

Peptide Therapy Overview

- Peptides regulate almost every known process and system in the body in a tissue- and cell-specific manner. There are over **300,000 peptides** in our body, and so far over 7,000 of them have been identified.
- Peptides **improve and modulate** specific parts of hormone production, immune function, sleep cycle, production of inflammatory mediators, DNA replication, cell division/renewal, cancer cell destruction & apoptosis, libido/sexual arousal, weight loss, lean muscle gain, tissue healing, biological functioning of the brain, skin, eyes, urinary and reproductive systems, etc.
- Peptides have been shown to be **extremely safe** (some at 100 or 1000 folds of typical doses)
- Increasing numbers of peptides are becoming clinically available that can safely improve, optimize or normalize specific functions of the body.



BPC 157

- Anti-inflammatory
- Most utilized peptide in the world. Highly effective and nontoxic.
- Great for muscle, tendon & bone healing
- Great for bowel healing, maintains GI mucosal integrity, prevents gastric ulcers
- Promotes cellular repair
- Protects liver from toxic insults (alcohol, antibiotics, etc)
- Repairs teeth, cornea, brain
- Induces serotonin release in brain, has antidepressant effect
- Modulates serotonergic & dopaminergic system, relieve behavioral disturbances
- Neuroprotective: protects neurons, promotes nerve regeneration after transection, after TBI, spinal cord compression, nerve necrosis, cyst formation, demyelination
- Induces NO (nitric oxide), with strong angiogenic effects (helping new blood vessel formation)
- Protects endothelium of blood vessels, counteracts high blood pressure
- Protects against thrombus, counteracts thrombocytopenia and prolonged bleeding time
- Up-regulates GH (growth hormone) receptor expression in ligaments & tendons, and promotes healing
- Supports muscle building in response to resistance training
- Reduces excessive pain perception
- Outperformed acyclovir for herpes infection at 1/1000 the dose of acyclovir
- May help with stress urinary incontinence
- Targeting conditions:
 - Lyme, HIV, chronic viral or intracellular infections, inflammatory conditions w/ CRP, C4a, ESR markers, CVD, DM, GI ulcers/inflammation/IBS, IBD, leaky gut, H pylori, GERD tendon/ligament/muscle repair, periodontitis, acute pancreatitis, liver lesions, aging, chemical sensitivity, allergies, post-surgical healing, TBI, mold & toxin exposure, neurodegenerative diseases, depression, anxiety, urinary incontinence, hyper/hypo-coagulability, HTN, hypotension, hypothyroidism/thyroid resistance, boost mitochondria function, pain syndrome, eye inflammation & dry eye.

Thymus & Pineal Gland Aging

- **Thymus** shrinkage/degradation (involution) is influenced by age, obesity, caloric intake, genetics, inflammation, stress, pregnancy, toxins, hypothyroidism, low growth hormone levels, chronic infections, and zinc deficiency.
- Thymic proteins reach its peak at age 10, then sharply declines, and stay at a steady low level from our mid 30's
- Progressive thymic dysfunction and immunosenescence naturally occur with aging, and results in:
 - Increased susceptibility to infections
 - Inadequate immune response to vaccinations
 - Increased tendency for autoimmune diseases
 - Increased cancer risk
 - Increased cardiovascular disease
- Overwhelming majority of patients with autoimmune diseases (such as myasthenia gravis, autoimmune thyroid disease, and Lupus) had abnormal thymus size or histology.
- **Pineal gland** is a unique organ that regulates circadian rhythm and pituitary function. It synthesizes melatonin, which is the signaling molecule of natural environmental changes, influences the secretion of neurotransmitters, endorphins, and hormones.
- Melatonin is associated with bone metabolism, weight loss, and cardiovascular health, and acts as a powerful antioxidant, immunomodulator, and anticancer agent. An intact and functional pineal gland is necessary for preserving optimal health.
- Unfortunately, pineal gland has the highest calcification rate among all organs and tissues of the human body. Pineal calcification jeopardizes melatonin's synthetic capacity and is associated with a variety of neuronal diseases.
- Majority of people have pineal gland calcification by age 30



Thymic Peptides

- Improved tissue repair and healing
- Improved host defense to infection
- Reverse immunosuppression of chronic infection (Lyme)
- Increases antioxidant and glutathione production
- Boost natural killer (NK) cell function
- TH2-TH1 immune modulation (important in infections, cancer, Herxheimer's reaction, autoimmune disorders)
- Bind neurotoxins and endotoxins
- Help cardiac regeneration and is protective after heart attack & in congestive heart failure
- Promote neurologic regeneration and protection in post-stroke, TBI, Lyme, Alzheimer's, neuropathy, Parkinson's, etc.
- Stimulate stem cell activity and proliferation
- Increase longevity
- With almost non-existent side effects even at 100-fold dose+ excess
- Excellent safety profile with large therapeutic window (over 1000 fold)

TB 500 (Thymosin Beta 4 or TB4)

- Found in all tissues and cell types (except red blood cells), found in blood and bodily fluids (tears, saliva, cerebral spinal fluid, wound fluids, etc). Both platelets & leukocytes release TB4 into wound fluid
- Showed regenerative activity in TBI, Spinal cord injury, stroke, MS, ischemic limbs, & ischemic cardiac damage
- Supports immunity, improves T cell function, antimicrobial
- Promotes angiogenesis, accelerate collagen deposition
- Calms muscle spasms, improves muscle tone, stretches connective tissue, maintains flexibility
- Reduces inflammation in joint tissue, prevents formation of adhesions and fibrous bands in muscles, tendons, ligaments
- Promotes hair growth, may help dry eyes, corneal injury, lung fibrosis, fatty liver disease/hepatic fibrosis, is cardioprotective (such as in ischemic conditions)
- Reduces systemic inflammation due to infection or infection die-off (Herxheimer's)
- Target conditions:
 - Lyme disease, HIV, malaria, chronic fatigue syndrome, fibromyalgia, autoimmune diseases, infections, myocardial infarction (MI), multiple sclerosis (MS), Alzheimer's, peripheral neuropathy, etc. Is a potential therapy for influenza, colds, Ebola, zika virus (along with TA1)

Thymosin Alpha 1 (TA1)

- Improves tissue repair & healing
- Improves host defense against infections
- Inhibits viral replication or cancer growth
- Improves microcirculation
- Improves stress tolerance
- Increases antioxidant & glutathione production
- Reverses immune suppression of chronic fatigue/fibromyalgia/ Lyme
- Reduces inflammation
- Anti-tumor
- Prevents & treats autoimmunity
- Its level is significantly lower in patients with severe infection & cancer
- Effectively reduced incidence of flu from 19% to 5.5% compared to placebo
- When injected into mice at 3.5 months, it increased their lifespan by 28%, decreased rate of cancer by 2.8 fold
- Increases cancer relapse-free survival
- Approved in >30 countries as a vaccine adjunct, and as treatment for Hep B, HepC, AIDS
- FDA approved under Orphan Drug Program
- Target conditions:
 - Lyme, HIV, chronic viral/intracellular infections, immune deficiency, chronic fatigue syndrome, fibromyalgia, autoimmune diseases, diabetes, allergies, chemical sensitivity, cancer, aging, prevention in travel situation



Pineal Peptides

Epithalon

- Consisting of 4 amino acids, Epithalon is considered a potent bioregulator, due to its ability to interact directly with DNA to alter gene expression
- Increases pineal synthesis of serotonin and melatonin
- Induces telomerase activity, increases and restores telomere length
- Slows down aging of the reproductive system and restores estrous and fertility in old female rats
- Increases T4 to T3 conversion
- Improves glucose tolerance and decreases insulin and triglyceride levels
- Activates gene expression and protein synthesis in specific target tissues
- Increased lifespan of mice, from 14% of mice reaching 2 years of age to 56%
- A study of 79 patients w/ coronary artery disease (CAD), age 60-69, half of them received 6 courses of Epithalon at 10mg every 3 days for 15 days, at 6 months intervals. Monitored for 10 years. Epithalon group were 9 years younger in their cardiovascular function compared to control, and mortality due to cardiovascular diseases reduced from 83% to 46%, with improved physical endurance by 10% (vs. a deterioration by 10% in control group). Epithalon group also had normalization of circadian rhythm, increased melatonin production, and improved carbohydrate and lipid metabolism.
- Effective prophylaxis of age-related pathology, including cancer

Pinealon

- Consisting of 3 amino acids, Pinealon is also considered a bioregulator
- Studies from Russia indicated that Pinealon can slow the rate of aging of the brain, measured by biological age indicators.
- Acts directly on pineal gland, can protect against effects of hypoxia
- Increases levels of another peptide called Irisin. Irisin is important in neuron proliferation and differentiation. Higher levels of irisin have been linked to improved memory and cognition, and it modulates the beneficial impact of exercise on the central nervous system
- Helps protect muscle cells during exercise, promotes fat burning, and promotes telomere lengthening, helps fight off effects of aging and oxidative stress.
- Can help boost production of Serotonin and help fight depression
- Helps reset pineal gland to circadian rhythm, improves sleep, mood and blood pressure
- Helps with poor memory, attention difficulties, brain injury, stroke, high stress, chronic fatigue, depression, insomnia, irritability, Alzheimer's, Parkinson's diseases, multiple sclerosis, neuralgia, neuritis, encephalopathy and demyelinating disease, and helps to maintain the functional status of the brain in elderly patients.



Brain Health Peptides

Dihexa

- Potently improve cognitive function
- Supports recovery from brain trauma
- Boosts synapse formation
- Makes nerve signals stronger and strengthens neuronal structure
- Improves brain blood flow
- 10 million times more potent than BDNF (Brain Derived Neurotropic Factor). It could help in the repair of the brain and nerves.
- Can increase mental stamina, improve creative thinking skills, enhance conversational skills, improve problem-solving, help in managing depression, and improve focus, learning and memory

Cerebrolysin

- Cerebrolysin is a nootropic drug which consists of low-molecular peptides which possesses neuroprotective and neurotrophic repair properties.
- The active fragment of Cerebrolysin is of very low molecular weight, thus can penetrate the blood-brain barrier and reach neurons directly.
- Proven to have neurotrophic action similar to nerve growth factors, which cause peripheral and central neuronal stimulation.
- Improves efficiency within the brain's aerobic metabolic processes and improves intracellular peptide synthesis.
- The neuroprotective properties of this nootropic agent help to shield neurons from lactacidosis, to prevent the formation of free radicals, and have been studied in Parkinson's, Alzheimer's, MS, ALS, TBI, and stroke.
- Cerebrolysin helps promote the growth of new brain cells, which helps improve brain cell communication enhancing learning capacity.

Selank

- While traditionally prescribed for anxiety and depression, it has been known to be effective in many other treatments related to immune modulation, anticoagulation, PTSD, ADHD, and metabolic syndromes.
- Neurotropic action is similar to that of nerve growth factors
- Promotes central & peripheral nervous system stimulation and rejuvenation
- Has pronounced anxiolytic activity and acts as a stable neuropsychotropic, antidepressant, and anti-stress drug that relieves aggression and fear reaction in different animal species.
- Positively influences the formation of memory and learning processes
- Clinical studies have shown that the effect of Selank is similar to that of tranquilizers at low doses, but is not accompanied by the unwanted side effects of benzodiazepine tranquilizers such as amnesia, withdrawal, or dependence.
- Experiments have also demonstrated the effectiveness of Selank in preventing the accumulation of body fat (i.e., weight gain)
- Shields neurons from neurotoxins, inflammation and injury
- Neurological regeneration, such as in TBI, Alzheimer's, Parkinson's, stroke, and toxin-induced damage

Semax

- Melanocortins system peptide, affects learning processes and exploratory behavior, regeneration and development, pain perception and inflammatory processes.
- Stimulates Neurogenesis, can accelerate nerve regeneration and improve neuromuscular performance.
- Currently is successfully used in treatment of patients with pathologies related to brain circulation dysfunction and with different intellectual/amnestic problems of the CNS.
- Can be used as a preventative measure to protect against chronic disease, and acutely to help improve memory and learning processes.
- Has protective ability against metal-induced cell toxicity
- Can improve selective attention and modulate brain development. It is proposed that Semax may have good therapeutic potential in ADHD
- Has a marked anti-thrombotic and fibrinolytic effect, and may play a significant role under conditions of ischemic damage
- gastric protective
- Can increase physical performance and adaptation capacities in exposure to high intensity exercise.
- Target conditions:
Anxiety, memory improvement, ischemic events, stroke, nerve regeneration, ADHD, opioid withdrawal, and chronic diseases such as ALS, Parkinson's, and Alzheimer's. Often prescribed for:
Anti-thrombosis, gastric protection, physical exertion, improvement of pain, metal toxicities.

PE-22-28

- Fast-acting peptide in relieving depression, generally only needing 4 days to exert antidepressant effect
- Improves mood and motivation
- Improves brain's stress resilience
- Increases neurogenesis and neuroplasticity
- Protects neurons from excessive glutamate
- Helps improve memory and learning
- May be effective for stroke recovery



Growth Hormone Releasing Peptides

Ipamorelin

- Is the most efficient, and the safest and selective growth hormone (GH) stimulant. Ipamorelin stimulates growth hormones without having an effect on the blood levels of prolactin and cortisol (like many other GHRPs)
- Mimics ghrelin, and promotes the production and release of GH
- No desensitization issues
- Improves sleep
- Anti-aging benefits: Reduction in body fat, improved muscle strength and mass, strengthened bones, repaired joints and ligaments, improved skin quality, increased energy and vitality

CJC 1295

- Synthetic GHRH analog, often combined with ipamorelin
- Increases GH secretion and IGF-1 level without prolactin elevation
- Increases muscle growth and fat loss
- Decreases recovery time
- Improve cognition
- Increase cellular repair & regeneration
- Promote slow wave deep sleep, which is responsible for highest level of muscle growth, memory retention and rejuvenation

Ipamorelin/CJC 1295 combination

- the combination results in 5 fold increase in efficacy
- Enhanced sleep quality on day 3-4
- Improves body composition
- Cardioprotective
- Neuroprotective
- Immunoprotective
- Muscle protective
- Metabolic protective

Tesamorelin

- A growth hormone-releasing analog, initially investigated for the treatment of HIV patients to reduce HIV drug-induced central obesity. Daily use for 26 weeks resulted in a significant decrease in visceral adipose tissue and improved lipids
- Increases natural productions of HGH (human growth hormone)
- Increases IGF-1 (Insulin Growth Factor – 1) without altering glucose parameters
- Increases protein synthesis and muscle growth and increases breakdown of fat. Shown to reduce body fat by 7.4%
- Improves fasting insulin level
- Reduces triglycerides
- Reduces carotid atherosclerosis, thus reducing risk of cardiovascular events. Improves cardiac health
- Reduces inflammation marker c-reactive protein (CRP)
- Reduces fatty liver disease
- Improves cognition & memory
- Improves exercise capacity & energy
- Improves bone density
- Improves immune function



Weight Loss Peptides

MOTS-c

- A mitochondria-encoded peptide that regulates metabolic homeostasis, by translocating to the nucleus to regulate adaptive nuclear gene expressions in response to cellular stress. Improves mitochondrial health
- Improves muscle building, fat loss, & reverses cellular senescence
- Activates AMPK pathway to improve energy dissipation and insulin sensitivity.
- Regulates energy (carbohydrate) metabolism, improve physical performance, a trend toward increased lifespan. Acts primarily on muscle, vs. Metformin acting primarily on liver
- Prevented ovariectomy-induced obesity and insulin resistance in mice. Increased brown fat activation, reduced fat accumulation and inflammatory invasion in white adipose tissue.
- Reduces vascular calcification by activating AMPK pathway

Semaglutide

- Semaglutide is a glucagon-like peptide-1 (GLP-1) receptor agonist approved by the FDA in 2014 as Ozempic — for lowering blood sugar and HgA1c in type 2 diabetics as a once-a-week subcutaneous injection
- Promotes weight loss in patients with or without diabetes, and improves glycemic control by stimulating insulin secretion and glucagon secretion without leading to hypoglycemia.
- Successfully regulates appetite by restoring the signaling system that tells the body “I’m full, I don’t want to eat anymore.”
- Can be used for the treatment of diabetes, obesity, non-alcoholic fatty liver disease and neurodegenerative diseases like Parkinson’s and Alzheimer’s.

5-Amino-1-MQ

- Regulates NAD pathways, increases level of NAD
- Inhibits NNMT, which is up-regulated in white adipose tissue as we age. NNMT level correlates with BMI & waist circumference.
- Animal study showed significant decrease in adipose tissue & body weight in a short amount of time
- Enhances mitochondrial function
- Repairs mitochondrial damage
- Increases basal metabolic rate (BMR)
- Targets fat, especially abdominal fat - white adipose tissue
- Improve neuromuscular function and increase ability to maximally contract muscle fibers through the same mechanism of NNMT inhibition.
- On top of delayed muscle soreness after intense high-volume workouts, it has the added bonus of lowering cellular senescence.
- A “body recomposition peptide” that aids in both maximal fat loss AND maximal muscle preservation.

Melanotan I

- Induces skin pigmentation through enhanced melanin production. Melanin prevents cellular damage in skin by absorbing, reflecting and refracting light.
- Is used for enhanced tanning, and is a prophylactic treatment for light-affected skin disorders and a potential skin cancer preventative agent
- Reduces sun damage to UV exposed skin, transforming cells to produce dark protective melanin.
- Can be safely combined with UV-B light or sunlight and appears to act synergistically in the tanning response to light
- Boosts neurogenesis, protects against cognitive decline in Alzheimer's Disease animal models
- Improves functional recovery after stroke
- Improves heart recovery and survival after heart attack
- Reduces neuroinflammation
- Stimulates fat burning



Antimicrobial Peptide

LL37

- An antimicrobial peptide that belongs to the cathelicidin family of AMPs
- Stored in neutrophil granules as inactive precursors, and released as mature peptides when neutrophils are stimulated.
- LL-37 is expressed in various cells and tissues such as circulating neutrophils and myeloid bone marrow cells, epithelial cells of the skin, the gastrointestinal tract, as well as the epididymis and lungs.
- Production of LL-37 in macrophages is stimulated by vitamin D released by sunlight through the skin.
- Has a broad spectrum of antimicrobial activity against bacteria, enveloped viruses, and fungi.
- Plays an important role in regulating the balance of pro- and anti-inflammatory molecules.
- Promotes wound healing
- Can inhibit biofilm formation.
- Several studies showed that LL-37 was effective in treating certain cancer cell types. LL-37 inhibits gastric cancer cell proliferation by the activation of bone morphogenetic protein (BMP) signaling.



Sexual Wellness Peptide

PT 141

- Induced rapid onset of sexual arousal
- Acts at the level of the brain, thus eliciting a natural sexual response
- Increases libido, induces erections in men, and vaginal blood flow in women
- Increases erection in 80% of men who do not respond to PDE5 inhibitors (such as viagra and cialis)

- A derivative of MT-II (Melanotan II), it induces sexual arousal by binding to melanocortin receptors in the hypothalamus
- MT-II was originally tested as a sunless tanning agent, but also seemed to cause sexual arousal and spontaneous erections in 9 out of the 10 original male volunteers tested
- PT-141 is FDA approved for women, and increases chance of having a sexual gratifying experience by 50%

Kisspeptin

- A neuropeptide hormone secreted by the hypothalamus
- Stimulates GnRH release to increase LH and FSH, in turn boosting estrogen, progesterone, and testosterone levels
- Helps stimulate sexual arousal
- May boost fertility outcomes and psychosexual mental health issues related to conception efforts. It is being researched as a potential alternative to hCG in fertility treatments.
- Increases both basal- and hCG-stimulated progesterone secretion from luteal phase uterine cells
- Increases liver antioxidants
- Boosts insulin secretion
- Temporarily increases oxytocin



Aesthetic Peptide

GHK-Cu

- Copper peptide, first identified in human plasma
- GHK-Cu levels decrease with age, resulting in increased inflammation, cancerous activity, and tissue destruction.
- Generated after tissue injury, and is a potent tissue protector and anti-inflammatory agent. Reduces oxidative damages that occur post-injury.
- Promotes wound healing by removing damaged/scarred tissue and generating new, healthy tissue.
- Stimulates collagen synthesis in skin fibroblasts, and promotes blood vessel growth
- When used as topical, can increase collagen by 70%, & decrease fine lines/wrinkles by 27%
- Tightens loose skin and reverses thinning of aged skin, and improves skin firmness, elasticity, and clarity
- Repairs protective skin barrier proteins
- Reduces photodamage, mottled hyperpigmentation, skin spots and lesions
- Reduces hair loss, increases hair growth and thickness; enlarges hair follicle size
- Improves lung health
- Protects the liver
- Promotes bone repair
- Fights different cancer types
- Accelerates nerve regeneration
- Fights anxiety
- Combats cognitive dysfunction