SECTION 3. SPORT MEDICINE, PHYSIOLOGY AND BIOCHEMISTRY OF SPORT

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VALIDATION OF RESTING ENERGY EXPENDITURE PREDICTION EQUATIONS IN HIGHLY TRAINED FEMALE ENDURANCE ATHLETES

ВАЛІДАЦІЯ РОЗРАХУНКОВИХ ФОРМУЛ ДЛЯ ВИЗНАЧЕННЯ ЕНЕРГОВИТРАТ У СТАНІ СПОКОЮ У КВАЛІФІКОВАНИХ СПОРТСМЕНОК ВИДІВ СПОРТУ З ПЕРЕВАЖНИМ ПРОЯВОМ ВИТРИВАЛОСТІ

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Introduction. Many elite athletes easily expend 1000-2000 kcal/day for sport-related activities [1, p. 90]. To optimize the peak physical performance of athletes, it is imperative to meticulously offset energy expenditure through dietary strategies featuring an appropriately calibrated caloric intake. In the computation of daily energy expenditure using physical activity coefficients or metabolic equivalents, the initial determinant is the resting energy expenditure (REE). Indirect calorimetry stands as the gold standard

for the resting energy expenditure measurement. Nonetheless, its usage necessitates specialized equipment and a considerable time investment for accurate measurements. Consequently, widely adopted are predictive equations for resting energy expenditure, based on anthropometric parameters, age, and gender. It is pertinent to acknowledge that these equations are extrapolations derived from averaged general population data, based on body size, gender, and age [2, p. 795], thus neglecting individualized factors influencing metabolism, such as muscle mass and hormonal status.

Furthermore, the socio-demographic characteristics of a population exert a discernible influence on resting energy expenditure, underscoring the importance of selecting equations validated on populations mirroring the region of residence. This study aims to compare actual and predicted energy expenditure among highly trained Ukrainian female endurance athletes, to identify the most pertinent equations applicable in the sports practice.

Materials and Methods: anthropometric assessments and indirect calorimetry (Fitmate, Cosmed, Italy). Statistical analyses were conducted using XLSTAT software (Lumivero, USA). The research transpired at the State Scientific Research Institute of Physical Culture and Sports, encompassing 31 measurements of REE via indirect calorimetry on female athletes participating in national teams for endurance sports, including rowing, biathlon, modern pentathlon, triathlon, and kayaking. The comparison entailed evaluating actual resting energy expenditure values against those predicted by six equations: Harris-Benedict, Mifflin, World Health Organization (WHO), ten Haaf, De Lorenzo, and Freire.

Results and Discussion. Descriptive statistics of the participants (mean ± SD): age 24.3 ± 4.5 years, height 1.72 ± 0.08 m, weight 65.7 ± 9.6 kg, and body mass index 22.2 ± 1.8 kg/m^2. Figure 1 illustrates the comparison between actual and predicted resting energy expenditure in the examined athletes.

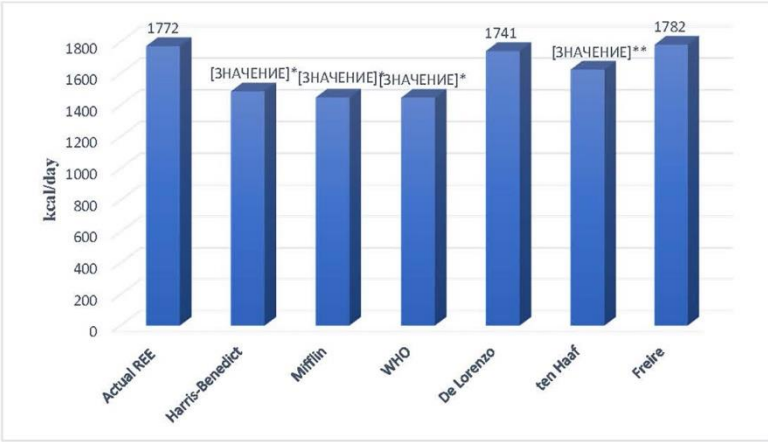

Fig. 1. Mean group differences between actual and predicted resting energy expenditure for female highly trained endurance athletes (n = 31)

*Notes: * highly significant difference from measured REE ($p \leq 0.001$)*
****significant difference from measured REE ($p \leq 0.05$)*

REE predicted by the Harris-Benedict, Mifflin, and WHO equations are significantly lower than measured values. This discrepancy is attributed to their development for a broad population and their failure to account for the physiological peculiarities of highly trained athletes. The ten Haaf formula, purportedly tailored for athletes, proved insufficiently accurate in our study. This inadequacy is linked to its formulation based on data from recreational athletes. Notably, the specifically designed for qualified athletes De Lorenzo and Freire equations [3, p. 1336] demonstrated the highest accuracy.

Conclusions:

1. The Harris-Benedict, Mifflin, WHO, and ten Haaf equations underestimate resting energy expenditure in highly trained Ukrainian female endurance athletes.

2. De Lorenzo and Freire equations proved to be the most accurate among the investigated resting energy expenditure prediction equations in highly trained Ukrainian female endurance athletes.

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TESTOSTERONE CONCENTRATION AND MAXIMUM OXYGEN VO_{2max} TEST IN QUALIFIED ATHLETES

ВМІСТ ТЕСТОСТЕРОНУ ТА МАКСИМАЛЬНА АЕРОБНА ПОТУЖНІСТЬ У КВАЛІФІКОВАНИХ СПОРТСМЕНІВ

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Актуальним напрямом сучасної спортивної науки є дослідження ендокринного статусу спортсменів. Під час фізичних навантажень змінюються функції багатьох ендокринних залоз, особливо тих, які