Casual Friday Series

The Hypertension-Inflammation Connection

A BIOGENETIX CLINICAL PRESENTATION

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Disclaimer

- *Information in this presentation is not intended, in itself, to diagnose, treat, reverse, cure, or prevent any disease. While this presentation is based on medical literature, findings, and text, The following statements have not been evaluated by the FDA.*
- *The information provided in this presentation is for your consideration only as a practicing health care provider. Ultimately you are responsible for exercising professional judgment in the care of your own patients.*

What is the #1 Killer in the US each year?

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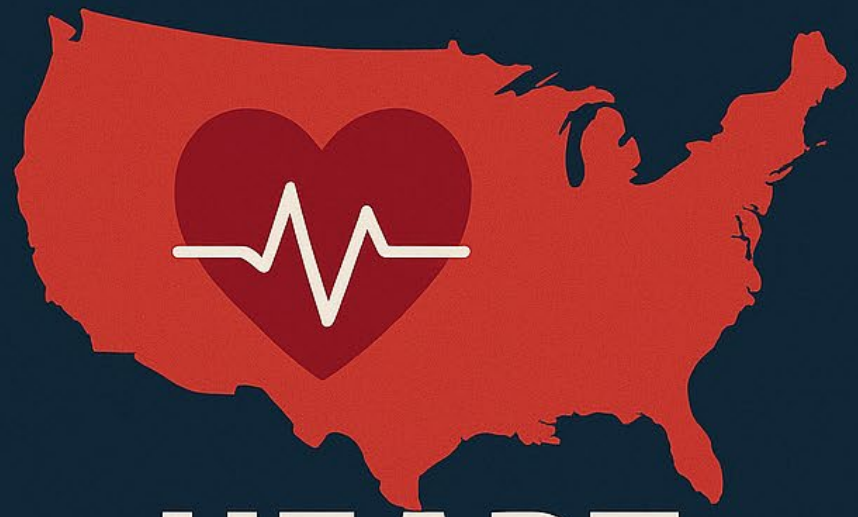
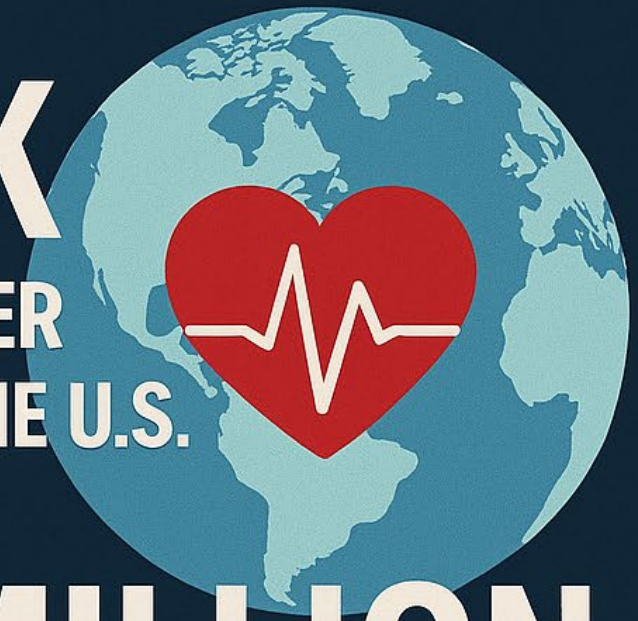
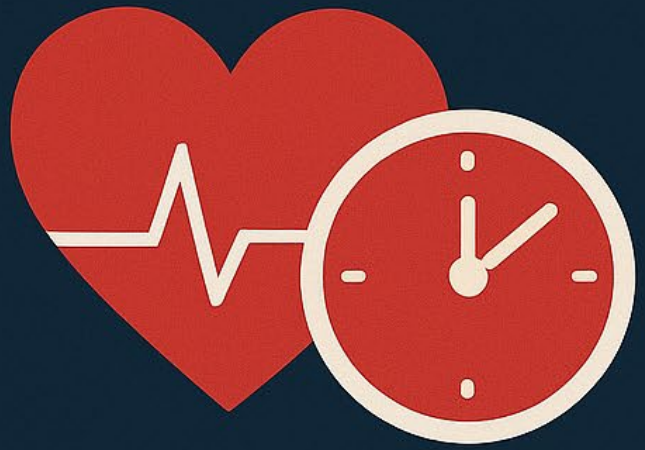


695K
DEATHS PER YEAR IN THE U.S.



HEART DISEASE

20 MILLION
DEATHS PER YEAR WORLDWIDE



EVERY 33 SECONDS
SOMEONE DIES FROM HEART DISEASE

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What is considered the Major Cause of Heart Disease?

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Hypertension
High Blood Pressure

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COMMON MISCONCEPTIONS ABOUT HYPERTENSION

MYTH	REALITY
“High blood pressure is all about salt.”	Inflammation & metabolic dysfunction are the real drivers.
“It’s genetic—you just have to take meds for life.”	Lifestyle & metabolic health play a huge role.
“If my numbers are normal on meds, I’m healthy.”	Meds don’t fix the underlying dysfunction.

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What is said to be the culprit with Hypertension?

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WORLD HEART FEDERATION

Despite being largely preventable, cardiovascular disease (CVD) causes more than 20.5 million deaths every year.

An estimated 80% of cardiovascular disease, including heart disease and stroke, is preventable.

There are many risk factors associated with heart disease and stroke. Some risk factors, like family history, cannot be modified, while others, like high blood pressure, can be modified through lifestyle interventions and treatment. Millions of people worldwide struggle to control the risk factors that lead to cardiovascular disease, and many others remain unaware that they are at high risk.

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What do we know is a leading driver of Hypertension?

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CHRONIC INFLAMMATION!!!

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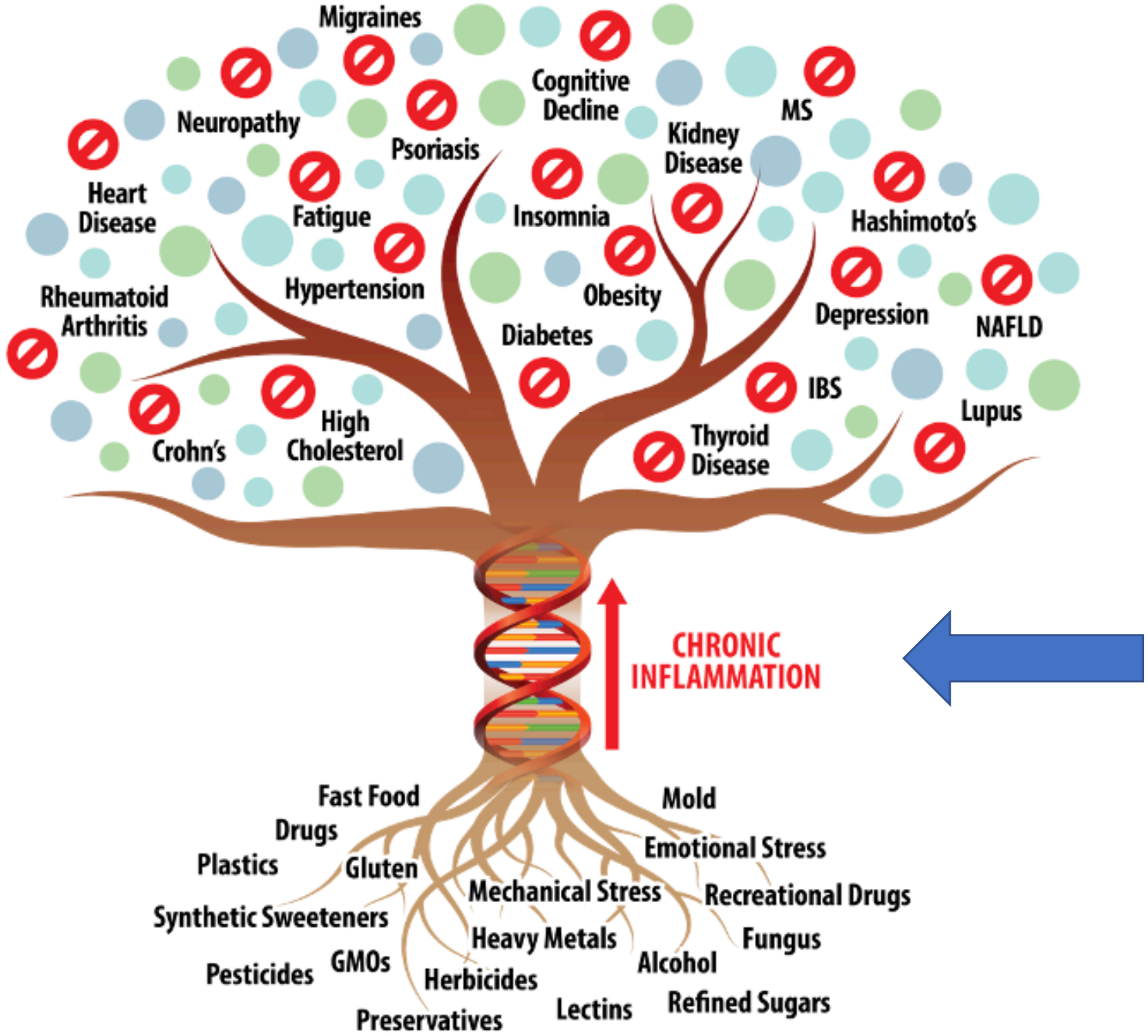

Migraines
Neuropathy
Psoriasis
Cognitive Decline
MS
Kidney Disease
Heart Disease
Fatigue
Insomnia
Hashimoto's
Hypertension
Obesity
Depression
NAFLD
Rheumatoid Arthritis
Diabetes
IBS
Lupus
Crohn's
High Cholesterol
Thyroid Disease
CHRONIC INFLAMMATION
Fast Food
Mold
Drugs
Emotional Stress
Plastics
Gluten
Mechanical Stress
Recreational Drugs
Synthetic Sweeteners
Heavy Metals
Fungus
Pesticides
GMOs
Alcohol
Herbicides
Lectins
Refined Sugars
Preservatives

The role of inflammation in hypertension: novel concepts

David M Patrick [1,2], Justin P Van Beusecum [1], Annet Kirabo [1]

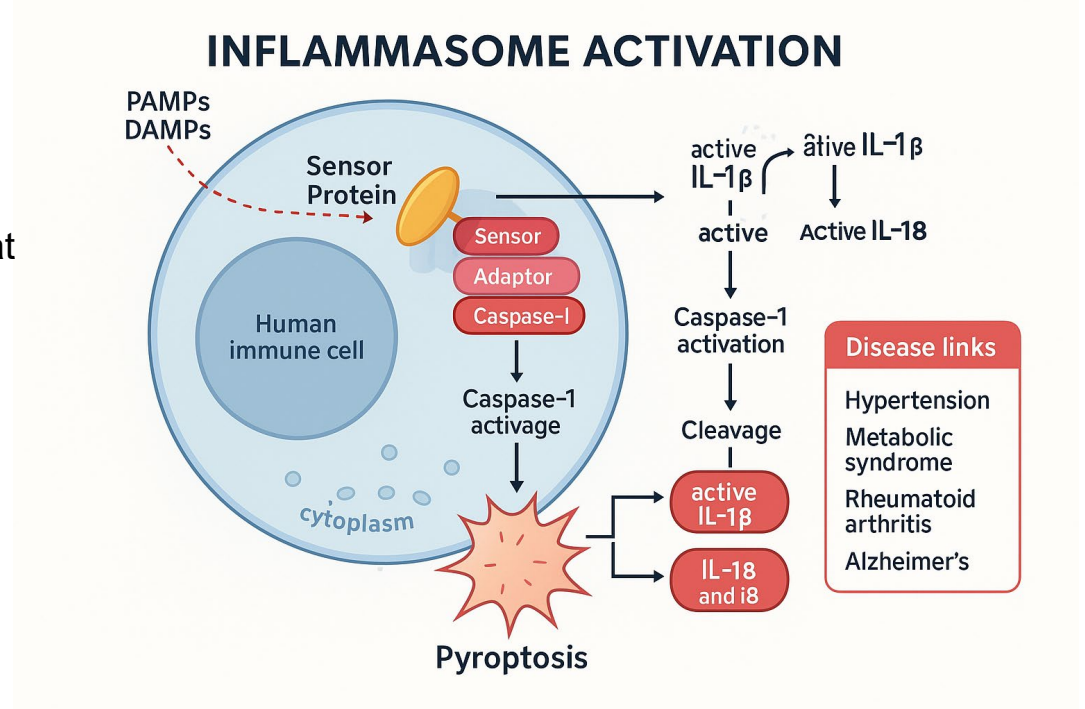
Author information Article notes Copyright and License information

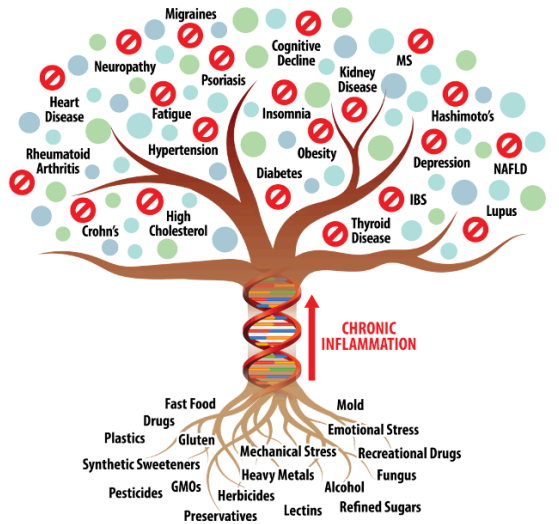
PMCID: PMC7552986 PMID: 33073072

Hypertension remains the most important modifiable risk factor for the development of cardiovascular disease. While it is clear that inflammation plays a pivotal role in the development and maintenance of hypertension, several novel discoveries have been made within the past decade that have advanced the field and have provided new mechanistic insights. First, recent studies have identified a central role of sodium-induced immune cell activation in the pathogenesis of hypertension by altering the gut microbiome and formation of products of lipid oxidation known as isolevuglandins. Second, cytokine elaboration by the inflammasome leading to end-organ dysfunction and immune activation has been found to play a role in the genesis of hypertension. Third, novel techniques have identified previously uncharacterized immune cell populations that may play a functional role in these processes.

The Inflammasome: The Spark Behind Chronic Inflammation

- The inflammasome is the immune system's **"fire alarm"**—a protein complex that detects stress or infection (PAMPs/DAMPs).
- **How It Works:**
  - **Sensor detects threat** (toxins, microbes, stressor)
  - **Activates caspase-1**
  - **Triggers:**
    - IL-1β & IL-18 (pro-inflammatory cytokines)
    - Pyroptosis – an inflammatory form of cell death
- **Why It Matters:**
  - If stuck "on," the inflammasome drives chronic inflammation
  - Leads to hypertension, insulin resistance, autoimmune conditions, neurodegeneration
- **What we see:**
  - Shows up as elevated hs-CRP, ferritin, homocysteine
  - Root-level triggers the "trunk" of the Root to Fruit model





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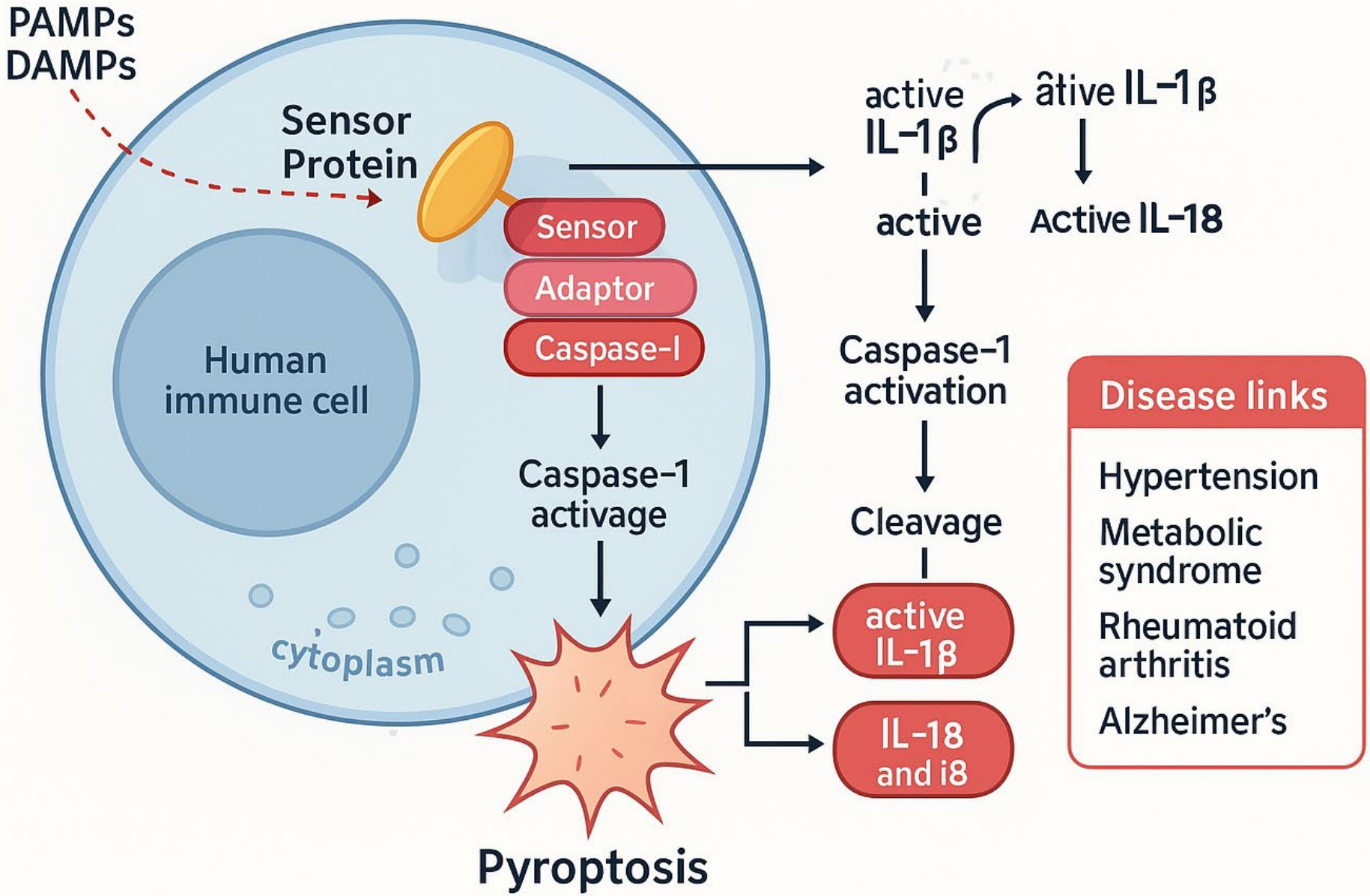
INFLAMMASOME ACTIVATION



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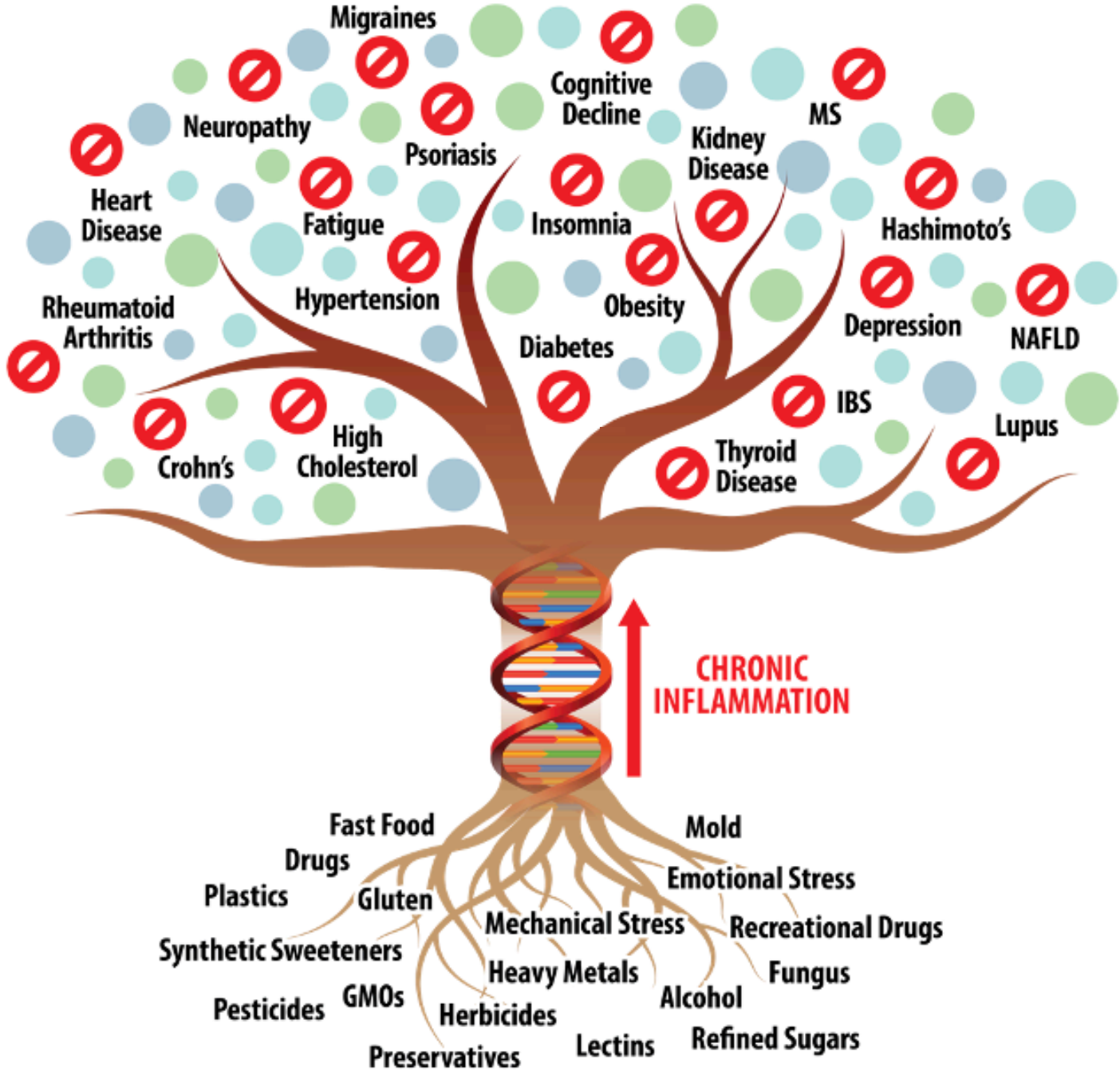
Role of inflammation, immunity, and oxidative stress in hypertension: New insights and potential therapeutic targets

PMCID: PMC9871625 PMID: 36703963

Hypertension is regarded as the most prominent risk factor for cardiovascular diseases, which have become a primary cause of death, and recent research has demonstrated that chronic inflammation is involved in the pathogenesis of hypertension. Both innate and adaptive immunity are now known to promote the elevation of blood pressure by triggering vascular inflammation and microvascular remodeling. For example, as an important part of

protective role in hypertension. Although inflammation is related to hypertension, the exact mechanisms are complex and unclear. The present review aims to reveal the roles of inflammation, immunity, and oxidative stress in the initiation and evolution of hypertension. We envisage that the review will strengthen public understanding of the pathophysiological mechanisms of hypertension and may provide new insights and potential therapeutic strategies for hypertension.


Migraines
Cognitive Decline
Neuropathy
Psoriasis
MS
Kidney Disease
Heart Disease
Fatigue
Insomnia
Hashimoto's
Hypertension
Obesity
Depression
NAFLD
Rheumatoid Arthritis
Diabetes
IBS
Lupus
Crohn's
High Cholesterol
Thyroid Disease
CHRONIC INFLAMMATION
Fast Food
Mold
Drugs
Emotional Stress
Plastics
Gluten
Mechanical Stress
Recreational Drugs
Synthetic Sweeteners
Heavy Metals
Fungus
Pesticides
GMOs
Alcohol
Herbicides
Lectins
Refined Sugars
Preservatives

Markers That Reveal Chronic Inflammation

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Homocysteine

- What it shows:
    - A methylation intermediate that becomes pro-inflammatory at elevated levels
    - Damages endothelial tissue and oxidizes LDL
    - Vasoconstriction
- Clinical Insight:
    - Suggests B-vitamin insufficiency and methylation dysfunction.
    - Often paired with oxidative stress and poor glutathione recycling.
    - I always look closer at the gut.

hs-CRP (High Sensitivity C-Reactive Protein)

- What it shows:
    - A liver-derived protein upregulated in response to IL-6.
    - Reflects systemic, acute-phase inflammation, particularly from endothelial stress
- Clinical Insight:
    - Acts as a flare from the liver indicating upstream cytokine activity.
    - Important to look at what's driving IL-6 and TNF-alpha.
    - When over 10, look for infection

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Fasting Insulin

- What it shows:
  - Elevated insulin levels promote chronic low-grade inflammation.
  - Triggers cytokine release (e.g., IL-6, TNF-α) and promotes visceral fat storage, which creates an inflammatory organ.
- Clinical Insight:
  - High insulin fuels immune system activation.
  - Often underlies metabolic inflammation, even before blood sugar elevates

Hemoglobin A1c

- What it shows:
  - Indicates chronic hyperglycemia and advanced glycation end product (AGE) formation.
  - AGEs bind to receptors (RAGE), activating inflammatory pathways and oxidative stress.
- Clinical Insight:
  - Reflects long-term tissue damage from elevated blood sugar.
  - Linked to mitochondrial stress and immune activation

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Ferritin

- What it shows:
  - Intracellular iron storage—but also an acute-phase reactant.
  - Elevated levels can signal oxidative stress and intracellular inflammation.
- Clinical Insight:
  - Must be interpreted in context of CRP and iron studies.
  - Can reflect inflammation, iron overload, or both.

GGT (Gamma-Glutamyl Transferase)

- What it shows:
  - Indicates chronic hyperglycemia and advanced glycation end product (AGE) formation.
  - AGEs bind to receptors (RAGE), activating inflammatory pathways and oxidative stress.
- Clinical Insight:
  - Reflects long-term tissue damage from elevated blood sugar.
  - Linked to mitochondrial stress and immune activation

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Fibrinogen

- What it shows:
  - A coagulation factor that also contributes to vascular inflammation and hypercoagulability.
  - Often elevated in chronic inflammatory states.
- Clinical Insight:
  - Elevated fibrinogen combined with CRP and homocysteine raises cardiovascular risk.
  - Indicates vascular stress and potential clotting issues.

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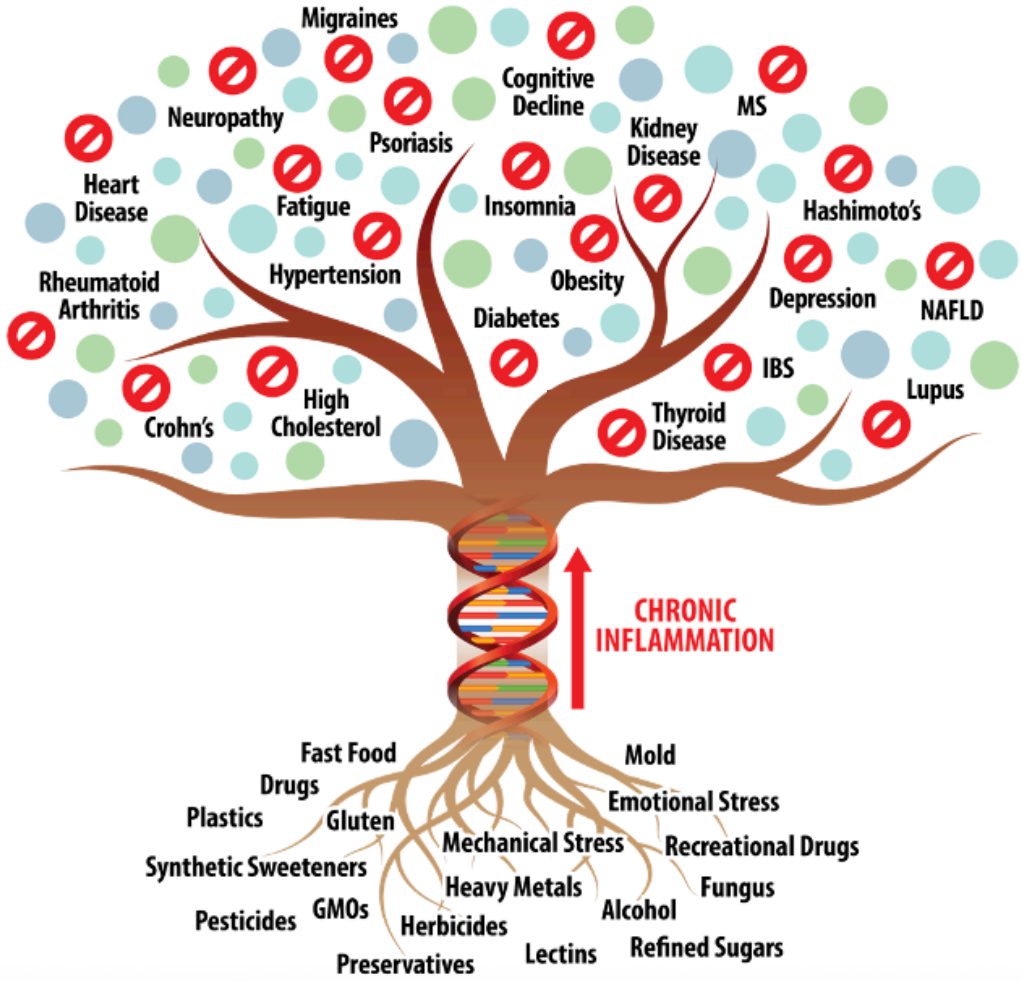

These markers are not just numbers—they reveal how your body is handling stress, toxins, sugar, and inflammation.
They help us find the root cause, so we can support the body upstream before symptoms or diagnoses show up as fruit.

Date Collected: **09/16/2024**

Fe+TIBC+Fer

Test	Current Result and Flag		Previous Result and Date	Units	Reference Interval
Iron Bind.Cap.(TIBC)	274			ug/dL	250-450
UIBC [01]	228			ug/dL	111-343
Iron [01]	46			ug/dL	38-169
Ferritin [01]	88			ng/mL	30-400

CBC With Differential/Platelet

	Test	Current Result and Flag		Previous Result and Date	Units	Reference Interval
	WBC [01]	4.8			x10E3/uL	3.4-10.8
▲	**RBC** [01]	**6.16**	**High**		x10E6/uL	4.14-5.80
	Hemoglobin [01]	14.9			g/dL	13.0-17.7
	Hematocrit [01]	49.8			%	37.5-51.0
	MCV [01]	81			fL	79-97
▼	**MCH** [01]	**24.2**	**Low**		pg	26.6-33.0
▼	**MCHC** [01]	**29.9**	**Low**		g/dL	31.5-35.7
▲	**RDW** [01]	**16.6**	**High**		%	11.6-15.4
	Platelets [01]	247			x10E3/uL	150-450
	Neutrophils [01]	37			%	Not Estab.
	Lymphs [01]	49			%	Not Estab.
	Monocytes [01]	12			%	Not Estab.
	Eos [01]	1			%	Not Estab.
	Basos [01]	1			%	Not Estab.
	Neutrophils (Absolute) [01]	1.8			x10E3/uL	1.4-7.0
	Lymphs (Absolute) [01]	2.4			x10E3/uL	0.7-3.1
	Monocytes(Absolute) [01]	0.6			x10E3/uL	0.1-0.9
	Eos (Absolute) [01]	0.0			x10E3/uL	0.0-0.4
	Baso (Absolute) [01]	0.0			x10E3/uL	0.0-0.2
	Immature Granulocytes [01]	0			%	Not Estab.
	Immature Grans (Abs) [01]	0.0			x10E3/uL	0.0-0.1

Comp. Metabolic Panel (14)

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
Glucose [01]	94		mg/dL	70-99
BUN [01]	14		mg/dL	6-24
Creatinine [01]	1.07		mg/dL	0.76-1.27
eGFR	88		mL/min/1.73	>59

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Comp. Metabolic Panel (14) (Cont.)

BUN/Creatinine Ratio	13		9-20
Sodium [01]	141	mmol/L	134-144
Potassium [01]	4.1	mmol/L	3.5-5.2
Chloride [01]	102	mmol/L	96-106
Carbon Dioxide, Total [01]	24	mmol/L	20-29
Calcium [01]	9.3	mg/dL	8.7-10.2
Protein, Total [01]	7.1	g/dL	6.0-8.5
Albumin [01]	4.1	g/dL	4.1-5.1
Globulin, Total	3.0	g/dL	1.5-4.5
Bilirubin, Total [01]	0.6	mg/dL	0.0-1.2
Alkaline Phosphatase [01]	84	IU/L	44-121
AST (SGOT) [01]	16	IU/L	0-40
ALT (SGPT) [01]	9	IU/L	0-44

UA/M w/rflx Culture, Comp

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
Urinalysis Gross Exam [01]				
Specific Gravity [01]	1.019			1.005-1.030
pH [01]	7.0			5.0-7.5
Urine-Color [01]	Yellow			Yellow
Appearance [01]	Clear			Clear
WBC Esterase [01]	Negative			Negative
Protein [01]	Trace			Negative/Trace
Glucose [01]	Negative			Negative
Ketones [01]	Negative			Negative
Occult Blood [01]	Negative			Negative
Bilirubin [01]	Negative			Negative
Urobilinogen,Semi-Qn [01]	0.2		mg/dL	0.2-1.0
Nitrite, Urine [01]	Negative			Negative
Microscopic Examination [01]	Microscopic follows if indicated.			
Microscopic Examination [01]	See below: Microscopic was indicated and was performed.			
WBC [01]	0-5		/hpf	0 - 5
RBC [01]	0-2		/hpf	0 - 2
Epithelial Cells (non renal) [01]	None seen		/hpf	0 - 10
Casts [01]	None seen		/lpf	None seen
Bacteria [01]	None seen			None seen/Few
Urinalysis Reflex [01]	This specimen will not reflex to a Urine Culture.			

LP+Non HDL Cholesterol

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
Cholesterol, Total [01]	198		mg/dL	100-199

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Date Collected: **09/16/2024**

LP+Non HDL Cholesterol (Cont.)

	Triglycerides[01]	65		mg/dL	0-149
	HDL Cholesterol[01]	48		mg/dL	>39
	VLDL Cholesterol Cal	12		mg/dL	5-40
▲	**LDL Chol Calc (NIH)**	**138**	**High**	mg/dL	0-99
	T. Chol/HDL Ratio	4.1		ratio	0.0-5.0

Please Note:[01]

T. Chol/HDL Ratio

	Men	Women
1/2 Avg.Risk	3.4	3.3
Avg.Risk	5.0	4.4
2X Avg.Risk	9.6	7.1
3X Avg.Risk	23.4	11.0

▲	**Non-HDL Cholesterol**	**150**	**High**	mg/dL	0-129

Thyroid Panel With TSH

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
TSH[01]	1.480		uIU/mL	0.450-4.500
Thyroxine (T4)[01]	7.3		ug/dL	4.5-12.0
T3 Uptake[01]	28		%	24-39
Free Thyroxine Index	2.0			1.2-4.9

Hgb A1c with eAG Estimation

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
Hemoglobin A1c[01]	5.5		%	4.8-5.6

Please Note:[01]

Prediabetes: 5.7 - 6.4
Diabetes: >6.4
Glycemic control for adults with diabetes: <7.0

Estim. Avg Glu (eAG)	111		mg/dL	

Vitamin D, 25-Hydroxy

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
▼ **Vitamin D, 25-Hydroxy[01]**	**15.0** **Low**		ng/mL	30.0-100.0

Vitamin D deficiency has been defined by the Institute of Medicine and an Endocrine Society practice guideline as a level of serum 25-OH vitamin D less than 20 ng/mL (1,2). The Endocrine Society went on to further define vitamin D insufficiency as a level between 21 and 29 ng/mL (2).

1. IOM (Institute of Medicine). 2010. Dietary reference intakes for calcium and D. Washington DC: The

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C-Reactive Protein, Cardiac

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
▲ **C-Reactive Protein, Cardiac** [01]	**4.01** **High**		mg/L	0.00-3.00

Relative Risk for Future Cardiovascular Event

Low	<1.00
Average	1.00 - 3.00
High	>3.00

Homocyst(e)ine

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
▲ **Homocyst(e)ine** [01]	**18.5** **High**		umol/L	0.0-14.5

Phosphorus

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
Phosphorus [01]	3.3		mg/dL	2.8-4.1

LDH

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
LDH [01]	155		IU/L	121-224

GGT

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
GGT [01]	25		IU/L	0-65

Triiodothyronine (T3)

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
Triiodothyronine (T3) [01]	110		ng/dL	71-180

Thyroid Antibodies

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
Thyroid Peroxidase (TPO) Ab [01]	11		IU/mL	0-34
Thyroglobulin Antibody [01]	<1.0		IU/mL	0.0-0.9

Thyroglobulin Antibody measured by Beckman Coulter Methodology
It should be noted that the presence of thyroglobulin antibodies may not be pathogenic nor diagnostic, especially at very low levels. The assay manufacturer has found that four percent of individuals without evidence of thyroid disease or autoimmunity will have positive TgAb levels up to 4 IU/mL.

Magnesium

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
Magnesium [01]	2.1		mg/dL	1.6-2.3

Fibrinogen Activity

Test	Current Result and Flag	Previous Result and Date	Units	Reference Interval
Fibrinogen Activity [01]	314		mg/dL	193-507

How to Lower Inflammation and Naturally Regulate Blood Pressure

Lifestyle Foundations: Regulate the Environment That Drives Inflammation

- **Air, Water, Food → Environmental Input Matters**
  - Reduce daily toxic load: clean air, filtered water, and anti-inflammatory food choices.
  - The foundation for metabolic and immune system recalibration.
- **Deep Breathing & Stress Reduction**
  - Activates the vagus nerve → lowers cortisol and inflammation.
  - Supports parasympathetic tone and blood pressure regulation.
- **Sleep Optimization**
  - Poor sleep elevates CRP, insulin, and sympathetic output.
  - Aim for rhythm, duration, and depth to support recovery and repair.
- **Walking & Resistance Training**
  - Improves endothelial function and nitric oxide output.
  - Supports insulin sensitivity, mitochondrial health, and lymphatic flow.
- **Detox Strategies**
  - Use sauna, movement, binders, and liver nutrients to reduce immune burden.
  - Supports glutathione production and inflammation resolution.

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Targeted Support: Clinical Tools to Optimize Results

Metabolic & Insulin Resistance Support

- **Berberine X** – Improves insulin sensitivity, supports glucose metabolism. A highly bioavailable metabolite of berberine, supporting healthy blood glucose, lipid metabolism and immune health.
- **Effecsulin** – Effecsulin is an herbal-based formulation designed to support normal blood sugar metabolism and healthy pancreatic (endocrine) function and insulin response.
- **Glucostatic Balance**– Blood sugar stabilization blend. Glucostatic Balance is a vitamin, mineral, and herbal-based formulation designed to support healthy blood sugar metabolism, normal insulin receptor site sensitivity, and healthy insulin responses.
- **Omega-3 Softgels** – Anti-inflammatory and endothelial support. Supporting Cardiovascular Health as well as Healthy Glucose and Insulin Metabolism

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Targeted Support: Clinical Tools to Optimize Results

Inflammation Modulation

- **MDS** – Aids in modulating multiple inflammatory pathways, supporting balanced cytokine production and promoting a healthy inflammatory response
- **Curcumin+** – Features BCM-95®, a pure turmeric extract with optimal bioavailability, providing antioxidant and cell-protective actions, and supporting overall inflammatory health.
- **Kapp-X** – Reduces NF-κB activity and is designed to target specific inflammatory pathways, supporting the body's natural ability to manage inflammation.
- **BioG-Max GSH / Super G** – Enhances antioxidant defense and detox

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Targeted Support: Clinical Tools to Optimize Results

Cardiovascular Health

- **Resveratrol** – Delivers resveratrol via a nanosphere delivery system, supporting cardiovascular health, immune health, and blood vessel health
- **Nattocore** – Contains nattokinase, an enzyme that supports healthy blood flow and cardiovascular function by maintaining healthy fibrin levels and promoting optimal circulation
- **PRM Prime** – Supports the body's natural resolution of inflammation, aiding in the maintenance of cardiovascular health.

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Targeted Support: Clinical Tools to Optimize Results

Stress Response and Cortisol Regulation

- **P/S Support:** P/S Support is a phospholipid formulation that can be useful in support of the HPA Axis, memory and cognition, healthy moods, normal cortisol levels, and protects against oxidative damage.
- **BioG-Max GABA:** Offers gamma-aminobutyric acid in a bioavailable form, promoting relaxation and supporting the parasympathetic nervous system balancing the sympathetic, fight or flight, reactivity
- **Hypaax Balance:** Hypaax Balance is an herbal-based adaptogen that has the ability to support the body in times of stress and support the normal function of the Hypothalamic-Pituitary-Adrenal (HPA) Axis. This product can be used in times of both hypo and hyperfunction of the adrenal glands.

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Targeted Support: Clinical Tools to Optimize Results

Additional Support

- **Binder Pro Capsules:** A robust blend designed to support proper detoxification activity by capturing a broad spectrum of environmental contaminants and promote ideal gut function.
- **D3K2 Capsules:** Provides a concentrated dosage of Vitamin D3 and K2, supporting immune function, bone health, and cardiovascular health.

It is Important to Remember…

Each of these products are chosen based on how the body is talking to us through labs and systems patterns.

Their use should be tailored to individual needs and health conditions.

Supplements Do Not Treat… They support the body and give it the ability to do what it is meant to do!

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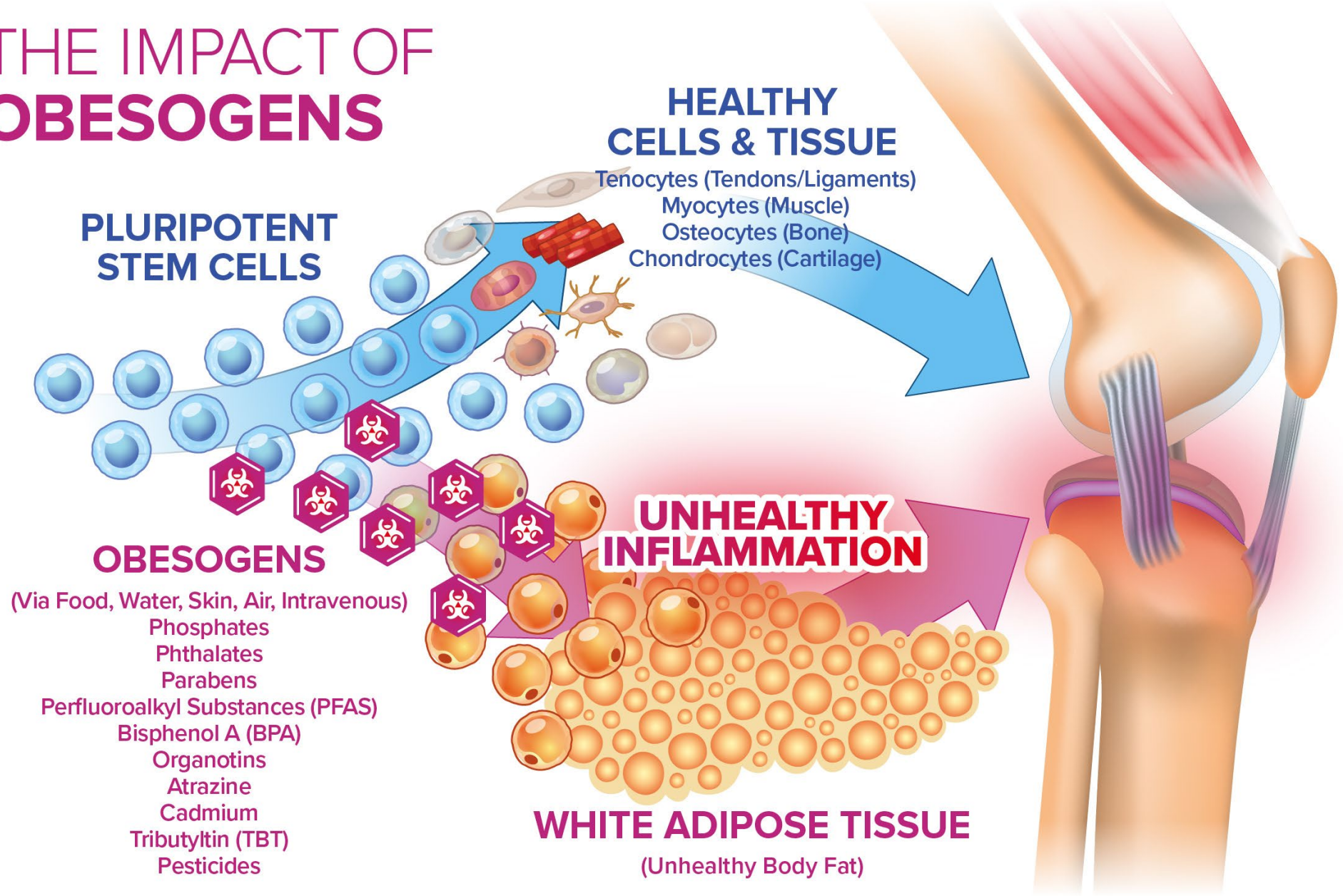
THE IMPACT OF **OBESOGENS**



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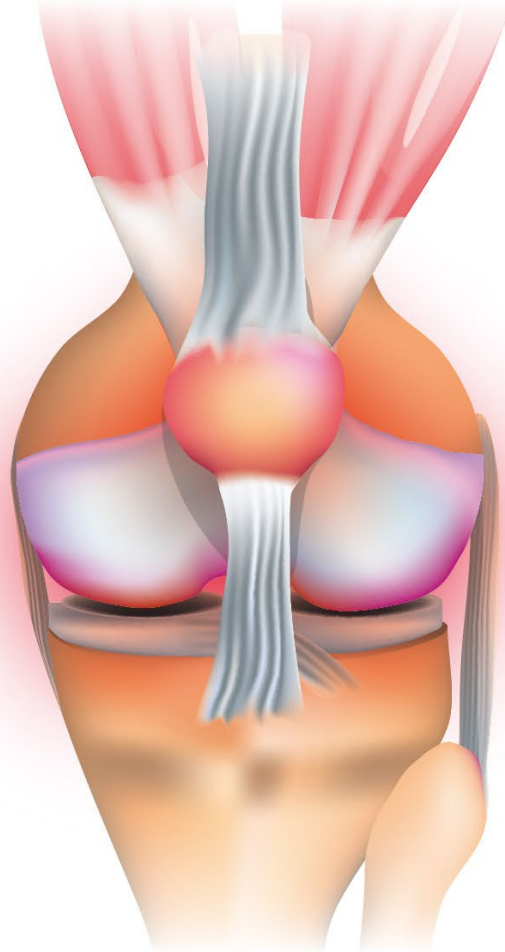
THE **ADIPOKINE** SPIRAL



1 Obesogens Drive Stem Cells into Adipocytes

2 Adiposity Increases

3 Increased Adipokine Activity

4 Triggering Increased Unhealthy Inflammation

5 Ongoing Tissue Damage

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