Laboratory Risk Assessment

TB-500 (research peptide)

Hazards, safe handling, storage and disposal in an in-vitro research setting

Document ref.	RBL-RA-004	**Assessment date**	9 September 2026
Revision	Rev. 1.0	**Next review**	September 2027, or on change of process
Scope	Receipt, storage, bench handling and disposal of lyophilised TB-500 and its aqueous solutions	**Basis**	COSHH Regulations 2002 (as amended); HSE 5-step approach

Research use only. TB-500 supplied by Richmond Biolabs is sold strictly for in-vitro laboratory research. It is not a medicine, food, cosmetic or veterinary product. This assessment covers laboratory handling only and makes no reference to, or provision for, administration to humans or animals.

Each peptide has its own risk assessment covering hazards, safe handling, storage and disposal in a laboratory setting.

1 Substance identification

Name	TB-500; synthetic thymosin β4, N-acetylated, 43 residues
CAS number	77591-33-4
Molecular formula	$C_{212}H_{350}N_{56}O_{78}S$
Molecular weight	4963.4 g/mol
Physical form	White lyophilised powder in sealed glass vial; typically supplied as acetate salt
Solubility	Freely soluble in water and aqueous buffers
Purity (supplied)	≥ 99% by RP-HPLC; identity by mass spectrometry. Batch values on the lot-specific COA

TB-500 (thymosin β4), 43 residues (N → C)

1 Ac-Ser	2 Asp	3 Lys	4 Pro	5 Asp	6 Met	7 Ala	8 Glu	9 Ile	10 Glu	11 Lys	12 Phe	13 Asp	14 Lys	15 Ser
16 Lys	17 Leu	18 Lys	19 Lys	20 Thr	21 Glu	22 Thr	23 Gln	24 Glu	25 Lys	26 Asn	27 Pro	28 Leu	29 Pro	30 Ser
31 Lys	32 Glu	33 Thr	34 Ile	35 Glu	36 Gln	37 Glu	38 Lys	39 Gln	40 Ala	41 Gly	42 Glu	43 Ser		

Fig. 1 Primary sequence. Shaded: N-acetyl serine at position 1 and Met at position 6, the main oxidation site. Residues 17–23 (LKKTETQ) form the actin-binding motif.

2 Hazards

TB-500 is not classified as hazardous under GB CLP on the data currently available, and no Workplace Exposure Limit is assigned in HSE EH40. Its toxicological properties have not been fully investigated. It is handled here as a **potentially biologically active substance**: exposure is kept as low as reasonably practicable and dry powder is never handled on an open bench.

The main risks come from the handling process: sharps and glass, the benzyl alcohol preservative in bacteriostatic diluent, cold-chain packaging, and loss of sample integrity. Oxidation of Met6 is a specific integrity risk for this peptide.

3 Hazard register

Likelihood (L) and severity (S) are each scored 1–5; risk rating R = L × S. Bands: **1–4 low**, **5–9 medium**, **10–15 high**, **16–25 very high**. Residual ratings assume all listed controls are in place.

Ref	Hazard / activity	Affects	L	S	R	Control measures	L	S	R
H01	**Inhalation of lyophilised powder** Opening vials, weighing, transfer of dry material	Personnel	2	3	6	Open and weigh in a Class II MSC or ventilated balance enclosure. Allow vial to reach room temperature unopened. Tap cake down before decrimping.	1	3	3
H02	**Skin or eye contact** Reconstitution, pipetting, aliquoting	Personnel	3	2	6	Nitrile gloves, safety glasses to EN 166, buttoned lab coat. Eyewash within 10 s travel.	1	2	2
H03	**Sharps and broken glass** Needle transfer through septa, crimp removal, dropped vials	Personnel	3	3	9	Use decrimper, not pliers. Sharps bin at point of use; no recapping. Blunt-fill needles where practical.	2	2	4
H04	**Benzyl alcohol in bacteriostatic water (0.9%)** Use as diluent	Personnel	2	2	4	Handle as mild irritant. Keep capped; refer to diluent SDS. Use sterile water where preservative is not required by the assay.	1	2	2
H05	**Microbial contamination of stock** Repeated septum puncture, non-sterile diluent	Sample	3	3	9	Aseptic technique in MSC. Sterile diluent, 0.22 µm PES filtration of stock. Swab septum with 70% IPA before each entry.	1	3	3
H06	**Thermal degradation and freeze–thaw loss** Storage outside range, repeated thawing	Sample	4	3	12	Store at −20 °C in a logged freezer. Aliquot on first reconstitution; one thaw per aliquot. Record time out of storage.	2	2	4
H07	**Moisture uptake by lyophilisate** Opening cold vials, humid rooms	Sample	3	2	6	Equilibrate to room temperature before opening. Reseal promptly; hold opened material in a desiccator.	1	2	2
H08	**Mislabelling or cross-contamination** Several peptides handled in one session	Sample	2	4	8	One compound on the bench at a time. Label every aliquot with lot no., concentration, date, initials. Single-use filter tips.	1	3	3
H09	**Cold burns; CO_2 build-up where dry ice is used** Unpacking cold-chain shipments, freezer access	Personnel	2	3	6	Cryo gloves for dry ice. Unpack in a ventilated area, never a cold room. Do not seal dry ice in airtight containers.	1	2	2
H10	**Spill of solution or powder** Bench work, dropped vial	Personnel	3	2	6	Spill kit on bench. Damp-wipe powder (no dry sweeping). Clean with detergent then 70% ethanol.	1	2	2
H11	**Release of bioactive material to drain** Disposal of residues and consumables	Environment	2	3	6	Collect liquid and solid waste for clinical/chemical incineration via licensed contractor. No drain disposal.	1	2	2
H12	**Oxidation of methionine residue** Air exposure of solutions, repeated opening	Sample	3	2	6	Use freshly opened or degassed diluent, keep headspace small, and limit vial openings. Aliquot rather than re-enter the stock vial.	1	2	2

12	1 → 0	7.0 → 2.6	4
hazards assessed	high-rated hazards	mean risk score	highest residual (low)

4 Risk profile

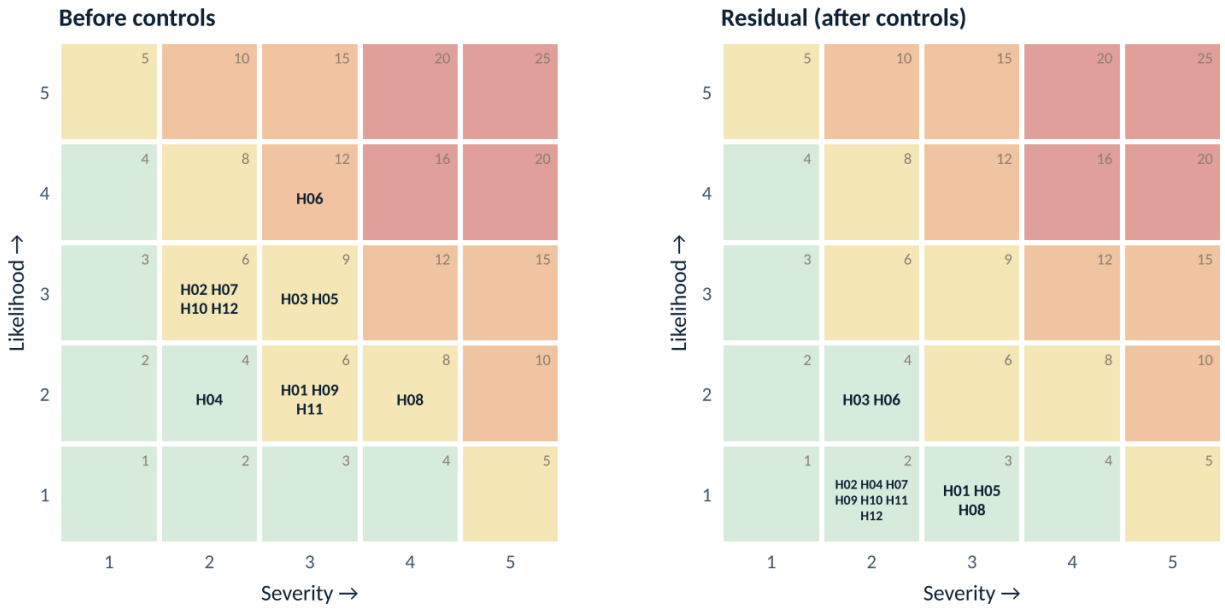

Fig. 2 Position of each hazard on the 5 × 5 matrix before and after controls. No hazard remains above the low band once controls are applied.

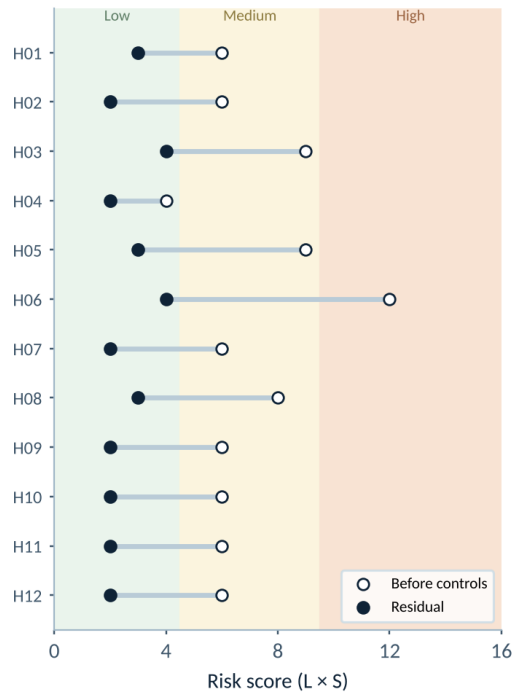

Fig. 3 Risk score per hazard before (open) and after (filled) controls.

Where the controls do most work

The largest reduction is for **H06, thermal degradation and freeze–thaw loss** (12 → 4). Store at −20 °C in a logged freezer.

H03 sharps and broken glass (9), **H05** microbial contamination of stock (9) and **H08** mislabelling or cross-contamination (8) are also brought into the low band, mainly through containment, technique and aseptic working rather than additional PPE.

H03 and H06 keep a residual of 4. That is acceptable, but should be checked at each review against near-miss records and freezer temperature logs.

5 Safe handling and storage

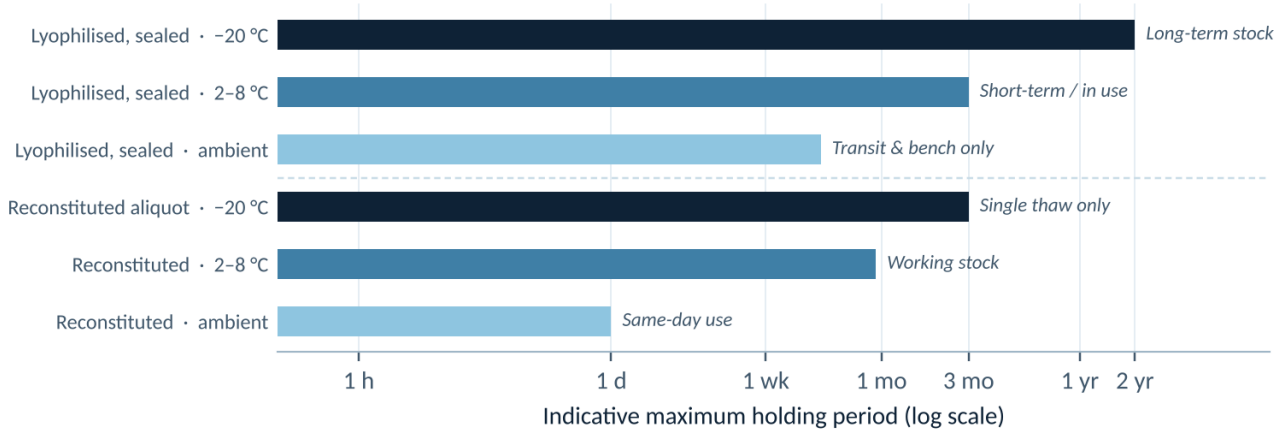

Fig. 4 Indicative holding periods based on general practice for lyophilised research peptides. These are planning limits, not product-specific stability data. Always defer to the lot COA and any in-house stability results.

Store	Sealed vials at −20 °C, protected from light, in a monitored freezer. 2–8 °C acceptable for material in active use.
Open	Let the vial reach room temperature (about 20 min) before opening, to stop condensation forming on the cake.
Reconstitute	Add diluent slowly down the vial wall; swirl, do not vortex or shake. Record diluent, volume, concentration and time.
Aliquot	Split into single-use volumes in low-protein-binding tubes on the day of reconstitution.
Record	Lot number, date opened, and every removal from the freezer, in the sample log.
TB-500	Minimise air exposure of solutions to protect Met6; aliquot rather than re-entering the stock vial.

6 Spills, accidental exposure and disposal

Powder spill	Do not dry-sweep. Cover with damp absorbent, wipe inwards, clean with detergent then 70% ethanol. Bag as chemical waste.
Solution spill	Absorb with spill pads, clean as above. Report spills over 10 mL to the lab supervisor.
Eye contact	Irrigate at the eyewash for at least 15 minutes, holding lids open. Report and record.
Skin contact	Remove contaminated gloves, wash with soap and water. Report and record.
Needlestick	Encourage bleeding, wash under running water, do not suck the wound. Report immediately to the supervisor.
Disposal	Vials, tips and residual solutions to the chemical/clinical waste stream for incineration by a licensed contractor. Sharps to UN-rated sharps bins. Nothing to drain.

Minimum PPE: nitrile gloves, safety glasses (EN 166), lab coat. Cryogenic gloves and face shield when handling dry ice.

7 Review

Reviewed by	Signature	Last updated
Richmond Biolabs		9 September 2026