

Technical Data Sheet

MOTS-c

Product Information

| | |
|----------------------|--|
| Alternate Names: | N/A |
| Size: | 10.0mg |
| Format/Appearance: | Lyophilized, white/off-white powder |
| Sequence: | NH ₂ - Met - Arg - Trp - Gln - Glu - Met - Gly - Tyr - Ile - Phe - Tyr - Pro - Arg - Lys - Leu - Arg - COOH |
| Purity: | >98% |
| Recommended Diluent: | Bacteriostatic Water |

Description

MOTS-c is a peptide of 16 amino acids expressed by a mitochondrial gene. Research by Pinchas Cohen and his colleagues at the Leonard Davis School of Gerontology at the University of Southern California provides evidence that mitochondria play a key role in signaling and in energy production.

MOTS-c is known to regulate metabolic functions throughout the body, including turning glucose into usable energy. The first studies on MOTS-c were conducted on obese mice. They showed that the peptide helped boost glucose metabolism even when the mice were fed a high fat diet. These preliminary studies show evidence for improved control over blood sugar levels for those with type 2 diabetes and obesity.

Cohen's research also shows that skeletal muscle is the major target tissue of MOTS-c. The skeletal muscle enhances insulin sensitivity and increases glucose uptake in myocytes (muscle cells) by activating the AMPK pathway and at the same time without increasing insulin. He also went on to say that it is fair to call MOTS-c an exercise-mimetic, meaning it imitates exercise on the body. Exercise also increases muscle glucose uptake without stimulating insulin.

Indications and Benefit

- Promotes fatty acid metabolism in the liver
- Protects against age and diet dependent insulin resistance and obesity
- Helps accelerate weight loss through glucose regulation
- Improves exercise capacity
- Helps prevent osteoporosis by promoting osteoblast formation

Preparation and Storage

Peptides should be stored in a dry, cool, dark place. For best preservation, store at 4°C or colder away from bright light. Dry peptides are stable at room temperature for many weeks but for long-term storage -20°C is to be preferred. Once reconstituted, refrigeration is essential.

Clinical Research and Related Publications

Kasai, T., Bandow, K., Suzuki, H., Chiba, N., Kakimoto, K., Ohnishi, T., Kawamoto, S., Nagaoka, E., & Matsuguchi, T. (2009). Osteoblast differentiation is functionally associated with decreased AMP kinase activity. *Journal of Cellular Physiology*, 221(3), 740–749. <https://doi.org/10.1002/jcp.21917>

Kim, S. - J., Miller, B., Mehta, H. H., Xiao, J., Wan, J., Arpawong, T. E., Yen, K., & Cohen, P. (2019). The mitochondrial-derived peptide MOTS-c is a regulator of plasma metabolites and enhances insulin sensitivity. *Physiological Reports*, 7(13), <https://physoc.onlinelibrary.wiley.com/doi/10.14814/phy2.14171>.
<https://doi.org/10.14814/phy2.14171>

Lee, C., Kim, K. H., & Cohen, P. (2016). MOTS-c: A novel mitochondrial-derived peptide regulating muscle and fat metabolism. *Free Radical Biology and Medicine*, 100, 182–187.
<https://doi.org/10.1016/j.freeradbiomed.2016.05.015>

Lee, C., Zeng, J., Drew, B. G., Sallam, T., Martin-Montalvo, A., Wan, J., Kim, S.-J., Mehta, H., Hevener, A. L., de Cabo, R., & Cohen, P. (2015). The Mitochondrial-Derived Peptide MOTS-c Promotes Metabolic Homeostasis and Reduces Obesity and Insulin Resistance. *Cell Metabolism*, 21(3), 443–454.
<https://doi.org/10.1016/j.cmet.2015.02.009>

López-Otín, C., Galluzzi, L., Freije, J. M. P., Madeo, F., & Kroemer, G. (2016). Metabolic Control of Longevity. *Cell*, 166(4), 802–821. <https://doi.org/10.1016/j.cell.2016.07.031>

Ming, W., Lu, G., Xin, S., Huanyu, L., Yinghao, J., Xiaoying, L., Chengming, X., Banjun, R., Li, W., & Zifan, L. (2016). Mitochondria related peptide MOTS-c suppresses ovariectomy-induced bone loss via AMPK activation. *Biochemical and Biophysical Research Communications*, 476(4), 412–419.
<https://doi.org/10.1016/j.bbrc.2016.05.135>

MOTS-c improves osteoporosis by promoting osteogenic differentiation of bone marrow mesenchymal stem cells via TGF- β /Smad pathway. (2018). MOTS-c Improves Osteoporosis by Promoting Osteogenic Differentiation of Bone Marrow Mesenchymal Stem Cells via TGF- β /Smad Pathway, <https://www.europeanreview.org/article/16247>. https://doi.org/10.26355/eurev_201811_16247

Muoio, D. M. (2014). Metabolic Inflexibility: When Mitochondrial Indecision Leads to Metabolic Gridlock. *Cell*, 159(6), 1253–1262. <https://doi.org/10.1016/j.cell.2014.11.034>

Olson, K. A., Schell, J. C., & Rutter, J. (2016). Pyruvate and Metabolic Flexibility: Illuminating a Path Toward Selective Cancer Therapies. *Trends in Biochemical Sciences*, 41(3), 219–230.
<https://doi.org/10.1016/j.tibs.2016.01.002>

Ramanjaneya, M. (2018). MitochondrialDerived Peptide MOTSc promotes hepatic fatty acid metabolism and regulation by metformin. *Qatar Foundation Annual Research Conference Proceedings Volume 2018 Issue 2*, <https://www.qscience.com/content/papers/10.5339/qfarc.2018.HBPD728>.
<https://doi.org/10.5339/qfarc.2018.hbpd728>

Reynolds, J. C., Lai, R. W., Woodhead, J. S. T., Joly, J. H., Mitchell, C. J., Cameron-Smith, D., Lu, R., Cohen, P., Graham, N. A., Benayoun, B. A., Merry, T. L., & Lee, C. (2019). Mitochondrial-Encoded Peptide MOTS-c is an Exercise-Induced Regulator of Aging Metabolic Homeostasis and Physical Capacity. *BioRxiv*, <https://www.biorxiv.org/content/10.1101/2019.12.22.886432v3>. <https://doi.org/10.1101/2019.12.22.886432>

Shah, M., Kola, B., Bataveljic, A., Arnett, T. R., Viollet, B., Saxon, L., Korbonits, M., & Chenu, C. (2010). AMP-activated protein kinase (AMPK) activation regulates in vitro bone formation and bone mass. *Bone*, 47(2), 309–319. <https://doi.org/10.1016/j.bone.2010.04.596>

Zarse, K., & Ristow, M. (2015). A Mitochondrially Encoded Hormone Ameliorates Obesity and Insulin Resistance. *Cell Metabolism*, 21(3), 355–356. <https://doi.org/10.1016/j.cmet.2015.02.013>