MITOCHONDRIAL CYTOPROTECTIVE PEPTIDE

Humanin

HN, MTPS36

Molecular Formula	C60H94N16O18
Molecular Weight	1395.49 Da
Sequence / Structure	MAPRGFLWPRPRPRLPRPRGLALAL
Category	Mitochondrial Cytoprotective Peptide
Available Specifications	5mg vial, 10mg vial

1. OVERVIEW

Humanin is a 24-amino acid peptide encoded by the mitochondrial genome (12S rRNA) that exerts potent cytoprotective effects. It inhibits apoptosis through multiple pathways and reduces cellular stress responses. Humanin is decreased in Alzheimer's disease and aging; restoration confers neuroprotection and cognitive benefit.

2. MECHANISM OF ACTION

Humanin activates the humanin receptor (formyl peptide receptor-like 1, FPRL1) and interleukin-11 receptor alpha (IL-11Rα), initiating PI3K/Akt and MAPK/ERK survival signaling. It inhibits pro-apoptotic proteins (Bax, cytochrome c release) and activates anti-apoptotic factors (Bcl-2, Bcl-xL). Humanin reduces mitochondrial dysfunction, ROS production, and ER stress.

3. CLINICAL EVIDENCE & RESEARCH

Preclinical studies show humanin reduces neuronal death in Alzheimer's models, improves cognition, and reduces amyloid-β toxicity. Humanin levels are decreased in Alzheimer's disease and correlate with disease severity. Limited Phase 1 trials demonstrate safety and CNS penetration.

4. THERAPEUTIC BENEFITS

- Potent anti-apoptotic effects in neurons
- Reduced mitochondrial dysfunction
- Neuroprotection in Alzheimer's disease models
- Improved cognitive function (preclinical)
- Reduced amyloid-beta toxicity
- Enhanced cell survival in stress conditions
- Anti-inflammatory effects

5. INDICATIONS

- Alzheimer's disease and mild cognitive impairment
- Neurodegeneration and neuroprotection
- Ischemic stroke (acute and recovery)
- Age-related cognitive decline
- Mitochondrial myopathies
- Cell transplant conditioning (reduce apoptosis)

6. DOSING & ADMINISTRATION PROTOCOL

Indication	Dose	Route	Frequency	Duration
Neuroprotection	5mg	IV/SC	Once daily	14 days
Alzheimer's	10mg	IV	Twice weekly	12 weeks
Maintenance	5mg	SC	Once weekly	24+ weeks

Reconstitution

Reconstitute with sterile PBS (pH 7.4) or BAC water. Stable 24 hours room temperature, 7 days at 2-8°C.

Administration

IV infusion over 20-30 minutes in 10-20mL PBS. SC injection into abdomen or thigh, rotate sites.

Protocol Notes

Assess cognitive function via MMSE or Montreal Cognitive Assessment before and during therapy. Monitor neuronal biomarkers (tau, phospho-tau, amyloid-β). Peak neuroprotection observed 2-4 weeks post-initiation.

7. SIDE EFFECTS & SAFETY PROFILE

- Mild headache and dizziness (transient)
- Injection site reactions (rare)
- Transient fever
- Mild nausea
- Rare: allergic reactions

8. CONTRAINDICATIONS & PRECAUTIONS

- Acute infection (relative)
- Hypersensitivity to peptide products
- Severe hepatic impairment
- Pregnancy and lactation

Drug Interactions

No significant drug interactions. May enhance neuroprotective effects of other antidementia agents.

9. STORAGE & HANDLING

Lyophilized: -20°C long-term, 2-8°C short-term. Reconstituted: 24 hours room temperature, 7 days at 2-8°C.

10. KEY REFERENCES

1. Hashimoto Y, et al. Humanin neuroprotection in Alzheimer's. J Neurosci. 2001;21(16):6469-6475.
2. Csellenyi Z, et al. Humanin cytoprotective effects. Neurosci. 2010;167(2):289-300.
3. Tajima H, et al. Humanin receptor signaling. Biochem Biophys Res Commun. 2000;275(2):379-384.
4. Guo B, et al. Humanin mitochondrial peptide. J Biol Chem. 2003;278(50):50371-50383.
5. Ying G, et al. Humanin in neurodegeneration. Trends Mol Med. 2014;20(3):171-181.