CHANGES IN REGIONAL BODY COMPOSITION VALUES FOR COLLEGIATE ATHLETES OVER TIME UTILIZING DUAL ENERGY X-RAY ABSORPTIOMETRY

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INTRODUCTION

- Body composition is an important variable for athletic performance.
- Increasing global lean mass and decreasing global fat mass is important for overall health but a number of sports are limited by regional lean mass development.
- The ability for athletes to increase or decrease lean mass in regions of the body is important for athletic development and should be investigated.
- Modification in fat mass can also improve sports performance and is worth investigating to realistic changes over different timelines.
- How much athletes can increase Lean mass while decreasing fat mass is also worth investigating and has been observed in a number of recreational and sedentary individuals.
- The timelines for lean mass accrual and fat mass loss is also described in nonathletic populations and how much this can change in athletic populations is worth investigating.

PURPOSE

- To examine regional changes in body composition in collegiate athletes throughout their athletic careers relative to their initial scan.

METHODS

- 219 college aged athletes (Division I athletes from a variety of sports in mid major sports conferences) participated in this longitudinal tracking investigation (ht. 176±10 cm (Mean±SD), wt. 77.8±20.0 kg, age 20.0±1.3 years, 127 female, 92 male subjects).
- Athletes from cross country, football, basketball, gymnastics, softball, baseball, soccer, and track and field were all participants in this investigation.
- After filling out informed consents and health history questionnaires students were scanned for total body composition utilizing a Dual Energy X-Ray Absorptiometry (DXA) scanner (Lunar Prodigy by GE) utilizing standardized clothing and normal testing methodology.
- When both sides of the body could not fit on the scanner the right side was scanned completely.
- Due to height the feet and or lower leg was estimated in those subjects by the machines algorithms.
- Regional and total fat mass and fat free mass values were analyzed for change relative to initial values for each subject. Bone mineral density and bone mineral content values for the total body were used in this analysis, not the regional data.
- Time between scans was between 3-24 months. Changes were analyzed based on absolute changes from one scan to the next and relative to changes from previously tested values (percentage values).

RESULTS

- Overall, the fault rates for each test are listed in the tables below. All values are listed as a percentage.
- The average total fault number over each exam was; entrance 3.35±1.47*, midpoint 3.30±1.52*, and exit 3.69±1.39.
- The exit exam fault rate was significantly higher than the entrance or midpoint exam for number of faults.
- Forward head fault increased significantly over training as did the high squat (not achieving depth), and foot turns out faults.
- Knee moves outward and heel rises faults decreased significantly over training.
- All other test fault rates stayed relatively consistent over the course of their cadet training.

CONCLUSIONS

- On average regional changes were small, but there was a high degree of variability.
- This was an observational study utilizing variable testing frequency which involved athletes who were injured and then rehabbed and returned to play.
- Further research into this area will allow for more defined body composition change timeline expectations for athletes and non-athletes which would be useful for coaches, trainers, and researchers.

PRACTICAL APPLICATIONS

- Overall regional changes in athlete body composition during their athletic career are small both in raw values and when examined over the entire career.
- Regional changes were much greater in fat mass compared to lean mass.
- Very large changes in athletes are likely rare and should inform choices on recruitment and realistic expectations.
- Athletes typically do not make large changes in lean mass over their career with the greatest change occurring in an athlete that put on over 8kg of lean mass over a number of years.

Absolute Change	Fat Mass Right Arm	Fat Mass Left Arm	Fat Mass Right Leg	Fat Mass Left Leg	Lean Mass Right Arm	Lean Mass Left Arm	Lean Mass Right Leg	Lean Mass Left Leg	Total Lean Mass (kg)	Total Fat Mass (kg)	Body Fat Percentage	Bone Mineral Density (g/cm^3)	Bone Mineral Content (g)
Mean±SD	0.01±.17	0.00±.17	-0.01±.51	-0.01±.51	0.03±.25	0.04±.27	0.11±.58	0.11±.54	0.44±2.76	0.01±2.78	0.00±3.41	-0.01±.15	-18.6±352.2
Max	0.60	0.60	2.09	2.27	0.91	1.05	1.77	1.82	8.64	11	26.58	0.09	520.9
Min	-0.68	-0.68	-2	-2.05	-0.73	-0.95	-2.08	-1.53	-26.10	-10.27	-13.7	-1.43	-3551

% change over time	Fat Mass Right Arm	Fat Mass Left Arm	Fat Mass Right Leg	Fat Mass Left Leg	Lean Mass Right Arm	Lean Mass Left Arm	Lean Mass Right Leg	Lean Mass Left Leg	Total Lean Mass (kg)	Total Fat Mass (kg)	Body Fat Percentage	Bone Mineral Density (g/cm^3)	Bone Mineral Content (g)
Mean±SD	1.03±.19	1.02±.19	1.01±.22	1.01±.23	1.01±.07	1.01±.08	1.01±.06	1.01±.05	1.01±.04	1.01±.20	1.01±.20	0.99±.11	0.99±.12
Max	2.5	2.71	3.86	4.125	1.25	1.64	1.18	1.18	1.17	3.42	2.96	1.09	1.29
Min	0.45	0.47	0.4	0.43	0.77	0.72	0.79	0.87	0.68	0.39	0.49	0.9	0.78

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ACKNOWLEDGEMENTS

The authors are grateful for the students and athletes that participated in this study as well as the efforts of the Courier