Role of Pulse Wave Velocity (PWV) in Diagnosing Arteriosclerosis

**DIAGNOSIS THROUGH PWV**

The benefits of PWV are well documented. In 1809 Thomas Young discovered the connection between the pulse wave and arterial stiffness. Since that time, many studies have been produced quantifying this connection. The most impactful study is the Framingham Heart Study conducted by the National Institutes of Health (NIH). This longitudinal study of over 2,200 participants measured the effectiveness of PWV screening in determining arterial stiffness and cardiovascular events in patients with and without symptoms. It concluded that PWV is a non-invasive, safe, & readily implemented screening within an office setting. It also determined that there is a relationship between an increase in PWV and an increase in risk for a cardiovascular event: “PWV was associated with a 48% increase in risk for a first major cardiovascular disease event”.

**5 MINUTE. NON-INVASIVE PWV SCREENING**

Through infra-red analysis, we are able to quickly assess arterial stiffness along with 15 other key insights into a patient’s cardiovascular and autonomic nervous system health including. Additional insights include blood circulation & residual blood volume after contraction of the heart, left ventricular ejection, contraction power, mental stress, physical stress, and resistance to stress.

- Overall cardiovascular health
- Heart rate variability
- Overall elasticity of large, small and peripheral arteries
- Arteriosclerosis progress
- Blood circulation
- Residual blood volume after heart contraction
- Heart contraction power
- Mental stress
- Physical stress
- Resistance to stress

**The Framingham Heart Study**

- Ongoing study conducted by The National Institutes of Health beginning in 2010
- Over 2,200 participants
- Study measures the effectiveness of Pulse Wave Velocity screening in determining arterial stiffness and cardiovascular events in patients with and without symptoms

**Key Findings:**

- Measurement of Pulse Wave Velocity is non-invasive, safe, and readily implemented in an office setting
- Relationship between increase in Pulse Wave Velocity and increase in risk for a first major cardiovascular disease event

Copy of complete study found at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2836717/pdf/NIHMS172819.pdf
Role of Pulse Wave Velocity (PWV) in Treating Arteriosclerosis

**STAGES OF ATHEROSCLEROSIS**

Arteries are affected by an innumerable amount of factors: gene-pool, lifestyle, disease, and aging all contribute towards atherosclerotic plaque and endothelial dysfunction. Although many sources have presented multiple stages of atherosclerosis, the chart below describes the primary phases.

**PWV SCREENING RESULTS**

PWV screening provides many cardiovascular and autonomic nervous system insights. One of the key insights derived is the waveform pattern. This pattern identifies the type of vessels that are found systemically throughout a patient’s body. A corresponding diagram is provided below:
Role of Pulse Wave Velocity (PWV) in Treating Arteriosclerosis

As arteries age and progress towards greater levels of atherosclerosis, it is important to customize the clinical approach with each patient; the approach will change depending on the arterial age based on PWV screening. The table below provides a suggestion for patient or clinical next steps within a primary care setting.

<table>
<thead>
<tr>
<th>Level</th>
<th>Vascular Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>This is a normal wave. It is found in a young and healthy person. Blood circulation and arteries are very good.</td>
</tr>
<tr>
<td>2</td>
<td>Circulation is below normal, with few symptoms. Some plaque is in the arteries.</td>
</tr>
<tr>
<td>3</td>
<td>Circulation is below normal and decreasing. There is possible arterial congestion and plaque is affecting the circulation. Consider Internist.</td>
</tr>
<tr>
<td>4</td>
<td>Circulation is in a relatively bad state. There is possible edema. Hands and feet getting cold. Signs of aging. Stiffer arteries. Consider Internist.</td>
</tr>
<tr>
<td>6</td>
<td>Exceptionally bad circulation. Hands and feet could be numb or worse. Very stiff arteries with slowed blood flow. See a specialist.</td>
</tr>
<tr>
<td>7</td>
<td>Circulation is such that diagnosis by a specialist is urgently recommended. Minimal blood flow.</td>
</tr>
</tbody>
</table>

*Recommendations are for informational purposes only. We do not provide medical advice, diagnosis or treatment. Always seek the advice from a qualified healthcare provider with any questions regarding a medical condition.

There are many sources for the treatment of atherosclerosis ranging from the American Heart Association to the NIH. Treatment guidelines from NIH are summarized below, but details are found at [http://www.nhlbi.nih.gov/health/health-topics/topics/atherosclerosis/treatment](http://www.nhlbi.nih.gov/health/health-topics/topics/atherosclerosis/treatment). The goals of treatment include: relieving symptoms, reducing risk factors in an effort to slow or stop the buildup of plaque, lowering the risk of blood clots forming, widening or bypassing plaque-clogged arteries, preventing atherosclerosis-related diseases.

Treatments for atherosclerosis may include lifestyle changes, medicines, and medical procedures or surgery. Lifestyle changes include following a healthy diet, being physically active, maintaining a healthy weight, quitting smoking, and managing stress. Consider referring to a specialist for additional screening and treatment.