

Project: A phantom for use in an MR imager

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Client: Victor Haughton, M.D.
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Date: 10/28/05 – 11/03/05

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:

- Set up testing time in MR scanner for the acrylimide and gelatin samples (ten total)
- Meet with John Perry to review phantom design
- Contact Maritza Hobson regarding testing of the Gd doped water samples
- Order additional glass vials
- Determine if making alginate and agarose hydrogels is feasible
- Begin contacting companies to receive price quotes for phantom construction

Summary of last week's accomplishments:

- Revised design drawings and specifications

- Modeled designed with AutoCAD
- Met with client to review design
- Compiled list of possible manufacturing companies to contact
- Additional vials ordered
- Researched alginate and agarose hydrogels
- Set up time with relaxometer

This week's goals:

- Call manufacturing companies and request quotes
- Select manufacturing company
- Acquire MR scan data from the acrylimide and gelatin hydrogels
- Acquire copy of Matlab program from John Perry
- Analyze MR data
- Research and order GAG
- Make alginate and agarose hydrogels

Difficulties: none right now.

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, client meeting, phantom design revision meetings, company research, project timeline, notebook updates: 7 hours
- Can – client meeting, updating notebook, BSAC, alginate preparation, researching hydrogels: 5.5 hours

- Ben – client meeting, communication with client and researchers, phantom design revision meetings, AutoCAD modeling of design, notebook updates: 7 hours
- Andrea –website updates, client meetings, notebook updates: 2 hours

Running Total (as of 11/03/05):

- Missy – 35.5 hr
- Can – 32.5 hr
- Ben– 44 hr
- Andrea – 35 hr