

# Autonomic Asymmetry and Right-Sided Tension Patterns: Implications for Manual Therapy in Stress-Related Musculoskeletal Disorders

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## Abstract

This commentary explores the concept of autonomic asymmetry – particularly the role of rightward hemispheric dominance in maintaining heightened sympathetic tone – and how it may contribute to lateralised tension patterns in the body. Drawing on long-term clinical observations by the author, developed over many years of osteopathic practice and during the creation of The Reaset Approach – a method prioritising body-centred autonomic regulation before addressing structural and functional somatic dysfunctions – recurring right-sided somatic dysfunctions were observed in patients presenting with suspected stress-related dysautonomia or autonomic lesions. These patterns align with theoretical models such as the Bihemispheric Autonomic Model, which links traumatic stress to hemispheric imbalance and prolonged autonomic dysregulation. If autonomic asymmetry indeed contributes to lateralised tension patterns in the body, this perspective could offer a valuable diagnostic lens – particularly for identifying stress-related musculoskeletal disorders rooted in dysautonomia or autonomic lesions. Recognising such patterns may help prevent treatment mismatch by distinguishing stress-related musculoskeletal disorders – those less likely to respond to conventional biomechanical interventions – from biomechanical disorders that do, thereby enabling a more effective therapeutic strategy to be initiated from the outset.

## 1. Introduction

The autonomic nervous system (ANS) regulates involuntary physiological functions, including, among others, cardiovascular, respiratory, and digestive processes. It also influences muscular tension, brain vascularisation, and function (Jänig, 2006). Traditionally viewed as operating symmetrically, recent research suggests a degree of lateralisation in autonomic control, with the right and left cerebral hemispheres exerting differential influences on sympathetic (SNS) and parasympathetic (PSNS) activities, respectively (Fontes et al., 2024). Understanding this asymmetry is clinically relevant for manual therapists, as it provides insights into the pathophysiology of various disorders and informs therapeutic strategies.

## 2. Somatic versus Autonomic Laterality

The brain's motor and sensory cortices exhibit contralateral control over the body – i.e., the left hemisphere controls the right side, and vice versa. However, this laterality does not extend to the autonomic nervous system. Both SNS and PSNS efferents tend to remain uncrossed. SNS fibres emerge from the thoracolumbar spine (T1–L2) and typically innervate ipsilateral structures. Similarly, PSNS outflow originates in the brainstem – via cranial nerves III, VII, IX, and especially X (vagus) – and in the sacral spinal cord segments S2–S4. These fibres primarily innervate target organs on the same side of the body, i.e., they act largely ipsilaterally. The exception is the vagus

nerve, that exerts bilateral influence in the thoracic and abdominal cavities (Bear et al., 2020; Jänig, 2006).

## 3. Hemispheric Influence on Autonomic Activity

Neuroimaging and lesion studies support the view that the left hemisphere is more involved in PSNS regulation, while the right hemisphere is more engaged in SNS arousal. Right insular lesions often reduce SNS tone, while left-sided lesions can impair PSNS function (Fontes et al., 2024). Sustained right hemispheric dominance – whether trait-based or as a state response to traumatic stress – may plausibly result in increased SNS tone on the right side of the body, due to the predominantly ipsilateral output of the ANS (Oppenheimer et al., 1992; Lee et al., 2014).

## 4. Clinical Observations of Right-Sided Tension in Stress-Related Disorders

From a manual therapy perspective, the hypothesis that right hemisphere SNS dominance contributes to heightened right-sided physiological arousal leads to several clinical considerations. This may manifest as:

- Increased muscle tone on the right side (e.g., trapezius, rhomboids, intercostals)
- Greater fascial tension or hypertonicity on the right
- Altered tension within the right abdominal cavity and lumbar area

Importantly, these patterns may not always respond to traditional biomechanical treatment approaches. When such lateralised tension is driven by unresolved autonomic (stress-related) dysregulation – rather than

muscle specific functional or structural problems – it may contribute to treatment resistance or recurrence of symptoms. This raises the possibility that autonomic asymmetry could serve not only as an explanatory model but also as an additional diagnostic cue to guide appropriate treatment selection and avoid mismatch between the underlying cause and the therapeutic method.

## **5. BHAM and the Hypothesis of Peripheral Autonomic Manifestation**

The Bihemispheric Autonomic Model (BHAM) offers a theoretical framework for understanding how traumatic stress can lead to asymmetrical brain activation and prolonged autonomic imbalance (Lee et al., 2014). According to BHAM, rightward hemispheric dominance represents an adaptive short-term response that, if sustained, may become maladaptive – contributing to chronic stress-related disorders and maladaptive coping behaviours.

While BHAM focuses on trauma-induced rightward dominance, it is important to consider that chronic and psychosocial stressors may also contribute to prolonged autonomic asymmetry. Persistent SNS activation in response to environmental pressures, unresolved emotional conflicts, or systemic stress can gradually shift a temporary state into a functional trait, reinforcing right hemisphere dominance and right-sided physiological tension. This further supports the need for clinical approaches that address both the psychophysiological state and the body's structural response to stress.

Given the widespread influence of the ANS throughout the body, it is plausible that such hemispheric dominance may also manifest peripherally, with functional changes appearing more prominently on one side than the other. This hypothesis resonates with clinical patterns observed by the author over many years of osteopathic practice and during the development of The Reaset Approach – a method that prioritises body-centred autonomic regulation before addressing structural and functional somatic dysfunctions (Meyers, 2014, 2019). In patients presenting with stress-related dysautonomia or suspected autonomic lesions, recurring right-sided tension patterns have been consistently noted. These include increased sensitivity or restriction in areas such as the right occiput and upper cervical spine (C0–C2), the maxillary region (particularly near the infraorbital foramen), the right thorax and abdomen, and the right psoas muscle.

While these observations are exploratory in nature, they raise important questions about the relationship

between hemispheric dominance, autonomic asymmetry, and lateralised somatic dysfunction. Further investigation into these patterns may contribute to the development of diagnostic tools for identifying autonomic dysfunction within manual therapy practice and inform more targeted and effective treatment strategies. This is particularly relevant in cases of stress-related musculoskeletal disorders, where dysautonomia or underlying autonomic lesions may be contributing factors. Such conditions often do not respond adequately to conventional biomechanical models, highlighting the need for an integrated approach that considers autonomic regulation as a central component of care.

In this light, recognising autonomic asymmetry in musculoskeletal presentations may help manual therapists distinguish cases more likely to benefit from autonomic-centred interventions as a first step, before applying biomechanical approaches. Integrating this lens could reduce ineffective treatments and support more accurate therapeutic targeting.

## **6. Conclusion**

Autonomic asymmetry presents a clinically relevant framework through which persistent, lateralised musculoskeletal tension patterns may be interpreted – particularly in individuals presenting with stress-related dysautonomia or autonomic lesions. The uncrossed nature of autonomic outflow, coupled with hemispheric dominance, offers a potential explanation for observed right-sided dysfunctions in chronic SNS arousal.

Over years of clinical practice and development of The Reaset Approach, patterns of right-sided tension – affecting the cranial base, thorax, abdomen and pelvis area – have emerged repeatedly in patients with autonomic imbalance. While these findings are anecdotal, they align with recent neurophysiological insights and may contribute to an evolving clinical narrative.

Manual therapy approaches that prioritise body-centred autonomic regulation may be uniquely suited to address such imbalances. Continued interdisciplinary research is encouraged to validate these clinical insights and to deepen our understanding of the complex relationship between hemispheric regulation, the autonomic nervous system, and somatic expression. A practitioner-informed perspective, integrated with contemporary neuroscience, can help bridge the gap between research and therapeutic application. Moreover, it may offer a valuable diagnostic lens for recognising stress-related musculoskeletal disorders that stem from autonomic dysfunction – helping practitioners prevent treatment

mismatch and offer immediately a more effective therapeutic strategy.

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