



Relationship Between Energy Balance, Menstrual Function, and Serum Osteoprotegerin in Female Collegiate Cross-Country Runners

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INTRODUCTION

- ↓ energy availability suppresses estrogen, which leads to ↓ bone mineral density and irregular menstrual function¹.
- The molecule osteoprotegerin (OPG) inhibits the loss of bone mineral density¹.
- Female exercisers with normal menstrual function exhibit 26% higher serum OPG levels than sedentary females².
- 30 calories per kg of lean body mass (cal/kgLBM) is the lower limit of energy intake required to maintain normal menstrual function³.

PURPOSE

To determine whether energy availability is reflected in menstrual status and serum OPG values among female collegiate cross-country runners.



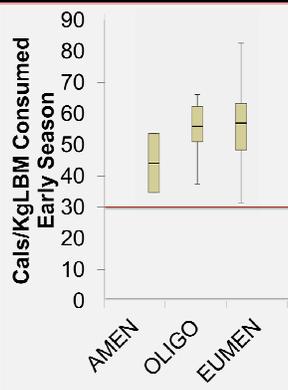
METHODS

Sep-4	Sep-6	Oct-10	Oct-12	Nov-6	Nov-8
Subjects Record Weekly Exercise Totals and Dates of Menstruation					
<ul style="list-style-type: none"> 3-Day Diet Record Serum OPG Meas. LBM Meas. 		<ul style="list-style-type: none"> 3-Day Diet Record Serum OPG Meas. LBM Meas. 		<ul style="list-style-type: none"> 3-Day Diet Record Serum OPG Meas. LBM Meas. 	

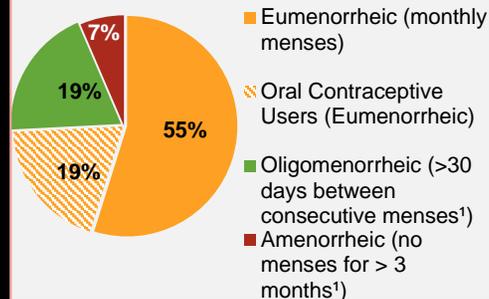
- IRB approval was obtained.
- Subjects were recruited from the CSB cross-country team (n=31)
- Subjects completed a bone and menstrual health survey.
- Diet records were analyzed using ChooseMyPlate.gov and all data was analyzed using bivariate analysis of variance.

RESULTS

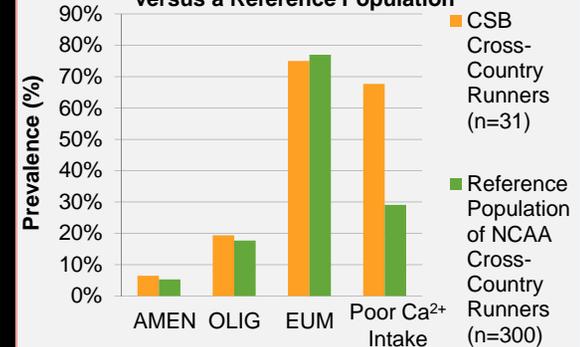
- No changes in menstrual status occurred during the course of the study; however, 2 subjects were amenorrheic and 6 subjects were oligomenorrheic coming into the study.
- No correlations between energy availability, menstrual status, and serum OPG levels.
- Average cal/kgLBM=53; Lowest cal/kgLBM=32
- 20 subjects consumed < the recommended 15 µg vitamin D / day
- 21 subjects consumed < the recommended 1,500 mg calcium / day
- Serum vitamin D deficiency (<75 nmol/L) was observed in 26 subjects.



Menstrual Status of CSB Cross Country Runners



Prevalence of Menstrual Dysfunction and Calcium Deficiency in CSB Runners versus a Reference Population⁴



CONCLUSION

- Serum OPG and menstrual status did not correlate with energy availability in this study.
- Energy availability (average=52.7 cal/kg) was sufficient to prevent changes in menstrual status or OPG in this population.
- Nutritional intake was adequate, with the exception of calcium and vitamin D.
- Female cross-country runners should be encouraged to increase their vitamin D and calcium intake to preserve bone mineral density.

ACKNOWLEDGEMENTS

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