**CEUS QIBA status and next steps**

Mike Averkiou 12/13/2016

Literature review:

Mendeley database (reference manager PDF organizer)

The database is underway and we will email URL’s to task force members to add references to this publicly accessible database. Assign individuals or pairs to review and summarize this literature in the targeted clinical applications of their interests for the state of the art in variance and bias in the measurement of physiological parameters such as vascular volume, tumor area, flow rate, presence of blood pooling or shunting or simply noting the “empirical” bolus parameters. Match these levels of uncertainty with minimum clinically significant changes and other clinically significant thresholds.

Grouping/areas/classification: in-vitro, in-vivo, clinical in-vivo, bolus models, clinical trials (per clinical area: liver, kidney, breast), administration method: bolus wash-in—washout, infusion destruction replenishment.

System requirements:

Dual display (requirement?) vs single display (contrast specific)

Linear signal cancellation (start with a black contrast image before bubbles arrive)

Adequate dynamic range to accommodate bubble signals (avoid signal saturation)

2 digit MI readout (will accept 1 if there are strong objections)

Parameter dependence on s/w release (ideally stable with no changes over time)

Quantification s/w requirements:

Linearize data (preference to use “native” data to avoid empiric linearization schemes from compressed or AVI files

Extract TIC in excel spreadsheet formal (or other simple tab-delimited format)

Curve fitting: there are multiple models and the committee should decide on one universal model to always use.

Respiratory gating and motion compensation

Output: quality of fit, bolus parameters in standard format

Phantom experiments:

What to measure: the first (basic) objective is to form time intensity curves from the single tube flow phantom (choice of tube diameter—frequency considerations) at a specific flow rate. Despite this being a far cry from tumor perfusion it is nevertheless a “standard” first milestone in order to establish that all systems, agents, labs, produce the same basic results when measuring the same parameters.

Time intensity curves (main parameters: RT, MTT, PI, AUC)

Establish range of I vs C linearity. This is important in order to confirm (a) the parameter range for a system where signal saturation is avoided and (b) find the range of microbubbles where acoustic shadowing is present (acoustic shadowing is a physical phenomenon and may not be corrected afterwards).

Confirm phantom measurements at 2 sites (UW, UT). At other sites, effort is to be supported by industry and/or other labs.

Clinical focus:

The clinical focus will be liver lesions (primary and metastatic). However, considering the expertise of the group in other areas we will move “in parallel” and consider other clinical areas as well (per investigator). An important topic for the clinical team to consider is to decide what physiological parameter they want to focus first. For example, vascular volume, tumor area, flow rate, or simply noting the “empirical” bolus parameters. Consideration should also be given to the 2D nature of the “current ultrasound” imaging equipment and start thinking about going 3D in the near future.

Action items:

Individual telcos with taskforce teams to initiate discussions of the above mentioned issues

Compilation of literature database

Compilation of imaging system requirements

Compilation of software requirements

Start phantom experiments at UW and UT Dallas

AIUM CEUS meeting (Saturday morning during same time of bioeffects meeting)