



LONGEVITY SCIENCE · PLAIN-ENGLISH GUIDE · 2026 EDITION

MOTS-c: the exercise signal your mitochondria stop sending.

MOTS-c is a tiny peptide with a strange address: it is written into the DNA inside your mitochondria, the power plants of your cells, not into the DNA in the nucleus like almost everything else. Your body makes more of it when you exercise and less of it as you age. In mice it protects against weight gain and insulin resistance and keeps old animals moving; in people, the evidence is one small four-week trial of a modified version. This guide explains what it does, what has actually been shown, and how to use it sensibly if you decide to.

WHERE I BUY IT · 15% OFF WITH MY CODE

Get MOTS-c at Limitless Life

Code **PEPTIDESCIENCE** takes 15% off at checkout. Prices show once you create the free account; lot-numbered certificates on every product.

Order MOTS-c with 15% off →

limitlesslifenootropics.com/product/mots-c



THINK OF IT LIKE THIS

Every cell has a nucleus that holds the master plans, and hundreds of mitochondria that burn fuel. For decades we assumed the mitochondria only took orders. MOTS-c is a message that goes the other way. When fuel runs low or a cell is under strain, the power plants send this little peptide up to the nucleus, and it switches on the genes for stress defence and fuel burning. It is the cell's version of the boiler room calling head office to say: we are struggling down here, change the plan. Exercise sends that call loudly. Ageing turns the volume down.

This may be for you if...

- You are past forty, you train, and your recovery, endurance or blood sugar are not what they were
- You have stubborn weight around the middle, or a doctor has used the words prediabetes or insulin resistance
- You want a compound with a clear mechanism and a real research trail, and you are honest that most of it is in mice
- You will keep a simple log, because the changes are gradual and easy to imagine

This probably is not for you if...

- You are pregnant, breastfeeding, or under eighteen
- You compete in tested sport; it is on the World Anti-Doping Agency prohibited list
- You take insulin or a sulfonylurea drug for diabetes and cannot monitor your blood sugar
- You are being treated for cancer; it changes how cells handle fuel and growth, and nobody has studied that in patients

EVIDENCE AT A GLANCE



Strong, repeated mouse data from university labs since 2015, and human data showing the body makes it and exercise raises it. In people, one four-week trial of a modified analog in twenty adults. No completed human trial of MOTS-c itself.

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A sixteen-letter message from the power plant to head office.

MOTS-c is sixteen amino acids long, found in 2015 inside a stretch of mitochondrial DNA everyone had filed under ‘does not code for anything.’ It is made in the mitochondria, released into the cell and the blood, and its best-understood job is to flip on AMPK, the body’s fuel gauge: cells burn fat, pull sugar out of the blood, and stop hoarding. Exercise turns AMPK on. So does MOTS-c.

The second discovery, in 2018: under metabolic stress, MOTS-c travels into the nucleus and switches on genes for antioxidant defence and recovery. A mitochondrion giving the nucleus orders, which is not how the textbooks had it.

WHAT IT DOES, STEP BY STEP

STEP 1 · SENSE

The cell runs low on fuel

Fasting, hard exercise, or oxidative strain. Mitochondria make and release MOTS-c in response.

STEP 2 · SIGNAL

AMPK switches on

The peptide quietly jams a folate pathway, a molecule called AICAR builds up, and AMPK, the fuel gauge, flips to burn mode.

STEP 3 · REWIRE

The nucleus changes the plan

MOTS-c moves into the nucleus and turns on stress-defence genes. Muscle takes up more sugar and burns more fat, and the cell settles.

AN EXERCISE MIMIC, WITH A CATCH

It works through the same fuel gauge as training, so it gets called an exercise mimetic. In a 2021 study one dose helped mice run further, and older mice dosed three times a week stayed fitter for longer. Nobody has run that experiment in a person. The rest is inference.

THREE THINGS WORTH KNOWING

- **It is in your mitochondrial DNA**, the ring of genes you inherit from your mother. A common variant in East Asian populations is linked to type 2 diabetes risk, a hint that the natural version matters.
- **Exercise raises it**. In young men, one bout of cycling raised MOTS-c in muscle and blood for hours.
- **Muscle is the main target**. That is where the mouse studies saw the changes: more sugar uptake, more fat burning, better insulin sensitivity, less diet-driven weight gain.

MOTS-C NEXT TO THE TWO THINGS IT GETS COMPARED WITH

	MOTS-C	SS-31	A HARD WORKOUT
Where it acts	Mitochondria to nucleus, muscle	Inner mitochondrial membrane	Whole body
Human evidence	One 4-week analog trial	Approved for one rare disease	Decades of trials
Main promise	Fuel burning, insulin sensitivity	Energy output in tired cells	All of the above, for free

PLAIN-ENGLISH NOTE

If you exercise regularly you already make this peptide, probably more than any vial would add. The case for injecting it is the body that no longer responds to training the way it used to. A real case, and an unproven one.

A decade of mouse studies, one small human trial, and a lot of hope.

The MOTS-c literature is unusual: excellent, repeated, mechanistic work in animals from serious labs, and then a cliff where the human trials should be. Here is what exists, honestly sized.

3x/wk

kept 23-month-old mice fitter for longer

Old mice dosed three times a week ran further and stayed active (Nature Communications, 2021). That rhythm is why protocols use three doses a week.

-21%

in a liver enzyme after four weeks of an analog

Twenty adults with fatty liver, a modified MOTS-c (CB4211) daily for four weeks: ALT down 21 percent, glucose down 6 percent. Small, short, not the natural peptide.

~1/5

lower blood levels in older adults

In cohort data, circulating MOTS-c ran about a fifth lower in older adults than in young adults. That decline is the whole rationale for taking it.

0

completed human trials of MOTS-c itself

Every human number here comes from an analog or from measuring the natural peptide. No controlled human trial of MOTS-c itself has been reported.

What we know

- In mice on a high-fat diet it prevented obesity and insulin resistance, and reversed age-related insulin resistance
- In mice, one dose improved exercise capacity, and three doses a week from late life improved function and healthspan
- Exercise raises MOTS-c in human muscle and blood; the peptide is real and the body regulates it
- In cells, it moves into the nucleus under stress and switches on antioxidant and stress-defence genes

What we are still learning

- Whether any mouse result happens in a person at any dose; the one human trial used a different molecule
- The right dose, frequency and course length; the 5 to 10 mg protocols come from mouse maths and forum consensus
- What it does over months, in people with normal metabolism, or with training
- Whether the weight and blood-sugar signals in the analog trial hold up beyond twenty people

WHAT THE STUDIES ACTUALLY LOOKED LIKE

STUDY	WHO	WHAT THEY DID	RESULT
Discovery, 2015	Mice on a junk-food diet	Daily injections, weeks	No obesity, no insulin resistance; older mice regained insulin sensitivity
Exercise study, 2021	Mice of three ages; plus 10 young men	Doses before running; 3x/week from late life	Mice ran further at every age; late-life course improved healthspan. Cycling raised the peptide in men
Nucleus study, 2018	Cells under metabolic stress	Watched where the peptide went	Moved into the nucleus within an hour and switched on stress-defence genes
CB4211 trial, 2021	20 adults with fatty liver and obesity	25 mg of a modified analog daily, 4 weeks	Liver enzymes and glucose fell; weight trended down; injection-site reactions

MY HONEST TAKE

The biology is beautiful: a mitochondrial peptide that tells the nucleus to switch on defence when fuel runs low is exactly the kind of signal that fades with age. I also have to say plainly that the human trial does not exist yet. If you use it, you are running a well-reasoned experiment on yourself: a fixed course, a log, and a decision at the end.

Three times a week, in courses, with a log.

There is no human dosing study, so every protocol below is what the research community has settled on, anchored to the three-times-a-week rhythm that worked in the late-life mouse study. The vendor sells MOTS-c as a lyophilised vial; the guide assumes 10 mg vials, so check the size before you order and adjust the maths if yours differ.

COURSE	DOSE	WHAT YOU NEED	WHAT TO EXPECT
Starter 4 weeks	5 mg under the skin, twice a week, mornings	4 × 10 mg vials	Enough to learn how you respond: injection comfort, afternoon energy, how workouts feel. Most notice nothing dramatic; some report steadier energy by week three.
Standard 6 weeks	5 mg, three times a week, mornings, on training days if you train	9 × 10 mg vials	Closest to the animal work. Where people log the changes that matter: waist, fasting glucose if you measure it, how long you can hold a pace.
Full course 8 weeks	5 mg, three times a week, then four weeks off	12 × 10 mg vials	The longest run that makes sense before a break. Past eight weeks is guesswork, and a break tells you what was the peptide and what was the training.

Which one? Start with the starter unless you have used it before. The changes are gradual and easy to imagine, so the log on page 7 is not optional. No more than eight weeks without a month off, and do not raise the dose to chase a feeling; there is no data that more is better.

 **Order what this course needs at Limitless Life.** Code **PEPTIDESCIENCE** takes 15% off at checkout:
limitlesslifenootropics.com/product/mots-c →

HOW TO USE IT, IN FOUR STEPS

- Mix.** Add 1 mL of bacteriostatic water to a 10 mg vial, slowly, down the side of the glass. Swirl, never shake. That gives 10 mg per mL, so 5 mg is 50 units on an insulin syringe.
- Inject.** Under the skin of the belly or thigh, in the morning, ideally an hour before you train. Rotate sites. A brief flush of warmth or a red spot is common and passes.
- Time it.** Mornings, because a few people report feeling wired if they dose late. On training days, dose before the session, because that is how the exercise studies were run.
- Store.** Sealed vials in the fridge or freezer. A mixed vial in the fridge, used within four weeks. Clear is right; cloudy or coloured means discard it.

DOSE TO UNITS

DOSE	DRAW
2.5 mg	25 units
5 mg	50 units
10 mg	100 units

At 10 mg per mL, a 10 mg vial mixed with 1 mL of water. If you use 2 mL of water, every draw doubles: 5 mg becomes 100 units.

COMMON QUESTIONS

Will it make me lose weight?

In mice on a bad diet it prevented weight gain rather than melting it off. In the one human trial the weight trend was small. Treat any weight change as a bonus, not the goal.

Can I take it with my diabetes medication?

Only with your doctor, and only if you can check your blood sugar. It lowers glucose by a mechanism that stacks with insulin and sulfonylureas, and that combination can drop you too low.

Does it stack with SS-31?

People do, on the logic that one repairs the power plant and the other sends its signal. There is no study of the pair. Run one at a time first so you know what each does.

No human dosing trial exists. These regimens reflect research-market practice and the rhythm of the animal studies, not a clinical protocol. Not a prescription. Talk to your doctor first, especially if you take anything that lowers blood sugar.

Read this page before you order anything.

In the animal work and the one human trial, MOTS-c was well tolerated, and the main complaint was the injection site. The reason for caution is different: it lowers blood sugar and changes how cells handle fuel, and it has never been studied for months in a person. Read both lists honestly.

Do not use this if...

- You are pregnant, breastfeeding, trying to conceive, or under eighteen
- You compete in tested sport; MOTS-c is on the World Anti-Doping Agency prohibited list
- You take insulin or a sulfonylurea and cannot check your blood sugar
- You are being treated for cancer, or being investigated for one, unless your oncologist knows and agrees
- You cannot get a certificate showing identity by mass spectrometry for the vial in your hand

Be cautious, and talk to your doctor first, if...

- You have type 2 diabetes on any medication; dose changes need your prescriber's eyes
- You have kidney or liver disease; nobody knows how the peptide is cleared in people
- You have a history of fainting or low blood pressure; report any dizziness after a dose
- You are on a very low-calorie diet or fasting hard; stacking a fuel-burning signal on an empty tank can leave you shaky
- You take a GLP-1 type injectable for weight or blood sugar; the appetite and glucose effects add up, so watch your intake

Stop and get medical help if...

- Shakiness, sweating, confusion or a racing heart in the hours after a dose; eat, and do not dose again until you have spoken to a doctor
- Hives, swelling of the face or throat, or trouble breathing
- Spreading redness, heat or a hard lump at an injection site
- Persistent nausea, vomiting or belly pain
- Palpitations, chest discomfort, or feeling wired and unable to sleep on dosing days; drop the dose or stop

Common, and usually mild

- A red spot, sting or brief warmth at the injection site; rotate sites and inject slowly
- A short flush of warmth or mild nausea in the first hour, usually gone by week two
- Feeling more awake on dosing days; take it in the morning
- Nothing you can feel at all. That is normal, and it is why the log matters

BEFORE YOU START

- ☐ Write down your baseline: waist at the navel, weight, resting heart rate, and fasting glucose if you have a meter
- ☐ Tell your doctor if you take anything that lowers blood sugar, and agree how you will monitor it
- ☐ Read the certificate: identity by mass spectrometry and purity above 98 percent
- ☐ Decide the course length before you start, and put the end date in your calendar
- ☐ Plan the training you will pair it with; the mouse data is about a peptide plus movement, not a peptide instead of it

These lists are drawn from the animal studies, the CB4211 trial, the known biology of AMPK activation, and case reports from the research community, because no long human trial exists. They are not complete, and they are not a substitute for a conversation with your own doctor.

Where I source it, and what to have in the cart.

The vendor I use stocks MOTS-c as a lyophilised vial. For this compound the certificate matters in the usual way, identity and purity by mass spectrometry, and the vial size matters for the maths: the courses below assume 10 mg vials, so check the listing before you order.

DIRECT LINK · MOTS-C VIAL

Limitless Life · MOTS-c

limitlesslifenootropics.com/product/mots-c

Use code **PEPTIDESCIENCE** at checkout for 15 percent off. A lyophilised vial for injection.

The catalogue is behind a free account, so the listing appears once you have signed in.

Shipping runs three to five business days.

Open MOTS-c with 15% off →

- 01 Open the link or scan the code, and create the free account.
- 02 Search "MOTS-c." Check the vial size on the listing and use the cart table below for your course.
- 03 Enter the code at checkout. On arrival, match the lot number to the certificate and check the purity line.



limitlesslifenootropics.com

CODE PEPTIDESCIENCE · 15%
OFF

Scan to open the listing with the
code applied

WHAT TO ORDER FOR EACH COURSE

COURSE	ADD TO CART
Starter, 4 weeks	4 × 10 mg MOTS-c · bacteriostatic water · 10 insulin syringes · swabs · sharps container
Standard, 6 weeks	9 × 10 mg MOTS-c · bacteriostatic water · 20 insulin syringes · swabs · sharps container
Full course, 8 weeks	12 × 10 mg MOTS-c · bacteriostatic water · 25 insulin syringes · swabs · tape measure · glucose meter

IF THE GOAL IS METABOLIC, TWO OTHER ROUTES WITH MORE HUMAN DATA

Retatrutide · weight and blood sugar

If the real goal is weight, this is the compound with large human trials behind it, and double-digit weight loss in late-stage testing. Deep dive 04.

EVIDENCE: LARGE HUMAN TRIALS

limitlesslifenootropics.com/product/retatrutide-ha

5-Amino-1MQ · fat metabolism

A small oral molecule that blocks an enzyme fat cells use to slow their own metabolism. Animal data only, but it is a capsule, not a needle, and it is covered in deep dive 05.

EVIDENCE: ANIMAL STUDIES

limitlesslifenootropics.com/product/5-amino-1mq-50mg-capsules-60

Exercise · the original source

A hard session raises your own MOTS-c in muscle and blood for hours, and it comes with decades of human trials. Every protocol in this guide assumes you are doing this too.

EVIDENCE: DECADES OF HUMAN TRIALS

Free, and where the mouse story started

HOW TO CHECK ANY VENDOR, IN FIVE POINTS

- **A certificate for your exact batch**, with a lot number you can match to the vial in your hand. "We test" is not a certificate.
- **A named, independent lab**. Janoshik and MZ Biolabs are the ones the community trusts. An unnamed in-house lab is a red flag.
- **The right tests**: identity (is it the right molecule), quantity (how much is really in the vial), and endotoxin (is it clean). Purity alone is not enough.
- **Sensible pricing**. Far below market usually means the corner was cut inside the vial.
- **A reputation you checked yourself**, on the big peptide forums and on finnricks.com, an independent site that publishes test results and sells nothing.

Disclosure: affiliate link, at no extra cost to you. Using it keeps these guides free. I only link a vendor I have vetted and use myself. Limitless Life sells at limitlesslifenootropics.com; the site header reads Limitless Biotech, same store. Educational content about published research, not medical advice, and not a claim that any compound is approved for human use. Research compounds are sold for laboratory research only; dosing figures reflect published trials, labels and common practice, not a prescription. Talk to your doctor before any health decision. © Longevity Science.



06 MOTS-C · 8-WEEK METABOLIC LOG

The changes are gradual. Measure them.

Fill in one row per week, the same morning each week, before food. **Energy:** 1 flat · 3 normal · 5 the best it has felt, judged over the whole week.

Waist: a tape at the navel, relaxed. **Glucose:** fasting, if you own a meter; leave it blank if not. **Training:** the longest session or the best pace of the week, in your own words. Print this, or screenshot it and mark it up on your phone.

Week 0

Baseline row before the first dose: waist, weight, energy, fasting glucose if you have it, and the lot number.

Week 3

Where the first honest read usually lands. Compare energy and training notes with week 0, not with memory.

Week 6

Standard course ends. Decide from the numbers: continue to eight weeks, or stop and take the month off.

Week 8

Full course ends. Four weeks off, then compare the off-weeks with the on-weeks. That comparison is the whole answer.

WK	DATE	DOSES THIS WK	ENERGY 1-5	WAIST CM	FASTING GLUCOSE	TRAINING NOTE	NOTES
0							Baseline. Lot number: _____
1							First doses. Injection comfort? Morning dosing?
2							
3							First honest comparison with week 0.
4							Starter course ends. ♡ Reorder if continuing.
5							
6							Standard course ends. Continue or stop?
7							
8							Full course ends. Four weeks off from here.

NOTES: WHAT ELSE CHANGED THIS WEEK (SLEEP, FOOD, TRAINING, OTHER COMPOUNDS)



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Reorder before the last vial

A one-point energy wobble is noise. A steady step up in what you can do in training, or a waist that keeps drifting down while your food has not changed, is signal. Write down anything else you changed at the same time, because sleep, a new programme and a cleaner diet all move the same needles.