Identifying Quadriceps Muscle Composition Differences in Young and Older Adults: 
An Ultrasound Approach

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### STUDY RATIONALE
- Advancing age is accompanied by changes in the structure and composition of skeletal muscle.
- Ultrasound (US) represents a practical and non-invasive strategy to assess differences / changes in skeletal muscle composition through assessment of echogenicity, or the brightness of the image.

### STUDY AIM
To identify the extent to which US can detect differences between young and older adults in quadriceps echogenicity, and to determine how imaging site / anatomical location impacts the comparison between young and older adults.

### SUBJECTS

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Age (yr)</th>
<th>Height (cm)</th>
<th>Weight (kg)</th>
<th>BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young</td>
<td>16</td>
<td>26 ± 4</td>
<td>171 ± 9</td>
<td>66 ± 12</td>
<td>22 ± 2</td>
</tr>
<tr>
<td>Old</td>
<td>12</td>
<td>70 ± 7</td>
<td>170 ± 11</td>
<td>75 ± 15</td>
<td>26 ± 4</td>
</tr>
</tbody>
</table>

Data are mean ± SD.

### METHODS
- Five total 2D B-mode US images (Terason uSmart 3300) of the quadriceps (right leg) were acquired after 20 minutes of supine rest.
- Two anterior plane images to capture rectus femoris (RF) and vastus intermedius (VI) were obtained at 39% (A1) and 56% (A2) of femur length (from inferior).
- Three lateral plane images to capture vastus lateralis (VL) and VI were obtained at 22% (L1), 39% (L2), and 56% (L3) of femur length (from inferior).
- Individual muscle echogenicity was measured using Fiji (Image J) software by outlining the muscle and obtaining the mean pixel brightness (0=Black, 255=White).

### RESULTS

#### Collapsed Across All Muscles and Imaging Sites

#### Collapsed Across Imaging Sites

#### Imaging Site Specific (RF and VL)

#### Imaging Site Specific (VI)

### CONCLUSIONS
- These data indicate that US is able to detect differences in echogenicity / composition between skeletal muscle of young and older adults, however, differences were not homogenous among the quadriceps muscles.
- Future research should couple US-based measures of skeletal muscle composition with functional / clinical outcomes to better understand the role that echogenicity assessment can provide in regard to muscle health, performance, and function.

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FUNDING: Supported by CWU School of Graduate Studies and Research