



LONGEVITY SCIENCE · PLAIN-ENGLISH GUIDE · 2026 EDITION

SS-31: the mitochondria peptide that became a real medicine.

SS-31 is a tiny four-amino-acid peptide that lodges in the inner wall of your mitochondria and helps them make energy more cleanly. It is the only compound in this series that is an FDA-approved medicine: since September 2025, for a rare genetic disease called Barth syndrome. It has also missed three large trials in more common conditions, and my vendor does not sell it. This guide explains what it does, what the trials really showed, and what I would do instead.

WHERE I BUY IT · 15% OFF WITH MY CODE

SS-31 is not stocked. For this goal I order MOTS-c at Limitless Life

The mitochondrial peptide their catalogue does carry, lot-tested with a published certificate. Code

PEPTIDESCIENCE takes 15% off; prices show once you create the free account.

Order MOTS-c with 15% off →

limitlesslifenootropics.com/product/mots-c



THINK OF IT LIKE THIS

Every cell has power plants called mitochondria. Inside each one, the turbines that make energy are bolted to a folded inner wall, and the bolt that holds them in place is a fatty molecule called cardiolipin. With age, illness and stress those folds sag, the turbines drift out of line, and electrons leak out as sparks, free radicals, instead of becoming energy. SS-31 is a clamp. It grips the cardiolipin and holds the wall in shape, so the turbines run cleaner and spark less.

This may be for you if...

- You have a diagnosed mitochondrial disease and want to understand the one drug built for it
- You follow longevity science and want the honest version of its most talked-about mitochondrial peptide
- You are comfortable with a daily injection and a genuinely experimental dose
- You would rather know what failed than be told what worked

This probably is not for you if...

- You want more energy or less fatigue; the large trial for exactly that did not beat placebo
- You want a sensible price per effective dose; the studied dose is 40 mg a day
- You are pregnant, breastfeeding, or trying to conceive
- You want a product from a vendor I have vetted; mine does not stock it

EVIDENCE AT A GLANCE

LAB DISH

ANIMALS

SMALL HUMAN STUDIES

LARGE HUMAN TRIALS

APPROVED

The only compound in this series with an FDA approval: accelerated approval in September 2025 for Barth syndrome, an ultra-rare genetic disease, based on twelve patients. Large trials in mitochondrial myopathy, heart failure and dry macular degeneration did not meet their goals.

INSIDE · WHAT IT IS P.2 · WHAT THE STUDIES SHOW P.3 · TYPICAL CYCLES AND DOSING P.4 · WARNINGS P.5 · SOURCES AND ALTERNATIVES P.6 · PRINTABLE TRACKER P.7

A four-piece peptide that clamps the inner wall of your mitochondria.

Mitochondria make almost all of your usable energy along a folded inner membrane, where a chain of protein complexes passes electrons hand to hand. The folds are held in shape by a fatty molecule called cardiolipin. When it is damaged, by age, stress or genetic disease, the folds loosen, the complexes drift apart, and electrons leak out as free radicals.

SS-31 is a synthetic four-amino-acid peptide, designed at Cornell in the early 2000s, that concentrates inside mitochondria a thousand-fold and binds to cardiolipin. It does not add a signal or block an enzyme. It stabilises a structure. In medicine it is called SS-31, and it is the first mitochondria-targeted drug ever approved.

WHAT IT DOES, STEP BY STEP

STEP 1 · ARRIVE

Concentrates in mitochondria

Its charge and shape pull it across membranes into the inner mitochondrial space, where it builds up at high concentration.

STEP 2 · CLAMP

Binds cardiolipin

It grips the fatty scaffold of the inner membrane and holds the folds, and the energy complexes sitting on them, in the right shape.

STEP 3 · RUN CLEANER

More energy, fewer sparks

In cells and animals: more ATP per unit of oxygen and less free-radical leakage. In people the results are more complicated; see page 3.

WHY A STRUCTURAL FIX IS DIFFERENT

Most supplements aimed at mitochondria hand them more fuel or more cofactors, like delivering extra coal to a plant with a warped boiler. SS-31 is the mechanic who straightens the boiler. That is why researchers were so excited, and why it was tested first in diseases where the boiler is genuinely bent: rare genetic mitochondrial disorders.

THREE THINGS WORTH KNOWING

- **It is an approved medicine.** A prescription form of it received FDA accelerated approval in September 2025 for Barth syndrome in patients weighing at least 30 kg. Continued approval depends on a confirmatory trial.
- **The approved dose is 40 mg injected under the skin, once a day.** Research-market vendors typically suggest 5 to 10 mg, and nobody has studied whether that fraction does anything.
- **It has a short half-life,** a few hours, which is why it is a daily injection and why any effect needs continuous use.

HOW IT COMPARES TO THE OTHER MITOCHONDRIAL PEPTIDE IN THIS SERIES

	MOTS-C	SS-31
What it is	A peptide your own mitochondria encode	A synthetic peptide designed in a lab
How it works	A signal that changes metabolism	A clamp that stabilises the inner membrane
Human evidence	One small trial of an analogue	Several large trials; one rare-disease approval

PLAIN-ENGLISH NOTE

A real drug label cuts both ways. We know roughly what 40 mg a day does to people, which is reassuring. We also know the doses sold are far below that, and that the conditions people buy it for are the ones where it did not beat placebo.

One rare-disease approval, and three large trials that missed.

SS-31 has been tested in more people than almost anything else sold as a research peptide. That is exactly why it deserves a careful read: the record is real, and it is mixed.

12

patients in the trial behind the approval

Barth syndrome, randomised crossover, 40 mg a day. Walking distance did not improve; knee strength did, over years of follow-up.

218

people in the largest mitochondrial-disease trial

MMPOWER-3, 24 weeks. Neither walking distance nor fatigue beat placebo. The company called it a miss.

Most

trial participants had injection-site reactions

Redness, itching, pain or a lump at the shot site. Mostly mild, very common.

0

studies of the 5 to 10 mg doses that are sold

Every human result comes from 40 mg a day, or from an intravenous dose. What a quarter of that does is unknown.

What we know

- In cells and animals it consistently improves mitochondrial efficiency and reduces free-radical leakage
- At 40 mg a day it is well tolerated apart from the injection site; serious side effects were rare across the trials
- In Barth syndrome, a rare genetic cardiolipin defect, long-term use improved muscle strength enough for a conditional approval
- In dry macular degeneration, a 48-week trial missed its main goal but showed a structural signal in the retina that is being followed up

What we are still learning

- Whether it does anything in people whose mitochondria are simply ageing rather than genetically broken
- Whether the community doses, a quarter or less of the studied dose, reach a meaningful level in the mitochondria
- Long-term effects outside the trial populations; the label is new and the confirmatory trial is not finished
- Why the cell and animal results have been so hard to reproduce in large human trials

WHAT THE BIG TRIALS FOUND

TRIAL	WHO	DOSE	RESULT
TAZPOWER	12 people with Barth syndrome	40 mg a day, injected	Missed the walking test at 12 weeks; strength gains over three years of open label; the basis of approval
MMPOWER-3	218 people with mitochondrial myopathy	40 mg a day, injected	Missed both main goals: walking distance and fatigue
PROGRESS-HF	People with heart failure	Intravenous	No benefit on heart function
ReCLAIM-2	176 people with dry macular degeneration	40 mg a day, injected	Missed its main goal; a structural signal in the retina

MY HONEST TAKE

If a family member with fatigue asked me about SS-31, I would say: the trial built for exactly that question, in people whose mitochondria really are broken, did not beat placebo. It is a remarkable molecule and a real medicine for a few hundred people with a rare disease. For the rest of us the evidence is not there yet, the studied dose is not affordable, and I have no vendor I trust for it. Page 6 has what I would do instead.

The approved dose, and the doses on the vial.

This page shows the gap honestly. The only dose with human data is 40 mg a day, the approved dose, and it is what every trial used. What research-market vendors suggest is a fraction of that. Vial counts assume 50 mg vials, a common size.

COURSE	DOSE	WHAT YOU NEED	WHAT TO EXPECT
Common, short 2 weeks	5 mg injected under the skin, once daily	2 × 50 mg vials (70 mg)	What forums suggest to “see how you feel.” No human study has used this dose. Any change you notice is unmeasured, and so is any risk.
Common, standard 4 weeks	5 to 10 mg injected under the skin, once daily	3 to 6 × 50 mg vials (140–280 mg)	The usual community cycle, still an eighth to a quarter of the studied dose. The tracker on page 7 is the only way to judge it.
Studied 4 weeks	40 mg injected under the skin, once daily	23 × 50 mg vials (1,120 mg)	The trial and label dose, shown so you can see how far the vial on sale sits from the medicine. At research-market prices it is rarely realistic, which is part of why I do not recommend it.

Which one? Honestly, none without a doctor involved. If you are going to try it regardless, the short course at the lowest dose, with a proper baseline, tells you what you need to know about tolerability. Do not talk yourself into the studied dose at grey-market quality.

 **SS-31 vials are not sold at my vendor.** For the same goal from a vetted vial, MOTS-c is, with code **PEPTIDESCIENCE** for 15% off: limitlesslifenootropics.com/product/mots-c →

HOW TO TAKE IT, IN FOUR STEPS

- 01 **Mix.** Add 1 mL of bacteriostatic water to a 50 mg vial for 50 mg per mL. Every milligram is then 2 units on an insulin syringe.
- 02 **Draw.** 5 mg is 10 units; 10 mg is 20 units. Same time every day, because the half-life is a few hours.
- 03 **Inject.** Under the skin of the belly or thigh. Rotate sites religiously; injection-site reactions were the most common problem in every trial.
- 04 **Store.** The mixed vial in the fridge, in the dark, used within 28 days. Unmixed vials in the freezer.

DOSE TO UNITS

DAILY DOSE	DRAW
5 mg	10 units
10 mg	20 units
20 mg	40 units
40 mg	80 units

At 50 mg per mL, a 50 mg vial mixed with 1 mL. A 10 mg vial with 1 mL is 10 mg per mL: multiply the units by five.

COMMON QUESTIONS

Why is the studied dose so much higher than what is sold?

Because it was set by pharmacology in a drug programme, not by what a vial costs. Vendors suggest what people will buy.

Can I take it with MOTS-c?

People do. There is no data on the pair, and it makes it impossible to know what did what. One thing at a time.

Morning or evening?

Morning. Headache and dizziness were reported in the trials, and you want to notice them while awake.

Regimens reflect the prescription label and the published trials, alongside common research-market practice. They are not a prescription. Talk to your doctor, particularly if you have a diagnosed mitochondrial condition.

Read this page before you buy it anywhere.

Because the prescription form has a real drug label, we know more about its safety at 40 mg a day than about almost any other compound in this series. Most of what follows comes from that label and the trials. The grey-market caveats, purity and dose, apply on top.

Do not use this if...

- You are pregnant, breastfeeding, or trying to conceive; there is no human data
- You have had an allergic reaction to it
- You cannot get a certificate showing identity by mass spectrometry for your vial; a four-amino-acid chain is cheap to fake
- You are under 18, unless a specialist is prescribing the approved product

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

- You have a diagnosed mitochondrial disease; you may be eligible for the approved product or a trial, a far better route than a vial
- You have kidney disease; the drug is cleared by the kidneys
- You have a history of fainting or low blood pressure; dizziness was reported in the trials
- You already take daily injections; the injection-site reactions add up
- You have had a raised eosinophil count; a rise was seen in some trial participants

Stop and get medical help if...

- Hives, swelling of the face or throat, or trouble breathing
- An injection site that spreads, hardens, blisters or stays hot for more than 48 hours
- Fainting, or dizziness that does not settle when you sit down
- A severe or persistent headache
- Anything new and unexplained; the sold dose has never been studied

Common, and usually mild

- Redness, itching, pain or a small lump where you injected, in most people; rotate sites and use a fresh needle every time
- A mild headache or dizziness in the first days
- Nausea
- Nothing at all, which at community doses is the most common report

BEFORE YOU START

- ☐ Talk to your doctor, and if you have a diagnosed mitochondrial condition, ask about the prescription form or an open trial
- ☐ Get a certificate for your lot with a mass-spectrometry identity line
- ☐ Log the baseline on page 7 before day one
- ☐ Plan your sites: eight spots, one per day, so nothing is hit twice in a week
- ☐ Decide your stop rule now: a spreading injection site is a same-day call

These lists are drawn from the prescription form's prescribing information, the published trials, and general caution about research-market products. They are not complete, and they are not a substitute for a conversation with your own doctor.

Sources and alternatives.

My vendor does not carry SS-31, and I have not vetted anyone who does. For a compound whose studied dose is forty milligrams a day, I will not pretend a grey-market vial is a substitute for the medicine. What I can offer is the five-point check for any vendor that sells it, and better-footed options for the goal most people have in mind: mitochondria that work better.

DIRECT LINK · THE CATALOGUE

Limitless Life · the catalogue

limitlesslifenuootropics.com

Use code **PEPTIDESCIENCE** at checkout for 15 percent off anything in it. The catalogue is behind a free account, so the listings appear once you have signed in. MOTS-c, below, is there.

Open the catalogue with 15% off →

- 01 Open the link or scan the code, and create the free account.
- 02 If you buy SS-31 elsewhere, run the five-point check below on that vendor first, and insist on the mass-spectrometry line.
- 03 Whatever you choose, match the lot number on the vial to the certificate before you use it.



limitlesslifenuootropics.com

CODE PEPTIDESCIENCE · 15% OFF

Scan for the catalogue with the code applied

TWO BETTER-FOOTED OPTIONS FOR THE SAME GOAL, AND ONE THAT IS FREE

MOTS-c · 5 or 10 mg

A peptide your own mitochondria encode, studied for exercise capacity and insulin sensitivity in animals, with one small human trial of a close analogue. Early, but a mitochondrial route my vendor stocks and I have vetted.

EVIDENCE: ANIMAL · EARLY HUMAN

limitlesslifenuootropics.com/product/mots-c

The prescription form, through a specialist

If you have a diagnosed mitochondrial disease, the approved product exists, with pharmacy-grade quality and a doctor watching. Ask a metabolic or mitochondrial specialist about it, or about open trials.

EVIDENCE: APPROVED, RARE DISEASE

Ask a specialist for it by name.

Zone 2 training, 150 minutes a week

The one intervention with decades of human data for building more and better mitochondria. Free, and it works in people whose mitochondria are merely ageing, which is exactly where SS-31 has not.

EVIDENCE: LARGE HUMAN STUDIES

Free. Start this week.

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 limitlesslifenuootropics.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 SS-31 · THE ENERGY BASELINE

Energy is a feeling. Measure it anyway.

Three quick measures, same time each morning, before caffeine. Run them three mornings before day one, then on the days marked. This sheet works for SS-31, for MOTS-c, and for the month after you start training. **The bar is not “I felt more energetic.”** The bar is a change larger than the spread between your three baseline mornings, still there two weeks after the last dose.

Sit-to-stand

Chair, arms crossed, count full reps in 30 seconds. A real clinical test of leg power and endurance.

Energy

At 11 am, one number: 1 flat, 3 normal, 5 wired. Plus last night's sleep in hours.

Site reaction

0 none · 1 pink · 2 itchy lump · 3 hot, spreading or blistered. A 3 ends the course.

Resting heart rate

First thing, before standing. The cheapest fitness marker there is; watch the trend, not the day.

DAY	DATE	DOSE	REST HR	SIT-TO-STAND / 30 S	ENERGY 1-5	SLEEP H	SITE 0-3	NOTES
Base 1								
Base 2								
Base 3								Average the three baselines. That number is your bar.
Day 1								
Day 3								
Day 5								
Day 7								Site check: any spot scoring 3? Stop and call.
Day 10								
Day 14								Short course ends here.
After +7								
After +14								A real effect should still be visible here. If it left with the last dose, it was not repair.
After +30								

NOTES: ENERGY, SLEEP, INJECTION SITES USED



limitlesslifenootropics.com
CODE PEPTIDESCIENCE · 15% OFF
The catalogue I use. Page 6 has what I would buy for this goal.

Dose column is blank on purpose: write what you actually injected each day and where. If you stop early, write why; that sentence is worth more than the rest of the sheet. If you started training instead, log that here too and watch the same numbers move.