Early Life Adversity is Associated With Biomarkers of Endothelial Dysfunction in Women Veterans

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Significance

- Veterans experience higher rates of coronary artery disease and stroke than non-Veterans

- Women Veterans have greater histories of abuse than civilians (Aversa, Lemmer, Nunnink, McLay & Baker, 2014)

- Early life adversity is associated with inflammation that can lead to endothelial dysfunction, a precursor to cardiovascular disease (Ehrlich, Ross, Chen & Miller, 2016)
Measures

Early life adversity — Childhood Trauma Questionnaire (Bernstein et al., 2003)

Physiological measures

- **Cardiovascular risk** — Reynolds Score (systolic blood pressure, history of parental myocardial infarction, Hba1c, cholesterol, hsCRP)

- **Endothelial dysfunction**
  - Soluble vascular adhesion molecule-1 (sVCAM-1)
  - sVCAM-1 plays important role in development of atherosclerosis by promoting inflammatory molecules through the endothelium
  - High levels of sVCAM-1 strongly associated with endothelial dysfunction (Mulvihill, Foley, Crean & Walsh, 2002)
Endopat-2000

Representation of Endo-Pat Waveform
Preliminary Baseline
Demographics

N=117 women veterans
Mean age – 50.1 years old (range 24-77)

Race
- White – 51.3%
- African American – 41%
- Other (Asian, Pacific Islander, American Indian) – 7.8%
Preliminary Baseline
Demographics

Household income
- <$25,000 – 42.3%
- $25,001 - $50,000 – 26.1%
- $50,001 - $75,000 – 14.4%
- >$75,001 - 13.5%

Highest educational level
- High school or GED - .9%
- Some college or technical school – 42.1%
- College graduate – 31.6%
- Post college degree – 24.6%
## Cardiovascular Risk Factors

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Mean</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>32.1</td>
<td>26% - Overweight</td>
</tr>
<tr>
<td></td>
<td></td>
<td>56% - Obese</td>
</tr>
<tr>
<td>SBP</td>
<td>116</td>
<td></td>
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<tr>
<td>DBP</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>HbA1c</td>
<td>5.76</td>
<td>26.8% (5.7-6.4% - pre-diabetes)</td>
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<tr>
<td></td>
<td></td>
<td>23.6% (&gt;6.5% - diabetes)</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>117</td>
<td>33% had levels &gt;150</td>
</tr>
<tr>
<td>Total cholesterol</td>
<td>184</td>
<td>39% had levels &gt;200</td>
</tr>
<tr>
<td>HDL</td>
<td>59</td>
<td>11% had levels &lt;40</td>
</tr>
<tr>
<td>LDL</td>
<td>103</td>
<td>55% had levels &gt;200</td>
</tr>
<tr>
<td>Currently smoking</td>
<td>17.2%</td>
<td></td>
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</tbody>
</table>
Endothelial Dysfunction

Endo-Pat- non-invasive measure of arterial tone changes in peripheral arterial beds.

- A Reactive Hyperemia Index (RHI) score of $\leq 1.67$ is indicative of endothelial dysfunction
  - RHI $\leq 1.67$ (red zone) 28%
  - RHI 1.68-2 (yellow zone) 37.8%
  - RHI 2.3 to 3 (green zone) 34.1%

Circulating vascular cell adhesion molecule-1 (sVCAM)

- Mean = 1762.7 ng/ml (higher than in community dwelling participants – (Achille et al., 2015))
Early Life Adversity

• Average total Childhood Trauma Questionnaire (CTQ) score: 52.28 (SD 19.71)

• In a community sample of women, a total CTQ score of 43 ranked in 90th percentile (Scher, Stein, Asmundson, Mccreary & Forde, 2001)
# Early Life Adversity

## Childhood Trauma Questionnaire (CTQ)

<table>
<thead>
<tr>
<th>CTQ Subscale</th>
<th>Women Veterans (N=117) Mean age 50.1</th>
<th>Breast Cancer Sample* (N=40) Mean age 55.6 ±9.4</th>
<th>Low-income African American Men** (N=34) Mean age 20.0 ±2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional Neglect</td>
<td>12.4 ±5.4</td>
<td>9.2±4.9</td>
<td>10.2 ±4.5</td>
</tr>
<tr>
<td>Physical Neglect</td>
<td>8.5 ±4.0</td>
<td>6.6±2.6</td>
<td>7.8±3.5</td>
</tr>
<tr>
<td>Emotional Abuse</td>
<td>11.7 ±6.1</td>
<td>8.9±4.9</td>
<td>7.6±3.6</td>
</tr>
<tr>
<td>Physical Abuse</td>
<td>9.9 ±4.9</td>
<td>6.9±4.3</td>
<td>8.3±3.1</td>
</tr>
<tr>
<td>Sexual Abuse</td>
<td>10.3±6.7</td>
<td>6.8±3.4</td>
<td>6.5±3.9</td>
</tr>
</tbody>
</table>
sVCAM-1 and Childhood Maltreatment

Higher levels of childhood maltreatment associated with higher levels of sVCAM-1

- Emotional abuse $r=.207$, $p=.043$
- Emotional neglect $r=.328$, $p=.001$
- Physical neglect $r=.195$, $p=.05$

* Controlling for age, body mass index, and smoking status*)
Conclusions and Implications

• Results demonstrate that women veterans experience high levels of early life adversity and that levels of early life adversity are associated with a biomarker of endothelial dysfunction.

• Measurement of early life adversity and sVCAM-1 may be important markers of cardiovascular disease risk in women.

• Additional research is needed to assess early life adversity and endothelial dysfunction in civilian populations.
Questions????
References


