Suitability of the equations by Harris-Benedict and Müller, Scalfi and Schebendach for estimating resting energy expenditure in moderately to severely underweight women

Rationale
In underweight women conventional equations for estimating resting energy expenditure (REE), such as Harris-Benedict or Müller, are commonly used in clinical practice. Yet, it is unclear if these equations provide reliable results or if special equations should be used.

Objectives
Comparison between the measured and estimated REE according to Scalfi [1], Schebendach [2], Harris-Benedict [3] and Müller 2004 [4].

Methods
REE was measured in 57 underweight women (28 ± 10 years, BMI 15.2 ± 2.2 kg/m²) by indirect calorimetry (IC) (Cosmed, Quark RMR, Rome, Italy) under standardized conditions. Overall, 49 women (86%) were diagnosed with anorexia nervosa, the remaining 8 women were healthy. REE-IC was compared with the equations of Harris Benedict and Müller 2004 (both for the general population), Scalfi (18-30-year-old women with anorexia nervosa) and Schebendach (modified Harris-Benedict formula for anorexia nervosa).

Results

Tab. 1: Subject Characteristics
Age (years) 28.4 ± 8.7 26.4 ± 9.7 28.6 ± 10.9
BW (kg) 34.5 ± 3.9 41.4 ± 4.1 50.2 ± 4.9
BMI (kg/m²) 12.5 ± 1.1 15.0 ± 0.7 17.5 ± 0.6

Deviation of equations from measured resting energy expenditure (IC-REE)

Fig. 1: Harris-Benedict
Fig. 2: Müller 2004
Fig. 3: Schebendach
Fig. 4: Scalfi

Conclusion
Universal equations for estimating REE (Harris-Benedict, Müller) are unreliable for underweight women, even in moderate underweight. Only the simple equation of Scalfi (REE= 96.3 x body weight) seems suitable for underweight women, at least for BMIs equal or higher than 14 kg/m².