

# Product Design Specifications

## *Transportable Table for subject Transfer between MRI and X-ray*

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**Client:** Dr. Wally Block PhD (Medical Physics/Biomedical Engineering Departments)  
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### Problem Statement

Liver cancer treatment can often involve higher, more targeted doses of chemotherapy if delivered directly to the liver. Professor Block's lab is integrating capabilities to guide cancer treatment to the liver using magnetic resonance imaging. Current x-ray treatments significantly over treat the patient's liver because radiologists and other clinicians cannot visualize the tumor. The MRI group is in need of a transportable table that can be used to transfer both an MRI coil and porcine test subject between the MRI scanner and the X-ray machine, without altering their position. This will allow the group to verify catheter placement under MRI guidance using the X-ray technology.

### Client Requirements

The prototype must be designed to meet the following requirements set forth by the client:

- The table must conform to both the MRI couch and the X-ray table
- The table must include handles
- The table material must have an x-ray attenuation coefficient less than that of PVC
- The table must be capable of being carried by two people (weight is not a limiting factor, but should be considered in design)
- The table must be no thicker than 5/8" to prevent distortion of the X-ray images
- The table must hold the coil securely such that it does not move during transport (Coil a 14" outer diameter by 2 ft. long PVC tube with 1/2" wall thickness)
- The table must be capable of supporting a 60 kg. porcine subject (all subjects will be less than 60 kg.)

### Design Requirements

Physical and Operational Characteristics

- a. Performance requirements: The table must securely hold the MRI coil and test subject while they are transferred from the MRI scanner to the X-ray machine. The table must be constructed in a way that ensures that neither the coil or subject move during transfer.
- b. Safety requirements: The device should be constructed with no sharp edges and appropriately sized handles to eliminate the risk of cuts or pinched fingers. The material chosen must be sturdy enough to adequately support the weight of the subject without breaking causing harm to those transporting.
- c. Accuracy and reliability: The device should effectively eliminate movement of both the test subject and MRI coil during transfer
- d. Life in service: If properly used, the materials used to create this table should not be compromised and it should not have a limited life in service.
- e. Shelf Life: This design does not have a limited shelf life. It will be stored in the phantom laboratory in the Wisconsin Institute of Medical Research.
- f. Operating Environment: The table will be used in the University of Wisconsin – Madison XMR suite.
- g. Ergonomic considerations: The table must be designed such that it is capable of being transported by two individuals. The handles must be designed according to anthropometric measurements of the hand to accommodate all hand sizes up to the 95<sup>th</sup> percentile male.

- h. Size: The table will be designed to fit on the MRI couch and within the MRI scanner. The width of the couch and the size of the bore will be the limiting size constraints. The thickness of the table is limited to 5/8" to permit X-ray imaging. The table will be designed to match the length of the largest usable subject.