Dynamic Chiropractic

CHIROPRACTIC (GENERAL)

# The Autonomic Nervous System: Part Two

The chiropractic profession has changed dramatically since I entered it. We now have a number of "specialists": chiropractic neurologists; orthopedists; radiologists; sports physicians; pediatricians; and followers of system techniques, to name a few. These specialists examine patients, make diagnoses, formulate treatment programs and treat patients in the light of their specialties.

If each performed a thorough history and examination, chronic hyperactivity of the innervating sympathetic pathways would be a prevailing theme in most of the clinical presentations, involving many tissues and organs. The problem in reality is that whatever the etiological or therapeutic implications, it appears that this widely shared feature of local, regional or segmental sympathetic hyperactivity is overlooked, dismissed or exaggerated because of the barriers and boundaries erected by specialization. We see this daily in the medical profession. Thus, the neurologist is not normally exposed to the orthopedic literature, nor the orthopedist to the radiologist, the radiologist to the sports physician, etc. Each discoverer of a sympathetic component seems therefore to regard it as peculiar to this or that disease within his or her area of specialization, rather than as part of a general theme or patient as a whole.

There are three classic scenarios that are seen in chiropractic offices involving the sympathetic nervous system:

1. Long-term or chronic hyperactivity of sympathetic pathways is deleterious to the end tissues, and may indeed have a rather general clinical expression and significance.

2. Clinical manifestations are determined by the organs or tissues that are innervated by the sympathetic neurons, each responding in its own way, even to the sympathetic vasoconstriction that may be the only common factor, i.e., an ephaptic event or transmission.

3. The high afferent input in selected sympathetic pathways may be related to neuromusculosketal dysfunction (subluxation), especially in the spinal and paraspinal regions of the spine.

A critical role, and one of the most important, with respect to the function of the sympathetic nervous system, rarely emphasized in textbooks or in classes, is its part in *ergotropic function*. This is the adjusting of circulatory, metabolic and visceral activities of the body according to postural, gait and musculoskeletal demand. From a chiropractic "postural and gait analysis" point of view, I offer this question: "When did you ever consider the sympathetic nervous system as a cause, result of, or compensation when looking at posture and gait?" *Forgotten Aspects of the Autonomic Reflexes* was the first part of this series, and this is yet another example you can add to your examination procedures immediately.

These adjustments include changes in cardiac output, distribution of blood flow by regulation of peripheral resistance, heat dissipation through the skin, and release of stored metabolites. These finite adjustments are of a systemic nature, yet they have a high degree of localization according to

site and amount of muscular activity. Obviously, the function of auto-regulation is important and often a dominant factor in these frequent and accurate adjustments.

For the sympathetic nervous system to perform its role, it must receive, directly (segmental afferent input) and indirectly (suprasegmental and higher centers), sensory input from the musculoskeletal system. From a chiropractic and biomechanical point of view, it would seem logical to consider that the sympathetic nervous system would be equally well-informed about strain/sprain injury or malfunction of some aspect of the neuromusculoskeletal system, and that there would be a major impact locally or segmentally if a segment of the vertebral column was involved. (You may want to review the synapses of the dorsal horn region of the cord.)

Here are some physiological indictors of the vast and varied responses of the sympathetic nervous system:

1. There are areas of hydrated skin associated with persistent low-grade sweat gland activity;

2. The segmental patterns of distribution of these aberrant areas vary greatly from patient to patient, but are significantly constant and reproducible for each person. ("intra," but not "inter," with respect to reliability when examining multiple patients, similar to most orthopedic tests).

3. Areas of sympathetic hyperactivity correlate well with segmental distribution when a patient has a history of musculoskeletal strain/sprain, trauma, or deep and superficial tenderness of paraspinal muscles.

4. Similar signs of sympathetic hyperactivity are found with visceral pathology in areas of referred pain and tenderness, segmentally related to the visceral pathology; a viscerosomatic reflex.

5. With the alteration in tone of the skin and muscle, the sympathetically hyperactive areas function differently from the normal areas; this can been seen and felt on most of the patients that present to a chiropractic office.

The Effects of the Sympathetic Nervous System - A Brief Overview

1. On skeletal muscle: The sympathetic innervation of skeletal muscle appears to have a direct augmentor effect on the energetics of the muscle. Sympathetic innervation is also involved in the development of contractures following trauma.

2. On peripheral sensory mechanisms: Overall, the effect of increased input in the sympathetic fibers innervating receptors is that of exaggerating their discharge, causing them to report a greater intensity of stimulation than is actually occurring, i.e., lowering the threshold of firing.

3. On the CNS: The influence of the sympathetic innervation seems an important and neglected area of neurophysiology, despite the obvious importance of the catecholamines in brain

function. There are numerous studies to show a variety of events including the following; behavioral changes, disappearance of established positive food-conditioned motor reflexes, alteration in the electrical activity of the hypothalamus, changes in the electrical activity of the visual regions of the cerebral cortex, the effect of sympathetic stimulations on the total brain, including the reticular formation, and the cerebellum may be under direct influence of the sympathetic nervous system. From this rather extensive (and by no means complete) list, one can see that the far-reaching effects of the sympathetic nervous system are vital to chiropractic, and that the chiropractic adjustment has a profound influence upon the structures the sympathetic nervous system influences.

4. On the collateral circulation: There appears to be an inverse relationship between the development of collateral circulation and sympathectomy, i.e., an increase in ateriovenous anastamoses, both in diameter and number.

5. On bone growth: Sympathetic innervation has been shown to exert an important influence on longitudinal bone growth, and possibly in collagen elaboration and matrix formation.

6. On adipose tissue: The sympathetic innervation is mandatory for the rapid lipolysis that takes place in the cold climate and for slower lipolysis in starvation situations. Metabolic response is delayed by the accompanying vasoconstriction of increased sympathetic activity.

7. On the reticuloendothelial system: As far back as 1953, Kuntz summarized the evidence then available that sympathetic innervation has important influences not only on blood flow through the blood-forming tissues, but also on such specific functions and factors as the phagocytic activity of the reticuloendothelial cells of bone marrow, on erythropoiesis, and on the release and distribution of leucocytes and on endothelial permeability.

8. On the endocrine system: Obvious to every chiropractor should be the effects of the sympathetic nervous system on this system. In the next article, I will deal with this more under the title of "Sympathetic Hyperactivity."

To summarize, one should remember that the diversity of the effects of stimulating various peripheral sympathetic pathways is not in the influences of the sympathetic neurons, but in the responses of the innervated tissues and organs. The responses are as varied as the tissues and organs which are innervated - virtually every tissue in the body. Sympathetic stimulation introduces no new qualities, but modifies (increases or decreases, accelerates or retards, stimulates or inhibits) the inherent functional properties of the target tissue, each, therefore, responding in its own manner.
In Part III, I will continue with the clinical implications of sympathetic hyperactivity.

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