

Document Title: Phantom Manufacturing and Testing Plan

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This phantom manufacturing protocol Caitlin Schneider's "Creation of Ultrasound and Elastography Phantoms."

Variation in Texture (Expected Deliverable)

The material to be used in the phantom production is plastisol. Plastisol is a suspension of PVC and other polymers in liquid plasticizer. It is used in textile printing as well as furniture coating. It is a liquid at room temperature and can be poured into a heated mold, such as when manufacturing worm bait. When heated above 180 deg Celsius, the plastic particles dissolve and turn into high viscosity gel. When then cooled to below 60 degree Celsius, it solidifies into a flexible, long-lasting, permanent plastic state. The texture of plastisol can be controlled by using hardener and softener.

For our phantom, the use of plastisol as the base material is a good choice, due to the ability to control texture, durability, and other material properties. There is also precedence in using this based on previous protocol.

Plastisol will be used in different ratios to softener and hardener to allow for variation in texture.

Ultrasound Compatibility (Maximum Deliverable)

To introduce ultrasound compatibility, microbeads of different densities can be used to introduce contrast in speckle as shown under ultrasound. Sigma Aldrich 75 micron acid-washed glass microbeads can be used at different concentrations to produce that effect. First, I will need to determine the relative difference between different concentrations of micro bead densities by weight. Then, I can add them to the phantom layers in order to create the desired effect under ultrasound.

Evaluation

To evaluate the effectiveness of the phantoms, an attending physician and medical student will perform maneuvers on the phantom. In addition, a needle will passed through the phantom and results will be observed. Additionally, ultrasound images will be taken and compared to state of the art to see if it is realistic or beneficial for locating the needle.

