Progress Report 12

Date: 17 November to 1 December, 2005

Project: Bioactive Interference Screw

Client: William Murphy, Ph. D

Members: Katherine Davis (BSAC)
          Aaron Huser (BWIG)
          Cole Kreofsky (BSAC)
          Dana Nadler (Communicator)
          Joe Poblocki (Team Leader)

Problem Statement:
Currently, during an ACL reconstructive surgery, titanium or partially degradable interference screws are used to secure the graft within the femur and tibia. These screws or parts of these screws will remain in the patient’s knee for the rest of his or her life and can cause problems. The current screws are also not conducive for tissue re-growth. It is, therefore, our client’s desire to develop a biphasic interference screw for ACL reconstruction that will promote and foster the growth of surrounding bone tissue, as well as limit any potential problems a patient may incur due to these screws in his or her body.

Summary of Accomplishments:
We are finishing the poster for the December 2nd presentation. We also fabricated and constructed two plugs and other necessary accessories out of hardware. These plugs were then tested in the lab for feasibility purposes concerning an actual RP mold. The results were promising. We constructed screws using a hot oil bath and got structurally sound polypropylene screws. We also began running compression tests, comparing full screws to ones with our cut outs in them to get an idea of what type of strength is being sacrificed in doing so.

Hours:

<table>
<thead>
<tr>
<th>Group</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Worked on poster presentation</td>
<td>7.0</td>
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<tr>
<td>Fabricated two steel plugs for testing</td>
<td>3.0</td>
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<td>Fabricated accessories for mold tests</td>
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<td>Screw fabrication</td>
<td>15.0</td>
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<td>Compression testing</td>
<td>2.5</td>
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<tr>
<td>Set up rapid prototyping for permanent mold</td>
<td>1.5</td>
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<td><strong>TOTAL:</strong></td>
<td><strong>66.5</strong></td>
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Goals for 12/1/05-12/8/05:
- finish paper
- turn in other deliverables
**Goals to be Accomplished Soon**
- receive permanent mold
- continue more in-depth mechanical testing; begin degradation testing
- begin scaling down screw to normal size for feasibility

<table>
<thead>
<tr>
<th>Task</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
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**March**
- Computer Model
- Bullet Mold Screw Synthesis
- Rapid Prototyping
- Metal Casting
- Modifications and Refinement

**April**
- Alginate Mineralization
- Polymer Ratio

**May**
- In Vitro Degradation
- Mineralized Alginate Properties
- Screw Mechanical Properties
- Interface Dynamics

**Continued Background Research**

**Mold Development**

**Materials of Screw**
- Alginate Mineralization
- Polymer Ratio

**Testing Materials & Prototype**
- In Vitro Degradation
- Mineralized Alginate Properties
- Screw Mechanical Properties
- Interface Dynamics

**Team Building**

**Meetings**
- Client (Formal or Informal)
- Advisor

**Deliverables**
- Progress Reports
- Midterm Presentation
- Final Poster Presentation
- Final Report

**Website Update**

**Problems:**
- things are currently running smoothly