Details of the Methods

Procedures
The participants signed an informed consent approved by the ethics committee for human research at the State University of Campinas. These terms contained information about the study procedures, confirmed their voluntary participation and consent to use the data for later scientific publications, and certified that they had not used any medications, food supplements or illegal substances. The volunteers answered the International Physical Activity Questionnaire (IPAQ) and the minimum score to be classified as “physically active” was used as the inclusion criterion. This questionnaire requires information about the type of activity, the weekly frequency, intensity and volume of exercise performed by each participant, and in this way a “score” on energy expenditure unit (MET-minute/week) was generated (Fig. 3 Online).

Importantly, equipment calibration was performed before each test with barbells of known weight and the horizontal vector of force data was obtained in order to convert the weights into force (N) units by means of a linear regression equation. The averaged value of each signal provides the information that composed the linear regression.

The ENM has a security side bar and the evaluated subjects were instructed to stop the test case should they feel any imbalance or discomfort. In addition, evaluators were alert and had taken all necessary care as participants mounted and dismounted the treadmill, mainly as the non-motorized treadmill accelerated and slowed down.

Blood samples consisted of 25 μL and were collected using heparinized capillaries and calibrated. The samples were subsequently deposited in Eppendorf tubes containing 400 μL 4% TCA to lock in the middle of the reaction and blood deproteinization. Due to the very low blood amount, systemic changes were not reported.

Velocity determination (m/s)
The creators of the ergometer developed a sensor capable of registering the velocity variation. This sensor has a Hall effect and captures the magnetic presence of a small roller attached to the front support brace magnet belt, marking each full turn. With this form of measurement, the velocity was obtained by the displacement signal conditioning time, since the pulses are generated after every complete turn of the front roller of the treadmill. A linear offset for each spin, as expressed in the equation ΔS = 2r, was observed for the dimensions of the NMT, with each sensor signal having a linear distance of 0.24 m. Thus, it was possible to determine the velocity through the ratio of this value for the time interval between each pulse.

Power output determination (watts)
The interpretation of the data generated from the load on the NMT cell system enabled capturing the horizontal force generated by the subject. From this, in each assessment it was possible to obtain the mechanical power value held by the individual through the product of force by velocity.

The AO3 protocol
The AO3 was explained by the argument that during prolonged maximum effort, the anaerobic component (W') runs out and the power can only be maintained for longer if it is at aerobic intensity, so W' = 0. Therefore, the equation of the linear model of conventional CP model – Power vs. 1/CP time represented by P = AWC/CP + time becomes P = CP.

Thus, the anaerobic component would be exhausted in about 2 to two and a half minutes of maximum effort and the power during the last 30 s would be equivalent to the maximum intensity sustained by aerobic metabolism. In this test the anaerobic work capacity or AWC is called W' and critical power is called EP, i.e., end power from AO3. The kinetic power output, strength and velocity generated by each subject were recorded and analyzed in time. The common feature of this response (at least in the power output parameter) is elevated values at the beginning that then fall at the last minute, being stable at that stage. For the purposes of estimating the CP, the mean values of the last 30 s of the evaluation were considered to obtain EP, the critical force (CF) and critical velocity (CV). Through the areas obtained in each of the kinetics analyzed by the trapezoidal method (power, strength and velocity), anaerobic components were determined by subtracting the total amounts less the energy from aerobic processes. Thus, it was possible to find the values of anaerobic work capacity (W'), anaerobic impulse (I) and anaerobic distance (D) from the graphs of power, strength and velocity, respectively. Fig. 1 illustrates the procedure for the performance data.

Analysis of blood lactate by spectrophotometry
The blood lactate concentration for the test and retest AO3 were determined by the enzymatic method. The blood samples (25 μL) collected during the assessments were immediately transferred to 1.5 ml Eppendorf tubes containing 400 μL solution of 4% trichloroacetic acid (TCA) for deproteinization. The samples were then stored at 2–8 °C. Once processed (no longer than 48 h after collection) the tubes were shaken and centrifuged for subsequent removal of 100 μL of the supernatant in each of the samples, which were transferred to test tubes, with 500 μL of reagent (stock glycine/EDTA), hydrazine hydrate 33%, NAD (beta – nicotinamide dinucleotide, Sigma) and LDH (L-Lactic Dehydrogenase from bovine heart – 1000 units/mL, Sigma) with pH 8.85 added. The samples were then shaken and incubated for 20 min in a water bath maintained at 37 °C. The lactate concentration was determined according to Engel & Jones [23], at 340 nm against a calibration curve with standards of 5, 10, 15 and 30 mM.
Fig. 3 Example (participant #8) of the AO3 using the ENM. Number 1 indicates the belt fixed to the participant, 2 represents the support fixed to the wall for the load cell and 3 shows the bearing system for ENM.