

BIOGRAPHICAL SKETCH

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NAME: Helen Ruth Nadel

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

POSITION TITLE: Director of Pediatric Nuclear Medicine

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 |
|--|------------------------------|-------------------------------|---------------------|
| University of Manitoba, Winnipeg, Manitoba, Canada | Medical School | 05/1977 | Medicine |
| Rotating Internship, Toronto General Hospital, University of Toronto, Toronto, Ontario, Canada | Intern | 06/1978 | Radiology |
| Residency in Diagnostic Radiology, University of Toronto, Toronto, Ontario, Canada | Resident | 06/1982 | Radiology |
| Pediatric Radiology Fellowship, Hospital for Sick Children, University of Toronto, Toronto, Ontario | Fellow | 06/1983 | Pediatric Radiology |
| Residency in Nuclear Medicine, University of British Columbia, Vancouver, British Columbia, Canada | Resident | 12/1989 | Nuclear Medicine |

A. Personal Statement

Dr. Nadel is a dual board certified Pediatric Radiologist and Nuclear Medicine Physician in both USA and Canada. I hold certification of the Royal College of Physicians and Surgeons of Canada in Diagnostic Radiology and Nuclear Medicine, The American Board of Radiology (ABR) with certificate of added qualification in Pediatric Radiology and the American Board of Nuclear Medicine. (ABNM). Dr. Nadel has been practicing as a pediatric radiologist and pediatric nuclear medicine physician and has been performing the entire breadth of general pediatric radiology and nuclear medicine studies in children in a fully integrated department of Pediatric Radiology for 35 years and has routinely performed intussusception reductions in children.

Dr. Nadel has been involved with Children's Oncology Group (COG) since 1991 and has been the recipient of sub-award grants for contributions to research of children with Cancer, particularly in children with bone tumors. She is a past Vice-Chair of the Diagnostic Imaging Committee for COG.

Dr. Nadel is currently the PI of a research consultancy with IAEA on Pediatric Lymphoma. She has also been the chair of a project to create a Pediatric Nuclear Medicine practical text for IAEA that will be published shortly. She has held administrative positions as Committee Chairs for British Columbia Children's Hospital, and for National and International Radiology and Nuclear Medicine organizations. She has contributed to the development of Appropriate Use Criteria for indications for imaging children in pediatric radiology and nuclear medicine, and including PET/CT and PET/MR under the auspices of ACR, SNMMI, SPR, and CANM. She has global outreach involvement with the International Atomic Energy Agency (IAEA) and has been a consultant for teaching pediatric nuclear medicine in a global outreach program in Asia-Oceania.

Dr. Nadel has been involved in multiple equipment requests for proposal for all equipment in nuclear medicine, for multi-detector CT in pediatric radiology and design and set-up of a radionuclide therapy room. She has been involved in the set-up and running of a therapy program for treatment of benign and malignant thyroid disease in children. Dr. Nadel participated in the Second International Workshop on PET/MR Imaging held in Tubingen,

Germany in 2013 and with publication of a white paper in 2014. Dr. Nadel currently uses PET/MR exclusively for PET imaging at Lucile Packard Children's Hospital at Stanford University.

B. Positions and Honors

Positions and Employment

1983-1986 Clinical Instructor, Department of Radiology, Faculty of Medicine, University of British Columbia, Vancouver, British Columbia

1986-1990 Clinical Assistant Professor, Department of Radiology, Faculty of Medicine, University of British Columbia, Vancouver, British Columbia

1990-1998 Assistant Professor, Department of Radiology, Faculty of Medicine, University of British Columbia, Vancouver, British Columbia

1983-2018 Head, Division of Nuclear Medicine, Department of Radiology, Faculty of Medicine, University of British Columbia, Vancouver, British Columbia

1998-2018 Associate Professor, Department of Radiology, Faculty of Medicine, University of British Columbia, Vancouver, British Columbia

2018- Clinical Professor of Radiology, Stanford University School of Medicine, Stanford, California

2018- Director of Pediatric Nuclear Medicine, Lucile Packard Children's Hospital at Stanford, Stanford University School of Medicine, Stanford, California

Other Experience and Professional Memberships

1988- Conference organizer and moderator for sessions for Society of Nuclear Medicine and Molecular Imaging mid-winter and annual meetings

1988- Multiple positions held for chapters, councils and centers and committees for Society of Nuclear Medicine and Molecular Imaging

2011-2017 Director Member, American Board of Nuclear Medicine

2012-2017 Vice Chair, Educational Exhibits for Society of Nuclear Medicine and Molecular Imaging

2012- Consultant and Expert Teaching Consultant for the International Atomic Energy Agency for various multi-center projects

2013-2016 Member, Board of Directors of the Society of Nuclear Medicine and Molecular Imaging

2015- Chair, Nuclear Medicine Committee Society for Pediatric Radiology

2015- Member, Radiographics Nuclear Medicine and Molecular Imaging Panel for RSNA

2017- Member, Nuclear Medicine Committee, RSNA

1978- Member, Radiological Society of North America

1978- Member, Canadian Association of Radiologists

1982- Member, College of Physicians and Surgeons of Ontario

1983- Member, College of Physician and Surgeons of British Columbia

1983- Member, Canadian Medical Protective Association

1983- Member, Doctors of British Columbia

1983- Member, Society for Pediatric Radiology

1983- Member, Society of Nuclear Medicine and Molecular Imaging

1982- Member, Royal College of Physicians & Surgeons of Canada

1987- Member, Pacific Coast Pediatric Radiology Association

1988- Conference organizer and moderator for sessions for Society of Nuclear Medicine and Molecular Imaging mid-winter and annual meetings

1988- Multiple Officer Positions held for chapters, councils and centers and committees for Society of Nuclear Medicine and Molecular Imaging

1990- Member, Canadian Association of Nuclear Medicine

1990- Member, American Roentgen Ray Society

1995- Member, European Association of Nuclear Medicine

1995-1998 Member, Editorial Board, European Journal of Nuclear Medicine and Molecular Imaging

1997- Member, International Society for Clinical Densitometry

2011-2017 Director Member, American Board of Nuclear Medicine

2012-2017 Vice Chair, Educational Exhibits for Society of Nuclear Medicine and Molecular Imaging

2012- Consultant and Expert Teaching Consultant for the International Atomic Energy Agency for various multi-center projects

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| 2013- | Member, American College of Radiology |
| 2013- | Member, Society for Radiologists in Ultrasound |
| 2013-2016 | Member, Board of Directors of the Society of Nuclear Medicine and Molecular Imaging |
| 2015- | Chair, Nuclear Medicine Committee Society for Pediatric Radiology |
| 2015- | Member, Radiographics Nuclear Medicine and Molecular Imaging Panel for RSNA |
| 2015- | Member, American Society of Nuclear Cardiology |
| 2016- | Member, American College of Nuclear Medicine |
| 2017- | Member, International Society for Magnetic Resonance in Medicine |
| 2017- | Member, Editorial Board, Journal of Nuclear Medicine |
| 2017- | Member, Nuclear Medicine Committee RSNA |

Honors

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|-----------|--|
| 1986 | “Most Significant” 14 articles on chest diseases published 1985: (Radiographics 5: p813, 1985) |
| 1993-1994 | Teaching Excellence Award, University of British Columbia Nuclear Medicine Residency Training Program |
| 1997 | Jewish Women of Valour Award |
| 1999-2000 | Co-Recipient, Radiology Residency Award for Excellence in Teaching, British Columbia Children’s Hospital |
| 2001 | Co-Recipient, Excellence in Teaching Award, British Columbia Children’s Hospital |
| 2008 | Best poster at the 6 th European Association of Pediatric Nuclear Medicine, Platja d’Aro, Spain |
| 2014 | Mickey (Cardiff) Williams Distinguished Service Award Western Regional Society of Nuclear Medicine and Molecular Imaging |
| 2018 | Lifetime Achievement Award from the European Society of Pediatric Nuclear Medicine |

C. Contribution to Science

1. Pediatric Nuclear Medicine: Dr. Nadel as a dual-certified diagnostic pediatric radiologist and pediatric nuclear medicine physician is among a small group of physicians that have these multiple subspecialty qualifications. Dr. Nadel has 64 journal publications, is the author or co-author of 22 chapters, and is the editor of a book currently in press through the Human Health Campus of the International Atomic Energy Agency. Dr. Nadel is an internationally recognized expert in her field and has given over 150 national and international presentations and has been an invited visiting professor on 26 occasions on six continents. She has been involved as a pediatric nuclear medicine representative on guideline and appropriate use committees for national and international organizations. Dr. Nadel completed a 7 year term in 2017, as the sole Canadian and pediatric director among 12 directors on the American Board of Nuclear Medicine (member board of ABMS).
 - a. Jadvar H, Colletti PM, Delgado-Bolton R, Esposito G, Krause BJ, Iagaru AH, **Nadel H**, Quinn DI, Rohren E, Subramaniam RM, Zukotynski K, Kauffman J, Ahuja S, Griffeth L. Appropriate Use Criteria for ¹⁸F-FDG PET/CT in Restaging and Treatment Response Assessment of Malignant Disease. Journal of nuclear medicine : official publication, Society of Nuclear Medicine. 2017; 58(12):2026-2037.
 - b. Bar-Sever Z, Biassoni L, Shulkin B, Kong G, Hofman MS, Lopci E, Manea I, Kozirowski J, Castellani R, Boubaker A, Lambert B, Pfluger T, **Nadel H**, Sharp S, Giammarile F. Guidelines on nuclear medicine imaging in neuroblastoma. Eur J Nucl Med Mol Imaging. 2018 Oct;45(11):2009-2024.
 - c. Moghbel MC, Mittra E, Gallamini A, Niederkohr R, Chen DL, Zukotynski K, **Nadel H**, Kostakoglu L. Response Assessment Criteria and Their Applications in Lymphoma: Part 2. Journal of nuclear medicine : official publication, Society of Nuclear Medicine. 2017; 58(1):13-22. PubMed [journal] PMID: 27879369 Moghbel MC, Kostakoglu L, Zukotynski K, Chen DL, Nadel H, Niederkohr R, Mittra E. Response Assessment Criteria and Their Applications in Lymphoma: Part 1. Journal of nuclear medicine : official publication, Society of Nuclear Medicine. 2016; 57(6):928-35.
 - d. Meyer JS, **Nadel HR**, Marina N, Womer RB, Brown KL, Eary JF, Gorlick R, Grier HE, Randall RL, Lawlor ER, Lessnick SL, Schomberg PJ, Kailo MD. Imaging guidelines for children with Ewing sarcoma and osteosarcoma: a report from the Children's Oncology Group Bone Tumor Committee. Pediatric blood & cancer. 2008; 51(2):163-70.

2. Optimized Hybrid Imaging: Within the last 10 years with the advent of PET/CT and SPECT/CT, Dr Nadel has championed the use performing hybrid studies with both PET/CT and SPECT/CT routinely utilizing optimized CT acquisitions with the use of intravenous contrast to provide optimized diagnostic studies. These studies then do not require additional stand-alone CT imaging for either PET attenuation correction, or additional CT diagnostic evaluation for use with SPECT/CT particularly for mIBG imaging. In addition, she has pioneered the use of low dose CT techniques for both these modalities.
 - a. Bailey DL, Barthel H, Beuthin-Baumann B, Beyer T, Bisdas S, Boellaard R, Czernin J, Drzezga A, Ernemann U, Franzius C, Gückel B, Handgretinger R, Hartenbach M, Hellwig D, **Nadel H**, Nekolla SG, Pfluger T, Pichler BJ, Quick HH, Sabri O, Sattler B, Schäfer J, Schick F, Siegel BA, Schlemmer HP, Schwenger NF, van den Hoff J, Veit-Haibach P, Wehrl HF. Combined PET/MR: Where are we now? Summary report of the second international workshop on PET/MR imaging April 8-12, 2013, Tübingen, Germany. *Mol Imaging Biol.* 2014 Jun;16(3):295-310. doi: 10.1007/s11307-014-0725-4. Review.
 - b. **Nadel HR**. SPECT/CT in pediatric patient management. *European journal of nuclear medicine and molecular imaging.* 2014; 41 Suppl 1:S104-14.
 - c. **Nadel HR**, Shulkin B. Pediatric positron emission tomography-computed tomography protocol considerations. *Seminars in ultrasound, CT, and MR.* 2008; 29(4):271-6.
 - d. Murphy JJ, Tawfeeq M, Chang B, **Nadel H**. Early experience with PET/CT scan in the evaluation of pediatric abdominal neoplasms. *J Pediatr Surg.* 2008 Dec;43(12):2186-92.
3. Oncologic Pediatric Nuclear Medicine: Dr. Nadel is currently the PI of a research consultancy with IAEA (International Atomic Energy Agency) as a multicenter prospective study in pediatric patients with lymphoma, HL and NHL, to validate the use of interim treatment PET/CT to predict response. This project has two presentations given as oral presentation at European Association of Nuclear Medicine Congress in Dusseldorf, Germany in October 2018. One of the presentations from the study has been accepted for inclusion in the highlights lecture for this congress.
 - a. Yanik GA, Parisi MT, Naranjo A, **Nadel H**, Gelfand MJ, Park JR, Ladenstein RL, Poetschger U, Boubaker A, Valteau-Couanet D, Lambert B, Castellani MR, Bar-Sever Z, Oudoux A, Kaminska A, Kreissman SG, Shulkin BL, Matthay KK. Validation of Postinduction Curie Scores in High-Risk Neuroblastoma: A Children's Oncology Group and SIOPEN Group Report on SIOPEN/HR-NBL1. *Journal of nuclear medicine : official publication, Society of Nuclear Medicine.* 2018; 59(3):502-508.
 - b. Ladenstein R, Lambert B, Pötschger U, Castellani MR, Lewington V, Bar-Sever Z, Oudoux A, Śliwińska A, Taborska K, Biassoni L, Yanik GA, Naranjo A, Parisi MT, Shulkin BL, **Nadel H**, Gelfand MJ, Matthay KK, Park JR, Kreissman SG, Valteau-Couanet D, Boubaker A. Validation of the mIBG skeletal SIOPEN scoring method in two independent high-risk neuroblastoma populations: the SIOPEN/HR-NBL1 and COG-A3973 trials. *European journal of nuclear medicine and molecular imaging.* 2018; 45(2):292-305.
 - c. Foran AE, **Nadel HR**, Lee AF, Savage KJ, Deyell RJ. Nivolumab in the Treatment of Refractory Pediatric Hodgkin Lymphoma. *Journal of pediatric hematology/oncology.* 2017; 39(5): e263-e266.
 - d. Whelan JS, Bielack SS, Marina N, Smeland S, Jovic G, Hook JM, Krailo M, Anninga J, Butterfass-Bahloul T, Böhling T, Calaminus G, Capra M, Deffenbaugh C, Dhooge C, Eriksson M, Flanagan AM, Gelderblom H, Goorin A, Gorlick R, Gosheger G, Grimer RJ, Hall KS, Helmke K, Hogendoorn PC, Jundt G, Kager L, Kuehne T, Lau CC, Letson GD, Meyer J, Meyers PA, Morris C, Mottl H, **Nadel H**, Nagarajan R, Randall RL, Schomberg P, Schwarz R, Teot LA, Sydes MR, Bernstein M; EURAMOS collaborators. EURAMOS-1, an international randomised study for osteosarcoma: results from pre-randomisation treatment. *Ann Oncol.* 2015 Feb;26(2):407-14. doi: 10.1093/annonc/mdu526. Epub 2014 Nov 24.
 - e. Cerci JJ, Etchebehere EC, Nadel H, et al. Is True Whole-Body ¹⁸F-FDG PET/CT Required in Pediatric Lymphoma? An IAEA Multicenter Prospective Study. *J Nucl Med.* 2019;60(8):1087-1093. doi:10.2967/jnumed.118.222299
 - f. McCarten KM, Nadel HR, Shulkin BL, Cho SY. Imaging for diagnosis, staging and response assessment of Hodgkin lymphoma and non-Hodgkin lymphoma. *Pediatr Radiol.* 2019;49(11):1545-1564. doi:10.1007/s00247-019-04529-8

Complete List of Published Work in My Bibliography:

<https://www.ncbi.nlm.nih.gov/sites/myncbi/1Zqc95xShz55kF/bibliography/56575173/public/?sort=date&direction=descending>

D. Research Support

Ongoing Research Support

BCCH Telethon Deyell (PI) 02/13/2013-05/29/2019
Using Imaging to Reduce Chemotherapy Side-Effects in Children & Adolescents with Cancer
Goal: Use of body mass taken from DXA for assessment of estimate body size in calculation of chemotherapy doses.
Role: Co-Investigator

Completed Research Support

Children's Oncology Group (COG) Strahlendorf (PI) 01/01/2015-06/30/2018
Subaward for conducting and participating in COG clinical trials
Goal: Provide central review of imaging for patients enrolled on COG studies.
Role: Co-Investigator

Rare Disease Foundation and BC Children's Hospital Foundation Darras (PI) 12/1/2015-12/4/2018
Role of [18F] FDG PET/CT in the Staging of Pediatric Malignant Germ Cell Tumours
Goal: To assess the efficacy of FDG-PET/CT in assessing response to therapy in children with germ cell Tumors.
Role: Co-Investigator