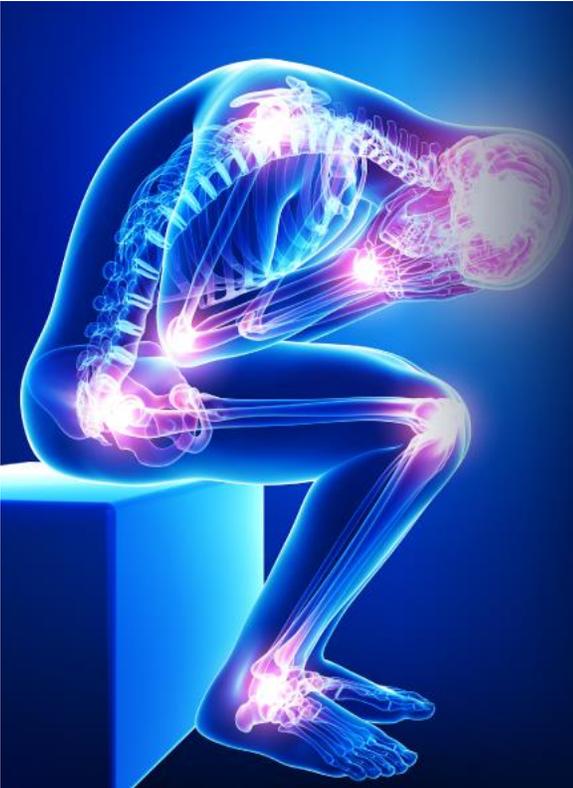


## Top 5 Blood Tests for Inflammation



It is one of the most insidious causes of disease that we overlook. Chronic inflammation is persistent, low-grade inflammation that can last for years. It is a precursor to accelerated aging and disease.

In fact, inflammation has been linked to almost every major health problem. It inhibits optimal function of your body from a cellular level, making you a slower healer and promoting disease at the deepest level. Luckily, there are advanced tests for inflammation that can help you design an anti-inflammatory lifestyle. There are several tests that can help determine the level of inflammation in your body. These tests should be performed routinely as a preventative measure and to monitor inflammatory status. This article will discuss what inflammation is, the top 5 tests for inflammation, and how you can test your own.



### 8 Ways Chronic Inflammation Can Damage Your Body

- Memory loss and cognitive decline
- Increased cardiovascular risk
- Abnormal growth of healthy cells
- Compromised digestive function
- Loss of muscle tone
- Weight gain
- Accelerated skin aging
- Joint pain and loss of mobility

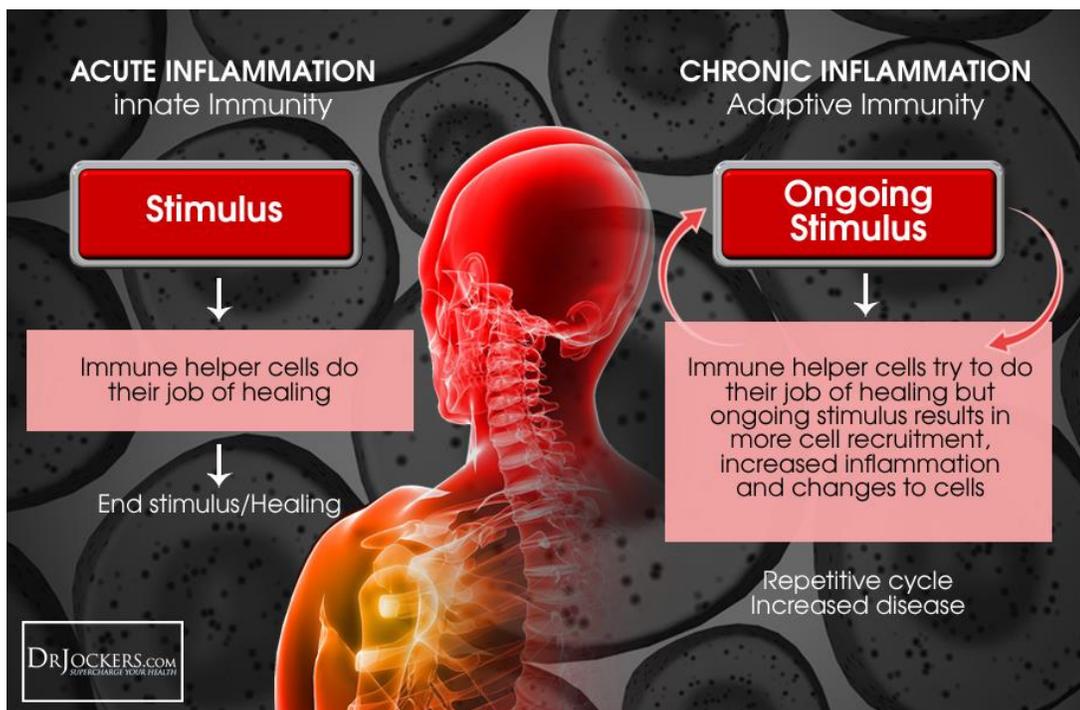
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## What is Inflammation?

Inflammation is the body's natural defense mechanism. It is part of the body's innate immune system and can be triggered by many things. It is a complex process by which the body's white blood cells are released into the blood or affected tissues to fight infection. Inflammation is essentially the body's way of tagging a part of the body to receive attention from the immune system.

There are two types of inflammation, acute and chronic. Acute inflammation starts quickly and generally disappears within a few days. Acute inflammation protects us against damaged cells, viruses, and bacteria. In this way, inflammation is beneficial.

Chronic inflammation is systemic inflammation that can last for months or years. Many things can contribute to chronic inflammation including inflammatory foods, environmental toxins, excess weight, and stress.



## Chronic inflammation & Disease

Chronic inflammation occurs when our bodies are repeatedly exposed to these influences and inflammatory mediators are produced throughout the body. The immune system becomes overwhelmed as the ongoing stimulus results in more cell recruitment, increased inflammation, and changes to cells.

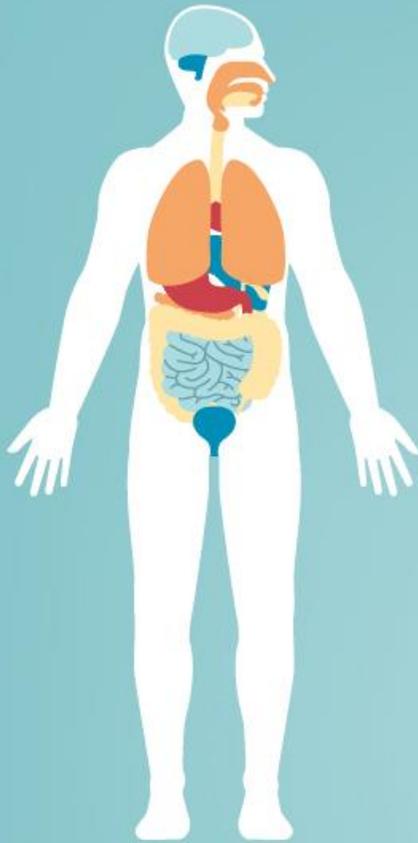
White blood cells will eventually start attacking internal organs or other necessary tissues and cells, which is characteristic of autoimmunity. This inflammatory response continues until the cause of the inflammation is addressed.

Chronic inflammation is at the root of most, if not all chronic diseases including cancer, ALS, and heart disease (1). It also increases the risk for diabetes and weight gain, aging, lung issues, increased bone loss and lack of bone growth, and depression.

Autoimmune diseases are also a result of inflammation. In autoimmune disease, the body's immune system triggers an inflammatory response to its own tissues. The body responds as if normal tissues are infected and attacks these tissues. Autoimmune diseases, such as Hashimoto's thyroiditis and arthritis, develop as a result.

# How Inflammation Affects the Body?

"Inflammation is at the root of practically all known chronic health conditions"



## BRAIN

Pro-inflammatory cytokines cause autoimmune reactions in the brain, which can lead to depression, autism, poor memory, Alzheimer's disease and MS.



## CARDIOVASCULAR

Inflammation in the heart & arterial & venous walls contributes to heart disease, strokes, high blood sugar (diabetes) and anemia.



## MUSCLE

Inflammatory cytokines can cause muscle pain and weakness. Can manifest as carpal tunnel syndrome, or polymyalgia rheumatica, to name a few.



## BONES

Inflammation interferes with the body's natural ability to repair bone mass, increasing the number of fractures & leading to conditions like osteoporosis.



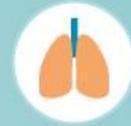
## SKIN

Chronic inflammation compromises the liver & kidneys, resulting in rashes, dermatitis, eczema, acne, psoriasis, wrinkles & fine lines.



## THYROID

Autoimmunity as a result of inflammation can reduce total thyroid receptor count and disrupts thyroid hormone function.



## LUNGS

Inflammation induces autoimmune reactions against the linings of airways. Can result in allergies or asthma.



## GI TRACT

Chronic inflammation damages our intestinal lining and can result in issues like GERD, Chron's disease and Celiac disease.



## KIDNEYS

Inflammatory cytokines restrict blood flow to the kidneys. Complications like edema, hypertension, nephritis & kidney failure can result.



## LIVER

Build-up of inflammation leads to an enlarged liver or fatty liver disease. Increased toxic load build-up in the body.

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## Inflammation & Mitochondria

Mitochondria are tiny structures within just about every cell of your body. They are responsible for producing the energy your cells need to carry out their functions. What many people don't realize is that these tiny structures are also very vulnerable to chronic inflammation.

What this means is that chronic inflammation damages mitochondria, lowers your body's overall ability to function and heal, and steals energy from just about every process in your body.

It is critical to test for inflammation and take measures to reduce inflammation in the body. The best tests for inflammation are Fasting Insulin, HgA1C, C Reactive Protein, Serum Ferritin, and Red Blood Cell Width. Each of these tests will be explained below and both clinical and optimal ranges will be given.

## The Role of the Mitochondria

- ✓ Energy Powerhouse of the Cell
- ✓ Produces Cellular Energy - ATP
- ✓ Maintains Glutathione levels
- ✓ Protects DNA
- ✓ Signals Cell Reproduction
- ✓ Activates Cell Apoptosis
- ✓ Maintains Cell Electrochemical Integrity



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### 5 Tests for Inflammation

With most health issues it can be extremely helpful to test and retest inflammatory markers periodically when attempting to overcome a health challenge. This will allow for detection of specific target points and will make progress easier to track moving forward.

I find that having these markers recorded at the beginning of a health plan generally improves the outcomes by providing quantifiable data points that can be monitored throughout the process.

### Top 5 Blood Tests For Inflammation

- 1) Fasting Insulin
- 2) Hemoglobin A1C (HgA1C)
- 3) C Reactive Protein (CRP-Hs)
- 4) Serum Ferritin
- 5) Red Blood Cell Width (RBW)

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## Fasting Insulin

The fasting insulin level test is a valuable test for detecting levels of inflammation. Insulin is a hormone that is produced and stored in the pancreas. Insulin helps transport glucose from the blood to cells. When the body recognizes that blood sugar is elevating, the pancreas releases insulin.

Our bodies need some circulating insulin at all times. However, high or low insulin levels can be problematic. A high insulin level is a sign of insulin resistance or diabetes. The association of obesity, insulin resistance, and chronic low-grade inflammation has been evident for years. All are related to aging as well (2).

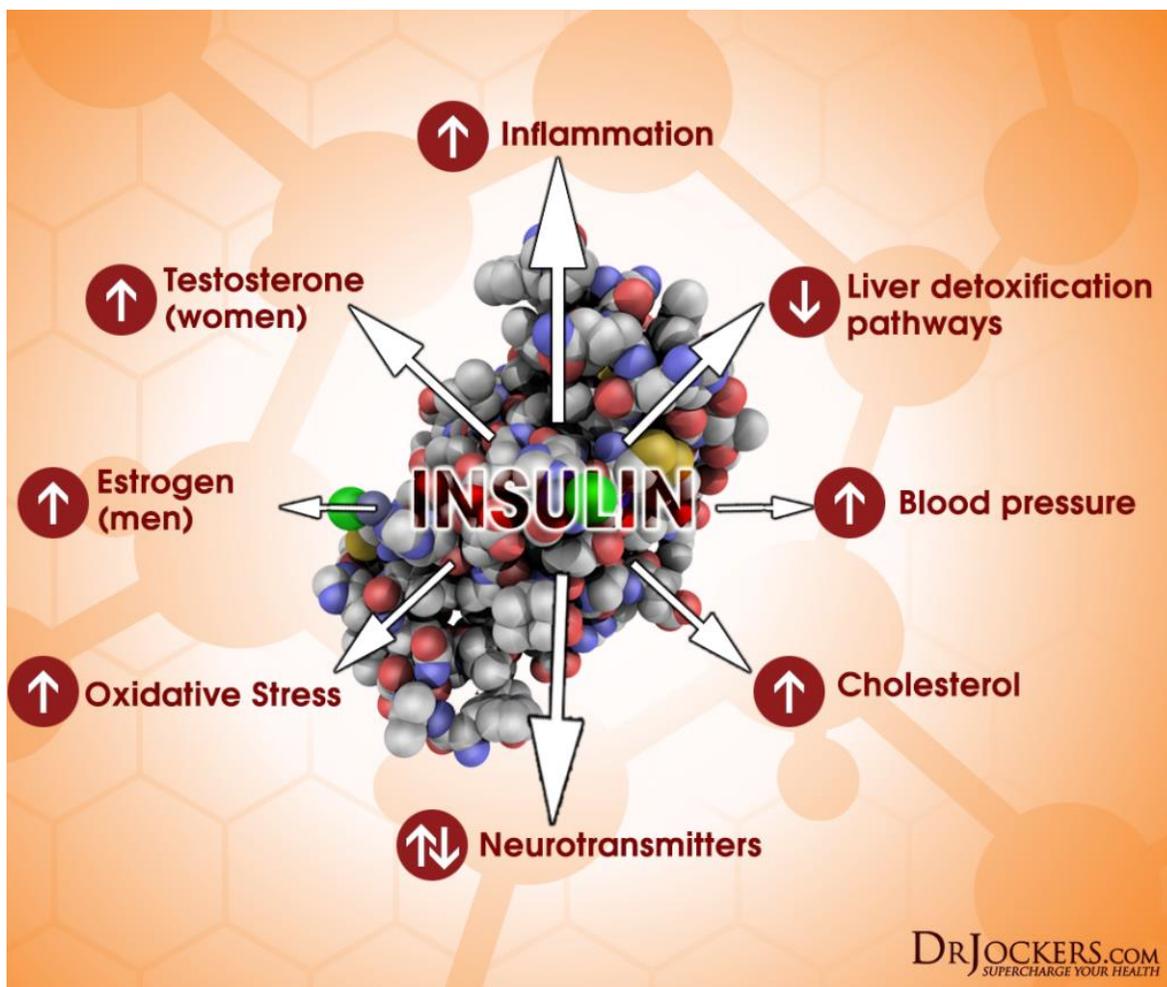
Insulin resistance is the decreased ability to respond to the effects of insulin. As a result, the body produces additional amounts of insulin which increases inflammatory processes within the body.

Over time, surges of insulin can cause chronic health complications. Health conditions associated with insulin resistance include type 2 diabetes, cardiovascular disease, obesity, and high blood pressure.

High fasting insulin can also indicate metabolic syndrome. Metabolic syndrome is a set of risk factors that increases a person's chance of developing serious conditions such as cardiovascular disease, type 2 diabetes, and stroke. These risk factors include: insulin resistance, abdominal obesity, unhealthy lipid levels, and high blood pressure. It is estimated that 34% of Americans have metabolic syndrome.

**Clinical Range: 2.6-24.9 uIU/ml**

**Optimal Range: 1.0-5.0 uIU/ml**



## Hemoglobin A1c

Hemoglobin A1c (HbA1c) gives the average amount of glucose in the blood, or blood sugar, over the past 3 months. It is one of the top tests for determining whether a person has inflammation.

Hemoglobin A1c (or glycated hemoglobin) is formed in the blood when glucose attaches to hemoglobin, the protein in red blood cells that carries oxygen. The higher the level of glucose in the blood, the more glycated hemoglobin is formed.

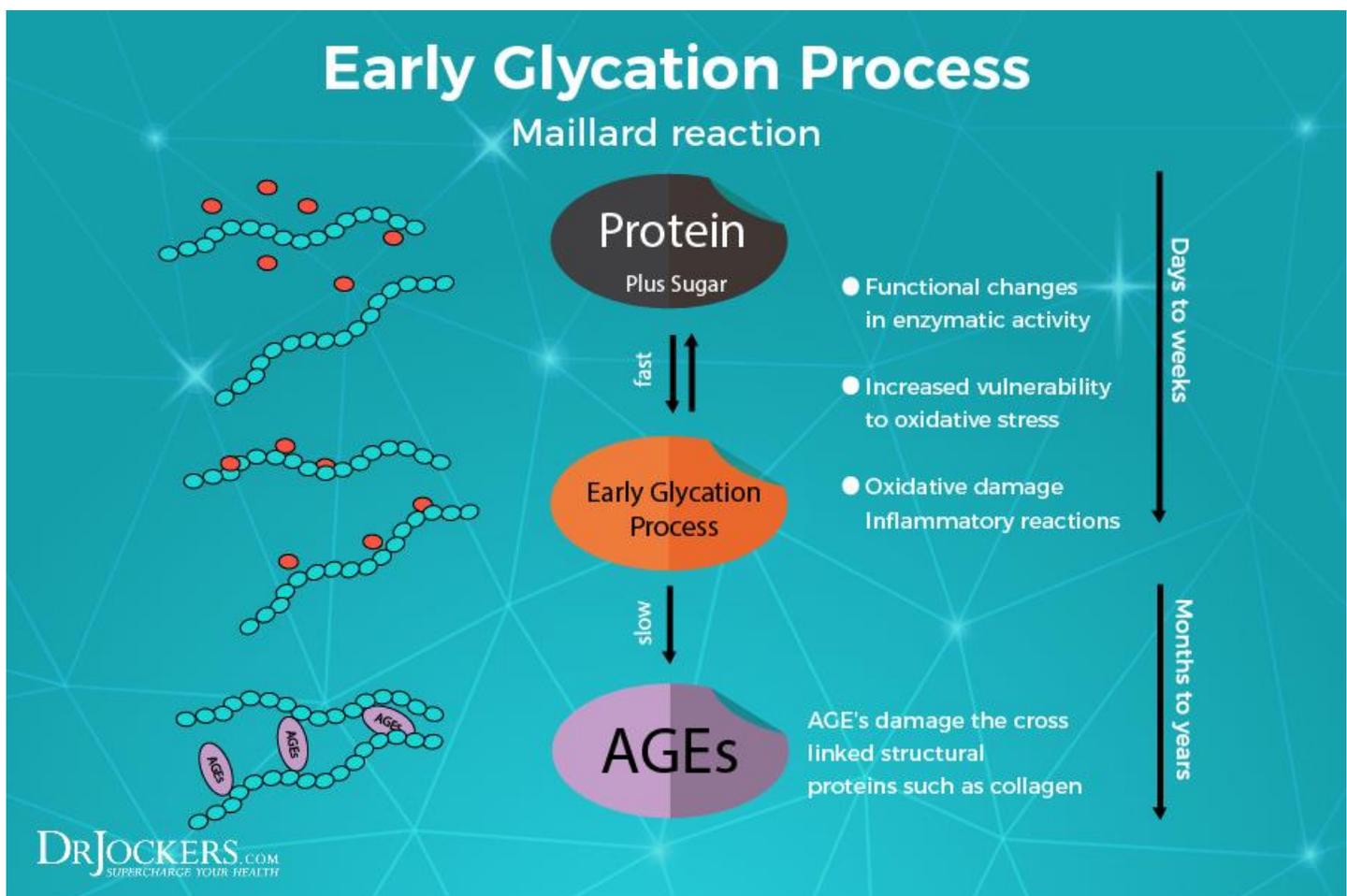
Red blood cells are constantly forming and dying, but typically they live for about 3 months. Thus, the A1c test reflects the average of a person's blood glucose levels over the past three months. The test is reported as a percentage. The higher the percentage, the higher a person's blood glucose levels have been.

The HbA1c test can screen for diabetes and prediabetes. It is also used to monitor the glucose control of diabetics over time. Chronically elevated glucose levels as reflected by a high HbA1c, can damage the body's organs and nerves.

Chronically elevated blood sugar reacts with enzymes and other protein molecules to create Advanced Glycolytic End Products (AGEs) (3). AGEs are highly inflammatory and damage tissue throughout the body. The result is neurological and cardiovascular complications which are common with diabetes.

**Clinical Range: 4.8-5.6**

**Optimal Range: 4.5-5.2**



## C-Reactive Protein (CRP)

The C-Reactive Protein (CRP) test is a blood test marker used to assess levels of inflammation in the body. CRP is a protein produced in the liver. It is an acute phase reactant, which means it increases or decreases in concentration with inflammation or trauma.

The best measurement to detect CRP is the high-sensitivity CRP (hs-CRP) test. This is often used for cardiovascular risk assessment since high-sensitivity CRP has been linked to heart disease and mortality (4).

CRP is also useful in diagnosing and monitoring chronic inflammatory conditions such as inflammatory bowel disease, arthritis, autoimmune diseases, and psychological issues (5). Measuring CRP gives the inflammatory status of the body and is critical for diagnosing and monitoring many chronic health conditions.

**Clinical Range: 0-3 mg/L**

**Optimal Range: 0-2 mg/L**

## A Simple BLOOD TEST that Can Save Your Life

*C-reactive protein (CRP) is a protein produced by the liver and found in the blood.  
The level of CRP rises when the body suffers inflammation.*

The American Heart Association categorizes the levels of CRP as follows:

Low CRP – less than 1.0 mg/L

Moderate CRP – 1-2mg/L

High CRP – anything over 2.0mg/L



Diabetes



Cancer



Heart Disease,  
Attacks & Strokes



Crohn's  
Disease



Obstructive  
Sleep Apnea



Rheumatoid  
Arthritis

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## Serum Ferritin

The ferritin test is a simple blood test that measures the level of ferritin in the body. Ferritin is a blood cell protein that stores iron. Low levels of ferritin indicate iron deficiency which causes anemia, a reduction in the number of red blood cells.

Like CRP, ferritin is an acute phase reactant. This makes a ferritin test useful in detecting a chronic disease process. Elevated levels of ferritin can indicate inflammation, liver disease, chronic infection, autoimmune disorders, and some types of cancer (6).

**Clinical Range: 30-400**

**Optimal Range: Females (25-100), Males (50-150)**

# Ferritin

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**Ferritin** is an intracellular protein that stores iron and releases it in a controlled fashion. The protein is produced by almost all living organisms, including algae, bacteria, higher plants, and animals. In humans, it acts as a buffer against iron deficiency and iron overload.

## Clinical Applications

### High Serum Ferritin

1. Iron overload
2. Acute inflammatory conditions
3. Liver disease
4. Alcohol excess



## Optimal range for ferritin is

### Male Ferritin Level ng/mL

Men: 50-150 (under 50 is low and over 150 is high)



### Female Ferritin Level ng/mL

Women: 25-100 (under 25 is low and over 100 is high)



## Red Blood Cell Width (RDW)

Red Cell Distribution Width (RDW) is an excellent test to detect inflammation in the body. A 2011 study found that RDW is a “robust predictor” of the risk of mortality from all causes and bloodstream infection (7). RDW reflects overall inflammation and oxidative stress.

RDW is an expression of the variation in size of the red blood cells that make up the total population of red blood cells in an individual. The size of the blood vessel has a lot to do with the maturation of the blood cells and this is dependent upon methylating agents such as folate and B12.

Red blood cells begin their life cycle very large but as they mature in the bone marrow, the overall width is reduced to a more optimal size to deliver oxygen and nutrients to the cells. Elevated RDW is associated with multiple diseases. RDW is a widely available, inexpensive test that is included in the complete blood count panel.

**Clinical Range: 12.3-15.4%**

**Optimal Range: 11.7-15%**