COMPOUND GUIDE

MOTS-c — Mitochondrial-Derived Peptide

16-AA mitochondrial peptide · AMPK activator · SubQ injection · WADA banned S4.4.1

Quick Start

WHAT IT IS

MOTS-c is a 16-amino acid peptide encoded by the mitochondrial genome (12S rRNA region) — the first mitochondrial-encoded peptide shown to have systemic endocrine effects. It is naturally secreted from mitochondria in response to stress (exercise, heat, caloric restriction) and acts as a metabolic regulator, signalling through AMPK pathways in skeletal muscle and adipose tissue.

RESEARCH DOSING

5 mg SubQ, 2–3× per week. Inject slowly — histamine response (flushing, warmth) is common during rapid injection. Slow injection over 30–60 seconds significantly reduces this response. Half-life is short; the mechanism works through downstream AMPK signalling rather than sustained plasma levels.

REGULATORY & DOPING STATUS

Not FDA-approved. Removed from Category 2 effective April 22, 2026; PCAC review July 23, 2026. WADA banned under **S4.4.1 (Metabolic modulators — AMPK activators)** — same class as AICAR. For competitive athletes, MOTS-c is prohibited. For research purposes only.

Dosing Protocol

PROTOCOL	DOSE	FREQUENCY	DURATION	NOTES
Standard	5 mg	2–3× per week	4–8 weeks	Inject slowly to minimise histamine response
Conservative	2.5–5 mg	2× per week	4 weeks	Starting dose; assess histamine tolerance
Wash-out	—	—	4 weeks minimum	Allow off-cycle before resuming

HISTAMINE RESPONSE — INJECT SLOWLY

Flushing and localised warmth at the injection site are common with MOTS-c, particularly with rapid injection. This is a histamine-mediated response, not an allergic reaction. Injecting over 30–60 seconds (rather than rapidly) substantially reduces the response. Pre-dosing with antihistamine can also attenuate this effect in research protocols.

Supplies & Reconstitution

Reconstitution Math — 10 mg Vial (3 mL BAC)

TARGET DOSE	UNITS (U-100)	DOSES / VIAL
2.5 mg	**75.0 units**	4
5 mg	**150.0 units**	2
10 mg	**300.0 units**	1

Reconstitute the 10 mg vial with **3.0 mL bacteriostatic water** → 3.33 mg/mL. U-100 syringe = 100 units per mL. Swirl gently — do not shake. Refrigerate 2–8°C.

Reconstitution Steps

01 Warm the vial
Allow lyophilised vial to reach room temperature from freezer.

02 Swab and draw
Alcohol swab both vial tops, air-dry. Draw required BAC water volume.

03 Inject along the wall
Run BAC water slowly down the inside glass wall. Do not jet onto the powder.

Swirl gently

04 Swirl until clear. Do not shake or vortex.

05 **Refrigerate and inject slowly**
Store at 2–8°C for up to 30 days. When injecting, depress the plunger slowly over 30–60 seconds to minimise histamine response. Protect from light.

Mechanism of Action

AMPK ACTIVATION

Primary proposed mechanism: activates AMP-activated protein kinase (AMPK) in skeletal muscle and other metabolic tissues. AMPK is the master metabolic switch activated by caloric deficit, exercise, and metformin — it shifts cells toward fat oxidation and glucose uptake.

GLUCOSE UPTAKE

AMPK activation stimulates GLUT4 translocation to the plasma membrane in muscle cells, increasing non-insulin-dependent glucose uptake. Studied in insulin resistance and metabolic syndrome models in mice and cell culture.

FAT OXIDATION

AMPK inhibits ACC (acetyl-CoA carboxylase), reducing malonyl-CoA and allowing carnitine palmitoyltransferase 1 (CPT1) to transport fatty acids into the mitochondria for beta-oxidation. Net effect: increased fat burning.

MITOCHONDRIAL BIOGENESIS

Downstream AMPK → PGC-1α signalling promotes mitochondrial biogenesis (synthesis of new mitochondria) and upregulates NRF2 / antioxidant defences. Studied in models of age-related metabolic decline.

Research Status

NO HUMAN RCT FOR NATIVE MOTS-C

As of mid-2026, no published human RCT exists for native MOTS-c. CB4211, a synthetic analogue, completed Phase 1 (safe and tolerated in humans), but this is not the same compound. The extensive preclinical data is from mouse models and in vitro studies. The relevance to human biology is promising but not yet confirmed by human trials.

STUDY TYPE	FINDING
Lee et al. 2015 (Nature Medicine)	Discovery of MOTS-c; AMPK activation; improved insulin sensitivity in mice
Exercise physiology studies	Endogenous MOTS-c levels rise during exercise; positively correlate with VO2max
CB4211 Phase 1 (analogue)	Safe and well tolerated; metabolic endpoints exploratory at Phase 1 stage
Ageing studies (mice)	Extended healthspan in old mice; improved motor function and metabolic parameters

Storage

STATE	TEMPERATURE	DURATION	NOTES
Lyophilised (powder)	−20°C (freezer)	Up to 24 months	Protect from light and moisture
Reconstituted (liquid)	2–8°C (refrigerator)	Up to 30 days	Do not freeze after reconstitution; protect from light

DISCLAIMER

This document is an educational research reference only. MOTS-c is not FDA-approved and is WADA banned (S4.4.1) for competitive athletes. No human RCT exists for native MOTS-c. By purchasing from LA LAB you confirm you are 18+ and that products are for research purposes only.