Oxytocin

Oxytocin is a cyclic nonapeptide hormone with amino acid sequence CYIQNCPLG that also acts as a neurotransmitter in the brain; the principal uterine-contracting and milk-ejecting hormone of the posterior pituitary. It is believed to influence social cognition and behaviour. It has a role as an oxytocic and a vasodilator agent. It is a peptide hormone and a heterodetic cyclic peptide.

Molecular structure - $C_{43}H_{66}N_{12}O_{12}S_2$

Method of use – nasal spray

Dose – 15 IU or 25 mcg – 2 to 4 times per day

Oxytocin, often referred to as the "love hormone," offers several potential longevity benefits for elderly individuals, impacting physical, emotional, and social health. Here are the key benefits:

Oxytocin (OT) is critical for maintenance and repair of muscle, bone, etc. tissues and for healthy metabolism. OT acts on muscle and bone directly, through OT receptors expressed by these tissues, via downstream activation of MAPK/pERK. This can counteract age-related sarcopenia (muscle loss) and improve muscle mass and strength.

Oxytocin reduces systemic inflammation, which is a major contributor to aging-related diseases. It has been shown to rejuvenate tissues, improve neurogenesis, and enhance cognitive performance in animal studies.

Oxytocin enhances cardiovascular health and may regenerate aged heart stem cells.

It protects telomere length, activates autophagy (cellular self-cleaning), and acts as an antioxidant, shielding mitochondria from oxidative stress.

Older adults tend to release more oxytocin in response to emotional stimuli, which increases empathy and prosocial behaviors like volunteering and charity. These behaviors are linked to greater life satisfaction.

Intranasal oxytocin administration has been shown to improve gratitude, reduce fatigue, and enhance emotional recognition in older adults.

Oxytocin protects nerve cells against aging-related damage and may improve cognitive health.

Oxytocin offers significant cardiovascular benefits for older adults, primarily through its protective and regulatory effects on the heart and vascular system. These benefits include:

1. Oxytocin induces vasodilation by enhancing nitric oxide (NO) production, which relaxes blood vessels and lowers blood pressure. This reduces mechanical stress on arterial walls and helps manage hypertension.

2. Oxytocin reduces inflammation and oxidative stress, both of which are major contributors to cardiovascular diseases. It limits the production of pro-inflammatory molecules and immune cell infiltration, protecting tissues from damage.

3. Oxytocin decreases oxygen consumption during ischemia-reperfusion (I/R) injury, improves coronary blood flow, and enhances cardiac work. It also promotes angiogenesis (formation of new blood vessels) and regeneration of damaged cardiomyocytes, aiding recovery after ischemic events like heart attacks.

4. Oxytocin reduces fibrosis and hypertrophy in cardiac muscle cells (CMCs), preserving their viability and morphology. This prevents structural remodeling of the heart, which is common in aging-related cardiovascular conditions.

5. Oxytocin enhances parasympathetic activity while reducing sympathetic outflow to the heart, improving cardiac function under stress conditions. This neuromodulation decreases arrhythmias and supports overall heart health.

6. Oxytocin improves glucose uptake, insulin sensitivity, and lipid metabolism through activation of AMP-activated protein kinase (AMPK). These metabolic effects contribute to better cardiovascular outcomes by reducing risk factors like diabetes and obesity.

7. Oxytocin suppresses atherosclerotic alterations by reducing immunological injuries, metabolic disorders, and inflammation in arteries. It also promotes cardiac stem cell differentiation to replace lost cells from ischemic events.

8. Oxytocin can realize efficient Aβ clearance from the brain, which might be due to its positive effects on the structure and function of both glymphatic and meningeal lymphatic systems, including the improvements in cerebral hemodynamics, AQP4 polarization, meningeal lymphangiogenesis and transcriptional profiles, thus greatly restoring cognitive function in AD mice.

These combined actions make oxytocin a promising therapeutic candidate for improving cardiovascular health in older adults.