



UNIVERSITY OF GOTHENBURG

# Validation of energy expenditure by multisensor armband in overweight lactating women



Frode Slinde, Fredrik Bertz, Anna Winkvist, Lasse Ellegård, Hanna Olausson, Hilde Brekke.

Dept of Internal medicine and clinical nutrition, University of Gothenburg, Sweden.

The Sahlgrenska Academy

# Background

Reproduction is a risk factor for excessive weight gain and postpartum weight retention, especially in women who are already overweight or obese.

Valid, affordable and easy-to use methods for measuring physical activity during the reproductive cycle are needed to tailor appropriate treatment.

# Aim

To validate Total Energy Expenditure (TEE) from the portable armband SenseWear SWA Pro 2 against TEE from Doubly Labeled Water ( $TEE_{DLW}$ ) in overweight and obese lactating women

Inner View software versions SWA 5.1 and SWA 6.1

# Subjects and methods

Breastfeeding, non-smoking women with a BMI  $>25$  kg/m<sup>2</sup> who had singleton, term deliveries with a birth weight  $> 2500$  g and were able to perform physical activity were recruited for the study at 10 weeks postpartum.

# Subjects and methods

TEE was measured using doubly labeled water during 2 weeks and the SWA Pro 2 armband was worn simultaneously during the first seven 24-hour periods.



# Subjects and methods

Resting Energy Expenditure (REE) was measured by indirect calorimetry.

Physical Activity Level (PAL) was calculated as  $TEE_{DLW}/REE$ .

# Subjects and methods

TEE (mean of seven 24 hour periods) as provided by the Inner View programs ( $TEE_{SWA5.1}$  and  $TEE_{SWA6.1}$ ) were used for comparisons to  $TEE_{DLW}$ .

# Results

62 women with a percent “on body time” for SWA of >90% were included in the analysis.

	Mean (sd)	Range
Age, years	33.2 (4.2)	24.6 to 41.3
BMI, kg/m <sup>2</sup>	30.0 (2.8)	25.2 to 37.4
TEE <sub>DLW</sub>	2765 (380)	1990-3895
TEE <sub>SWA5.1</sub>	2850 (435)	1905-3950
TEE <sub>SWA6.1</sub>	2524 (295)	1875-3070
Resting Energy Expenditure, indirect calorimetry, kcal	1507 (143)	1210 to 1840
PAL <sub>DLW</sub>	1.83 (0.17)	1.47-2.35

# Results

$TEE_{SWA\ 5.1}$  was overestimated with 85 kcal compared to  $TEE_{DLW}$  ( $p=0.040$ ),

$TEE_{SWA\ 6.1}$  was underestimated with 241 kcal compared to  $TEE_{DLW}$  ( $p<0.001$ ).

# Results

Forty-four percent (27 of 62) were within a predefined level of agreement of  $\pm 10\%$  (277 kcal) using SWA 5.1 and 52% (32 of 62) were within this level of agreement using SWA 6.1.

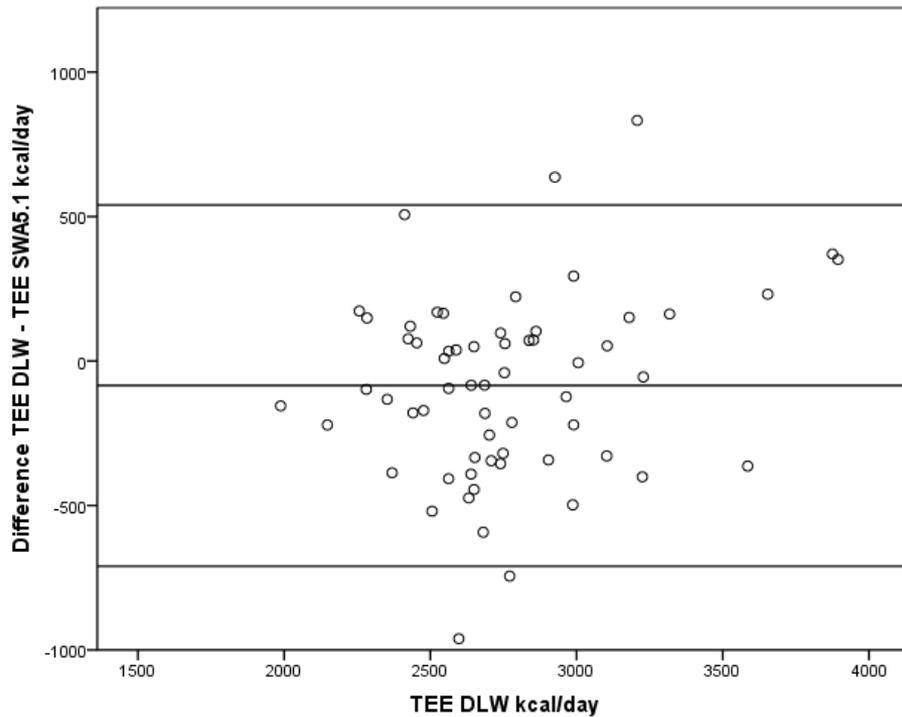


Figure 1 A. Graphic plot of difference ( $TEE_{DLW} - TEE_{SWA5.1}$ ) and  $TEE_{DLW}$ ,  $R= 0.231$ ,  $p=0.070$  (horizontal lines, mean  $\pm 1.96SD$ ).

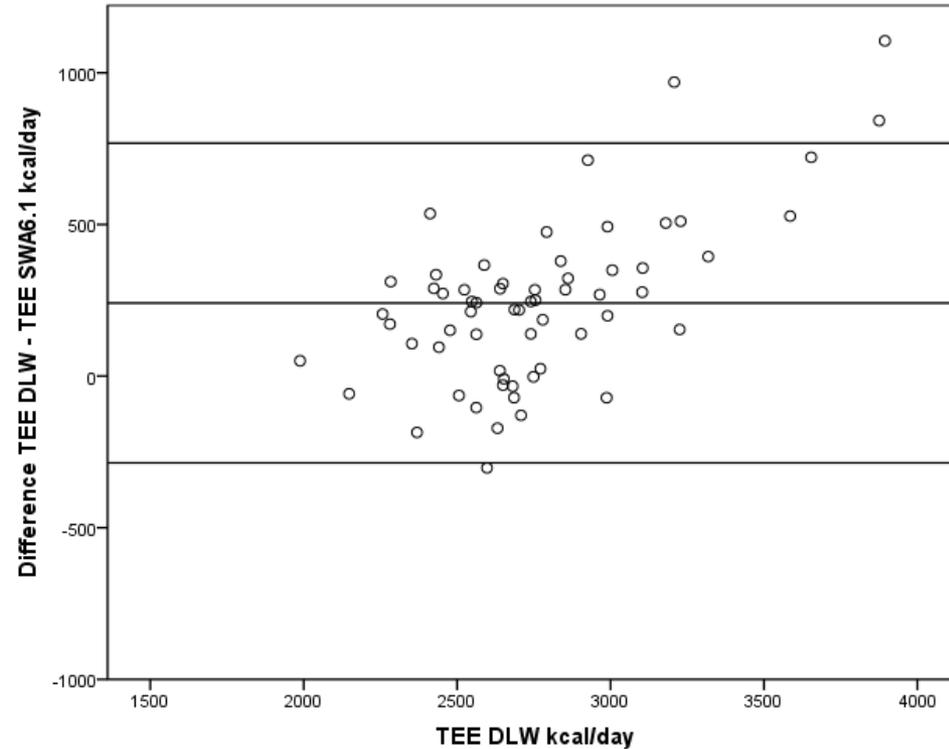


Figure 1 B. Graphic plot of difference ( $TEE_{DLW} - TEE_{SWA6.1}$ ) and  $TEE_{DLW}$ ,  $R= 0.638$ ,  $p<0.001$  (horizontal lines, mean  $\pm 1.96SD$ ).

# Conclusions

- SenseWear armband Pro 2 combined with the InnerView software version 5.1 can be used to estimate TEE within 3% of  $TEE_{DLW}$
- The Inner View software version 6.1, underestimates TEE with about 9% with a systematic underestimation at higher levels of TEE, PAL and BMI.

# Take home message

- Choice of software version is important to consider when estimating TEE using SenseWear Pro 2 armband in overweight subjects
- The Inner View software version 5.1 is preferable to version 6.1 for measuring TEE at a group level in overweight lactating women