

# Stanford

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## Bhavik Natvar Patel

Assistant Professor of Radiology (Body Imaging) at the Stanford University Medical Center

### CLINICAL OFFICES

- **Stanford Radiology**

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### Bio

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#### CLINICAL FOCUS

- Diagnostic Radiology

#### ACADEMIC APPOINTMENTS

- Assistant Professor - Med Center Line, Radiology
- Member, Bio-X
- Member, Stanford Cancer Institute

#### ADMINISTRATIVE APPOINTMENTS

- Director of Clinical Trials, Stanford Radiology, (2017- present)
- Director of Body CT, Stanford Radiology, (2017- present)

#### PROFESSIONAL EDUCATION

- Fellowship: Stanford University Radiology Fellowships (2013) CA
- Residency: University of Alabama at Birmingham Radiology Residency (2012) AL
- Internship: Brigham and Women's Hospital General Surgery Residency (2008) MA
- MBA, UCLA Anderson School of Management (2015)
- Fellowship, Stanford Body Imaging (2013)
- Board Certification: Diagnostic Radiology, American Board of Radiology (2012)
- Medical Education: University of Alabama School of Medicine (2007) AL

### Research & Scholarship

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#### CURRENT RESEARCH AND SCHOLARLY INTERESTS

Advanced CT, MRI, & Ultrasound Techniques & Applications

Dual-energy CT  
Machine Learning  
Artificial Intelligence & Deep Learning

## Publications

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### PUBLICATIONS

- **Assessing the Effectiveness of a Health Care Economics Curriculum for Radiology Residents** *JOURNAL OF THE AMERICAN COLLEGE OF RADIOLOGY*  
Dixon, A., Johnson, K., Strickland, L., Patel, B., Said, N.  
2019; 16 (8): 1083–87
- **Comparison of Iodine Quantification and Conventional Attenuation Measurements for Differentiating Small, Truly Enhancing Renal Masses From High-Attenuation Nonenhancing Renal Lesions With Dual-Energy CT** *AMERICAN JOURNAL OF ROENTGENOLOGY*  
Meyer, M., Nelson, R. C., Vernuccio, F., Gonzalez, F., Schabel, C., Mileto, A., Patel, B. N., Schoenberg, S. O., Marin, D.  
2019; 213 (1): W26–W36
- **Virtual Unenhanced Images at Dual-Energy CT: Influence on Renal Lesion Characterization** *RADIOLOGY*  
Meyer, M., Nelson, R. C., Vernuccio, F., Gonzalez, F., Farjat, A. E., Patel, B. N., Samei, E., Henzler, T., Schoenberg, S. O., Marin, D.  
2019; 291 (2): 380–89
- **Systematic Review and Meta-Analysis Investigating the Diagnostic Yield of Dual-Energy CT for Renal Mass Assessment** *AMERICAN JOURNAL OF ROENTGENOLOGY*  
Bellini, D., Panvini, N., Laghi, A., Marin, D., Patel, B. N., Wang, C. L., Carbone, I., Mileto, A.  
2019; 212 (5): 1044–53
- **Virtual Unenhanced Images at Dual-Energy CT: Influence on Renal Lesion Characterization.** *Radiology*  
Meyer, M., Nelson, R. C., Vernuccio, F., Gonzalez, F., Farjat, A. E., Patel, B. N., Samei, E., Henzler, T., Schoenberg, S. O., Marin, D.  
2019: 181100
- **Systematic Review and Meta-Analysis Investigating the Diagnostic Yield of Dual-Energy CT for Renal Mass Assessment.** *AJR. American journal of roentgenology*  
Bellini, D., Panvini, N., Laghi, A., Marin, D., Patel, B. N., Wang, C. L., Carbone, I., Mileto, A.  
2019: 1–10
- **Assessing the Effectiveness of a Health Care Economics Curriculum for Radiology Residents.** *Journal of the American College of Radiology : JACR*  
Dixon, A., Johnson, K., Strickland, L., Patel, B., Said, N.  
2019
- **Dual-Energy CT Material Density Iodine Quantification for Distinguishing Vascular From Nonvascular Renal Lesions: Normalization Reduces Intermanufacturer Threshold Variability.** *AJR. American journal of roentgenology*  
Patel, B. N., Vernuccio, F., Meyer, M., Godwin, B., Rosenberg, M., Rudnick, N., Harring, S., Nelson, R., Ramirez-Giraldo, J. C., Farjat, A., Marin, D.  
2019; 212 (2): 366–76
- **ACR Appropriateness Criteria® Acute Onset of Scrotal Pain-Without Trauma, Without Antecedent Mass.** *Journal of the American College of Radiology : JACR*  
Wang, C. L., Aryal, B., Oto, A., Allen, B. C., Akin, O., Alexander, L. F., Bardo, D. M., Chong, J., Froemming, A. T., Fulgham, P. F., Heller, M. T., Maranchie, J. K., Mody, et al  
2019; 16 (5S): S38–S43
- **Deep Learning-Assisted Diagnosis of Cerebral Aneurysms Using the HeadXNet Model.** *JAMA network open*  
Park, A., Chute, C., Rajpurkar, P., Lou, J., Ball, R. L., Shpanskaya, K., Jabarkheel, R., Kim, L. H., McKenna, E., Tseng, J., Ni, J., Wishah, F., Wittber, et al  
2019; 2 (6): e195600
- **Association of Interim FDG-PET Imaging During Chemoradiation for Squamous Anal Canal Carcinoma With Recurrence** *INTERNATIONAL JOURNAL OF RADIATION ONCOLOGY BIOLOGY PHYSICS*  
Hong, J. C., Cui, Y., Patel, B. N., Rushing, C. N., Faight, A. M., Eng, J. S., Higgins, K., Yin, F., Das, S., Czito, B. G., Willett, C. G., Palta, M.  
2018; 102 (4): 1046–51
- **Deep-learning-assisted diagnosis for knee magnetic resonance imaging: Development and retrospective validation of MRNet.** *PLoS medicine*

- Bien, N., Rajpurkar, P., Ball, R. L., Irvin, J., Park, A., Jones, E., Bereket, M., Patel, B. N., Yeom, K. W., Shpanskaya, K., Halabi, S., Zucker, E., Fanton, et al  
2018; 15 (11): e1002699
- **Deep learning for chest radiograph diagnosis: A retrospective comparison of the CheXNeXt algorithm to practicing radiologists.** *PLoS medicine*  
Rajpurkar, P., Irvin, J., Ball, R. L., Zhu, K., Yang, B., Mehta, H., Duan, T., Ding, D., Bagul, A., Langlotz, C. P., Patel, B. N., Yeom, K. W., Shpanskaya, et al  
2018; 15 (11): e1002686
  - **Abdominal Radiography With Digital Tomosynthesis: An Alternative to Computed Tomography for Identification of Urinary Calculi?** *UROLOGY*  
Wollin, D. A., Gupta, R. T., Young, B., Cone, E., Kaplan, A., Marin, D., Patel, B. N., Mazurowski, M. A., Scales, C. D., Ferrandino, M. N., Preminger, G. M., Lipkin, M. E.  
2018; 120: 56–61
  - **Routine MR Imaging for Pancreas** *MAGNETIC RESONANCE IMAGING CLINICS OF NORTH AMERICA*  
Patel, B. N.  
2018; 26 (3): 315–+
  - **Characterization of Small Incidental Indeterminate Hypoattenuating Hepatic Lesions: Added Value of Single-Phase Contrast-Enhanced Dual-Energy CT Material Attenuation Analysis.** *AJR. American journal of roentgenology*  
Patel, B. N., Rosenberg, M., Vernuccio, F., Ramirez-Giraldo, J. C., Nelson, R., Farjat, A., Marin, D.  
2018: 1–9
  - **Strategies to Improve Image Quality on Dual-Energy Computed Tomography.** *Radiologic clinics of North America*  
Patel, B. N., Marin, D.  
2018; 56 (4): 641–47
  - **Energy-Specific Optimization of Attenuation Thresholds for Low-Energy Virtual Monoenergetic Images in Renal Lesion Evaluation** *AMERICAN JOURNAL OF ROENTGENOLOGY*  
Patel, B. N., Farjat, A., Schabel, C., Duvnjak, P., Mileto, A., Ramirez-Giraldo, J., Marin, D.  
2018; 210 (5): W205–W217
  - **Extrapneumatic perineural invasion in pancreatic adenocarcinoma** *ABDOMINAL RADIOLOGY*  
Patel, B. N., Olcott, E., Jeffrey, R.  
2018; 43 (2): 323–31
  - **Routine MR Imaging for Pancreas.** *Magnetic resonance imaging clinics of North America*  
Patel, B. N.  
2018; 26 (3): 315–22
  - **The effects of a transjugular intrahepatic portosystemic shunt on the diagnosis of hepatocellular cancer.** *PloS one*  
Wong, K., Ozeki, K., Kwong, A., Patel, B. N., Kwo, P.  
2018; 13 (12): e0208233
  - **Dual-Energy Computed Tomography Applications in Neurointervention.** *Journal of computer assisted tomography*  
Wolman, D. N., Patel, B. P., Wintermark, M., Heit, J. J.  
2018
  - **Financial Forecasting and Stochastic Modeling: Predicting the Impact of Business Decisions.** *Radiology*  
Rubin, G. D., Patel, B. N.  
2017; 283 (2): 342–358
  - **Characterization of Small Focal Renal Lesions: Diagnostic Accuracy with Single-Phase Contrast-enhanced Dual-Energy CT with Material Attenuation Analysis Compared with Conventional Attenuation Measurements.** *Radiology*  
Marin, D., Davis, D., Roy Choudhury, K., Patel, B., Gupta, R. T., Mileto, A., Nelson, R. C.  
2017: 161872-?
  - **Dual-energy CT workflow: multi-institutional consensus on standardization of abdominopelvic MDCT protocols.** *Abdominal radiology*  
Patel, B. N., Alexander, L., Allen, B., Berland, L., Borhani, A., Mileto, A., Moreno, C., Morgan, D., Sahani, D., Shuman, W., Tamm, E., Tublin, M., Yeh, et al  
2017; 42 (3): 676–687
  - **Effect of Radiation Dose Reduction and Reconstruction Algorithm on Image Noise, Contrast, Resolution, and Detectability of Subtle Hypoattenuating Liver Lesions at Multidetector CT: Filtered Back Projection versus a Commercial Model-based Iterative Reconstruction Algorithm.** *Radiology*

- Solomon, J., Marin, D., Roy Choudhury, K., Patel, B., Samei, E.  
2017: 161736-?
- **Duodenal invasion by pancreatic adenocarcinoma: MDCT diagnosis of an aggressive imaging phenotype and its clinical implications.** *Abdominal radiology (New York)*  
Patel, B. N., Olcott, E. W., Jeffrey, R. B.  
2017
  - **Image-Rich Radiology Reports: A Value-Based Model to Improve Clinical Workflow.** *Journal of the American College of Radiology*  
Patel, B. N., Lopez, J. M., Jiang, B. G., Roth, C. J., Nelson, R. C.  
2017; 14 (1): 57-64
  - **Characterization of Small (< 4 cm) Focal Renal Lesions: Diagnostic Accuracy of Spectral Analysis Using Single-Phase Contrast-Enhanced Dual-Energy CT.** *AJR. American journal of roentgenology*  
Patel, B. N., Bibbey, A., Choudhury, K. R., Leder, R. A., Nelson, R. C., Marin, D.  
2017; 209 (4): 815-25
  - **Extrapancreatic perineural invasion in pancreatic adenocarcinoma** *Abdominal Radiology*  
Patel, B. N., Olcott, E., Jeffrey, R. B.  
2017
  - **Triphasic contrast enhanced CT simulation with bolus tracking for pancreas SBRT target delineation.** *Practical radiation oncology*  
Godfrey, D. J., Patel, B. N., Adamson, J. D., Subashi, E., Salama, J. K., Palta, M.  
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  - **Use of a Noise Optimized Monoenergetic Algorithm for Patient-Size Independent Selection of an Optimal Energy Level During Dual-Energy CT of the Pancreas** *JOURNAL OF COMPUTER ASSISTED TOMOGRAPHY*  
Bellini, D., Gupta, S., Ramirez-Giraldo, J. C., Fu, W., Stinnett, S. S., Patel, B., Mileto, A., Marin, D.  
2017; 41 (1): 39-47
  - **Optimizing window settings for improved presentation of virtual monoenergetic images in dual-energy computed tomography.** *Medical physics*  
Fu, W., Marin, D., Ramirez-Giraldo, J. C., Choudhury, K. R., Solomon, J., Schabel, C., Patel, B. N., Samei, E.  
2017
  - **Preoperative Multidetector CT Diagnosis of Extrapancreatic Perineural or Duodenal Invasion Is Associated with Reduced Postoperative Survival after Pancreaticoduodenectomy for Pancreatic Adenocarcinoma: Preliminary Experience and Implications for Patient Care** *RADIOLOGY*  
Chang, S. T., Jeffrey, R. B., Patel, B. N., DiMaio, M. A., Rosenberg, J., Willmann, J. K., Olcott, E. W.  
2016; 281 (3): 816-825
  - **Introduction to Business Strategy** *JOURNAL OF THE AMERICAN COLLEGE OF RADIOLOGY*  
Patel, B. N., Cespedes, F. V.  
2016; 13 (6): 747-749
  - **Deal or No Deal? Negotiation 101** *JOURNAL OF THE AMERICAN COLLEGE OF RADIOLOGY*  
Patel, B. N., Rubin, G. D.  
2016; 13 (6): 756-758
  - **Effect of a Noise-Optimized Second-Generation Monoenergetic Algorithm on Image Noise and Conspicuity of Hypervascular Liver Tumors: An In Vitro and In Vivo Study** *AMERICAN JOURNAL OF ROENTGENOLOGY*  
Marin, D., Ramirez-Giraldo, J. C., Gupta, S., Fu, W., Stinnett, S. S., Mileto, A., Bellini, D., Patel, B., Samei, E., Nelson, R. C.  
2016; 206 (6): 1222-1232
  - **Sonographic Detection of Extracapsular Extension in Papillary Thyroid Cancer.** *Journal of ultrasound in medicine*  
Kamaya, A., Tahvildari, A. M., Patel, B. N., Willmann, J. K., Jeffrey, R. B., Desser, T. S.  
2015; 34 (12): 2225-2230
  - **MDCT Diagnosis of Perineural Invasion Involving the Celiac Plexus in Intrahepatic Cholangiocarcinoma: Preliminary Observations and Clinical Implications.** *AJR. American journal of roentgenology*  
Raghavan, K., Jeffrey, R. B., Patel, B. N., DiMaio, M. A., Willmann, J. K., Olcott, E. W.  
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- **MDCT Diagnosis of Perineural Invasion Involving the Celiac Plexus in Intrahepatic Cholangiocarcinoma: Preliminary Observations and Clinical Implications.** *AJR. American journal of roentgenology*  
Raghavan, K., Jeffrey, R. B., Patel, B. N., DiMaio, M. A., Willmann, J. K., Olcott, E. W.  
2015; 205 (6): W578-84
- **How the radiologist can add value in the evaluation of the pre- and post-surgical pancreas** *ABDOMINAL IMAGING*  
Patel, B. N., Gupta, R. T., Zani, S., Jeffrey, R. B., Paulson, E. K., Nelson, R. C.  
2015; 40 (8): 2932-2944
- **The role of CT-guided percutaneous drainage of loculated air collections: an institutional experience** *ABDOMINAL IMAGING*  
Patel, B. N., Morgan, M., Tyler, D., Paulson, E., Jaffe, T. A.  
2015; 40 (8): 3257-3264
- **Dual-Energy Multidetector-Row Computed Tomography of the Hepatic Arterial System: Optimization of Energy and Material-Specific Reconstruction Techniques** *JOURNAL OF COMPUTER ASSISTED TOMOGRAPHY*  
Marin, D., Caywood, D. T., Mileto, A., Reiner, C. S., Seaman, D. M., Patel, B. N., Boll, D. T., Nelson, R. C.  
2015; 39 (5): 721-729
- **Organizational Behavior: A Primer** *JOURNAL OF THE AMERICAN COLLEGE OF RADIOLOGY*  
Patel, B. N.  
2015; 12 (8): 805-807
- **Imaging of Iatrogenic Complications of the Urinary Tract Kidneys, Ureters, and Bladder** *RADIOLOGIC CLINICS OF NORTH AMERICA*  
Patel, B. N., Gayer, G.  
2014; 52 (5): 1101-?
- **Sonography of the normal appendix: its varied appearance and techniques to improve its visualization.** *Ultrasound quarterly*  
Ung, C., Chang, S. T., Jeffrey, R. B., Patel, B. N., Olcott, E. W.  
2013; 29 (4): 333-341
- **Material Density Hepatic Steatosis Quantification on Intravenous Contrast-Enhanced Rapid Kilovolt (Peak)-Switching Single-Source Dual-Energy Computed Tomography** *JOURNAL OF COMPUTER ASSISTED TOMOGRAPHY*  
Patel, B. N., Kumbla, R. A., Berland, L. L., Fineberg, N. S., Morgan, D. E.  
2013; 37 (6): 904-910
- **Pitfalls in sonographic evaluation of thyroid abnormalities.** *Seminars in ultrasound, CT, and MR*  
Patel, B. N., Kamaya, A., Desser, T. S.  
2013; 34 (3): 226-235
- **Single-source dual-energy spectral multidetector CT of pancreatic adenocarcinoma: Optimization of energy level viewing significantly increases lesion contrast** *CLINICAL RADIOLOGY*  
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2013; 68 (2): 148-154
- **Three-dimensional volume-rendered multidetector CT imaging of the posterior inferior pancreaticoduodenal artery: its anatomy and role in diagnosing extrapancreatic perineural invasion** *CANCER IMAGING*  
Patel, B. N., Giacomini, C., Jeffrey, R. B., Willmann, J. K., Olcott, E.  
2013; 13 (4): 580-590
- **Radiation Necrosis in the Brain: Imaging Features and Differentiation from Tumor Recurrence** *RADIOGRAPHICS*  
Shah, R., Vattoth, S., Jacob, R., Manzil, F. F., O'Malley, J. P., Borghei, P., Patel, B. N., Cure, J. K.  
2012; 32 (5): 1343-1359
- **Pulmonary artery pseudoaneurysm arising secondary to cavitary pneumonia.** *Radiology case reports*  
Smith, C. B., Patel, B. N., Smith, J. P.  
2012; 7 (3): 654-?
- **Carbon dioxide as an intravascular imaging agent: review.** *Current problems in diagnostic radiology*  
Patel, B. N., Kapoor, B. S., Borghei, P., Shah, N. A., Lockhart, M. E.  
2011; 40 (5): 208-217

- **Clinico-radiologic profile of spinal cord multiple sclerosis in adults.** *The neuroradiology journal*  
BAG, A. K., Patel, B. N., Osman, S., Roberson, G. H.  
2011; 24 (4): 511-518
- **Severe Contrast Reaction Emergencies: High-fidelity Simulation Training for Radiology Residents and Technologists in a Children's Hospital** *ACADEMIC RADIOLOGY*  
Tofil, N. M., White, M. L., Grant, M., Zinkan, J. L., Patel, B., Jenkins, L., Youngblood, A. Q., Royal, S. A.  
2010; 17 (7): 934-940
- **Intercostal muscle flap reduces the pain of thoracotomy: A prospective randomized trial** *JOURNAL OF THORACIC AND CARDIOVASCULAR SURGERY*  
Cerfolio, R. J., Bryant, A. S., Patel, B., Bartolucci, A. A.  
2005; 130 (4): 987-993