

Hypothesis on the Neuroreflex mechanism of blood pressure correction

José Palomar Lever, Mikhail Zabrodin, Lina L Kuznetsova

Narrative: We present the hypothesis underpinning our new, innovative, non-pharmacological method of neuroreflex therapy for arterial hypertension (AH).

The purpose of this publication is to present the scientific rationale for testing the hypothesis that correction of sensory afferentation using the P-DTR method can lead to a sustained reduction in BP in patients with essential hypertension. Rigorous randomised controlled trials designed to evaluate its efficacy and safety are necessary to validate this approach.

This hypothesis is testable and meets the criteria of novelty, offering a new perspective on the therapeutic modulation of the neurogenic component of AH.

Indexing terms: Chiropractic; Arterial hypertension; neurogenic mechanism; P-DTR; neuroreflex method.

Introduction

Arterial hypertension (AH) remains a leading cause of preventable mortality and disability worldwide, serving as a key risk factor for cardiovascular, cerebrovascular, and renal diseases. Current clinical guidelines, including those from the WHO, are primarily based on pharmacotherapy, which has proven effective in reducing blood pressure (BP) and its associated complications. (1)

However, being largely symptomatic, standard therapy often requires lifelong use and can be associated with side effects and issues of treatment adherence. This highlights an unmet need for developing strategies targeting the pathophysiological mechanisms underlying BP dysregulation.

One such promising mechanism is considered to be impaired neurogenic regulation. Growing evidence suggests that dysfunction of afferent signalling from various peripheral receptors, including baro-, chemo-, and mechanoreceptors, may play a key role in the pathogenesis of AH.

... We hypothesise that distorted sensory information leads to the formation of maladaptive efferent commands by the central nervous system (CNS). This, in turn, causes a sustained increase in BP ...'



Hypothesis

We hypothesise that distorted sensory information leads to the formation of maladaptive efferent commands by the central nervous system (CNS). This, in turn, causes a sustained increase in BP, mediated by, among other things, chronic hyperactivation of the sympathetic nervous system (SNS).

In line with this hypothesis, the P-DTR (Proprioceptive-Deep Tendon Reflex) method, developed by Jose Palomar, (2) can be considered as an approach for neuromodulation of these disorders.

The theoretical basis of the P-DTR method is the diagnosis and correction of peripheral sensory receptor dysfunctions aimed at normalising afferent input. We hypothesise that such correction may contribute to the restoration of physiological BP regulation patterns by the CNS.

Unlike many manual methods, including its foundational kinesiology, as well as osteopathy or massage, which often focus on biomechanical adjustments, P-DTR is positioned as a method aimed directly at normalising sensory input. This theoretical distinction suggests that P-DTR could target a deeper link in the pathogenetic chain of AH, potentially capable of providing a long-term effect. Nevertheless, there is currently no evidence base confirming the effectiveness of P-DTR in treating AH.

The purpose of this publication is to present the scientific rationale for testing the hypothesis that correction of sensory afferentation using the P-DTR method can lead to a sustained reduction in BP in patients with essential hypertension. Rigorous randomised controlled trials designed to evaluate its efficacy and safety are necessary to validate this approach.

The Neurogenic Model of Hypertension:

From Classical Physiology to a modern therapeutic hypothesis

The neurogenic model of AH, which posits a key role of dysregulation by CNS, has deep historical roots. Experiments by Claude Bernard in the 19th century, which first demonstrated that brainstem lesions could increase AP, laid the foundation for understanding central control of vascular tone (cited in Ben-Sasson, (3) and Modell H (4)). This concept was further developed in the works of Walter Cannon, (5) who described the role of the SNS in maintaining homeostasis. Research on the baroreflex arc conducted by Carl Ludwig, Henry Pickering Bowditch, and Corneille Heymans also made significant contributions, as noted by Sudakov. (6)

In the 20th century, the contributions of GF Lang (7) and AL Myasnikov (8) helped formulate the concept of AH as a disorder of regulation, initially arising as a neurosis of the higher nervous centres. According to this concept, chronic psycho-emotional stress leads to persistent hyperactivation of the SNS, which is confirmed by modern direct measurements of neural activity (micro-neurography), (9) showing increased sympathetic tone in patients with essential hypertension.

The key link in this chain is impaired sensory afferentation. Reduced baroreceptor sensitivity, as a classic example, leads to inadequate feedback and the formation of maladaptive efferent commands by the CNS. This process is exacerbated by chronic stress, where hyperactivity of the amygdala and weakened control from the prefrontal cortex create a vicious cycle that sustains the activation of the hypothalamic-pituitary-adrenal axis and the SNS. The consequences include not only a direct vasoconstrictor effect but also mediated effects on the kidneys (increased renin secretion, sodium retention), thereby integrating neurogenic and humoral mechanisms in the pathogenesis of AH.

Thus, the SNS acts as an integral driver of AH, making it an attractive therapeutic target. However, existing pharmacological approaches to sympathetic blockade are often non-selective and associated with side effects. This justifies the search for non-pharmacological methods capable of targeted neuromodulation.

We hypothesise that the P-DTR method may represent such an approach. Unlike manual methods focused on biomechanical adjustments, P-DTR focuses on diagnosing and correcting dysfunctions of peripheral sensory receptors, including proprioceptive ones. The theoretical basis is the principle that distorted sensory afferentation leads to the formation of erroneous motor and autonomic responses by the CNS. The method uses manual muscle testing as a functional indicator of the nervous system's state, and subsequent specific stimulation of receptors aims to normalise afferent input.

The hypothesis requiring testing is as follows:

Correction of impaired afferent signalling using P-DTR can modulate maladaptive sympathetic activity, leading to a sustained reduction in AP in patients with essential hypertension.

This assumption is based not on a direct continuation of the work of classical physiologists, but on a modern understanding of neuroplasticity and the role of sensory input in the regulation of autonomic functions. Rigorous clinical studies are necessary to test it, designed to objectively evaluate both the method's efficacy and its proposed neurophysiological mechanism of action.

Conclusion

The presented hypothesis proposes a paradigm shift in the approach to treating AH, moving from palliative blood pressure control towards correcting its underlying neurogenic mechanisms. We postulate that a key pathogenetic link is impaired afferent signalling, leading to maladaptive sympathetic activation. The P-DTR method is presented as a potential tool for the targeted neuromodulation of this process by correcting dysfunctional sensory information.

The theoretical rationale for the hypothesis relies on well-established principles of neurogenic circulatory regulation and the role of the sympathetic nervous system in the pathogenesis of AH. Unlike existing non-pharmacological approaches, P-DTR focuses on the primary link in pathogenesis, normalising afferent input, which could potentially restore physiological regulatory patterns from the CNS.

To date, there are no published data from randomised controlled trials (RCTs) dedicated to the application of P-DTR for BP correction. The main challenges for conducting such studies are the novelty of the method, the lack of standardised protocols, and the need for specialised practitioner training. Despite these difficulties, the growing international spread of the method creates an opportunity for its independent validation.

Thus, this hypothesis is testable and meets the criteria of novelty, offering a new perspective on the therapeutic modulation of the neurogenic component of AH. To translate this concept from the realm of theoretical assumptions into the sphere of evidence-based medicine, rigorously designed RCTs are critically needed. We call upon the scientific community to consolidate efforts in organising such studies, which should aim to assess both the clinical efficacy of the P-DTR method in reducing BP and its impact on objective markers of sympathetic activity.

Recently, there has been a noticeable increase in interest in neurogenic mechanisms for blood pressure correction. These include renal sympathetic denervation, experimental research on the baroreceptor mechanism of the coronary sinus, multi-channel stimulation of the carotid sinus afferent nerve, direct interaction of bradykinin B1 receptors with the classical angiotensin type 1 receptor, among others.

Lina Leonidovna Kuznetsova

MD

Deputy Director for Research

Mikhail Zabrodin's P-DTR School

Russia

[https://p-dtr.org/
llkuznetsova@mail.ru](https://p-dtr.org/llkuznetsova@mail.ru)

Mikhail Zabrodin

MD

Traumatologist-orthopedist,

Chiropractor, Kinesiologist

Medical lawyer

Mikhail Zabrodin's P-DTR School

Russia

<https://p-dtr.org/>

José Palomar Lever

MD

ICAK kinesiologist Mikhail

Zabrodin's P-DTR School

Russia

<https://p-dtr.org/>

Cite: Palomar JL, Zabrodin M, Kuznetsova LL. Hypothesis on the Neuroreflex mechanism of blood pressure correction. *Asia-Pac Chiropr J.* 2026;6.4. <https://apcj.net/Papers-Issue-6-4/#PalomarHypothesis>

References

1. Visseren FLJ, Mach F, Smulders YM, Carballo D, Koskinas KC, Bäck M, et al. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. *Eur Heart J.* 2021;42(34):3227-337. Available from: <https://doi.org/10.1093/eurheartj/ehab484>
2. Ben-Sasson Sh, Ham-Moses R, Meizels E. *Illyustrirovannaia fiziologiya* [Illustrated Physiology]. Zinchuk V.V., editor of Russian translation. Moscow: BINOM. Laboratoriia znaniy; 2020. 224 p. Russian.
3. Modell H, Cliff W, Michael J, McFarland J, Wenderoth MP, Wright A. A physiologist's view of homeostasis. *Adv Physiol Educ.* 2015;39(4):259-66. DOI 10.1152/advan.00107.2015.
4. Cannon WB. *The Wisdom of the Body*. 2nd ed., rev. and enl. New York: W. W. Norton & Company; 1939. 333 p. Sudakov K.V., Slugin V.S. *Fiziologiya serdtsa* [Physiology of the Heart]. Moscow: Meditsinskoe Informatsionnoe Agentstvo; 2015. 408 p. Russian.
5. Sudakov, K. V., & Slugin, V. S. (2015). *Fiziologiya serdtsa* [Physiology of the Heart]. Meditsinskoe Informatsionnoe Agentstvo, 2015. 408 p. Russian.
6. Lang G.F. *Gipertonicheskaia bolezn'* [Hypertension]. Leningrad: Medgiz; 1950. 496 p. Russian.
7. Myasnikov A.L. *Gipertonicheskaia bolezn'* [Hypertension]. Moscow: Medgiz; 1954. 892 p. Russian.
8. Schmidt R., Thews G., editors. *Fiziologiya cheloveka* [Human Physiology]. 3rd ed. Kobrin V.I., Alipov N.N., Kostiuk P.G., editors of Russian translation. Moscow: Mir; 2005. Vol. 1. 323 p. Russian.
9. Tawakol A, Ishai A, Takx RAP, et al. Relation between resting amygdalar activity and cardiovascular events: a longitudinal and cohort study. *Lancet.* 2017;389(10071):834-45. DOI 10.1016/S0140-6736(16)31714-7.
10. Guyton AC, Hall JE. *Meditsinskaia fiziologiya* [Medical Physiology]. Kobrin VI, editor of Russian translation. Moscow: Logosfera; 2008. 1296 p. Russian.
11. Grassi G. Sympathetic neural mechanisms in hypertension. *Circ Res.* 2024;134(8):965-80. DOI 10.1161/CIRCRESAHA.124.323515.
12. Karpov IuA, Sorokin EV. Rol' renin-angiotenzin-aldosteronovoi sistemy v serdechno-sosudistom kontinuumе [The role of the renin-angiotensin-aldosterone system in the cardiovascular continuum]. In: Karpov IuA, Sorokin EV, editors. *Profilaktika serdechno-sosudistykh zabolevaniy v real'noi klinicheskoi praktike* [Prevention of cardiovascular diseases in real clinical practice]. Moscow: Media Sfera; 2018. p. 45-62. Russian.
13. Palomar Lever KH, Svet MS. Sposob diagnostiki i vosstanovleniia refleksornoj myshechnoi aktivnosti [Method for diagnosis and restoration of reflex muscle activity]. Russian Federation patent RU 2722402. 2020 May 29. Available from: <https://fips.ru/iiss/document.xhtml?faces-redirect=true&id=ac91f1ee47814b8995f7f537cd0739b3>
14. Sechenov IM. *Refleksy golovnogo mozga* [Reflexes of the Brain]. Moscow: AST; 2020. 320 p. Russian.
15. Pavlov IP. *Lektsii o rabote bol'shikh polusharii golovnogo mozga* [Lectures on the work of the cerebral hemispheres]. Leningrad: Izd-vo AN SSSR; 1927. Russian.

16. Sherrington CS. The Integrative Action of the Nervous System. New York: Charles Scribner's Sons; 1906.
17. Bernstein NA. O postroenii dvizhenii [On the Construction of Movements]. Moscow: Medgiz; 1947. Russian.
18. Kendall HO, Kendall FP, Wadsworth GE. Testirovanie i funktsiia myshts [Muscle Testing and Function]. Frederiks K, editor of Russian translation. 2nd ed. Baltimore: The Williams & Wilkins Company; 1971. 326 p. Russian.

About the authors

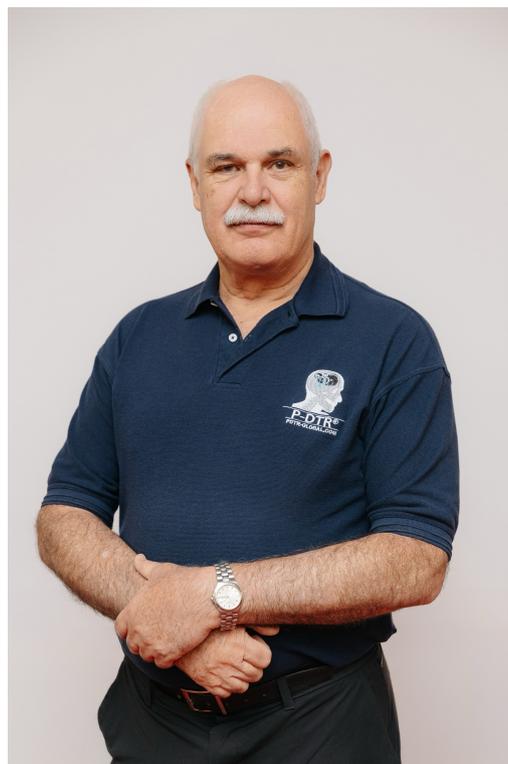
Palomar J.L., MD

Author of the P-DTR method, orthopaedic traumatologist, vertebrologist surgeon, neurologist, ICAK kinesiologist

Dr. José Palomar Lever was born in the capital of the Mexican state of Jalisco – Guadalajara. At the age of 17, he began to study medicine at the Autonomous University Guadalajara, Universidad Autónoma de Guadalajara (UAG) and passed, in addition, Orthopaedic Surgery and Traumatology Course at the University of the Army and Air Force, Universidad del Ejercito y Fuerza Aérea (UDEFA). From 1984 to 1988, José Palomar was an orthopaedic surgeon at the Institute of Reconstructive and Plastic Surgery in Jalisco and later completed specialised training in minimally invasive spine surgery at the Texas Back Institute in Dallas.

Currently, in addition to his research work, Dr. Palomar teaches P-DTR method in Russia and Europe.

Doctor Jose Palomar Lever is a native of Guadalajara, the capital city of the state of Jalisco in Mexico. He began his medical school education at the age of 17 at the Universidad Autónoma de Guadalajara (UAG) and received his training in Orthopaedic Surgery and Traumatology at the Universidad del Ejercito y Fuerza Aérea (UDEFA). He performed his first orthopaedic surgery at the age of 24 and between 1984 and 1988 he was an orthopaedic surgeon on the staff of the Reconstructive and Plastic Surgery Institute of Jalisco, S.S.A. He went on to receive specialised training in minimally invasive spine surgery at the Texas Back Institute in Dallas, Texas. Pursuing his interest in what he now refers to as the “software” of the human body, a study, which began in earnest for him in 2000, Dr. Palomar became a Diplomate in Applied Kinesiology from the International College of Applied Kinesiology (ICAK). He received the organisation's Alan Beardall Memorial Award for Research for 2004-2005 and over the years has had eighteen papers accepted for inclusion in ICAK-USA Proceedings. He also completed the Carrick Institute for Graduate Studies program in Clinical Neurology. Today, in addition to pursuing an ongoing research program, Dr. Palomar conducts regular trainings in Proprioceptive – Deep Tendon Reflex (P-DTR) for medical practitioners in the United States, Russia, Mexico, Latvia and Ukraine, and continues to practice medicine from his home base in Guadalajara, Mexico.



Mikhail Zabrodin, MD

Traumatologist-orthopedist, Chiropractor, Kinesiologist, Medical lawyer.
Teacher at Mikhail Zabrodin's P-DTR School.

He has more than 20 years of experience in traumatology and orthopedics, of which 10 years he is the head of the department.

Author of two patents, more than 35 articles. He has written 2 books on the P-DTR method.



Kuznetsova L.L., MD

Lina Leonidovna Kuznetsova (Nizhny Novgorod) graduated with honours from the Gorky Medical Institute, then completed her clinical residency clinical postgraduate studies in the Department of Nervous Diseases. She headed the scientific department of preventive angioneurology and later defended her Doctor of Sciences dissertation (Dr. hab.).

She has been involved in holistic medical methods – homeopathy and P-DTR. She is currently the Scientific Director of Mikhail Zabrodin's P-DTR School. She has co-authored two books on the P-DTR method.

