

# **Evaluation of Simulated Limb in Teaching Transtibial Prosthetics**



# THE SIM LIMBS

**15 were built with a replica internal plastic skeletal structure.**

- Femoral Condyles
- Tibia,
- Fibula Head
- Fibula Shaft
- Patella.
- Pseudo Patella Ligaments
- Pseudo Hamstrings
- Knee Flexion/Extension

Has tough, waterproof silicone foam soft tissues and a replaceable silicone outer skin



# THE SIM LIMBS

## Used in the Transtibial teaching program:-

- To teach palpation of skeletal and soft tissue structures
- To teach hand plaster casting techniques
- To teach ICECAST Anatomy plaster casting techniques



# THE SIM LIMBS

## Preliminary Results

To evaluate SIM LIMB use, 33 Student's first SIM LIMB casts were compared to prosthetic Expert's plaster casts.

After casts were digitised, linear and circumferential measurements were compared.

### Findings

#### Students

Student's casts had a mean 1.5% difference in length

Student's casts had <2% difference in circumference

#### Clinicians

Expert's casts had <1% difference in length

Expert's casts had < 2% difference in circumference

#### Student's casts compared to Clinician's casts

Student's casts were <1% different to Expert's casts in overall measurements.

### **SIMILAR STUDIES**

Saunders et.al. (2007) used 3 CAD CAM sockets & had manufacturing variability of  $\pm 1.1\%$

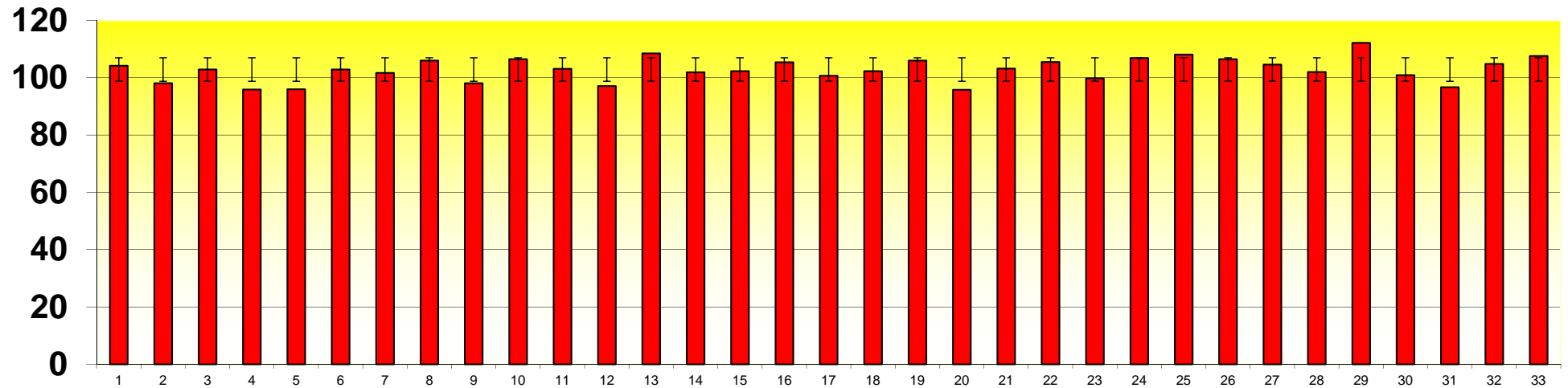
Garry et.al. (2008) used Tracer CAD and had an A/P variability of 107-113mm

Convery et.al. (2003) compared 2 clinicians cast modifications and found variability of > 2.0 mm

**Each of these studies used either CAD CAM generated or rigid plaster casts for their models**

# THE SIM LIMB DATA

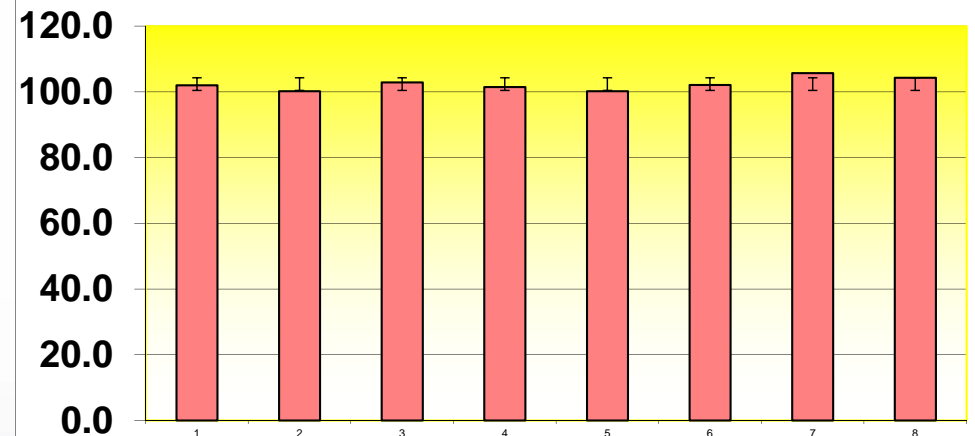
## Student's Mid Patella Tendon A/P



**Overall MEAN cast A/P differences between Students and Experts = 0.5%**

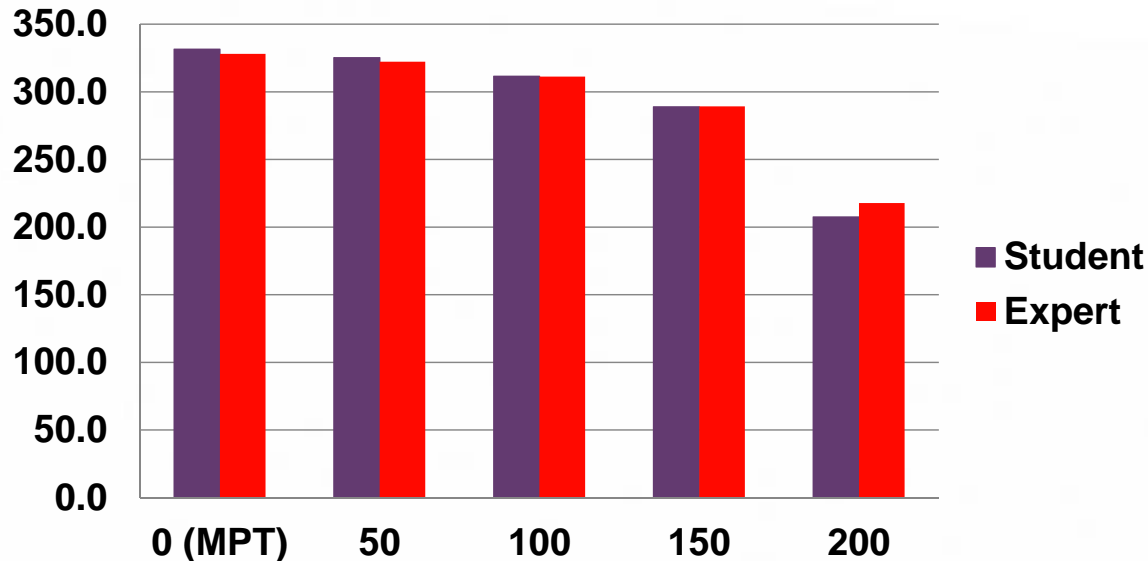
**Students 95-112mm ( $\pm$  8.5 mm) had greater variability than Experts 100-108mm ( $\pm$  4.0 mm).**

## Expert's MPT A/P



# THE SIM LIMB DATA

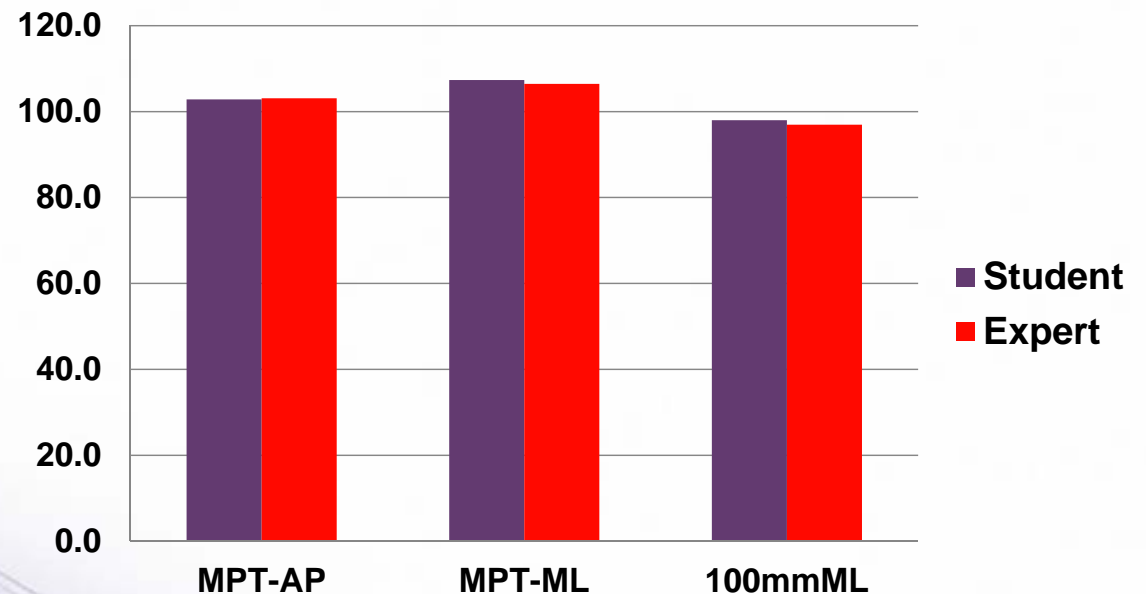
## Circumference Means



**Overall MEAN cast circumferential differences between Students and Experts was 0.31% and for Linear Means = 1%**

**Students MPT Circ 321-334mm ( $\pm$  6.5 mm) variability was greater than Experts 324-334mm ( $\pm$  5.0 mm).**

## Linear Measurement Means



## SIMULATED LIMB REFERENCES

Bokken, Lonneke et.al.(2010) *Instructiveness of Real Patients and Simulated Patients in Undergraduate Medical Education: A Randomized Experiment*. Academic Medicine,V. 85;1,148-154

Commercial Simulated Limbs:- <http://www.simulation.com/?gclid=CNzB66iBiqwCFSZNpgodbDoWnA>

Convery, P., Buis, A.W.P., Wilkie, R., Sockalingam , S., A. Blair, A. and McHugh, B. (2003) *Measurement of the consistency of patellar-tendon-bearing cast rectification*. P&O Int., 27, 207-213

Debra Nestel et.al. (2011) *Key challenges in simulated patient programs: An international comparative case study*. BMC Medical Education,**11**:69

McGarry,T. Mchugh, B. Buis, A. Mckay,G. (2008) Evaluation of the effect of shape on a contemporary CAD System. P&O Int. 32(2): 145 – 154

Saunders et.al. (2007) CAD/CAM transtibial prosthetic sockets from central fabrication facilities: How accurate are they? Journal of Rehabilitation Research & Development, Volume 44, Number 3, 395-406.

Scerbo MW, Schmidt EA, Bliss JP.(2006) *Comparison of a virtual reality simulator and simulated limbs for phlebotomy training*. [J Infus Nurs](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1888881/). Jul-Aug;29(4):214-24.

USA Simulated Limbs:- <http://limbsandthings.com/us/home/>

