## BIOGRAPHICAL SKETCH

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NAME: **Hersh Chandarana, MD, MBA**

POSITION TITLE: Professor of Radiology and Urology, Vice Chair of Hospital Operations & Analytics

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

| INSTITUTION AND LOCATION | DEGREE *(if applicable)* | COMPLETION DATE MM/YYYY | FIELD OF STUDY |
|---|---|---|---|
| St. John's University, Jamaica, NY | B.S. | 06/1998 | Pharmacy |
| NYU School of Medicine, New York, NY | M.D. | 06/2002 | Medicine |
| Winthrop University Hospital, Mineola, NY | Internship | 06/2003 | Medicine |
| NYU Medical Center, New York, NY | Residency | 06/2007 | Radiology |
| NYU Medical Center, New York, NY | Fellowship | 06/2008 | MRI – Body and Cardiovascular |
| Stern School of Business, New York, NY | MBA | 08/2017 | Business Administration |

### A. Personal Statement

I am a physician scientist and Vice Chair of Hospital Operations & Analytics in the department of radiology at NYU Grossman School of Medicine. Previously, I served as an Associate Chair for Clinical and Translational Research in the department of radiology. I also serve as co-director of our NIH funded (P41) biotechnology resource center (BTRC). Over the last 15 years, as a principal investigator/co-investigator on NIH and Radiological Society of North America (RSNA) foundation supported projects, I have been involved in the development and application of advance imaging techniques to study pathophysiology of abdominopelvic diseases, with special interest in oncologic imaging. One of our major areas of focus is to make abdominopelvic MR imaging motion robust, free-breathing, fast and easy in sick, pediatric, elderly and oncologic patients. This work has led to development of novel accelerated MRI methods for motion robust and motion-sorted imaging such as GRASP and XD-GRASP. Our group's recent efforts are focused on making MRI more accessible by decreasing cost and complexity of the scanner and examination through advances in hardware, software, and image reconstruction methods. I work closely with clinicians and imaging scientists as well as industry partners to translate technologic advances to address important unsolved clinical problems.

### B. Positions and Honors

**Positions and Employment**

2008-15 Assistant Professor, Department of Radiology, NYU, New York, NY
2008- Assistant Attending in Radiology, Bellevue Hospital, New York, NY
2012-17 Chief, Division of Abdominal Imaging
2015-21 Associate Professor, Department of Radiology, NYU, New York, NY
2017-22 Associate Chair for Clinical and Translational Research
2021- Professor of Radiology
2022- Vice Chair of Hospital Operations & Analytics

**Other Professional Positions and Visiting Appointments**

2010 Visiting Fellowship - MR Research & Development, Siemens HealthCare, Erlangen, Germany

## Other Experience and Professional Memberships

*Memberships in Professional Societies*

- Radiological Society of North America (RSNA)
- International Society for Magnetic Resonance in Medicine (ISMRM)
- Society of Abdominal Radiology (SAR)
- Society of Advance Body Imaging (SABI)
- International Cancer Imaging Society (ICIS)

*Editorial Boards*

| | | |
|---|---|---|
| 2008- | RADIOLOGY | Ad hoc reviewer |
| 2009- | American Journal of Roentgenology | Ad hoc reviewer |
| 2009- | Journal of Magnetic Resonance in Medicine | Ad hoc reviewer |
| 2009- | NMR in Biomedicine | Ad hoc reviewer |
| 2010- | Investigative Radiology | Ad hoc reviewer |
| 2011- | American Society of Nephrology | Ad hoc reviewer |
| 2011- | Journal of Pancreas | Ad hoc reviewer |
| 2011- | Academic Radiology | Ad hoc reviewer |
| 2013-18 | RADIOLOGY | Associate Editor |
| 2013- | Journal of Magnetic Resonance in Medicine | Deputy Editor |
| 2017 | Investigative Radiology | Assistant Editor |

## Honors

- Somerville Memorial Scholarship for Academic Excellence
- Merck Award for Excellence in Academic Achievement
- Rho Chi Society Research Award
- Silver Medal Recipient for the second highest GPA in the graduating class; St. John's University
- Wolfe Scholarship for 4th Year Medical Student
- Alpha Omega Alpha, NYU School of Medicine
- ISMRM Education Stipend Award 2008
- 3rd place scientific paper award, Society of Uroradiology Annual meeting 2010
- Reviewer with Distinction; Editor's Recognition Awards RADIOLOGY 2009 & 2010
- Reviewer with Distinction; JMRI 2010 & 2012
- Elected Fellow of Society of Abdominal Radiology (SAR) and SCBT-MR
- Guest Editor, Radiology Clinics, Issue on Advance MR imaging in Clinical Practice

## C. Contributions to Science

1. Current abdominal MR techniques suffer from being too slow and depend on the breath-hold capacity of the individuals which is limited in pediatric subjects and elderly patients. With my colleagues at Center for Biomedical Imaging (CBI), we have developed a free-breathing robust MR technique for dynamic contrast enhanced imaging called GRASP (provisional patent filed) which permits simultaneous high spatial and temporal resolution free-breathing imaging. We have developed free-breathing fast-imaging framework for diagnostic abdominopelvic MRI in pediatric patients without the need for sedation. This work was supported by NIH grant (NIH/NIBIB #1R01EB018308-01A1, PI: Hersh Chandarana and Tobias Block).

    a. **Chandarana H**, Block TK, Rosenkrantz AB, Lim RP, Kim D, Mossa DJ, Babb JS, Kiefer B, Lee VS. Free-breathing radial 3D fat-suppressed $T_1$-weighted gradient echo sequence: A viable alternative for contrast-enhanced liver imaging in patients unable to suspend respiration. *Invest Radiol*. 2011; 46(10):648-53.
    b. **Chandarana H**, Block KT, Winfeld MJ, Lala SV, Mazori D, Giuffrida E, Babb JS, Milla SS. Free-breathing contrast-enhanced T1-weighted gradient-echo imaging with radial k-space sampling for paediatric abdominopelvic MRI. *Eur Radiol*. 2014; 24(2):320-6.

c. **Chandarana H**, Feng L, Block TK, Rosenkrantz AB, Lim RP, Babb JS, Sodickson DK, Otazo R. Free-breathing contrast-enhanced multiphase MRI of the liver using a combination of compressed sensing, parallel imaging, and golden-angle radial sampling. *Invest Radiol*. 2013; 48(1):10-6. PMCID: PMC3833720
d. Feng L, Axel L, **Chandarana H**, Block KT, Sodickson DK, Otazo R. XD-GRASP: Golden-Angle Radial MRI with reconstruction of extra motion-state dimensions using compressed sensing. *Magn Reson Med*. 2016 Feb;75(2):775-88. PMCID: PMC4583338

2. Using these novel MR techniques we are studying tumor and organ structure, perfusion, and function with MRI. Some very promising applications include assessment of liver function, kidney function (MR-GFR), kidney tumor, bowel wall perfusion in Crohn's disease, and prostate cancer perfusion. Ability to assess organ perfusion with MRI will provide insight into changes in health and disease. Similarly assessment of tumor vascularity is important to assess tumor aggressiveness as well as monitoring early treatment response.

   a. Kang SK, Huang WC, Wong S, Zhang JL, Stifelman MD, Bruno MT, Babb JS, Lee VS, **Chandarana H**. Dynamic contrast-enhanced magnetic resonance imaging measurement of renal function in patients undergoing partial nephrectomy: Preliminary experience. *Invest Radiol*. 2013; 48(10):687-92.
   b. **Chandarana H**, Block TK, Ream J, Mikheev A, Sigal SH, Otazo R, Rusinek H. Estimating liver perfusion from free-breathing continuously acquired dynamic gadolinium-ethoxybenzyl-diethylenetriamine pentaacetic acid-enhanced acquisition with compressed sensing reconstruction. *Invest Radiol*. 2015; 50(2):88-94. PMCID: PMC4286452
   c. Ream JM, Doshi A, Lala SV, Kim S, Rusinek H, **Chandarana H**. High spatiotemporal resolution dynamic contrast-enhanced MR enterography in Crohn disease terminal ileitis using continuous Golden-Angle Radial sampling, compressed sensing, and parallel imaging. *AJR Am J Roentgenol*. 2015 Jun;204(6):W663-9.
   d. Rosenkrantz AB, Geppert C, Grimm R, Block TB, Glielmi C, Feng L, Otazo R, Ream JM, Romolo MM, Taneja SS, Sodickson DK, **Chandarana H**. Dynamic contrast-enhanced MRI of the prostate with high spatiotemporal resolution using compressed sensing, parallel imaging, and continuous Golden-Angle Radial sampling: Preliminary experience. *Magn Reson Imaging*. 2015 May;41(5):1365-73. PMCID: PMC4233205

3. PET/MRI permits simultaneous or near simultaneous acquisition of PET and MRI data. Our group has been involved in development, validation and clinical translation of this exciting technology in oncologic diseases. We work closely and collaboratively with industry scientists to translate these technological advances to clinical practice.

   a. **Chandarana H**, Heacock L, Rakheja R, DeMello LR, Bonavita J, Block TK, Geppert C, Babb JS, Friedman KP. Pulmonary nodules in patients with primary malignancy: comparison of hybrid PET/MR and PET/CT imaging. Radiology. 2013 Sep;268(3):874-81.
   b. Rakheja R, **Chandarana H**, DeMello L, Jackson K, Geppert C, Faul D, Friedman K. Correlation between standardized uptake value and apparent diffusion coefficient of neoplastic lesions evaluated with whole-body simultaneous hybrid PET/MRI. *AJR Am J Roentgenol*. 2013; 201(5):1115-9.
   c. Heacock L, Weissbrot J, Raad R, Campbell N, Friedman K, Ponzo F, **Chandarana H**. PET/MRI for the evaluation of patients with lymphoma: initial observations. *AJR Am J Roentgenol*. 2015; 204(4):842-8. PMCID: PMC4465553
   d. Raad RA, Friedman KP, Heacock L, Ponzo F, Melsaether A, **Chandarana H**. Outcome of small lung nodules missed on hybrid PET/MRI in patients with primary malignancy. *J Magn Reson Imaging*. 2016 Feb;43(2):504-11.

4. MRI is a powerful imaging modality but is not routinely used as a first line imaging for many oncologic applications such as screening for prostate and liver cancer. This is due to limited accessibility and high cost of MRI scanners and complexity of performing and interpreting these exams. Our group in interested in breaking this accessibility and cost barrier of MRI through advances in hardware, software, and image reconstruction in order to democratize MRI scanners and examination.

a. Johnson PM, Tong A, Donthireddy A, Melamud K, Petrocelli R, Smereka P, Qian K, Keerthivasan MB, **Chandarana H**, Knoll F. Deep Learning Reconstruction Enables Highly Accelerated Biparametric MR Imaging of the Prostate. J Magn Reson Imaging. 2021 Dec 7.
b. **Chandarana H**, Bagga B, Huang C, Dane B, Petrocelli R, Bruno M, Keerthivasan M, Grodzki D, Block KT, Stoffel D, Sodickson DK. Diagnostic abdominal MR imaging on a prototype low-field 0.55 T scanner operating at two different gradient strengths. Abdom Radiol (NY). 2021 Aug 20.
c. Khodarahmi I, Brinkmann IM, Lin DJ, Bruno M, Johnson PM, Knoll F, Keerthivasan MB, **Chandarana H**, Fritz J. New-Generation Low-Field Magnetic Resonance Imaging of Hip Arthroplasty Implants Using Slice Encoding for Metal Artifact Correction: First In Vitro Experience at 0.55 T and Comparison With 1.5 T. Invest Radiol. 2022 Mar 2.
d. Azour L, Condos R, Keerthivasan MB, Bruno M, Pandit Sood T, Landini N, Silverglate Q, Babb J, **Chandarana H**, Moore WH. Low-field 0.55 T MRI for assessment of pulmonary groundglass and fibrosis-like opacities: Inter-reader and inter-modality concordance. Eur J Radiol. 2022 Sep 8

**List of Published Work in PubMed: https://pubmed.ncbi.nlm.nih.gov/?term=Chandarana+H[AU]**

## D. Additional Information: Research Support and/or Scholastic Performance

**Ongoing Research Support**

R21 CA256324-01 (Chandarana. H.) NIH/NCI 12/01/20 – 11/30/22
Low-Field High-Performance MRI for Screening Clinically Significant Prostate Cancer: Developing novel methods on low-field MRI to enable MRI for screening clinically significant prostate cancer.
Role: Principal Investigator

1R01CA245671-01A1 (Sigmund, E. & Chandarana, H.) NIH/NCI 08/01/20 - 04/31/25
Advanced Diffusion Imaging for Management of Renal Cancer: Oncologic Control and Renal Functional Reserve
By evaluating kidney cancer patients with diffusion-weighted magnetic resonance imaging, we propose to both better understand the cancer itself and potentially predict the risk of function loss before surgery.
Role: MPI

5P41EB017183-07 (Sodickson, D.) NIH/NIBIB 09/30/14 - 07/31/24
*Center for Advanced Imaging Innovation and Research ($CAI^2R$)*
*Sub ID 6366, TR&D 1: Reimagining the Future of Scanning: Intelligent Image Acquisition, Reconstruction, and Analysis*
The broad mission of our Center for Advanced Imaging Innovation and Research ($CAI^2R$) is to bring together collaborative translational research teams for the development of high-impact biomedical imaging technologies, with the ultimate goal of changing day-to-day clinical practice. Technology Research and Development (TR&D) Project 1 aims to replace traditional complex and inefficient imaging protocols with simple, comprehensive acquisitions that also yield quantitative parameters sensitive to specific disease processes. In the first funding period of this P41 Center, our project team led the way in establishing rapid, continuous, comprehensive imaging methods, which are now available on a growing number of commercial magnetic resonance imaging (MRI) scanners worldwide.
Role: Co-Investigator

5P41EB017183-07 (Sodickson, D.) NIH/NIBIB 09/30/14 - 07/31/24
*Center for Advanced Imaging Innovation and Research ($CAI^2R$)*
*Sub ID 6365, $CAI^2R$ Administration*
Our administrative component supports this mission by a) maintaining efficient and effective day-to-day operations, b) promoting robust communication among our staff and our various stakeholders, and c) providing thoughtful strategic guidance informed both by external expertise and by ongoing self-evaluation.
Role: Co-Investigator

5U24NS113844-02 (Petkova, E. & Troxel, A.) NIH/NINDS 09/30/19 - 08/31/24
*EPPIC-NET DCC*
The Data Coordinating Center (DCC) of the EPPIC-Net, in close collaboration with the network's Clinical Coordinating Center, the Specialized Clinical Centers, HEAL, and government partners, will provide statistical and data management expertise for conducting high-quality efficient studies for developing non-addictive treatments for pain. In addition, it will compile a collection of clinical and biomarker data and establish a repository for biospecimens. These resources will be linked and shared with the community of pain researchers.
Role: Co-Investigator

**Completed Research Support (past three years)**

U01EB018760 (Sodickson D & Otazo R) NIH/NIBIB 09/16/15 - 05/31/20
*SparseCT: Order-of-Magnitude Dose Reduction with Interrupted-Beam Acquisition*
The aim of this project is to incorporate multi-hole collimator and compressed sensing reconstruction algorithms to reduce the radiation dose to sub-mSv level in patients undergoing thoracic and abdominal CT examinations.
Role: Co-Investigator

R01EB018308 (Chandarana, H.) NIH/NIBIB 02/01/15 - 12/31/19
*Comprehensive Motion-Robust Pediatric MR Imaging Using Radial Acquisitions*
In the proposed project, we will develop novel motion-robust MR imaging techniques based on radial k-space acquisition and advanced non-linear reconstruction, and evaluate them in clinical studies for abdominopelvic imaging of pediatric patients with Tuberous Sclerosis.
Role: Co-PD/PI

RSCH1003 (Chandarana, H.) RSNA R&E Foundation 07/01/10 - 06/30/17
*Evaluation and Prediction of Treatment Response in Liver Metastasis Undergoing Chemotherapy with use of Dual Energy CT Iodine Quantification Technique*
The overall aim of this project is to validate the use of the quantitative measurement of tumor vascularity based on detecting intralesional iodine concentration obtained by contrast enhanced dual energy CT to assess and predict treatment response in patients undergoing chemotherapy with antiangiogenic agents.
Role: Principal Investigator

5K07CA197134-04 (Kang, S.) NIH/NCI 08/01/16 - 07/31/21
*Patient-Centered Decision-Making for Management of Small Renal Tumors*
We will determine the optimal management strategies for patients with small kidney tumors, and create tools to communicate personalized harms and benefits of treatment options and promote shared decision-making.
Role: Co-Mentor