

# QIBA and QI/ Imaging Biomarkers in the Literature

Articles are divided into two categories:

1. Articles that are generated by Quantitative Imaging Biomarkers Alliance (QIBA) research teams
2. Articles that reference QIBA

If available, links are provided to PubMed or journal landing pages.

## I. QIBA-GENERATED ARTICLES

### 2014

#### QIBA Metrology Papers

Huang EP, Wang XF, Choudhury KR, McShane LM, Gönen M, Ye J, Buckler AJ, Kinahan PE, Reeves AP, Jackson EF, Guimaraes AR, Zahlmann G. [Introduction to Metrology Series: Meta-Analysis of the Technical Performance of an Imaging Procedure: Guidelines and Statistical Methodology](#). *Statistical Methods in Medical Research*. May 2014: pii: 0962280214537394  
[Epub ahead of print] first published online May 28, 2014. [PubMed Citation](#) doi: 10.1177/0962280214537394

Kessler LG, Barnhart HX, Buckler AJ, Choudhury KR, Kondratovich MV, Toledano A, Guimaraes AR, Filice R, Zhang Z, Sullivan DC. [Introduction to Metrology Series: The Emerging Science of Quantitative Imaging Biomarkers: Terminology and Definitions for Scientific Studies and Regulatory Submissions](#). *Statistical Methods in Medical Research*. June 2014: pii: 0962280214537333.  
[Epub ahead of print] first published online 11 June 2014. [PubMed Citation](#) doi: 10.1177/0962280214537333

Obuchowski NA, Reeves AP, Huang EP, Wang XF, Buckler AJ, Kim HJ, Barnhart HX, Jackson EF, Giger ML, Pennello G, Toledano AY, Kalpathy-Cramer J, Apanasovich TV, Kinahan PE, Myers KJ, Goldgof DB, Barboriak DP, Gillies RJ, Schwartz LH, Sullivan DC. [Introduction to Metrology Series: Quantitative Imaging Biomarkers: A Review of Statistical Methods for Computer Algorithm Comparisons](#). *Statistical Methods in Medical Research*. June 2014: pii: 0962280214537390.  
[Epub ahead of print] first published online June 11, 2014. [PubMed Citation](#) doi:10.1177/0962280214537390

Obuchowski NA, Barnhart HX, Buckler AJ, Pennello G, Wang XF, Kalpathy-Cramer J, Kim HJ, Reeves AP. [Introduction to Metrology Series: Statistical Issues in the Comparison of Quantitative Imaging Biomarker Algorithms using Pulmonary Nodule Volume as an Example](#). *Statistical Methods in Medical Research*. June 11, 2014: pii: 0962280214537392.  
[Epub ahead of print] first published online June 11, 2014. [PubMed Citation](#) doi:10.1177/0962280214537392

Raunig DL, Pennello G, Gatsonis C, McShane LM, Carson PL, Voyvodic JT, Wahl RL, Kurland BF, Schwarz AJ, Gönen M, Zahlmann G, Kondratovich M, O'Donnell K, Petrick N, Cole PE, Garra B, Sullivan DC. [Introduction to Metrology Series: Quantitative Imaging Biomarkers: A Review of Statistical Methods for Technical Performance Assessment](#). *Statistical Methods in Medical Research*. June 2014: pii: 0962280214537344.  
[Epub ahead of print] first published online June 11, 2014. [PubMed Citation](#) doi:10.1177/0962280214537344

Kinahan PE, Wahl RL, Shao LX, Frank RA, Perlman ES. [Oncology: Basic, Translational & Therapy, MTA I: Technical Advances & Quantification Posters: The QIBA profile for quantitative FDG-PET/CT oncology imaging.](#) *J Nucl Med.* 2014; 55 (Supplement 1):1520.

Milkowski A, Hall TJ, Garra B, Nightingale K, Palmeri ML, Chen S, Carson PL. **Radiological Society of North America/Quantitative Imaging Biomarkers Alliance Ultrasound Shear Wave Speed Estimation in Elastic Phantoms: Sources and Magnitude of Variability in a Multicenter Study.** *American Institute of Ultrasound in Medicine Proceedings: J Ultrasound Med.* 2014; 33(suppl):S1–S124. [Link to conference proceedings paper](#)

Nightingale K, Palmeri ML, Deng Y, Rosenzweig S, Rouze N. **Shear Wave Speed Estimation in Calibrated Phantoms: Factors Affecting Bias.** *American Institute of Ultrasound in Medicine Proceedings: J Ultrasound Med.* 2014; 33(suppl):S1–S124, 2014. [Link to conference proceedings paper](#)

Oo JH, Leal J, Zhang J, Barrington S, Boellaard R, Eikman E, Wahl RL. [Instrumentation & Data Analysis, MTA II: Data Analysis & Management Posters: Multicenter quantitative assessment of treatment response by FDG PET/CT.](#) *J Nucl Med.* 2014; 55 (Supplement 1):2061.

Palmeri ML, Garcia-Reyes K, Gupta R, Rosenzweig S, Miller Z, Glass T, Kauffman C, Polascik T, Nightingale K, **A Comparison of 3-Dimensional In Vivo Acoustic Radiation Force Impulse Imaging With Multiparametric Magnetic Resonance Imaging for Prostate Cancer Diagnosis.** *American Institute of Ultrasound in Medicine Proceedings: J Ultrasound Med.* 2014; 33(suppl):S1–S124. [Link to conference proceedings paper](#)

Petrick N, Kim HJG, Clunie D, Borradaile K, Ford R, Zeng R, Gavrielides M, McNitt-Gray M, Lu ZQJ, Fenimore C, Zhao B, Buckler AJ. **Comparison of 1D, 2D, and 3D Nodule Sizing Methods by Radiologists for Spherical and Complex Nodules on Thoracic CT Phantom Images.** *Academic Radiology.* 2014; 21(1):30-40.  
doi: <http://dx.doi.org/10.1016/j.acra.2013.09.020>. [Link to Science Direct](#); [PubMed Citation](#)

Rodriguez A, Ranallo F, Judy PF, Gierada D, Fain SB. **Airway Measurement Accuracy For Low Dose Quantitative CT (qCT) Using Statistical (ASIR), And Model Based Reconstruction Techniques (Veo).** A108. *LUNG IMAGING: STATE OF PLAY ON STRUCTURE AND FUNCTION.* May 1, 2014; A2395-A2395.

## 2013

Boss MA, Chenevert TL, Waterton JC, Morris DM, Hossein R, Jackson A, DeSouza N, Collins DJ, van Beers BE, Garteiser P, Doblaz S, Russek SE, Keenan KE, Jackson EF, and Zahlmann G. **Temperature-controlled Isotropic Diffusion Phantom with Wide Range of Apparent Diffusion Coefficients for Multicenter Assessment of Scanner Repeatability and Reproducibility.** {Not yet published.}

Chen B, Barnhart H, Richard S, et al. **Volumetric Quantification of Lung Nodules in CT with Iterative Reconstruction (ASIR and MBIR).** *Med. Phys.* Nov 2013; 40 (11): 111902. [Link to journal landing page](#)

Garra B, Hall TJ, Milkowski A, et al. **RSNA/QIBA: Shear Wave Speed as a Biomarker for Liver Fibrosis Staging.** 2013-IEEE International Ultrasonics Symposium (IUS), Joint IEEE-International Symposium on the Applications of Ferroelectrics (ISAF), and Piezoresponse Force Microscopy and Nanoscale Phenomena in Polar Materials (PFM), Joint IEEE-International Frequency Control Symposium (IFCS), and European Frequency and Time Forum (EFTF); July 21 -25, 2013; Prague, Czech Republic. [Link to conference proceedings paper](#)

Gavrielides MA, Li Q, Zeng R, et al. **Minimum Detectable Change in Lung Nodule Volume in a Phantom CT Study.** *Academic Radiology.* 2013; 20 (11):1364-1370. doi: 10.1016/j.acra.2013.08.019. [PubMed Citation](#)

Kinahan P, Pierce L, Elston B, Nelson D, Clunie D. **PET/CT Digital Reference Object.** [PET/CT DRO User Guide](#) *Not yet published. Publication of design methodology and results is planned for the future.*

Sullivan DC, Schwartz LH, Zhao B. **The Imaging Viewpoint: How Imaging Affects Determination of Progression-Free Survival.** *Clin Cancer Res.* 2013; 19(10); 2621–8. doi: 10.1158/1078-0432.CCR-12-2936. [PubMed Citation](#)

Zacà D, Jovicich J, Nadar SR, Voyvodic JT, and Pillai JJ. **Cerebrovascular Reactivity Mapping in Patients with Low Grade Gliomas Undergoing Presurgical Sensorimotor Mapping with BOLD fMRI.** *J Magn Reson Imaging.* 2013; doi: 10.1002/jmri.24406. [Link to journal landing page](#)

## 2012

Fenimore C, Lu ZJ, McNitt-Gray MF, Kim HJ, Clunie D, Gavrielides MA, Petrick N, Samei E, Chen B, Saiprasad G, Boedeker K, Chen-Mayer H, Buckler AJ, **Clinician sizing of synthetic nodules to evaluate CT interscanner effects.** RSNA 2012.

Voyvodic JT. **Reproducibility of Single-Subject fMRI Language Mapping with AMPLE Normalization.** *J Magn Reson Imaging.* Sept 2012; 36(3): 569–580. doi: 10.1002/jmri.23686. [PubMed Citation](#)

Mozley PD, Bendtsen C, Zhao B, Schwartz LH, Thorn M, Rong Y, Zhang L, et al. **Measurement of Tumor Volumes Improves RECIST-based Response Assessments in Advanced Kung Cancer.** *Translational Oncology.* 2012; 5(1):19–25. [PubMed Citation](#)

## 2011

Buckler AJ, Bresolin L, Dunnick NR, Sullivan DC, Aerts HJ, Bendriem B, Bendtsen C, Boellaard R, Boone JM, Cole PE, Conklin JJ, Dorfman GS, Douglas PS, Eidsaunet W, Elsinger C, Frank RA, Gatsonis C, Giger ML, Gupta SN, Gustafson D, Hoekstra OS, Jackson EF, Karam L, Kelloff GJ, Kinahan PE, McLennan G, Miller CG, Mozley PD, Muller KE, Patt R, Raunig D, Rosen M, Rupani H, Schwartz LH, Siegel BA, Sorensen AG, Wahl RL, Waterton JC, Wolf W, Zahlmann G, Zimmerman B. **Quantitative Imaging Test Approval and Biomarker Qualification: Interrelated but Distinct Activities.** *Radiology.* June 2011; 259(3):875-84. [Epub Feb 15, 2011]. [PubMed Citation](#)

Buckler AJ, Bresolin L, Dunnick NR, Sullivan DC; Group. **A Collaborative Enterprise for Multi-stakeholder Participation in the Advancement of Quantitative Imaging.** *Radiology.* March 2011; 258(3):906-14. [PubMed Citation](#)

Buckler AJ, Boellaard R. **Standardization of Quantitative Imaging: The Time is Right, and 18F-FDG PET/CT is a Good Place to Start.** *J Nucl Med.* Feb 2011; 52(2):171-2. [Epub Jan 13, 2011. No abstract.] [PubMed Citation](#)

McNitt-Gray MF, Kim HJ, Zhao B, Schwartz L, Clunie D, Borradaile K, Byrne K, Kaplan S, Barudin J, Sherman J, Slazak K, Petrick NP, Fenimore C, Lu J, Buckler, AJ, **Estimating the Minimum Detectable Change of Lung Lesions Using Patient Datasets Acquired Under a “No Change” Condition,** RSNA 2011.

Petrick NP, Kim HJ, Clunie D, Borradaile K, Ford R, Zeng R, Gavrielides MA, McNitt-Gray MF, Fenimore C, Lu J, Zhao B, Buckler AJ. **Evaluation of 1D, 2D and 3D Nodule Size Estimation by Radiologists for Spherical and Non-spherical Nodules Through CT Thoracic Phantom Imaging,** SPIE, February 2011.

## 2010

Buckler AJ, Mozley PD, Schwartz L, Petrick N, McNitt-Gray M, Fenimore C, O'Donnell K, Hayes W, Kim HJ, Clarke L, Sullivan D. **Volumetric CT in Lung Cancer: An Example for the Qualification of Imaging as a Biomarker.** *Acad Radiol.* Jan 2010; 17(1):107-15. [PubMed Citation](#)

Buckler AJ, Mulshine JL, Gottlieb R, Zhao B, Mozley PD, Schwartz L. **The Use of Volumetric CT as an Imaging Biomarker in Lung Cancer.** *Acad Radiol.* Jan 2010; 17(1):100-6. [PubMed Citation](#)

Buckler AJ, Schwartz LH, Petrick N, McNitt-Gray M, Zhao B, Fenimore C, Reeves AP, Mozley PD, Avila RS. **Data Sets for the Qualification of Volumetric CT as a Quantitative Imaging Biomarker in Lung Cancer.** *Opt Express.* July 5, 2010; 18(14):15267-82. [See also [http://vjbo.osa.org/virtual\\_issue.cfm](http://vjbo.osa.org/virtual_issue.cfm)]. [PubMed Citation](#)

Mozley PD, Schwartz LH, Bendtsen C, Zhao B, Petrick N, Buckler AJ. **Change in Lung Tumor Volume as a Biomarker of Treatment Response: A Critical Review of the Evidence.** *Ann Oncol.* Sept 2010; 21(9):1751-5. [Epub March 23, 2010, Review]. Free article. [PubMed Citation](#)

## 2009

Paldino MJ, Barboriak DP. **Fundamentals of Quantitative Dynamic Contrast-Enhanced MR Imaging.** *Magn Reson Imaging Clin N Am.* 2009; 17:277–289. [PubMed Citation](#)

## 2008

Frank R; FDG-PET/CT Working Group. **Quantitative Imaging Biomarkers Alliance FDG-PET/CT Working Group Report.** *Mol Imaging Biol.* Nov-Dec. 2008; 10(6):305. [PubMed Citation](#)

## II. ARTICLES THAT REFERENCE QIBA

### 2014

Abramson RG, Yankeelov TE. **Imaging Biomarkers and Surrogate Endpoints in Oncology Clinical Trials, Chapter 2.** In: *Functional Imaging in Oncology, Biophysical Basis and Technical Approaches.* Volume 1. New York, NY: Springer-Verlag Berlin Heidelberg; 2014: 29-42. [Link to publisher's landing page](#)

Chen B, Wilson J, Samei E. **A Refined Methodology for Modeling Volume Quantification Performance in CT.** *Proc. SPIE 9033, Medical Imaging 2014: Physics of Medical Imaging, 903325.* March 19, 2014. doi:10.1117/12.2044004; <http://dx.doi.org/10.1117/12.2044004>.

Doot RK, Pierce, LA, Byrd D, Elston B, Allberg KC, Kinahan PE. **Biases in Multicenter Longitudinal PET Standardized Uptake Value Measurements.** *Transl Oncol.* Feb 2014; 7(1): 48–54. [Published online Feb 1, 2014]. [PubMed Citation](#)

Gavrielides MA, Li Q, Zeng R, Myers KJ, Sahiner B, et al. **Volume Estimation of Multi-Density Nodules with Thoracic CT.** *Proc. SPIE 9033, Medical Imaging 2014: Physics of Medical Imaging, 903331.* March 19, 2014. doi:10.1117/12.2043833; <http://dx.doi.org/10.1117/12.2043833>.

Huang W, Li X, Chen Y, et al. **Variations of Dynamic Contrast-Enhanced Magnetic Resonance Imaging in Evaluation of Breast Cancer Therapy Response: A Multicenter Data Analysis Challenge.** *Transl Oncol.* Feb 2014; 7(1): 153–166. [Published online Feb 1, 2014]. [PubMed Citation](#)

Krishnaraj A, Weinreb JC, Ellenbogen PH, Allen Jr B, Norbash A, Kazerooni EA. **The Future of Imaging Biomarkers in Radiologic Practice: Proceedings of the Thirteenth Annual ACR Forum.** *Journal of the American College of Radiology (JACR).* 2014; 11(1):20-23. doi: <http://dx.doi.org/10.1016/j.jacr.2013.08.017> [PubMed Citation](#)

Litmanovich DE, Hartwick K, Silva M, Bankier AA. **Multidetector Computed Tomographic Imaging in Chronic Obstructive Pulmonary Disease: Emphysema and Airways Assessment.** *Radiologic Clinics of North America.* 2014; 52 (1):137–154. doi: <http://dx.doi.org/10.1016/j.rcl.2013.09.002> [PubMed Citation](#)

Miller CG, Krasnow J, Schwartz LH, (eds). *Medical Imaging in Clinical Trials.* London: Springer-Verlag, 2014; 65-82. doi: [http://dx.doi.org/10.1007/978-1-84882-710-3\\_4](http://dx.doi.org/10.1007/978-1-84882-710-3_4)

Moyer BR, Cheruvu NPS, Hu T, Eds. **Chapter 13: Regulatory Considerations Involved in Imaging.** In: *Pharmaco-Imaging in Drug and Biologics Development. Fundamentals and Applications Series: AAPS Advances in the Pharmaceutical Sciences Series.* Vol. 8. New York, NY: AAPS Press, Springer, 2014: 355-390. ISBN 978-1-4614-8247-5 | doi: 10.1007/978-1-4614-8247-5\_13. [Link to publisher's landing page](#)

Onxley JD, Yoo DS, Muradyan N, McFall JR, Brizel DM, Craciunescu OI. **Comprehensive Population-Averaged Arterial Input Function for Dynamic Contrast-Enhanced vMagnetic Resonance Imaging of Head and Neck Cancer.** *International Journal of Radiation Oncology\*Biophysics\*Physics.* July 2014; 89(3): 658–665. doi: 10.1016/j.ijrobp.2014.03.006. [PubMed Citation](#)

Rosenthal MH, Kim KW, Fuchs CS, Meyerhardt JA, Ramaiya NH. **Relationships between KRAS mutation status and baseline radiographic distribution of disease in patients with stage IV colorectal cancer.** *Abdominal Imaging.* June 7, 2014. [Epub ahead of print] doi: 10.1007/s00261-014-0165-2 [PubMed Citation](#)

## 2013

Andriantsimiavona R, Grimm S, Hatzakis H. **Harnessing the Global Brain in Medical Imaging: 3DnetMedical, Network-Centric Innovation in the Cloud—Our Experience.** The Authors and Future Technology Press 2013; In Impact: *The Journal of Innovation Impact.* 13-009:5(1):96–103. [Public Access article link](#)

Aronhime S, Calcagno C, Jajamovich GH, et al. **DCE-MRI of the Liver: Effect of Linear and Nonlinear Conversions on Hepatic Perfusion Quantification and Reproducibility.** *J Magn Reson Imaging.* 2013: 1522-2586. doi: 10.1002/jmri.24341. [Link to journal landing page](#)

Buckler AJ, Paik D, Ouellette M, Danagoulian J, et al. **A Novel Knowledge Representation Framework for the Statistical Validation of Quantitative Imaging Biomarkers.** *J Digit Imaging.* 2013; 26:614–629. doi: 10.1007/s10278-013-9598-3. [PubMed Citation](#)

Buckler AJ, Ouellette M, Danagoulian J, et al. **Quantitative Imaging Biomarker Ontology (QIBO) for Knowledge Representation of Biomedical Imaging Biomarkers.** *J Digit Imaging.* 2013; 26:630–641. doi: 10.1007/s10278-013-9599-2. [PubMed Citation](#)

Coxson HO. **Sources of Variation in Quantitative Computed Tomography of the Lung.** *J Thorac Imaging.* Sept 2013; 28(5):272-9. doi: 10.1097/RTI.0b013e31829efbe9. [PubMed Citation](#)

Curran BH, Starkschall G, Siochi RAC, eds. *Informatics in Radiation Oncology.* Series: *Imaging in Medical Diagnosis and Therapy*; Florida: CRC Press, 2013; 329 pages.

Gómez-Cenzano P, Pino-Sorroche F. **Standardization and Quantification in FDG-PET/CT Imaging for Staging and Restaging of Malignant Disease.** *PET Clinics.* [Available online 4 December 2013, ISSN 1556-8598]. doi: <http://dx.doi.org/10.1016/j.cpet.2013.10.003>. [Link to Science Direct](#)

Heye T, Boll DT, Reiner CS, Bashir MR, Dale BM and Merkle EM. **Impact of Precontrast T10 Relaxation Times on Dynamic Contrast-enhanced MRI Pharmacokinetic Parameters: T10 Mapping Versus a Fixed T10 Reference Value.** *J Magn Reson Imaging*. Oct 29, 2013. doi: 10.1002/jmri.24262. [Link to journal landing page](#)

Jain R. **Measurements of Tumor Vascular Leakiness Using DCE in Brain Tumors: Clinical Applications.** *NMR in Biomedicine*. 2013; 26(8): 1042–1049. doi: 10.1002/nbm.2994. [PubMed Citation](#)

Kim N, Choi J, Yi J, et al. **An Engineering View on Megatrends in Radiology: Digitization to Quantitative Tools of Medicine.** *Korean J Radiol*. Mar-Apr 2013; 14(2):139-153. doi: <http://dx.doi.org/10.3348/kjr.2013.14.2.139>  
[PubMed Citation](#)

Kurland BF, Doot RK, Linden HM, Mankoff DA, Kinahan PE. **Multicenter Trials Using 18F-Fluorodeoxyglucose (FDG) PET to Predict Chemotherapy Response: Effects of Differential Measurement Error and Bias on Power Calculations for Unselected and Enrichment Designs.** *Clin Trials*. Oct 29, 2013; 10(5). doi: 10.1177/1740774513506618. [Epub ahead of print] [PubMed Citation](#)

Ortuño JE, Ledesma-Carbayo MJ, Simões RV, et al. **DCE@urLAB: a Dynamic Contrast-enhanced MRI Pharmacokinetic Analysis Tool for Preclinical Data.** *BMC Bioinformatics*. 2013; 14:316. doi: 10.1186/1471-2105-14-316. [Public Access article link](#); [PubMed Citation](#)

Petrella, JR. **Neuroimaging and the Search for a Cure for Alzheimer Disease.** *Radiology*. 2013; (269)3:671-691. doi: <http://dx.doi.org/10.1148/radiol.13122503>. [PubMed Citation](#)

## 2012

Taylor, Jonathan. **Meeting Report: Radiological Society of North America (RSNA) Annual Meeting 2012.** *SCOPE: Institute of Physics and Engineering in Medicine*. June 2013; 22(2): 42-44. [Public Access article link](#)

## 2011

Wang YXJ, Ng CK. **The Impact of Quantitative Imaging in Medicine and Surgery: Charting our Course for the Future.** *Quant Imaging Med Surg*. 2011; 1:1-3. doi: 10.3978/j.issn.2223-4292.2011.09.01 [PubMed citation](#)

## 2009

Mulshine JL, Jablons DM. **Volume CT for Diagnosis of Nodules Found in Lung-Cancer Screening.** *N Engl J Med*. Dec 3, 2009; 361(23): 2281-2. [PubMed Citation](#)

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