Views from Exercise Physiology

Andrea Macaluso

Metabolic Physiology Suite

- Treadmill with adjustable slope and speed with BWU.
- Mechanically braked Cycle-ergometer.
- Iso-power Cycle-ergometer, with instrumented cranks.
- Breath by breath Metabolimeter with integrated ECG.
- Portable Telemetric Metabolimeter.
- Heart Rate Monitors.
- Lactate Analyzer

Neuromechanics Suite

- Isokinetic dynamometer.
- 16 channel electromyography system for linear arrays.
- 16 channel portable electromyography recording system.
- High voltage stimulator.
- 8-channel stimulator.

Walking Energy Cost (WEC)

Protocol

3 walking trials on an oval circuit (23 m)
at self-selected speeds:
comfortable, slow and fast
5 min each trial (5 min recovery)

Measures

Oxygen uptake
Speed

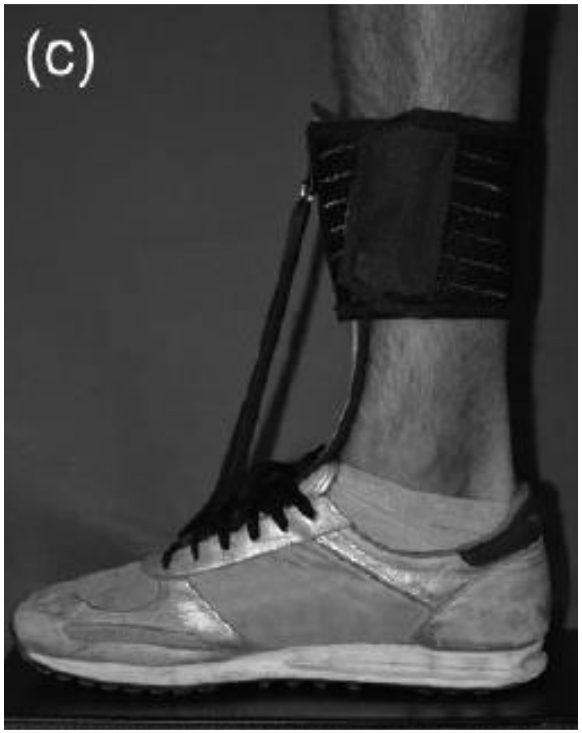
Walking Energy Cost (WEC)

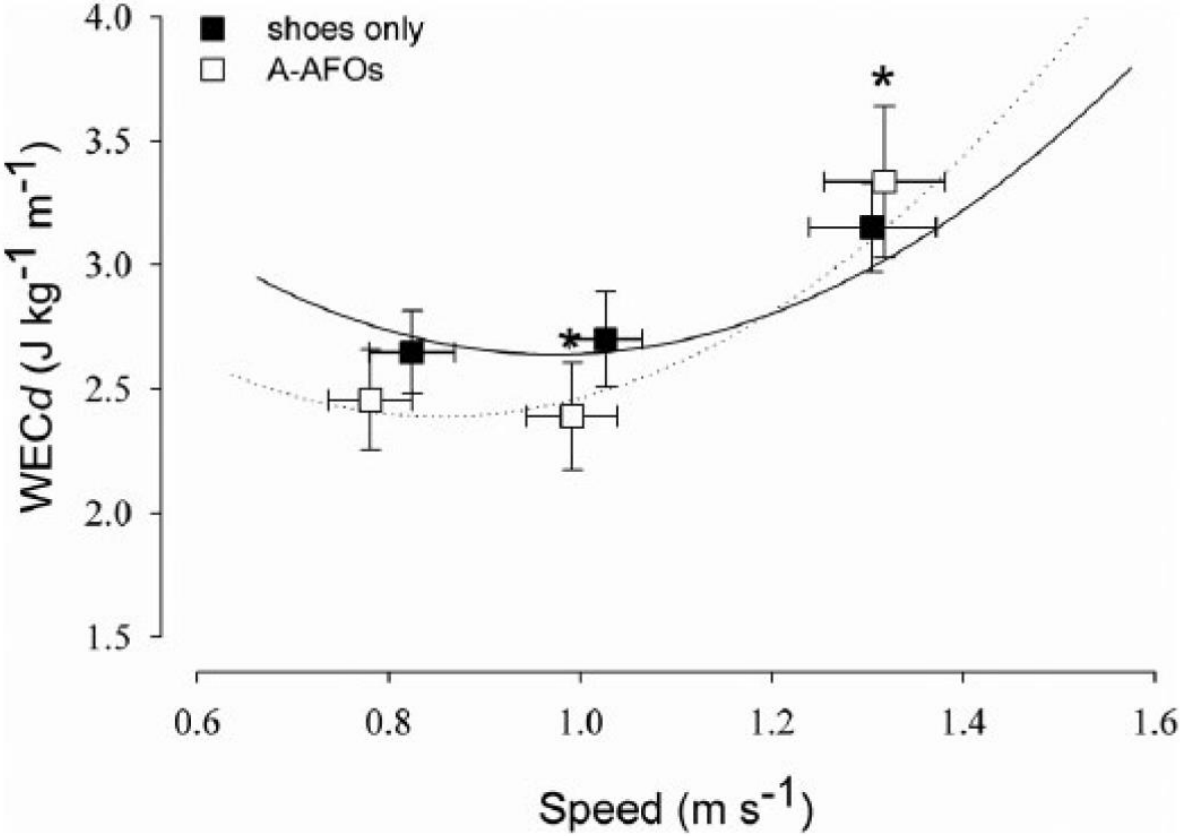
WEC per unit of time (WEC*t*). Amount of oxygen uptake per unit of body mass and per unit of time

WEC per unit of distance (WEC*d*). Amount of oxygen uptake per unit of body mass and per unit of distance, obtained by dividing WEC*t* by the walking speed

- WEC*t* relates to the level of physical effort during walking, whilst WEC*d* is an indicator of the economy of walking

An anterior ankle-foot orthosis improves walking economy in Charcot-Marie-Tooth type 1A patients



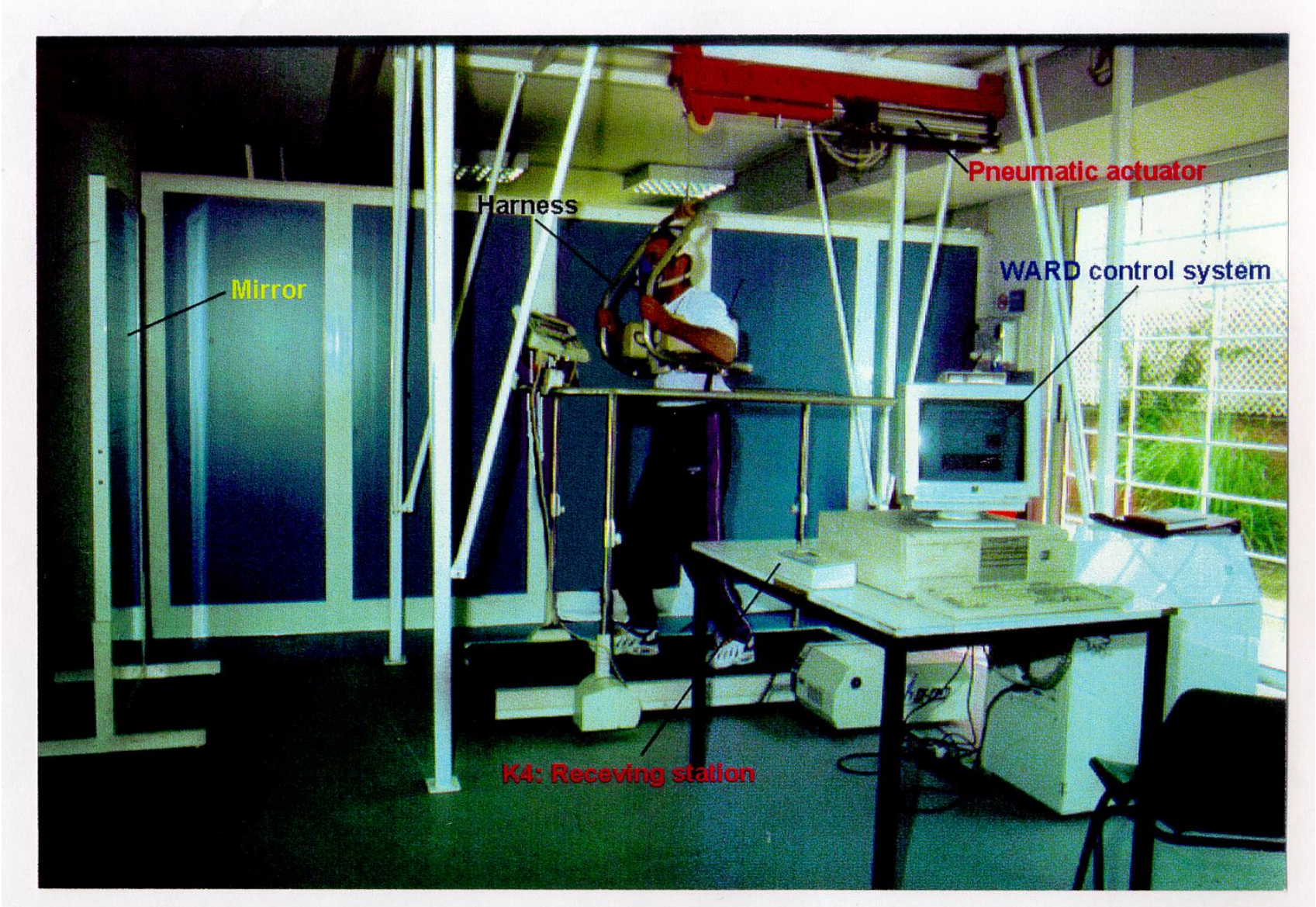


From Menotti et al. (2014) – Prosthet Orthot Int 38:387-92

If we had only measured walking speed, we would have not seen the effectiveness of the intervention.

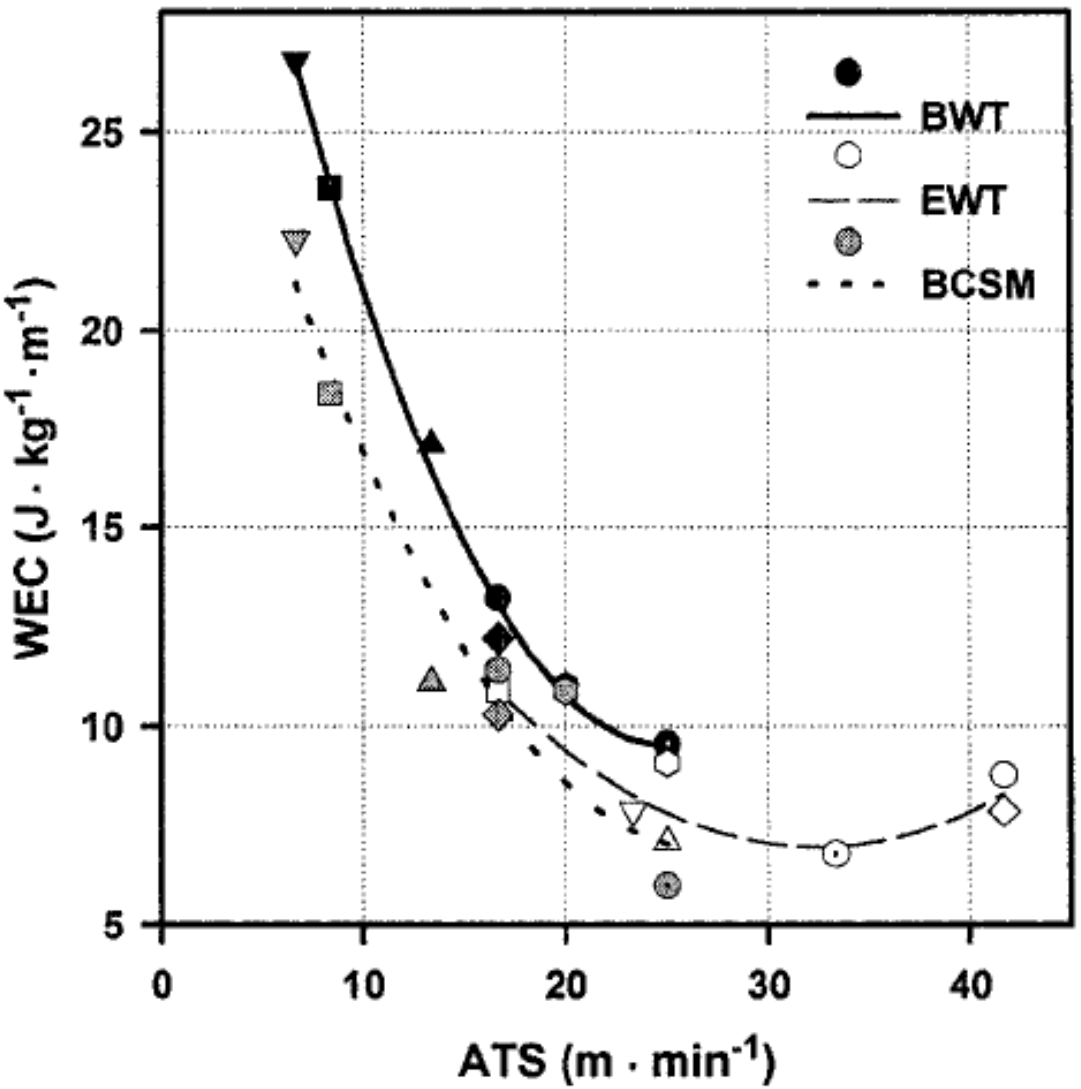
Most of clinical intervention studies do not use accurate assessment procedures such as the energy cost of walking.

Ambulation training with body weight unloading in neurological patients



From Gazzani, Bernardi, Macaluso et al. (1999) – Spinal Cord 37:336-44

Ambulation training with body weight unloading in neurological patients



From Gazzani, Bernardi, Macaluso et al. (1999) – Spinal Cord 37:336-44

Speed training with body weight unloading in healthy older women

From Thomas, De Vito and Macaluso (2007) – J Appl Physiol – 103:1598-1603

Hindawi Publishing Corporation
BioMed Research International
Volume 2015, Article ID 175719, 10 pages
http://dx.doi.org/10.1155/2015/175719

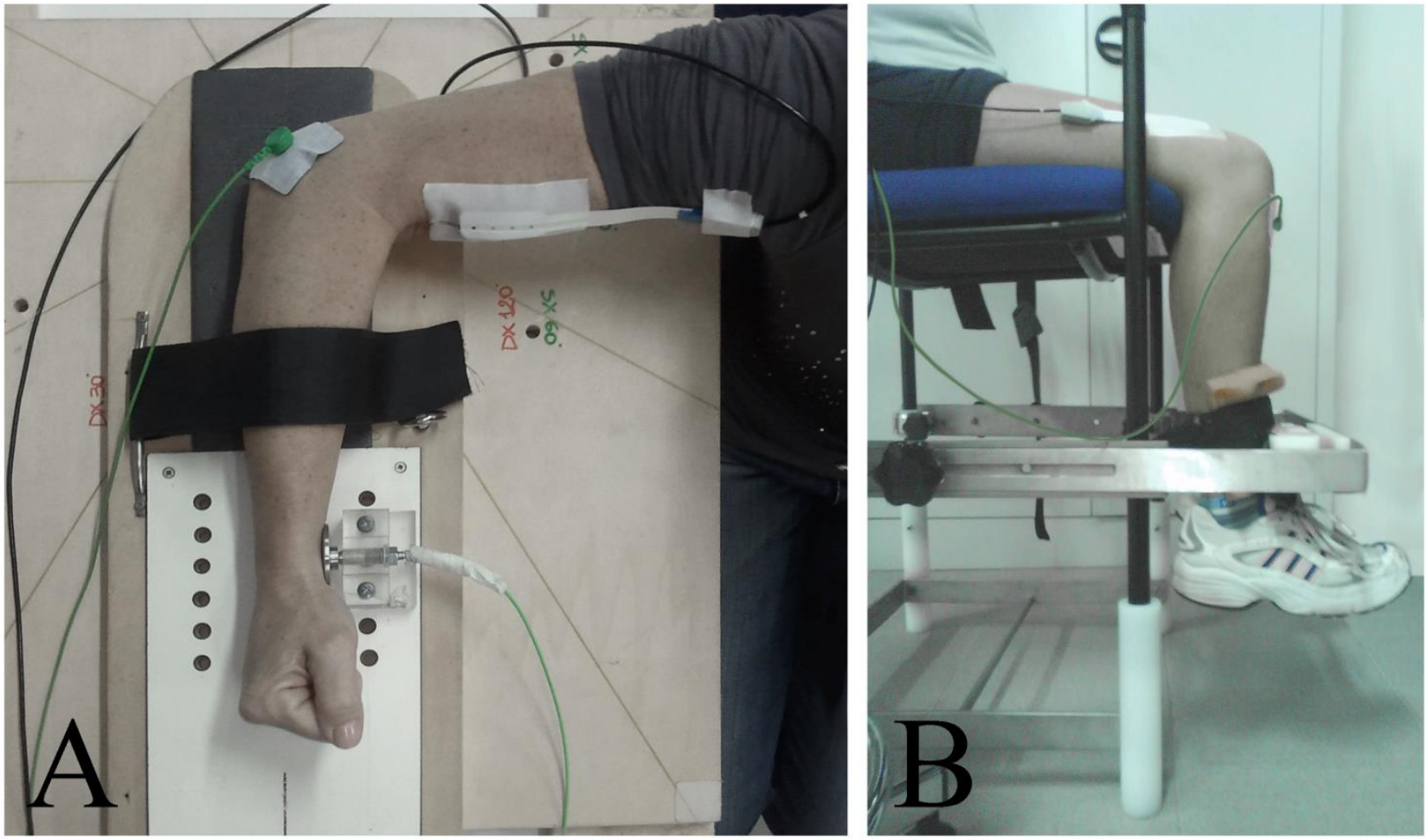
Research Article

The Effect of Body Weight Support Treadmill Training on Gait Recovery, Proximal Lower Limb Motor Pattern, and Balance in Patients with Subacute Stroke

Yu-Rong Mao,[1] Wai Leung Lo,[1] Qiang Lin,[1] Le Li,[1] Xiang Xiao,[1] Preeti Raghavan,[2] and Dong-Feng Huang[1]

[1]*Department of Rehabilitation Medicine, Guangdong Provincial Research Center for Rehabilitation Medicine and Translational Technology, The First Affiliated Hospital, Sun Yat-sen University, Guangzhou 510080, China*
[2]*Motor Recovery Research Laboratory, Department of Rehabilitation Medicine, RUSK Rehabilitation, New York, NY*

Main methods of strength assessment
ISOMETRIC DYNAMOMETRY



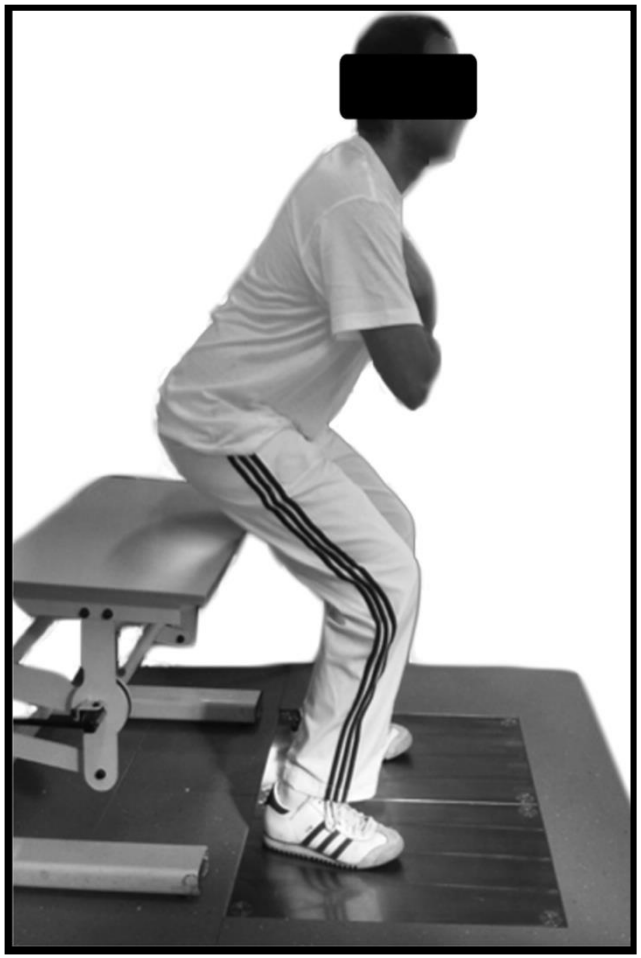
From Menotti et al. (2012) – Muscle Nerve 46:434-39

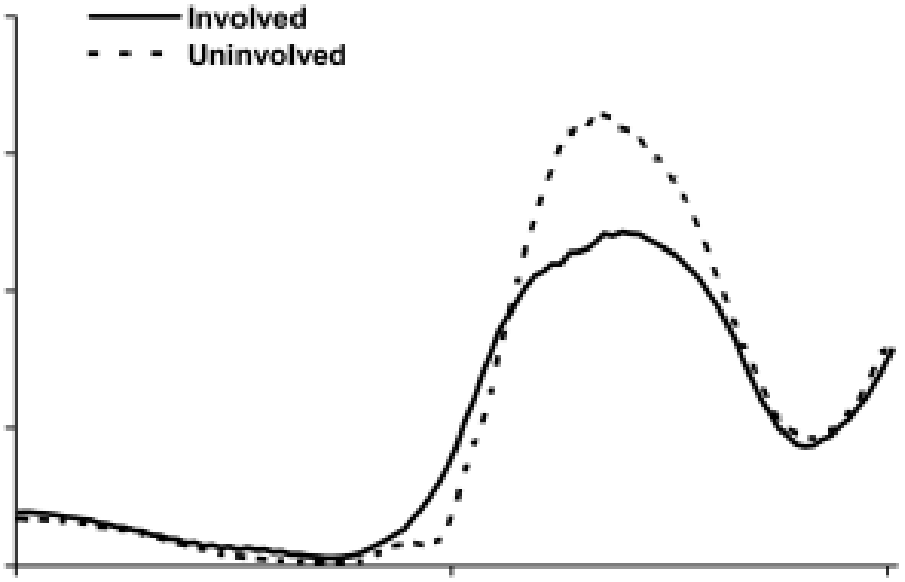
Main methods of power assessment
ISOINERTIAL DYNAMOMETRY

From Pigozzi, Giombini, Macaluso (2012) – Am J Rehab Med 91:458-60

Assessment of asymmetrical lower extremity loading

... patients unload the operated limb, and overload the healthy limb.





$$LSI = \frac{\text{Involved limb}}{\text{Uninvolved limb}} \times 100$$

Laudani et al. (2014) Am J Phys Med Rehabil 93:189-199

Training interventions
POWER TRAINING

Macaluso et al. (2003) – J Appl Physiol – 95: 2544–2553

ACRM
AMERICAN CONGRESS OF REHABILITATION MEDICINE

Archives of Physical Medicine and Rehabilitation

journal homepage: www.archives-pmr.org

Archives of Physical Medicine and Rehabilitation 2015;96:188-96

ORIGINAL ARTICLE

Functional Electrical Stimulation—Assisted Active Cycling—Therapeutic Effects in Patients With Hemiparesis From 7 Days to 6 Months After Stroke: A Randomized Controlled Pilot Study

Petra Bauer, MSc,[a,b] Carmen Krewer, PhD,[a] Stefan Golaszewski, MD,[b,c] Eberhard Koenig, MD,[a] Friedemann Müller, MD, MSc[a]

From [a]Schön Klinik Bad Aibling, Bad Aibling, Germany; [b]Paracelsus Medical University Salzburg, Salzburg, Austria; and [c]Christian Doppler Clinic, Department of Neurology and Neuroscience Institute, Paracelsus Medical University Salzburg, Salzburg, Austria.


ITALIA
IMS
VILLA STUART SPORT CLINIC
eclipse

The BASES Expert Statement on Fitness, Physical Activity and Exercise after Stroke

Produced on behalf of the British Association of Sport and Exercise Sciences by Dr David Saunders, Prof Frederike van Wijck, Bex Townley, Prof Dawn A Skelton, Dr Claire Fitzsimons and Prof Gillian Mead.

The Sport and Exercise Scientist ■ Issue 49 ■ Autumn 2016

- Do you believe that exercise scientists can play a crucial role in the translation from basic science to service delivery for stroke survivors (assessing key fitness parameters and designing exercise interventions)?