AGEs are associated with the intensity of back pain symptoms in patients with lumbar spinal stenosis

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Disclosure

No conflict of interest
Advanced glycation end products (AGEs) affect cells and trigger the generation of free radicals and expression of inflammatory mediators in the body. AGEs are also thought to be a factor in the aging process. We reported the association between decreasing muscle mass in men and increasing fat mass in women with increasing AGEs.

Autofluorescence (AF) is a proposed marker for accumulation of AGEs in the skin. Skin AF, associated with the content of AGEs, such as pentosidine from skin biopsies, has been reported as a non-invasive method of measuring AGE deposition.

However, there have been no reports examining skin AF in patients with low back pain. This study measured the relationship between AF and the intensity of low back pain, leg pain, and leg numbness in patients with lumbar spinal stenosis (LSS).
Material and Method

Among the 160 patients with LSS that were treated at our center from September 2017 to May 2019, a total of 116 patients was included in this study. Because 44 patients were excluded owing to the presence of diabetes, which is reported to be associated with AGEs.

LSS was diagnosed by spine surgeons through physical and neurological examinations and MRI.

AF was measured by placing a RQ-AG01J device (Sharp Life Science Corporation, Japan) on the middle finger for 30 seconds.

Statistical Analysis

Low back pain, lower limb pain and numbness of the lower limbs were quantitatively measured by NRS, and the relationship with AF value was analyzed by Spearman’s rank correlation coefficient. The significance level was set to 5% or less.
### Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of participants</td>
<td>116</td>
<td>46</td>
<td>70</td>
</tr>
<tr>
<td>Age (years)</td>
<td>73.7 (9.2)</td>
<td>73.9 (10.0)</td>
<td>73.6 (8.6)</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>157.3 (12.4)</td>
<td>116.1 (6.5)</td>
<td>151.6 (5.9)</td>
</tr>
<tr>
<td>Weight (cm)</td>
<td>58.0 (12.4)</td>
<td>66.8 (12.4)</td>
<td>52.1 (8.4)</td>
</tr>
<tr>
<td>AF value</td>
<td>0.51 (0.12)</td>
<td>0.55 (0.15)</td>
<td>0.48 (0.10)</td>
</tr>
<tr>
<td>NRS score of low back pain</td>
<td>4.63 (2.8)</td>
<td>4.74 (2.6)</td>
<td>4.58 (2.9)</td>
</tr>
<tr>
<td>NRS score of leg pain</td>
<td>5.07 (2.8)</td>
<td>5.34 (2.4)</td>
<td>4.89 (2.9)</td>
</tr>
<tr>
<td>NRS score of numbness</td>
<td>4.25 (3.0)</td>
<td>4.89 (2.8)</td>
<td>3.83 (3.2)</td>
</tr>
</tbody>
</table>

Mean (standard deviation) AF: Autofluorescence  NRS: numerical rating scale.

The subjects were 46 men (average age 73.9 years) and 70 women (73.6 years old). The average AF value was 0.51 ± 0.12. The mean NRS was 4.5±2.7 for low back pain, 4.8±2.9 for lower limb pain, and 4.3±3.0 for lower limb numbness.
There was significant correlation between AF and NRS scores of low back pain.

\[ r = 0.20 \ (p < 0.05). \]
There was no significant correlation between AF and NRS scores leg pain. $r = 0.15$ ($p = 0.14$).
There was no significant correlation between AF and NRS scores of leg numbness. $r = 0.07 \ (p = 0.5)$. 
Chemical stimuli and inflammatory mediators such as cytokines following trauma or disease have been found to increase the effect of AGEs on sensory nerve hyper-excitability.

Eguchi Y, et al. Eur Spine J 2018

Accumulation of AGEs was significantly associated with the intensity of low back pain in patients with LSS, but no significant association with leg symptoms was found. Therefore, the accumulation of AGEs may cause degeneration of the muscle rather than neurodegeneration.
This study measured the relationship between AF and the intensity of low back pain, leg pain, and leg numbness in patients with lumbar spinal stenosis.

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Therefore, the accumulation of AGEs may cause degeneration of the muscle rather than neurodegeneration.