

The Vast Dangers of Corticosteroids and the Safe Treatments for Autoimmunity

Analysis by [A Midwestern Doctor](#)

May 23, 2025

STORY AT-A-GLANCE

- › Corticosteroids are widely used in medicine, but their safety has long been questioned, with more and more dangers being discovered
- › Understanding the effects of the body's natural corticosteroids explains many of the common side effects from synthetic steroids like diabetes, fractures, and tissue loss
- › Steroids exemplify a common criticism of modern medicine — treating symptoms rather than addressing the root cause can lead to far more severe chronic health issues
- › While they are frequently misused, in some cases, steroids can also be lifesaving, hence requiring knowledge of their appropriate uses
- › Superior natural and conventional alternatives to steroid therapy now exist, reducing the justification for using these unsafe drugs

To regulate itself, the body often relies upon sensors that detect something amiss and then emit a signal that is amplified by the body so that a process can be set in motion to fix the issue that set the sensor off. One of the key signals the body relies upon are hormones, as small amounts of these molecules being released are often sufficient to change the internal state of the body drastically.

The hypothalamic-pituitary-adrenal (HPA) axis is the body's central stress response system. It has three main components: the hypothalamus and pituitary gland in the brain, and the adrenal glands on top of the kidneys. When you experience stress, the

hypothalamus releases corticotropin-releasing hormone (CRH), which signals the pituitary gland to secrete adrenocorticotrophic hormone (ACTH).

ACTH then travels through the bloodstream to the adrenal glands, prompting them to release the corticosteroid cortisol (the body's primary stress hormone). Finally, once cortisol levels are high enough, they signal the brain to reduce CRH and ACTH production, creating a negative feedback loop that prevents over-activation of the stress response. Cortisol, in turn, has a few key functions in the body:

- **Immune modulation** — Cortisol first enhances the immune system's immediate response to threats (protecting the body during stress), then limits excessive immune activity to prevent autoimmunity. It does this partly by inhibiting proinflammatory cytokines (e.g., IL-1, IL-6) and reducing T-cell activity. Over time, this shifts to immune suppression, making synthetic corticosteroids, a popular treatment for inflammation and autoimmunity.

Cortisol Exposure	Immune Effect	Mechanism/Outcome
Acute	Temporary boost to innate immunity	Increases circulating neutrophils and natural killer (NK) cells for rapid defense
	Limits excessive inflammation	Suppresses overproduction of pro-inflammatory cytokines (IL-1, TNF- α) and eicosanoids
	Reduces lymphocyte activity	Temporarily inhibits T and B cell proliferation to prevent autoimmunity
	Controls immune cell trafficking	Demargination: mobilizes immune cells from vessel walls into circulation
Chronic	Suppresses adaptive immunity	Reduces T cell activation and proliferation, impairs B cell antibody production
	Increases infection risk	Lowered cellular and humoral immunity leads to more frequent or severe infections
	Alters cytokine balance	Persistent suppression of pro-inflammatory cytokines; possible later resistance (glucocorticoid resistance)
	Promotes chronic low-grade inflammation	Long-term dysregulation can paradoxically lead to ongoing mild inflammation
	Impairs wound healing	Inhibits fibroblast function and collagen synthesis, delaying tissue repair
	Changes immune cell distribution	Causes lymphopenia (decreased lymphocytes) and neutrophilia (increased neutrophils)
	Weakens vaccine response	Reduced antibody production and memory cell formation after vaccination
	Suppresses antigen presentation	Inhibits dendritic cell and macrophage function, reducing the body's ability to recognize and respond to new pathogens

Note: At lower doses, this transition from immune stimulation to immune suppression takes much longer, whereas at high doses it's faster (hence why high steroid doses are given for dangerous autoimmune flares).

- **Blood sugar** — When blood sugar is low, cortisol raises it by stimulating gluconeogenesis in the liver, mobilizing amino acids (from muscle) and fatty acids (from fat) for glucose production, and reducing insulin sensitivity in tissues like

muscle and fat. Excessive cortisol can lead to diabetes, abdominal fat accumulation (obesity), weight gain, insulin resistance, and cardiovascular issues.

- **Connective tissues** — Cortisol promotes protein catabolism (breakdown) in muscles, providing substrates for glucose synthesis and inhibiting collagen synthesis. Excessive cortisol causes muscle wasting, bone loss (e.g., osteoporosis or osteonecrosis), poor wound healing (which is also a result of immune suppression), skin thinning, easy bruising, and purple striae.
- **Circulation** — Cortisol raises blood pressure by increasing sodium and water retention, sensitizing blood vessels to epinephrine and norepinephrine. This causes vasoconstriction and an increased heart rate while also damaging the blood vessel lining. This elevates the risk for cardiovascular disease^{1,2,3} (e.g., a one-standard deviation increase in morning plasma cortisol is linked to an 18% higher risk of future cardiovascular events⁴).
- **Cognition** — Cortisol modulates arousal, attention, and memory consolidation. Chronic excess corticosteroids (from either endogenous cortisol or synthetic steroids) impair hippocampal function, causing memory deficits, increased pain sensitivity, attention issues, cravings for high-calorie foods, substance abuse, and, rarely, psychosis.
- **HPA axis dysfunction** — Since the HPA axis is regulated by cortisol levels, once natural or synthetic corticosteroids are chronically elevated, the HPA axis becomes desensitized, leading to excessive cortisol secretion or loss of the ability to secrete cortisol when needed.

This in turn creates many issues such as those associated with chronically excessive cortisol or varying degrees of fatigue (e.g., due to the adrenal glands not secreting cortisol when needed).

Note: Excessive cortisol can also cause other effects such as blood electrolyte imbalances, alkalosis, cataracts, and glaucoma.

Because of this, many argue excessive cortisol secretion and HPA axis dysfunction (e.g., due to chronic stress, poor diet, poor sleep, alcoholism, too many stimulants like caffeine, social isolation, a lack of exercise, or irregular daily rhythms) is a root cause of disease (e.g., the metabolic syndrome afflicting our country).

As such, they advocate for lifestyle practices that counteract these HPA axis-disrupting factors, and in many cases significant health benefits follow the adoption of those practices.

Corticosteroids

The hormone cortisol belongs to a class of steroids known as corticosteroids due to its release by the cortex of the adrenal glands. While many related corticosteroids (henceforth referred to as "steroids") exist within the body, the body's primary ones are cortisol (a glucocorticoid) and aldosterone, a mineralocorticoid that regulates blood pressure, volume, and electrolyte balance.

In 1946, the first synthetic steroid (cortisone) was synthesized.⁵ Two years later, enough had been produced to test it on a human, where it was discovered to improve rheumatoid arthritis symptoms (which won the 1950 Nobel Prize⁶) and was immediately hailed as a 'wonder drug.'⁷ Before long, it was discovered that other inflammatory syndromes also responded to cortisone, and a rush of other steroids hit the market:

Corticosteroid	Introduced	Corticosteroid	Introduced
Cortisone	1948	Triamcinolone	1956
Hydrocortisone	1951	Dexamethasone	1958
Fludrocortisone acetate (<i>a mineralocorticoid</i>)	1954	Betamethasone	1958
Prednisolone	1955	Triamcinolone acetonide	1958
Prednisone	1955	Fluorometholone	1959
Methylprednisolone	1956	Deflazacort	1969

Following its success in rheumatoid arthritis, steroids (e.g., prednisone, hydrocortisone) were rapidly adopted for a wide range of inflammatory and autoimmune disorders, including systemic lupus erythematosus, inflammatory bowel disease, and multiple sclerosis, due to their ability to suppress immune-mediated tissue damage.

In the early 1950s, steroids were hailed as a revolutionary treatment for those conditions (and hence widely prescribed), with new steroids (e.g., prednisone) being rapidly introduced to the market, but in the late 1950s, serious side effects began to accumulate from long-term steroid use.

By the early 1960s, steroid treatment was "shunned altogether by the rheumatology community"⁸ (to the point shortly after that NSAIDs like ibuprofen were named nonsteroidal anti-inflammatory drugs to distinguish them from the disastrous steroids⁹) after which point steroids were prescribed with more caution and at lower doses until it was reborn in the 1980s under a low dose regimen.

Currently, steroids remain widely used, and their use has gradually increased. For example, in 2009, 6.4% of American adults had used oral steroids at least once in the last year,¹⁰ whereas in 2018, 7.7% did, while a 2017 study found 21.4% of adults (age 18 to 64) had used at least one oral steroid prescription in the last three years.¹¹

Note: *After harms were discovered with steroids, a pivot was made that they are safe if "low doses" are given. However, over the decades, what constituted a safe "low dose" has greatly declined (i.e., doses now considered toxic previously were routinely prescribed), and that drop will likely continue to (e.g., in 2016, Europe's Rheumatology group concluded it was unsafe to give more than 5 mg a day of long-term steroids¹² — a figure significantly lower than the current amounts used in America¹³).*

Steroid Side Effects

As you would expect, the side effects from taking steroids mirror those seen with excessive cortisol, although in many cases are much more severe.

Furthermore, they are quite common (e.g., one study found 90% of users report adverse effects, and 55% report at least one that is very bothersome¹⁴). Consider this summary of what users across the internet have reported:

Side Effect	Frequency Across Steroids
Weight gain	Frequently reported for all steroids
Mood changes	Frequently reported for Prednisone, Prednisolone, Dexamethasone
Insomnia	Frequently reported for Prednisone, Methylprednisolone, Dexamethasone
Skin thinning	Frequently reported for Prednisone, Hydrocortisone
Vision problems	Sometimes reported for Prednisone and Dexamethasone
Muscle weakness	Sometimes reported for Prednisone and Methylprednisolone
Stomach upset	Sometimes reported for Prednisone and Prednisolone
Hyperglycemia	Sometimes reported for Dexamethasone and Prednisone
Adrenal suppression	Rarely reported across all steroids
Psychiatric symptoms	Rarely reported for Prednisone and Dexamethasone
Bone fractures	Rarely reported for long-term use of Prednisone and Methylprednisolone
Stomach ulcers	Rarely reported for Prednisone and Dexamethasone

Likewise, much of that has been established within the scientific literature:

- **Bone loss** — Corticosteroids double one's risk of a fracture (and even more so for a vertebra¹⁵), with 12% of users reporting fractures.¹⁶ At typical doses, steroids cause a 5% to 15% loss of bone each year,¹⁷ and in long-term users, 37% experience vertebral fractures¹⁸ (additionally, high dose steroid use increases the risk of vertebral fractures fivefold¹⁹).

Steroid bone loss, in fact, is such a common problem that treating it is one of the few official indications the FDA provides for bisphosphonates²⁰ (which while widely prescribed for bone loss **have many severe side effects** — including **making your bones more likely to break**). Lastly, higher doses increase the likelihood of avascular necrosis (with 6.7% of users taking higher steroid doses developing it²¹).

- **Weight gain** — Approximately 70% of individuals taking oral corticosteroids long-term (over 60 days) report weight gain.²² One study found a 5.73 to 12.79 lbs. increase per year,²³ and another found a 4% to 8% increase in body weight after two years of steroid use. Additionally, this fat typically stores in areas like the face, neck, and belly.²⁴
- **Adrenal insufficiency** — Corticosteroids reduce the adrenal gland's ability to produce cortisol (which can sometimes be life-threatening). This is a huge problem that increases with the duration of therapy and systemic routes of administration (e.g., affecting 48.7% of oral users²⁵).

Administration	Studies	Patients		Absolute risk (95% CI)
Oral	38	1419		48.7 (36.9, 60.6)
Inhalation	60	1418		7.8 (4.2, 13.9)
Topical	15	320		4.7 (1.1, 18.5)
Nasal	8	173		4.2 (0.5, 28.9)
Intra-articular	4	69		52.2 (40.5, 63.6)
Multiple forms	11	354		42.7 (28.6, 58.0)

- **Diabetes** — A systematic review found individuals taking systemic corticosteroids were 2.6 times more likely to develop hyperglycemia²⁶ (with 1.8% of those receiving steroids in a hospital then developing diabetes).²⁷

Likewise, patients who'd taken systemic corticosteroids at least once were 1.85 times more likely to develop diabetes.²⁸ Finally, a meta-analysis found that, in patients without pre-existing diabetes, a month or more of steroids caused hyperglycemia in 32% and diabetes mellitus in 19% of them.²⁹

- **Cardiovascular** — High doses of steroids have been observed to increase heart attacks by 226%, heart failure by 272%, and strokes by 73%.³⁰

- **Eyes** — Steroids have been found to increase the risk of cataracts by 245% to 311%³¹ (with 15% of users reporting this side effect)³² and the risk of ocular hypertension or open angle glaucoma by 41%.³³
- **Gastrointestinal** — Steroids are linked to many gastrointestinal events (e.g., nausea and vomiting)³⁴ and have been found to increase the risk of gastrointestinal bleeding or perforation by 40%.³⁵
- **Psychiatric** — Between 1.3% to 18.4% of steroid users develop psychiatric reactions (with the rates increasing with the dose),³⁶ and around 5.7% experience severe reactions. Additionally, 61% of steroid users reported sleep disturbances,³⁷ and steroids can also sometimes cause psychosis.^{38,39}
- **Infections** — Steroids also increase the risk of infections. For example, users of inhaled steroids were found to be 20% more likely to develop tuberculosis,⁴⁰ and this increased at higher doses in patients with asthma or COPD. Similarly, patients on steroids were 20% more likely to develop sepsis⁴¹ (possibly due to the initial symptoms of the infection being masked by the steroids).
- **Skin** — Prolonged topical use of steroids also frequently causes skin issues⁴² (e.g., up to 5% experience skin atrophy after a year of use).

Lastly, certain steroids are much more potent than others, and the more potent ones that persist in the body (e.g., dexamethasone) are more likely to create systemic effects like HPA axis dysfunction.

<i>Agent</i>	<i>Approx. equiv. dose (mg)</i>	<i>Relative anti-inflammatory (glucocorticoid) potency</i>	<i>Relative mineralocorticoid (Na⁺ retaining) potency</i>	<i>Biologic half-life (hrs)</i>
Cortisone	25	0.8	0.8	8-12
Hydrocortisone	20	1	1	8-12
Prednisone	5	4	0.8	18-36
Prednisolone	5	4	0.8	18-36
Methylprednisolone	5	5	0.5	18-36
Dexamethasone	0.75	25	0	36-54

Uses of Steroids

The toxicity of steroids greatly increases with prolonged doses and routes of administration that have systemic absorption (e.g., oral). Because of this, many now believe they should be reserved for life-threatening emergencies (with the side effects that frequently follow being an acceptable trade off) and for a prolonged period, only be used in a manner with minimal systemic absorption (e.g., topically).

Note: *I recently interviewed a variety of specialists for their perspectives on using steroids in their fields of medicine. Collectively, they felt that while steroids can be helpful, they are frequently prescribed in an inappropriate manner that causes more harm than good (discussed [here](#)).*

- **Inhaled steroids** — Inhaled steroids are routinely used to treat asthma and COPD. Since the systemic absorption of inhaled steroids is much less than from oral steroids, systemic side effects are rarer (but can still occur with prolonged use at higher doses).

While inhaled steroids (along with the other medications commonly prescribed for these respiratory conditions) can help and are often the only option available to patients, I believe in most cases natural therapies that directly treat the conditions are preferable. For example, COPD is seen as a progressive and incurable illness which can only be delayed or partially mitigated with the existing therapies.

In contrast, when [nebulized glutathione](#) is used to replenish the protective lining of the lungs, it halts the progression of the disease, and unlike steroids does so without side effects. Likewise, [many natural therapies exist for asthma](#).

- **Topical steroids** — Topical steroids are routinely used for skin issues and sometimes in other areas as well, such as for certain eye conditions, like preventing graft rejection after a necessary corneal transplant. In these instances, systemic side effects are rare, and most local issues result from prolonged use (e.g., skin changes or skin thinning — particularly on the face).

Note: I have long suspected topical steroids in part work by reducing fluid circulation to the skin (via the interstitium⁴³), thereby preventing inflammatory toxins from arriving there and creating skin reactions (whereas **agents like DMSO treat skin conditions** by augmenting the skin's microcirculation so stagnant toxins cannot irritate a set area).

As such, due to the potential issues with suppressing skin symptoms, I typically treat skin issues with **natural therapies like DMSO** or by eliminating the **underlying cause of the skin issue**.

- **Injectable steroids** — Frequently, when patients have significant pain in a joint, steroids will be injected into the joint to improve the pain. There are three major issues with this approach.
 - First, a certain degree of systemic absorption occurs, so many of the previously mentioned side effects can follow steroid injections (e.g., high blood sugar for over a week⁴⁴).
 - Second, if the injected steroid is not water soluble (most aren't), it will often remain in the joint (e.g., you can often see previously injected steroids within a joint when it is arthroscopically) examined.
 - Third, steroids weaken and degrade connective tissue (e.g., the ligaments holding a joint together).

Since arthritis often results from weakened ligaments no longer holding the joint in the correct position (causing it to grind against itself when it moves), this creates a situation where a temporary relief is gained from the steroid that is followed by a worsening of the underlying issues, which then typically results in the patient eventually needing surgery — which is very common story with knee replacements and **is particularly disastrous in cases where a spinal fusion is performed**.⁴⁵

Note: For this reason, we treat joint pain either by strengthening the joint's ligaments (which for instance often **cures spinal pain**) or using a natural therapy which reduces inflammation and pain without damaging the ligaments (**such as DMSO**).

Lastly, it is important to note that many (and arguably the majority) of joint issues have an inflammatory component (e.g., many patients have undiagnosed seronegative spondyloarthropathies⁴⁶ that often do not show up on standard diagnostic tests⁴⁷).

On the one hand, this illustrates why both conventional and natural approaches for reducing inflammation can help with so many different joint issues. Conversely, it also helps explain why arthritis increase with age, as inflammation and metabolic health worsen with age.⁴⁸

- **Intravenous steroids** — Certain more severe illnesses respond to steroids, and as a result intravenous steroids are routinely given to certain hospitalized patients. In those instances (especially given the options available for hospitalized patients),⁴⁹ this is often necessary and lifesaving. At the same time however, it must be remembered that **this approach can lead to significant side effects**.
- **Oral steroids** — Oral steroids have the widest range of diseases they are used to treat, which is unfortunate since they also tend to cause the most side effects. Some of their common uses include:
 - Severe cases of chronic lung conditions (e.g., asthma or COPD).
 - Allergic reactions of varying severity.
 - Various rheumatologic disorders, along with many other autoimmune conditions such as inflammatory bowel diseases and certain blood disorders.
 - Preventing the rejection of transplanted organs.
 - Replacing hormones that the adrenal glands have lost the ability to produce.

- Certain skin disorders.
- For disc herniations, along with other acute musculoskeletal issues like gout, bursitis, or tendonitis that are not responding to NSAIDs, or to reduce swelling and pain from a recent severe injury.

While some of these are justified, a strong case can be made that **many other uses cause more harm than any benefit they provide.**

Alternatives to Steroids

A central issue with steroids is that while they do suppress the immune system (which is sometimes needed), they are too broad in their effects, and as a result, in most conditions, they cause a significant number of unwanted consequences.

Because of this, a variety of attempts have been made over the years to find alternative ways to suppress the immune system.

For example, Anthony Fauci is a hero to the rheumatology field because shortly after he joined the NIH in 1968, he had the insight that chemotherapy drugs (which destroyed the white blood cells at standard doses), when given at low doses could instead be used to suppress dangerous autoimmune responses.⁵⁰ This worked, and cyclophosphamide allowed certain once terminal diseases to become quite manageable.⁵¹

Many of those drugs were not at all safe (e.g., cyclophosphamide often gives you cancer), but compared to the previously existing options were revolutionary, and as such, immune suppressing drugs which created various consequences of immune suppression (e.g., frequent and unusual infections) were seen as justified and were widely adopted.

Note: *The drug Fauci pioneered for life-threatening vasculitides, cyclophosphamide, is still used in that manner but never received an FDA approval⁵² (which is noteworthy given how aggressively Fauci targeted "unapproved" therapies **during the AIDS crisis and COVID-19**).*

Since then, a variety of less toxic but still effective rheumatologic drugs have been developed that have greatly improved the prognosis of autoimmune disorders (listed [here](#)). Unfortunately, due to the medical field's tendency to greatly delay the adoption of new therapeutic approaches, many of these newer drugs are rarely utilized and instead far more toxic immune suppressing medications like steroids remain the standard of care.

In tandem, a variety of natural approaches have been discovered over the years that often effectively treat a wide range of autoimmune disorders (or at least improve them enough for lower doses and less toxic doses of immunosuppressive medications to be needed). Likewise, much safer natural alternatives have been found for many of the other conditions steroids "treat" (e.g., DMSO for musculoskeletal pain and injury).

Note: *Many things we have direct control over (e.g., [exercise](#), [sunlight exposure](#), [diet](#), and [stress](#)), can greatly improve autoimmune disorders and reduce the need for costly therapies.*

Conclusion

Having an autoimmune disorder often forces a patient to accept utilizing a therapy they know entails significant side effects. However, while drugs like steroids are sometimes necessary, in most cases, a far less toxic alternative exists that allows a patient to live a long and fulfilling life.

Worse still, because the increasing toxicity of our environment and [the refusal to look at what causes autoimmunity](#), we are now seeing an annual increase of 3% to 12% in the rates of these life-changing diseases.^{53,54}

For far too long, we've had to accept these abysmal trade-offs as the medical system incentivizes lucrative pharmaceuticals irrespective of their toxicity while actively shunning natural therapies. However, now that the MAHA movement is ushering in a historic change in healthcare, we at last have an opportunity to shift this dysfunctional

dynamic and begin looking at real solutions to chronic illness rather than outdated ones that no longer serve their purpose.

Author's Note: *This is an abridged version of [a longer article](#) which goes into more detail on the dangers of steroids, the ways to safely utilize or withdraw from them, and the safest natural or conventional methods for treating autoimmune disorders and musculoskeletal issues. That article can be read [here](#).*

A Note from Dr. Mercola About the Author

A Midwestern Doctor (AMD) is a board-certified physician from the Midwest and a longtime reader of Mercola.com. I appreciate AMD's exceptional insight on a wide range of topics and am grateful to share it. I also respect AMD's desire to remain anonymous since AMD is still on the front lines treating patients. To find more of AMD's work, be sure to check out [The Forgotten Side of Medicine](#) on Substack.

Sources and References

- ¹ Am J Cardiol. 2012 Sep 10;110(12):1711–1716
- ² Psychosom Med. 2014 Jul-Aug;76(6):468–475
- ³ The Cardiology Advisor, February 3, 2023
- ⁴ European Journal of Endocrinology, Volume 181, Issue 4, Oct 2019, Pages 429–438
- ⁵ Journal of Endocrinology, 10 Jul 2007, Volume 195: Issue 1
- ⁶ The Nobel Prize in Physiology or Medicine 1950. NobelPrize.org. Nobel Prize Outreach 2025. Fri. 9 May 2025
- ^{7, 8, 9} Inflammopharmacology 22, 263–267 (2014)
- ¹⁰ Clin Transl Sci. 2023; 16: 2565-2576
- ¹¹ BMJ 2017;357:j1415
- ¹² Rheumatology Advisor, March 21, 2016
- ¹³ Drugs.com, August 22, 2024
- ^{14, 16, 22, 32} Arthritis Rheum. 2006 Jun 15;55(3):420-6
- ^{15, 17, 18} RMD Open. 2015 Apr 8;1(1):e000014
- ¹⁹ J Bone Miner Res, 15: 993-1000
- ²⁰ Fosamax, February 2012
- ^{21, 30, 33, 35, 40, 41} J Pharm Technol. 2022 Aug 30;38(6):360–367
- ²³ Arthritis Rheum. 2008 May 15;59(5):746–753
- ²⁴ Arthritis.org, Corticosteroids
- ²⁵ J Clin Endocrinol Metab. 2015 Jun;100(6):2171-80

- ²⁶ Diabet Med. 2025 Mar;42(3):e15475
- ²⁷ Radcliffe Department of Medicine, September 10, 2024
- ²⁸ Diabetes Obes Metab. 2022 Nov;24(11):2222-2231
- ²⁹ Nat Rev Endocrinol. 2022 Sep;18(9):540-557
- ³¹ Ophthalmology. 2009 Apr;116(4):652-7
- ³⁴ Pharmacotherapy. 2008 Nov;28(11):1325–1334
- ³⁶ Diagnostics (Basel). 2023 Jan 17;13(3):337
- ³⁷ Arthritis & Rheumatism, 55: 420-426. doi: 10.1002/art.21984
- ³⁸ Cureus. 2023 May 19;15(5):e39221
- ³⁹ Wikem.org, Steroid-induced psychosis
- ⁴² J Eur Acad Dermatol Venereol. 2012 May;26 Suppl 3:47-51
- ⁴³ The Forgotten Side of Medicine, December 1, 2024
- ⁴⁴ AJR Am J Roentgenol. 2024 Mar;222(3):e2330458
- ⁴⁵ The Forgotten Side of Medicine, October 27, 2023
- ⁴⁶ StatPearls [Internet], Treasure Island (FL): StatPearls Publishing; 2025 Jan
- ⁴⁷ Creakyjoints.org, November 15, 2018
- ⁴⁸ Nat Rev Endocrinol. 2018 Oct;14(10):576-590
- ⁴⁹ The Forgotten Side of Medicine, November 24, 2024
- ^{50, 51} Pathog Immun. 2024 Sep 16;9(2):152–171
- ⁵² Cyclophosphamide Injection, June 2023
- ⁵³ J Clin Invest. 2025;135(4):e178722
- ⁵⁴ International Journal of Celiac Disease 3, no. 4 (2015): 151-155