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***Biomedical Applications in  
Molecular, Structural, and  
Functional Imaging***

**Xiaoping P. Hu  
Anne V. Clough**  
*Editors*

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J. Cebal, F. Mut, George Mason Univ. (United States); C. Putman, Inova Fairfax Hospital (United States); M. Alley, R. Bammer, Stanford Univ. Medical School (United States); F. Calamante, Brain Research Institute (Australia)

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**POSTER SESSION: CARDIAC IMAGING**

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- 7262 25 **Micro-CT analysis of myocardial blood supply in young and adult rats** [7262-33]  
H. M. Schaefer, P. E. Beighley, D. R. Eaker, A. J. Vercknocke, E. L. Ritman, Mayo Clinic College of Medicine (United States)
- 7262 26 **Myocardial deformation from tagged MRI in hypertrophic cardiomyopathy using an efficient registration strategy** [7262-76]  
G. Piella, Ctr. for Computational Imaging and Simulation Technologies in Biomedicine, Univ. Pompeu Fabra (Spain) and Networking Ctr. on Biomedical Research (Spain); M. De Craene, Networking Ctr. on Biomedical Research (Spain) and Ctr. for Computational Imaging and Simulation Technologies in Biomedicine, Univ. Pompeu Fabra (Spain); E. Oubel, Ctr. for Computational Imaging and Simulation Technologies in Biomedicine, Univ. Pompeu Fabra (Spain) and Networking Ctr. on Biomedical Research (Spain); I. Larrabide, Networking Ctr. on Biomedical Research (Spain) and Ctr. for Computational Imaging and Simulation Technologies in Biomedicine, Univ. Pompeu Fabra (Spain); M. Huguet, CETIR Sant Jordi (Spain); B. H. Bijnens, Catalan Institution for Research and Advanced Studies (ICREA) (Spain), Ctr. for Computational Imaging and Simulation Technologies in Biomedicine, Univ. Pompeu Fabra (Spain), and Networking Ctr. on Biomedical Research (Spain); A. F. Frangi, Ctr. for Computational Imaging and Simulation Technologies in Biomedicine, Univ. Pompeu Fabra (Spain) and Networking Ctr. on Biomedical Research (Spain)
- 7262 27 **Systolic and diastolic assessment by 3D-ASM segmentation of gated-SPECT studies: a comparison with MRI** [7262-77]  
C. Tobon-Gomez, Ctr. for Computational Imaging and Simulation Technologies in Biomedicine, Univ. Pompeu Fabra (Spain), Networking Ctr. on Biomedical Research (Spain), and CETIR Sant Jordi (Spain); B. H. Bijnens, ICREA (Spain), Ctr. for Computational Imaging and Simulation Technologies in Biomedicine, Univ. Pompeu Fabra (Spain), and Networking Ctr. on Biomedical Research (Spain); M. Huguet, CETIR Sant Jordi (Spain) and Networking Ctr. on Biomedical Research (Spain); F. Sukno, Networking Ctr. on Biomedical Research (Spain) and Ctr. for Computational Imaging and Simulation Technologies in Biomedicine, Univ. Pompeu Fabra (Spain); G. Moragas, CETIR Unidad Teknon (Spain); A. F. Frangi, Ctr. for Computational Imaging and Simulation Technologies in Biomedicine, Univ. Pompeu Fabra (Spain) and Networking Ctr. on Biomedical Research (Spain)
- 7262 28 **Identification of left pulmonary vein ostia using centerline tracking** [7262-78]  
M. E. Rettmann, D. R. Holmes III, D. L. Packer, R. A. Robb, Mayo Clinic (United States)
- 7262 29 **Novel echocardiographic prediction of non-response to cardiac resynchronization therapy** [7262-79]  
R. Chan, Philips Research (United States); F. Tournoux, A. C. Tournoux, V. Nandigam, Massachusetts General Hospital (United States); R. Manzke, S. Dalal, Philips Research (United States); J. Solis-Martin, D. McCarty, J. N. Ruskin, M. H. Picard, A. E. Weyman, J. P. Singh, Massachusetts General Hospital (United States)

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**POSTER SESSION: OPTICAL IMAGING**

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- 7262 2A **Development of a targeted CT contrast agent: assessment of cellular interactions using novel integrated optical labels (Cum Laude Poster Award)** [7262-80]  
N. Matsuura, M. L. Hill, I. Gorelikov, S. Zhu, K. Wan, J. G. Mainprize, M. J. Yaffe, J. A. Rowlands, Sunnybrook Health Sciences Ctr. (Canada)

- 7262 2B **Study of four regularization methods for the inverse problem in bioluminescence tomography** [7262-81]  
X. He, Xidian Univ. (China) and Northwest Univ. (China); J. Tian, Xidian Univ. (China) and Institute of Automation (China); Y. Wu, Y. Hou, N. Ren, K. Peng, Xidian Univ. (China)
- 7262 2C **Three-dimensional localization of in vivo bioluminescent source based on multispectral imaging** [7262-82]  
J. Feng, K. Jia, Beijing Univ. of Technology (China); J. Tian, Institute of Automation (China) and Xidian Univ. (China); G. Yan, S. Zhu, Institute of Automation (China)
- 7262 2D **3-D segmentation of the rim and cup in spectral-domain optical coherence tomography volumes of the optic nerve head** [7262-83]  
K. Lee, The Univ. of Iowa (United States); M. Niemeijer, The Univ. of Iowa (United States) and The Univ. of Iowa Health Care (United States); M. K. Garvin, The Univ. of Iowa (United States); Y. H. Kwon, The Univ. of Iowa Health Care (United States); M. Sonka, The Univ. of Iowa (United States) and The Univ. of Iowa Health Care (United States); M. D. Abramoff, The Univ. of Iowa (United States), The Univ. of Iowa Health Care (United States), and Veterans' Administration MC (United States)
- 7262 2E **A hybrid  $P_1$ - $DP_0$  diffusion theory for optical imaging** [7262-84]  
K. Liu, J. Tian, C. Qin, D. Liu, X. Yang, M. Xu, Institute of Automation (China)
- 7262 2F **Calibration of CCD-based redox imaging for biological tissues** [7262-85]  
H. N. Xu, B. Wu, S. Nioka, B. Chance, L. Z. Li, The Univ. of Pennsylvania Health System (United States)
- 7262 2G **Improvement of a snapshot spectroscopic retinal multi-aperture imaging camera** [7262-86]  
P. Lemaillot, The Catholic Univ. of America (United States); A. Lompado, Polaris Sensor Technologies (United States); J. C. Ramella-Roman, The Catholic Univ. of America (United States)
- 7262 2H **Robust image modeling technique with a bioluminescence image segmentation application** [7262-87]  
J. Zhong, Beijing Jiaotong Univ. (China) and Institute of Automation (China); R. Wang, Beijing Jiaotong Univ. (China); J. Tian, Institute of Automation (China)
- 7262 2I **A posteriori correction for source decay in 3D bioluminescent source localization using multiview measured data** [7262-89]  
L. Sun, P. Wang, Beijing Univ. of Technology (China); J. Tian, D. Liu, R. Wang, Institute of Automation (China)

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#### POSTER SESSION: METHODOLOGY

- 7262 2J **Association between lung function and airway wall density** [7262-14]  
J. K. Leader, B. Zheng, C. R. Fuhrman, J. Tedrow, S. C. Park, J. Tan, J. Pu, J. M. Drescher, D. Gur, F. C. Sciruba, Univ. of Pittsburgh (United States)
- 7262 2K **Micro-CT analysis of sea sponge pore architecture as a model of a cell-populated synthetic tissue scaffold** [7262-25]  
A. S. Plath, T. L. Kline, D. R. Eaker, P. E. Beighley, A. J. Vercnocke, E. L. Ritman, Mayo Clinic College of Medicine (United States)

- 7262 2L **Microwave imaging utilizing a soft prior constraint** [7262-90]  
A. H. Golnabi, P. M. Meaney, S. D. Geimer, M. W. Fanning, K. D. Paulsen, Dartmouth College (United States)
- 7262 2M **Registration of multimodality medical image using ordinary Procrustes analysis and maximum likelihood framework** [7262-91]  
W. Cho, J. Park, S. Kim, M. Lee, Chonnam National Univ. (Korea, Republic of); S. Park, Mokpo National Univ. (Korea, Republic of); J. Lim, G. Lee, H. P. Le, S. Kim, Chonnam National Univ. (Korea, Republic of); C. Jeong, Honam Univ. (Korea, Republic of)
- 7262 2N **Molecules 3D Delaunay triangulation: a spectral study** [7262-92]  
J. Giard, B. Macq, Univ. Catholique de Louvain (Belgium)
- 7262 2O **Automated labeling of anatomic segments of the colon in CT colonography** [7262-94]  
P. J. Glynn, R. M. Summers, National Institutes of Health (United States)
- 7262 2P **The analysis of nanoparticle magnetization vibration using magnetic spectroscopy** [7262-95]  
J. B. Weaver, Dartmouth-Hitchcock Medical Ctr. (United States) and Dartmouth College (United States); A. M. Rauwerdink, E. W. Hansen, Dartmouth College (United States)
- 7262 2Q **An application of the complex general linear model to analysis of fMRI single subjects multiple stimuli input data** [7262-96]  
D. Rio, R. Rawlings, National Institutes of Health (United States); L. Woltz, Synergy Research Inc. (United States); J. Gilman, D. Hommer, National Institutes of Health (United States)
- 7262 2R **Automated liver segmentation using a normalized probabilistic atlas** [7262-97]  
M. G. Linguraru, Z. Li, F. Shah, S. Chin, R. M. Summers, National Institutes of Health (United States)
- 7262 2S **Model-based reconstruction for undersampled dynamic contrast-enhanced MRI** [7262-98]  
B. K. Felsted, The Univ. of Utah (United States) and Utah Ctr. for Advanced Imaging Research (United States); R. T. Whitaker, The Univ. of Utah (United States); M. Schabel, E. V. R. DiBella, Utah Ctr. for Advanced Imaging Research (United States)
- 7262 2T **Registration of parametric dynamic F-18-FDG PET/CT breast images with parametric dynamic Gd-DTPA breast images** [7262-99]  
A. Magri, Syracuse Univ. (United States); A. Krol, SUNY Upstate Medical Univ. (United States) and Syracuse Univ. (United States); E. Lipson, Syracuse Univ. (United States) and SUNY Upstate Medical Univ. (United States); J. Mandel, Syracuse Univ. (United States); W. McGraw, CNY PET, LLC (United States); W. Lee, G. Tillapaugh-Fay, D. Feiglin, SUNY Upstate Medical Univ. (United States)
- 7262 2V **Enhanced volume rendering techniques for high-resolution color cryo-imaging data** [7262-101]  
M. Gargsha, M. Qutaish, D. Roy, G. Steyer, Case Western Reserve Univ. (United States); H. Bartsch, Visage Imaging Inc. (United States); D. L. Wilson, Case Western Reserve Univ. (United States)



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**Armando Manduca**, Mayo Clinic College of Medicine (United States)
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**Merryn H. Tawhai**, The University of Auckland (New Zealand)
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**Juan R. Cebral**, George Mason University (United States)

- 5 Tissue Microstructure and Function  
**Felix W. Wehli**, University of Pennsylvania (United States)
- 6 Optical Imaging  
**Boudewijn P. F. Lelieveldt**, Leids Universitair Medisch Centrum  
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- 8 Image-based Modeling  
**Axel Wismueller**, University of Rochester (United States)
- 9 Mechanics I  
**John B. Weaver**, Dartmouth-Hitchcock Medical Center (United States)
- 10 Mechanics II  
**Erik L. Ritman**, Mayo Clinic College of Medicine (United States)
- 11 Clinical Applications  
**Ronald M. Summers**, National Institutes of Health (United States)

**In Memoriam**  
**Robert F. Wagner**  
**1938–2008**



**A founding scientist and prolific contributor  
to modern medical imaging science and SPIE**

Robert F. "Bob" Wagner was a tremendous innovator in the field of medical imaging and image assessment methodologies. He was a key figure in the creation of the SPIE Medical Imaging symposium. A SPIE Fellow since 1988, Bob was active on the program committee of the Physics of Medical Imaging conference at the Medical Imaging symposium, and author of numerous technical papers published by SPIE.

"The medical imaging community has lost one of its founding fathers and most highly regarded members," said Kyle Myers, director of the Division of Imaging and Applied Mathematics at the Center for Devices and Radiological Health (CDRH), U.S. Food and Drug Administration (FDA). "Bob's career was dedicated to the development of consensus measurement methods for the assessment of medical imaging systems, quantitative medical imaging and tissue characterization, and computer-aided diagnosis. He earned an international reputation in these areas and applied his expertise to a wide range of regulatory issues central to the FDA's mission. He enlightened the scientific community within the agency as well as the international scientific community through the many invited presentations and tutorials he gave in and outside of the FDA, his numerous publications, his many professional society activities, and his assistance in regulatory decision making."

At this 2009 Medical Imaging symposium, a joint keynote session hosted by the CAD and Image Perception conferences honored Bob's many contributions from the early 1970s to the present through a series of presentations by some of his closest collaborators.

David Brown (CDRH/FDA) recalled Bob's early years in the field, relating that after graduate and post-graduate work on the physics of nuclear interactions with radiation, Bob was hired by the Bureau of Radiological Health [a precursor to CDRH] to assess the dose reduction potential of radiographic intensifying screens made with phosphors developed in the color TV industry. Within three months he published a review of the relevant imaging literature from the medical, defense, consumer, and scientific communities, together with a charter for a laboratory program. Soon after, Bob introduced digital noise analysis to radiography, and showed that the new technology offered a 1.6- to 2.5-fold exposure reduction without compromising imaging performance. He then launched a program of inter-laboratory comparison of measurements on radiographic film samples that were circulated among fifteen commercial, government, and academic laboratories worldwide. In the process, he became the prime mover for work toward consensus methodology for quantitative imaging performance measurements.

Mike Insana (Univ. of Illinois at Urbana-Champaign) shared memories of his years as Bob's post-doctoral student, working with Bob on the statistical characterization of ultrasound images. He described Bob as an exemplary mentor who shared his passion and joy for science.

Myers agreed, "Bob's greatest legacy may be the many young scientists he nurtured, who either worked directly under his tutelage at the FDA or otherwise benefitted from his unflinching patience and unselfish ease of availability."

Harry Barrett (Univ. of Arizona) began his presentation by relating noise-equivalent quanta (NEQ)—a concept central to Bob's unified approach to objective image performance assessment—to historical information-theoretic methods for evaluation of imaging systems. Barrett went on to describe the many ways in which NEQ was extended to address problems beyond the simple signal-known-exactly, background-known-exactly (SEK/BKE) task.

Ken Hanson (Los Alamos National Lab.) described his years of collaboration with Bob. He said they worked together, first in the area of noise characterization of radiographic and CT images and later on the evaluation of images confounded by artifacts. In this latter work, Bob and Ken pioneered the application of a decision theoretic approach to the assessment of image reconstruction algorithms, demonstrating that the common mean-square-error metric did not predict visual task performance as measured by detectability.

Bob's contemporary work, as described by Myers, "involved the consideration of the random effects associated with multiple readers of medical images and the logical extension of this work to the problem of the evaluation of multiple competing classifiers in statistical pattern recognition. Bob tackled problems of increasing complexity over the course of his career, relying throughout on the application of a unified, decision theoretic framework. In the process he brought about consensus on the importance of a task-based approach to the objective assessment of imaging systems."

During more than forty years of professional life, Bob Wagner made numerous contributions to the field of medical imaging that significantly impacted academia, industry, and the FDA. His brilliant mind, incredible intuition, passion for science, sense of humor, charm, and warm friendship will be greatly missed.