Life’s Simple 7 and Risk of Peripheral Artery Disease

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Disclosures

CL Wassel and co-authors have no disclosures.
Background

- 8.5 million in the US and 202 million globally affected by lower extremity peripheral artery disease (PAD)

- Substantially ↑ risk of CV events, mortality, and functional decline

- In 2010, AHA initiated tracking of Life’s Simple 7 (LS7) health metrics → goal of improving CV health of all Americans by 2020

- Association of LS7 with risk of PAD has not been previously examined
Objectives

To assess the magnitude of the association of Life’s Simple 7 score and individual components with:

- Incident PAD
- Change in the Ankle Brachial Index (ABI), the major diagnostic criterion for PAD, over time

in the Multi-Ethnic Study of Atherosclerosis (MESA)
The Multi-Ethnic Study of Atherosclerosis (MESA)

- Prospective population based cohort
- 6814 Caucasian, African American, Hispanic and Chinese men and women from 6 US field centers
- Current study: 5529 participants with complete LS7 data and without PAD at baseline
# Life’s Simple 7

<table>
<thead>
<tr>
<th>Metric</th>
<th>Poor Health</th>
<th>Intermediate Health</th>
<th>Ideal Health</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Smoking</strong></td>
<td>Current</td>
<td>Former ≤ 12 months</td>
<td>Never, former &gt;12 months</td>
</tr>
<tr>
<td><strong>BMI</strong></td>
<td>≥ 30 kg/m²</td>
<td>25-29.9 kg/m²</td>
<td>&lt; 25 kg/m²</td>
</tr>
<tr>
<td><strong>Physical Activity</strong></td>
<td>None</td>
<td>1 to 3x per week</td>
<td>≥ 4x per week</td>
</tr>
<tr>
<td><strong>Healthy Diet Score</strong></td>
<td>1 component</td>
<td>2-3 components</td>
<td>4-5 components</td>
</tr>
<tr>
<td><strong>Total Cholesterol</strong></td>
<td>≥ 240 mg/dL</td>
<td>200-239 mg/dL or treated to goal</td>
<td>&lt;200 mg/dL, not treated</td>
</tr>
<tr>
<td><strong>Blood pressure</strong></td>
<td>SBP ≥ 140 or DBP ≥ 90 mmHg</td>
<td>SBP 120-139 or DBP 80-89 or treated to goal</td>
<td>SBP&lt;120 and DBP&lt;80 mmHg, not treated</td>
</tr>
<tr>
<td><strong>Fasting glucose</strong></td>
<td>≥ 126 mg/dL</td>
<td>100-125 mg/dL or treated to goal</td>
<td>&lt;100 mg/dL, not treated</td>
</tr>
</tbody>
</table>
Life’s Simple 7 Scoring

- Each of the individual LS7 components receives a 0, 1, or 2 for inadequate, average or optimum CV health

- Overall continuous score, 0-14
- Overall categorical score:
  - Inadequate, 0-7 pts
  - Average, 8-11 pts
  - Optimum, 12-14 pts
Incident Peripheral Artery Disease

- The ABI available at Exams 1 (2000-02), 3 (2004-05) and 5 (2010-12)
- **Incident PAD**: ABI ≤ 0.90 at Exam 3 or 5
- Excluded: prevalent PAD (ABI ≤ 0.90 at Exam 1) or ABI > 1.4 at any exam

- **Significant change in the ABI**: *absolute* change > 0.15 vs. ≤ 0.15, Exam 1 to 5
- Does not exclude ABI > 1.4
Statistical Analysis

- Cox models for association of continuous and categorical LS7 scores with incident PAD
- Logistic regression for significant change in the ABI
- Poisson regression to calculate adjusted rates of PAD by LS7 categories
- Adjustments for age, sex, race/ethnicity, education, income; baseline ABI for change
## Characteristics by Incident PAD

<table>
<thead>
<tr>
<th></th>
<th>No Incident PAD</th>
<th>Incident PAD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=5278</td>
<td>n=251</td>
</tr>
<tr>
<td>Age, years</td>
<td>61 ± 10</td>
<td>68 ± 9</td>
</tr>
<tr>
<td>Female Gender, n(%)</td>
<td>2756 (52%)</td>
<td>155 (62%)</td>
</tr>
<tr>
<td>Race/Ethnicity, n(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic White</td>
<td>2145 (41%)</td>
<td>82 (33%)</td>
</tr>
<tr>
<td>Chinese</td>
<td>676 (13%)</td>
<td>18 (7%)</td>
</tr>
<tr>
<td>African-American</td>
<td>1309 (25%)</td>
<td>105 (42%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1148 (22%)</td>
<td>46 (18%)</td>
</tr>
<tr>
<td>Education, n(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤High School</td>
<td>1764 (33%)</td>
<td>109 (43%)</td>
</tr>
<tr>
<td>Some college</td>
<td>1503 (28%)</td>
<td>70 (28%)</td>
</tr>
<tr>
<td>≥Bachelor’s degree</td>
<td>2010 (38%)</td>
<td>72 (29%)</td>
</tr>
<tr>
<td>Income&gt;$50k, n(%)</td>
<td>2196 (43%)</td>
<td>75 (32%)</td>
</tr>
<tr>
<td>Life’s Simple 7 Score</td>
<td>8.5 ± 2.0</td>
<td>7.5 ± 2.2</td>
</tr>
<tr>
<td>Simple 7 Categories, n(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate (0-7 pts)</td>
<td>1616 (31%)</td>
<td>128 (51%)</td>
</tr>
<tr>
<td>Average (8-11 pts)</td>
<td>3279 (62%)</td>
<td>118 (47%)</td>
</tr>
<tr>
<td>Optimum (12-14 pts)</td>
<td>383 (7%)</td>
<td>5 (2%)</td>
</tr>
</tbody>
</table>
PAD cases: LS7 and race/ethnicity

- Caucasian, n=82
  - Inadequate: 1%
  - Average: 54%
  - Optimum: 45%

- Chinese, n=18
  - Inadequate: 17%
  - Average: 11%
  - Optimum: 72%

- African American, n=105
  - Inadequate: 0%
  - Average: 43%
  - Optimum: 57%

- Hispanic, n=46
  - Inadequate: 35%
  - Average: 63%
  - Optimum: 2%
## Associations with PAD and the ABI

<table>
<thead>
<tr>
<th>Life’s Simple 7</th>
<th>PAD Incidence Rate Per 1000 Person Years</th>
<th>Incident PAD HR (95% CI)</th>
<th>Significant Change in the ABI OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per 1 point higher</td>
<td>--</td>
<td>0.83 (0.78, 0.88)</td>
<td>0.92 (0.88, 0.95)</td>
</tr>
<tr>
<td>Categories:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate (0-7 pts)</td>
<td>17.8</td>
<td>ref</td>
<td>ref</td>
</tr>
<tr>
<td>Average (8-11 pts)</td>
<td>8.6</td>
<td>0.51 (0.38, 0.66)</td>
<td>0.66 (0.55, 0.78)</td>
</tr>
<tr>
<td>Optimum (12-14 pts)</td>
<td>4.1</td>
<td>0.24 (0.10, 0.59)</td>
<td>0.62 (0.43, 0.87)</td>
</tr>
</tbody>
</table>
Individual LS7 Components and PAD
Individual LS7 Components and ABI

- BP
- Cholesterol
- Glucose
- Physical Activity
- Healthy Diet
- BMI
- Smoking

![Graph showing hazard ratio for different components of LS7 and ABI](image)
Conclusions

• Maintaining average or optimum CV health results in:
  • substantially reduced risk of PAD
  • more constant level of the ABI over time

• Encouraging improvement in health behaviors and treatment to achieve and maintain better levels of CV health metrics → decreasing the rate of PAD
Acknowledgements

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- MESA Coordinating Center

- MESA participants!
Extra Slides
Change in the ABI

n=444 vs. n=856 with differing definitions

However, if we model change in the ABI as <-0.15 vs ≥-0.15, results are similar:

Per 1 point: 0.92 (0.87, 0.97); p=0.003

Average vs. Inadequate: 0.74 (0.58, 0.93); p=0.0116
Optimum vs. Inadequate: 0.54 (0.32, 0.90); p=0.0179