Effect of Anthropometric Adjustments on BMD and BMC Z-Scores in a Population of Prader-Willi Syndrome Pediatric Patients

Amanda E. Marker
Wright State University, amanda.marker@wright.edu

David F. Short
Wright State University - Main Campus, david.short@wright.edu

Talia Eldar-Geva

Harry J. Hirsch

Varda Gross-Tsur

See next page for additional authors

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Authors
Amanda E. Marker, David F. Short, Talia Eldar-Geva, Harry J. Hirsch, Varda Gross-Tsur, Maayan Tiomkin, Ari Zimran, and Thomas N. Hangartner

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Lijun Pei
By comparing to the OVX group, bone quality in groups with IV injection were analyzed for evaluation of bone quality and microarchitecture. For results, the 5th vertebra body of lumbar region was scanned by micro-CT (Scanco micro-CT 40). Trabecular bone was identified and parameters of fracture were enhanced in the increased BMD (p < 0.05), trabecular bone number and connectivity density (p < 0.05). Also the efficacy of the targeting icaritin delivery system tended to be dosage dependent (BV increased 14.16% in high dose group, Tb.N increased 10.34% and connectivity density of trabecular bone increased 19.70%). Moreover from Structure Model Index (SMI) value, we concluded that the morphology of trabecular bone in icaritin injection groups tends more to be plat-like: SMI(OVX) = 2.19±0.30, SMI(IV-AP8+LPS-ICT-T) = 2.07±0.36, SMI(IV-AP8+LPS-ICT-H) = 2.01±0.23. More signals retain in bone 72 hours after injection by comparing to the delivery system without bone targeting molecules ASP8 shown in IVIS image.

Conclusion: The novel bone-targeting delivery system carrying osteopromotive phytomolecule(s) Icaritin was confirmed that was capable of preventing the estrogen depletion induced osteoporosis in a dose dependent manner. Micro-CT 3D images of trabecular bone in L5.

Methods: (ASPB)-Liposome-icaritin was synthesized by thin film evaporation method with extruding through polycarbonate filter membranes to obtain unilamellar vesicles with bone targeting molecules ASP8 attached. Eighty four-month-old C57/BL6 female mice were divided into 8 groups (n = 10): Baseline (BL), Sham surgery (SH), Ovariectomy (OVX), Estradiol for oral administration (O-E2), Icaritin for oral administration (O-ICT), low dose (8mg/kg, once a week) targeting delivery system with icaritin injected via caudal vein (IV-LIP-ICT+ASPB-H), delivery system with icaritin injected via caudal vein (IV-LIP-ICT, 8mg/kg, twice a week). Administrations of gavage and IV injection were applied respectively for 6 weeks from the day right after the OVX surgery. Lumbar spine and lower limbs were harvest 6 weeks after surgery for bone quality analysis. The 5th vertebra body of lumbar region was scanned by micro-CT (Scanco micro-CT 40). Trabecular bone was identified and parameters of bone quality were analyzed for evaluation of bone quality and microarchitecture. For confirming the specificity of the targeting delivery system, Xenogen IVIS spectrum was used to semi-qualify the distribution of bone targeting system ex vivo by injecting labelled targeting delivery system.

Results: By comparing to the OVX group, bone quality in groups with IV injection were enhanced reflected in the increased BMD (p < 0.05), bone volume (p < 0.05), trabecular bone number and connectivity density (p < 0.05). Also the efficacy of the targeting icaritin delivery system tended to be dosage dependent (BV increased 14.16% in high dose group, Tb.N increased 10.34% and connectivity density of trabecular bone increased 19.70%). Moreover from Structure Model Index (SMI) value, we concluded that the morphology of trabecular bone in icaritin injection groups tends more to be plat-like: SMI(OVX) = 2.19±0.30, SMI(IV-AP8+LPS-ICT-T) = 2.07±0.36, SMI(IV-AP8+LPS-ICT-H) = 2.01±0.23. More signals retain in bone 72 hours after injection by comparing to the delivery system without bone targeting molecules ASP8 shown in IVIS image.

Conclusion: The novel bone-targeting delivery system carrying osteopromotive phytomolecule(s) Icaritin was confirmed that was capable of preventing the estrogen depletion induced osteoporosis in a dose dependent manner. Micro-CT 3D images of trabecular bone in L5.
after applying the anthropometric corrections, we can gain insight into the relevance of such adjustments. Whereas 8/31 (26%) patients cross from the non-critical to the critical region with WH correlations applied to sub-head whole-body BMD, 6/31 (19%) cross the same boundary when WHF corrections are applied. The numbers are similar for BMC, with 9/31 (29%) crossing the critical boundary with WH or WHF corrections applied. The number of patients crossing from critical to non-critical is 23% for BMC with the WH correlation and 29% for BMC with the WHF correlation applied. However, when BMD is considered, that change in classification is smaller for the WH correlation (13%) but not for the WHF correlation (19%). The patterns are similar for the other body sites.

Conclusion: Anthropometric correction for the calculation of Z-scores appears to affect a considerable fraction of patients with PWS. This is due to the large abnormality in body size, and DXA measurements, being projection measurements, are affected by body size. However, fracture risk has not yet been studied in connection with DXA parameters in individuals with PWS, and the full implication of anthropometric corrections needs to be evaluated pending such investigations.

Abstracts

IBDW2014-00142-F0065 MUSCLE DENSITY IS ASSOCIATED WITH FRAGILITY FRACTURES IN POSTMENOPAUSAL WOMEN WHO ARE LESS FRAIL: THE CAmOS MUSCLE QUALITY STUDY

Andy Kin On Wong a, Courtney Kennedy b, George Ioannidis c, Karen A. Beattie c, Christopher Gordon c, Laura Pickard c, Alexandra Papaloannou a, David Gottzman e, Jerilynn Prior c, CaMos Research Group

*Osteoporosis Program, University Health Network, Toronto, ON, USA
bDepartment of Medicine, Hamilton Health Sciences, Hamilton, ON, USA
cDepartment of Medicine, McMaster University, Hamilton, ON, USA
dDepartment of Nuclear Medicine, McMaster University, Hamilton, ON, USA
eDepartments of Medicine & Physiology, McGill University, Montreal, QC, USA
fCentre for Menstrual Cycle and Ovulation Research, Vancouver, BC, USA

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Muscle is the largest source for energy production and storage and is a determinant of frailty. Muscle has been linked to bone strength and fractures previously. It is unknown how muscle relates to fractures independently of frailty.

Objectives: To determine how muscle associates with fragility fractures in postmenopausal women in the context of frailty.

Methods: A subset of women 60-85 years old participating in the Canadian Multicentre Osteoporosis Study (CaMOS) completed peripheral quantitative computed tomography (pQCT) (20 mm/s, 38 kVp, 500 µm in-plane resolution) scans using XCT 2000 (Stratec Medizintechnik) at 66% of the tibial length (at year 16). Muscle density, mass, and area were derived using manufacturer’s software. Comorbidities, cognition, energy level, function and mobility questions obtained at year 10 were used to compute the CaMOS frailty index (CFI). Incident fractures from baseline to year 15 were derived from the CaMOS database. A binary logistic regression analysis measured odds ratios (OR) for fragility fractures per standard deviation difference in each muscle measure, adjusting for age, body mass index (BMI), lowest areal bone mineral density (aBMD) T-score of total hip or lumbar spine and having fallen within the last 12 months. The interaction of muscle outcomes and CFI was examined as an interaction with each muscle measurement.

<table>
<thead>
<tr>
<th>pQCT variables</th>
<th>A) Base model</th>
<th>B) age, BMI, aBMD</th>
<th>C) B + Falls</th>
<th>D) C + CFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscle density</td>
<td>1.34 (1.09, 1.65)</td>
<td>1.39 (1.09, 1.77)</td>
<td>1.40 (1.09, 1.78)</td>
<td>1.35 (1.05, 1.74)</td>
</tr>
<tr>
<td>Muscle area</td>
<td>1.04 (0.85, 1.26)</td>
<td>1.19 (0.94, 1.50)</td>
<td>1.19 (0.94, 1.50)</td>
<td>1.05 (0.82, 1.35)</td>
</tr>
<tr>
<td>Muscle mass</td>
<td>1.14 (0.93, 1.38)</td>
<td>1.31 (1.03, 1.65)</td>
<td>1.30 (1.03, 1.65)</td>
<td>1.16 (0.90, 1.48)</td>
</tr>
</tbody>
</table>

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