CONCLUSION
3 or more days (weekend days excluded) were required to achieve acceptable reliability on all three outcomes when using ActiVital data in monitoring PA in patients with different cancer diagnoses referred to a cancer-support program.

REFERENCES

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A METHODOLOGY TO DETERMINE VALIDITY AND RELIABILITY OF ACTIVITY SENSORS

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INTRODUCTION
Accelerometer-based activity sensors are nowadays widely deployed in ambulatory monitoring of physical activity. Field experiments are characterized by very little control over the usage of the sensor [1]. A malfunctioning sensor, giving output within the range of normal physical activity, will not be noticed based on just the sensor output. A quick and reliable calibration procedure is required [2], focused on determining the relationship between accelerometer output and physical activity across a range of activity levels. The purpose of this study was to develop an easy-to-use approach to monitor the validity and reliability of activity sensors.

METHODS
In this study, four sensors were securely fastened to a mechanical oscillator (Vibration Exciter, type 4809, Bruel & Kjaer) and moved at various frequencies (6.67Hz; 13.45Hz; 19.88Hz) within the range of human physical activity. For each of the three sensor axes, the sensors were simultaneously moved for five minutes at defined frequencies. The acceleration of each movement was expressed by its RMS value (RMSraw). Raw sensor output (sample frequency 200 Hz) was converted to IMU values in minutes (counts per minute, in units of gravitational force, g). According to Boutil et al. [1997] [3], linear regression analysis was used to examine the relationship between the RMS and IMU. Factors taken into account were the four sensors and the three axes. The device tested in this study was the ProMove2 (Inertia Technology), containing the 3D MEMS inertial sensor (type: LIS3LV02DL, ST Microsystems).

RESULTS
The RMS output of the sensors was within 6% of the RMSraw at each frequency, indicating a high accuracy of the sensors. There were no significant differences between the sensors in IMU values. Small differences (<2%) were found in IMU values at the different axes, but these differences were not significant when added to the regression model. The resulting regression model is: IMU [g] = 3.9 + 25.9*RMS [ms⁻²] (R² = 0.9898), indicating that only RMSraw is significant for the output of the sensors.

DISCUSSION AND CONCLUSION
The developed methodology provides an easy to perform procedure to test an individual activity sensor as well as to determine the inter-variability of a set of activity sensors. This is especially useful when multiple sensors are used in a field experiment. The tested activity sensors showed to be reliable in the frequency range of human movement with negligible inter-sensor variability, and are therefore feasible to use in field trials.

REFERENCES

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TEST–RETEST RELIABILITY OF STEP COUNTS WITH THE ACTIVPAL™ DEVICE IN COMMON DAILY ACTIVITIES

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INTRODUCTION
The ActivPal device is a well-established physical activity monitor for assessment of physical activity[1-3]. Aim: To investigate test–retest reliability of step counts and establish minimal detectable changes (MDC) in step count to account for intra device error over time in various physical activities.

METHODS
methods: Healthy participants (n = 24, age range, 18-29 years) performed activities on two occasions, 1 week apart, in a laboratory setting; self-paced floor walking, treadmill walking at three different speeds (3.2 km/h, 4.5 km/h and 4.5 km/h with incline), treadmill jogging (8.0 km/h), stair walking and cycling on an exercise bike at three speeds (45 rpm, 60 rpm and 75 rpm). Relative reliability was calculated using intraclass correlation coefficient (ICC) and Spearman correlation. Absolute reliability was assessed using standard error of measurement (SEM) and coefficient of repeatability (CR).

RESULTS
results: The ActivPal showed high to very high relative reliability for treadmill walking at all speeds and stair walking, while self-paced normal floor walking showed moderate reliability. The absolute reliability was the best for treadmill walking activities, slightly increased for self-paced walking, followed by stair walking and jogging. The use of activity monitors during cycling has been questioned and our results confirm a low absolute and relative reliability. MDC values varied according to the type of activity e.g., treadmill walking 4.5 km/h (10 steps), walking on the floor (45 steps). Data loss in this study (10–13%) was higher than previously reported.

DISCUSSION AND CONCLUSION
Conclusions: The ActivPal is reliable for treadmill walking, jogging and self-paced walking, MDC varies according to the activity and should be considered when establishing true change over time. Future needs is to established limits for changes in number of steps over time due to intra device error for clinical populations in order to be able to attribute effects to intervention in clinical trials or explore changes in physical activity profiles over time.

REFERENCES

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RELIABILITY AND CONCURRENT VALIDITY OF GT1M AND MTA1CTIGRAPH ACCELEROMETERS USING A MECHANICAL SETUP

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INTRODUCTION
The MTA and GT1M (Actigraph,LLC, Florida) uniaxial accelerometers have been used interchangeably in field research, however their internal technologies are different. The GT1M detects acceleration via a polysilicon surface micromachined sensor, while the MTA utilises a cantilevered beam accelerometer. Determining the reliability across accelerometers and the validity between models is important prior to their use in the field. The aim of this study was to determine the intra and inter-unit reliability of the MTA and the GT1M accelerometers and to investigate their concurrent validity using a mechanical set-up.

METHODS
A mechanical unit, based on a model by Brage et al [1], consisting of 3 wheels connected by horizontally placed linkage was developed. Six accelerometers could be positioned along their x-axis on the unit. Rotation of the wheels caused the accelerometers to move through a sinusoidal acceleration in two axes (anteroposterior and mediolateral).