

Measurement of human energy expenditure

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Measurement of Human Energy Expenditure - biological variability and technical validity

Paul F.M. Schoffelen Maastricht University

1. Biological variability and technical validity of measured energy expenditure in healthy subjects should be in agreement regarding magnitude. (*this thesis*)
2. For evaluation of overnight- and sleeping metabolic rate, the data of a night following free-living conditions is the most reproducible. (*this thesis*)
3. Challenging previously reported non-linearity between maximum power and maximum oxygen uptake, full capture diluted mode gas exchange measurements for healthy participants with a stable training status show a linear relation over the full range of power. (*this thesis*)
4. Technical validation methods for frequent periodic validation of a calorimeter must be available on site, and must realistically mimic biological parameters in the mode of operation as applied with the intended group of subjects. (*this thesis*)
5. True molar balance equations for indirect calorimetry, based on SI units and in absence of "ideal" gas assumption, provide a formal description of molar quantities and allow for stricter compartmentalization of sub-processes. (*this thesis*)
6. The carbon dioxide concentration in our atmosphere has increased 35% compared to maximum values found in 800.000 years before 1900, an increase that accelerated after WWII and keeps accelerating to this day as also confirmed by the background measurements performed with human calorimeters.
(Paul F.M. Schoffelen, *data from ice-cores¹⁾ and gas analysis in Maastricht*)
7. Much of what is new today will be out by tomorrow. Some of the old knowledge, however, should not be forgotten[.] (Max Kleiber, *The Fire of Life*)
8. The measurement or estimation of energy expenditure cannot be avoided by anyone interested in the nutritional aspects of energy balance. (John M. Kinney, *Energy Metabolism*)
9. In order to select suitable devices, technical setup, and a viable study protocol, an in-depth knowledge of both biological variability and technical validity is required.(*this thesis*)
10. Insights from development and research are the main reason why prototypes keep changing, when applied for production purposes these prototypes may never reach final product status. (Paul F.M. Schoffelen)
11. I love deadlines. I like the whooshing sound they make as they fly by.
(Douglas Adams, *The Salmon of Doubt*).

¹⁾ Lüthi, D., et al. 2008. EPICA Dome C Ice Core 800KYr Carbon Dioxide Data. MacFarling Meure et al. 2006, Law Dome Ice Core 2000-Year CO₂. Accessed from the Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy