


# Stanford

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## Sandy Napel

Professor of Radiology (Integrative Biomedical Imaging Informatics) and, by courtesy, of Medicine (Medical Informatics) and of Electrical Engineering

 Curriculum Vitae available Online

### CONTACT INFORMATION

#### • Alternate Contact

Elizabeth Colvin - Administrative Associate

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### Bio

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#### BIO

I am the Division Chief of IBIIIS (Integrative Biomedical Imaging Informatics at Stanford), whose mission is to advance the clinical and basic sciences in radiology, while improving our understanding of biology and the manifestations of disease, by pioneering methods in the information sciences that integrate imaging, clinical and molecular data, and co-director of the Radiology 3D and Quantitative Imaging Lab, providing clinical service to the Stanford and local community. My primary focus is on radiomics and radiogenomics, i.e., making image features computer-accessible, to facilitate content-based retrieval of similar lesions, and prediction of molecular phenotype, response to therapy, and prognosis from imaging features. I have also been involved in developing diagnostic and therapy-planning applications and strategies for the acquisition, visualization, and quantitation of multi-dimensional medical imaging data. Examples are: creation of three-dimensional images of blood vessels using CT, visualization of complex flow within blood vessels using MR, computer-aided detection and characterization of lesions (e.g., colonic polyps, pulmonary nodules) from cross-sectional image data, visualization and automated assessment of 4D ultrasound data, and fusion of images acquired using different modalities (e.g., CT and MR). I have also been involved in developing and evaluating techniques for exploring cross-sectional imaging data from an internal perspective, i.e., virtual endoscopy (including colonoscopy, angioscopy, and bronchoscopy), and in the quantitation of structure parameters, e.g., volumes, lengths, medial axes, and curvatures. I am also interested in creating workable solutions to the problem of "data explosion," i.e., how to look at the thousands of images generated per examination using modern CT and MR scanners.

#### ACADEMIC APPOINTMENTS

- Professor, Radiology
- Professor (By courtesy), Electrical Engineering
- Professor (By courtesy), Medicine - Biomedical Informatics Research
- Member, Bio-X
- Member, Cardiovascular Institute
- Member, Stanford Cancer Institute

#### ADMINISTRATIVE APPOINTMENTS

- Division Chief, Integrative Biomedical Imaging Informatics at Stanford , (2009- present)
- co-Director, Radiology 3D and Quantitative Imaging Laboratory , (1996- present)

## HONORS AND AWARDS

- College of Fellows, American Institute for Medical and Biological Engineering (AIMBE) (November 2009)
- Distinguished Investigator Award, Academy of Radiology Research (2012)

## PROFESSIONAL EDUCATION

- BS, SUNY Stony Brook , Engineering Sciences (1974)
- MS, Stanford University , Electrical Engineering (1976)
- PhD, Stanford University , Electrical Engineering (1981)

## LINKS

- Integrative Biomedical Imaging Informatics at Stanford (IBIIS): <http://ibiis.stanford.edu>
- 3D and Quantitative Imaging Web Site: <http://3dqmlab.stanford.edu>
- My NCBI Publications: <http://www.ncbi.nlm.nih.gov/sites/myncbi/sandy.napel.1/bibliography/43913272/public/>
- My Lab Site: <http://med.stanford.edu/riipl.html>

## Research & Scholarship

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### CURRENT RESEARCH AND SCHOLARLY INTERESTS

I am the Division Chief of IBIIS (Integrative Biomedical Imaging Informatics at Stanford), whose mission is to advance the clinical and basic sciences in radiology, while improving our understanding of biology and the manifestations of disease, by pioneering methods in the information sciences that integrate imaging, clinical and molecular data, and co-director of the Radiology 3D and Quantitative Imaging Lab, providing clinical service to the Stanford and local community. My primary focus is on radiomics and radiogenomics, i.e., making image features computer-accessible, to facilitate content-based retrieval of similar lesions, and prediction of molecular phenotype, response to therapy, and prognosis from imaging features. I have also been involved in developing diagnostic and therapy-planning applications and strategies for the acquisition, visualization, and quantitation of multi-dimensional medical imaging data. Examples are: creation of three-dimensional images of blood vessels using CT, visualization of complex flow within blood vessels using MR, computer-aided detection and characterization of lesions (e.g., colonic polyps, pulmonary nodules) from cross-sectional image data, visualization and automated assessment of 4D ultrasound data, and fusion of images acquired using different modalities (e.g., CT and MR). I have also been involved in developing and evaluating techniques for exploring cross-sectional imaging data from an internal perspective, i.e., virtual endoscopy (including colonoscopy, angiography, and bronchoscopy), and in the quantitation of structure parameters, e.g., volumes, lengths, medial axes, and curvatures. I am also interested in creating workable solutions to the problem of "data explosion," i.e., how to look at the thousands of images generated per examination using modern CT and MR scanners.

## Teaching

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### STANFORD ADVISEES

#### Postdoctoral Faculty Sponsor

Eduardo Somoza

#### Doctoral Dissertation Advisor (AC)

Shaimaa Bakr

#### Postdoctoral Research Mentor

Eduardo Somoza

### GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Bioengineering (Phd Program)

- Biomedical Informatics (Phd Program)

## Publications

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### PUBLICATIONS

- **Radiomics and Radiogenomics: Technical Basis and Clinical Applications**

edited by Xing, L., Li, R., Napel, S., Rubin, D. L.  
CRC Press.2019

- **Quantitative imaging of cancer in the postgenomic era: Radio(geno)mics, deep learning, and habitats.** *Cancer*

Napel, S., Mu, W., Jardim-Perassi, B. V., Aerts, H. J., Gillies, R. J.  
2018

- **A radiogenomic dataset of non-small cell lung cancer.** *Scientific data*

Bakr, S., Gevaert, O., Echegaray, S., Ayers, K., Zhou, M., Shafiq, M., Zheng, H., Benson, J. A., Zhang, W., Leung, A. N., Kadoch, M., D Hoang, C., Shrager, et al  
2018; 5: 180202

- **Radiogenomics is the future of treatment response assessment in clinical oncology** *MEDICAL PHYSICS*

El Naqa, I., Napel, S., Zaidi, H.  
2018; 45 (10): 4325–28

- **Quantitative Image Feature Engine (QIFE): an Open-Source, Modular Engine for 3D Quantitative Feature Extraction from Volumetric Medical Images.** *Journal of digital imaging*

Echegaray, S., Bakr, S., Rubin, D. L., Napel, S.  
2017

- **A Rapid Segmentation-Insensitive "Digital Biopsy" Method for Radiomic Feature Extraction: Method and Pilot Study Using CT Images of Non-Small Cell Lung Cancer.** *Tomography : a journal for imaging research*

Echegaray, S., Nair, V., Kadoch, M., Leung, A., Rubin, D., Gevaert, O., Napel, S.  
2016; 2 (4): 283–94

- **NOTE: This list is not complete** *see CV link*

Napel, S.  
2013

- **Bone Marrow and Tumor Radiomics at 18F-FDG PET/CT: Impact on Outcome Prediction in Non-Small Cell Lung Cancer.** *Radiology*

Mattonen, S. A., Davidzon, G. A., Benson, J., Leung, A. N., Vasanawala, M., Horng, G., Shrager, J. B., Napel, S., Nair, V. S.  
2019: 190357

- **[18F] FDG Positron Emission Tomography (PET) Tumor and Penumbra Imaging Features Predict Recurrence in Non-Small Cell Lung Cancer.** *Tomography (Ann Arbor, Mich.)*

Mattonen, S. A., Davidzon, G. A., Bakr, S., Echegaray, S., Leung, A. N., Vasanawala, M., Horng, G., Napel, S., Nair, V. S.  
2019; 5 (1): 145–53

- **Stability and reproducibility of computed tomography radiomic features extracted from peritumoral regions of lung cancer lesions.** *Medical physics*

Tunali, I., Hall, L. O., Napel, S., Cherezov, D., Guvenis, A., Gillies, R. J., Schabath, M. B.  
2019

- **A RADIOMICS APPROACH TO ANALYZE CARDIAC ALTERATIONS IN HYPERTENSION**

Cetin, I., Petersen, S. E., Napel, S., Camara, O., Gonzalez Ballester, M., Lekadir, K., IEEE  
IEEE.2019: 640–43

- **Principles and Rationale of Radiomics and Radiogenomics** *Radiomics and Radiogenomics: Technical Basis and Clinical Applications*

Napel, S.  
CRC Press.2019; 1: 3–12

- **Deep Learning Techniques for Automatic MRI Cardiac Multi-Structures Segmentation and Diagnosis: Is the Problem Solved?** *IEEE TRANSACTIONS ON MEDICAL IMAGING*

- Bernard, O., Lalande, A., Zotti, C., Cervenansky, F., Yang, X., Heng, P., Cetin, I., Lekadir, K., Camara, O., Gonzalez Ballester, M., Sanroma, G., Napel, S., Petersen, et al  
2018; 37 (11): 2514–25
- **Magnetic resonance imaging and molecular features associated with tumor-infiltrating lymphocytes in breast cancer.** *Breast cancer research : BCR*  
Wu, J., Li, X., Teng, X., Rubin, D. L., Napel, S., Daniel, B. L., Li, R.  
2018; 20 (1): 101
  - **Deep learning to predict survival prognosis for patients with non-small cell lung cancer using images and clinical data**  
Lee, E. H., Zhou, M., Gamboa, N., Brennan, K., Itakura, H., Nair, V., Napel, S., Wong, S., Gevaert, O.  
AMER ASSOC CANCER RESEARCH.2018
  - **GFPT2-expressing cancer-associated fibroblasts mediate metabolic reprogramming in human lung adenocarcinoma.** *Cancer research*  
Zhang, W., Bouchard, G., Yu, A., Shafiq, M., Jamali, M., Shrager, J. B., Ayers, K., Bakr, S., Gentles, A. J., Diehn, M., Quon, A., West, R. B., Nair, et al  
2018
  - **Semi-automated pulmonary nodule interval segmentation using the NLST data** *MEDICAL PHYSICS*  
Balagurunathan, Y., Beers, A., Kalpathy-Cramer, J., McNitt-Gray, M., Hadjiiski, L., Zhao, B., Zhu, J., Yang, H., Yip, S. F., Aerts, H. L., Napel, S., Cherezov, D., Cha, et al  
2018; 45 (3): 1093–1107
  - **Intratumoral Spatial Heterogeneity at Perfusion MR Imaging Predicts Recurrence-free Survival in Locally Advanced Breast Cancer Treated with Neoadjuvant Chemotherapy.** *Radiology*  
Wu, J., Cao, G., Sun, X., Lee, J., Rubin, D. L., Napel, S., Kurian, A. W., Daniel, B. L., Li, R.  
2018: 172462
  - **Erratum: Semi-automated pulmonary nodule interval segmentation using the NLST data.** *Medical physics*  
Balagurunathan, Y., Beers, A., Kalpathy-Cramer, J., McNitt-Gray, M., Hadjiiski, L., Zhao, B., Zhu, J., Yang, H., Yip, S. S., Aerts, H. J., Napel, S., Cherezov, D., Cha, et al  
2018; 45 (6): 2689–90
  - **Non-Small Cell Lung Cancer Radiogenomics Map Identifies Relationships between Molecular and Imaging Phenotypes with Prognostic Implications.** *Radiology*  
Zhou, M., Leung, A., Echegaray, S., Gentles, A., Shrager, J. B., Jensen, K. C., Berry, G. J., Plevritis, S. K., Rubin, D. L., Napel, S., Gevaert, O.  
2018; 286 (1): 307–15
  - **Radiogenomics Map: A Novel Approach for Noninvasive Identification of Molecular Properties? Response** *RADIOLOGY*  
Gevaert, O., Napel, S.  
2017; 285 (3): 1061
  - **Prediction of EGFR and KRAS mutation in non-small cell lung cancer using quantitative 18F FDG-PET/CT metrics.** *Oncotarget*  
Minamimoto, R., Jamali, M., Gevaert, O., Echegaray, S., Khuong, A., Hoang, C. D., Shrager, J. B., Plevritis, S. K., Rubin, D. L., Leung, A. N., Napel, S., Quon, A.  
2017
  - **Variations in the functional visual field for detection of lung nodules on chest computed tomography: Impact of nodule size, distance, and local lung complexity.** *Medical physics*  
Ebner, L., Tall, M., Choudhury, K. R., Ly, D. L., Roos, J. E., Napel, S., Rubin, G. D.  
2017
  - **Adaptive local window for level set segmentation of CT and MRI liver lesions.** *Medical image analysis*  
Hoogi, A., Beaulieu, C. F., Cunha, G. M., Heba, E., Sirlin, C. B., Napel, S., Rubin, D. L.  
2017; 37: 46-55
  - **Predictive radiogenomics modeling of EGFR mutation status in lung cancer** *SCIENTIFIC REPORTS*  
Gevaert, O., Echegaray, S., Khuong, A., Hoang, C. D., Shrager, J. B., Jensen, K. C., Berry, G. J., Guo, H. H., Lau, C., Plevritis, S. K., Rubin, D. L., Napel, S., Leung, et al  
2017; 7
  - **A Convolutional Neural Network for Automatic Characterization of Plaque Composition in Carotid Ultrasound** *IEEE JOURNAL OF BIOMEDICAL AND HEALTH INFORMATICS*  
Lekadir, K., Galimzianova, A., Betriu, A., del Mar Vila, M., Igual, L., Rubin, D. L., Fernandez, E., Radeva, P., Napel, S.

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- **Heterogeneous Enhancement Patterns of Tumor-adjacent Parenchyma at MR Imaging Are Associated with Dysregulated Signaling Pathways and Poor Survival in Breast Cancer.** *Radiology*  
Wu, J., Li, B., Sun, X., Cao, G., Rubin, D. L., Napel, S., Ikeda, D. M., Kurian, A. W., Li, R.  
2017; 162823
- **Prediction of EGFR and KRAS mutation in non-small cell lung cancer using quantitative 18F FDG-PET/CT metrics.** *Oncotarget*  
Minamimoto, R., Jamali, M., Gevaert, O., Echegaray, S., Khuong, A., Hoang, C. D., Shrager, J. B., Plevritis, S. K., Rubin, D. L., Leung, A. N., Napel, S., Quon, A.  
2017; 8 (32): 52792–801
- **Noninvasive radiomics signature based on quantitative analysis of computed tomography images as a surrogate for microvascular invasion in hepatocellular carcinoma: a pilot study.** *Journal of medical imaging (Bellingham, Wash.)*  
Bakr, S., Echegaray, S., Shah, R., Kamaya, A., Louie, J., Napel, S., Kothary, N., Gevaert, O.  
2017; 4 (4): 041303
- **Radiomics of Lung Nodules: A Multi-Institutional Study of Robustness and Agreement of Quantitative Imaging Features.** *Tomography : a journal for imaging research*  
Kalpathy-Cramer, J., Mamomov, A., Zhao, B., Lu, L., Cherezov, D., Napel, S., Echegaray, S., Rubin, D., McNitt-Gray, M., Lo, P., Sieren, J. C., Uthoff, J., Dilger, et al  
2016; 2 (4): 430-437
- **Intratumor Partitioning of Serial Computed Tomography and FDG Positron Emission Tomography Images Identifies High-Risk Tumor Subregions and Predicts Patterns of Failure in Non-Small Cell Lung Cancer After Radiation Therapy** *58th Annual Meeting of the American-Society-for-Radiation-Oncology (ASTRO)*  
Wu, J., Gensheimer, M. F., Dong, X., Rubin, D. L., Napel, S., Diehn, M., Loo, B. W., Li, R.  
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- **Robust Intratumor Partitioning to Identify High-Risk Subregions in Lung Cancer: A Pilot Study.** *International journal of radiation oncology, biology, physics*  
Wu, J., Gensheimer, M. F., Dong, X., Rubin, D. L., Napel, S., Diehn, M., Loo, B. W., Li, R.  
2016; 95 (5): 1504-1512
- **A Comparison of Lung Nodule Segmentation Algorithms: Methods and Results from a Multi-institutional Study** *JOURNAL OF DIGITAL IMAGING*  
Kalpathy-Cramer, J., Zhao, B., Goldgof, D., Gu, Y., Wang, X., Yang, H., Tan, Y., Gillies, R., Napel, S.  
2016; 29 (4): 476-487
- **SU-D-207B-05: Robust Intra-Tumor Partitioning to Identify High-Risk Subregions for Prognosis in Lung Cancer.** *Medical physics*  
Wu, J., Gensheimer, M., Dong, X., Rubin, D., Napel, S., Diehn, M., Loo, B., Li, R.  
2016; 43 (6): 3349-?
- **A Rapid Segmentation-Insensitive 'Digital Biopsy' Method for Radiomic Feature Extraction; Method and Pilot Study Using CT Images of Non-Small Cell Lung Cancer** *Tomography*  
Echegaray, S., Nair, V., Kadoch, M., Leung, A., Rubin, D., Gevaert, O., Napel Sandy , et al  
2016; 2 (4): 283–94
- **Core samples for radiomics features that are insensitive to tumor segmentation: method and pilot study using CT images of hepatocellular carcinoma.** *Journal of medical imaging (Bellingham, Wash.)*  
Echegaray, S., Gevaert, O., Shah, R., Kamaya, A., Louie, J., Kothary, N., Napel, S.  
2015; 2 (4): 041011-?
- **Special Section Guest Editorial:Radiomics and Imaging Genomics: Quantitative Imaging for Precision Medicine.** *Journal of medical imaging (Bellingham, Wash.)*  
Napel, S., Giger, M.  
2015; 2 (4): 041001-?
- **Magnetic resonance image features identify glioblastoma phenotypic subtypes with distinct molecular pathway activities.** *Science translational medicine*  
Itakura, H., Achrol, A. S., Mitchell, L. A., Loya, J. J., Liu, T., Westbroek, E. M., Feroze, A. H., Rodriguez, S., Echegaray, S., Azad, T. D., Yeom, K. W., Napel, S., Rubin, et al  
2015; 7 (303): 303ra138-?

- **Magnetic resonance image features identify glioblastoma phenotypic subtypes with distinct molecular pathway activities.** *Science translational medicine*  
Itakura, H., Achrol, A. S., Mitchell, L. A., Loya, J. J., Liu, T., Westbroek, E. M., Feroze, A. H., Rodriguez, S., Echegaray, S., Azad, T. D., Yeom, K. W., Napel, S., Rubin, et al  
2015; 7 (303): 303ra138-?
- **Glioblastoma Multiforme: Exploratory Radiogenomic Analysis by Using Quantitative Image Features.** *Radiology*  
Gevaert, O., Mitchell, L. A., Achrol, A. S., Xu, J., Echegaray, S., Steinberg, G. K., Cheshier, S. H., Napel, S., Zaharchuk, G., Plevritis, S. K.  
2015; 276 (1): 313-?
- **Content-based image retrieval in radiology: analysis of variability in human perception of similarity.** *Journal of medical imaging (Bellingham, Wash.)*  
Faruque, J., Beaulieu, C. F., Rosenberg, J., Rubin, D. L., Yao, D., Napel, S.  
2015; 2 (2): 025501-?
- **Characterizing Search, Recognition, and Decision in the Detection of Lung Nodules on CT Scans: Elucidation with Eye Tracking** *RADIOLOGY*  
Rubin, G. D., Roos, J. E., Tall, M., Harrawood, B., Bag, S., Ly, D. L., Seaman, D. M., Hurwitz, L. M., Napel, S., Choudhury, K. R.  
2015; 274 (1): 276-286
- **On combining image-based and ontological semantic dissimilarities for medical image retrieval applications.** *Medical image analysis*  
Kurtz, C., Depeursinge, A., Napel, S., Beaulieu, C. F., Rubin, D. L.  
2014; 18 (7): 1082-1100
- **Glioblastoma multiforme: exploratory radiogenomic analysis by using quantitative image features.** *Radiology*  
Gevaert, O., Mitchell, L. A., Achrol, A. S., Xu, J., Echegaray, S., Steinberg, G. K., Cheshier, S. H., Napel, S., Zaharchuk, G., Plevritis, S. K.  
2014; 273 (1): 168-174
- **NCI Workshop Report: Clinical and Computational Requirements for Correlating Imaging Phenotypes with Genomics Signatures** *TRANSLATIONAL ONCOLOGY*  
Colen, R., Foster, I., Gatenby, R., Giger, M. E., Gillies, R., Gutman, D., Heller, M., Jain, R., Madabhushi, A., Madhavan, S., Napel, S., Rao, A., Saltz, et al  
2014; 7 (5): 556-569
- **Glioblastoma Multiforme: Exploratory Radiogenomic Analysis by Using Quantitative Image Features** *RADIOLOGY*  
Gevaert, O., Mitchell, L. A., Achrol, A. S., Xu, J., Echegaray, S., Steinberg, G. K., Cheshier, S. H., Napel, S., Zaharchuk, G., Plevritis, S. K.  
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- **Predicting Visual Semantic Descriptive Terms From Radiological Image Data: Preliminary Results With Liver Lesions in CT.** *IEEE transactions on medical imaging*  
Depeursinge, A., Kurtz, C., Beaulieu, C., Napel, S., Rubin, D.  
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- **A hierarchical knowledge-based approach for retrieving similar medical images described with semantic annotations** *JOURNAL OF BIOMEDICAL INFORMATICS*  
Kurtz, C., Beaulieu, C. F., Napel, S., Rubin, D. L.  
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- **A hierarchical knowledge-based approach for retrieving similar medical images described with semantic annotations.** *Journal of biomedical informatics*  
Kurtz, C., Beaulieu, C. F., Napel, S., Rubin, D. L.  
2014; 49: 227-244
- **CT Angiography after 20 Years: A Transformation in Cardiovascular Disease Characterization Continues to Advance** *RADIOLOGY*  
Rubin, G. D., Leipsic, J., Schoepf, U. J., Fleischmann, D., Napel, S.  
2014; 271 (3): 633-652
- **CREATING A RADIOGENOMICS MAP OF MULTI-OMICS AND QUANTITATIVE IMAGE FEATURES IN GLIOBLASTOMA MULTIFORME**  
Gevaert, O., Mitchell, L., Achrol, A., Xu, J., Steinberg, G., Cheshier, S., Napel, S., Zaharchuk, G., Plevritis, S.  
OXFORD UNIV PRESS INC.2013: 140-41
- **Modeling Perceptual Similarity Measures in CT Images of Focal Liver Lesions** *JOURNAL OF DIGITAL IMAGING*  
Faruque, J., Rubin, D. L., Beaulieu, C. F., Napel, S.  
2013; 26 (4): 714-720

- **Uncluttered Single-Image Visualization of Vascular Structures Using GPU and Integer Programming** *IEEE TRANSACTIONS ON VISUALIZATION AND COMPUTER GRAPHICS*  
Won, J., Jeon, Y., Rosenberg, J. K., Yoon, S., Rubin, G. D., Napel, S.  
2013; 19 (1): 81-93
- **Prognostic PET F-18-FDG Uptake Imaging Features Are Associated with Major Oncogenomic Alterations in Patients with Resected Non-Small Cell Lung Cancer** *CANCER RESEARCH*  
Nair, V. S., Gevaert, O., Davidzon, G., Napel, S., Graves, E. E., Hoang, C. D., Shrager, J. B., Quon, A., Rubin, D. L., Plevritis, S. K.  
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- **Non-Small Cell Lung Cancer: Identifying Prognostic Imaging Biomarkers by Leveraging Public Gene Expression Microarray Data-Methods and Preliminary Results** *RADIOLOGY*  
Gevaert, O., Xu, J., Hoang, C. D., Leung, A. N., Xu, Y., Quon, A., Rubin, D. L., Napel, S., Plevritis, S. K.  
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- **Radiogenomic analysis indicates MR images are potentially predictive of EGFR mutation status in glioblastoma multiforme**  
Gevaert, O., Mitchell, L., Xu, J., Yu, C., Rubin, D., Zaharchuk, G., Napel, S., Plevritis, S.  
AMER ASSOC CANCER RESEARCH.2012
- **A Comprehensive Descriptor of Shape: Method and Application to Content-Based Retrieval of Similar Appearing Lesions in Medical Images** *JOURNAL OF DIGITAL IMAGING*  
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- **Accuracy of a Remote Eye Tracker for Radiologic Observer Studies: Effects of Calibration and Recording Environment** *ACADEMIC RADIOLOGY*  
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- **Automatic annotation of radiological observations in liver CT images.** *AMIA ... Annual Symposium proceedings / AMIA Symposium. AMIA Symposium*  
Gimenez, F., Xu, J., Liu, Y., Liu, T., Beaulieu, C., Rubin, D., Napel, S.  
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- **Quantifying the margin sharpness of lesions on radiological images for content-based image retrieval** *MEDICAL PHYSICS*  
Xu, J., Napel, S., Greenspan, H., Beaulieu, C. F., Neeraj, A., Rubin, D. L.  
2012; 39 (9): 5405-5418
- **Automated Tracing of the Adventitial Contour of Aortoiliac and Peripheral Arterial Walls in CT Angiography (CTA) to Allow Calculation of Non-calcified Plaque Burden** *JOURNAL OF DIGITAL IMAGING*  
Raman, B., Raman, R., Rubin, G. D., Napel, S.  
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- **Automated temporal tracking and segmentation of lymphoma on serial CT examinations** *MEDICAL PHYSICS*  
Xu, J., Greenspan, H., Napel, S., Rubin, D. L.  
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- **Managing Biomedical Image Metadata for Search and Retrieval of Similar Images** *JOURNAL OF DIGITAL IMAGING*  
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- **Integrating medical images and transcriptomic data in non-small cell lung cancer**  
Gevaert, O., Xu, J., Hoang, C., Leung, A., Quon, A., Rubin, D., Napel, S., Plevritis, S.  
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- **Content-Based Image Retrieval in Radiology: Current Status and Future Directions** *JOURNAL OF DIGITAL IMAGING*  
Akgul, C. B., Rubin, D. L., Napel, S., Beaulieu, C. F., Greenspan, H., Acar, B.  
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- **Automated Quantification of Aortoortic and Aortoiliac Angulation for Computed Tomographic Angiography of Abdominal Aortic Aneurysms before Endovascular Repair: Preliminary Study** *JOURNAL OF VASCULAR AND INTERVENTIONAL RADIOLOGY*  
Raman, B., Raman, R., Napel, S., Rubin, G. D.

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- **Automated Retrieval of CT Images of Liver Lesions on the Basis of Image Similarity: Method and Preliminary Results** *RADIOLOGY*  
Napel, S. A., Beaulieu, C. F., Rodriguez, C., Cui, J., Xu, J., Gupta, A., Korenblum, D., Greenspan, H., Ma, Y., Rubin, D. L.  
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- **Assessing operating characteristics of CAD algorithms in the absence of a gold standard** *MEDICAL PHYSICS*  
Choudhury, K. R., Paik, D. S., Yi, C. A., Napel, S., Roos, J., Rubin, G. D.  
2010; 37 (4): 1788-1795
- **Computer-aided detection (CAD) of lung nodules in CT scans: radiologist performance and reading time with incremental CAD assistance** *EUROPEAN RADIOLOGY*  
Roos, J. E., Paik, D., Olsen, D., Liu, E. G., Chow, L. C., Leung, A. N., Mindelzun, R., Choudhury, K. R., Naidich, D. P., Napel, S., Rubin, G. D.  
2010; 20 (3): 549-557
- **Imaging informatics: toward capturing and processing semantic information in radiology images.** *Yearbook of medical informatics*  
Rubin, D. L., Napel, S.  
2010: 34-42
- **Uncluttered single-image visualization of the abdominal aortic vessel tree: Method and evaluation** *MEDICAL PHYSICS*  
Won, J., Rosenberg, J., Rubin, G. D., Napel, S.  
2009; 36 (11): 5245-5260
- **Lower Extremity CT Angiography (CTA): Initial Evaluation of a Knowledge-Based Centerline Estimation Algorithm for Femoro-Popliteal Artery (FPA) Occlusions** *ACADEMIC RADIOLOGY*  
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