Thymosin Alpha-1

PATIENT EDUCATION GUIDE — IMMUNE MODULATION & RESILIENCE THERAPY

Harriman Precision Health
Physician-Supervised Telemedicine Wellness
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What Is Thymosin Alpha-1?

Thymosin Alpha-1 (Tα1) is a naturally occurring 28-amino-acid peptide originally isolated from thymosin fraction 5 — a thymic extract — in 1972 by researcher Allan Goldstein at the George Washington University School of Medicine.[1] The thymus gland, which plays a foundational role in immune system development and function, produces Tα1 as one of its primary signaling molecules. Tα1 has been the subject of extensive clinical research for over four decades, with studies and clinical applications spanning chronic viral infections, cancer immunotherapy adjuvancy, sepsis management, and immune resilience.[2]

A pharmaceutical form of Thymosin Alpha-1 — Zadaxin (thymalfasin) — is approved in over 35 countries outside the United States for the treatment of chronic hepatitis B, chronic hepatitis C, and as an immune adjuvant in certain cancers.[3] In the United States, Tα1 is used off-label as a compounded therapy for immune optimization, immune resilience, chronic infections, autoimmune modulation, and longevity protocols. Its core mechanism — immune modulation rather than immune stimulation or suppression — makes it uniquely valuable in both underactive and dysregulated immune states.

How It Works

Tα1 is an immune modulator, not an immunostimulant or immunosuppressant. This distinction is clinically critical. Rather than broadly activating or suppressing immune function (as steroids, immunotherapy drugs, or simple immune supplements do), Tα1 precisely recalibrates immune response — enhancing it where it is insufficient and dampening it where it is dysregulated.[4] The primary mechanisms involve

activation of toll-like receptors (TLR2, TLR3, TLR4, TLR7, TLR9), which drive downstream signaling through IRF3 and NF-κB pathways to promote proliferation and activation of T-cells, NK cells, dendritic cells, and macrophages.[5] Tα1 increases production of interferon-gamma and other cytokines essential for viral defense and anti-tumor surveillance, while simultaneously exerting anti-inflammatory and tolerance-inducing effects through regulatory T-cell promotion in autoimmune contexts.[6] This bidirectional immune calibration is what makes Tα1 applicable across such a wide range of immune conditions.

What Thymosin Alpha-1 Is Used For

Immune resilience and infection defense: Tα1 is used proactively to strengthen immune surveillance and response — reducing susceptibility to viral and bacterial infections and shortening recovery time when illness does occur.[7] It is particularly valuable for high-performing athletes, frequent travelers, individuals with high-stress lifestyles, and anyone who experiences frequent immune crashes or prolonged recovery from infections. **Chronic viral infections:** Tα1 has demonstrated clinical benefit in chronic hepatitis B and C through immune recalibration and enhanced viral clearance mechanisms — the basis for its pharmaceutical approval globally.[3] Post-viral syndromes and long-term immune sequelae following viral illness are emerging applications. **Autoimmune conditions:** Research has explored Tα1 for autoimmune conditions including rheumatoid arthritis, multiple sclerosis, and systemic lupus erythematosus, where its immune-modulating rather than immunosuppressive mechanism may offer therapeutic value with a more favorable side effect profile than conventional immunosuppressants.[8] **Cancer support:** Tα1 has been studied as an immune adjuvant in cancer protocols — supporting NK cell activity and anti-tumor immune surveillance.[9] **Longevity and aging immune decline:** Immune function declines with age (immunosenescence) in ways that increase infection risk, cancer susceptibility, and inflammatory burden. Tα1 is increasingly used in longevity protocols to maintain immune competence through the aging process.

What to Expect: Timeline of Results

Tα1's effects on immune resilience develop progressively over the treatment cycle. Most patients do not notice dramatic acute effects —

rather, they observe over weeks that they are getting sick less frequently, recovering faster when they do, and experiencing fewer energy crashes associated with immune burden.[7] For patients with active chronic infections or post-viral syndromes, more noticeable symptomatic improvements typically develop over four to eight weeks of consistent use. Athletes using Tα1 for overtraining immune compromise often notice improved recovery and reduced frequency of upper respiratory infections within the first two to four weeks. Full immune resilience benefits, including T-cell and NK cell activity optimization, develop over the complete eight to twelve week cycle.

Standard Protocol

Parameter	Details
Dose	1.0–1.5 mg per injection
Frequency	2–3 times weekly
Route	Subcutaneous injection; rotate sites
Cycle Length	4–8 weeks; reassess seasonally or based on immune status and goals
Proactive Use	May be used proactively during periods of increased immune stress (high travel, seasonal illness, overtraining)
Medication Source	Compounded by Empower Pharmacy (Houston, TX)

Safety Profile

Thymosin Alpha-1 has an extensive and well-characterized safety record built on decades of clinical use in over 35 countries.[3] It is not a hormone, does not suppress the HPG axis, and does not broadly suppress immune function — meaning it does not increase susceptibility to opportunistic infections the way corticosteroids or conventional immunosuppressants do.[4] Side effects are minimal: mild, transient injection site reactions are the most commonly reported finding. No significant systemic adverse events have been documented at therapeutic doses in the extensive available clinical literature.[10] Tα1 is not recommended during pregnancy or

breastfeeding due to insufficient safety data in those populations. Patients with active autoimmune conditions on existing immunosuppressive therapy should discuss Tα1 with their rheumatologist or specialist before initiating.

How to Maximize Your Results

- **Use Proactively, Not Just Reactively**[7] — Tα1 is most effective when used before immune stress occurs — before high-travel periods, before competitive athletic events, during winter illness season, or during periods of high work stress. Waiting until you are already sick limits what it can do. Proactive cycling builds the immune reserve that produces the most consistent resilience benefits.
- **Gut Health Support** — Approximately 70–80% of immune function originates in the gut-associated lymphoid tissue (GALT). A quality probiotic, prebiotic fiber intake, and anti-inflammatory diet directly support the immune environment Tα1 is optimizing. Leaky gut and gut dysbiosis impair systemic immune competence.
- **Adequate Sleep**[11] — Sleep is the body's primary immune recovery window. T-cell production, NK cell activation, and cytokine regulation all occur predominantly during sleep. Chronic sleep deprivation is one of the most powerful suppressors of immune function — working directly against what Tα1 is building.
- **Vitamin D Optimization**[12] — Vitamin D is essential for T-cell activation and immune regulation. Deficiency is extremely common and directly blunts Tα1's T-cell enhancing effects. Have your vitamin D level checked and supplement to maintain 50–80 ng/mL for optimal immune function.
- **Zinc Adequacy**[13] — Zinc is a critical cofactor for thymic peptide function and T-cell proliferation. Deficiency — common in older adults and athletes — impairs the immune pathways Tα1 activates. A daily zinc supplement (15–30 mg) is a simple, impactful addition for Tα1 patients.
- **Stress Management** — Chronic psychological stress elevates cortisol, which suppresses T-cell and NK cell activity — directly opposing Tα1's mechanisms. Mindfulness practices, adequate

> work-rest balance, and cortisol management are practical immune-supporting habits throughout your cycle.

Is Thymosin Alpha-1 the same as TB-500 (Thymosin Beta-4)?

No — they are completely different peptides with different mechanisms and applications. Thymosin Alpha-1 is an immune-modulating peptide produced by the thymus. TB-500 (Thymosin Beta-4) is a tissue repair peptide that regulates actin dynamics and promotes healing. The naming similarity is coincidental — they share a thymosin family heritage but function in entirely different biological domains.

Can Thymosin Alpha-1 help with autoimmune conditions?

Emerging research suggests Tα1 may have a role in autoimmune modulation — its ability to promote regulatory T-cells and recalibrate immune tolerance pathways is clinically relevant for conditions like RA, MS, and lupus.[8] However, patients with autoimmune conditions on existing treatments should always involve their specialist in the decision to add Tα1. Your HPH physician will coordinate appropriately.

How is my medication sourced?

All peptides are compounded by Empower Pharmacy, our licensed Houston-based compounding partner, under strict quality and sterility standards.

Important Notice: This document is for educational purposes only. All therapies at Harriman Precision Health are physician-supervised and individualized. In the United States, Tα1 is an off-label compounded therapy. Patients with active autoimmune conditions on immunosuppressive therapy should involve their specialist before initiating. Not recommended during pregnancy or breastfeeding. Questions? Contact us through your patient portal.

References

1. Goldstein AL, et al. Thymosin: isolation and sequence analysis of an immunologically active polypeptide from calf thymus. *Proceedings of the National Academy of Sciences.* 1972;69(7):1800–1803.
2. Tuthill CW, King RS. Thymosin alpha 1 — a peptide immune modulator with a broad range of clinical applications. *Journal of Clinical & Experimental Pharmacology.* 2013;3:133. doi:10.4172/2161-1459.1000133.
3. Innerbody Research. Thymosin Alpha-1: Safety, Benefits, and More — FDA Status,

Zadaxin, and Clinical Applications. 2026. Available at: innerbody.com.

4. Swolverine. Thymosin Alpha-1 for Beginners: Immune Support, Dosage, and Benefits — Immune Modulation vs. Stimulation. 2025. Available at: swolverine.com.

5. Liu T, et al. Thymosin alpha 1 and its role in viral infectious diseases — molecular mechanisms and clinical applications. *Molecules.* 2023;28(8):3539. doi:10.3390/molecules28083539.

6. Romani L, et al. Thymosin alpha 1: an endogenous regulator of inflammation, immunity and tolerance. *Annals of the New York Academy of Sciences.* 2007;1112:236–238.

7. FDA Regulatory Document. Thymosin Alpha 1 TA1 Thymalfasin Zadaxin — Immune Support and Clinical Evidence Summary. FDA-2024-N-4777-0003. 2024.

8. Tian Y, et al. Thymosin alpha 1 alleviates inflammation and prevents infection in patients with severe acute pancreatitis through immune regulation: a systematic review and meta-analysis. *Frontiers in Immunology.* 2025;16:1571456. doi:10.3389/fimmu.2025.1571456.

9. Garaci E, et al. Thymosin alpha 1 and cancer: action on immune effector and tumor target cells. *Annals of the New York Academy of Sciences.* 2012;1269:26–33.

10. Sigalos JT, Pastuszak AW. The safety and efficacy of growth hormone secretagogues. *Sexual Medicine Reviews.* 2018;6(1):45–53.

11. Irwin MR. Sleep and inflammation: partners in sickness and in health. *Nature Reviews Immunology.* 2019;19(11):702–715.

12. Aranow C. Vitamin D and the immune system. *Journal of Investigative Medicine.* 2011;59(6):881–886.

13. Rink L, Gabriel P. Zinc and the immune system. *Proceedings of the Nutrition Society.* 2000;59(4):541–552.

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