thymosin alpha 1

Thymosin alpha 1 (Tα1) is a synthetic copy of a natural thymus-derived peptide that acts as an **immunomodulator**, enhancing certain immune responses while also helping control excessive inflammation.[1] [2] [3]

What it is

- Tα1 is a 28–amino-acid fragment derived from prothymosin-α, a protein encoded by the PTMA gene and normally produced in the thymus.[4] [2]
- It is classified as a thymic hormone–like peptide with broad immune-regulating, anti-tumor, and antiviral activities in preclinical and clinical studies.[3] [1]

Mechanism of action

- Tα1 promotes maturation and activation of CD4+ and CD8+ T cells, increases natural killer (NK) cell activity, and activates dendritic cells, boosting cell-mediated immunity.[2] [5] [1]
- It signals partly via Toll-like receptors (notably TLR2 and TLR9) on dendritic and other immune cells, leading to cytokine production (e.g., IL-2, IFN-γ) and enhanced antigen presentation via increased MHC class I expression.[5] [6] [3]
- It can both up-regulate helpful Th1-type responses and dampen excessive pro-inflammatory cytokines such as IL-1β and TNF-α, contributing to a more balanced immune response.[7] [1]

Clinical and experimental uses

- Approved indications in some countries include chronic hepatitis B and C and certain cancers, often as an adjuvant to other therapies to improve immune function and treatment tolerance.[1] [3]
- Studies have explored Tα1 in sepsis, COVID-19, vaccine responsiveness (e.g., in elderly or immunocompromised patients), and as an adjunct in solid tumors like melanoma and hepatocellular carcinoma, with mixed but sometimes promising results.[8] [9] [10] [3]
- A large recent sepsis trial did not show a clear mortality benefit at 28 days, highlighting that benefits are condition- and study-dependent.[9]

Safety, regulation, and access

- Across thousands of treated patients, Tα1 generally shows a favorable safety profile, with most reported adverse effects being mild and injection-site related, though immune reactions are a concern and long-term data remain limited.[11] [12] [2]

- In the United States, injectable Tα1 has been restricted from compounding by the FDA, despite a 2024 review arguing that available clinical data support it as a well-tolerated and effective immune modulator.[12] [11]
- In Canada, injectable peptides such as Tα1 are regulated as prescription drugs, and Health Canada has warned against unauthorized peptide products sold online, emphasizing that non-approved versions may pose serious health risks.[13] [14]

If you share your interest (e.g., immune health, autoimmunity, infection, performance), a more tailored, risk-focused overview can be provided.

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Clinical dose

For approved medical uses, thymosin alpha 1 has typically been dosed around 1.6 mg subcutaneously twice weekly in adults, usually for several months, with some protocols ranging from 0.8–6.4 mg per dose depending on indication and study design.[22] [23]

Typical clinical ranges

- Many hepatitis B and C trials used 1.6 mg (about 900 micrograms/m²) subcutaneously twice weekly for 6–12 months.[24] [25] [22]
- Reviews summarizing broad clinical use report standard single doses from 0.8–6.4 mg and total daily/short-course doses from 1.6–16 mg over 5–7 days, given subcutaneously 2–3 times per week in liver disease, cancer, and autoimmune settings.[26] [23]

Condition-specific examples

- Chronic hepatitis B: 0.8–1.6 mg subcutaneously twice weekly for 6–12 months, sometimes combined with antivirals or interferon.[27] [28] [22]
- Oncology adjuvant (e.g., with chemotherapy): commonly 1.6 mg, up to about 3.2 mg, subcutaneously 2–3 times weekly; some studies explore loading doses or higher short-term regimens, but these are investigational.[29] [30] [31]

Practical cautions

- Dosing is not standardized across indications, and some higher-dose regimens remain experimental with limited long-term safety data.[32] [33] [23]
- In Canada and the U.S., thymosin alpha 1 for most uses is not formally approved and access is mainly via off-label or research settings; dosing should therefore be determined and monitored by a specialist familiar with the specific disease and local regulations.[34] [33]

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how long does the reconstituted vial last

For most research and clinic-style protocols, a reconstituted thymosin alpha 1 vial is typically kept refrigerated and used within about 2–4 weeks, but some technical sheets advise only 2–7 days, so the exact "expiration" depends on the specific product and diluent.[43] [44] [45]

What stability data show

- One peer-reviewed review notes that after reconstitution, thymosin alpha 1 can be stored at about 4 °C for "two to seven days," with longer storage only if combined with a carrier protein such as 0.1% human or bovine serum albumin and avoiding repeated freeze–thaw.[45] [46] [43]
- Several research suppliers state that reconstituted thymosin alpha 1 should be kept at 4 °C for 2–7 days and, for future use, stored below −18 °C with a carrier protein, reflecting conservative, lab-oriented stability guidance rather than clinical practice.[47] [48] [46] [45]

Common practice in peptide clinics/labs

- Some peptide-oriented protocols and patient info sheets (off-label, not regulatory-approved) suggest that when reconstituted with bacteriostatic water and stored at 2–8 °C, vials may remain suitable for use for about 30–42 days, while emphasizing protection from light and avoiding freezing.[44] [49] [50] [51]
- Because these longer timeframes are not backed by formal, public stability studies and different products have different excipients, the safest course is to follow the exact storage/"use by" instructions provided by the manufacturer or compounding pharmacy on your specific vial.[49] [52]

Practical guidance

- Keep reconstituted TA1 in a refrigerator (2–8 °C), protected from light, never frozen, and do not repeatedly warm and cool it.[50] [43] [44]
- If your vial's label or information sheet gives a shorter in-use period (e.g., 7 days, 30 days), treat that as the limit; if not specified, discuss a conservative maximum in-use time with the prescribing clinician or pharmacist, as stability and sterility limits can differ by formulation and setting.[53] [49]

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