AbstractID: 13232 Title: Assessment of transducer artifacts using a novel, low cost ultrasound phantom

Purpose:
Ultrasound artifacts are often identified by scanning a uniform region of a rigid tissue-mimicking phantom while moving the transducer across the scan surface, and identifying any deviations from the expected smooth echotexture. Due to the rigid nature of commercial phantoms it is difficult to simultaneously couple the entire face of curved array transducers. We have proposed a novel low cost liquid phantom with a flexible scan surface. The purpose of this work is to demonstrate the proof of concept of this unique phantom.

Method and Materials:
The phantom consisted of a water/cornstarch solution enclosed in a thin latex balloon (thickness 0.24 mm). When shaken, the cornstarch provides a dynamic speckle pattern. Initial experiments were conducted to establish the basic effectiveness of this innovative phantom to demonstrate artifacts, to assess reproducibility of image acquisition, and inter-operator variability. The phantom was imaged using an Acuson Sequoia US scanner and 4 transducer models (9L4, 6C2, 4V1 and EC-10C5), and dynamic clips of the changing speckle field were recorded. Two transducers with independently-confirmed artifacts were also tested.

Results:
The flexible scanning surface allowed excellent acoustic coupling of the entire face of all transducer models with the phantom, including tightly curved arrays. Little manual transducer motion was required with the liquid phantom as a result of the dynamic speckle field. Artifacts due to inactive elements were detected, including a single crystal dropout. Using a defined scan protocol, reproducible clips exhibiting low inter- and intra-operator dependency were obtained by 5 operators with minimal training, for transducers with and without artifacts.

Conclusion:
Due to its ease of operation, low cost, and sensitivity, this phantom may be superior to current methods of detecting ultrasound artifacts, and has the potential to promote better acceptance and compliance of ultrasound quality control.

Conflict of Interest (only if applicable): N/A