

RESEARCH MONOGRAPH . COMPOUND PROFILE

TB-500 Fragment (LKKTETQ)

A seven-residue actin-binding fragment of thymosin beta-4 (T β 4 residues 17 through 23), studied as the minimal active region driving the cell migration and angiogenic effects of the parent peptide.

DOCUMENT	KDC-MN-1335
ISSUED	2026-05-10
REVISION	1.0
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COMPOUND CLASS	Heptapeptide active fragment of thymosin beta-4

ABSTRACT

TB-500 Fragment (Leu-Lys-Lys-Thr-Glu-Thr-Gln; LKKTETQ; thymosin beta-4 residues 17 through 23; molecular weight 819.93) is a seven-residue synthetic peptide corresponding to the minimal actin-binding region of thymosin beta-4 (Tbeta4), the 43-residue actin-sequestering protein expressed at high concentration in platelets, leukocytes, and many other cell types. The full-length Tbeta4 sequence is the molecule supplied as Kodiak biolabs TB-500 (KDC-MN-003); the LKKTETQ fragment is a separate research-grade preparation that has been used in vendor literature and a limited research literature interchangeably with TB-500 (a confusion that should be resolved by mass spectrometry on each lot, since the fragment and full-length peptides have very different masses). The pharmacological argument for the heptapeptide is that LKKTETQ retains the cell migration and angiogenic activity of the parent at substantially lower molecular weight, with potentially favorable pharmacokinetic and tissue distribution profiles. Published in vitro and rodent studies support migration-promoting activity at this minimal sequence. The full-length Tbeta4 has additional activities (anti-inflammatory effects, regulation of cardiac and corneal repair) that depend on residues outside the 17-23 region and are not necessarily reproduced by the fragment. Investigators should specify whether the research-grade preparation in question is the full-length 43-residue peptide (KDC-MN-003) or the LKKTETQ heptapeptide (this monograph), since the published preclinical record is dominated by the full-length compound and translation of full-length results to fragment dosing should be done with caution. Reconstitution and handling parallel other

small synthetic peptides; the heptapeptide is highly water-soluble and stable to lyophilization. Plasma half-life is on the order of minutes; tissue retention is shorter than for the full-length peptide.

1. 1. Compound Identification

TB-500 Fragment (LKKTTETQ) is described as heptapeptide active fragment of thymosin beta-4. A seven-residue actin-binding fragment of thymosin beta-4 (Tβ4 residues 17 through 23), studied as the minimal active region driving the cell migration and angiogenic effects of the parent peptide.

1.1. 1.1 Class summary

Heptapeptide active fragment of thymosin beta-4

1.2. 1.2 Subtitle

A seven-residue actin-binding fragment of thymosin beta-4 (Tβ4 residues 17 through 23), studied as the minimal active region driving the cell migration and angiogenic effects of the parent peptide.

2. Abstract

TB-500 Fragment (Leu-Lys-Lys-Thr-Glu-Thr-Gln; LKKTETQ; thymosin beta-4 residues 17 through 23; molecular weight 819.93) is a seven-residue synthetic peptide corresponding to the minimal actin-binding region of thymosin beta-4 (Tbeta4), the 43-residue actin-sequestering protein expressed at high concentration in platelets, leukocytes, and many other cell types. The full-length Tbeta4 sequence is the molecule supplied as Kodiak biolabs TB-500 (KDC-MN-003); the LKKTETQ fragment is a separate research-grade preparation that has been used in vendor literature and a limited research literature interchangeably with TB-500 (a confusion that should be resolved by mass spectrometry on each lot, since the fragment and full-length peptides have very different masses). The pharmacological argument for the heptapeptide is that LKKTETQ retains the cell migration and angiogenic activity of the parent at substantially lower molecular weight, with potentially favorable pharmacokinetic and tissue distribution profiles. Published in vitro and rodent studies support migration-promoting activity at this minimal sequence. The full-length Tbeta4 has additional activities (anti-inflammatory effects, regulation of cardiac and corneal repair) that depend on residues outside the 17-23 region and are not necessarily reproduced by the fragment. Investigators should specify whether the research-grade preparation in question is the full-length 43-residue peptide (KDC-MN-003) or the LKKTETQ heptapeptide (this monograph), since the published preclinical record is dominated by the full-length compound and translation of full-length results to fragment dosing should be done with caution. Reconstitution and handling parallel other small synthetic peptides; the heptapeptide is highly water-soluble and stable to lyophilization. Plasma half-life is on the order of minutes; tissue retention is shorter than for the full-length peptide.

3. Mechanism of Action

Actin G-binding at the minimal sequence corresponding to Tbeta4 residues 17 through 23. Cell migration and angiogenic activity preserved relative to full-length parent; some activities of full-length Tbeta4 not reproduced by the fragment.

The mechanistic profile described above represents the consensus position from peer-reviewed literature where available; for compounds with sparse formal characterization, this section reflects vendor-grade reports and structurally-related class pharmacology and should be interpreted with appropriate caution.

4. 4. Pharmacokinetics and Routes of Administration

Pharmacokinetic data are summarized within the abstract for compounds with formal Phase 1 records. Compounds without published human pharmacokinetic studies are noted as such; investigators should treat the absence of data as a research limitation.

5. 5. Reported Research Dose Ranges

Research-grade dosing 1 to 5 mg subcutaneous twice weekly. No human clinical record. Rodent in vivo work 1 to 10 mg/kg.

Doses are scaled from clinical use where the compound is approved as a medicine, from Phase 2/3 trials where development advanced, or from rodent dose-response data scaled by allometric assumptions where the compound has no human clinical record. Investigators should treat dose ranges from research-chemical-grade vendors as starting points for their own pharmacokinetic and tolerability characterization rather than validated dosing recommendations.

6. 6. Sourcing and Quality Verification

Investigators should obtain analytical confirmation of identity (mass spectrometry; for peptides, additionally amino acid analysis or N-terminal sequencing) and purity (HPLC area-percent, ideally greater than 95 percent) on every lot. Vendor certificates of analysis vary in quality; third-party analytical confirmation through independent laboratories (e.g., Janoshik Analytical, Anabolic Lab) is the gold standard for research-grade peptides and small molecules.

For compounds with established pharmaceutical-grade marketing in any jurisdiction, sourcing from the marketed product (where legal and accessible) provides the highest quality assurance.

7. 7. Reconstitution and Handling

Peptides should be reconstituted in bacteriostatic water or sterile water for injection in the volume appropriate to the desired concentration; lyophilized peptides should be allowed to come to room temperature before reconstitution to minimize precipitation. Reconstituted peptides should be stored refrigerated and used within the timeframe specified by the manufacturer (typically 14 to 30 days for bacteriostatic water reconstitutions, shorter for sterile water).

Small molecules: storage conditions vary by compound; consult the certificate of analysis for the specific product. Most are stable at room temperature in dry, dark conditions; oxidation-sensitive compounds (e.g., catecholamine precursors) require cool storage and protection from light.

8. 8. Stack Interaction Considerations

Investigators combining this compound with other research substances should consider receptor-level interactions (additive effects at shared targets), enzyme-level interactions (CYP-mediated drug-drug interactions where applicable), and pharmacodynamic interactions (additive sedation, additive serotonergic activity, additive hemodynamic effects).

The stack interaction section in published monographs of well-characterized compounds is necessarily incomplete for any specific combination; investigators should treat novel combinations with elevated caution and titrate gradually.

9. 9. References

1. Goldstein AL, et al. Thymosin beta4: a multi-functional regenerative peptide. Expert Opin Biol Ther 2012.
2. Sosne G, et al. Thymosin beta 4: a potential novel therapy. Vitam Horm 2010.
3. Philp D, et al. Thymosin beta 4 promotes angiogenesis. Wound Repair Regen 2003.

This monograph is provided for research use only. Not for medical, diagnostic, or therapeutic purposes. Not for human consumption. Compound class generalizations are noted where compound-specific data are sparse; investigators should weight the evidence accordingly.