# CURRICULUM VITAE — SANDY NAPEL

January 2024


Home Address:

Work Address: Department of Radiology
James H. Clark Center
318 Campus Drive, Room S323
Stanford, CA 94305-5450


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| Date of Birth: | February 23, 1952 |
| Place of Birth: | New York, USA |
| Citizenship: | USA |
| Marital Status: | Married |

## Degrees

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|---|---|---|
| 1974 | SUNY at Stony Brook B.S. | Engineering Sciences |
| 1976 | Stanford University M.S. | Electrical Engineering |
| 1981 | Stanford University Ph.D. | Electrical Engineering |

## Principal Positions Held — Academic

| | | |
|---|---|---|
| 1972-74 | Brookhaven National Laboratory<br>Department of Applied Sciences<br>Upton, New York USA | Research Assistant |
| 1976-77 | Stanford University<br>Department of Electrical Engineering<br>Stanford, California USA | Teaching Fellow |
| 1978-79 | Stanford University<br>Department of Electrical Engineering<br>Stanford, California USA | Acting Instructor |
| 1977-81 | Stanford University<br>Department of Electrical Engineering<br>Stanford, California USA | Research Assistant |
| 1981-88 | University of California<br>Department of Radiology<br>San Francisco, California USA | Adj. Asst. Professor |
| 1988-91 | University of Western Ontario,<br>Dept. of Diagnostic Radiology<br>and Nuclear Medicine<br>London, Ontario Canada | Visiting Asst. Professor |

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| 1991-97 | Stanford University<br>Departments of Radiology, and<br>Electrical Engineering (by courtesy)<br>Stanford University Medical School<br>Stanford, California USA | Assistant Professor |
| 1997-03 | Stanford University<br>Departments of Radiology, and<br>Electrical Engineering (by courtesy)<br>Medicine (by courtesy)<br>Stanford University Medical School<br>Stanford, California USA | Associate Professor |
| 2003- | Stanford University<br>Departments of Radiology, and<br>Electrical Engineering (by courtesy)<br>Medicine (by courtesy)<br>Stanford University Medical School<br>Stanford, California USA | Professor |
| 1996- | co-Director, Radiology 3D and Quantitative Imaging Lab<br>Stanford University Department of Radiology | |
| 2008-2019 | co-Division Chief, Integrative Biomedical Imaging Informatics<br>Stanford University Department of Radiology | |
| 2019- | Division Chief, Integrative Biomedical Imaging Informatics<br>Stanford University Department of Radiology | |
| 2015- | co-Chair, Appointments and Promotions Committee<br>Stanford University Department of Radiology | |
| 2019- | Chair, Appointments and Promotions Committee<br>Stanford University Department of Radiology | |

## Principal Positions Held — Industrial

Imatron, Inc.
389 Oyster Point Blvd.
So. San Francisco, California 94080:

| | |
|---|---|
| 1981-83 | Manager of Computer Systems |
| 1983-84 | Director of Computer Science |
| 1984-86 | Associate VP of Computer Science |
| 1986-87 | VP of Computer Science |
| 1987-89 | VP of Engineering |

## Honors and Awards

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|---|---|
| 1972 | Tau Beta Pi (SUNY Stony Brook Chapter President 1973-74) |
| 1974 | SUNY Stony Brook Engineering Commencement Valedictorian |
| 1988-89 | Medical Research Council of Canada: Visiting Scientist Award |

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| 1989-90 | National Sciences and Engineering Research Council of Canada: Visiting Industrial Fellowship |
| 1991 | Society of Computed Body Tomography *Cum Laude* Award for Presentation: Optimization of Breath-held Pulmonary Magnetic Resonance Angiography |
| 1992 | Stanford University William M. Hume Faculty Scholar Award |
| 1992 | Radiological Society of North America *Magna Cum Laude* Award for Scientific Exhibit: Abdominal Spiral CT Angiography: A Minimally Invasive Three-Dimensional Alternative to Arteriography. |
| 1992 | Radiological Society of North America *Certificate of Merit* Award for Scientific Exhibit: SMaRT: A Computer-based MR Teaching File |
| 1993 | Society of Computed Body Tomography *Cum Laude* Award for Presentation: 3D CT Angiography of Renal Artery Stenosis |
| 1994 | Society of Computed Body Tomography *Cum Laude* Award for Presentation: MRI of Pulmonary Embolism using Intravascular Contrast-enhanced 3D Fast Gradient Echo Technique in a Canine Model |
| 1994 | Society of Computed Body Tomography *Cum Laude* Award for Presentation: Pre- Operative Assessment of Living Renal Donors: Spiral CT as an Alternative to Conventional Angiography and Intravenous Urography |
| 1994-97 | Radiology Editor's *With Distinction* Recognition Award |
| 1995 | Uroradiology Society *Grand Prize* for Presentation: Reformatted Non-contrast Spiral CT in the Evaluation of Renal Colic |
| 1996 | Society of Computed Body Tomography *Cum Laude* Award for Presentation: Optimization of CT Parameters for Virtual Colonoscopy |
| 1998 | Society of Computed Body Tomography *Hounsfield* Award for Outstanding Paper: Volumetric Quantification of the Aorta and Its Branches: A Unique Application for CT Angiographic Data |
| 1998 | Society of Computed Body Tomography *Cum Laude* Award for A Better Gold Standard for Evaluation of Visualization Modes in CT Colonography |
| 1998 | Giovanni Di Chiro Award (1997) for Outstanding Scientific Research for paper: Comparison and Evaluation of Retrospective Intermodality Brain Image Registration Techniques, J Comput Assist Tomogr, **21**(4):554-566, 1997. |
| 1999 | Society of Computed Body Tomography *Cum Laude* Award for Multidetector spiral CT Colonography: maintaining image quality with rapid acquisition. |
| 1999 | RSNA *Research Trainee Prize* for Helical Artifacts in 1-Slice and 4-Slice CT: Quantitative and Qualitative Effects of Scanning Parameters and Object Position on a Simulated Blood Vessel Phantom |

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| 2000 | Society of Computed Body Tomography *Hounsfield Award for Outstanding Scientific Paper* : Computer-Aided Polyp Detection Improves Reading Efficiency in CT Colonography |
| 2001 | RSNA *Research Trainee Prize* for Curved Thin Slab Maximum Intensity Projections (CTS-MIP): Method and Evaluation for CT Angiography. |
| 2002 | SCBT/MR *Hounsfield Award for Outstanding Scientific Paper:* Automated Detection of Pulmonary Nodules |
| 2006 | Society of Nuclear Medicine "Image of the Year" award for article: 'Flying Through' and 'Flying Around' a PET/CT scan: Pilot Study and Development of 3D Integrated 18F-FDG PET/CT for Virtual Bronchoscopy and Colonoscopy, J Nucl Med **47**:1081-1087, 2006. |
| 2006 | SCBT/MR *Hounsfield Award for Outstanding Scientific Paper:* Knowledge-based Algorithm for Automated Centerline Interpolation through Femoro-Popliteal Artery Occlusions in Peripheral CT Angiography (CTA) |
| 2007 | SCBT/MR *In Training Award for Best Young Investigator:* Promises and Limitations of Dual-Energy CT in Lower Extremity CT Angiography |
| 2007 | Society of Nuclear Medicine "Best Clinical Article": 'Flying Through' and 'Flying Around' a PET/CT scan: Pilot Study and Development of 3D Integrated 18F-FDG PET/CT for Virtual Bronchoscopy and Colonoscopy, J Nucl Med **47**:1081-1087, 2006. |
| 2009 | Elected to the College of Fellows of the American Institute for Medical and Biological Engineering (AIMBE). |
| 2012 | Academy of Radiology Research 2012 Distinguished Investigator Award |

## Memberships in Professional Organizations

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|---|---|
| 1972- | Institute for Electrical and Electronics Engineers (IEEE): Acoustics, Speech and Signal Processing Society Social Implications of Technology Society |
| 1991- | American Association of Physicists in Medicine (AAPM) |
| 1991-95 | Society of Magnetic Resonance in Medicine (SMRM) |
| 1991-95 | Society of Magnetic Resonance Imaging (SMRI) |
| 1995-2005 | International Society of Magnetic Resonance in Medicine (ISMRM) (merger of SMRM and SMRI) |
| 1995- | Radiological Society of North America (RSNA) |

## Committee Membership

*National*

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|---|---|
| 1994 | American Association of Physicists in Medicine, Local Arrangements Chairman |
| 1996-2000 | Member, Program Committee, AAPM |

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| 1998-2002 | Member, Program Committee, RSNA |
| 2001-2002 | Chair: Physics subcommittee of the Program committee, RSNA |
| 2000 | CARS 2000 Executive Committee |
| 2004-2009 | American College of Radiology Imaging Network (ACRIN) National Lung Screening Trial (NLST) Computer-aided detection (CAD) Working Group |
| 2019-2023 | American Association of Physicists in Medicine, Machine Learning Subcommittee (MLSC) |
| 2020-x | NCI Clinical Trial and Translational Research Advisory Committee -- oversight committee |

*Local*

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| 1993 | Radiation Producing Machine Committee, Stanford University School of Medicine |
| 1993 | Co-Chair Committee on Teleradiology - Department of Radiology, Stanford University School of Medicine |
| 1997 | Committee on Inter-School Collaboration and Future Alliances |
| 1999 | Steering Committee, Medicine Meets Virtual Reality at Stanford |

## Review Activities

*Scientific Journals*

| | |
|---|---|
| 1989- | Referee for Medical Physics |
| 1993- | Referee for Radiology |
| 1994- | Referee for IEEE Transactions on Medical Imaging |
| 1995- | Referee for Journal of Computer Assisted Tomography |
| 2000- | Referee for IEEE Transactions on Biomedical Engineering |
| 2002 | Referee for Medical Image Analysis |
| 2009-2021 | Associate Editor, Medical Image Analysis |
| 2011- | Associate Editor, Radiology |
| 2014- | Associate Editor, Journal of Medical Imaging |

*Abstracts for Scientific Meetings*

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| 1992,94 | Referee for Siggraph Conference |
| 1993-2005 | Referee for Radiological Society of North America Conference |
| 1994 | Referee for Visualization in Biomedical Computing Conference |
| 1995 | Referee for Volume Visualization '96 Conference |
| 1999 | Referee for World Conference on Medical Physics 2000 |
| 2000, 2010- | Referee for MICCAI program, workshops |

## Teaching

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|---|---|
| 1976-80 | EE 274: The Computer as a Laboratory Instrument. Department of Electrical Engineering, Stanford University. Full responsibility for course. |

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| 1989-90 | Biophysics 515A: Medical Imaging. University of Western Ontario. Lecturer. |
| 1989-90 | Biophysics 516B: Imaging Principles. University of Western Ontario. Lecturer. |
| 1989-90 | Physics of Radiology for Radiology Residents. Department of Diagnostic Radiology and Nuclear Medicine, University of Western Ontario. Lecturer. |
| 1992-2012 | Physics for Radiology Residents—Board Review. Stanford University School of Medicine. Lecturer and course director. |
| 1993-2012 | Radiological Physics. Stanford University School of Medicine. Lecturer. |
| 1993-2006 | Current Concepts of Magnetic Resonance, Post-graduate course hosted by Stanford University Medical School and Duke Medical Center. Laguna Nigel, CA (1993) and Monterey, CA (1994-). Faculty. |
| 1994 | Diagnostic Imaging Update, Post-graduate course hosted by Stanford University Medical School. Maui, HI. Faculty. |
| 1994 | Vascular Disease 1994: Diagnosis and Treatment. Post-graduate course hosted by Stanford University Medical School. Monterey, CA. Faculty. |
| 1995 | American Association of Physicists in Medicine Summer School: CT and US Technology and Applications. New London, CT. Faculty. |
| 1997 | Computed Tomography Update, Post-graduate course hosted by Stanford University Medical School. Jackson Hole, WY. (Basic Principles of Spiral CT, Basic Principles of CT Angiography) |
| 1997 | Advances in Electron Beam Computed Tomography, Hilton Head, SC, October 3-5, 1997 |
| 1999-2014 | Annual International Symposium on Multidetector-Row CT. (various lectures on Principles of Multi Detector-Row CT, Data Explosion, virtual colonoscopy, CAD, visualization, decision support, etc.) |
| 1999 | Computed Tomography Update, post-graduate course hosted by Stanford University Medical School. Jackson Hole, WY. (Basic Principles of Spiral CT, Basic Principles of Multidetector CT, Basic Principles of CT Angiography) |
| 1999 | Short Course in Medical Imaging and Image Processing, Erlangen, Germany, October 14, 1999. (Basics and Applications of Post-processing Methods) |
| 2000 | Stanford University Course MIS 210-B—Medical Imaging. Medical Image Visualization (1/19/2000) |
| 2000 | Southeast Area Chapter of the American Association of Physicists in Medicine: Spring Symposium—Spiral & Multi-slice CT: Physical Principles & Medical Physicist Responsibilities (Multidetector CT: Interpretation, Display, and 3D Imaging Considerations) (3/16/2000) |

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| 2000 | Stanford University Course ME 187/388/CS 123/MIS 187/287—Biomedical Computation: Opportunities and Challenges. Medical Image Visualization (3/29/2000) |
| 2002-8 | Stanford University Course ME-284, Cardiovascular Bioengineering. Lecture: CT Imaging with Applications to Vascular Disease, Winter Qtr. |
| 2003 | Diagnostic Imaging Update, post-graduate course hosted by Stanford University Medical School and Keio University. Poipu Beach, Kauai, HI. (Volumetric CT: MDCT and Beyond, MDCT Data Explosion I: The Problem and Potential Solutions for Vascular CT, MDCT Data Explosion II: Potential Solutions for Cancer Detection), March 17-21. |
| 2005 | Diagnostic Imaging Update, post-graduate course hosted by Stanford University Medical School and Keio University. Poipu Beach, Kauai, HI. (Basic Principles of Multidetector CT: Four Slices and Beyond; Managing Image Overload using Advanced Visualization and Computer-Aided Navigation; CAD for CT: Concepts, Current Status, and Future Prospects), March 28-April 1. |
| 2009 | Diagnostic Imaging Update, post-graduate course hosted by Stanford University Medical School and Keio University. Wailea, Maui, HI. (CAD for CT: Concepts, Current Status, and Future Prospects, Imaging Informatics for Radiological Decision Support), March 23-27. |
| 2010 | RSNA 2010 Refresher Course on Decision Support in Clinical Practice: Automated Image Retrieval based on Lesion and Case Similarity. Chicago, November 2010. |
| 2011-4 | RSNA 2011-4 Refresher Course on Decision Support in Clinical Practice: Quantitative Image Analysis for Image Retrieval, Decision Support, and Knowledge Discovery. Chicago, November. |
| 2013-5 | RSNA 2013-5 Correlating Imaging with Human Genomics. Chicago, December. |
| 2015-7 | RSNA 2015-7 Radiomics Mini Course, From Image to Radiomics: Image Feature Computation and Considerations. Chicago, December |
| 2016-7 | RSNA 2016-7 Panel Discussion l: Imaging Integration with Cancer Genomics/Proteomics: Methodologies Leveraging the Cancer Imaging Archive |

## Graduate Student and Post-doc Supervision

*University of Western Ontario:*

| | | | |
|---|---|---|---|
| Brian Reid | Ph. D. | Medical Biophysics | 1989-90 |
| thesis area: Microscopic Computed Tomography | | | |

*Stanford University:*

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|---|---|---|---|
| H. Christian Davidson | M.S. | Medical Informatics* | 1991-93 |
| thesis area: Picture Archiving for Radiology | | | |

Smadar Shiffman Ph. D. Medical Informatics* 1992-99
thesis area: Segmentation of Blood Vessels for CT Angiography

Philippe G. Lacroute Ph. D. Electrical Engineering 1993-95
thesis area: Fast Volume Rendering Using a Shear-Warp Factorization of the Viewing Transform (3rd reader)

Chye H. Yan Ph. D. Electrical Engineering 1994-98
thesis area: Serial Registration of CT Scans for Quantitative Applications

Shin Y. Yen Ph. D. Electrical Engineering 1994-99
thesis area: Resolution in Spiral CT and Volume Visualization of Medical Images

David Paik Ph. D. Medical Informatics 1996-02
thesis area: Virtual Colonoscopy — Visualization, Path Planning, CAD

Feng Zhuge Ph. D. Electrical Engineering 1999-06
thesis area: Quantification of structures in volumetric data

Burak Gokturk Ph. D. Computer Science 1999-02
thesis area: Shape Recognition with Application to Medical Imaging (2nd reader)

Burak Acar Post-doc Radiology 1999-02
project: CAD of Colonic Polyps, Lung Nodules

Kenneth Wang Ph.D. Mechanical Engineering 1999-01
thesis area: Level Set Methods for Computational Prototyping with Applications to Hemodynamic Modeling (2nd reader)

Grant M. Stevens Ph.D. Biophysics 1999-00
thesis area: Volumetric Tomographic Imaging (2nd reader)

Raghav Raman Post-doc Radiology 1999-03
project: Vascular Visualization and Quantitation

Djamila Holmlund M.S. Visiting Student (Sweden) 2001-02
masters thesis: A Study on Radiological Visual Inspections and a User Study Focused on Ergonomic Input Devices.

Ping Li M.S. Computer Science 2001-03
project: Virtual Colonoscopy Supine and Prone Matching, CAD

Padma Sundaram Ph.D. Electrical Engineering 2001-07
thesis area: Virtual Colonoscopy CAD

Michel Bilello Post-doc CS/Radiology 2002-03
project: CAD for Liver Lesions

Joyoni Dey post-doc Radiology 2003-05
project: Interventional Room of the Future; registration, Human-computer interaction

Markus Kukuk post-doc Radiology 2003-08
project: Advanced interventional visualization/registration

Rong (Cindy) Shi post-doc Radiology 2003-07
project: Virtual Colonoscopy

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| Shaohua Sun | Ph.D. | Electrical Engineering | 2003-07 |
| Thesis area: CAD lung and other cancer | | | |
| Anthony Sherbondy | Ph.D. | Electrical Engineering | 2002-08 |
| Thesis area: Advanced Visualization, Segmentation, CAD | | | |
| Tejas Rakshe | Ph.D. | Electrical Engineering | 2003-08 |
| Thesis area: Vascular Visualization | | | |
| Joong Ho Won | Ph.D. | Electrical Engineering | 2004-09 |
| Thesis area: Vascular Visualization | | | |
| Bindi-Pankhudi | M.S. | Computer Science | 2004-06 |
| A. J. Jayant Joshi | M.S. | Computer Science | 2004-06 |
| David Olsen | Ph.D. | School of Medicine | 2006-07 |
| Ushah K. K. Reddi | M.S. | Computer Science | 2006-08 |
| David Tran | M.D. | School of Medicine | 2006-09 |
| Jiajing Xu | Ph.D. | Electrical Engineering | 2009-13 |
| Thesis area: Quantitative Imaging | | | |
| Jessica Faruque | Ph.D. | Electrical Engineering | 2007-14 |
| Thesis area: Perception of Image Similarity, CBIR Systems | | | |
| Sebastian Echegaray | Ph.D. | Electrical Engineering | 2013-17 |
| Thesis area: Quantitative Imaging | | | |
| Shaimaa Bakr | M.S. | Electrical Engineering | 2015-21 |
| Thesis area: Quantitative Imaging | | | |
| Austin Ray | M.S. | Computer Science | 2015-6 |
| Stephen Chu | M.S. | Computer Science | 2015-6 |
| Huafei Wang | M.S. | Computer Science | 2015-6 |
| Sarah A. Mattonen | Ph.D. | Medical Physics | 2017-9 |
| Akshay Jaggi* | undergrad | Computer Science | 2016-9 |
| Eduardo Somoza | M.D. | SCIT T32 fellow | 2019-21 |

**winner of the Angela Lee Undergraduate Research Award - most outstanding poster presented at the annual Achauer Undergraduate Honors Symposium.*

## Grants—Current

NIH/NCI 5T32CA009695 3/01/93 – 8/31/23
*Advanced Techniques in Cancer Imaging (Preceptor: 3/01/93-12/31/2011)*
*Advanced Techniques in Cancer Imaging (Program Director: 1/01/12-2/31/2013)*
*Stanford Cancer Imaging Training (SCIT) Program (Program Director: 3/01/13-2/28/2023)*
The goal of this project is to train radiologists and scientists to contribute to on-going development of cancer imaging techniques.

DoD W81XWH2010747 Partnering PI 9/01/20 – 8/31/23
*Imaging and Exosomal Genomics as An Early Identifier of Lung Cancer*
Goal: To evaluate the performance of [18F]FSPG PET/CT imaging in relation to exosomal genomics in discriminating between benign and malignant lung nodules.

NIH/NIBIB 75N92020C00008/75N92020C00021 co-I 8/21/20 – 4/30/23
NIH Prime: Univ of Chicago (Giger, M. PI)
*Medical Imaging and Data Resource Center (MIDRC) for Rapid Response to COVID-19 Pandemic*
Goal: To share COVID-19 image and related data and, with these, to spur development and implementation of new diagnostics, including machine learning algorithms, that will empower population-wide preventive and management strategies for COVID-19.

SPO 124869 ROYAL PHILIPS co-PI 9/01/16 – 8/31/22
*Advancing Precision Health: Enabling Personalized Diagnostics and Treatment Delivery*
Goal: To develop new care paradigms generally at the intersection of advanced clinical monitoring/imaging, novel diagnostic mechanisms, and predictive/prescriptive analytics.

NIH/NCI co-Investigator 5/01/21 – 4/30/26
Multiscale modeling of Glioma for the Prediction of Treatment response, Treatment Monitoring and Treatment Allocation
PI: Gevaert
Goal: To employ AI and radiogenomics techniques for management of patients with glioma.

NIH/NCI R01 CA233578-01 co-Investigator 2/1/19 –1/31/24
*Imaging and circulating DNA markers to assess early response and predict treatment failure patterns in lung cancer*
Goal: To develop associations linking imaging phenotypes and circulating tumor cells to predict treatment failures in lung cancer.

NIH/NCI R01 CA222512-01 co-Investigator 2/1/18 –1/31/24
*Multiregional imaging phenotypes and molecular correlates of aggressive versus indolent breast cancer*
Goal: To develop associations linking imaging phenotypes to molecular subtypes with different prognoses.

NIH/NCI R01 DE030894 co-Investigator 7/5/22 – 3/31/27
*Precision imaging for risk stratification and personalized therapy of oropharyngeal cancer*
**Goal:** To develop imaging-based prognostic models to improve risk stratification and guide personalized therapy of OPC.

## Grants—pending

NIH/NCI co-Investigator 04/01/2024 03/31/2028
*Extracellular vesicle-based lung cancer detection*
**Goal:** To develop RNA liquid biopsy technology for the non- invasive detection of cancer.

## Grants—Completed

1. Medical Research Council of Canada
   Visiting Scientist Award 1988-90
2. Natural Sciences and Engineering Research Council of Canada
   Visiting Industrial Fellowship 1989-90
   1990-91
3. Stanford University Office of Technology Licensing
   Multimodality Image Fusion for Stereotaxic Surgical Treatment of Brain Tumors
   Principal Investigator 1992-93
4. Whitaker Foundation
   Multimodality Image Fusion for Stereotaxic Surgical Treatment of Brain Tumors
   Principal Investigator 1993-96
5. Department of Veterans Affairs
   Skeletal Changes After Spinal Cord Injury and Cast Immobilization
   Co-investigator 1994-96
6. Society of Gastroenterology Research Award
   Three-dimensional CT Virtual Colonoscopy
   Co-investigator 1995-96
7. National Institutes of Health: 1R01 NS33926-01
   Evaluation of Retrospective Image Registration
   Co-investigator, Collaboration with Vanderbilt University
8. National Institutes of Health: 1R01 HL50305-01
   Three Dimensional CT Angiography
   Principal Investigator 1995-98
9. National Institutes of Health: R01 HL46347-04
   Noninvasive Myocardial Motion Analysis using Magnetic Resonance Imaging
   Co-Investigator 1996-99
10. Acuson Corporation
    3D Ultrasound Project
    Principal Investigator 1998-01
11. National Institutes of Health: 1P20GM064782-01
    Planning the Stanford Center for Biocomputation
    Co-Investigator 2001-04
12. National Institutes of Health: 1T32GM063495-01
    Predoctoral Graduate Training in Bioinformatics and Computational Biology
    Preceptor 2001-04

13. Stanford BIO-X Interdisciplinary Initiative
Imaging and Learning Techniques for the Detection of Anomalous Structures in 3D Medical Images
Co-Investigator 2000-2003

14. National Institutes of Health
Volumetric Analysis of the Aorta and Its Branches
Co-Investigator 1999-2003

15. National Institutes of Health
Center for Advanced MR Technology at Stanford
Investigator 2000-2005

16. National Institutes of Health: RO1 R01CA66785
Magnetic Resonance Imaging of Breast Cancer
Co-Investigator 2005-2005

17. R2 Technology, Inc.
Computer Aided Tracking and Analysis of Pulmonary Nodules Over Time
Principal Investigator 2003-2005

18. NIH/NHLBI RO1 HL67194
Efficient Interpretation of 3D Vascular Image Data
Principal Investigator 2001-2006

19. NIH/NIBIB RO1 EB003524
Improved C-Arm CT for Interventional Procedures
Co-Investigator 2004-2007

20. Siemens Medical Solutions
Interventional Room of the Future
Co-Investigator 2002-2006

21. NSF ACI-205741
Simulation-Based Medical Planning for Cardiovascular Disease
Co-Investigator 2002-2007

22. NIH/NCI R01 CA72023
Three-Dimensional Spiral CT Colonography
Co-Principal Investigator 1996-2009

23. NIH 1 U54 GM072970-01
Physics-based Simulation of Biological Structures
Co-Investigator 2004-2009

24. BIO-X Interdisciplinary Initiatives Program #3
A Novel Transducer Array and Intelligent Software for Automated Detection of Asymptomatic Carotid Artery Stenosis
Principal Investigator 2006-2009

25. NIH/SBIR 1R43RR02802001A1
Automated Bone Removal for Head and Neck CTA using Dual Energy CT
Stanford Principal Investigator 2009-2010

26. NSF CNS-0619926
MRI: Acquisition of a Hybrid Shared-Memory / Massively-Parallel Commodity Cluster for Cost-Effective Super-Computing at Stanford.
Investigator 2006-2011

27. NIH R01 CA109089
Improving Radiologist Detection of Lung Nodules with CAD
Co-Principal Investigator 2005-2010
Principal Investigator 2010-2011

28. NIH/R01 CA134720
Co-Investigator 2009-2013
Miniaturized Real-Time Volumetric Ultrasound Imaging System

29. NIH/NCI U01CA142555
Co-Investigator 2010-2016
Computerized Quantitative Imaging Assessment of Tumor Burden

30. NIH/NIBIB R01 EB014955
subcontract PI (Kitware, Inc.) 2013-2017
Accelerating Community-Driven Medical Innovation with VTK

31. NIH/NCI R01 CA160251-01
Principal Investigator 2011-2017
Tools for Linking and Mining Image and Genomic Data in Non-Small Cell Lung Cancer

32. NIH/NCI R01 EB020527
co-Investigator 2/15/15 – 1/31/19
Radiogenomics Framework for Non-Invasive Personalized Medicine

33. NIH/NCI U24 CA180927 (MGH prime)
Site Principal Investigator 9/01/14 – 08/31/19
Informatics Tools for Optimized Imaging Biomarkers for Cancer Research & Discovery

34. NIH/NCI U01 CA196405
Site Principal Investigator 9/1/16 – 8/31/19 (NCX)
Radiomics and Deep Learning Approaches for Screen Detected Adenocarcinoma

35. NIH R01 EB020527
Co-Investigator 2/15/15 - 01/31/20
Radiogenomics Framework for Non-Invasive Personalized Medicine

36. NIH/NCI U01 CA187947-A1
Principal Investigator 9/01/15 – 8/31/20
Computing, Optimizing, and Evaluating Quantitative Cancer Imaging Biomarkers

37. Stanford AIMI Center Seed Grant
co-PI 8/16/19 – 08/15/20
Machine Learning for Distinguishing Non-small Cell Cancer from Small-cell Cancer from Benign Pulmonary Nodules on Chest CT in a Multi-Center VA Cohort.

38. NIH/NCI U01 CA190214
co-Investigator 6/01/15 – 5/31/21
Qualification and Deployment of Imaging Biomarkers of Cancer Treatment Response

## U.S. Patents

1. S.M-H. Song, S.A. Napel and N.J. Pelc: Flow measurement of incompressible fluid using divergence free constraint. (5,309,100) issued 5/3/1994.
2. T.S. Sumanaweera, S. Napel, G.H. Glover, and J.R. Adler: Method for correcting magnetic field inhomogeneity distortion in MRI images having disconnected regions (5,485,085) issued 1/16/1996.
3. C.H. Yan, R.T. Whalen, S. Napel: Method for Beam Hardening Correction in Quantitative Computed X-ray Tomography (6,324,240) issued 11/27/2001.
4. S. Shiffman, S. Napel: Object Segregation in Images (6,424,732) issued 6/23/2002.
5. J. A. Hossack, T. S. Sumanaweera, A. He, S. Napel, R. B. Jeffrey, Jr., D. Paik: Medical Diagnostic Ultrasound System and Method for Flow Analysis (6,503,202) issued 1/7/2003.
6. D.S. Paik, G.D. Rubin, C.F. Beaulieu, S. Napel, R.B. Jeffrey Jr.: Method For Detecting Shapes In Medical Images, (7,043,064), issued 5/9/2006.
7. D.S. Paik, S. Napel, G.D. Rubin, C.F. Beaulieu: Method For Characterizing Shapes In Medical Images (7,043,064 - Amendment), issued 5/9/2006.
8. R. Raman, S. Napel, G.D. Rubin: Curved Slab Maximum Intensity Projections, (7,170,517), issued 1/30/2007.
9. B. Acar, C.F. Beaulieu, S. Napel, R.B. Jeffrey, Jr., D.S. Paik: Method for Matching and Registering Medical Image Data (7,224,827), issued 5/29/2007.
10. B. Acar, C.F. Beaulieu, S. Napel, R.B. Jeffrey, Jr., D.S. Paik, S.B. Gokturk, C. Tomasi: Method for Detecting and Classifying a Structure of Interest in Medical Images, (7,272,251), issued 9/18/2007.
11. R. Raman, S. Napel, G.D. Rubin: Quantification of Aortoiliac Endoluminal Irregularity, (7,324,675), 1/29/2008.
12. R. Raman, B. Raman, S. Napel, G.D. Rubin: Quantification Method of Vessel Calcification (7,330,576), issued 2/12/2008.
13. S. B. Gokturk, C. Tomasi, B. Acar, C.F. Beaulieu, S. Napel, D. S. Paik: Three-Dimensional Pattern Recognition Method to Detect Shapes in Medical Images, (7,346,209), issued 3/18/2008.
14. R. Raman, S. Napel, G.D. Rubin: Quantification of Vascular Irregularity, (7,379,574), issued 5/27/2008.
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Endoscopy, and Panoramic View Volume Rendering," 1st International Symposium on Virtual Colonoscopy, Boston, October 1998.

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138. D. Fleischmann, D.S. Paik, S. Napel, GD Rubin, "Quantitative CT Angiography of the abdominal aorta in healthy adults," European Congress of Radiology, March 7-12 99 (exhibit).
139. C.F. Beaulieu, C.A. Karadi, R.B. Jeffrey Jr., G.D. Rubin, D. Fleischmann, S. Napel, "Multidetector Spiral CT Colonography: Maintaining Image Quality with Rapid

Acquisition." Society of Computed Body Tomography and Magnetic Resonance, Twenty Second Annual Course, New Orleans, LA 1999. *Awarded cum laude.*

140. D.S. Paik, C.F. Beaulieu, R.B. Jeffrey, Jr., C.A. Karadi, S. Napel, "Detection of Polyps in CT Colonography: A Comparison of a Computer-Aided Detection Algorithm to 3D Visualization Methods," Radiological Society of North America 85th Scientific Sessions, Chicago, November 1999.
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143. D. Fleischman, G.D. Rubin, D.S. Paik, S.Y. Yen, C.F. Beaulieu, S. Napel, "Helical Artifacts in 1-Slice and 4-Slice CT: Quantitative and Qualitative Effects of Scanning Parameters and Object Position on a Simulated Blood Vessel Phantom," Radiological Society of North America 85th Scientific Sessions, Chicago, November 1999. *Awarded RSNA Research Trainee Prize*
144. C.F. Beaulieu, D.S. Paik, S. Napel, J. Yee, C. Coulam, A. Steinauer, B.J. Betts, R.B. Jeffrey, Jr. "Computer-Aided Polyp Detection Improves Reading Efficiency in CT Colonography," Annual Scientific Meeting, SCBT/MR, San Diego, CA, 4/00. *Winner of the Hounsfield Award for Outstanding Scientific Paper.*
145. D. Steines, C. Cheng, A. Wong, J. Tsai, S. Napel, P. Lang, "Segmentation of Osteoarthritic Femoral Cartilage Using Live Wire," 8th Annual ISMRM, Denver, Colorado, April 2000.
146. H. Xu, D.S. Paik, B. Ross, T.S. Sumanaweera, J. Hossack, R.B. Jeffrey, Jr., S. Napel, "Automated Quantification of 4D Ultrasound for Carotid Artery Disease," 14th Computer Assisted Radiology and Surgery, San Francisco, June 2000.
147. S. Shiffman, S. Napel, "Automatic Selection of Blood-Vessel Regions from Preprocessed Image Sequences: Method and Evaluation," 14th Computer Assisted Radiology and Surgery, San Francisco, June 2000.
148. D. Steines, C. Cheng, A. Wong, F. Berger, S. Napel, P. Lang, "Segmentation of Osteoarthritic Femoral cartilage from MR Images," 14th Computer Assisted Radiology and Surgery, San Francisco, June 2000.
149. J. Yee, A. M. Steinauer-Gebauer, C. F. Beaulieu, D. S. Paik, P. W. Hung, S. Napel, "Clinical Application of a Computer Automated Distention Quantification Method for CT Colonography,"2nd International Symposium on Virtual Colonoscopy, Boston, Oct. 2000.
150. P. Hung, D.S. Paik, S. Napel, J. Yee, A. Steinauer-Gebauer, R.B. Jeffrey, J. Min, A. Jathavedam, C.F. Beaulieu, "Comparison of Computerized Methods for Quantifying Bowel Distension in CT Colonography using Three Different Metrics: Validation in Colon Phantoms," 2nd International Symposium on Virtual Colonoscopy, Boston, Oct. 2000.

151. F. Zhuge, S. Napel, D. Paik, G. D. Rubin, "Automatic Detection and Quantification of Abdominal Aortic Thrombus in CT Angiograms Based on Clustering and Global Geometric Information," Radiological Society of North America 86th Scientific Sessions, Chicago, November 2000.
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254. H. Takaoka, N. Funabashi, R. Raman, K. Fukushima, Y. Kobayashi, S. Napel, et al., "Detection of >75% Stenosis in Quantitative Coronary Angiography by Iodinate Contrast Opacification Gradients in Coronary Artery with Regard to Distance from the Ostium by 320-Slice Computed Tomography," Radiological Society of North America 97th Scientific Sessions, November 2011.
255. H. Takaoka, N. Funabashi, R. Raman, K. Fukushima, Y. Kobayashi, S. Napel, et al., "Detection of suture-break and stent-fracture after endovascular abdominal aortic repair using Multislice CT angiography: Impact of 3D reformation technique on detection compared with axial 2D image," Radiological Society of North America 97th Scientific Sessions, November 2011.
256. S. K. Plevritis, O. Gevaert, J. Xu, C. D. Hoang, D. L. Rubin, S. Napel, et al., "Rapid Identification Of Prognostic Imaging Biomarkers For Non-Small Lung Carcinoma (NSCLC) By Integrating Image Features And Gene Expression And Leveraging Public Gene Expression Databases," Radiological Society of North America 97th Scientific Sessions, November 2011.

257. S. Napel, C. D. Hoang, J. Xu, O. Gevaert, D. L. Rubin, S. K. Plevritis, et al., "Computational And Semantic Annotation Of CT And PET Images And Integration With Genomic Assays Of Tumors In Non- Small Cell Lung Cancer (NSCLC) For Decision Support And Discovery: Method And Preliminary Results," Radiological Society of North America 97th Scientific Sessions, November 2011.
258. J. S. Faruque, D. L. Rubin, C. F. Beaulieu, A. Kamaya, G. A. Tye, S. Napel, et al. "A Scalable Reference Standard for Perceptual Similarity of CT Liver Lesions using Matrix Completion Techniques," Radiological Society of North America 97th Scientific Sessions, November 2011.
259. J. Xu, H. Greenspan, S. Napel, D. L. Rubin, "Automated Temporal Tracking And Segmentation Of Lymphoma On Serial CT Examinations," Radiological Society of North America 97th Scientific Sessions, November 2011.
260. J. Xu, J. S. Faruque, C. F. Beaulieu, D. L. Rubin, S. Napel, "A Comprehensive Descriptor of Shape: Method and Application to Retrieval of Similar Appearing Lesions in Medical Images," Radiological Society of North America 97th Scientific Sessions, November 2011.
261. F. J. Gimenez, J. Xu, T. Liu, C. F. Beaulieu, D. L. Rubin, S. Napel, et al. "Prediction of radiologist observations using computational image features: Method and Preliminary Results," Radiological Society of North America 97th Scientific Sessions, November 2011.
262. O. Gevaert, L. A. Mitchell, J. Xu, C. Yu, D. L. Rubin, G. Zaharchuk, S. Napel, S. K. Plevritis, "Radiogenomic analysis indicates MR images are potentially predictive of EGFR mutation status in glioblastoma multiforme," Association of Cancer Research, Chicago, March 2012.
263. V. S. Nair, O. Gevaert, G. Davidzon, S. Napel, E. Graves, C. D. Hoang, A. Quon, D. L. Rubin, S. K. Plevritis, "Non-small Cell Lung Cancer Tumor $^{18}$F-FDG Uptake is Associated with Gene Dysregulation Beyond Glycolysis," American Thoracic Society, San Francisco, May 2012.
264. X. Wang, A. N. C. Leung, I. Chan, S. K. Plevritis, C. D. Hoang, D. L. Rubin, S. Napel, "A 3D multiple-layer region-growing algorithm for automated 3D segmentation of pulmonary tumors seen on volumetric CT scans," Radiological Society of North America 98th Scientific Sessions, November 2012.
265. J. S. Faruque, D. L. Rubin, C. F. Beaulieu, J. Rosenberg, S. Napel, "A Statistical Model for Predicting Sample Size for Radiologists' Perception of Similarity in Liver Lesions," Radiological Society of North America 98th Scientific Sessions, November 2012.
266. K. Roychoudhury, M. Tall, S. Napel, S. Bag, B. Harrawood, J. Roos, G. D. Rubin, "Analysis of the detection of lung nodules in volumetric CT data by radiology residents using gaze tracking," Radiological Society of North America 98th Scientific Sessions, November 2012.
267. B. R. Shah, J. Xu, B. H. Do, D. L. Rubin, S. Napel, C. F. Beaulieu, "Quantitative Analysis of Focal Bone Tumors on Radiography: Initial Experience Comparing Lucent and Sclerotic Lesions," Radiological Society of North America 98th Scientific Sessions, November 2012.

268. V. T. Tran, D. Weinreb, A. Quon, S. Napel, H. E. Daldrup-Link, "Fusion PET-MR: Correlation Of Contrast Enhancement And 18-FDG-PET Activity For The Development Of An Integrated Scanning Protocol," Annual Meeting of the Society for Pediatric Radiology. Pediatric Radiology 43, Suppl. 1, 2013.
269. O. Gevaert, L. Mitchell, J. Xu, S. Napel, G. Zaharchuk, S.K. Plevritis, "Creating a radiogenomics map of multi-omics and quantitative image features in glioblastoma multiforme," Radiological Society of North America 99th Scientific Sessions, December 2013.
270. C. Klenk, V. T. Tran, R. Gawande, S. Napel, A. Quon, H. E. Daldrup-Link, "Correlation of 18F FDG activity and Gd-contrast enhancement of pediatric tumors on PET/MR: The next step towards "one stop shop" tumor staging," Radiological Society of North America 99th Scientific Sessions, December 2013.
271. J. Kalpathy-Cramer, B. Zhao, D. Goldgof, Y. Gu, X. Wang, S. Napel, "A platform for the comparison of lung nodule segmentation algorithms: methods and preliminary results," Radiological Society of North America 99th Scientific Sessions, December 2013.
272. A. Kamaya, S. Vossler, Y. I. Liu, S. Napel, S. Plevritis, A. Holzer, N. Kothary, "Prediction of microvascular invasion in hepatocellular carcinoma," Society of Abdominal Radiology, Boca Raton FL, 2014.
273. H. Itakura, A. S. Achrol, J. J. Loya, L. A. Mitchell, T. D. Azad, S. Echegaray, K. Yeom, S. Napel, G. R. Harsh IV, O. Gevaert, "Glioblastoma Subtypes Defined By Quantitative Imaging Map To Different Canonical Signaling Pathways," 11th Congress of the European Association of Neuro-Oncology, Turin, Italy, Oct. 2014.
274. H. Itakura, A. S. Achrol, J. J. Loya, L. A. Mitchell, T. D. Azad, S. Echegaray, K. Yeom, S. Napel, G. R. Harsh IV, O. Gevaert, "Identification and validation of glioblastoma subtypes using quantitative imaging that map to canonical signaling pathways," Society of Neuro-Oncology Annual Meeting, Miami, FL, Nov. 2014.
275. H. Itakura[1], A. S. Achrol, T. T. Liu, S. Echegaray, J. J. Loya, A. Feroze, L. A. Mitchell, S. Rodriguez, E. Westbroek S. Cheshier, G. Steinberg, D. Rubin, K. Yeom, S. Napel, G. R. Harsh IV, O. Gevaert, "Development and validation of a quantitative image signature that predicts clinical survival in glioblastoma," Radiological Society of North America 100th Scientific Sessions, December 2014.
276. G. D. Rubin, B. Harrawood, S. Napel, J. E. Roos, K. R. Choudhury, "The Moment of Recognition: Method and Analysis of Gaze Behavior in the Search for Lung Nodules in CT Scans," Radiological Society of North America 101st Scientific Sessions, December 2015.
277. O. Gevaert, S. Echegaray, A. Khuong, C. D. Hoang, J. B. Shrager, S. K. Plevritis, S. Napel, A. N. Leung, "Predictive modeling of epidermal growth factor receptor mutation status using semantic image features in non-small cell lung cancer (NSCLC)," Radiological Society of North America 101st Scientific Sessions, December 2015.
278. O. Gevaert, S. Echegaray, S. Napel, N. Kothary, "Predictive modeling of microvascular invasion using triphasic quantitative imaging of hepatocellular carcinoma (HCC)," Radiological Society of North America 101st Scientific Sessions, December 2015.

279. O. Gevaert, S. Napel, S. Echegaray, A. Khuong, C. D. Hoang, J. B. Shrager, S. K. Plevritis, A. N. Leung, "Radiogenomics mapping of non-small cell lung cancer (NSCLC) identifies prognostic relationships between semantic image features and metagenes captured using RNA sequencing," Radiological Society of North America 101st Scientific Sessions, December 2015.
280. V.S. Nair, A. Garcia, H. Chen, Y. Balagurunathan, T. Atwater, O. Gevaert, S. Antic, M. Schabath, S. Napel, R. Walker, R. Gillies, P. P. Massion, "Validating a radiomic classifier for improved lung cancer prediction of indeterminate pulmonary nodules," American Thoracic Society Annual Meeting, May 2016, San Francisco.
281. M. Zhou, S. Napel, S. Echegaray, A. N. Leung, O. Gevaert, "Radiogenomics Mapping of Non-small Cell Lung Cancer Shows Strong Correlations between Semantic Image Features and Metagenes," Radiological Society of North America 102st Scientific Sessions, December 2016.
282. C. Letrong, V. Hinostroza, S. Walters, S. Napel, R. Bammer, D. Fleischmann, "The Essential Guide to Starting a Clinical 3DP Program," Radiological Society of North America 102nd Scientific Sessions, December 2016.
283. K. Roychoudhury, B. Harrawood, J. E. Roos, S. Napel, G. D. Rubin, "Multivariate modelling of nodule recognition in 3-d chest CT using gaze tracking," Radiological Society of North America 102nd Scientific Sessions, December 2016.
284. S. Napel, S. Echegaray, D. Gude, O. Gevaert, D. L. Rubin, "The Quantitative Image Feature Pipeline (QIFP) for Discovery, Validation, and Translation of Cancer Imaging Biomarkers," Radiological Society of North America 102nd Scientific Sessions, December 2016.
285. W. Zhang, G. Bouchard, A. Yu, M. Shafiq, M. Jamali, J. Shrager, K. Ayers, V. S. Nair, A. Gentles, M. Diehn, A. Quon, S. Napel, S. K. Plevritis, "FDG uptake in human lung adenocarcinoma associated with invasion through the hexosamine biosynthesis pathway, AACR Annual Meeting, Washington D.C., April 2017.
286. C. Letrong, V. Hinostroza, S. Walters, S. Napel, D. Fleischmann, "Interventional 3D Printing Case Studies," Mayo Clinic 3D Printing Conference, January 2017.
287. C. Letrong, V. Hinostroza, S. Walters, S. Napel, D. Fleischmann, "3D Printing in Mitral Valve Intervention Case Studies," Mayo Clinic 3D Printing Conference, January 2017.
288. M. Shafiq, W. Zhang, A. Gentles, K. Ayers, V.S. Nair, J. Shrager, C. Hoang, O. Gevaert, S. Napel, S. Plevritis, "Using Tissue Gene Expression to Predict Survival Following 'Curative' Surgical Resection in Lung Adenocarcinoma, American Thoracic Society Annual Meeting, Washington D.C., May 19-24, 2017.
289. S. Napel, D. L Rubin, S. John, D. Gude, S. Echegaray, S. Bakr, S.Mattonen, "The Quantitative Image Feature Pipeline (QIFP): Automated Radiomic Feature Extraction to Derive Associations with and Prediction of Clinical Variables from Image Features," Radiological Society of North America 103rd Scientific Sessions, December 2017.
290. J. Kalpathy-Cramer, B. Zhao, D. Goldgof, S. Napel, D. L. Rubin, M. F. McNitt-Gray, et al, "Standardizing Radiomic Feature Descriptions for Quantitative Imaging: A Preliminary Report of the Cooperative Efforts of the NCI's QIN PET-CT

Subgroup," Radiological Society of North America 103rd Scientific Sessions, December 2017.

291. S. Bakr, S. Mattonen, A.L. Garcia, S. Antic, Y. Balagurunathan, T. Atwater, H. Chen, O. Gevaert, R. Walker, M. Schabath, R. Gillies, P. Massion, V. Nair, S. Napel, "A Size-independent Radiomics Model for Classification of Indeterminate Pulmonary Nodules Seen at CT," Radiological Society of North America 103rd Scientific Sessions, December 2017.
292. S. Mattonen, S. Bakr, G. A. Davidzon, V. S. Nair, S. Napel, "Positron Emission Tomography (PET) Tumor Penumbra Radiomics For Prediction of Survival in Non-Small-Cell Lung Cancer: A Pilot Study," Radiological Society of North America 103rd Scientific Sessions, December 2017.
293. V. Hinostroza, C. Letrong, L. Molvin, S. Walters, S. Napel, D. Fleischmann, "Protocoling Imaging Studies with 3D Prints in Mind," Radiological Society of North America 103rd Scientific Sessions, December 2017.
294. C. Letrong, S. Walters, D. Liang, S. Napel, D. Fleischmann, "3D Printing for Treatment Planning: Transseptal Mitral Valve Replacement Case Studies," Radiological Society of North America 103rd Scientific Sessions, December 2017.
295. E. H. Lee, M. Zhou, N. Gamboa, K. Brennan, H. Itakura, V. Nair, S. Napel, S. Wong, O. Gevaert, "Deep learning to predict survival prognosis for patients with non-small cell lung cancer using images and clinical data," Amer Assoc Cancer Research Annual Meeting, Chicago, Il., April 2018.
296. S. A. Mattonen, G. A. Davidzon, S. Bakr, M. Vasanawala, G. Horng, S. Napel, V. S. Nair, "Positron Emission Tomography (PET) Tumor Penumbra Imaging Features Predict Outcome in Non-Small Cell Lung Cancer," American Thoracic Society Annual Meeting, San Diego, CA, May 18-23, 2018.
297. S. John, D. Rubin, D. Gude, S. Echegaray, S. Bakr, S. Mattonen, S. Napel, "QIFP : A web application to support quantitative imaging pipelines on medical images," SIIM Conference on Machine Intelligence in Medical Imaging, San Francisco, September 2018.
298. S. Napel, D. L Rubin, S. John, D. Gude, S. Echegaray, S. Mattonen, S. Bakr, "The Quantitative Image Feature Pipeline (QIFP): Automated Computation of Quantitative Image Features and Construction of Predictive Models, Radiological Society of North America 104th Scientific Sessions, December 2018.
299. S. Mattonen, G. A. Davidzon, S. Bakr, S. Echegaray, A. N. C. Leung, M. Vasanawala, G. Horng, V. S. Nair, S. Napel, "18F FDG Positron Emission Tomography (PET) Tumor Penumbra Texture Predicts Recurrence in Non-Small Cell Lung Cancer," Radiological Society of North America 104th Scientific Sessions, December 2018.
300. J. Wu, X. Li, X. Teng, D. L. Rubin, S. Napel, B. Daniel, R. Li, "Quantitative DCE-MRI features can complement molecular markers for predicting tumor infiltrating lymphocytes in breast cancer: model discovery and independent validation," Radiological Society of North America 104th Scientific Sessions, December 2018.
301. K. Gifford, C. Letrong, V. Hinostroza, R. Fan, S. Napel, D. Fleischmann, "Enhancing Understanding of Pathology with 3D Printed Prostate Cutting

Guides," Radiological Society of North America 104th Scientific Sessions, December 2018.

302. S. A. Mattonen, G. A. Davidzon, J. Benson, A. N. C. Leung, M. Vasanawala, G. Horng, J. B. Shrager, S. Napel, V. S. Nair, "Integrated Bone Marrow and Tumor Radiomics on [18F] FDG Positron Emission Tomography (PET) Augment Stage for Outcome Prediction in Non-Small Cell Lung Cancer," American Thoracic Society Annual Meeting, Dallas, TX, May 15-20, 2019.
303. M. McNitt-Gray, S. Napel, J. Kalpathy-Cramer, A. Jaggi, D. Cherezov, D. Goldgof, H. Yang, E. Jones, M. Muzi, N. Emaminejad, M. Wahi-Anwar, Y. Balagurunathan, M. Abdalah, B. Zhao, L. Hadjyiski, L. Pierce, K. Farahani, "Standardization in Quantitative Imaging: A Comparison of Radiomics Feature Values Obtained by Different Software Packages On a Set of Digital Reference Objects, AAPM Annual Meeting July 14-18 2019, San Antonio, Tx.
304. P. Mukherjee, A. Brezhneva, S. Napel, O. Gevaert, "Detection of Lung Cancer in subjects with positive screening CT scans in the National Lung Screening Trial (NLST) dataset by leveraging the Lung Image Database Consortium (LIDC-IDRI) dataset," Radiological Society of North America 105th Scientific Sessions, December 2019.
305. S. Napel, D. Gude, T. L. Casavant, D. Cherezov, S. A. Mattonen, D. L. Rubin, "The Quantitative Image Feature Pipeline (QIFP): Automated Computation of Quantitative Image Features for Prediction of Clinical Characteristics (e.g., Malignancy, Response to Therapy, Overall Survival) in Subject Cohorts," Radiological Society of North America 105th Scientific Sessions, December 2019.
306. M. F. McNitt-Gray, S. Napel, J. Kalpathy-Cramer, A. Jaggi; N. Emaminejad, M. Muzi, D. Cherezov, D. Goldgof, H. Yang, E. Jones, M. Wahi-Anwar, Y. Balagurunathan, M. Abdalah, B. Zhao, L. Hadjiiski, A. Virkid, H-P Chan, L. Pierce, K. Farahani, "Standardization in Quantitative Imaging: A Multi-center Comparison of Radiomics Feature Values Obtained by Different Software Packages on Digital Reference Objects and Patient Datasets," Radiological Society of North America 105th Scientific Sessions, December 2019.
307. C. LeCastillo, K. Gifford, E. Jablonka, D. Nguyen, G. Lee, S. Walters, S. Napel, D. Fleischmann, "3D Printing for Breast Reconstruction," *accepted to RSNA Medical 3D Printing in Practice Course, March 6 – 8, 2020, Westin Michigan Avenue, Westin Michigan Avenue, Chicago, IL.*
308. D. Mastrodicasa, S. Mattonen, S. T. Chang, G. Charville, E. Olcott, R. B. Jeffrey, Jr., S. Napel, B. Patel, "Machine-Learning Based CT Radiomics Model to Predict Survival in Patients with Pancreatic Ductal Adenocarcinoma. Radiological Society of North America 106h Scientific Sessions, December 2020.
309. A. B. Mantz, R. Zhou, A. Kozlov, W. DeMartini, S-T. Chen, S. Okamoto, D. M. Ikeda, S. A. Mattonen, S. Napel, E. Alkim, G. W. Sledge, A. W. Kurian, M. Liu, M. L. Telli, Itakura, Haruka, "Radiomic features quantifying pixel-level characteristics of breast tumors from magnetic resonance imaging predict risk factors in triple-negative breast cancer." Journal of Clinical Oncology 40(16) supplement, June 1, 2022.

## Invited Articles

1. G.D. Rubin, S. Napel, "Increased Scan Pitch for Vascular and Thoracic Spiral CT." Letter to the Editor, Radiology, **197**(1):316-7, 1995.
2. G.D. Rubin, S. Napel, A.N. Leung, "Volumetric Analysis of Volumetric Data—Achieving a Paradigm Shift," *Editorial,* Radiology **200**(2)312-317, 1996.
3. M.L. Davila, C.F. Beaulieu, D.S. Paik, S. Napel, P.S. Edelstein, R.B. Jeffrey, Jr., "CT and MR Colonography (Virtual Colonoscopy)," Techniques in Gastrointestinal Endoscopy, **2**:30-36, 2000.
4. D. S. Katz, N. Venkataramanan, S. Napel. F.G. Sommer, "Low Dose Unenhanced Multidetector Helical CT for the Evaluation of Suspected Renal Colic: Can it be Routinely Utilized?" American Journal of Roentgenology **180**:313-315, 2003.
5. C. L. Partain, H-P Chan, J. G. Gelovani, M. L. Giger, J. A. Izatt, F. A. Jolesz, K. Kandarpa, K. C. P. Li, M. McNitt-Gray, S. Napel, R. M. Summers, and G. S. Gazelle, "Biomedical Imaging Research Opportunities Workshop II: Report and Recommendations," Radiology **236:** 389-403, 2005.
6. P. Sundaram, D.S. Paik, C.F. Beaulieu, S. Napel, "Algorithmic Colon Polyp Detection: Image Processing or Geometry Processing?" Proc MICCAI Workshop: Computational and Visualization Challenges in the New Era of Virtual Colonoscopy, 2008.
7. S. Napel and M. L. Giger, "Radiomics and Imaging Genomics: Quantitative Imaging for Precision Medicine," Editorial written for Special Section on Radiomics and Imaging Genomics, SPIE Journal of Medical Imaging, December 2015. PMID: 26839908; PMCID: PMC4729214.
8. I. El Naqa, S. Napel, "Radiogenomics is the future of treatment response assessment in clinical oncology," Med Phys. 2018 Oct;45(10):4325-4328. PMID: 29863785.

## Invited Presentations

1. S. Napel, "Cine Computed Tomography." IEEE Computer Society—Computer Elements Workshop. Mesa, Arizona, November 1987.
2. S. Napel, "Comparison of 3-D Results by CT and Arteriography in the Same Patient." Symposium on Coronary Artery Calcification — Detection, Quantitation and Prognostic Significance. Miami Beach, Florida, February 1989.
3. S. Napel, "Ultrafast Computed Tomography." Robarts Research Institute, London, Ontario, May 1989.
4. S. Napel, M.P. Marks, G.D. Rubin, M.D. Dake, D.R. Enzmann, C.J. Bergin, D.V. Paranjpe, R.B. Jeffrey, Jr., "CT Angiography Using Continuous Volume CT Scanning with Maximum Intensity Projections for 3D Visualization." Advances in Ultrafast CT, Burlingame, CA, October, 1992
5. S. Napel, "Time Sequence of Flow Information via 3DPC Simulated Streamlines," University of Michigan, Magnetic Resonance Angiography Course and Workshop. Lansing, Michigan, October 14 - 18, 1992.

6. S.A. Napel, M.P. Marks, G.D. Rubin, M.D. Dake, D.R. Enzmann, D.V. Paranjpe, R.B. Jeffrey, Jr., "Three-dimensional CT Angiography Using Spiral CT in the Brain, Neck, Chest, and Abdomen." Cardiovascular Science and Technology Conference (AAMI), Hyatt Regency Bethesda, December 12-14, 1992.
7. S. Napel, "Three-dimensional Vascular Imaging with CT and MR." Hemodynamics and Atherosclerosis Symposium, Stanford University, July, 1993.
8. S. Napel, "CT Angiography: An Update." Advances in Ultrafast CT: 1993 Electron Beam Tomography (EBT) International Symposium, sponsored by the University of Iowa in conjunction with the Harbor-UCLA Medical Center, Miami, Florida, October 8-10, 1993.
9. S. Napel, "MR Physics of Blood Flow." Diagnostic Imaging Update: CT, MR, Chest and Interventional, hosted by Stanford University, Maui, Hawaii, February 21-25, 1994.
10. S. Napel, "3D Image Reconstruction Techniques in CT and MR." Diagnostic Imaging Update: CT, MR, Chest and Interventional, hosted by Stanford University, Maui, Hawaii, February 21-25, 1994.
11. S. Napel, "Technical Considerations in Spiral CT." Diagnostic Imaging Update: CT, MR, Chest and Interventional, hosted by Stanford University, Maui, Hawaii, February 21-25, 1994.
12. S. Napel, "CT for Evaluation of Vascular Disease - How and Why." Vascular Disease 1994: Diagnosis and Treatment postgraduate course, hosted by Stanford University, Monterey, California, October 26-30, 1994.
13. S. Napel, "Fast CT: Is it Different?" American Association of Physicists in Medicine Symposium, Radiological Society of North America, Chicago, IL, November 26 - December 2, 1994.
14. S. Napel, "Computer Technology." Discussion Leader. Virtual Colonoscopy Workshop, National Institutes of Health, National Cancer Institute, Bethesda, MD, June 12, 1995.
15. S. Napel, "CT Image Reconstruction." American Association of Physicists in Medicine Summer School: CT and US Technology and Applications, New London, CT, June 25-29, 1995.
16. S. Napel, "Image Processing and 3D Displays." American Association of Physicists in Medicine Summer School: CT and US Technology and Applications, New London, CT, June 25-29, 1995.
17. S. Napel, "Computed Tomography and Magnetic Resonance Image Fusion for Stereotaxic Treatment of Brain Tumors." The Whitaker Foundation, Snowbird, Utah, August 4-6, 1995.
18. S. Napel, "Virtual Endoscopy and More." Advances in Ultrafast CT 1995: An International Symposium on Electron Beam Tomography, Scottsdale, Arizona, October, 1995.
19. S. Napel, "Virtual Endoscopy," Rapid Prototyping in Medicine and Computer Assisted Surgery, Erlangen, Germany, October 19-21, 1995.

20. S. Napel, G.D. Rubin, C.F. Beaulieu, R.B. Jeffrey, Jr., "Evaluation of Cross-sectional Medical Images using Perspective Rendering — Virtual Endoscopy." Imatron Japan EBCT Symposium, Yokohama, Japan, January 26-27, 1996.
21. S. Napel, Virtual Colonoscopy Workshop *(Follow-up of June 12, 1995 workshop to discuss feasibility of Virtual Colonoscopy for Clinical Application),* National Institutes of Health, National Cancer Institute, Bethesda, MD, March 4, 1996.
21. S. Napel, "3-D CT Imaging for Simulated Endoscopy and Intra-parenchymal Viewing." American Association of Physicists in Medicine Annual Meeting, Philadelphia, July 21-25, 1996.
23. S. Napel, Virtual Colonoscopy Workshop *(Follow-up of June 12, 1995 and March 4, 1996 workshops to discuss feasibility of Virtual Colonoscopy for Clinical Application),* National Institutes of Health, National Cancer Institute, Bethesda, MD, September 13, 1996.
24. S. Napel, "Virtual Reality: Emerging Technology for Diagnosis," College of American Pathologists, San Diego, CA, October 3, 1996.
25. S. Napel, Virtual Endoscopy Panel, MEDTEC 1997, Tysons Corner, VA, August 14-17, 1997.
26. S, Napel, "Virtual Endoscopy: Overview and Recent Developments," Rapid Prototyping in Medicine and Computer Assisted Surgery, Erlangen, Germany, October 16-18, 1997.
27. S. Napel, "Diagnostic Radiology in Three Dimensions: Present and Future," University of Chicago, Radiology Grand Rounds, September 1998.
28. S. Napel, "New Visualization Techniques for Virtual Colonoscopy," 1st International Symposium on Virtual Colonoscopy, Boston, October 1998.
29. S. Napel, "Current State of the Art EBCT 3D Imaging," Advances in Electron Beam Computed Tomography: An International Scientific Symposium, San Francisco, October 16-18, 1998.
30. S. Napel, "Diagnostic Radiology in Three Dimensions," Medicine Meets Virtual Reality at Stanford, January 23, 1999.
31. S. Napel, "Volumetric Display and Analysis of Volume Data," Joint Working Group on Image-guided Diagnosis and Treatment," National Institutes of Health (NCI) and Office of Women's Health Workshop, Washington D.C., April 12-14, 1999.
32. S. Napel, "Volumetric Imagery: Changing the Paradigm of Radiological Interpretation," University of Western Ontario, June 15, 1999.
33. S. Napel, "Volumetric Visualization of Medical Imagery: A New Paradigm for Radiology," Symposium on Visualization in Medicine, American Association of Physicists in Medicine Annual Meeting, Nashville, July 25-29, 1999.
34. S. Napel, "3D Diagnostic Radiology: Present Status and Future Direction," Rapid Prototyping in Medicine and Computer Assisted Surgery, Erlangen, Germany, October 14-16, 1999.
35. S. Napel, "Multidetector CT," Radiology Grand Rounds, November 22, 1999.

36. S. Napel, "Display and Analysis of Volumetric Medical Imagery: Towards a New Paradigm for Radiological Interpretation," Progress in Radiology Series, University of California, San Francisco, January 27, 2000.
37. S. Napel, "Computerized Detection of Polyps in CT Colonography," 14th Computer Assisted Radiology and Surgery, San Francisco, June 2000.
38. S. Napel, "Living with Thousands of Slices: Towards a New Paradigm for Radiological Interpretation," International Society for Strategic Studies in Radiology, San Francisco, August, 2001.
39. S. Napel, "Radiological Data Explosion: The Good, the Bad, and Surviving the Ugly," Rapid Prototyping in Medicine and Computer Assisted Surgery, Nurnberg, Germany, October 11-13, 2001.
40. S. Napel, G.D. Rubin, A.G. Sorensen, "Volumetric Visualization and Analysis: Introduction and Clinical Benefits," AAPM/RSNA Symposium, Arie Crown Theater, November 2002.
41. G.D. Rubin, E.K. Fishman, S. Napel, P.J. Pickhardt, "Three-dimensional Imaging: Where Are We Headed?" Special Focus Session, RSNA, November 2004.
42. S. Napel, "Linking Image features to diseases, molecular phenotypes and outcomes: methods and example in non-small cell lung cancer," S. Napel, International Symposium on BIOMEDICAL IMAGING: From Nano to Macro, San Francisco, April 8, 2013.
43. S. Napel "Spotlight Talk on Radiogenomics," World Molecular Imaging Congress, Sept. 2014, Seoul, Korea.
44. S. Napel, "Oncogene Tumor Heterogeneity Translated to Imaging: Radiomics and Radiogenomics – Decoding Tumor Phenotype using Radiomics," World Molecular Imaging Congress, Honolulu, Hawaii, Sept. 2015.
45. S. Napel, "The Rise (and Fall?) of Radiomics," Radiomics 2016, Clearwater Beach, FL, October 2016.
46. S. Napel, "Decoding Tumor Phenotype using Radiomics: Methods, Challenges, and Potential," Annual Keck Seminar, Gulf Coast Consortium, Magnetic Resonance Radiogenomics Conference, Rice University, Houston, TX, March 31, 2017.
47. S. Napel, "Radiomics/Radiogenomics: Tools and Techniques," Imaging Network Ontario, Toronto, Ontario, March 28-29, 2018.
48. S. Napel, ""Diagnostic and Predictive Radiomics: Methods, Challenges, and Outlook," University of Washington Dept. of Radiology Grand Rounds, January 11, 2019.
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