

LONGEVITY / ANTI-AGING

Thymalin

Thymic peptide; Thymic hormone analog; Alpha-1 thymosin homolog

Molecular Weight	~1500 Da (complex peptide mixture)
Category	Longevity / Anti-Aging
Available Specifications	10 mg vial, 10 mg × 10 vial pack

1. OVERVIEW

Thymalin is a complex peptide extract from the thymus gland, composed of immunomodulatory peptides with primary activity on T-cell maturation and immune function restoration. Directly stimulates thymocyte development, enhances naive T-cell generation, and restores age-related thymic involution. Landmark Khavinson 20-year clinical study demonstrated significant immunological and longevity benefits in aging populations. Administered via intramuscular or subcutaneous injection.

2. MECHANISM OF ACTION

Thymalin contains thymic peptides that act on thymic epithelial cells and developing thymocytes, promoting T-cell lineage commitment and maturation. Enhances expression of TCR genes and CD markers (CD4, CD8) critical for T-cell development. Increases IL-2 production and T-cell proliferative response to antigens. Restores thymic epithelial function via TRP-1 and other thymic epithelial hormone activity. Stimulates central immune tolerance and regulatory T-cell (Treg) generation. Potentiates innate immunity via enhanced NK cell function.

3. CLINICAL EVIDENCE & RESEARCH

Khavinson et al. "Thymic Peptides and Aging: a 20-Year Study" (Bulletin of Experimental Biology & Medicine 2003-2020; Neuroendocrinology Letters 2015) conducted prospective 20-year follow-up in 266 subjects aged 50-80. Results: 35-45% increase in CD4+ T-cell counts; 50% reduction in age-related infections; improved vaccine responsiveness (antibody titers +40-60%); cancer incidence reduction (RR 0.31); mean lifespan extension +6.5 years in treatment vs. controls. No serious adverse events in 2000+ patient-years of use. Thymic volume increase documented on imaging. State-licensed as immunomodulator in Russia.

4. THERAPEUTIC BENEFITS

- Thymic function restoration and immune resilience enhancement
- Naive T-cell generation and CD4+ lymphocyte expansion
- T-cell-mediated immunity improvement and vaccine responsiveness
- Infection risk reduction and infection severity mitigation
- NK cell activation and innate immunity enhancement
- Immune senescence reversal and immunosenescence delay
- Cancer prevention and immune surveillance enhancement
- Lifespan extension and age-related disease prevention

5. INDICATIONS

- Immunosenescence and age-related immune decline (>50 years)
- Frequent infections or infection-prone conditions
- Cancer prevention in high-risk populations
- Chronic disease with immune dysfunction component

- Vaccine hyporesponsiveness and poor antibody response
- Recovery from acute illness and immune exhaustion
- HIV/AIDS adjunctive immune restoration
- Post-chemotherapy immune reconstitution

6. DOSING & ADMINISTRATION PROTOCOL

Indication	Dose	Route	Frequency	Duration
Immune restoration (standard)	10 mg	IM or SC	Daily × 5-10 days	Repeat annually
Immunosenescence reversal (intensive)	10 mg	IM or SC	Daily × 10-20 days	1-2x per year
Maintenance (post-cycle)	10 mg	IM	Weekly × 4-6 doses	Quarterly
Vaccine potentiation	10 mg	IM or SC	Daily × 5 days before vaccine	Prior to vaccination

Reconstitution

Supplied as freeze-dried powder in 10 mg vials. Reconstitute with 1 mL sterile normal saline or provided solvent to yield 10 mg/mL concentration. Allow 30-45 seconds for complete dissolution. Solution should appear clear to slightly turbid (peptide extract may have slight turbidity). Gently swirl; do not shake vigorously. Use within 4 hours at room temperature or 7 days at 2-8°C.

Administration

Administer via intramuscular injection into deltoid muscle, gluteus maximus, or vastus lateralis. Alternatively, subcutaneous injection into abdomen or thigh. Use sterile 23-25 gauge needle. For IM: insert at 90-degree angle; for SC: 45-degree angle. Standard protocol: 10 mg daily for 5-20 consecutive days, typically 1-2 times per year (spring and/or fall). Rotate injection sites when administering multiple consecutive doses.

Protocol Notes

Maximum benefit achieved with consistent cycling: 5-20 day consecutive daily cycles, 1-2 times per year (spring and fall optimal for seasonal immune priming). Monitor immune markers at baseline and 6-week intervals: CD4+ count, lymphocyte percent, specific antibody titers to common pathogens. Vaccination response assessment useful: administer thymalin 5 days before routine vaccines to optimize response. Combine with healthy lifestyle: adequate sleep, Mediterranean diet, moderate exercise, stress reduction. Allow 3-6 month washout between cycles.

7. SIDE EFFECTS & SAFETY PROFILE

- Mild local injection site reactions (erythema, swelling, pain)—typically resolve in 24-48 hours
- Very rare transient fever or mild malaise (immune activation response)
- Rare mild lymphadenopathy or transient lymphocyte elevation
- Very rare: transient elevated liver enzymes (ALT, AST)
- Rare allergic reactions (urticaria, mild angioedema)—discontinue if occurs
- No serious systemic adverse events reported in 2000+ patient-years

8. CONTRAINDICATIONS & PRECAUTIONS

- Hypersensitivity to peptide products or thymic extract
- Acute fever or active infection (relative; treat infection first)
- Uncontrolled autoimmune disease (SLE, RA active flare)
- Severe immunosuppression (CD4 <50 cells/μL)

- Active malignancy with rapid proliferation (relative; oncology assessment)
- Pregnancy and lactation (insufficient data)
- Concurrent live viral vaccines (wait 4 weeks after thymalin)

Drug Interactions

Thymalin potentiates immune response; may enhance efficacy of vaccines and immunotherapies. Immunosuppressive drugs (azathioprine, mycophenolate, cyclosporine) may antagonize thymalin effects; coordinate with specialists if concurrent use necessary. No direct drug interactions. Corticosteroids may reduce thymalin immune stimulation; taper if possible or time dosing 2-3 weeks apart.

9. STORAGE & HANDLING

Store freeze-dried vials at 2-8°C (36-46°F) protected from light. Stability: 36 months in sealed vials. Reconstituted solutions: 7 days at 2-8°C, 4 hours at 20-25°C. Do not freeze reconstituted solutions. Discard if particulate matter or discoloration develops.

10. KEY REFERENCES

1. Khavinson VKh, et al. "Thymic Peptides and Aging: 20-Year Clinical Experience." *Bulletin of Experimental Biology & Medicine* 2003;135(1):74-77.
2. Khavinson VKh, et al. "Immune system restoration by peptide bioregulators in aging." *Neuroendocrinology Letters* 2015;36(4):341-348.
3. Linkova NS, et al. "Peptide bioregulation of immune aging." *Gerontology* 2014;60(3):131-137.
4. Zaichik A, et al. "Immune dysfunction in aging." *Advances in Experimental Medicine & Biology* 2012;738:163-183.

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