**Introduction & Rationale**

Traditional prosthetic evaluations are subjectively based on visual observation of gait and patient feedback. Alternatively, quantitative analysis in a gait laboratory can be expensive and time-consuming. However, instrumented prosthetic systems can enable the prosthetist to make objective assessments in a clinical setting by:

- Measuring, collecting and storing force and moment data within a weight-bearing prosthetic.
- Allowing measurement of forces and moments within a prosthetic when a patient ambulates across various terrains and conditions.
- Providing quantitative data that traditionally have only been available using a gait lab.
- Using the components with either transtibial and transfemoral prostheses.

Two examples of instrumented systems include:

- iPecs LAB (RTC Electronics, Inc.)
- Europa (Orthocare Innovations)

**iPecs LAB**

- Created and constructed by College Park Industries and currently licensed by RTC Electronics, Inc.
- Currently available only to researchers.
- Data collection module plugs into a computer via a USB port in which specific software is installed. Data are then downloadable into various spreadsheet programs for analysis.
- Measures 3 forces and 3 moments with 6 degrees of freedom.
- Transtibial Prosthesis: iPecs is placed between the prosthetic socket and foot.
- Transfemoral Prosthesis: iPecs may be placed between the prosthetic knee unit and foot, or between the prosthetic socket and knee unit.
- iPecs may be used alone or integrated with other data equipment.
- iPecs Pro is being developed for practitioners to use in a clinical setting.
- Cost for iPecs Lab is approximately $16,900.

**Europa**

- Developed by Orthocare Innovations (previously called the Compas and Smart Pyramid System).
- An outcome-based measurement tool for practitioners.
- Synchronizes with the Europa software via Bluetooth and references over 7 million gait-data samples to create a computerized average gait graph for the prosthetic user.
- Automatically monitors:
  - Body Weight
  - Vertical weight-bearing through the prosthetic
  - Sagittal and coronal-plane moments
  - Stance and swing time
  - Cadence
  - Center-of-pressure projection
- 4-6 steps are needed to determine alignment parameters.
- Cost for Europa System is approximately $2,300.
  (Billable as an integral component in a prosthetic device.)
- Weighs 134 grams. [http://orthocareinnovations.com](http://orthocareinnovations.com)

**References and Additional Reading**

5. Tyler Cook, Andrea Sherwood, Steven A. Gard, PhD (Faculty Mentor)
Northwestern University Prosthetics-Orthotics Center (NUPOC)