Characterization of joint instability and cartilage changes in early knee OA

**Mentoring Committee**
- Prof. Dr.-Ing. Georg Duda, Director JWI, Charité
- Prof. Dr.-Ing. Marc Kraft, Humboldt University
- Dr.-Ing. William Taylor, JWI, Charité

**Field: Musculoskeletal Biomechanics**

**Heide Boeth**
- Engineering Track
- Project start January 2010

**Aims and Objectives**

**Early detection of knee OA**

- **Quantification knee joint stability**
  - Optical measurement system

- **Quantification cartilage volume**
  - 3D reconstruction from MRI data

- **Detection of collagen wear products**
  - Serum / urine samples

**Hypothesis:**

<table>
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<tr>
<th>Knee joint stability</th>
<th>young active</th>
<th>senior active</th>
<th>Cartilage volume</th>
<th>young active</th>
<th>senior active</th>
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**Preliminary Results**

**Schedule**

- **2010 Jan**
  - Literature search, Ethical approval, Investigating methods for measuring knee joint stability
  - April
  - Test measurements + data analysis
  - Subject recruitment
  - Sept
  - Proposal submission
  - Functional measurement protocol completed
  - 1st & 2nd subject cohort: MRT + serum / urine
  - 1st subject cohort: stability measurement
- **2011 Jan**
  - 2nd & 3rd subject cohort: stability measurement
  - 3rd subject cohort: MRT + serum / urine
- **Apr**
  - Data analysis, Algorithm development
- **2012 Sept**
  - Repeat all measurements
- **2013 Jan**
  - Data analysis of repeated measurements
  - Write up results. Get Ph.D.

**Materials & Methods**

- Vicon measurement system
- Calculation of knee joint axis (Ehrig et al. 2007) during a balancing task

**Perspectives**

1. **Development from baseline?**
   - Adaptation?
   - C1
   - C2
   - C3
   - stable
   - unstable

2. **Adaptation after 2 years?**
   - Is there a relevant increase in knee joint stability in young active athletes over the 2 years?
   - Are active seniors able to maintain joint stability?
   - Do young and elderly athletes loose cartilage at the same rate?

**Acknowledgements**

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