Päivittäinen toiminta lihasaktivisuudella arvioituna

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Definitions

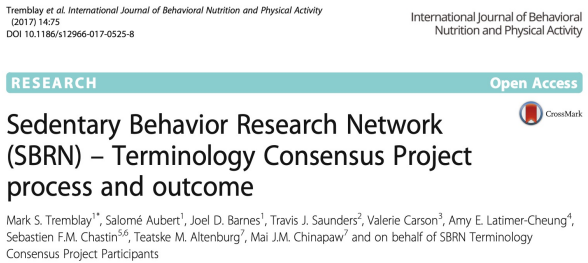
- **Physical activity** is defined as any bodily movement produced by skeletal muscles that results in energy expenditure.

https://www.ncbi.nlm.nih.gov › articles ▾ Käännä tämä sivu

Physical activity, exercise, and physical fitness - NCBI

kirjoittanut CJ Caspersen · 1985 · Viittausten määrä 12197 — **Physical activity** is defined as any bodily movement produced by skeletal muscles that results in energy expenditure. The…

- Sedentary behaviour is defined as “any waking behaviour characterized by an energy expenditure ≤1.5 metabolic equivalents (METs), while in a sitting, reclining or lying posture”



Tremblay *et al. International Journal of Behavioral Nutrition and Physical Activity* (2017) 14:75
DOI 10.1186/s12966-017-0525-8

International Journal of Behavioral Nutrition and Physical Activity

RESEARCH Open Access

Sedentary Behavior Research Network (SBRN) – Terminology Consensus Project process and outcome

Mark S. Tremblay[1*], Salomé Aubert[1], Joel D. Barnes[1], Travis J. Saunders[2], Valerie Carson[3], Amy E. Latimer-Cheung[4], Sebastien F.M. Chastin[5,6], Teatske M. Altenburg[7], Mai J.M. Chinapaw[7] and on behalf of SBRN Terminology Consensus Project Participants

EMG shorts

IOP Publishing — Physiological Measurement
Physiol. Meas. **28** (2007) 1405–1419 — doi:10.1088/0967-3334/28/11/007

Measurement of EMG activity with textile electrodes embedded into clothing

T Finni[1], M Hu[2,3], P Kettunen[1], T Vilavuo[1] and S Cheng[2]

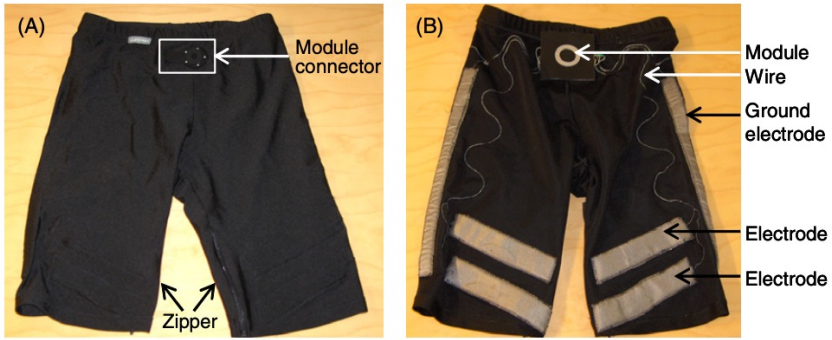
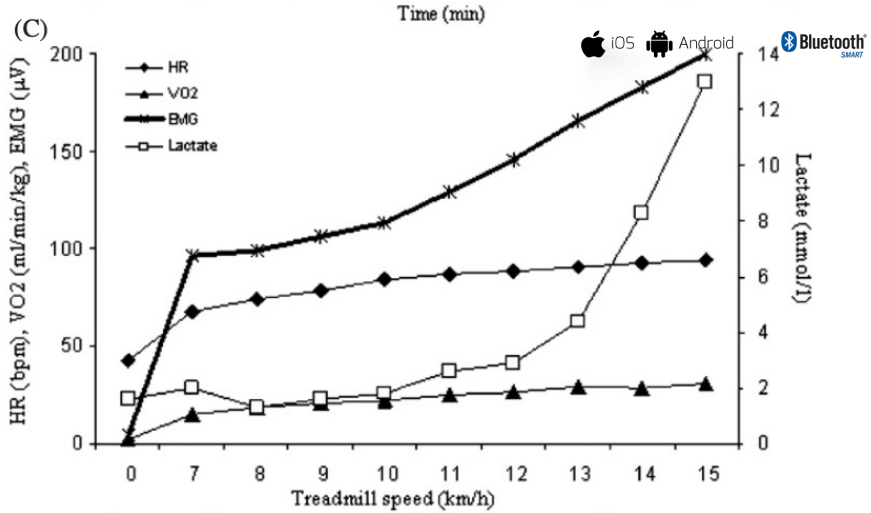


Figure 3. Picture of the shorts with embedded textile electrodes, wires and electronics module attachment point. The shorts viewed from front (A) and the front side viewed inside out (B).



- Provide similar or even better reproducibility than the bipolar surface electrodes with a CV between 5% and 17% (Finni et al. 2007)

Finni et al. 2007. Measurement of EMG activity with textile electrodes embedded into clothing. Physiol. Meas. 28 (2007) 1405–1419

XAMK

EMG, Heart Rate, and Accelerometer as Estimators of Energy Expenditure in Locomotion

OLLI TIKKANEN[1], SALME KÄRKKÄINEN[2], PIIA HAAKANA[1], MAURI KALLINEN[3], TEEMU PULLINEN[1], and TAIJA FINNI[1]

[1]Neuromuscular Research Center, Department of Biology of Physical Activity, University of Jyväskylä, Jyväskylä, FINLAND; [2]Department of Mathematics and Statistics, University of Jyväskylä, Jyväskylä, FINLAND; and [3]Department of Medical Rehabilitation, Oulu University Hospital, Oulu, FINLAND

methods in accordance with the individual correlations. **Conclusions**: It is shown for the first time that EMG shorts can be used for EE estimations across a wide range of physical activity intensities in a heterogeneous group. Across all loads, HR is a superior method of predicting EE, whereas ACC is most accurate for level loads at the population level. At low levels of physical activity in changing terrains, thigh muscle EMG provides more accurate EE estimations than those in ACC and HR if individual calibrations are performed. **Key Words:** TEXTILE ELECTRODES, EMG CLOTHING, ENERGY EXPENDITURE, PHYSICAL ACTIVITY, INACTIVITY, ACCELERATION

Individual calibration:

- Normalization to maximal voluntary contraction
- Individual-level prediction equations

Normalized EMG is a measure of effort relative to capacity

- Accelerometry does not measure physiological effort relative to capacity.
- We compared accelerometer-measured absolute intensity and EMG-measured relative muscle activity between people with low versus excellent aerobic fitness levels during their habitual walking.
- “Conclusions. People with low-average aerobic capacity habitually walk with a lower accelerometer-measured absolute intensity, but the physiological stimulus for lower extremity muscles is similar to those with excellent aerobic capacity. This should be considered when measuring and prescribing walking for health. “

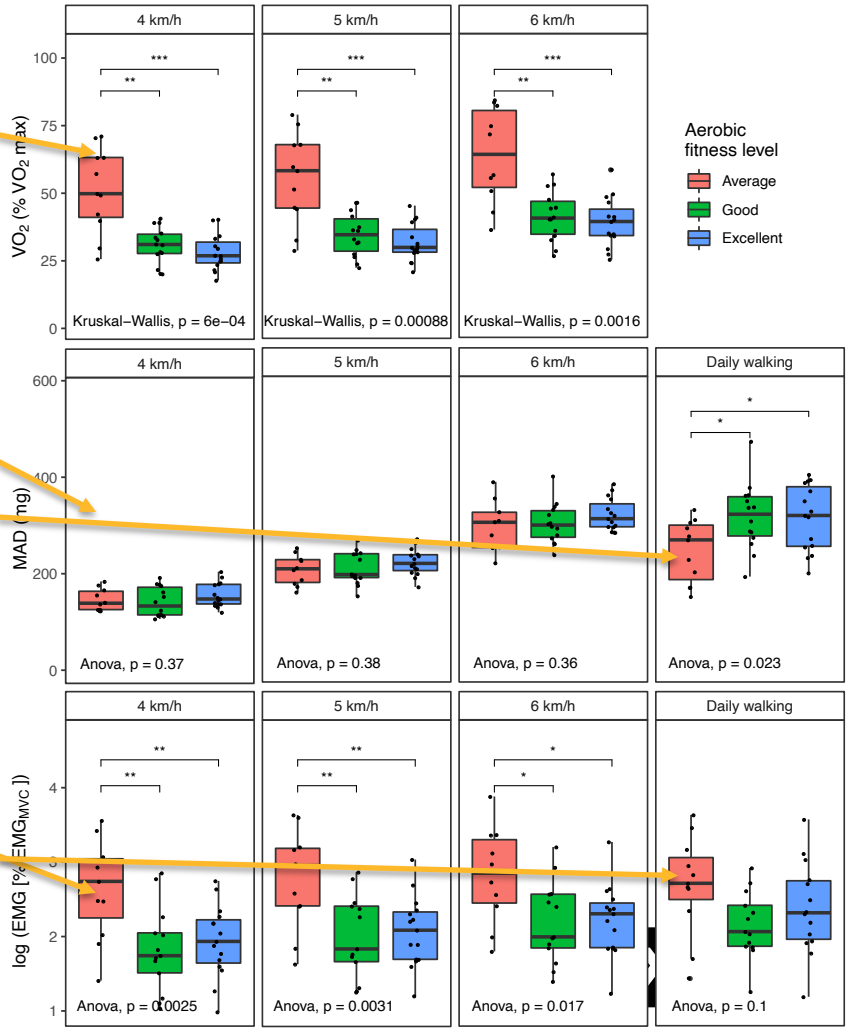
Aerobic capacity determines habitual walking acceleration, not EMG-indicated relative effort. Pesola A.J[a], Rantalainen T[b], Gao Y[c], Finni T[d]. JMBP accepted.

VO2: Higher in average fit group at a given load

Acceleration: No difference at a given load

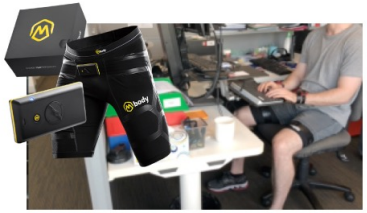
Lower in average fit group during daily walking

EMG: Higher in average fit group at a given load, no difference during daily walking

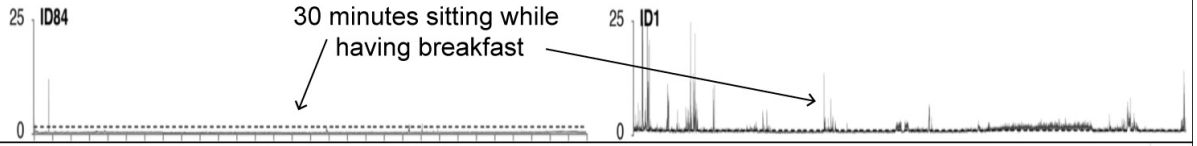


Muscle inactivity research

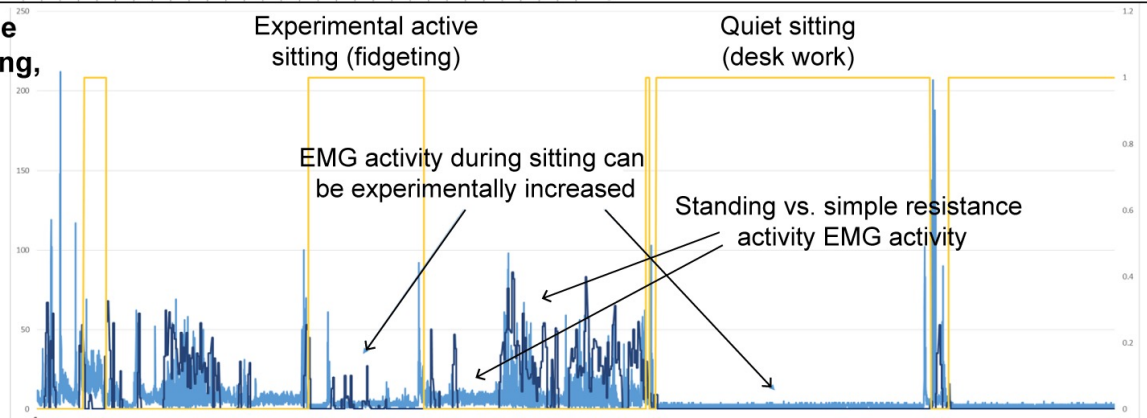
A. EMG activity during sitting, ambulatory and non-ambulatory activities



B. Inter-individual variability in sitting EMG activity (modified from Pesola et al. 2016)

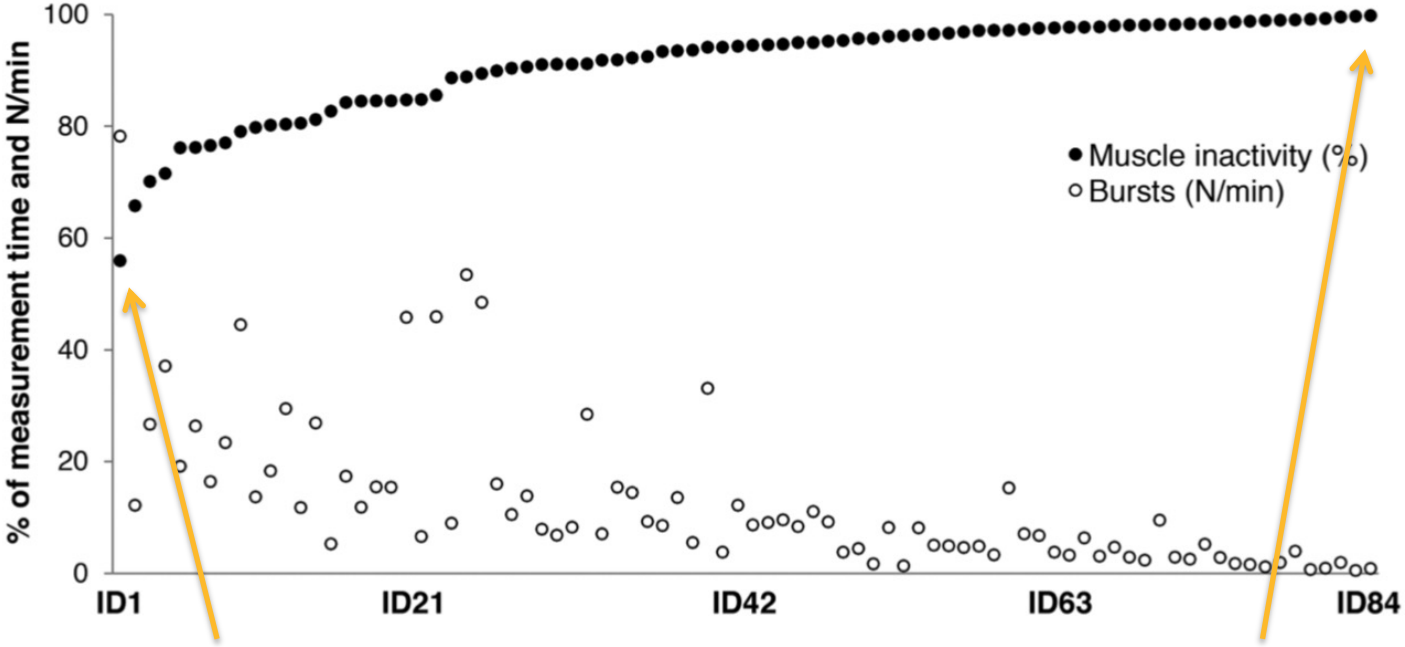


C. Interventions can decrease muscle inactivity during sitting, or increase muscle activity in upright postures



Is all sitting the same?

30 minutes sitting at a brealfast table



”Active sitter”
55% inactivity

”Passive sitter”
100% inactivity

Pesola, AJ. et al. Heterogeneity of muscle activity during sedentary behavior. Applied Physiology, Nutrition and Metabolism. 2016, 41(11): 1155-1162, 10.1139/apnm-2016-0170.

Muscle Inactivity Is Adversely Associated with Biomarkers in Physically Active Adults

Med. Sci. Sports Exerc., Vol. 47, No. 6, pp. 1188–1196, 2015.

ARTO J. PESOLA[1], ARTO LAUKKANEN[1,2], OLLI TIKKANEN[1], SARIANNA SIPILÄ[3], HEIKKI KAINULAINEN[1], and TAIJA FINNI[1]

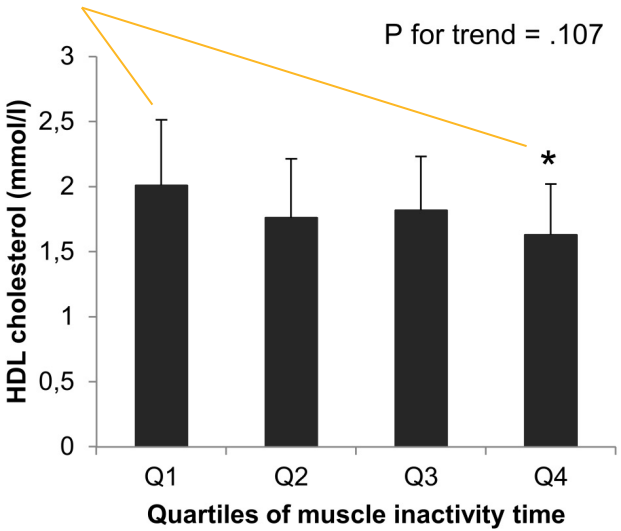
[1]*Department of Biology of Physical Activity, Neuromuscular Research Center, University of Jyväskylä, FINLAND;* [2]*Department of Sport Sciences, University of Jyväskylä, FINLAND; and* [3]*Department of Health Sciences, Gerontology Research Center, University of Jyväskylä, FINLAND*

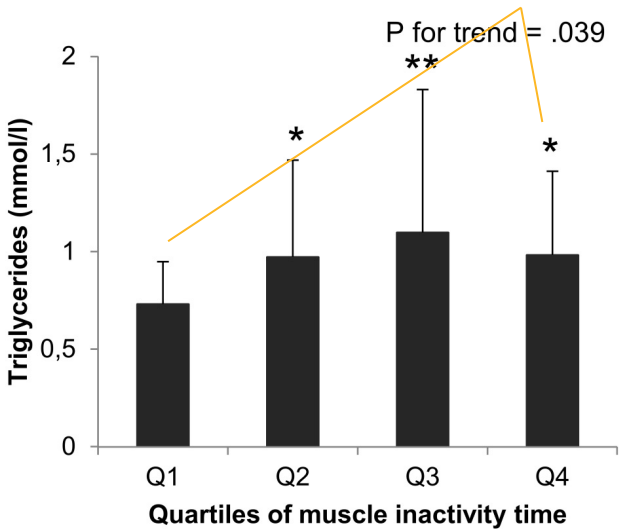
Q1-Q4 difference in muscle inactivity time

2:18 hours

HDL difference:
0.32 mmol/l

Triglycerides difference:
0.30 mmol/l





Cut points for quartiles were 55.5%, 65.8% and 74.8%. Adjusted for age, sex, education, smoking, winter/summer, no of days, recording time, no of channels, inactivity threshold and moderate-to-vigorous muscle activity.

“Sit actively” (pedalling, target 2h per day)
“Break up sitting” (walking, SRA, target 2 breaks per hour)
“Move more” (target 10 000 steps per day)

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Active Life Lab

Baker HEART & DIABETES INSTITUTE

JYVÄSKYLÄN YLIOPISTO
UNIVERSITY OF JYVÄSKYLÄ

Intervention N=125

6 months intervention
Health coaching (two in-person and eight telephone-delivered sessions over six months
Portable pedal machine (will be provided for the 6-month duration)
Smartphone-based monitoring and behavioural prompting (A wrist-worn activity monitor)

Delayed intervention N=125

Usual care control

3 month mini-intervention

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Randomization

Other application areas

- Fatique analysis
- Ventilatory threshold estimation (anaerobinen kynnys)
- Ergonomics
- Rehabilitation
- etc

Muscle Performance Investigated With a Novel Smart Compression Garment Based on Pressure Sensor Force Myography and Its Validation Against EMG

Aaron Belbasis[1] and Franz Konstantin Fuss[2*]

[1]School of Engineering, RMIT University, Melbourne, VIC, Australia
[2]Smart Equipment Engineering and Wearable Technology Program, Centre for Design Innovation, Swinburne University of Technology, Melbourne, VIC, Australia

IOP Publishing — Physiological Measurement
Physiol. Meas. **33** (2012) 603–614 doi:10.1088/0967-3334/33/4/603

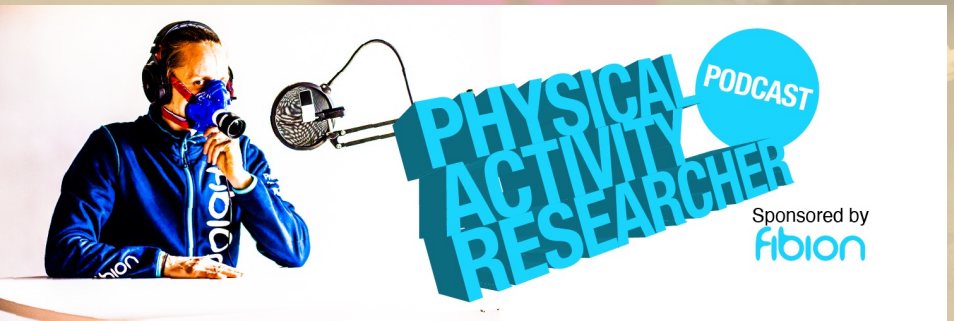
Ventilatory threshold during incremental running can be estimated using EMG shorts

Olli Tikkanen[1,2,3], Min Hu[4,5], Toivo Vilavuo[1], Pekka Tolvanen[6], Sulin Cheng[4] and Taija Finni[1]

FAB magazine: Myontec reduces sick leaves with smart textiles and promises remarkable savings

Some of our previous EMG-work:

- Pesola, A.J., Laukkanen, A., Heikkinen, R., Sipilä, S., Sääkslahti, A., Finni, T. 2017. Accelerometer-assessed sedentary work, leisure time and cardio-metabolic biomarkers during one year: Effectiveness of a cluster randomized controlled trial in parents with a sedentary occupation and young children. PLoS ONE 12(8):e0183299
- Pesola, A.J., Laukkanen, A., Tikkanen, O., Finni, T. 2016. Heterogeneity of muscle activity during sedentary behavior. Applied Physiology, Nutrition and Metabolism. 2016, 41(11): 1155-1162, 10.1139/apnm-2016-0170.
- Pesola, A.J., Laukkanen, A., Tikkanen, O., Sipilä, S., Kainulainen, H., Finni, T. 2015. Muscle inactivity is adversely associated with biomarkers in physically active adults. Med Sci Sports Exerc. 2015 Jun;47(6):1188-96
- Pesola, A.J., Laukkanen, A., Haakana, P., Havu, M., Sääkslahti, A., Sipilä, S., Finni, T. 2014. Muscle inactivity and activity patterns after sedentary-time targeted RCT. Medicine & Science in Sports & Exercise, Vol. 46, No. 11, pp. 2122–2131



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