BPC-157 for Healing Gastric Ulcers and Superior Healing of Tendinopathies

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What is a Peptide?

• A peptide is a short chain of amino acids that are linked together, and can be thought of as a small protein.
• To date, over 7,000 naturally-occurring peptides have been identified.
• In our bodies, these small proteins typically act as signaling molecules.
• They bind to receptors on the cell surface and tell other cells and molecules what to do.
What is a Peptide?

• Peptides are highly specific while also being safe and well-tolerated!

• As of January 2015, there were over 60 FDA-approved peptide medications, 140 peptide drugs being evaluated in clinical trials, and 500 in pre-clinical development.

• More peptides are created everyday!
Peptide Therapy Goal

Peptide therapy aimed at normalization of the serum IGF-1 is associated with significant improvements in serum triglycerides, LDL-C, total cholesterol, total cholesterol/HDL-C ratio, decrease in CIMT and atherogenic lipid profile, increase in CO, increase in EF, decrease in CVD, increased lean body mass, decreased inflammatory visceral fat, improvement in energy levels and emotional reaction, improved psychological well-being, improved skeletal mass and osteopenia/osteoporosis scores, decreased fatigability and greater vitality.
What are the Peptides?

THPdb
A database of FDA approved therapeutic peptides and proteins

Browse No. of Amino Acid in THPdb

This page provides the amino acid distribution of peptides and proteins present in the THPdb. For more information see HELP page.

<table>
<thead>
<tr>
<th>Length</th>
<th>Count</th>
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<tr>
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<td>Above 1500</td>
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Link to access list of peptides: [http://crdd.osdd.net/raghava/thpdb/length.php](http://crdd.osdd.net/raghava/thpdb/length.php)
Peptides – Legalities & Regulations

EXEMPTION FD&C ACT

A compounded drug product intended for use in humans that meets the conditions of section 503A of the FD&C Act and its associated regulations is exempt from the requirements under sections 501(a)(2)(B), 502(f)(1), and 505 of the FD&C Act.

Pharmacy Compounding of Human Drug Products Under Section 503A of the Federal Food, Drug, and Cosmetic Act
HTTP://www.fda.gov/Drugs/GuidanceComplianceRegulatoryInformation/Guidances/default.htm
Peptides – Legalities & Regulations

EXEMPTION FD&C ACT

Sections 351 (a)(2)(B), 352 (f)(1), and 355 (NEW DRUGS) shall not apply to a drug product if the drug product is compounded for an identified individual patient based on the receipt of a valid prescription order or a notation, approved by the prescribing practitioner, on the prescription order that a compounded product is necessary for the identified patient, if the drug product meets the requirements of this section, and if the compounding—

(1) is by—

(A) a licensed pharmacist in a State licensed pharmacy or a Federal facility, or
(B) a licensed physician,
on the prescription order for such individual patient made by a licensed physician or other licensed practitioner authorized by State law to prescribe drugs;

https://www.law.cornell.edu/uscode/text/21/353a
Reasons compounded product is necessary for the identified patient:

- Allergens or dye sensitivity to commercially available products
- Failure of initial therapy on commercially available products
- Lifestyle request which commercially available products may not accommodate
- Patient adherence and compliance is necessary and un-achievable with commercially available products
- Micronization and modified release is necessary and un-achievable with commercially available products
Reasons compounded product is necessary for the identified patient:

• Patient has allergy to cottonseed oil, a component in brand name testosterone, Depo®-Testosterone
• Patient has a needle phobia, requiring use of creams
• Patient has sensitivity to alcohol based gels
Peptides – Legalities & Regulations

Federal law clearly states that licensed physicians may “manufacture, prepare, propagate, compound, or process drugs solely for use in the course of their professional practice” [21 USC 360(g)]. Furthermore, the Federal Food, Drug, and Cosmetic Act (FD&C) cannot regulate the therapeutic practices themselves.
The purpose of this lecture is to understand how peptides provide powerful therapeutic tools due to their receptor specificity and excellent low side effect profile, and which patients and conditions would likely benefit from peptide therapy and alternative treatment strategies.
How many peptides?

- Short chain of amino acids from 2-50, but < 50 AA
- Seemingly simple peptides are found to regulate most every known process and system in the body in a tissue specific manner.
- While hormone therapy and optimization is a mainstay of age management, understanding that regulatory peptides are the master controllers of many functions of the body, including hormone production.
How many peptides?

• The human body has about 293,700 peptides according to the Human Poteome Map

• Compared to about 30,000 proteins
Peptides that are Hormones

- ACTH
- ADH
- Atrial Natriuretic Peptide
- Calcitonin
- GHRH-44 amino acid peptide-7 min half-life
- Oxytocin
- Parathyroid Hormone
- Prolactin
Currently, peptides are available that are shown to safely and effectively improve and modulate specific parts of:

- Hormone production
- Immune function
- Sleep cycle
- Production of inflammatory mediators
- DNA replication
- Cell division and renewal
- Cancer cell destruction and apoptosis
- Libido and sexual arousal
- Tissue healing
- Specific biological functioning of the brain, skin, eyes, urinary and reproductive systems.
Hormones generally work on nuclear receptors with resultant gene activation and protein synthesis.

Peptides are generally non-genomic that act on membrane receptors to activate an intracellular signaling cascade.

Peptide signaling molecules generally have more of a rapid response with less side-effects when compared to hormones.

Peptides have more precise tissue-selective effects, while hormones have less precise broader effects.
The side effect profile and low cost of peptide repair therapies suggest a first treatment line option for many different types of muscle, ligament, and tendon injuries. Many of these options could be explored before more drastic treatment protocols.
What Is BPC-157?

Pentadecapeptide BPC 157, composed of 15 amino acids, is a partial sequence of body protection compound (BPC) that is discovered in and isolated from human gastric juice.
BPC 157

- H-Gly-Glu-Pro-Pro-Pro-Gly-DL-Lys-Pro-Ala-Asp-Asp-AlaGly-Leu-Val-OH
- Accelerates the healing of many different wounds, including tendon, ligaments, muscles, nervous system and other organs
- BPC 157 increases growth hormone receptors
- BPC 157 also promotes the outgrowth of tendon fibroblasts, cell survival under stress, and the migration of tendon fibroblasts
- This peptide is also shown to decrease pain in damaged areas
BPC 157

- Protects and prevents gastric ulcers
- Improves digestive function
- Protects and heals inflamed intestinal epithelium (leaky gut)
- Eosinophilic esophagitis
- It has also been shown to help in Inflammatory bowel disease
- Protects liver from toxic insults (alcohol, antibiotics, etc) and promotes healing
- Traumatic brain injury
- May protect against acute and chronic toxic effects of alcohol symptoms of alcohol withdrawal
- May antagonize 5HT2 receptor (high numbers of 5HT2 receptors found in depression and suicidal patients)
BPC 157: Potential target conditions

Aging
Allergies
CFS/Fibromyalgia
Chemical sensitivity
GI ulcers/inflammation
Inflammatory conditions
Inflammatory bowel disease
Prevent/treat heart arrhythmias
Autoimmune disease (asthma, lupus)
Chronic viral or intracellular infections
Lyme disease/HIV, especially in conjunction with TA1

CVD
Post surgical
Diabetes
Leaky gut
H-pylori
Patient #1: Severe Esophageal Pain

50 yo male with constant, persistent esophageal pain and spasms for 2 years. Has had several EGDs and manometry. Has tried numerous therapies with minimal relief.
Patient #1: Severe Esophageal Pain
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Patient was started on BPC-157 oral daily for 4 weeks.

Place on my “SSD” to shed 8-10 lbs.
Two week follow up demonstrated a 100% resolution of esophageal spasm and pain.
Patient #1: Severe Esophageal Pain
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Patient #1: Severe Esophageal Pain
BPC 157

BPC 157 is the most stable gastric pentadecapeptide that is available in human gastric juice. It has remarkable effects in the lower and the upper GI tracts. It is also known for its side effect-free property.
BPC 157

“Stable gastric pentadecapeptide BPC 157 is an antiulcer peptidergic agent, safe in inflammatory bowel disease clinical trials and wound healing, stable in human gastric juice and has no reported toxicity. Particularly, it has a prominent effect on alcohol lesions (i.e., acute, chronic) and NSAIDs-lesions (interestingly, BPC 157 both prevents and reverses arthritis)... and acts as a free radical scavenger and exhibits neuroprotective properties.”
Peptides have gained increased interest as therapeutics during recent years. More than 60 peptide drugs have reached the market for the benefit of patients and several hundreds of novel therapeutic peptides are in preclinical and clinical development. The key contributor to this success is the potent and specific, yet safe, mode of action of peptides. The future development of peptide drugs will continue to build upon the strengths of naturally occurring peptides, with the application of traditional rational design to improve their weaknesses, such as their chemical and physical properties.
Peptides vs GH

Benefits of growth hormone secretagogues, relative to recombinant growth hormone:

- Simulate natural, pulsatile GH secretion
- Allow the pituitary to self regulate GH secretion
- Do not down regulate pituitary’s own GH secretion
- Safe for long-term use
Self Regulation / Negative Feedback

Hypothalamus

Growth hormone releasing hormone (GHRH)

Growth hormone inhibiting hormone (GHIH)

Anterior pituitary

Growth hormone (GH)

Liver

High levels of IGF-1
- Stimulates GHIH/SS
- Decreased secretion of GH

High levels of GH
- Inhibits GHRH

Insulin-like growth factor 1 (IGF-1)
Growth hormone in the aging male

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Keywords:
growth hormone
insulin-like growth factor I
longevity
dwarfs
sarcopenia
muscle weakness
tesamorelin
ghrelin

Secretion of growth hormone (GH) and IGF-1 levels decline during advancing years-of-life. These changes (somatopause) are associated with loss of vitality, muscle mass, physical function, together with the occurrence of frailty, central adiposity, cardiovascular complications, and deterioration of mental function. For GH treatment to be considered for anti-aging, improved longevity, organ-specific function, or quality of life should be demonstrable. A limited number of controlled studies suggest that GH supplementation in older men increases lean mass by 2 kg with similar reductions in fat mass. There is little evidence that GH treatment improves muscle strength and performance (e.g. walking speed or ability to climb stairs) or quality of life. The GHRH agonist (tesamorelin) restores normal GH pulsatility and amplitude, selectively reduces visceral fat, intima media thickness and triglycerides, and improves cognitive function in older persons. This report critically reviews the potential for GH augmentation during aging with emphasis on men since women appear more resistant to treatment.

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Patient #2: The Hobbler

35 y/o male who presents with chronic right ankle pain from eleven injuries. MRI demonstrates chronic inflammation of the anterior talofibular ligament and chronic sinus tarsi syndrome. Has tried numerous therapies, now orthopedist wants to scope to “clean and tighten”.
Treatment Strategy

He was put on BPC-157 for 3 months

PRP joint injection in the right ankle

Three months later is pain free
The patient **rolls the forefoot slightly internally** to stretch the lateral ligaments.

The probe is placed parallel to the examination bed, **transversely over the lateral malleolus.**
- LM (Lateral malleolus)
- Tal (Talus)
- ▲ (Anterior talofibular ligament)
Patient #3: The Ex Jock

42 y/o at 6’2 and 240 lbs. male presents with complaint of right shoulder pain and weakness of bicep.

Examination reveals positive Yergason, positive O’Brion, positive Speed, positive empty can tests
Possible Treatment Options

This patient could:

• Hope it heals on its own
• Take NSAIDS and Steroids
• Go to physical therapy
• Consider surgery
• PRP
• Strategic use of BPC-157
Patient #3: The Ex Jock

Treatment Strategy

He was put on BPC-157 for 3 months

PRP joint injection in the right biceps and supraspinatus tendons

Approximately three months later is pain free with normal strength
The emerging peptide technologies, including multifunctional peptides, cell penetrating peptides and peptide drug conjugates, will help broaden the applicability of peptides as therapeutics. Taking all of the above into account, we are convinced that peptides offer enormous growth potential as future therapeutics for the treatment of unmet medical needs.
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