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## BIOGRAPHICAL SKETCH

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NAME: Miriam A. Bredella, M.D.

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eRA COMMONS USER NAME (credential, e.g., agency login): MBREDELLA

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POSITION TITLE: Professor of Radiology, Harvard Medical School, Vice Chair Faculty Affairs, Department of Radiology, Massachusetts General Hospital

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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.*)

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| INSTITUTION AND LOCATION                               | DEGREE<br>(if applicable) | Completion<br>Date<br>MM/YYYY | FIELD OF STUDY               |
|--------------------------------------------------------|---------------------------|-------------------------------|------------------------------|
| University of Hamburg Medical School, Hamburg, Germany | MD                        | 06/1997                       | Medicine                     |
| University of California, San Francisco                | Postdoctoral              | 06/99                         | Osteoporosis, arthritis      |
| Greater Baltimore Medical Center, Baltimore, MD        | Internship                | 06/2000                       | Internal Medicine            |
| University of California, San Francisco                | Residency                 | 06/2004                       | Radiology                    |
| Massachusetts General Hospital, Boston, MA             | Fellowship                | 06/2005                       | Musculoskeletal<br>Radiology |

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### A. Personal Statement

I am Professor of Radiology at HMS and an interventional musculoskeletal radiologist and the Director of musculoskeletal research in the Department of Radiology at MGH. I am also Vice Chair for Faculty Affairs, Department of Radiology, and Director of the Center for Faculty Development at MGH. I have established a multidisciplinary clinical research program in the area of metabolic imaging that combines innovative translational, clinical, and outcomes research. I have developed advanced imaging methods, including feasibility studies, to noninvasively quantify bone microarchitecture, lipid distribution and mitochondrial function, liver and marrow adiposity, and muscle composition in patients with obesity, insulin resistance, growth hormone (GH) disorders, and anorexia nervosa. I am currently the PI on 3 R01 grants from the NIDDK, examining the effects of bariatric surgery on bone in adolescents with obesity (R01 DK103946), the effects of intranasal oxytocin on hypothalamic inflammation, liver adiposity, and body composition in adolescents with obesity (R01 DK124223), and the effect of estrogen administration to counter steatosis, fibrosis, inflammation, and immune dysregulation in NASH (R01DK120983). I am also the PI on a K24 mentoring award (K24 DK109940) and the director and PI of the KL2/Harvard Catalyst Medical Investigator Training Program (KL2TR002542). Over the last 15 years, I have worked on investigating marrow adiposity, bone microarchitecture, lipid distribution, mitochondrial function, liver adiposity and muscle composition in patients with anorexia nervosa, growth hormone (GH) disorders, obesity, and the female athlete triad.

### B. Positions, Scientific Appointments and Honors

#### Positions

2021-present Vice Chair for Clinical Operations, Department of Radiology, MGH, Boston, MA  
2020-present Director Center for Faculty Development, MGH  
2020-present Chair Educational Exhibits Awards Committee (EEAC) MSK /BONE Subcommittee, Radiological Society of North America (RSNA)  
2020-2022 NIH Clinical and Translational Science Awards (CTSA) Program Steering Committee  
2018- present Co-director KL2/Harvard Catalyst Medical Investigator Training Program  
2018-present Vice Chair Faculty Affairs, Department of Radiology, MGH, Boston, MA  
2017-present Professor of Radiology, Harvard Medical School, Boston, MA

2012-2017 Associate Professor of Radiology, Harvard Medical School, Boston, MA  
2007-2012 Assistant Professor of Radiology, Harvard Medical School, Boston MA  
2005-2007 Instructor in Radiology, Harvard Medical School, Boston MA  
2005-present Assistant Radiologist, Department of Radiology, Massachusetts General Hospital, Boston, MA  
2004-2005 Fellow in Musculoskeletal Radiology, Department of Radiology, Massachusetts General Hospital, Boston, MA  
2000-2004 Residency in Diagnostic Radiology, University of California, San Francisco (2003-2004: Chief Resident)  
1999-2000 Internship, Greater Baltimore Medical Center, Baltimore, MD  
1997-1999 Postdoctoral Research Fellow, University of California, San Francisco, Department of Radiology, Osteoporosis and Arthritis Research Group

### **Scientific Appointments**

2021 Ad hoc reviewer NIH-ZDK1 GRB-S (M3): Liver Cirrhosis Network: Clinical Research Centers (U01)  
2021 Chair: NIH-ZRG1 EMNR A (53): Intersection of Sex and Gender Influences on Health and Disease  
2021 Ad hoc reviewer NIH Director's Pioneer Award (NDPA) NIDDK Catalyst Award  
2020 Chair: NIH-ZRG1 EMNR A (53): Intersection of Sex and Gender Influences on Health and Disease  
2020-present Secretary, Society of Academic Bone Radiologists (SABR)  
2019-2020 Deputy Editor for *Radiology*  
2019 Ad hoc reviewer NIH CMRI Special Emphasis Panel/Scientific Review Group ZRG1 EMNR-A (70) R, U54 Specialized Centers of Research Excellence (SCORE) on Sex Differences  
2019 Chair: NIH- ZRG1 EMNR A (52): Building Interdisciplinary Research Careers in Women's Health (BIRCWH) K12s  
2018 Ad hoc reviewer NIH-NIDDK Special Emphasis Panel ZDK1 GRB-9 (M3)  
2018- Executive Committee, International Skeletal Society  
2017- Education Exhibits Awards Committee, Radiological Society of North America (RSNA)  
2017 Ad hoc reviewer NIH Skeletal Biology Development and Disease (SBDD) Study Section  
2017 Ad hoc reviewer NIH-NIDDK Special Emphasis Panel ZDK1 GRB-9 (O1)  
2017 Ad hoc reviewer NIH Special Emphasis Panel ZRG1 PSE-V (O2) M  
2017 Chair of collaborative committee for the Performance and Interpretation of Magnetic Resonance Imaging of the Fingers and Toes, American College of Radiology (ACR)–Society of Pediatric Radiology (SPR)– Society of Skeletal Radiology (SSR)  
2016- Editorial Board, Journal of Bone and Mineral Research (JBMR)  
2016 Board of Directors, Academy of Radiology Research  
2016 Fellowship/Education Committee, Society of Academic Bone Radiologists (SABR)  
2016 Ad hoc reviewer Special Emphasis Panel NIH-NIDDK ZDK1 GRB-9 (J4)  
2016 Ad hoc reviewer NIH Clinical and Integrative Diabetes and Obesity (CIDO) Study Section  
2016 Ad hoc reviewer Swiss National Science Foundation  
2016 Ad hoc reviewer NIH Special Emphasis Panel NIH ZDK1 GRB-7 (O2) 1: Exploration of the Roles of Brown and Beige Adipose Tissue in Humans (R01)  
2016 Ad hoc reviewer National Science Foundation (NSF) Biological Anthropology Program  
2016 Ad hoc reviewer NIH Skeletal Biology Development and Disease (SBDD) Study Section  
2015 Ad hoc reviewer Special Emphasis Panel NIH-NIDDK ZDK1 GRB-3R01  
2015 Ad hoc reviewer NIH Clinical and Integrative Diabetes and Obesity (CIDO) Study Section  
2015 Ad hoc reviewer National Science Foundation (NSF) Biological Anthropology Program  
2014- Founding Editorial Board, Journal of Hip Preservation Surgery  
2014- Council of Distinguished Investigators of the Academy of Radiology Research  
2014- Chair Scientific Review Committee, International Skeletal Society (ISS)  
2013- Editorial Board, Skeletal Radiology  
2012 Guest Editor, MRI Clinics of North America  
2006- Poster selection committee, Radiological Society of North America (RSNA)

### **Honors**

2021 Fellow of the American College of Radiology (ACR)  
2020 Program Award for Culture of Excellence in Mentoring, Harvard Medical School  
2020 2020 Innovative Initiatives Award, Boston Women's Workforce Council  
2019 Robert H. Freiburger, MD, Honorary Lecture in Musculoskeletal Radiology, Hospital for Special Surgery, NY, NY

- 2018-19 SCARD-GE Lead, Empower and Disrupt (LEAD) Scholar, Society of Chairs of Academic Radiology Departments (SCARD)
- 2018 Howard Steinbach Memorial Lecture, University of California, San Francisco
- 2014 National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) – NIH Committee on standards for conducting FDG-PET studies to detect human brown fat
- 2014 Presidents Medal, International Skeletal Society (ISS)
- 2014 Distinguished Investigator Award, Academy of Radiology Research
- 2010 PCIR Junior Investigator Laboratory Support Award, Harvard Catalyst
- 2009 Radiology Research Alliance Young Investigator Award, Association of University Radiologists (AUR)
- 2008 Claflin Distinguished Scholar Award, Massachusetts General Hospital
- 2008 Harold M. Frost Young Investigator Award, American Society for Bone and Mineral Research (ASBMR)
- 2006 Golden Fabella Teaching Award, Musculoskeletal Radiology, Massachusetts General Hospital
- 2004 Elmar Ng Award, Outstanding Resident in Diagnostic Radiology, University of California, San Francisco
- 2003 Research and Education Foundation Member-in-Training Award in Diagnostic Radiology, American Association for Women Radiologists (AAWR)
- 2002 Margulis Society Research Award, University of California, San Francisco
- 2002 Toshiba Resident Program to attend the Annual Society of Radiologists in Ultrasound (SRU) meeting
- 2002 Lucy Frank Squire Distinguished Resident Award, American Association for Women Radiologists (AAWR)
- 2001 Margulis Society Research Award, University of California, San Francisco
- 2001 Roentgen Resident Research Award, Radiological Society of North America (RSNA)
- 1999 Radiological Society of North America (RSNA) Fellowship Research Trainee Prize
- 1998 Doctoral Thesis (magna cum laude), University of Hamburg Medical School, Hamburg, Germany

### C. Contribution to Science

1. **Functional imaging to assess mechanisms of insulin resistance in obesity:** I have developed novel imaging techniques to investigate body composition predictors of insulin resistance in obesity *non-invasively*. I have developed and validated a breath-hold technique for quantification of intrahepatic lipid (IHL) content using proton MR spectroscopy (1H-MRS) which is particularly valuable in studying children and adolescents. I have also developed techniques to quantify intramyocellular lipids (IMCL) using 1H-MRS and investigated mechanisms by which IMCL and IHL modulate insulin resistance. These novel techniques have been published in peer-reviewed journals and are now applied to many NIH-funded research protocols. I have received the PCIR Junior Investigator Laboratory Support Award from Harvard Catalyst for my work on adiponectin and ectopic fat content in obesity.
  - a. **Bredella MA**, Ghomi RH, Thomas BJ, Ouellette HA, Sahani DV, Miller KK, Torriani M. Breath-hold 1H-magnetic resonance spectroscopy for intrahepatic lipid quantification at 3 Tesla. *J Comput Assist Tomogr* 2010;34:372-6. PMID: PMC2877282
  - b. **Bredella MA**, Ghomi RH, Thomas BJ, Miller KK, Torriani M. Comparison of 3.0 T proton magnetic resonance spectroscopy short and long echo-time measures of intramyocellular lipids in obese and normal-weight women. *J Magn Reson Imaging* 2010;32:388-93. PMID: 20677267, PMID: PMC3662051
  - c. Schorr M, Dichtel LE, Gerweck AV, Valera RD, Torriani M, Miller KK, **Bredella MA**. Sex differences in body composition and association with cardiometabolic risk. *Biol Sex Differ*. 2018 Jun 27;9(1):28. PMID: PMC6022328
  - d. Haines MS, Dichtel LE, Santoso K, Torriani M, Miller KK, **Bredella MA**. Association between muscle mass and insulin sensitivity independent of detrimental adipose depots in young adults with overweight/obesity. *Int J Obes (Lond)*. 2020 Sep;44(9):1851-1858. PMID: PMC7483278
2. **Bone-fat connection in obesity:** I have conducted several studies on detrimental effects of adiposity on bone, using novel non-invasive imaging techniques. While obesity was thought to protect against osteoporosis, I have shown that visceral adiposity and ectopic lipids, such as intrahepatic lipids and intramyocellular lipids (IMCL) have detrimental effects on bone. I have developed novel imaging techniques to quantify the amount of marrow adipose tissue (MAT) and composition and I was the first to investigate determinants of MAT in obesity. This work has resulted in a R24 grant where I am a co-investigator. My studies on detrimental effects of obesity on bone have led to many peer reviewed publications, a R01 grant on the effects of bariatric surgery on bone in obese adolescents, press conferences and press releases.

- a. **Bredella MA**, Torriani M, Ghomi RH, Thomas BJ, Brick DJ, Gerweck AV, Rosen CJ, Klibanski A, Miller KK. Vertebral bone marrow fat is positively associated with visceral fat and inversely associated with IGF-1 in obese women. *Obesity* 2011;19:49-53. PMID: 20467419, PMCID: PMC3593350
  - b. **Bredella MA**, Lin E, Gerweck AV, Landa MG, Thomas BJ, Torriani M, Bouxsein ML, Miller KK. Determinants of bone microarchitecture and mechanical properties in obese men. *J Clin Endocrinol Metab.* 2012; 97(11):4115-22. PMCID: PMC3485587
  - c. **Bredella MA**, Gill CM, Gerweck AV, Landa MG, Kumar V, Daley SM, Torriani M, Miller KK. Ectopic and Serum Lipid Levels Are Positively Associated with Bone Marrow Fat in Obesity. *Radiology.* 2013 Nov;269(2):534-41. PMCID: PMC3807082
  - d. **Bredella MA**, Singhal V, Hazhir Karzar N, Animashaun A, Bose A, Stanford FC, Carmine B, Misra M. Effects of Sleeve Gastrectomy on Bone Marrow Adipose Tissue in Adolescents and Young Adults with Obesity. *J Clin Endocrinol Metab* 2020 Nov 1;105(11):e3961-e3970. PMCID: PMC7494241
2. **Effects of low growth hormone on cardiometabolic risk, IHL, and bone in obesity:** I have performed several interventional studies on the effects of low growth hormone (GH) and GH replacement on insulin resistance, body composition including IHL, and bone in obesity. I was the first to demonstrate improvement in intrahepatic lipids in obese men following GH administration. I received a K23 grant on the effects of GH on IMCL in obesity and a R01 grant on the effects of GH replacement on bone in obesity.
- a. **Bredella MA**, Torriani M, Thomas BJ, Ghomi RH, Brick DJ, Gerweck AV, Miller KK. Peak growth hormone-releasing hormone-arginine-stimulated growth hormone is inversely associated with intramyocellular and intrahepatic lipid content in premenopausal women with obesity. *J Clin Endocrinol Metab* 2009;94:3995-4002. PMCID: PMC2758723
  - b. **Bredella MA**, Gerweck AV, Lin E, Landa MG, Torriani M, Schoenfeld DA, Hemphill LC, Miller KK. Effects of GH on body composition and cardiovascular risk markers in young men with abdominal obesity. *J Clin Endocrinol Metab.* 2013 Sep;98(9):3864-72. PMCID: PMC3763970
  - c. **Bredella MA**, Gerweck AV, Barber LA, Breggia A, Rosen CJ, Torriani M, Miller KK. Effects of growth hormone administration for 6 months on bone turnover and bone marrow fat in obese premenopausal women. *Bone.* 2014 May;62:29-35. PMCID: PMC4014200
  - d. **Bredella MA**, Schorr M, Dichtel LE, Gerweck AV, Young BJ, Woodmansee WW, Swearingen B, Miller KK. Body Composition and Ectopic Lipid Changes With Biochemical Control of Acromegaly. *J Clin Endocrinol Metab* 2017 Nov 1;102(11):4218-4225. PMCID: PMC6283448
3. **Effects of undernutrition on bone and fat:** I studied bone microarchitecture in women with anorexia nervosa (AN) and was the first to describe impaired trabecular microarchitecture of the distal radius in adolescents with AN who had normal BMD. This work was awarded the Harold M. Frost Young Investigator Award from the American Society for Bone and Mineral Research (ASBMR). I was the first to study marrow adipose tissue in women with AN using 1H-MRS and this work laid the basis of our R24 grant. I studied brown adipose tissue (BAT) in AN and evaluated the effects on BAT bone. This work has led to presentations at NIH and participation in a NIH expert panel on imaging of BAT.
- a. **Bredella MA**, Misra M, Miller KK, Madisch I, Sarwar A, Cheung A, Klibanski A, Gupta R. Distal radius in adolescent girls with anorexia nervosa: trabecular structure analysis with high-resolution flat-panel volume CT. *Radiology.* 2008 Dec;249(3):938-46. PMCID: PMC2691811
  - b. **Bredella MA**, Fazeli PK, Miller KK, Misra M, Torriani M, Thomas BJ, Ghomi RH, Rosen CJ, Klibanski A. Increased bone marrow fat in anorexia nervosa. *J Clin Endocrinol Metab* 2009;94:2129-36. PMCID: PMC2690416
  - c. **Bredella MA**, Fazeli PK, Freedman LM, Calder G, Lee H, Rosen CJ, Klibanski A. Young women with cold-activated brown adipose tissue have higher bone mineral density and lower Pref-1 than women without brown adipose tissue: a study in women with anorexia nervosa, women recovered from anorexia nervosa, and normal-weight women. *J Clin Endocrinol Metab.* 2012 Apr;97(4):E584-90. PMCID: PMC3319179
  - d. Tabari A, Torriani M, Miller KK, Klibanski A, Kalra MK, **Bredella MA**. Anorexia Nervosa: Analysis of Trabecular Texture with CT. *Radiology* 2017 Apr;283(1):178-185. PMCID: PMC5375622

**Complete List of Published Work in MyBibliography:**

<http://www.ncbi.nlm.nih.gov/pubmed/?term=bredella>