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'Inflammaging' Is a Lifestyle Phenomenon, Not a Universal Aging Trait

Analysis by Dr. Joseph Mercola | September 23, 2025

STORY AT-A-GLANCE

- Inflammation is your body's defense response to injury, infection, or stress. While helpful when temporary, chronic low-grade inflammation over time damages tissues and raises disease risk
- Chronic inflammation has become so widespread with age in modern societies that scientists now call this pattern "inflammaging," a slow-burning immune response tied to nearly every major chronic disease
- Chronic inflammation isn't an inevitable part of aging. A new study found that indigenous adults had high but consistent levels of inflammation that did not worsen with age or lead to chronic disease
- The findings challenge the idea that inflammation is harmful by default. Instead, they highlight how environmental context determines whether inflammation promotes healing or drives degeneration
- Strategies to reduce chronic inflammation include removing modern stressors like seed oils, toxins, EMFs, and gut-disrupting foods while reinforcing protective inputs like whole food, sunlight, sleep, and movement

Inflammation is one of your body's most important defense tools. It rallies immune cells to fight off pathogens, clears out damaged tissue, and helps restore normal function after injury or infection. In a healthy response, inflammation rises when needed and

fades once the threat is resolved. But sometimes the immune system doesn't fully stand down. Instead, it stays slightly activated, generating a steady trickle of inflammatory signals that quietly wear on tissues over time.[1]

This persistent inflammation has been widely documented in older adults living in industrialized countries, where it's been linked to a long list of chronic conditions, including heart disease, neurodegeneration, and Type 2 diabetes.[2] Because it so often shows up alongside age-related disease, it's come to be seen as a normal consequence of aging itself — a process called "inflammaging."[3]

However, new research by a team from Columbia University's Mailman School of Public Health challenges that assumption. Drawing on data from Indigenous populations in Bolivia and Malaysia, the study suggests that this chronic inflammatory drift is not a universal feature of aging, but a reflection of lifestyle, environment, and the modern conditions many people live in without realizing the harm.[4]

New Study Found Inflammation Reflects Environment, Not Age

The featured study, published in Nature Aging in June 2025 examined inflammation patterns across four adult populations — two from industrialized regions in Italy and Singapore, and two from non-industrialized, Indigenous communities, the Tsimane of the Bolivian Amazon and the Orang Asli of Peninsular Malaysia. The goal was to determine whether the inflammation profile associated with aging in Western populations holds true elsewhere.[5]

- **A broader measure of immune aging** — Instead of relying on a single marker like IL-6, the researchers measured a panel of 19 cytokines, which are immune-signaling proteins that shift in meaningful ways over the course of your life. This approach offers a broader view of how immune activity patterns evolve and interact rather than capturing only one facet of inflammation.

- **Evidence of inflammaging in industrialized groups** — In the Italian and Singaporean participants, several cytokines rose with age, and these increases were linked to higher rates of age-related diseases. This pattern matches what most medical literature reports for industrialized societies, where chronic low-grade inflammation is tied to cardiovascular disease, metabolic dysfunction, frailty, and neurodegeneration.

- **A different pattern in Indigenous populations** — The Tsimane and Orang Asli showed high baseline inflammation, but levels stayed stable with age. This was despite widespread active infections — 66% of Tsimane had at least one intestinal parasite, and over 70% of Orang Asli had active infections during data collection.

- **Inflammation linked to infection, not aging** — In these Indigenous groups, inflammation reflected exposure to bacteria, viruses, and parasites rather than a progressive biological decline. Markers that predict disease in urban older adults did not correspond with negative health outcomes here. Chronic illnesses like Type 2 diabetes, cardiovascular disease, and Alzheimer's were also rare or absent in these groups.

- **Shorter lifespans but lower disease burden** — The researchers acknowledged that shorter lifespans of Indigenous communities may limit the ability to observe late-life inflammation patterns and that differences in blood collection protocols could affect results. Even so, their central finding stands:

  > *"These results point to an evolutionary mismatch between our immune systems and the environments we now live in. Inflammaging may not be a direct product of aging, but rather a response to industrialized conditions,"* Cohen noted.[6]

- **Environment shapes immune aging** — These findings suggest that inflammation behaves differently depending on environmental and lifestyle conditions. In regions with high infection and low exposure to industrial pollutants, synthetic chemicals,

and processed foods, the immune system adapts in ways that prevent long-term harm. As lead author Alan Cohen explained:

> *"These findings really call into question the idea that inflammation is bad per se. Rather, it appears that inflammation — and perhaps other aging mechanisms too — may be highly context dependent. On the one hand, that's challenging, because there won't be universal answers to scientific questions. On the other, it's promising, because it means we can intervene and change things."*[7]

For your health, the key message is that inflammation isn't automatically harmful — it's how and why it's happening that matters. By reducing the modern lifestyle factors that drive chronic, low-grade inflammation, you shift your immune system toward a healthier, more adaptive state, no matter your age. Learn more about how researchers are advancing our understanding of inflammation in "**Scientists Uncover a New Way to Pinpoint Inflammation in the Body**."

What Are the 'Four E's' That Drive Chronic Inflammation?

Breaking free from chronic inflammation means going beyond symptom relief and addressing the forces that keep it active. I call these the "Four E's" — four powerful, everyday drivers that keep the inflammatory burden high and make balance harder to maintain.

1. **Excess linoleic acid (LA)** — An omega-6 polyunsaturated fat (PUF), LA is found in abundance in vegetable oils and ultraprocessed foods. It is one of the most harmful components of the Western diet. When consumed in excessive amounts, LA interferes with your metabolic rate and disrupts the gut microbiome, two of the most important factors for maintaining proper inflammatory responses and protecting overall health.

   LA also embeds itself into your cell membranes and mitochondrial structures, where it oxidizes easily and generates toxic byproducts. These compounds alter gene expression, damage enzymes, and keep your immune system in a state of

chronic activation. The result is inflammation that doesn't shut off and cellular dysfunction that doesn't heal.

2. **Electromagnetic fields (EMFs)** — EMFs from everyday electronics like cell phones, Wi-Fi routers, and microwaves generate invisible stress inside the body. They activate voltage-gated calcium channel (VGCC) receptors in your cells, causing an influx of calcium ions. This surge fuels the production of peroxynitrite, a potent oxidant that damages tissues and contributes to cellular stress and inflammation.[8]

3. **Endocrine-disrupting chemicals (EDCs)** — Exposure to EDCs alters hormonal signaling, in part by over-activating estrogen receptors. Microplastics, which are now widespread in the environment, are a major source of these chemicals. Research suggests the average person ingests the equivalent of a credit card's weight in plastic each week.[9]

   Moreover, plastics often contain phthalates and bisphenol A (BPA), both of which bind to estrogen receptors and disrupt normal hormone balance. Elevated estrogen increases intracellular calcium, which drives peroxynitrite production, intensifies inflammation, and contributes to a wide range of chronic health conditions.[10]

4. **Endotoxins** — Ultraprocessed foods high in vegetable oils and high-fructose corn syrup (HFCS), along with exposure to EDCs, damage gut health and increase the production of endotoxins. These toxic substances come from the outer cell walls of certain bacteria, especially gram-negative species.

   Because these bacteria are facultative anaerobes (able to live in both oxygen-rich and oxygen-poor environments), they colonize different areas of the body, including the gut, and fuel inflammation. When endotoxins escape into the bloodstream through a compromised gut barrier, they trigger a strong immune response called endotoxemia. This state is linked to conditions such as metabolic syndrome and autoimmune disease.

By removing these inflammatory drivers, you reduce the burden on your system and allow your body to restore a balanced immune response. Dive deeper into these root causes in "**Cellular Health Revolution — Unveiling Hidden Threats and Empowering Solutions**."

Strategies to Reduce Inflammation and Promote Healthy Aging

Knowing what drives chronic inflammation is just the start. Real change comes from removing those triggers and replacing them with inputs that sustain your health over time. The strategies below target not only the core drivers outlined above but also other factors, offering clear steps to lower your inflammatory load and build lasting health as you age.

1. **Cut LA down to under 5 grams per day, ideally below 2 —** If you're going to change just one thing, make it this. Nearly every processed food, no matter how "natural," "organic," or "healthy" it looks, is loaded with LA. You'll find it in restaurant meals, salad dressings, sauces, chips, crackers, protein bars, frozen foods, and even health store snacks that flaunt gluten-free or non-GMO labels.

   The food industry slips it in under innocent names like sunflower oil, safflower oil, grapeseed oil, rice bran oil, soy oil, and canola. Replace the vegetable oil in your kitchen with grass fed butter, ghee, beef tallow, or coconut oil. These are stable, saturated fats your body knows how to use.

   While you're at it, avoid olive oil and avocado oil, too — most are secretly cut with cheap seed oils, and even pure versions are still heavy in monounsaturated fat, which accumulates in mitochondrial membranes and triggers the same oxidative damage.

   To track your intake, I recommend you download my Mercola Health Coach app. It has a feature called the Seed Oil Sleuth, which monitors your LA intake to a tenth of a gram.

2. **Use real food to calm inflammation —** Toss out anything with artificial ingredients, preservatives, emulsifiers, or flavor enhancers. Build your meals around whole, nutrient-dense foods instead, such as grass fed meats, organic fruits and vegetables, raw dairy, and pastured low-PUFA eggs. Real food gives your cells the materials they need to regulate inflammation, repair damage, and keep your immune responses in check.

3. **Support your gut health —** A strong gut barrier is your first line of defense against endotoxins that fuel inflammation, and you can reinforce yours by feeding your gut fiber-rich vegetables, resistant starches, and fermented foods to foster a strong gut barrier, which acts as your first line of defense against endotoxins that fuel inflammation. However, if your gut is already compromised, fibrous foods are hard to digest and will fuel the wrong bacteria.

   Introduce fiber gradually and strategically. Begin with easier-to-digest options like whole fruits and well-cooked white rice. As your gut heals, begin layering in starches like peeled potatoes or cooked squash. Later, move toward root vegetables and, finally, more **fibrous foods**.

4. **Minimize your EMF exposure —** You don't need to unplug from modern life entirely, but you do need boundaries. Turn off Wi-Fi at night to give your system a break, keep your phone on airplane mode when you're not using it, and avoid surrounding yourself with wireless signals while your body is supposed to be recovering. Get more tips in "**The No. 1 Thing to Do to Protect Yourself from EMFs**."

5. **Reduce your exposure to toxins —** One of the most common sources of toxic chemicals is food contact with plastic — heating or storing food this way allows hormone-disrupting compounds to leach directly into what you eat. Those same types of chemicals enter through your water, which is why filtering to remove heavy metals, fluoride, and industrial pollutants is essential.

The products you put on your skin and use in your home matter just as much, since many conventional cleaners and personal care items contain synthetic fragrances, formaldehyde releasers, and other persistent toxins. By replacing them with cleaner alternatives, you reduce the chemical load from every angle.

6. **Boost anti-inflammatory signals with sun exposure —** Natural light is one of the most powerful and overlooked regulators of inflammation.[11] To maximize benefits, aim for one hour of sun exposure around solar noon (12 noon or 1 p.m. during daylight saving time). Wear as little clothing as possible to expose large areas of your skin.

   However, if your diet has been high in LA, it's important to approach sun exposure with caution, as UV radiation interacts with LA in the skin, triggering inflammatory responses and DNA damage, as well as increasing your risk of photoaging and skin cancer.

   Instead of getting direct sun exposure during peak hours of the day, limit it to early morning or late afternoon until seed oils and other sources of LA have been eliminated from your diet for at least two to six months. To speed up LA clearance, increase your intake of C15:0 (pentadecanoic acid), a stable, anti-inflammatory fat found in full-fat dairy. Learn how to do this in "**The Fast-Track Path to Clearing Vegetable Oils from Your Skin**."

7. **Prioritize stress reduction and get quality sleep —** Chronic stress floods your system with cortisol, which dysregulates immune function and keeps inflammation simmering at low levels. Poor sleep has the same effect, raising inflammatory cytokines and lowering your ability to recover from daily stressors.

   Establish a consistent sleep routine, avoid screens in the hour before bed, and create a cool, dark environment to promote uninterrupted rest. To lower your stress levels, incorporate stress-regulating practices like breathwork, meditation, **Emotional Freedom Techniques** (EFT), or time in nature.

8. **Incorporate regular physical activity —** Movement acts like an internal anti-inflammatory signal, improving circulation, enhancing lymphatic flow, and reducing visceral fat, one of the body's most potent sources of inflammatory compounds.[12]

   You don't need to train like an athlete; a mix of walking, resistance training, stretching, and occasional higher-intensity exercise is enough to keep inflammatory markers lower and metabolic health stronger. Find out the optimal amount of exercise you need in "Nailing the Sweet Spots for Exercise Volume."

Frequently Asked Questions (FAQs) About Inflammation and Aging

Q: What is inflammaging and how do I know if I have it?

A: Inflammaging refers to the chronic, low-grade inflammation that often affects the elderly in industrialized countries. It's driven by modern environmental and lifestyle factors, not age itself. Blood tests may show elevated cytokines, and they're often linked with conditions like heart disease, neurodegeneration, and Type 2 diabetes.

Q: Is inflammation always harmful as I get older?

A: Not necessarily. The featured study shows that in non-industrialized populations with high infection rates, inflammation stayed stable with age and didn't lead to chronic disease. What matters is why the inflammation is happening. In industrialized settings, it's often a response to hidden stressors in the modern environment — not a direct consequence of getting older.

Q: What are the Four E's that drive chronic inflammation in modern life?

A: The Four E's are excess LA, EMFs, EDCs, and endotoxins. These stressors keep your immune system activated, fueling low-grade inflammation that doesn't resolve and increases disease risk over time.

Q: How do seed oils trigger chronic inflammation in my body?

A: Excess LA gets incorporated into your cell and mitochondrial membranes, where it oxidizes and creates toxic byproducts. These activate immune responses that keep your system in a low-grade inflammatory state. Cutting LA dramatically lowers this burden.

Q: How do I naturally reduce inflammation and improve my health as I age?

A: Start by cutting LA to below 5 grams per day, or better yet, under 2 grams. Focus on real food, fiber-rich vegetables, resistant starches, fermented foods, and full-fat dairy. Reduce toxin exposure, limit EMF exposure, get sun at the right time, and improve your sleep and stress response. Each of these changes helps shift your immune system to a healthier state.

Q: Why does gut health matter for inflammation?

A: A damaged gut allows endotoxins — components of harmful bacteria — to leak into your bloodstream and trigger immune responses. Supporting your gut with fermented foods, resistant starches, and gradual fiber increases helps reinforce your barrier and reduce the inflammatory load.

Sources and References

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