

## ***Project: A phantom for use in an MR imager***

**Team Members:** Missy Haehn - Leader  
Can Pi – BSAC  
Ben Sprague – Communications  
Andrea Zelisko– BWIG

**Client:** Victor Haughton, M.D.  
UW Dept. of Radiology  
3252 Clinical Science Center-E3  
Phone: 263-5306  
email: [vmhaughton@facstaff.wisc.edu](mailto:vmhaughton@facstaff.wisc.edu)

**Date:** 11/18/05 – 12/01/05

**Problem Statement:** Design a phantom for use in an MR imager to calibrate T2 relaxation value to water concentration in a gel over a range of 70 - 90%.

**Restatement of Team Goals:** The phantom is meant to assess the accuracy of an MR scanner. Measurements made with the phantom will help assess which variables affect the accuracy of the MR scanner, such as the distance between the spinal coil and the patient's spine, the size of the patient, and the sensitivity of the MR scanner to very similar doped water solutions. The phantom will hold artificial samples which are comparable to that of lumbar intervertebral disk tissue in order to compare known disk composition (% water) to experimentally found T2 values.

The initial prototype from spring of 2005 needed the following improvements: a new container without the sloping sides (image artifact), possibly new material for container to replace HDPE (less material interface artifact), more testing of doped water samples (more exact T2 values), a new way to compose the intervertebral disk samples (hydrogels or alginates?). Also, the placement of the samples within the phantom needs to be closer together such that the magnetic field the samples are in is constant.

### **Last week's goals:**

- Continue working on the poster
- Additional testing of gelatin and acrylimide samples in MR
- Building of prototype
- Make the GAG hydrogels
- Test the GAG hydrogels

### **Summary of last week's accomplishments:**

- Finished design poster for presentation
- Tested gelatin and acrylimide samples in MR
- Built phantom prototype

**This week's goals:**

- A successful final presentation
- Write final design paper
- Peer, client, advisor evaluations
- Continue working on design-hydrogels, fabrication
- Name the phantom

**Difficulties:** none.

**Rough Project Schedule:**

9/09/05: Meet with Client

9/16/05: First draft of PDS to advisor and client

9/02/05 - 09/16/05: Research new materials for phantom

- Contact Standard Imaging company
- Contact other MR materials company
- Test plastic samples from these companies

9/09/05 - 09/30/05: Research hydrogels disk samples

9/30/05: Hydrogel testing in MR scanner

10/14/05: Midsemester design presentation

10/1/05-12/02/05: Construct and test phantom and disk samples

- Order supplies needed for samples (GAGs, vials)
- Purchase the prototype container of a new shape and material
- Make up disk (hydrogels) and doped water samples
- Test doped water samples with relaxometer (with Ernie Madsen)
- Combine samples and phantom container
- Prototype manufacturing (by 11/23/05)
- Test prototype phantom

12/02/05: Final poster presentations

12/09/05: Final report and notebooks due to advisor

12/14/05: Final meeting with advisor

**Activities:****Week to date:**

- Missy – progress report, group meeting, fabrication company research and communication, putting poster together, writing poster part, notebook updates: 10 hours
- Can – class meetings, updating notebook, meeting with John and MR data analysis, BSAC, writing poster part, printing poster: 12 hours
- Ben – Building prototype, writing poster text, notebook update, company and UW ME Shop contacts for construction, presentation preparation, group meetings: 23 hrs
- Andrea –website updates, class meetings, notebook updates, putting poster together, writing poster part: 9 hours

**Running Total (as of 12/01/05):**

- Missy – 57 hr
- Can – 52.5 hr
- Ben– 88 hr
- Andrea – 55 hr