

# Low Bone Mineral Density and Increased Fat Mass in Boys with Severe Hemophilia

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## Introduction:

Background: A growing body of evidence suggests that children with hemophilia are at risk for low bone mineral density (BMD).<sup>1</sup> The majority of studies evaluating the BMD of children with hemophilia have been performed in settings where prophylactic factor replacement is not the standard of care. In addition, these studies have not adjusted for height, age, and weight thus resulting in possible over or under estimation of BMD.<sup>2,3</sup>

Objectives: This study aimed to determine if BMD in Canadian children and youth with severe hemophilia A or B was different from height, age, and weight-adjusted controls.

## Methods:

In this cross-sectional observational study, subjects with severe hemophilia A or B on prophylactic factor replacement aged 3-18 years were recruited from the Hamilton-Niagara Regional Hemophilia Centre. Subjects underwent DXA scans of the lumbar spine (LS), bilateral hips and whole body (WB). Results were expressed both as Z scores and as height, age, weight (HAW) scores.

## Results:

Seventeen subjects were recruited (3 FIX, 14 FVIII). Mean age ( $\pm$  sd) was  $9.0 \pm 4.0$ . LS BMD was increased in subjects with hemophilia compared to controls ( $p < 0.01$ ) while there was no difference in hip BMD. WB BMD was significantly reduced ( $p < 0.001$ ). These differences were maintained whether BMD was expressed as a Z score or as a HAW score. DXA scans identified an increased fat mass ( $p < 0.05$ ) with no statistically significant differences in WB bone mineral content or lean body mass between subjects and controls.

Figure 1: Body Composition Z Scores for Whole Body Bone Mineral Content, Lean Body Mass, and Fat Mass

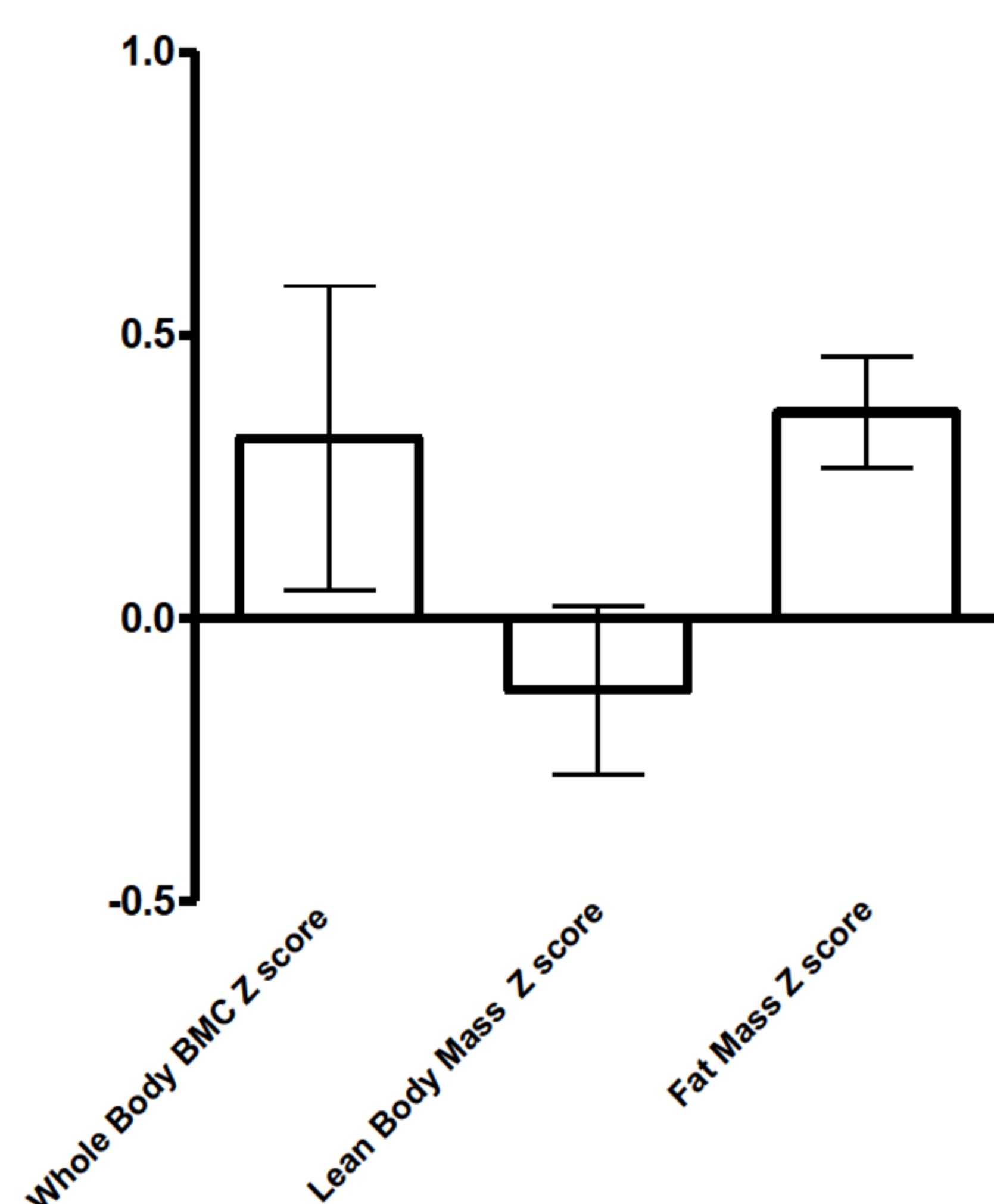
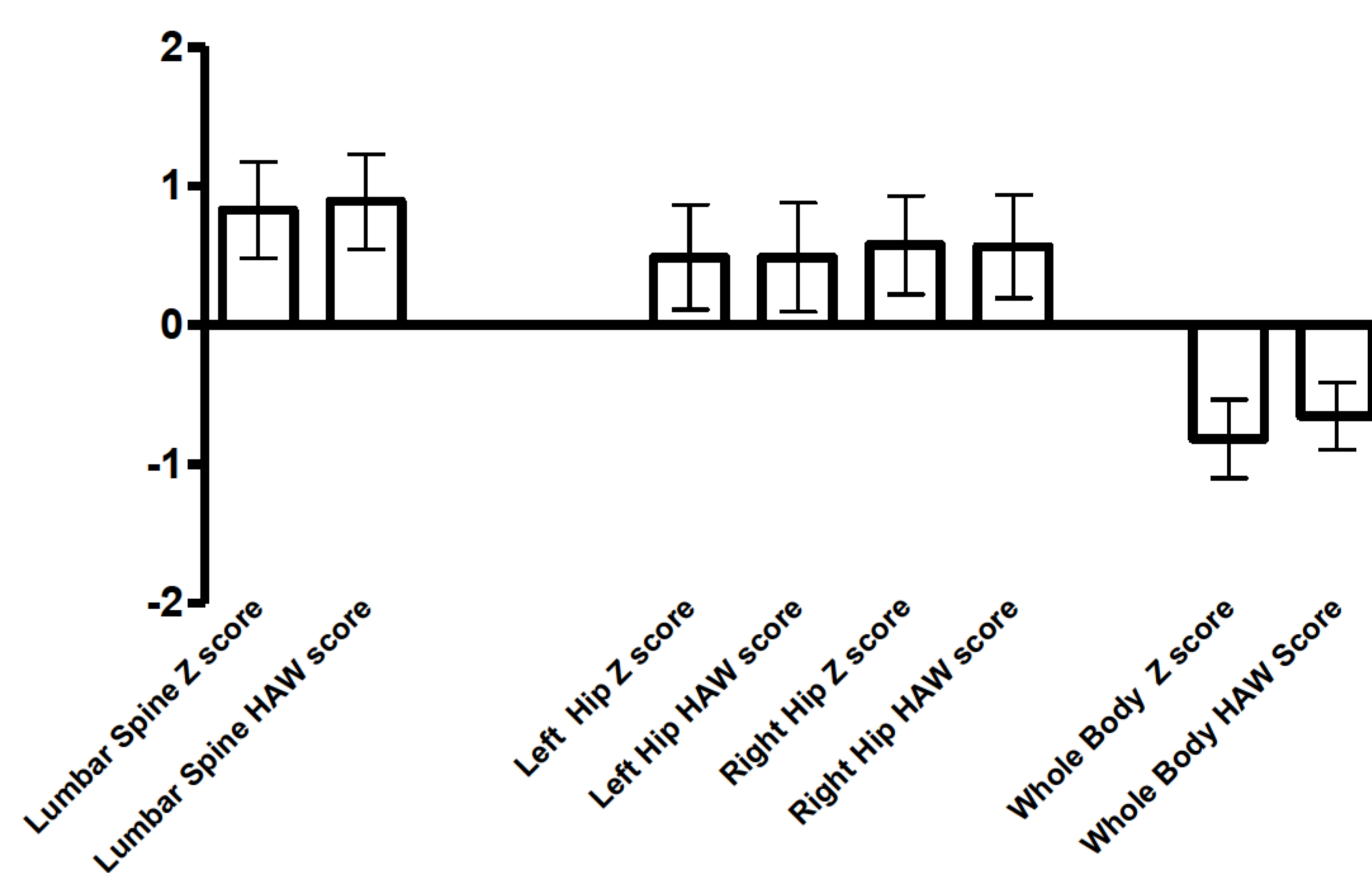


Figure 2: Z score and HAW Score for Lumbar Spine, Left and Right Hip, and Whole Body



## Conclusions:

In our cohort of 17 subjects aged 3-18 with severe hemophilia A or B, Whole Body BMD was lower than controls, Lumbar Spine BMD was increased while hip BMD was the same as controls. The increased fat mass may represent a response to reduced physical activity that, in turn, results in a decrease of cortical bone with a reduced Whole Body BMD.

## References:

1. Iorio, A., Fabbriani, G., Marcucci, M., Brozzetti, M., & Filipponi, P. (2010). Bone mineral density in haemophilia patients. A meta-analysis. *Thrombosis & Haemostasis*, 103(3), 596-603.
2. Webber CE, Beaumont LF, Morrison J, et al. (2007). Age-predicted values for lumbar spine, proximal femur, and whole-body bone mineral density: Results from a population of normal children aged 3 to 18 years. *Can Assoc Radiol J*, 58(1):37-45.
3. Webber CE, Sala A, Barr RD. (2009) Accounting for body size deviations when reporting bone mineral density variables in children. *Osteoporos Int*, 20(1):113-21.

## Acknowledgments:

Support received from the 2011 Canadian Hemophilia Society Care Until Cure Award

