AGREEMENT OF BODY COMPOSITION ESTIMATES IN COLLEGIATE BASEBALL PLAYERS MEASURED BY DSM-BIA AND DXA FOLLOWING A RESISTANCE TRAINING INTERVENTION

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INTRODUCTION

- In baseball, the volume of play during a competitive season leads to decreases in body mass (BM) and FFM. Strategies to increase FFM during the offseason may translate to improved performance and the preservation of FFM throughout the competitive season.
- Monitoring body composition is essential in evaluating the effectiveness of a resistance training (RT) program; specifically, increases in lean muscle mass.
- Dual energy x-ray absorptiometry (DXA) and direct segmental multifrequency bioelectrical impedance analysis (DSM-BIA) are methods commonly used to estimate body composition.
- The purpose of this study was to analyze body composition changes over a five-week offseason program and compare methodologies.

METHODS

- Participants included 20 NCAA Division III collegiate baseball players.
- Body composition was estimated using DXA (Hologic Horizon) and DSM-BIA (InBody 770) at two separate timepoints: pre- and post-RT intervention.
- Paired t-tests and Pearson's r correlation analyses were utilized to assess mean differences and agreement, respectively.
- Percent changes were calculated at pre- and post-timepoints using both DXA and DSM-BIA for the following variables: FFM, FM, and total body mass.

RESULTS

- N = 20; age: 19.5±1.1 y; height: 183.7±6.2 cm; BM: 84.5±6.9 kg; DXA body fat: 16.8±4.0%
- Though BM percent changes were strongly correlated (r=0.9, p< 0.001) between DSM-BIA and DXA, FFM (r= 0.4, p= 0.07) and FM (r= 0.3, p= 0.21) changes displayed no significant correlation between methodologies.
- Paired samples t-test revealed statistically significant differences in lean mass percent changes detected by DXA versus DSM-BIA (p= 0.04).
- Though no statistically significant differences between methodologies were observed in FM percent changes (p= 0.3), wide confidence intervals were observed [-3.3, 11.2].
- Additionally, FFM changes measured by DSM-BIA (1.2±2.5 kg or 1.8±3.6%) were less sensitive to FFM gains as compared to DXA (2.7±3.4 kg or 4.3%)
- DSM-BIA estimated a slight mean gain in FM (0.1±1.5 kg or 2.2±14%) and DXA detected a decrease (-0.5±1.8 kg or -1.7±11.9%).

CONCLUSION

- Despite similar changes in total body mass, body composition shifts as measured by DXA and DSM-BIA were not in agreement.
- The present study agrees with findings by Boykin et al. (2021) in which DXA was more sensitive to increases in FFM.

IN DIVISION III BASEBALL PLAYERS, DXA IS MORE SENSITIVE TO DETECTING GAINS IN LEAN MUSCLE MASS AS COMPARED TO INBODY, DESPITE SIMILAR CHANGES IN OVERALL BODY MASS.

1. Body composition analyses (DXA & InBody) performed prior to RT program.
2. Athletes completed a 5-week RT program.
3. Body composition analyses (DXA & InBody) repeated post RT program.

PRACTICAL APPLICATION

- The degree to which DXA and DSM-BIA differ in analyzing body composition introduces possible error when monitoring body composition changes.
- Future research should further establish standardized protocols in order to best utilize DXA and DSM-BIA.
- In our study, DXA recognized a decrease in fat mass while InBody detected a gain in fat mass. Moreover, FFM increases were greater in DXA as compared to InBody.
- Precision when estimating FFM and FM changes over time is integral to assessing the progress in athletic populations, thus identifying reasons for disagreement between methodologies would benefit coaches, clinicians, and researchers.

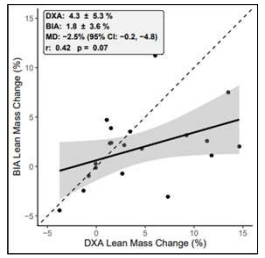

Figure 1. Graph displays correlation between DXA percent changes in lean mass and InBody percent Changes in lean mass.

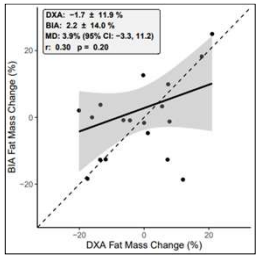

Figure 2. Graph displays correlation between DXA percent changes in fat mass and InBody percent Changes in fat mass.

N=20	Mean	SD
Age (y)	19.5	1.1
Height (cm)	183.7	6.2
InBody Fat Mass % Change	2.2	14
InBody Lean Mass % Change	1.8	3.6
DXA Fat Mass % Change	-1.7	11.9
DXA Lean Mass % Change	4.3	5.3

Table 1. Table displays descriptive data of study population. InBody mean values show an overall gain in fat mass while DXA shows a decrease in fat mass.

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