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PENTADECAPEPTIDE BPC 157: PANACEA OR OVERHYPED PEPTIDE?

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Abstract:
Interest in Pentadecapeptide BPC 157, an oligopeptide originally derived from human gastric juice, has grown substantially among members of the fitness community in the past few years due to its wide range of purported and previously reported effects on improving health and enhancing performance. In spite of these effects, the use of BPC 157 is accompanied by uncertainties, specifically the impact of long-term use. The composition, pharmacokinetics, route of administration and potential clinical applications will be presented in this brief investigative report.

Keywords: BPC 157, pentadecapeptide, amino acids, injury recovery, ergogenic aids

1. Introduction

Pentadecapeptide BPC 157, colloquially known as the "Body Protection Compound", is derived from a gastric oligopeptide comprised of a chain of 15 amino acids. Recent scientific and anecdotal reports have illuminated its immense versatility in augmenting recovery and healing, burnishing musculoskeletal health, enhancing neurocognition, attenuating gastrointestinal distress, and promoting muscular hypertrophy, albeit indirectly via enhanced recovery capacity, in turn, warranting interest among active populations and garnering media coverage in recent years. Early investigations involving

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BPC 157 elucidated improvements in connective tissue repair (Staresinic *et al.*, 2003), increased angiogenesis, wound healing, protection against gastrointestinal and liver lesions and reduced inflammation (Sikiric *et al.*, 1997). More recently, BPC 157 has been shown to harbor an array of neuroprotective properties and has been identified as a potential adjunctive or eventual treatment following brain trauma (Sikiric *et al.*, 2016) and spinal cord injury (Perović *et al.*, 2022). Additionally, BPC 157 has shown promise in treating gastrointestinal disorders and reducing gastric and colon cancer risk (Sikiric *et al.*, 2021). Its role in facilitating improved recoverability of soft tissue structures (Pevec *et al.*, 2010; Chang *et al.*, 2011; Gwyer *et al.*, 2019) and streamlined neurocognitive performance (Sikiric *et al.*, 2023; Vukojević *et al.*, 2022) are of particular interest among the general population and thus will serve as the focus of this review.

2. Background and Mechanism of Action

BPC 157 was initially discovered in the 1990s when it was extracted from human gastric juice --- a blend of hydrochloric acid and digestive enzymes, lipase and pepsin, that is secreted by the gastric mucosa, which lines the stomach. Its unique sequence of amino acids and structural composition enable it to withstand hydrolysis, enzymatic activity, and acidic environments, which include exposure to gastric juices. While its exact mechanism of action is not completely understood, BPC 157 has been shown to modulate several metabolic pathways, specifically the nitric oxide system (NO) by neutralizing free radicals, thus contributing to cellular homeostasis and allaying apoptosis. This capacity, in tandem with its role in promoting angiogenesis, could explain its role in counteracting lesions of the gastrointestinal tract and stabilizing NO and malondialdehyde values and oxidative stress markers amid ulcerative colitis (Đuzel *et al.*, 2017). BPC 157 was also shown to be involved in activating the Focal Adhesion Kinase (FAK) paxillin pathway, which signals satellite cells needed to facilitate migration, adhesion, and regeneration of connective and contractile tissue (Chang *et al.*, 2011). Further, its role in catalyzing angiogenesis is rooted in its participation in upregulating the expression of vascular endothelial growth factor (VEGF) receptors and activating downstream protein kinase B (Akt) and endothelial nitric oxide synthase (eNOS) signaling pathways that contribute to enhanced blood perfusion and subsequent recovery (Brcic *et al.*, 2009).

3. Potential Clinical Applications

BPC 157 has illustrated remarkable potential to facilitate the healing process across various tissues and organs, underscoring its value in clinical applications. BPC 157 has demonstrated substantial protective effects against ischemia-reperfusion (IR) injury across various organs, including the kidneys, lungs, and liver. IR injury is a complex pathological process that occurs when the blood supply to an organ is temporarily interrupted and then restored. This interruption can lead to significant tissue damage and dysfunction. Although the mechanisms of healing have not been completely elucidated,

biochemical and histopathological analyses have shown that BPC 157 effectively tempers oxidative stress, diminishes inflammation, and significantly enhances antioxidant defenses in tissues affected by IR injury, highlighting its therapeutic potential (Demirtaş *et al*., 2025).

In the domain of tendon injuries, BPC157 has been identified as a promising therapeutic agent for the treatment of severe trauma and stress-related injuries (Bricic *et al*., 2009; He *et al*., 2022). This is particularly relevant considering that tendon injuries are among the most frequently encountered injuries in sports. These injuries typically result from ruptures in tendon fibers, which may occur due to factors such as overuse, age-related degeneration, or traumatic incidents. The healing process for a ruptured tendon is often complex, and in cases involving complete tears, surgical intervention frequently represents the most effective treatment option (Chang *et al*., 2014). BPC-157 could serve as a potential alternative or supplementary option to surgical repair as it has been shown to increase the expression of growth hormone receptors in tendon fibroblasts, potentially enhancing the proliferation-promoting effects of growth hormone, thereby contributing to tendon healing and facilitating functional recovery (Chang *et al*., 2014). The favorable influence of BPC 157 on musculoskeletal healing may also be attributed to its capacity to enhance angiogenesis and modulate nitric oxide synthesis (Bricic *et al*., 2009; Chang, 2014).

In addition to its role in the healing of tendons, BPC 157 exhibits significant therapeutic benefits for muscle injuries. Research has demonstrated that BPC-157 can accelerate the healing of skeletal muscle injuries, effectively restoring full muscle function in a manner comparable to the benefits seen in tendon rehabilitation (Gwyer *et al*., 2019). Moreover, BPC-157 may serve as an effective approach to enhancing wound healing. The therapeutic mechanism has been attributed to its capacity to accelerate the formation of reticulin and collagen, and stimulation of macrophage and fibroblast infiltration, in addition to supporting epithelial regeneration, facilitating dermal remodeling, and increasing collagen deposition (Huang *et al*., 2015), all of which are critical processes for effective wound healing.

Members of the general population also laud BPC 157 for its purported conferral of improved neurocognitive performance. Substantial evidence emanating from a host of scientific reports synthesized by Vukojević and colleagues (2022) elucidates its role in supporting central nervous system (CNS) functioning. BPC 157 has been shown to counteract brain neuronal damage, dopamine disturbances, and impart a convalescent effect following spinal cord injury. Moreover, BPC 157 demonstrated the ability to counteract neural hippocampal damage following stroke, brain lesions occurring during mild traumatic brain injury (MTBI), and preserve synaptic activity within multiple brain regions in drug-induced states that simulate autoimmune and neurodegenerative disorders (Sikiric *et al*., 2023). BPC 157 also demonstrated sensitization and recovery of somatosensory neurons and governed the secretion of serotonin (Sikiric *et al*., 2023). The role of BPC 157 in stimulating angiogenesis could plausibly explain improvements in brain and central nervous system health and enhanced memory.

4. Non-clinical Use and Supplementation

In spite of its versatility and promising clinical application, the US Food and Drug Administration (FDA) added BPC 157 to Category 2 of the Bulk Substances Nominated Under Section 503A of the Federal Food, Drug, and Cosmetic Act, citing a lack of sufficient data related to safety among human subjects (U.S. Food and Drug Administration, 2024). The FDA also highlighted concerns related to routes of administration and possible peptide-related and active pharmaceutical ingredient impurities. Further, BPC 157 has been added to the prohibited substances list by the World Anti-Doping Agency (WADA) (Józwiak *et al.*, 2025), who designated it as a performance-enhancing drug based on potential safety issues and claims of accelerated recoverability that may confer unfair advantages among competitive athletes who deploy it. Enhanced recoverability via BPC 157 ostensibly facilitates more frequent training, in turn, eventuating in gains in hypertrophy and strength as well as improvements in fitness qualities and biomotor skills that correlate to increased athletic performance.

Traditionally, peptide hormones, such as insulin and somatropin and peptides such as glucagon-like peptide-1 receptor agonists are injected subcutaneously. While BPC 157 may be administered subcutaneously, it may also be consumed orally in pill or capsule form, which combines it with arginate salt for enhanced stability, increased solubility, and improved bioavailability. However, since it is banned for human consumption by the FDA and considered a prohibited substance by the WADA, there is little guidance on dosing recommendations. Recommendations on dosing ranges, which largely emanate from anecdotal reports, are speculative at best and may potentially jeopardize the health of users. Further, little is known about the effects associated with long-term use; therefore, longitudinal analyses of human clinical trials are warranted prior to determining their safety.

5. Conclusion

While the vast health-improving effects of BPC 157 make it worthy of consideration for potential use, the long-term effects associated with its deployment are largely unknown. Beyond its involvement in facilitating recovery and regeneration of contractile and connective tissue, this brief investigative report elucidated the role of BPC 157 in attenuating oxidative stress and inflammation, which bears relevance for future exploration of its involvement in tempering etiological inflammatory responses across multiple organs and body systems that contribute to chronic disease. Furthermore, its role in restoring neurometabolic health pursuant to brain trauma, including concussions, warrants future exploration. Nevertheless, additional investigations should be executed to affirm its efficacy, ascertain its safety, and offer a greater understanding of long-term effects.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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References

Brcic, L., Brcic, I., Staresinic, M., Novinscak, T., & Seiwerth, S. (2009). Modulatory effect of gastric pentadecapeptide BPC 157 on angiogenesis in muscle and tendon healing. *Journal of Physiology and Pharmacology: An Official Journal of the Polish Physiological Society*, *60*(Suppl 7), 191-196. https://www.researchgate.net/publication/51443032_Modulatory_effect_of_gastric_pentadecapeptide_BPC_157_on_angiogenesis_in_muscle_and_tendon_healing

Chang, C.-H., Tsai, W.-C., Lin, M.-S., Hsu, Y.-H., & Pang, J.-H.S. (2011). The promoting effect of pentadecapeptide BPC 157 on tendon healing involves tendon outgrowth, cell survival, and cell migration. *Journal of Applied Physiology (1985)*, *110*(3), 774–780. https://doi.org/10.1152/japplphysiol.00945.2010

Chang, C.-H., Tsai, W.-C., Hsu, Y.-H., & Su Pang, J.-H. (2014). Pentadecapeptide BPC 157 enhances the growth hormone receptor expression in tendon fibroblasts. *Molecules*, *19*(11), 19066–19077. https://doi.org/10.3390/molecules191119066

Demirtaş, H., Özer, A., Kutay Yıldırım, A., Dursun, A.D., Sezen, Ş.C., & Arslan, M. (2025). Protective effects of BPC 157 on liver, kidney, and lung distant organ damage in rats with experimental lower-extremity ischemia–reperfusion injury. *Medicina*, *61*(2), 291. https://doi.org/10.3390/medicina61020291

Đuzel, A., Vlainić, J., Antunovic, M., Malekinusic, D., Vrdoljak, B., Samara, M., Gojkovic, S., Krezic, I., Vidovic, T., Bilic, Z., Knežević, M., Sever, M., Lojo, N., Kokot, A., Kolovrat, M., Drmic, D., Vukojević, J., Kralj, T., Kasnik, K., Siroglavić, M., Seiwerth, S., & Sikiric, P. (2017). Stable gastric pentadecapeptide BPC 157 in the treatment of

colitis and ischemia and reperfusion in rats: new insights. *World Journal of Gastroenterology*, *23*(48), 8465–8488. https://doi.org/10.3748/wjg.v23.i48.8465

Gwyer, D., Wragg, N. M., & Wilson, S. L. (2019). Gastric pentadecapeptide body protection compound BPC 157 and its role in accelerating musculoskeletal soft tissue healing. *Cell and Tissue Research*, *377*(2), 153–159. https://doi.org/10.1007/s00441-019-03016-8

He, L., Feng, D., Guo, H., Zhou, Y., Li, Z., Zhang, K., Zhang, W., Wang, S., Wang, Z., Hao, Q., Zhang, C., Gao, Y., Gu, J., Zhang, Y., Li, W., & Li, M. (2022). Pharmacokinetics, distribution, metabolism, and excretion of body-protective compound 157, a potential drug for treating various wounds, in rats and dogs. *Frontiers in Pharmacology*, *13*. https://doi.org/10.3389/fphar.2022.1026182

Huang, T., Zhang, K., Sun, L., Xue, X., Zhang, C., Shu, Z., Mu, N., Gu, J., Zhang, W., Wang, Y., & Zhang, W. (2015). Body protective compound-157 enhances alkali-burn wound healing in vivo and promotes proliferation, migration, and angiogenesis in vitro. *Drug Design, Development and Therapy*, *9*, 2485-2499. https://doi.org/10.2147/DDDT.S82030

Józwiak, M., Bauer, M., Kamysz, W., & Kleczkowska, P. (2025). Multifunctionality and possible medical application of the BPC 157 peptide-literature and patent review. *Pharmaceuticals (Basel)*, *18*(2), 185. https://doi.org/10.3390/ph18020185

Perović, D., Milavic, M., Dokuzovic, S., Krezic, I., Gojkovic, S., Vranes, H., Bebek, I., Bilic, V., Somun, N., Brizic, I., Skorak, I., Hriberski, K., Sikiric, S., Lovric, E., Strbe, S., Kubat, M., Boban Blagaic, A., Skrtic, A., Seiwerth, S., & Sikiric, P. (2022). Novel therapeutic effects in rat spinal cord injuries: recovery of the definitive and early spinal cord injury by the administration of pentadecapeptide BPC 157 therapy. *Current Issues in Molecular Biology*, *44*(5), 1901–1927. https://doi.org/10.3390/cimb44050130

Pevec, D.R., Novinscak, T., Brcic, L., Sipos, K., Jukic, I., Staresinic, M., Mise, S., Brcic, I., Kolenc, D., Klicek, R., Banic, T., Sever, M., Kocijan, A., Berkopic, L. Radic, B., Buljat, G., Anic, T., Zoricic, I., Bojanic, I., Seiwerth, S., & Sikiric, P. (2010). Impact of pentadecapeptide BPC 157 on muscle healing impaired by systemic corticosteroid application. *Medical Science Monitor*, *16*(3), BR81–BR88. https://medscimonit.com/abstract/index/idArt/878454

Sikiric, P., Seiwerth, S., Grabarevic, Z., Rucman, R., Petek, M., Jagic, V., Turkovic, B., Rotkvic, I., Mise, S., Zoricic, I., Konjevoda, P., Perovic, D., Simicevic, V., Separovic, J., Hanzevacki, M., Ljubanovic, D., Artukovic, B., Bratulic, M., Tisljar, M., & Rekic, B. (1997). Pentadecapeptide BPC 157 positively affects both non-steroidal anti-inflammatory agent-induced gastrointestinal lesions and adjuvant arthritis in rats. *Journal of Physiology-Paris*, *91*(3-5), 113–122. https://doi.org/10.1016/s0928-4257(97)89474-0

Sikiric, P., Seiwerth, S., Rucman, R., Kolenc, D., Batelja Vuletic, L., Drmic, D., Grgic, T., Strbe, S., Zukanovic, G., Crvenkovic, D., Madzarac, G., Rukavina, I., Sucic, M., Baric, M., Starcevic, N., Krstonijevic, Z., Lovric Bencic, M., Filipcic, I., Stancic

Rokotov, D., & Vlainic, J. (2016). Brain-gut Axis and pentadecapeptide BPC 157: theoretical and practical implications. *Current Neuropharmacology*, *14*(8), 857–865. https://doi.org/10.2174/1570159x13666160502153022

Sikiric, P. Skrtic, A., Gojkovic, S., Krezic, I., Zizek, H., Lovric, E., Sikiric, S., Knezevic, M., Strbe, S., Milavic, M., Kokot, A., Boban-Blagaic, A., & Seiwerth, S. (2021). Gastric pentadecapeptide BPC 157 in cytoprotection to resolve major vessel occlusion disturbances, ischemia-reperfusion injury following Pringle maneuver, and Budd-Chiari syndrome. *World Journal of Gastroenterology*, *28*(1), 23–46. https://doi.org/10.3748/wjg.v28.i1.23

Sikiric, P., Gojkovic, S., Krezic, I., Smoday, I.M., Kalogjera, L., Zizek, H., Oroz, K., Vranes, H., Vukovic, V., Labidi, M., Strbe, S., Baketic Oreskovic, L., Sever, M., Tepes, M., Knezevic, M., Barisic, I., Blagaic, V., Vlainic, J., Dobric, I., Staresinic, M., Skrtic, A., Jurjevic, I., Blagaic, A.B., & Seiwerth, S. (2023). Stable gastric pentadecapeptide BPC 157 may recover brain–gut axis and gut–brain axis function. *Gut and Liver*, *16*(5), 676–676. https://doi.org/10.3390/ph16050676

Staresinic, M., Sebecic, B., Patrlj, L., Jadrijevic, S., Suknaic, S., Perovic, D., Aralica, G., Zarkovic, N., Borovic, S., Srdjak, M., Hajdarevic, K., Kopljar, M., Batelja, L., Boban-Blagaic, A., Turcic, I., Anic, T., Seiwerth, S., & Sikiric, P. (2003). Gastric pentadecapeptide BPC 157 accelerates healing of transected rat Achilles tendon and in vitro stimulates tendocytes growth. *Journal of Orthopaedic Research*, *21*(6), 976–983. https://doi.org/10.1016/s0736-0266(03)00110-4

U.S. Food and Drug Administration (2024). *Substances in Compounding that May Present Significant Safety Risks*. https://www.fda.gov/drugs/human-drug-compounding/certain-bulk-drug-substances-use-compounding-may-present-significant-safety-risks

Vukojević, J., Vrdoljak, B., Malekinušić, D., Siroglavić, M., Milavić, M., Kolenc, D., Boban-Blagaić, A., Batelja, L., Drmić, D., Seiverth, S., & Sikirić, P. (2020). The effect of pentadecapeptide BPC 157 on hippocampal ischemia/reperfusion injuries in rats. *Brain and Behavior*, *10*(8). https://doi.org/10.1002/brb3.1726

Vukojević, J., Milavić, M., Perović, D., Ilić, S., Zemba Čilić, A., Đuran, N., Štrbe, S., Zoričić, Z., Filipčić, I., Brečić, P., Seiverth, S., & Sikirić, P. (2022). Pentadecapeptide BPC 157 and the central nervous system. *Neural Regeneration Research*, *17*(3), 482–487. https://doi.org/10.4103/1673-5374.320969