AIUM/QIBA
Ultrasound Volume Blood Flow Biomarker

MINUTES 2015-11-02

Previous Agenda:

Introductions
QIBA review - Voting
Committee invitations
Overview of original proposal
Discussion of experimentation using test objects

Attendance:

O. Kripfgans, B. Fowlkes, J. Rubin, M. Lockhart, J. Gao, J. Jago, D. Dubberstein, R. Tadross, T. Hall.

I. QIBA Website

Official website:
http://qibawiki.rsna.org/index.php?title=AIUM/QIBA_Ultrasound_Volume_Blood_Flow_Biomarker_Ctte

Subgroup of QIBA website:
http://qibawiki.rsna.org

Reference Materials section with original proposal to the QIBA steering committee

II. QIBA Voting Review

Process of operation; decision points; governance of QIBA committees; decision making through consensus where possible.
Rights to vote remain to committee members (and chairs) that participate in the current as well as the previous teleconference call. (A face-to-face meeting such as at RSNA equals a teleconference call).

III. QIBA Subcommittees

Evolution of the work in this committee may require the creation of respective subcommittees for work in specific areas that arise.
Timothy Hall and Paul Carson may join future calls to guide the process in this committee.

IV. Inclusiveness

Chairs sent general letter to list of the companies that might be interested in joining this process. The letter is shown in the Reference Materials section of the website.

This should be an open process for everyone to be able to participate who has technology that they think would be appropriate for volume flow; a quantitative volume flow assessor. Currently GE and Philips are participating.

V. Discussion of the Original Proposal to the QIBA Steering Committee

Two-stage process:
First, look at phantom test object design. Criteria: adequate test for in vivo volumetric flow, measurement process dependent, straight tubes are not adequate.

Second, in conjunction with clinical members, perform direct in vivo assessment of volume flow measurements in operating room under clinical conditions.

Timeline for milestones of the two-stage process:
3 years for 3 major activities: 1 year phantom design, 1 year phantom test, 1 year in vivo test. Deviations may allow for ½ year phantom design, 1-1½ year phantom testing at participating organizations, and 1 year in vivo testing.

VI. Discussion on Phantom Design

Purpose of activity: evaluate potential sources of error to obtain full understanding of potential sources of error other than acoustic environment like aberration, including tube size, tortuosity, stenosis, proximity between arterial and venous, depth of vessel. Might need more than one phantom to explore all various potential sources of error.

Discussion of relevance of stenosis, since it creates turbulence, which is expected *in vivo*. Need a priority list to narrow the number of parameters. Drive parameter selection by clinical target, here renal transplant.

Clinical observations: 5-8 mm for single renal arteries, 4-5 mm for two renal arteries, same size as hemodialysis access in forearm (4-5 mm). Hemodialysis access is venous, Renal transplants: up to 15% of patients have multiple renal arteries, most have single renal arteries. Using single renal artery patients will yield larger lumen size, though possibly measure flow on both renal arteries, then transplants with two renal arteries will be advantageous.

Big difference is: end-to-end of the internal iliac, straight shot flow to the transplant. When using external iliac, will require a 90° angle, will result in a very different flow dynamics and range of turbulence plus advanced atherosclerotic plaques in the common iliac artery (renal failure patients). There might be a stent in place to correct/compensate for the atherosclerotic plaques, though not always. If Doppler waveform shows parvus and tardus (or truly limiting inflow), then stent placement may occur but not when turbulence only. Variation in vivo will be from host body not from renal lumen of donated kidney. Might also include Carrel patch if from cadaver donor. Cadaver will show different flow then life donor.

Different ultrasound scanners need to be used, so far have GE and Philips devices, including different scan geometries.

Precision versus accuracy. Repetition must include (start from square one) repositioning. Phantom must allow for such. Hemodialysis clinic shows that repeated volume flow measurements show very high precision, though not when patient moves.

Consider the clinical use of ultrasound dilution technique (UDT) as a gold standard

reference (involves placement of catheter).

VII. Discussion on Measurement Process

Method of flow estimation is not limited to the process of Gaussian integration of c-plane (constant depth plane). Methods of measuring quantitative flow in for example millimeters per minute. Spectral Doppler approach is currently not the object of investigation. 3D vector Doppler is a possible technology.

VIII. Discussion on Simulations

Simulations may help in obtaining turbulence data. Such could be used in Field II.

IX. Other Discussions

Collaboration with AIUM is novel for QIBA
Joint professional organizations efforts may become more frequent

X. To Do List

a. Create list of phantom parameters as well as phantom design
b. Obtain clinical data on renal transplant lumen parameters
c. In vivo selection criteria: life donors and/or cadaver donors
d. Post minutes, invitation list, original proposal