Medical Imaging 2016

Computer-Aided Diagnosis

Georgia D. Tourassi Samuel G. Armato III Editors

28 February–2 March 2016 San Diego, California, United States

Sponsored by SPIE

Cosponsored by Modus Medical Devices Inc. (Canada) Bruker (United States) Poco Graphite (United States) imXPAD (France)

Cooperating Organizations

AAPM—American Association of Physicists in Medicine (United States)

APS—American Physiological Society (United States)

IFCARS—International Foundation for Computer Assisted Radiology and Surgery (Germany)

Medical Image Perception Society (United States)

Radiological Society of North America (United States)

Society for Imaging Informatics in Medicine (United States)

World Molecular Imaging Society

The DICOM Standards Committee

Volume 9785
Part One of Two Parts

Proceedings of SPIE, 1605-7422, V. 9785

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Medical Imaging 2016: Computer-Aided Diagnosis, edited by Georgia D. Tourassi, Samuel G. Armato III, Proc. of SPIE Vol. 9785, 978501 \cdot © 2016 SPIE \cdot CCC code: 1605-7422/16/\$18 \cdot doi: 10.1117/12.2240961

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary.org.

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:

Author(s), "Title of Paper," in *Medical Imaging 2016*: Computer-Aided Diagnosis, edited by Georgia D. Tourassi, Samuel G. Armato III, Proceedings of SPIE Vol. 9785 (SPIE, Bellingham, WA, 2016) Six-digit article CID Number.

ISSN: 1605-7422

ISSN: 2410-9045 (electronic) ISBN: 9781510600201

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445 SPIE.ora

Copyright © 2016, Society of Photo-Optical Instrumentation Engineers.

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 1605-7422/16/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.



Paper Numbering: Proceedings of SPIE follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a six-digit CID article numbering system structured as follows:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

Contents

xiii Authors

xix Conference Committee

xxiii 2016 Medical Imaging Award Recipients

Part One

VESSELS AND HEART 9785 02 Inner and outer coronary vessel wall segmentation from CCTA using an active contour model with machine learning-based 3D voxel context-aware image force [9785-1] 9785 03 Automated identification of best-quality coronary artery segments from multiple-phase coronary CT angiography (cCTA) for vessel analysis [9785-2] 9785 04 3D assessment of the carotid artery vessel wall volume: an imaging biomarker for diagnosis of the atherosclerotic disease [9785-3] 9785 05 A system for automatic aorta sections measurements on chest CT [9785-4] 9785 06 Quantitative MRI myocarditis analysis by a PCA-based object recognition algorithm [9785-5] MUSCULOSKELETAL AND MISCELLANEOUS 9785 07 Differentiation of fat, muscle, and edema in thigh MRIs using random forest classification [9785-6] 9785 08 Assessing vertebral fracture risk on volumetric quantitative computed tomography by geometric characterization of trabecular bone structure [9785-7] 9785 09 Classification of voting patterns to improve the generalized Hough transform for epiphyses localization [9785-8] 9785 0A Medical sieve: a cognitive assistant for radiologists and cardiologists [9785-9] 9785 OB Acne image analysis: lesion localization and classification [9785-10] 9785 OC Classification of melanoma lesions using sparse coded features and random forests [9785-11]

LUNG AND CHEST I

	LUNG AND CILLUIT
9785 0D	Localized Fisher vector representation for pathology detection in chest radiographs [9785-12]
9785 OE	Intensity targeted radial structure tensor analysis and its application for automated mediastinal lymph node detection from CT volumes [9785-13]
9785 OF	Automatic aortic root segmentation in CTA whole-body dataset [9785-14]
9785 OG	Effects of CT dose and nodule characteristics on lung-nodule detectability in a cohort of 90 national lung screening trial patients [9785-15]
9785 OH	An automated lung nodule detection system for CT images using synthetic minority oversampling [9785-16]
	BREAST
9785 01	Quantification of mammographic masking risk with volumetric breast density maps: how to select women for supplemental screening [9785-17]
9785 OJ	Seamless lesion insertion in digital mammography: methodology and reader study [9785-18]
9785 OK	Workflow improvements for digital breast tomosynthesis: computerized generation of enhanced synthetic images [9785-19]
9785 OL	A fully automated system for quantification of background parenchymal enhancement in breast DCE-MRI [9785-20]
9785 OM	Parenchymal texture measures weighted by breast anatomy: preliminary optimization in a case-control study [9785-21]
9785 ON	Automated linking of suspicious findings between automated 3D breast ultrasound volumes [9785-22]
	KEYNOTE AND DEEP LEARNING I
9785 OP	Deep convolutional networks for automated detection of posterior-element fractures on spine CT [9785-24]
9785 0Q	Increasing CAD system efficacy for lung texture analysis using a convolutional network [9785-25]

RADIOMICS I

9785 OR	Increasing cancer detection yield of breast MRI using a new CAD scheme of mammograms [9785-26]
9785 OS	Identification, segmentation, and characterization of microcalcifications on mammography [9785-27]
9785 OT	Predicting Ki67% expression from DCE-MR images of breast tumors using textural kinetic features in tumor habitats [9785-28]
9785 OU	Applying quantitative adiposity feature analysis models to predict benefit of bevacizumab-based chemotherapy in ovarian cancer patients [9785-29]
9785 OV	Radiogenomics of glioblastoma: a pilot multi-institutional study to investigate a relationship between tumor shape features and tumor molecular subtype [9785-30]
9785 0W	Prognosis classification in glioblastoma multiforme using multimodal MRI derived heterogeneity textural features: impact of pre-processing choices [9785-31]
	DEEP LEARNING II
9785 0X	Detection of soft tissue densities from digital breast tomosynthesis: comparison of conventional and deep learning approaches [9785-32]
9785 OY	Deep-learning convolution neural network for computer-aided detection of microcalcifications in digital breast tomosynthesis [9785-33]
9785 OZ	Computer aided lung cancer diagnosis with deep learning algorithms [9785-34]
9785 10	Visualizing and enhancing a deep learning framework using patients age and gender for chest x-ray image retrieval [9785-35]
9785 11	Deep convolutional neural networks for automatic coronary calcium scoring in a screening study with low-dose chest CT [9785-36]
9785 12	Comparison of bladder segmentation using deep-learning convolutional neural network with and without level sets [9785-37]
	LUNG AND CHEST II
9785 13	Pulmonary nodule detection using a cascaded SVM classifier [9785-38]
9785 14	Spatial context learning approach to automatic segmentation of pleural effusion in chest computed tomography images [9785-39]
9785 15	Lymph node detection in IASLC-defined zones on PET/CT images [9785-40]

9785 16	Intrapulmonary vascular remodeling: MSCT-based evaluation in COPD and alpha-1 antitrypsin deficient subjects [9785-41]
9785 17	Automatic heart localization and radiographic index computation in chest x-rays [9785-42]
	HEAD AND NECK
9785 18	Comprehensive eye evaluation algorithm [9785-43]
9785 19	Vessel discoloration detection in malarial retinopathy [9785-44]
9785 1A	Computer-aided detection of human cone photoreceptor inner segments using multiscale circular voting [9785-45]
9785 1B	Sweet-spot training for early esophageal cancer detection [9785-46]
9785 1C	A single-layer network unsupervised feature learning method for white matter hyperintensity segmentation [9785-47]
9785 1D	Early esophageal cancer detection using RF classifiers [9785-48]
	RADIOMICS II
9785 1E	Applying a radiomics approach to predict prognosis of lung cancer patients [9785-49]
9785 1F	Radiomics versus physician assessment for the early prediction of local cancer recurrence after stereotactic radiotherapy for lung cancer [9785-50]
9785 1G	Automatic staging of bladder cancer on CT urography [9785-51]
9785 1H	Signal intensity analysis of ecological defined habitat in soft tissue sarcomas to predict metastasis development [9785-52]
9785 11	Classification of progression free survival with nasopharyngeal carcinoma tumors [9785-53]
	COLON AND PROSTATE
9785 1J	Decision forests for learning prostate cancer probability maps from multiparametric MRI [9785-54]
9785 1K	Fusion of multi-parametric MRI and temporal ultrasound for characterization of prostate cancer: in vivo feasibility study [9785-55]
9785 1L	An integrated classifier for computer-aided diagnosis of colorectal polyps based on random forest and location index strategies [9785-56]

9785 1M	Deep learning for electronic cleansing in dual-energy CT colonography [9785-57]
9785 1N	Colitis detection on abdominal CT scans by rich feature hierarchies [9785-58]
	ABDOMINAL
9785 10	Automatic detection of ureter lesions in CT urography [9785-59]
9785 1P	Segmentation of hepatic artery in multi-phase liver CT using directional dilation and connectivity analysis [9785-60]
9785 1Q	Semi-automatic assessment of pediatric hydronephrosis severity in 3D ultrasound [9785-61]
9785 1R	Machine-learning based comparison of CT-perfusion maps and dual energy CT for pancreatic tumor detection [9785-62]
9785 1\$	Automatic anatomy recognition on CT images with pathology [9785-63]
9785 1T	Differentiating bladder carcinoma from bladder wall using 3D textural features: an initial study [9785-64]

Part Two

	POSTERS: BREAST
9785 1U	Reference state estimation of breast computed tomography for registration with digital mammography [9785-65]
9785 1V	Improving the performance of lesion-based computer-aided detection schemes of breast masses using a case-based adaptive cueing method [9785-66]
9785 1W	Quantitative breast MRI radiomics for cancer risk assessment and the monitoring of high-risk populations [9785-67]
9785 1X	Benign-malignant mass classification in mammogram using edge weighted local texture features [9785-68]
9785 1Y	Parameter optimization of parenchymal texture analysis for prediction of false-positive recalls from screening mammography [9785-69]
9785 1Z	Automatic quantification of mammary glands on non-contrast x-ray CT by using a novel segmentation approach [9785-70]
9785 20	Computer-aided classification of mammographic masses using the deep learning technology: a preliminary study [9785-71]
9785 21	An initial investigation on developing a new method to predict short-term breast cancer risk based on deep learning technology [9785-72]

9785 22	Computer-aided global breast MR image feature analysis for prediction of tumor response to chemotherapy: performance assessment [9785-73]
9785 23	First and second-order features for detection of masses in digital breast tomosynthesis [9785-74]
9785 24	An adaptive online learning framework for practical breast cancer diagnosis [9785-75]
	POSTERS: COLON AND PROSTATE
9785 25	Computer-aided detection of polyps in optical colonoscopy images [9785-76]
9785 26	Performance evaluation of multi-material electronic cleansing for ultra-low-dose dual-energy CT colonography [9785-77]
9785 27	Detection of benign prostatic hyperplasia nodules in T2W MR images using fuzzy decision forest [9785-78]
9785 28	Colonoscopic polyp detection using convolutional neural networks [9785-79]
9785 29	Normalization of T2W-MRI prostate images using Rician a priori [9785-80]
9785 2B	Deep transfer learning of virtual endoluminal views for the detection of polyps in CT colonography (Cum Laude Poster Award) [9785-82]
	POSTERS: HEAD AND NECK
9785 2C	Detection and measurement of retinal blood vessel pulsatile motion [9785-83]
9785 2D	
	Automatic determination of white matter hyperintensity properties in relation to the development of Alzheimer's disease [9785-84]
9785 2E	
9785 2E 9785 2F	development of Alzheimer's disease [9785-84] Improvement of retinal blood vessel detection by spur removal and Gaussian matched
	development of Alzheimer's disease [9785-84] Improvement of retinal blood vessel detection by spur removal and Gaussian matched filtering compensation [9785-85]
9785 2F	development of Alzheimer's disease [9785-84] Improvement of retinal blood vessel detection by spur removal and Gaussian matched filtering compensation [9785-85] Automated blood vessel extraction using local features on retinal images [9785-86]
9785 2F 9785 2G	development of Alzheimer's disease [9785-84] Improvement of retinal blood vessel detection by spur removal and Gaussian matched filtering compensation [9785-85] Automated blood vessel extraction using local features on retinal images [9785-86] Automated detection of retinal whitening in malarial retinopathy [9785-87] Finding regional models of the Alzheimer disease by fusing information from

9785 2K	Automated metastatic brain lesion detection: a computer aided diagnostic and clinical research tool [9785-91]
9785 2L	Automated detection of retinal nerve fiber layer defects on fundus images: false positive reduction based on vessel likelihood [9785-93]
9785 2M	Phenotypic characterization of glioblastoma identified through shape descriptors [9785-94]
9785 2N	3D texture-based classification applied on brain white matter lesions on MR images [9785-95]
9785 20	Classification of SD-OCT volumes for DME detection: an anomaly detection approach [9785-96]
9785 2P	A toolbox to visually explore cerebellar shape changes in cerebellar disease and dysfunction [9785-97]
9785 2Q	Using support vector machines with tract-based spatial statistics for automated classification of Tourette syndrome children [9785-98]
9785 2R	A diagnosis model for early Tourette syndrome children based on brain structural network characteristics [9785-99]
9785 2\$	A primitive study of voxel feature generation by multiple stacked denoising autoencoders for detecting cerebral aneurysms on MRA [9785-100]
9785 2T	Predicting outcomes in glioblastoma patients using computerized analysis of tumor shape: preliminary data [9785-101]
9785 2U	Glioma grading using cell nuclei morphologic features in digital pathology images [9785-102]
9785 2V	Quantitative characterization of brain β -amyloid in 718 normal subjects using a joint PiB/FDG PET image histogram [9785-103]
	POSTERS: LUNG AND CHEST
9785 2W	A novel approach for tuberculosis screening based on deep convolutional neural networks [9785-104]
9785 2X	Ensemble lymph node detection from CT volumes combining local intensity structure analysis approach and appearance learning approach [9785-105]
9785 2Y	Classification of pulmonary nodules in lung CT images using shape and texture features [9785-106]
9785 2Z	Differentiation of several interstitial lung disease patterns in HRCT images using support vector machine: role of databases on performance [9785-107]
9785 30	Automated anatomical description of pleural thickening towards improvement of its computer-assisted diagnosis [9785-108]

9785 31	Computer aided diagnosis for severity assessment of pneumoconiosis using CT images [9785-109]
9785 32	Lung nodule detection using 3D convolutional neural networks trained on weakly labeled data [9785-110]
9785 33	Investigating the effects of majority voting on CAD systems: a LIDC case study [9785-111]
9785 35	Change descriptors for determining nodule malignancy in national lung screening trial CT screening images [9785-113]
9785 36	Adaptive thresholding of chest temporal subtraction images in computer-aided diagnosis of pathologic change [9785-114]
9785 37	Correlation analysis between pulmonary function test parameters and CT image parameters of emphysema [9785-115]
9785 38	Computerized lung cancer malignancy level analysis using 3D texture features [9785-116]
9785 39	A computer-aided diagnosis system to detect pathologies in temporal subtraction images of chest radiographs [9785-117]
	POSTERS: MUSCULOSKELETAL AND MISCELLANEOUS
9785 3A	Computer-aided diagnosis for osteoporosis using chest 3D CT images [9785-118]
9785 3B	Segmentation of knee MRI using structure enhanced local phase filtering [9785-120]
9785 3C	Automated morphological analysis of bone marrow cells in microscopic images for diagnosis of leukemia: nucleus-plasma separation and cell classification using a hierarchical tree model of hematopoesis [9785-121]
9785 3D	A B-spline image registration based CAD scheme to evaluate drug treatment response of ovarian cancer patients [9785-122]
9785 3E	Phantom-less bone mineral density (BMD) measurement using dual energy computed tomography-based 3-material decomposition [9785-123]
9785 3F	Reliable measurement of 3D foot bone angles based on the frame-of-reference derived from a sole of the foot [9785-124]
9785 3G	Segmentation and determination of joint space width in foot radiographs [9785-125]
9785 3H	Multi-atlas segmentation of the cartilage in knee MR images with sequential volume- and bone-mask-based registrations [9785-126]
9785 31	A new paradigm of oral cancer detection using digital infrared thermal imaging [9785-127]
9785 3J	Image segmentation evaluation for very-large datasets [9785-128]

9785 3K	Automated recognition of the iliac muscle and modeling of muscle fiber direction in torso CT images [9785-129]
9785 3L	Multispectral imaging burn wound tissue classification system: a comparison of test accuracies between several common machine learning algorithms [9785-130]
9785 3M	Automated torso organ segmentation from 3D CT images using conditional random field [9785-131]
9785 3N	Interactive computer-assisted approach for evaluation of ultrastructural cilia abnormalities [9785-132]
9785 30	Improving vertebra segmentation through joint vertebra-rib atlases [9785-133]
9785 3P	A machine learning approach for classification of anatomical coverage in CT [9785-134]
9785 3Q	Computerized scheme for vertebra detection in CT scout image [9785-135]
	POSTERS: VESSELS AND HEART
9785 3R	Learning evaluation of ultrasound image segmentation using combined measures [9785-136]
9785 3S	Atorvastatin effect evaluation based on feature combination of three-dimension ultrasound images [9785-137]
9785 3T	Fully automated segmentation of left ventricle using dual dynamic programming in cardiac cine MR images [9785-138]
9785 3U	Computerized flow and vessel wall analyses of coronary arteries for detection of non-calcified plaques in coronary CT angiography [9785-139]
	POSTERS: ABDOMINAL
9785 3V	Maximal area and conformal welding heuristics for optimal slice selection in splenic volume estimation [9785-140]
9785 3W	Computer-aided detection of bladder mass within non-contrast-enhanced region of CT Urography (CTU) [9785-141]

Proc. of SPIE Vol. 9785 978501-12

Authors

Numbers in the index correspond to the last two digits of the six-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first four digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Abas, Fazly Salleh, 0B
Abidin, Anas Z., 08
Abolmaesumi, Purang, 1K
Abulnaga, S. Mazdak, 2P
Acernese, Fausto, 06
Afshin, Mariam, 04
Agarwal, Prachi, 3U
Aghaei, Faranak, 0R, 1V, 22
Agurto, C., 18, 19, 2G
Alva, Ajjai, 1G
An, Dong, 2C, 2E
Anavi, Yaron, 10
Anirudh, Rushil, 32
Antani, Sameer, 17
Ardon, Roberto, 1Q

Antani, Sameer, 17 Ardon, Roberto, 1Q Armato, Samuel G. III, 36, 39 Ashizawa, Kazuto, 31 Avila, Jesus, 0S Azuma, K., 3K Babino, Giovanni, 06

Balagurunathan, Yoganand, 35

Baldwin, T., 0A
Banerjee, S., 3I
Barish, Mathew, 3V
Barone, Fabrizio, 06
Barriga, S., 18, 19, 2G
Bastian-Jordan, Matthew, 1K

Bauer, Jan S., 08 Bauer, Ralf W., 3E Baum, Thomas, 08 Ben-Ari, R., 0A Bergtholdt, Martin, 13 Bernelot Moens, H. J., 3G

Beymer, D., 0A Biggs, Elijah, 1Q Bikowski, Joseph, 0B Binesh Marvasti, Tina, 04 Böer, Gordon, 09 Borelli, Cristina, 0L Boyko, O., 0A Bremer, Timo, 32 Brillet, Pierre-Yves, 0Q, 16

Brown, Matthew S., 0G, 3P Burns, Joseph E., 0P, 3O Cai, Yunliang, 17 Camp, Jon J., 2V Candemir, Sema, 17

Cao, Y., 0A

Caoili, Elaine M., 12, 1G, 1O, 3W

Carass, Aaron, 2P Carrazza, Miguel, 33 Casas, Rafael Jr., 14 Cerrolaza, Juan J., 1Q

Cha, Kenny H., 0Y, 12, 1G, 1O, 1U, 23, 3W

Chaddad, Ahmad, 2M Chaisaowong, Kraisorn, 30 Chakraborty, Jayasree, 1X Chakraborty, M., 31

Chan, Heang-Ping, 03, 0Y, 12, 1G, 1O, 1U, 23, 3U,

3W

Chang, Silvia, 1K Chang, Yeun-Chung, 37 Chaudhuri, K., 3I

Chaudhury, Baishali, 0T, 1H Checefsky, Walter A., 08 Chen, Chung-Ming, 37 Chen, Jiayu, 24 Chen, Jinbo, 1Y Chen, Qiang, 3Q Cheng, Samuel, 20, 21, 22

Cheung, Y., 20 Chu, Tianshu, 24 Chughtai, Aamer, 03, 3U Ciompi, Francesco, 11 Clark, Kal, 0V, 2T

Collins, Leslie M., 0V, 2T

Cohan, Richard H., 12, 1G, 1O, 3W

Compas, C., 0A
Conant, Emily F., 0M, 1Y
Cong, Lin, 3Q
Cool, Derek W., 1K
Cornfeld, Daniel, 1J
Creasman, Jennifer, 0S
Crosnier, Adeline, 16
Czarnek, Nicholas M., 0V, 2T

Dasgupta, A., 3I Dash, Jatindra K., 2Z De Giorgi, Igino, 06 de Jong, Pim A., 11 de Leeuw, Frank-Erik, 1C de Muinck Keizer, D. M., 3G

de Vos, Bob D., 11 de With, Peter H. N., 1B, 1D Deserno, Thomas M., 09 Desrosiers, Christian, 2M Devine, Jeremy, 2K Dhara, Ashis Kumar, 0H, 2Y Dickson, Dennis W., 2V Dijkstra, Jouke, OF
DiMaio, J. Michael, 3L
Ding, Kai, OU, 3D
Ding, Mingyue, 3R, 3S
Drukker, Karen, OS
Drukteinis, Jennifer S., OS, OT
Dubra, Alfredo, 1A, 2J
Duncan, James S., 1J
Dutta, Anirvan, OH, 2Y
Eguchi, K., 3A
Ehrenberg, Henry R., 1J
Eisenhawer, Christian, 30
Emaminejad, Nastaran, 1E

Evert, Matthias, 3N Exell, Trevor, 1O Faccinetto, Alex, 0Q Faltin, Peter, 30 Fan, Wensheng, 3L Fang, Mengjie, 3R

Farhidzadeh, Hamidreza, OT, 1H, 11

Fenster, Aaron, 1K Fetita, Catalin, 0Q, 16 Flohr, Thomas G., 3E Fotin, Sergei V., 0K, 0X Frayne, Richard, 2N Freeman, Sabrina, 27 Freixenet, Jordi, 29 Fritz, Franziska, 1R Frost, Shaun, 2C

Flost, Snauri, 2C Fujita, Hiroshi, 1Z, 2F, 2L, 3K Fujiwara, Michitaka, 2X Furst, Jacob, 33 Furukawa, Kazuhiro, 2X Gabriel, Eric, 09 Gaed, Mena, 1K Gao, Xinpei, 0F Gaonkar, Bilwaj, 2l Garapati, Sankeerth S., 1G Garcia, Rafael, 0C

García-Arteaga, Juan D., 2H Garg, Mandeep, 2Y, 2Z Gastounioti, Aimilia, 0M Gatenby, Robert A., 0T, 1H, 35

Geiger, Benjamin, 35 Gelbart, Elad, 10 Georgii, Joachim, 1P Geva, Ofer, 0D, 10 Ghafoorian, Mohsen, 1C Ghavidel, Sahar, 1K Gibson, Eli, 1K

Giger, Maryellen L., 0S, 1W Gilboa-Solomon, F., 0A Gillies, Robert J., 0T, 1H, 35 Giordano, Gerardo, 06 Giraldo, Diana L., 2H Gobbi, David, 2N

Goldgof, Dmitry B., 0T, 1H, 1I, 35

Goldin, Johnathan, 3P Gomez, Jose A., 1K

Goetz, Michael, 1R

Goto, Hidemi, 2X Grafe, Claudia, 3N Greenspan, Hayit, 0D, 10 Grosskopf, Stefan, 02 Gu, Xianfeng, 3V Guan, Yubao, 1E Gube, Monika, 30

Gubern-Mérida, Albert, 0L, 0N Guo, Wei, 3Q

Guo, Y., 0A Gur, Y., 0A Gurcan, Metin N., 0B Gutenko, levgeniia, 3V Guy, Amit, 0A Hacihaliloglu, Ilker, 3B

Hadjiiski, Lubomir M., 03, 0Y, 12, 1G, 1O, 1U, 23,

3U, 3W

Haferlach, Torsten, 3C Hahmann, Ferdinand, 09 Hahn, Horst K., 1P

Haldankar, Hrishikesh, OK, OX Hall, Lawrence O., OT, 1H, 11, 35

Han, Hao, 1L
Hanaoka, Shouhei, 2S
Hansen, Christian, 1P
Hanson, Dennis P., 2V
Hara, Takeshi, 1Z, 3K
Harding, S., 19, 2G
Harrison, Louis B., 11
Harrison, Melanie, 36, 39
Harsha, Nagam Chaithan, 0H

Hashoul, S., 0A Hatanaka, Yuji, 2F, 2L Hatt, Mathieu, 0W Hawkins, Samuel, 35 Hayashi, Naoto, 2S Hayashi, Yuichiro, 3M He, Huiguang, 2Q, 2R Helvie, Mark A., 0Y, 1U, 23

Heskes, Tom, 1C

Hironakaa, Toru, 1M, 26, 2B Hoffman, John M., 0G Hoffmeister, Jeffrey W., 0K, 0X Hofmann, Philipp, 3E Holland, Katharina, 0l Hollingsworth, Alan B., 0R, 22

Hong, Helen, 3H Honma, Hirotoshi, 0E Hovda, David, 2l Hsieh, Meng-Kang, 0M Hu, Yifan, 1L

Holmes, David R., 2V

Hu, Yifan, 1L Huang, Lidong, 1S Huang, Xia, 38

Hwang, Sangheum, 2W Iftekharuddin, Khan M., 2U

Imani, Farhad, 1K Išgum, Ivana, 11 Ishida, Kyoko, 2L Ishida, Takayuki, 26 Iwano, Shingo, 0E Jaeger, Stefan, 17 Jago, James, 1Q Janse, Mark H. A., 1D Jedynak, Bruno M., 2P Jeong, Jihoon, 2W Jiana, Luan, 3T Jiang, Mingze, 30 Joe, Bonnie, OS Johnson, Carol, 1F Jokisch, Martha, 2D Joshi, V., 19, 2G

Kaffenberger, Benjamin, OB

Kakrania, D., 0A Kale, Mandar, 2Z Kamiya, N., 3K

Kanagasingam, Yogi, 2C, 2E

Kaneko, M., 3A Kano, Takuya, 1Z Kansal, Kalyani, 2P Karam, Irene, 2K

Karssemeijer, Nico, OI, OL, ON

Kassam, Zahra, 1K Kato, Katsuya, 31 Kaufman, Arie, 25, 3V Kawata, Yoshiki, 31, 3A Kazemi, Leila, OS Kazerooni, Ella A., 03, 3U Keller, Brad M., 0M, 1Y Kemp, Bradley J., 2V Kennedy, Brendan, 33 Kerlikowske, Karla, OS Khallaghi, Siavash, 1K

Khandelwal, Niranjan, 0H, 2Y, 2Z

Khojaste, Amir, 1K Kim, H. J. Grace, 0G Kim, Hee-Jin, 2W Kim, Hyeonjin, 3H Kim, Hyeun A., 3H Kim, Hyo-Eun, 2W Kim, Hyojin, 32 Kim, Joo Y., 11 Kim, Junmo, 3H Kim, Lauren, 1N Kim, Se Hyung, 1M Kim, Taeho, 3F King, Darlene R., 3L Kishimoto, Takumi, 31

Kisilev, P., 0A

Kitasaka, Takayuki, 0E, 2X, 3M

Kitslaar, Pieter, OF Klinder, Tobias, 13 Koell, Marco, 1R Kogan, Ilya, 10 Kohlhase, Naja, 26 Konen, Eli, 05, 0D Kontos, Despina, 0M, 1Y Kovacs, William, 07 Krappe, Sebastian, 3C Kraus, Thomas, 30

Krauss, Bernhard, 3E Krings, Gregor, 0S Kumar, Prafulla, 2Y Kusumoto, M., 3A Lamoureux, E., 20 Lay, Nathan, 1N, 27 Le Reste, Pierre-Jean, OW Lee, Dong Yeon, 3F Lee, Han Sang, 3H Leite, Mariana, 2N

Lelieveldt, Boudewijn P. F., OF Lemaître, Guillaume, 0C, 29 Lessmann, Nikolas, 11 Leveridge, Michael, 1K Lewallen, S., 19, 2G Li, Chia-Chen, 37 Li, Hui, 1W Li, Lihong, 1L Li, Qiang, 3Q, 3T Li, Shuo, 1Z Li, Weizhi, 3L

Li, Zhena, 3D Liang, Zhengrong, 1L Lieberman, Sivan, 0D Lim, Mikhiel, 3B Lin, Wilson, 17 Ling, Shan, 3T

Linguraru, Marius George, 14, 1Q

Liu, Cheng-Pei, 37 Liu, Chia-Ying, 07 Liu, Hong, OR, OU, 20, 21, 3D

Liu, Jiamin, 1N Liu, Jianfei, 1A, 2J Liu, Shuang, 3J Liu, Yang, 1T Liu, Yue, 2Q, 2R Lo, Pechin, 0G, 3P Looper, Jared, 36, 39 Lopes Simoes, Rita, 2D Lotufo, Roberto, 2N Louie, Alexander V., 1F Lowe, Val J., 2V Lu, Hongbing, 1T Lu, Le, 0P, 1N

Lu, Yang, 3L Luo, Yongkang, 3R, 3S MacCormick, I., 19, 2G Macyszyn, Luke, 21 Mahnken, Andreas H., 3E Maier-Hein, Klaus H., 1R Mali, Willem P. Th. M., 11 Malkov, Serghei, OS Mann, Ritse M., OI, OL, ON Mansoor, Awais, 14, 1Q Maraj, Tishan, 04 Martel, Anne L., 2K Martí, Robert, 29 Martin, Neil, 21

Marzani, Franck, 0C

Massich, Joan, OC, 29

ΧV

Matsuhiro, Mikio, 31, 3A Mattonen, Sarah A., 1F Mayer, Arnaldo, 05 Mayer, Philipp, 1R

Mazurowski, Maciej A., 0V, 2T McNitt-Gray, Michael F., 0G Mehre, Shrikant A., 0H Mendel, Kayla R., 1W Menze, Bjoern H., 02 Merhof, Dorit, 30

Mériaudeau, Fabrice, 0C, 29, 20

Meyer, Carsten, 09 Meyer-Baese, Anke, 29 Midya, Abhishek, 1X Miki, Soichiro, 2S Milea, D., 2O

Misawa, Kazunari, 2X, 3M

Mo, Weirong, 3L

Moenninghoff, Christoph, 2D

Moody, Alan, 04 Moore, Kathleen, 3D Moradi, M., 0A More, Kathleen, 0U Morel, Olivier, 0C Morey, J., 0A

Mori, Kensaku, 0E, 2X, 3M Mori, Masaki, 0E Morvan, Yannick, 0W Mousavi, Parvin, 1K Moussa, Madeleine, 1K Mukhopadhyay, S., 3I

Mukhopadhyay, Sudipta, 0H, 2Y, 2Z, 3I

Münzenmayer, Christian, 3C Muramatsu, Chisako, 2F, 2L, 3K

Murray, Melissa E., 2V Nadeem, Saad, 25 Nagarajan, Mahesh B., 08 Nakamura, Yoshihiko, 2X

Nakano, Y., 3A

Näppi, Janne J., 1M, 26, 2B

Natori, Hiroshi, 0E Nawaf, Cayce B., 1J Negadhar, R., 0A Nemeth, S., 18, 19, 2G Nemoto, Mitsutaka, 2S Niki, Noboru, 31, 3A Nimura, Yukitaka, 0E, 2X, 3M

Ning, Ruola, 1U Nomura, Yukihiro, 2S Oda, Hirohisa, 0E Oda, Masahiro, 0E, 2X Odhner, Dewey, 15, 1S Ogohara, Kazunori, 2F Ohmatsu, H., 3A Ohtomo, Kuni, 2S Okumura, Susumu, 2F Onyike, Chiadi U., 2P Orientale, Antonio, 06 Ota, Junko, 26 Otero, Hansel, 1Q Oudkerk, Matthjis, 11 Palm, Christoph, 3N Palma, David A., 1F Paramagul, Chintana, 1G Parisi, Joseph E., 2V Park, Jinah, 3F Park, Sun Young, 28 Patsa, S., 31 Peng, Hao, 3V Peng, Yun, 2Q, 2R Pereira, Malesa M., 0S Periaswamy, Senthil, OK, OX Peters, Craig A., 1Q Peters, Katherine B., OV, 2T Petersen, Ronald C., 2V Petrick, Nicholas, 0J Pezeshk, Aria, 0J Pfeffer, Yitzchak, 05 Pickhardt, Perry J., 1L Platel, Bram, 1C Prasanna, P., 0A Prince, Jerry L., 2P Qian, Wei, 0Z, 1E, 1V, 38 Qiu, Yuchen, 0U, 20, 21 Rabidas, Rinku, 1X Rabinovici-Cohen, S., 0A Raghavan, Meera, 1H Raicu, Daniela, 33 Rajan, D., 0A

Ramakrishna, Bharath, 3P Rasin, Alexander, 33 Rastgoo, Mojdeh, 0C, 29 Ray, J. G., 3I Ray, Shonket, 1Y

Razavi, Mohammad, 1P Reeves, Anthony P., 3J Regge, Daniele, 26, 2B Reiber, Johan H. C., 0F Rempfler, Markus, 02 Reza, Syed M. S., 2U Rittner, Letícia, 2N Robb, Richard A., 2V Rodrigues, George, 1F Romagnoli, Cesare, 1K Romano, Rocco, 06 Romero, Eduardo, 2H Roth, Holger R., OP, 3O Sadhu, Anup, 1X Sahgal, Arjun, 2K Sahiner, Berkman, OJ Salluzi, Marina, 2N

Samala, Ravi K., 0Y, 12, 1U, 23

Samo, Kazuki, 2F Sankar, S., 2O Sargent, Dusty, 28 Sawada, Akira, 2L Schenk, O., 3G

Schourr, Alena-Kathrin, 1P Scholte, Arthur J. H. A., 0F Schoon, Erik J., 1B, 1D

xvi

Schramm, Hauke, 09 van Ginneken, Bram, 11 Schroeder, Josef A., 3N van Uden, Inge W. M., 1C Schwier, Michael, 1P van Zelst, Jan, ON Scott, Jacob G., 1H, 11 Viergever, Max A., 11 Sedlmair, Martin, 3E Vignarajan, Janardhan, 2C, 2E Sellke, Eric W., 3L Vijverberg, Koen, 1C Semmelmann, Matthias, 3N Vilanova, Joan C., 29 Senan, Suresh, 1F Vreemann, Suzan, OL Senjem, Matthew L., 2V Walach, E., 0A Setio, Arnaud A. A., 11 Walker, Paul M., 29 Shepherd, John, OS Wanders, Johanna OP, 01 Sidibé, Désiré, 0C, 2O Wang, Cheng-Yi, 37 Wang, H., 0A Siegmund, Heiko, 3N Siemens, D. Robert, 1K Wang, Jie, 24 Wang, Jieqiong, 2Q, 2R Singh, Navneet, 04 Sivalingam, Udhayaraj, 02 Wang, Lei, 1P Skornitzke, Stephan, 1R Wang, Xiaoyong, 3P Slump, Cornelis H., 2D, 3G Wang, Yinong, OP, 3O Soliz, P., 18, 19, 2G Wang, Yunzhi, 0U, 1E, 1V, 21 Song, Yihua, 15 Wanke, Isabel, 2D Sprenkle, Preston C., 1J Ward, Aaron D., 1F, 1K Squiers, John J., 3L Weber, Christian, 1R Stiller, Wolfram, 1R Wei, Jun, 03, 1G, 1O, 23, 3U Stindel, Eric, OW Wei, Zhuoshi, 1N Stough, Rebecca G., OR Weimar, Christian, 2D Suehling, Michael, 02 Weinfurtner, Robert J., 0T Summers, Ronald M., 07, 0P, 1N, 27, 3O Weizer, Alon, 1G, 3W Sun, Wenging, 0Z, 38 Wels, Michael, 02 Suzuki, Hidenobu, 31, 3A Wen, Hongwei, 2Q, 2R Sveda-Mahmood, T., 0A Wichmann, Julian L., 3E Tachibana, Rie, 1M, 26 Wiemker, Rafael, 13 Tajima, Mikiya, 2F Wismüller, Axel, 08 Takabatake, Hirotsugu, 0E Wittenberg, Thomas, 3C Tam, Johnny, 1A, 2J Wong, T. Y., 20 Tan, Maxine, OR, 1V, 20, 21, 22, 3D Xiao, Di, 2C, 2E Tan, Tao, ON Xie, Yitina, 3J Tarando, Sebastian Roberto, OQ Xu, Xiaopan, 1T Tay-Kearney, Mei-Ling, 2C, 2E Xue, Zhiyun, 17 Taylor, T., 19, 2G Yamamoto, Tetsuya, 2L Yan, Shiju, 1E, 20, 21 Thabut, Gabriel, 16 Thai, Theresa, OU, 3D Yang, Zhen, 2P Thatcher, Jeffrey E., 3L Yao, Jianhua, 07, 0P, 3O Thiagarajan, Jayaraman J., 32 Yao, Peter, 1Q Thoma, George, 17 Yeung, Timothy P. C., 1F Tian, Qiang, 1T Yin, Yin, OK, OX Toews, Matthew, 2M Ying, Sarah H., 2P Tong, Yubing, 15, 1S Yokoyama, Ryujiro, 1Z Torigian, Drew A., 15, 1S Yoneda, K., 3A Tseng, Tzu-Liang, 38 Yoon, Young Cheol, 3H Yoshida, Hiroyuki, 1M, 26, 2B Tsuchida, T., 3A Turkbey, Baris, 27 Yoshikawa, Takeharu, 2S Turkbey, Evrim, 1N Young, Stefano, 0G Yu, Chong-Jen, 37 Udupa, Jayaram K., 15, 18 Yu, Wen-Kuana, 37 Ufuk Dalmiş, Mehmet, OL Upadhaya, Taman, 0W Zamora, G., 18 Zhang, Guodong, 3Q Vahtel, M., 18 van Cappellen van Walsum, Anne-Marie, 2D Zhang, Guopeng, 1T van der Sommen, Fons, 1B, 1D Zhang, Jianying, 38

Zhang, Jishui, 2Q, 2R

Zhang, Xi, 1T

van der Velden, Sandra, 2D

van Gils, Carla H., 01

Zhang, Xu, 3L
Zhao, Yue, 1P
Zheng, Bin, OR, OU, OZ, 1E, 1V, 20, 21, 22, 3D
Zholkover, Adi, 05
Zhou, Chuan, 03, 1G, 1O, 3U, 3W
Zhou, Hanxun, 3Q
Zhou, Mu, OT
Zhou, Xiangrong, 1Z, 3K
Zhou, Xinxin, 1Z
Zhu, Wei, 1L
Zidowitz, Stephan, 1P
Zinger, Svitlana, 1B, 1D
Zlotnick, A., OA

Conference Committee

Symposium Chairs

Steven C. Horii, University of Pennsylvania Health System (United States)

Berkman Sahiner, U.S. Food and Drug Administration (United States)

Conference Chairs

Georgia D. Tourassi, Oak Ridge National Laboratory (United States) **Samuel G. Armato III**, The University of Chicago (United States)

Conference Program Committee

Susan M. Astley, The University of Manchester (United Kingdom)

Stephen Aylward, Kitware, Inc. (United States)

Kyongtae Ty Bae, University of Pittsburgh Medical Center (United States)

Matthew S. Brown, University of California, Los Angeles (United States)

Heang-Ping Chan, University of Michigan Health System (United States)

Marleen de Bruijne, Erasmus MC (Netherlands)

Thomas M. Deserno, RWTH Aachen (Germany)

Karen Drukker, The University of Chicago (United States)

Catalin Fetita, Télécom SudParis (France)

Hiroshi Fujita, Gifu University School of Medicine (Japan)

Maryellen L. Giger, The University of Chicago (United States)

Hayit Greenspan, Tel Aviv University (Israel)

Lubomir M. Hadjiiski, University of Michigan Health System (United States)

Horst Karl Hahn, Fraunhofer MEVIS (Germany)

Khan M. Iftekharuddin, Old Dominion University (United States)

Nico Karssemeijer, Radboud University Nijmegen Medical Center (Netherlands)

JongHyo Kim, Seoul National University Hospital (Korea, Republic of)

Marius George Linguraru, Children's National Medical Center (United States)

Fabrice Meriaudeau, University de Bourgogne (France)

Kensaku Mori, Nagoya University (Japan)

Janne J. Näppi, Massachusetts General Hospital (United States)

Noboru Niki, University of Tokushima (Japan)

Carol L. Novak, Siemens Corporation, Corporate Technology (United States)

Nicholas A. Petrick, U.S. Food and Drug Administration (United States)

Clarisa I. Sánchez, Radboud University Nijmegen Medical Center (Netherlands)

Ronald M. Summers, National Institutes of Health (United States)

Kenji Suzuki, Illinois Institute of Technology (United States)

Bram van Ginneken, Radboud University Nijmegen Medical Center (Netherlands)

Eva M. van Rikxoort, Radboud University Nijmegen Medical Center (Netherlands)

Rafael Wiemker, Philips Research (Germany)

Axel Wismüller, University of Rochester Medical Center (United States)

Xiaofeng Yang, Emory University (United States)

Hiroyuki Yoshida, Massachusetts General Hospital (United States)

Session Chairs

1 Vessels and Heart

Stephen Aylward, Kitware, Inc. (United States) **Thomas Deserno**, Uniklinik RWTH Aachen (Germany)

2 Musculoskeletal and Miscellaneous

Axel Wismüller, University of Rochester Medical Center (United States)

3 Lung and Chest I

Matthew S. Brown, University of California, Los Angeles (United States) **Catalin Fetita**, Télécom SudParis (France)

4 Breast

Hiroshi Fujita, Gifu University School of Medicine (Japan) **Karen Drukker**, The University of Chicago (United States)

5 Keynote and Deep Learning I

Lubomir M. Hadjiiski, University of Michigan Health System (United States)

Georgia D. Tourassi, Oak Ridge National Laboratory (United States)

6 Radiomics I

Maryellen L. Giger, The University of Chicago (United States)
Samuel G. Armato III, The University of Chicago (United States)

7 Deep Learning II

Ronald M. Summers, National Institutes of Health (United States) **Hayit Greenspan**, Tel Aviv University (Israel)

8 Lung and Chest II

Bram van Ginneken, Radboud University Medical Center (Netherlands)

Eva M. van Rikxoort, Radboud University Medical Center (Netherlands)

9 Head and Neck

Khan M. Iftekharuddin, Old Dominion University (United States)

10 Radiomics II

Heang-Ping Chan, University of Michigan Health System (United States)

11 SPIE-AAPM-NCI PANEL: CAD Grand Challenges: Paving the Way for Imaging in the Era of Precision Medicine Samuel G. Armato III, The University of Chicago (United States)

12 Colon and Prostate

Janne J. Näppi, Massachusetts General Hospital (United States) **Kenji Suzuki**, Illinois Institute of Technology (United States)

13 Abdominal

Hiroyuki Yoshida, Massachusetts General Hospital (United States) **Kensaku Mori**, Nagoya University (Japan)

Proc. of SPIE Vol. 9785 978501-22

2016 Medical Imaging Award Recipients

Robert F. Wagner Best Student Paper Award

Robert F. Wagner was an active scientist in the SPIE Medical Imaging meeting, starting with the first meeting in 1972 and continuing throughout his career. He ensured that the BRH, and subsequently the CDRH, was a sponsor for the early and subsequent Medical Imaging meetings, helping to launch and ensure the historical success of the meeting. The Robert F. Wagner All-Conference Best Student Paper Award (established 2014) is acknowledgment of his many important contributions to the Medical Imaging meeting and his many important advances to the field of medical imaging.



This award is cosponsored by:



The Medical Image Perception Society



2016 Recipients:

First Place: MIND Demons for MR-to-CT deformable image registration in image-guided spine surgery (9786-16)

S. Reaungamornrat, T. De Silva, A. Uneri, Johns Hopkins Univ. (United States), J.-P. Wolinsky, Johns Hopkins Hospital (United States), A. J. Khanna, Johns Hopkins Health Care & Surgery Ctr. (United States), G. Kleinszig, S. Vogt, Siemens Healthcare (Germany), J. L. Prince, J. H. Siewerdsen, Johns Hopkins Univ. (United States)

Second Place: Design, fabrication, and implementation of voxel-based 3D printed textured phantoms for task-based image quality assessment in CT (9783-76)

Justin Solomon, Duke Univ. School of Medicine (United States), Alexandre Ba, Institut Univ. de Radiophysique Appliquée (Switzerland), Andrew Diao, Duke Univ. (United States), Joseph Lo, Elianna Bier, Duke Univ. School of Medicine (United States), François Bochud, Institut Univ. de Radiophysique Appliquée (Switzerland), Michael Gehm, Duke Univ. (United States), Ehsan Samei, Duke Univ. School of Medicine (United States)

Conference 9785 Awards

Cum Laude Poster Award

First Place: Deep transfer learning of virtual endoluminal views for the detection of polyps in CT colonography (9785-82)

J. J. Näppi, T. Hironaka, H. Yoshida, Massachusetts General Hospital (United States); D. Regge, Institute for Cancer Research and Treatment (Italy)

Proc. of SPIE Vol. 9785 978501-24