

A Novel Breast Stabilization Device for MRI-Guided Interventions

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A breast stabilization device or breast cradle has been developed for use in interventional procedures. The device is a three-dimensional collapsible linkage that, when actuated, lightly compresses the breast while pulling it away from the chest wall. The compression provides the pressure needed to hold the breast firm during needle biopsy, ablation, or other procedures while being more comfortable than bilateral compression plates. By collapsing radially in an open configuration, the cradle provides nearly full access to the breast, as compared to the restrictive two-dimensional layout of grid-based bilateral compression plates. By pulling the breast away from the chest wall, the breast cradle may

reduce the incidence of lung puncture or other medical errors. Several iterations of the device were developed, including rigid-joint models and a compliant-joint model. The rigid models more precisely show the kinematics of the device, but the manufacturability and assembly of the joints may be tedious in a production environment. Conversely, the compliant model may be more easily mass-produced, although the design would be more complex and costly. To provide a proof-of-concept for the compliant-joint design, a rapid prototyping machine was used to quickly produce several models that could be produced by other means (i.e. vacuum forming or injection molding) in full production. These models will be tested with breast phantoms in a magnetic resonance imaging (MRI) environment to ensure compatibility. Other tests will be performed to ensure patient comfort amongst various breast sizes and shapes.