QIBA Multi-parametric Metrology TF Call
02 September 2020 at 10 AM CT
Call Summary

In attendance			RSNA
Nancy Obuchowski, PhD (Chair)	Timothy Hall, PhD	Daniel Sullivan, MD	Julie Lisiecki
Michael Boss, PhD	Charles Hatt, PhD	Ying Tang, PhD	
Andrew Buckler, MS	Erich Huang, PhD	John Vennemeyer, PhD	
Nandita deSouza, MD	Gene Pennello, PhD	Xiaofeng Wang, PhD	
Andrea Falkoff, MBA	David Raunig, PhD		

Moderator: Dr. Raunig

Approval of Call Summary

- The notes from August 17, 2020 were approved as presented

Use Case #1, Multi-dimensional descriptor: (Dr. Raunig) – Topics discussed included:

- There are 39 informative publications on multi-variate biomarkers
- Multi-variate biomarkers should be restricted to ratio variables
- Dr. Raunig is using Dr. Huang's paper as a template
- It was determined that there was no use for interval variables
- Use of negative to positive biomarkers may vary depending on the biomarker
- Water values must be considered
- For multi-variate normal distribution, there may be trouble with multi-component biomarkers
- Dr. Hall asked if phase sensitivity is distributed normally or if there is a bias?
  - Want to consider this within the context of a multi-parametric biomarker
- The paper is currently structured as a "menu" for validation of the biomarker and is geared toward a statistical audience
- Standardization of the distribution of predictors will help to explain variation, though specificity will be needed to demonstrate change
  - This will be referenced in the COV matrix that will examine QIB differences
- Candidate selection included discussion of an example used for prostate cancer
  - This is a good example because it incorporates multiple biomarkers in a multi-variate sense
  - It will include ultrasound and atherosclerosis, as well as simulation studies
- Validation and how it will be achieved was also discussed
  - Will multiple phantoms be used? One phantom cannot encompass all biomarkers
  - Will need to include clinical outcome to demonstrate linearity
- Increasing numbers of biomarkers correspond to an increasing monatomic response for the corresponding disease
- Ultrasound echo simulations frequently use digital phantoms to aid in assessing coherence; this is also used in MR-related studies for phase-sensitive detectors
- Digital phantoms are artificial datasets, which are often used in screening settings, such as mammography or low-dose CT lung cancer screening
- Generation of these artificial datasets are used to train algorithms
  - Dr. Hatt referenced Dr. Samei's simulated data, noting he may be a helpful resource
  - Among statisticians, it may not be well known that digitally manipulatable data is available
- Dr. Pennello mentioned a [virtual patient model](), which may prove helpful
- A table will be created to summarize statistics and distribution
- Clinical validity and a claim with a multivariate score may need more discussion

Next call: Dr. Delfino to present on Phenotype classification (Use case 2) on Monday, Sept 14th at 2 pm CT

Call Schedule: schedule has been adjusted

Date:	Topic:	Lead:
Monday, Sept 14 (2 pm CT)	Use case 3: Risk prediction	Dr. Huang
Wednesday, Oct 7 (10 am CT)	Use case 2: Phenotype classification	Dr. Delfino
Monday, Oct 19 (2 pm CT)	Use case 4: Radiomics	Dr. Wang
Wednesday, Nov 4 (10 am CT)	Use case 1: Multi-dimensional descriptor	Dr. Raunig

Use cases:

- **Use case 1**: (Multi-dimensional descriptor) a panel to determine how to care for a patient
- **Use case 2**: (Phenotype classification) rule or decision tool to diagnose phenotype
- **Use case 3**: (Risk prediction) several biomarkers will be evaluated to create a prediction or risk score
- **Use case 4**: (Radiomics) may not have a specific biomarker for reference