Reference Ranges for Human Body Composition and Fluid Overload

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BACKGROUND

• Determination of human body composition and fluid overload (FO) is of major importance in the therapy of patients with CKD.
• Studies show that whole body bi impe dance spectroscopy (BCM – Body Composition Monitor) can be used for an accurate and objective assessment of body composition and fluid status.
• Reference ranges (normal ranges) are essential to facilitate the clinical interpretation of the measured body composition and fluid overload.

AIMS

• Derivation of normal body composition ranges in a healthy paediatric and adult population.

SUBJECTS AND METHODS

• BCM Biimpedance measurements from 2071 healthy Caucasian subjects (307 boys, 300 girls, 680 males, and 784 females) aged 2 – 95 years
• Determination of fluid overload FO and body composition in terms of extra- and intracellular water (ECW, ICW) and lean and fat tissue
• Normalization of lean and fat tissue:
  - Lean Tissue Index: LTI = Lean Tissue Mass/Height
  - Fat Tissue Index: FTI = Adipose Tissue Mass/Height
• Calculation of reference ranges by a percentile-based analysis of LTI, FTI, ECW/ICW ratio, absolute FO, and relative fluid overload (RelFO = FO / ECW)
• Normal ranges are separated for gender and age and compared with data available from the literature.

RESULTS

• Figures on the right side show reference ranges (data points, 10th and 90th percentile lines and polynomial fit) for the LTI, FTI, ECW/ICW ratio and the absolute and relative fluid overload in male and female subjects over age.
• Reference ranges for LTI, FTI and the ECW/ICW ratio are dependent on age and gender
• Reference ranges for absolute and relative fluid overload are independent of age and gender:
  - Absolute FO: ± 1.1 L
  - Relative fluid overload: ± 7 %

CONCLUSION

• Characteristics of the normal ranges calculated consistent with well known observations concerning the development of body composition during maturation and aging.
• Age and gender are essential inputs for calculating reference ranges in individual subjects.
• Improvement of the method to assess fluid and nutritional status

TAKE HOME MESSAGE

• Reference ranges offer a significant improvement in the evaluation of a single subject’s body composition and fluid overload
• Assessment of fluid status and nutritional status at a glance

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