Japan-QIBA: Overview and Current Status

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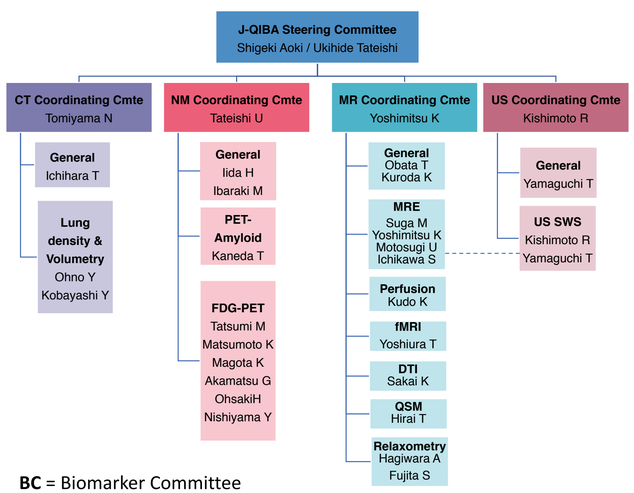
JAPAN RADIOLOGICAL SOCIETY

Quantitative Imaging Biomarkers Alliance RSNA

Organizational Structure

- Japan-QIBA (J-QIBA) was organized by Japan Radiological Society (JRS) in 2015. The motive of J-QIBA establishment is based on the enthusiastic activity of RSNA QIBA.
- The activity of J-QIBA is mainly supported by JRS and Japanese Society of Magnetic Resonance in Medicine.



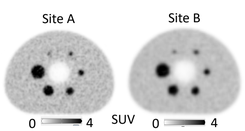
BC = Biomarker Committee

Past Activity Highlights of J-QIBA

- J-QIBA homepage opened in Oct 2018
  - Introduction of J-QIBA activities
  - Japanese translation of RSNA-QIBA Profiles
- Comparative table between RSNA-QIBA FDG PET/CT Profile and guideline of J-PEQi
- Active participation of SPECT public comment regarding the QIBA Profile for the DaT-SPECT Profile in cooperation with Japanese Society of Nuclear Medicine (JSNM).
- Interaction with RSNA-QIBA, including participation in QIBA Annual Meeting.

Nuclear Medicine BC

- Standardization of FDG-PET/CT for Response Evaluation by RSNA-QIBA Profile: Preliminary Results of a Multicenter Study
- Twelve facilities in Asia (South Korea, Taiwan and Hong Kong) were enrolled in this trial, and standardization was carried out.
- For evaluation of the scanner, we performed the following three measurements as described in the profile:
  (1) standardized uptake value (SUV) measurements
  (2) resolution measurements
  (3) noise measurements



Phantom image. The left image was reconstructed in Site A (COV 11.9%), and the right was in Site B (COV 5.2%).

Site	SUV measurements		Resolution measurements	Noise measurements
	mean	SD		COV (%)
A	1.0	0.1	Yes	11.9%
B	1.0	0.1	Yes	5.2%
C	0.9	0.1	Yes	6.1%
D	1.0	0.1	Yes	7.7%
E	1.1	0.1	Yes	7.1%
F	1.1	0.1	Yes	11.7%
G	0.9	0.1	Yes	8.3%
H	1.1	0.1	Yes	8.6%
I	1.0	0.1	Yes	7.9%
J	1.1	0.1	Yes	8.7%
K	1.0	0.1	Yes	9.7%
L	1.0	0.1	Yes	10.4%

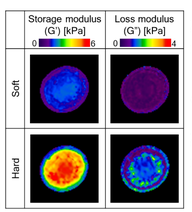
CT Lung Density & Volumetry BC

- As CT volumetry biomarker commitee issue, we applied our CADv software to RSNA QIBA 3A Public Challenge and publish the following paper with RSNA QIBA: Athelogou M, et al. Acad Radiol. 2016; 23(8): 940-52.
- After the above-mentioned Public Challenge, we tested the influence of radiation dose reduction and reconstruction algorithm to CADv and published the following paper: Ohno Y, et al. .Eur J Radiol. 2016; 85(8): 1375-82
- As CT lung density committee issue, we performed QIBA phantom study and tested the influence of scan method, radiation dose and reconstruction and published the results as follows: Ohno Y, et al. Jpn J Radiol. 2019; 37(5):399-411.
- Based on the above-mentioned study results, we published a review article as follows: Ohno Y, et al. Eur J Radiol. 2019; 111: 93-103.

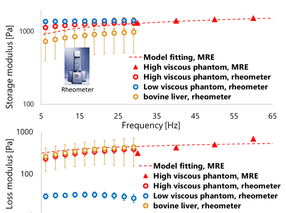
MR Elastography BC

- For characterization and quality assurance of the MRE system, tissue-mimicking viscoelastic gel phantoms were developed.
- The storage and loss modulus of the phantom
  Less than 3% change:
  - for 2 years
  - by changing temperature from 19 to 30 degree

Tissue-mimicking viscoelastic phantom (Polyacrylamide gel)



Storage and loss modulus maps of the MRE phantoms with different viscoelasticity

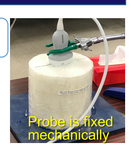


Frequency characteristics of the phantom and in-vitro tissue

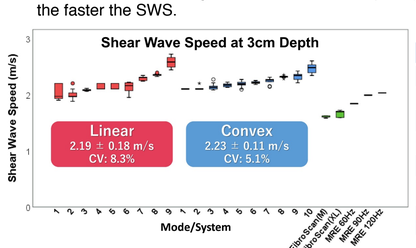
US Shear Wave Speed BC

Collaboration study with the MR elastography BC and the SWE standardization Subcommittee of US Equipment and Safety Committee, The Japan Society of Ultrasonics in Medicine

- Measured shear wave speed (SWS) of a visco-elastic phantom with linear probe (9 modes) or convex probe (10 modes) of 6 shear wave elastography (SWE) systems, and compared the results with the SWS obtained from transient elastography (TE) and MR elastography (MRE).
- In comparison of the SWE, TE and MRE measurements, it was found that the higher the shear wave frequency, the faster the SWS.



System	Shear Wave Frequency
SWE	100~500 Hz
TE	40~50 Hz
MRE	60~120 Hz

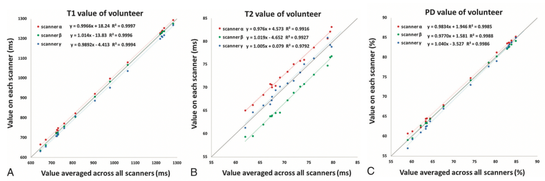


Vendor / System (alphabetical order)
Canon Medical Systems/Aprio i800
GE Healthcare Japan/LOGIC E10
Hitachi /ARIETTA 850
Konica Minolta/Aixplorer
Phillips Japan/EPIQ Elite
Siemens Healthineers / ACUSON Sequoia
[Transient Elastography] Integral Corporation/FibroScan

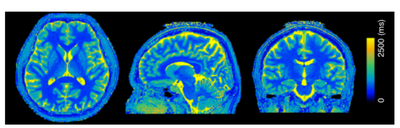
Note: Results are sorted in ascending order of the median.

MR Relaxometry BC

- In collaboration with SyntheticMR (Linköping, Sweden) to standardize the quantitative values acquired by synthetic MRI.
- High accuracy, repeatability, and reproducibility were achieved on 3 scanners from 3 different vendors [*Hagiwara et al. Investigative Radiology. 2019*].



- High repeatability in 3D acquisition on one scanner [*Fujita et al. MRI. 2019*].



Representative example of three-dimensional T1 maps of the brain. Intrasubject CVs of 0.5%, 0.5%, and 0.4% for the T1, T2, and PD values, respectively.

J-QIBA in the Japan Safe Radiology

- JRS is building a system of Japan Safe Radiology, which aims to increase the safety and efficacy of clinical radiology.
- Japan Medical Image Database (J-MID) was developed to accumulate multi-center data for this purpose, and J-QIBA is participating in J-MID to standardize the quality of data.