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COMPARISON OF BODY COMPOSITION METHODS: CIRCUMFERENCE MEASUREMENTS AND BIOELECTRICAL IMPEDANCE TO DUAL-ENERGY X-RAY ABSORPTIOMETRY

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High-frequency (500Khz) direct segmental multifrequency bioelectrical impedance analysis (BIA) accurately calculates total water mass and body fat% (BF%), but it is unknown whether higher frequencies (1000Khz) increase measurement accuracy. **PURPOSE:** This study compared BIA 500Khz, BIA 1000Khz, the Department of Defense (DoD) Circumference Method (CM), and the reference-standard Dual Energy X-ray Absorptiometry (DEXA). **METHODS:** A total of 62 participants from the military healthcare system (n=25 males, 38.8±11.4yrs, n=37 females 43.7±15.95yrs) were measured. BF% was estimated via DEXA, BIA 500, BIA 1000, and CM to identify the relationship between methods using Pearson Correlation, Intraclass Correlation Coefficients, and Bland Altman Plots (p <.05). **RESULTS:** CM BF% estimates displayed significant moderate correlations with BIA 500 (males r=.63, ICC=.76; females r=.77, ICC=.85), BIA 1000 (males r=.59, ICC=.74; females r=.77, ICC=.85), and DEXA (males r=.62, ICC=.62; females r=.73, ICC=.82). BIA 500 BF% displayed significant strong correlations with BIA 1000 (males r=.99, ICC=.99; females r=.99, ICC=.99) and DEXA (males r=.93, ICC=.94; females r=.89, ICC=.89). Lastly, BIA 1000 BF% also showed a significant strong correlation DEXA (males r=.93, ICC=.94; females r=.84, ICC=.90). Evaluating proportional bias using a Bland-Altman analysis confirmed an overall mean bias of -1.72% (CM and DEXA) in the female group, indicating the tendency of CM to underestimate BF% compared to DEXA limits of agreement from -14.24 to 10.8. There was an upward slope of .33 as the CM BF% decreased and the DEXA BF% increased. There was agreement of BF% to 32%, but after 32%, there was more dispersion from the mean and outliers and with a significant trend for a greater difference in BF% between CM and DEXA (p<.05). **CONCLUSION:** The correlation was higher between BIA 500 and BIA 1000 to DEXA when compared to CM. There was proportional bias between DEXA and CM in the female group with CM underestimating BF% compared to DEXA. **SIGNIFANCE/NOVELTY:** When compared to BIA methods, BF% estimated via CM methods do not correlate well with BF% from DEXA. However, it does not seem as though higher BIA frequencies better predict BF%.

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