. *J. Magn. Reson. B* 1996;111:300-304.
10. Peled S, Jolesz FA, Tseng CH, Nascimben L, Albert MS, Walsworth RL. Determinants of tissue delivery for  $^{129}\text{Xe}$  magnetic resonance in humans. *Magn Reson Med* 1996;36:340-344.
11. Zhao L, Mulkern R, Tseng CH, Williamson D, Patz S, Kraft R, Walsworth RL, Jolesz FA, Albert MS. Gradient echo imaging considerations for hyperpolarized  $^{129}\text{Xe}$  MR. *J Magn Reson B* 1996;113:179-183.
12. Zhao L, Albert MS. Biomedical imaging using hyperpolarized noble gas MRI: Pulse sequence considerations. *Nucl Instr and Meth.* 1998;402:454-460.
13. Albert MS, Kacher DF, Balamore D, Venkatesh A, Jolesz FA,  $T_1$  of  $^{129}\text{Xe}$  in Blood and the Role of Oxygenation. *J Magn Reson.* 1999;140:264-273.
14. Spiegelman JJ, Venkatesh AK, Albert MA, Recycling system for hyperpolarized noble gases. *Eur. Radiol.* 1999; 9:B38.
15. Zhao L, Venkatesh AK, Albert MS and Panych LP, Dynamically adaptive hyperpolarized noble gas MR imaging using spatially selective RF pulse encoding. *Eur. Radiol.* 1999; 9:B3
16. Venkatesh AK, Zhao L, Pausak T, Ward CF, Jolesz FA and Albert MS, Hyperpolarized gas imaging using a simple programmable gas delivery system. *Eur. Radiol.* 1999; 9:B34.
17. Venkatesh AK, Li L-P, Chin C-L, Balamore D, Jolesz FA, Albert MA, Dynamic uptake of hyperpolarized  $^{129}\text{Xe}$  in the rat brain. *Eur. Radiol.* 1999; 9:B41.
18. Venkatesh AK, Zhao L, Balamore D, Jolesz FA and Albert MS, Using carrier-agents in live rats to deliver hyperpolarized  $^{129}\text{Xe}$ , *Eur. Radiol.* 1999; 9:B44

19. Venkatesh AK, Zhao L, Balamore D, Jolesz FA, Albert MS. Evaluation of carrier agents for hyperpolarized  $^{129}\text{Xe}$  MRI, *NMR in Biomed.* 2000;13:245-252.
20. Ramirez MP, Sigaloff KCE, Kubatina LV, Donahue MA, Venkatesh AK, Albert MS. Physiological response of rats to delivery of helium and xenon: Implications for hyperpolarized gas imaging. *NMR in Biomed.* 2000;13:253-264.
21. Albert MS, Balamore D, Kacher D, Venkatesh AK, Jolesz FA, Hyperpolarized  $^{129}\text{Xe}$   $T_1$  in oxygenated and deoxygenated blood, *NMR in Biomed.* 2000;13:407-414.
22. Sun Y, Sugawara M, Mulkern RV, Hynynen K, Mochizuki S, Albert M, Zuo C, Simultaneous measurements of temperature and pH *in vivo* using NMR in conjunction with TmDOTP, *NMR in Biomed.* 2000;13:460-466.
23. Zhao L, Venkatesh AK, Albert MS, Panych L, Signal-to-noise comparison of encoding methods for hyperpolarized noble gas MRI, *J Magn Reson.* 2001;148,314-326.
24. Venkatesh AK, Zhao L, Balamore D, Jolesz FA, Albert MS. Hyperpolarized xenon MRI using gas-filled liposomes, *Academic Radiology.* 2002; 9, S270-274.
25. Sun Y, Zhou J, Stayner C, Fielding J, Shen X, Munasinghe J, Beier D, Albert MS, MRI Assessment of a Murine Model of Recessive Polycystic Kidney Disease, *Comparative Medicine.* 2002; 52;433-438.
26. Tooker AC, Hong KS, McKinstry EL Costello P, Jolesz FA, Albert MS, Dynamic imaging of distal airways in humans using hyperpolarized  $^3\text{He}$  MRI, *Radiology.* 2003; 227:575–579.
27. Venkatesh AK, Zhang AX, Mansour J, Kubatina L Oh CH, Blasche G, Ünlü S, Balamore D, Jolesz FA, Goldberg BB, Albert MS, MRI of the Lung Gas-Space at Very Low-Field Using Hyperpolarized Noble Gases, *Magn Reson Imaging.* 2003; 21:773-776.
28. Sun Y, Schmidt NO, Schmidt K, Doshi S, Rubin JB, Mulkern RV, Carroll R, Ziu M, Erkmen K, Poussaint TY, Black P, Albert M, Burstein D, Kieran MW, Perfusion MRI of U87 Brain Tumors in a Mouse Model, *Magn Reson Med.* 2004; 51:893-899.
29. Sun Y, Mulkern RV, Schmidt K, Albert M, Carrol R, Schmidt NO, Ziu M, Poussaint TY, Black P, Kieran MW: Quantification of Water Diffusion and Relaxation Times of Human U87 Tumors in a Mouse Model. *NMR in Biomed.* 2004; 17:399-404.
30. Schmidt NO, Ziu M, Carrabba G, Giussani C, Bello L, Sun Y, Schmidt K, Albert M, Black PM, Carroll RS. Antiangiogenic Therapy by Local Intracerebral Microinfusion Improves Treatment Efficiency and Survival in an Orthotopic Human Glioblastoma Model *Clinical Cancer Research* 2004; 10:1255-1262.

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101. Y. Sun, B. O'Sullivan, R. Walvick, A. Reno, L. Shi, D. Baker, J. Mansour, M.S. Albert, Using Hyperpolarized  $^3\text{He}$  MRI to Evaluate Therapeutics in Cystic Fibrosis Patients, Proceedings of the Eighteenth Annual Meeting of the International Society of Magnetic Resonance in Medicine, Stockholm, Sweden, 2010.  
Abstract  
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Refereed?: Yes, Invited?: Yes
102. Y Sun, L Shi, G Jin, A Reno, S Zhalehdoust-Sani, SJ Krinzman, J Liu, KR Lutchen, JM Madison, MS Albert, Assessing the Persistence of Ventilation Defects in Asthmatics at Baseline and Following Methacholine Challenge Using Hyperpolarized  $^3\text{He}$  MRI, Proceedings of the Eighteenth Annual Meeting of the International Society of Magnetic Resonance in Medicine, Stockholm, Sweden, 2010.  
Abstract  
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Refereed?: Yes, Invited?: Yes

103. RP Walvick, BT Bratane, J Bouley, N Henninger, M Albert, M Fisher, MRI of Emboli Localization and Lysis in an Embolic Model of Rat Middle Cerebral Artery Occlusion, Proceedings of the Eighteenth Annual Meeting of the International Society of Magnetic Resonance in Medicine, Stockholm, Sweden, 2010.

Abstract

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Refereed?: Yes, Invited?: Yes

104. RP Walvick, AL Reno, M Gounis, MS Albert, Detection of Pulmonary Ischemia using the Oxygen Sensitivity of Hyperpolarized Helium MRI in a Rodent Model of Pulmonary Embolism, Proceedings of the Nineteenth Annual Meeting of the International Society of Magnetic Resonance in Medicine, Montreal, Canada, 2011.

Abstract

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Refereed?: Yes, Invited?: Yes

105. RP Walvick, AL Reno, AA Bognadov, MS Albert, Pulmonary Blood Volume Mapping using a Modified T1 Weighted, Steady State MRI Technique in a Rodent Model of Hypoxic Pulmonary Vasoconstriction, Proceedings of the Nineteenth Annual Meeting of the International Society of Magnetic Resonance in Medicine, Montreal, Canada, 2011.

Abstract

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Refereed?: Yes, Invited?: Yes

106. Couch M, O'Sullivan B, Roche JP, Walvick R, Zheng S, Baker D, Johnson M, Botfield M, Albert MS. Assessment of repeatability of hyperpolarized gas MR ventilation imaging in cystic fibrosis patients. Proceedings of the Twentieth Annual Meeting of the International Society of Magnetic Resonance in Medicine, Melbourne, Australia, 2012.

Abstract

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Refereed?: Yes, Invited?: Yes

107. Iain K. Ball, Marcus J. Couch, Tao Li, Matthew S. Fox, Jordan A. Lovis, Ralph Hashoian, Shalyn L. Littlefield, Birubi Biman, and Mitchell S. Albert. *Apparent Diffusion Coefficient Mapping in Human Lungs using  $^{19}\text{F}$  MRI of Inert Fluorinated Gases*. Proceedings of the 11<sup>th</sup> Imaging Network of Ontario Symposium, Toronto, February 4 – 5, 2013. (Oral Presentation)

Poster

Published

Refereed?: Yes, Invited?: Yes

108. Marcus J. Couch, Iain K. Ball, Tao Li, Matthew S. Fox, Jordan A. Lovis, Ralph Hashoian, and Mitchell S. Albert. *Image Optimization in Phantoms for  $^{19}\text{F}$  MRI of Inert Fluorinated Gases*. Proceedings of the 11<sup>th</sup> Imaging Network of Ontario Symposium, Toronto, February 4 – 5, 2013. (Poster Presentation)

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109. Marcus J. Couch, Iain K. Ball, Tao Li, Matthew S. Fox, Jordan A. Lovis, Ralph Hashoian, Shalyn L. Littlefield, Birubi Biman, and Mitchell S. Albert. *<sup>19</sup>F Ultra-Short Echo Time MRI of Human Lungs Using Inert Fluorinated Gases*. Proceedings of the 11<sup>th</sup> Imaging Network of Ontario Symposium, Toronto, February 4 – 5, 2013. (Oral Presentation)

Poster  
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110. Iain K. Ball, Marcus J. Couch, Tao Li, Matthew S. Fox, Ralph Hashoian, Shalyn L. Littlefield, Birubi Biman, and Mitchell S. Albert. *<sup>19</sup>F Apparent Diffusion Coefficient MRI of Inert Fluorinated Gases in Human Lungs*. The 2013 International Pulmonary Imaging Workshop, Philadelphia PA, May 16 – 18, 2013. (Poster and Oral Presentation)

Poster  
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Refereed?: Yes, Invited?: Yes

111. Marcus J. Couch, Iain K. Ball, Tao Li, Matthew S. Fox, Shalyn L. Littlefield, Ralph Hashoian, Birubi Biman, and Mitchell S. Albert. *Comparison of <sup>19</sup>F MRI of Human Lungs using 3D Gradient Echo and UTE Techniques*. The 2013 International Pulmonary Imaging Workshop, Philadelphia PA, May 16 – 18, 2013. (Poster Presentation)

Poster  
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112. Marcus J. Couch, Iain K. Ball, Tao Li, Matthew S. Fox, Shalyn L. Littlefield, Ralph Hashoian, Birubi Biman, and Mitchell S. Albert. *<sup>19</sup>F UTE MRI of Human Lungs Using Inert Fluorinated Gases*. The 2013 International Pulmonary Imaging Workshop, Philadelphia PA, May 16 – 18, 2013. (Poster Presentation)

Poster  
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113. Mitchell S. Albert. *New Advances in Pulmonary Functional MR Imaging Using Inert Gases*. The 2013 International Pulmonary Imaging Workshop, Philadelphia PA, May 16 – 18, 2013. (Oral Presentation)

Poster  
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Refereed?: Yes, Invited?: Yes

114. Marcus J. Couch, Iain K. Ball, Tao Li, Matthew S. Fox, Shalyn L. Littlefield, Birubi Biman, and Mitchell S. Albert. *<sup>19</sup>F Ultra-Short Echo Time MRI of Human Lungs Using Inert*

*Fluorinated Gases*. American Thoracic Society International Conference, Philadelphia PA, May 17 – 22, 2013. (Poster Presentation)

Poster

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Refereed?: Yes, Invited?: Yes

115. Marcus J. Couch, Iain K. Ball, Tao Li, Matthew S. Fox, Shalyn L. Littlefield, Ralph Hashoian, Birubi Biman, and Mitchell S. Albert. *<sup>19</sup>F UTE MRI of Human Lungs Using Inert Fluorinated Gases*. 6<sup>th</sup> International Workshop for Pulmonary Functional Imaging, Madison WI, July 18 – 20, 2013. (e-Poster Presentation)

Poster

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Refereed?: Yes, Invited?: Yes

116. Marcus J. Couch, Iain K. Ball, Tao Li, Matthew S. Fox, Shalyn L. Littlefield, Ralph Hashoian, Birubi Biman, and Mitchell S. Albert. *Comparison of <sup>19</sup>F MRI of Human Lungs using 3D Gradient Echo and UTE Techniques*. 6<sup>th</sup> International Workshop for Pulmonary Functional Imaging, Madison WI, July 18 – 20, 2013. (Oral Presentation)

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117. Marcus J. Couch, Iain K. Ball, Tao Li, Matthew S. Fox, Shalyn L. Littlefield, Ralph Hashoian, Birubi Biman, and Mitchell S. Albert. *<sup>19</sup>F Apparent Diffusion Coefficient MRI of Inert Fluorinated Gases in Human Lungs*. 6<sup>th</sup> International Workshop for Pulmonary Functional Imaging, Madison WI, July 18 – 20, 2013. (Oral Presentation)

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Refereed?: Yes, Invited?: Yes

118. Krista M. Dowhos, Jordan S. Wentzell, Matthew S. Fox, Iain K. Ball, Tao Li, Gowtham Gajawada, Brenton De Boef, and Mitchell S. Albert. *Enhanced <sup>129</sup>Xe Hyper-CEST Efficiency with PK11195 Functionalized Cryptophane-A*. 6<sup>th</sup> International Workshop for Pulmonary Functional Imaging, Madison WI, July 18 – 20, 2013. (e-Poster Presentation)

Poster

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Refereed?: Yes, Invited?: Yes

119. Marcus J. Couch, Iain K. Ball, Tao Li, Matthew S. Fox, Alexei V. Ouriadov, Birubi Biman, and Mitchell S. Albert. *Optimized Strategies for <sup>19</sup>F MRI of Human Lungs and Comparison of UTE and Gradient Echo Imaging*. Proceedings of the International Society for Magnetic Resonance in Medicine, 22<sup>nd</sup> Annual Meeting, Milan, Italy, May 10 – 16, 2014.

Abstract

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Refereed?: Yes, Invited?: Yes

120. Marcus J. Couch, Iain K. Ball, Tao Li, Matthew S. Fox, Birubi Biman, and Mitchell S. Albert. *Gravitational Distribution Gradient of Inert Fluorinated Gases in Human Lungs Using  $^{19}\text{F}$  Ultra-Short Echo Time MRI*. Proceedings of the International Society for Magnetic Resonance in Medicine, 22<sup>nd</sup> Annual Meeting, Milan, Italy, May 10 – 16, 2014.  
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Refereed?: Yes, Invited?: Yes
121. Krista M. Dowhos, Matthew S. Fox, Iain K. Ball, Tao Li, Gowtham Gajawada, Jordan Wentzell, Brenton De Boef, and Mitchell S. Albert. *Enhanced  $^{129}\text{Xe}$  Hyper-CEST Efficiency Using PK11195 Functionalized Cryptophane-A*. Proceedings of the International Society for Magnetic Resonance in Medicine, 22<sup>nd</sup> Annual Meeting, Milan, Italy, May 10 – 16, 2014.  
Abstract  
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Refereed?: Yes, Invited?: Yes
122. Jordan A. Lovis, Matthew S. Fox, Iain K. Ball, Tao Li, Marcus J. Couch, Tao Li, and Mitchell S. Albert. *In Vivo chemical Shift Imaging of 5-Fluorouracil and It's Metabolites*. Proceedings of the International Society for Magnetic Resonance in Medicine, 22<sup>nd</sup> Annual Meeting, Milan, Italy, May 10 – 16, 2014.  
Abstract  
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Refereed?: Yes, Invited?: Yes
123. Sana R. Alharbi, Marcus J. Couch, Tao Li, Matthew S. Fox, Birubi Biman, and Mitchell S. Albert. *Correlation Between Hyperpolarized  $^3\text{He}$  MR Measurements of Ventilation Defect Percentage and Body Mass Index*. American Thoracic Society, Sand Diego, May 17-21, 2014.  
Abstract  
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Refereed?: Yes, Invited?: Yes
124. Marcus J. Couch, Matthew S. Fox, Chris Viel, Gowtham Gajawada, Tao Li, and Mitchell S. Albert. *Detection of Inflammation in an LPS-Instilled Rat Model using Inert Fluorinated Gas MRI*, American Thoracic Society, Denver, May 15-20, 2015.  
Abstract  
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Refereed?: Yes, Invited?: Yes
125. Marcus J. Couch, Iain K. Ball, Tao Li, Matthew S. Fox, Birubi Biman, and Mitchell S. Albert. *Can Inert Fluorinated Gas MRI Provide Meaningful Functional Lung Information Similar to Hyperpolarized  $^3\text{He}$  MRI?* American Thoracic Society, Denver, May 15-20, 2015.  
Abstract  
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Refereed?: Yes, Invited?: Yes



126. Marcus J. Couch, Iain K. Ball, Tao Li, Matthew S. Fox, Birubi Biman, and Mitchell S. Albert. *Comparing Pulmonary MRI using Inert Fluorinated Gases and Hyperpolarized  $^3\text{He}$ : Is  $^{19}\text{F}$  MRI Good Enough?* Proceedings of the International Society for Magnetic Resonance in Medicine, 23<sup>rd</sup> Annual Meeting, Toronto ON, May 30 – June 5, 2015.  
Abstract  
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Refereed?: Yes, Invited?: Yes
127. Marcus J. Couch, Matthew S. Fox, Chris Viel, Gowtham Gajawada, Tao Li, and Mitchell S. Albert. *Fractional Ventilation Mapping using Inert Fluorinated Gas MRI in a Rat Model of Inflammation*, Proceedings of the International Society for Magnetic Resonance in Medicine, 23<sup>rd</sup> Annual Meeting, Toronto ON, May 30 – June 5, 2015.  
Abstract  
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Refereed?: Yes, Invited?: Yes
128. Francis T. Hane, Peter S. Smylie, Tao Li, Krista M. Dowhos, Julia A. Ruberto, Iain K. Ball, Brenton DeBoef, Mitchell.S. Albert. *Xenon Biosensor Molecular MR Imaging in Blood with Reduced Surface Absorption Rate Using Cucurbit[6]uril based Biosensors*, World Molecular Imaging Congress 2015, Honolulu, HI, September 2-5, 2015.  
Abstract  
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Refereed?: Yes, Invited?: Yes
129. Albert M, Hane F. (2015). *Magnetic Resonance Imaging of Hyperpolarized  $^{129}\text{Xe}$  in the Brain*. XeMat 2015. Dresden, Germany.  
Abstract  
Published  
Refereed?: Yes, Invited?: Yes
130. Hane F, Brown J, Dowhos K, Rhoat J, Fox M, Ball I, Li T, Moore C, Golen J, Rheingold A, Euler W, Albert M, DeBoef B. (2015). *Xenon-binding cyclotrimeratrylene is detectable by NMR*. Biophysical Society of Canada 1<sup>st</sup> Annual Meeting. Waterloo, Canada  
Abstract  
Published  
Refereed?: Yes, Invited?: Yes
131. Francis Hane, Tao Li, Peter Smylie, Jennifer Plata, Raiili Pellizzari, Boguslaw Tomanek, Brenton Deboef, Mitchell Albert. (2016). *In Vivo MRI Detection of Cucurbit[6]uril Xenon Cage HyperCEST Effect in Rat Abdomen*. 14th Annual Meeting of the Imaging Network Ontario, Toronto, Canada Conference Date: 2016/3  
Poster  
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Refereed?: Yes, Invited?: No

132. Francis T. Hane, Tao Li, Peter Smylie, Mitchell Albert. (2016). In Vivo Detection of Cucurbit[6]uril in Rat Abdomen. International Society for Magnetic Resonance in Medicine, 24th Annual Meeting, Singapore, Singapore Conference Date: 2016/5  
Abstract  
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Refereed?: Yes, Invited?: Yes
133. Hane F, Li T, Smylie P, Albert M. (2016). HyperCEST MRI Detection of the Cucurbit[6]uril Xenon Cage in the Rat Abdomen in vivo. World Molecular Imaging Congress, New York, United States Conference Date: 2016/1  
Abstract  
Published  
Refereed?: Yes, Invited?: Yes
134. Li, Tao and Hane, Francis T and Lawrence-Dewar, Jane M and Hassan, Ayman and Granberg, Karl and Pellizzari, Raiili M and Plata, Jennifer A and Albert, Mitchell S. (2017). Using Hyperpolarized  $^{129}\text{Xe}$  MRI to Detect Impaired Cerebral Perfusion in Human Brain with Alzheimer's Disease. International Society of Magnetic Resonance in Medicine (ISMRM), Honolulu, United States (487) Conference Date: 2017/4  
Abstract  
Published  
Refereed?: Yes, Invited?: Yes
135. Hane F, Li T, Lawrence-Dewar J, Hassan A, Granberg K, Plata J, Pellizzari R, Albert MS. (2016). Using hyperpolarized  $^{129}\text{Xe}$  in human participants to perform functional magnetic resonance imaging (fMRI). International Society for Magnetic Resonance in Medicine (ISMRM), Conference Date: 2017/4  
Abstract  
Submitted  
Refereed?: Yes, Invited?: Yes
136. A Kopanski, F Hane, T Li, M Albert. (2016).  $^1\text{H}$  Magnetic Resonance Imaging of the Lungs using Propane as an Inhalation Agent. International Society for Magnetic Resonance in Medicine (ISMRM), Conference Date: 2017/4  
Abstract  
Submitted  
Refereed?: Yes, Invited?: Yes
137. Prete PRJ, Chahal S, Fernando A, Li T, Hane F, Deboef B, Albert MS. (2017). *Cyclodextrin-based rotaxanes as conjugatable molecular imaging biosensors for hyperpolarized  $^{129}\text{Xe}$  MRI*. International Society of Magnetic Resonance in Medicine (ISMRM) conference, 25<sup>th</sup> Annual Meeting, Honolulu, United States, Conference Date: April 22-27, 2017.  
Abstract  
Submitted  
Refereed? Yes, Invited? Yes

138. Albert MS. (2017). *Hyperpolarized Xenon Functional MRI of the Brain*. 14<sup>th</sup> Annual World Congress Society for Brain Mapping & Therapeutics, Los Angeles, United States.  
Conference Date: April 18-20, 2017.  
Abstract  
Published  
Refereed? Yes, Invited? Yes.
139. Albert MS. Albert MS. (2017). Comparing Hyperpolarized and Inert Fluorinated Gas MRI of the Lungs and Xenon-129 Biosensor Molecular MRI. International Workshop on Pulmonary Imaging, Conference Date: 2017/3  
Abstract  
Published  
Refereed? Yes, Invited? Yes.
140. Albert MS. (2017). *Magnetic Resonance Imaging with Hyperpolarized and Inert Gas Contrast Agents and Xenon Biosensor Molecular MRI*. ICMRM, Halifax, NS, Canada.  
Conference Date: August 13-17, 2017.  
Abstract  
Published  
Refereed? Yes, Invited?: Yes
141. Albert MS. (2017). *Hyperpolarized and Inert Gas MRI Physics and Medical Applications*. ICMRM, Halifax, NS, Canada.  
Conference Date: August 13-17, 2017.  
Abstract  
Published  
Refereed? Yes, Invited?: Yes
142. Albert MS. (2017). Medical Applications of Hyperpolarized Noble Gases Including in vivo HyperCEST detection. Polarization in Noble Gases Conference, Conference Date: 2017/10  
Abstract  
Published  
Refereed? Yes, Invited? Yes.
143. Albert MS. (2017). Hyperpolarized and Inert Gas MRI Technology and Biosensor Molecular MRI. Hyperpolarized and Inert Gas MRI Technology and Biosensor Molecular MRI, Krakow, Poland Conference Date: 2017/10  
Abstract  
Published  
Refereed? Yes, Invited? Yes.
144. Albert MS. (2017). Red Hot 19F Human Lung MRI with Inert Fluorinated Gases. Red Hot MRI: Fluorine Imaging Symposium, Conference Date: 2017/10  
Abstract

Published

Refereed? Yes, Invited? Yes.

145. Shepelytskyi Y, Davenport K, Fox MS, Li T, Albert MS, Davenport E. (2017). <sup>19</sup>F Chemical Shift Imaging (CSI) as a novel method for detection of 5-fluorouracil (5-FU) in colorectal tumor. Northern Health Research Conference, Conference Date: 2017/10

Abstract

Published

Refereed? Yes, Invited? Yes.

146. Hane F, Li T, Lawrence-Dewar J, Hassan A, Granberg K, Pellizzari R, Plata J, Albert MS. (2017). Detecting functional brain activity using hyperpolarized (HP) <sup>129</sup>Xenon Magnetic Resonance Imaging (MRI). Northern Health Research Conference, Conference Date: 2017/10

Abstract

Published

Refereed? Yes, Invited? Yes.

147. Prete PRJ, Chahal S, Fernando A, Li T, Hane F, Deboef B, Albert MS. (2017). HyperCEST Detection of Cyclodextrin-Based Pseudorotaxanes using Hyperpolarized <sup>129</sup>Xenon Magnetic Resonance Imaging at 3.0T. Polarization in Noble Gases, Conference Date: 2017/10

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Refereed? Yes, Invited? Yes.

148. Prete PRJ, Chahal S, Fernando A, Li T, Hane F, Deboef B, Albert MS. (2017). HyperCEST Detection of Cyclodextrin-Based Pseudorotaxanes using Hyperpolarized <sup>129</sup>Xenon Magnetic Resonance Imaging at 3.0T. Polarization in Noble Gases, Conference Date: 2017/10

Abstract

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Refereed? Yes, Invited? Yes.

149. Prete PRJ, Chahal S, Fernando A, Li T, Hane F, Deboef B, Albert MS. (2017). Using hyperpolarized <sup>129</sup>Xe Magnetic Resonance Imaging to Identify Potential Supramolecular Scaffolds for Xenon Biosensor Molecular Imaging Agents. Northern Health Research Conference, Conference Date: 2017/10

Abstract

Published

Refereed? Yes, Invited? Yes.

150. . Li T, Hane F, Lawrence-Dewar JM, Hassan A, Granberg K, Pellizzari R, Plata J, Albert MS. (2017). Can hyperpolarized <sup>129</sup>Xe MRI Detect Changes in Human Cerebral Perfusion Caused by Alzheimer's Disease? . Northern Health Research Conference, Conference Date: 2017/10

Abstract

Published

Refereed? Yes, Invited? Yes.

151. Li T, Hane F, Lawrence-Dewar JM, Hassan A, Granberg K, Pellizzari R, Plata J, Albert MS. (2017). In vivo detection of impaired cerebral perfusion in the human brain in Alzheimer's disease using hyperpolarized  $^{129}\text{Xe}$  MRI. Polarization in Noble Gases, Conference Date: 2017/10  
Abstract  
Published  
Refereed? Yes, Invited? Yes.
152. Hane F, Li T, Smylie P, Pellizzari R, Plata J, Albert MS. (2017). Results of the first In Vivo HyperCEST detection of a hyperpolarized xenon biosensor, cucurbit[6]uril. Northern Health Research Conference, Conference Date: 2017/10  
Abstract  
Published  
Refereed? Yes, Invited? Yes.
153. Plata J, Hane F, Li T, Smylie P, Pellizzari R, Albert MS. (2017). Detection of a cucurbit[6]uril biosensor in an animal model using hyperpolarized xenon MRI. Polarization in Noble Gases, Conference Date: 2017/10  
Abstract  
Published  
Refereed? Yes, Invited? Yes.
154. Braedan R.J. Prete, Dave Robinson, Ashvin Fernando, Yurii Shepelytskyi, Alanna Wade, Francis T. Hane, Brenton DeBoef & Mitchell S. Albert. (2018). Benzene-Appended Cucurbit[6]uril as a Potential Biosensor Scaffold for Hyperpolarized  $^{129}\text{Xe}$  MRI Molecular Contrast Agents. In Proc. Intl. Soc. Mag. Reason. Med 26. International Society for Magnetic Resonance in Medicine, Paris, France (3034) Conference Date: 2018/6  
Abstract  
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Refereed? Yes, Invited? Yes.
155. Yurii Shepelytskyi, Karen Davenport, Matthew S. Fox, Tao Li, Mitchell Albert and Eric Davenport. (2018). Detection of 5-Fluorouracil (5-FU) Tumor Trapping Using Fluorine-19 Chemical Shift Imaging in a Murine Model of Colorectal Cancer. In Proc. Intl. Soc. Mag. Reason. Med 26. International Society for Magnetic Resonance in Medicine, Paris, France (4001) Conference Date: 2018/6  
Abstract  
Published  
Refereed? Yes, Invited? Yes.
156. Albert MS. (2018). Advances in hyperpolarized xenon-129 magnetic resonance imaging. XeMat Conference at the University of Pennsylvania, Philadelphia, United States Conference Date: 2018/5  
Abstract  
Published  
Refereed? Yes, Invited? Yes.

157. Shepelytskyi Y, Li T, Hane F, Wade A, Grynko V, Newman C, Albert M. (2019). Octafluorocyclobutane as a novel <sup>19</sup>F MRI gas agent for significant lung image quality improvement. Proc. Intl. Soc. Mag. Reson. Med 27. International Society for Magnetic Resonance in Medicine, Montreal, Canada (1881) Conference Date: 2019/1  
Abstract  
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Refereed? Yes, Invited? Yes.
158. Shepelytskyi Y, Campbell M, Hane F, Li T, Solomin V, Grynko V, Albert M. (2019). Fluorine-19 (<sup>19</sup>F) Labeled Benzothiazole Derivative as a Biosensor for Detection of Alzheimer's Disease using Magnetic Resonance Imaging. Proc Int. Soc. Mag. Reson. Med 27. International Society for Magnetic Resonance in Medicine, Montreal, Canada (4369) Conference Date: 2019/4 \
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Refereed? Yes, Invited? Yes.
159. Shepelytskyi Y. Hane FT., Grynko V., Li T., Hassan A., Albert MS. (2020). Hyperpolarized <sup>129</sup>Xe function brain mapping. Proc Int. Soc. Mag. Reson. Med. International Society for Magnetic Resonance in Medicine, (0556) Conference Date: 2020/1  
Abstract  
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Refereed? Yes, Invited? Yes.
160. Yeo SK., Shepelytskyi Y., Grynko V., Hane FT., Li T., Albert MS. (2020). Detection of Tau Aggregates Using Lansoprazole in an Ex Vivo Rat Model of Alzheimer's Disease. Proc Int. Soc. Mag. Reson. Med. International Society for Magnetic Resonance in Medicine, (2996) Conference Date: 2020/1  
Abstract  
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Refereed? Yes, Invited? Yes.
161. Newman C., Shepelytskyi Y., Fernando A., Cesana PT., Li T., Wade A., Grynko V., Mendieta AM., Hane FT., DeBoef B., Albert MS. (2020). In-vitro HyperCEST detection of decacationic pillar-5-arene. Proc Int. Soc. Mag. Reson. Med. International Society for Magnetic Resonance in Medicine, (3078) Conference Date: 2020/3  
Abstract  
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Refereed? Yes, Invited? Yes.
162. Shepelytskyi Y., Grynko V., Li T., Hassan A., Granberg K., Albert MS. (2021). The effects of an initial depolarization pulse on the dissolved phase hyperpolarized <sup>129</sup>Xe images. Proc Int. Soc. Mag. Reson. Med. International Society for Magnetic Resonance in Medicine, (3574) Conference Date: 2021/1  
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Refereed? Yes, Invited? Yes.

163. Grynko V., Shepelytskyi Y., Li T., Hassan A., Granberg K., Albert MS. (2021). Multi-slice imaging of the human brain with hyperpolarized  $^{129}\text{Xe}$ . Polarization in Noble Gas Workshop, (13) Conference Date: 2021/12

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Refereed? Yes, Invited? Yes.

164. Grynko V., Shepelytskyi Y., Li T., Hassan A., Granberg K., Albert MS. (2021). Multi-slice imaging of the human brain with hyperpolarized  $^{129}\text{Xe}$ . Polarization in Noble Gas Workshop, (13) Conference Date: 2021/12

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Refereed? Yes, Invited? Yes.

165. Albert MS. (2021). Hyperpolarized  $^{129}\text{Xe}$  Brain MR Imaging and HP  $^{129}\text{Xe}$  Molecular Imaging. Polarization in Noble Gas workshop, (18-19) Conference Date: 2021/12

Abstract

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Refereed? Yes, Invited? Yes.

166. Matheson AM., Kooner HK., Bier E., Lu J., Driehuys B., Kirby M., Santyr G., Albert MS., Shepelytskyi Y., Grynko V., Svenningsen S., Ouriadov A., Dhaliwal I., Nicholson JM., Parraga G. (2022).  $^{129}\text{Xe}$  GasTransfer MRI RBC-to-Barrier Ratio in Post-Acute COVID19 Syndrome: Polarization in Noble Gas workshop, (18-19) Conference Date: 2021/12

Abstract

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Refereed? Yes, Invited? Yes.

167. Grynko V., Shepelytskyi Y., Li T., Hassan A., Granberg K., Albert MS. (2021). Multi-slice imaging of the human brain with hyperpolarized  $^{129}\text{Xe}$ . Polarization in Noble Gas Workshop, (13) Conference Date: 2021/12

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Refereed? Yes, Invited? Yes.

168. Matheson AM., Kooner HK., Bier E., Lu J., Driehuys B., Kirby M., Santyr G., Albert MS., Shepelytskyi Y., Grynko V., Svenningsen S., Ouriadov A., Dhaliwal I., Nicholson JM., Parraga G. (2022).  $^{129}\text{Xe}$  GasTransfer MRI RBC-to-Barrier Ratio in Post-Acute COVID19 Syndrome: Clinically relevant?. Proc. Int. Soc. Mag. Reson. Med 30. International Society for Magnetic Resonance in Medicine Annual Conference 2022, London, United Kingdom (2211)

Abstract

Published

Refereed? Yes, Invited? Yes.

169. Grynko V., Shepelytskyi Y., Li T., Aalto H., Ruset I.C., Albert M.C. (2022). Maximization of cucurbit [6] uril hyperpolarized chemical exchange saturation transfer with saturation pre-pulse train optimisation at 3 T. World Molecular Imaging Congress, Miami, United States  
Abstract  
Published  
Refereed? Yes, Invited? Yes.
170. Shepelytskyi Y., Grynko V., Li T., Hassan A., Granberg K., Albert MS. Hyperpolarized  $^{129}\text{Xe}$  Time-of-Flight pulse sequence for substantial brain signal stability improvement. Imaging Network Ontario Symposium 2022 (digital poster at ImNO 2022 meeting).
171. Grynko V., Bataarchuk V., Shepelytskyi Y., Aalto H., Deschamps J., Ruset IC., Albert, MS. Maximization of cucurbit[6]uril hyperpolarized chemical exchange saturation transfer (HyperCEST) in bovine blood at 3.0 T. In: Proc. Intl. Soc. Mag. Reson. Med. International Society for Magnetic Resonance in Medicine (31).  
Conference Date: 2023/06  
Abstract  
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Refereed? Yes, Invited? Yes.
172. Mikowska L, Grynko V, Shepelytskyi Y, Ruset IC, Deschamps J, Aalto H, Targosz-Korecka M, Haranczyk H, Balamore D, Albert MS. Effect of glucose on the HP  $^{129}\text{Xe}$  dissolved phase blood resonances. In: Proc. Intl. Soc. Mag. Reson. Med. International Society for Magnetic Resonance in Medicine (31). 31. 2023:4503.  
Abstract  
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Refereed? Yes, Invited? Yes.
173. Bataarchuk V., Grynko V., Shepelytskyi Y., Aalto H., Deschamps J., Ruset IC., Albert, MS. Hyperpolarized chemical exchange saturation transfer (HyperCEST) maximization of cucurbit[6]uril imaging biosensor in blood for 3.0 T clinical MRI. In: Imaging Network Ontario Symposium 2022 Proceedings, 2023. p. 60.  
Abstract  
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Refereed? Yes, Invited? Yes.