

**"PRI Breathing Mechanics
in COVID Times"**

with Ron Hruska, MPA, PT
Every Tuesday at 6PM CT

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Restoration
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**WEEK 8:
SOMATOSENSORY PROCESSING OF
RESPIRATORY BASED RIGHT THORACIC
ROTATION AND EXPANSION**

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Humans have a need to process and organize sensory information for regulating desirable reproducible functional behavior.

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There are three primary patterns of sensory processing disorders; sensory modulated disorder, sensory-based motor disorder, and sensory discrimination disorder.

Each of these primary patterns of organizing disorders has underlying sensory processing impairments in one or more of the seven sensory systems: auditory, visual, gustatory, olfactory, somatosensory (which includes touch and proprioception), vestibular, and interoceptive.

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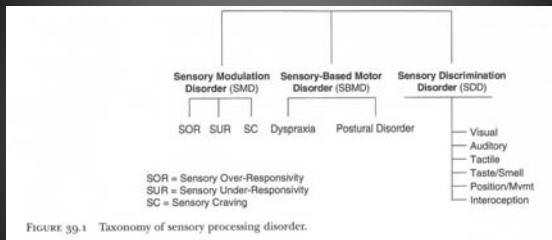


FIGURE 39-1 Taxonomy of sensory processing disorder.

Figure from: Stein BE. *The new handbook of multisensory processing*. 2012. MIT Press Books. Cambridge, Massachusetts.

Out of the three primary patterns, the sensory modulated disorder has the greatest influence on our ability to sense activity regulated by us, the producer of the movement.

There are three subtypes of this pattern behavior; sensory over responsiveness, sensory under responsiveness (which is a primary issue with those who overuse their right lateral respiratory muscle more during postural perturbation challenge), and sensory craving.

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Individuals with sensory under responsiveness are usually slow to respond to sensory events (right lateral chest wall expansion when standing or sitting with more weight distributed over the left hip and foot), have less intense responses than are typical (sense of expansion at the right lateral and superior chest walls and left posterior chest wall), and require more intense stimuli to respond to the demands of the situation (inhalation using left internal oblique, left transverse abdominis, left external intercostals, right external obliques and right internal intercostals).

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The second primary pattern, sensory-based motor disorder, relates to right thoracic rotation and refers to the associated difficulty stabilizing the left body and sequencing coordinated movements with the left body.

Individuals with this poor sense of “body” planning are assumed to be the result of inadequate processing and discrimination in one or more of the following sensory domains on the left side: visual, tactile, proprioceptive, and vestibular.

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The third primary pattern, sensory discrimination disorder, is characterized by problems interpreting or deriving meaning from sensations.

Tactile is knowing what is in one’s hands or under one’s hands without looking.

These individuals with this sensory disorder require slow processing of specific non-multiple sensory stimuli, preferably with the use of their hands.

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Somatesthesia

The perception of tactual, or proprioceptive, or gut sensation is called 'somatesthesia'.

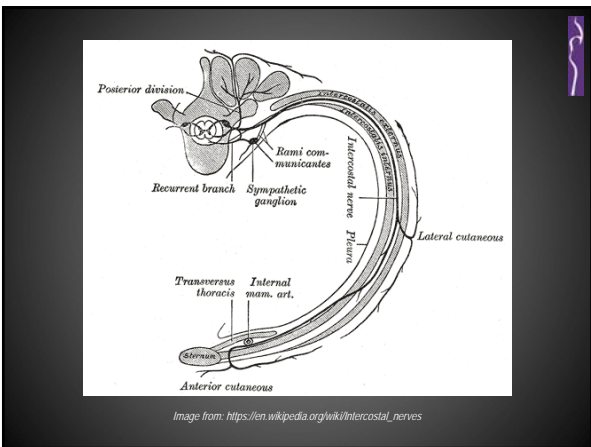
The intercostal nerves supply innervation to the skin and musculature of the chest and abdominal walls.

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Unlike the nerves from the autonomic nervous system that innervates the visceral pleura of the thoracic cavity, the intercostal nerves arise from the somatic nervous system.

This enables them to control the contraction of muscles, as well as provide specific sensory information regarding the skin and parietal pleura.

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Damage to the internal wall of the thoracic cavity can be felt as a sharp pain localized in the injured region.

Damage to the visceral pleura is experienced as an un-localized ache.

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The first two nerves supply fibers to the upper limb in addition to their thoracic branches; the next four are limited in their distribution to the walls of the thorax; the lower five supply the walls of the thorax and abdomen.

The 7th intercostal nerve terminates at the xyphoid process, at the lower end of the sternum.


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External Anterior Cutaneous Sensation

The anterior division of the first thoracic nerve divides into two branches: the larger, leaves the thorax in front of the neck of the first rib, and enters the brachial plexus; and the smaller branch, the first intercostal nerve, runs along the first intercostal space, and ends on the front of the chest as the first anterior cutaneous branch of the thorax.

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Brachial and anterior lateral chest wall expansion sensation depends on freedom of movement of the first rib and clavicle, and often sensation of expansion of this area on the right side is limited because of postural restricted movement of the first rib and clavicle.



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The 2nd through the 6th thoracic nerves pass forward in the intercostal spaces below the intercostal vessels.


At the back of the chest they lie between the pleura and the posterior intercostal membranes, then run between the internal intercostals and the innermost intercostals, and they end up lying between the anterior pleura and the internal intercostals.



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The fourth intercostal nerve is innervated by cutaneous slowly-adapting and rapidly-adapting mechanoreceptors, especially by ones densely-packed under the areola.

Innervation subsequently triggers oxytocin release, which, when in the peripheral bloodstream, causes myoepithelial cell contraction and expulsion of excreted glandular cell secretions and lactation. (This is an example of a non-nerve-innervation muscular reflex).



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Oxytocin is a hormone secreted by the posterior lobe of the pituitary gland.

It is known as the “cuddle hormone” or the “love hormone”, because it is released when people snuggle up or bond socially.

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The lateral cutaneous branches are all derived from the intercostal nerves, about midway between the vertebrae and sternum.

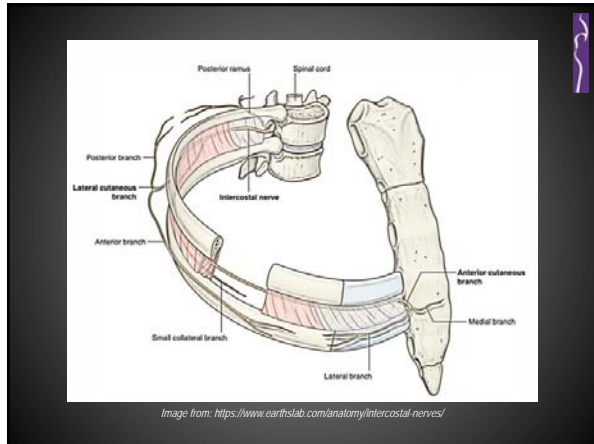
They pierce the external intercostals and the serratus anterior and then divide into an anterior and posterior branch.

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Lateral Cutaneous Branches

- > The anterior branches run forward to the side and the forepart of the chest and skin. The fifth and sixth nerves supply the upper digitations of the external oblique abdominals.
- > The posterior branches run backward, and supply the skin over the scapula and latissimus dorsi.

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Feeling of Body Ownership

Our self-identification of body parts is achieved by dynamic multisensory integration processes that occur from anatomical circuits that receive this somatesthesia and cutaneous sense at the occipital and anterior parietal lobes.

Projections from these areas into the intraparietal sulcus, inferior parietal cortex, and the premotor cortex also strengthen our body and limb ownership and performance.

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Placing one's own hand on the surface area of a chest wall enhances the necessary foundation for higher cognitive functions related to self-consciousness to emerge during respiration, but also strengthens the reflective self-awareness of the associated chest wall and parietal movement during breathing through body and hand autobiographical self-actualization.

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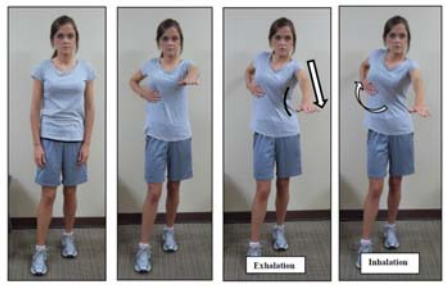
PRI Technique Considerations for Those Individuals Experiencing Lateral Chest Wall Sensory Under Responsiveness

Standing Left Centering with Right Thoracic Rotation, Left Rib Sensory Awareness and Exhalation Focus



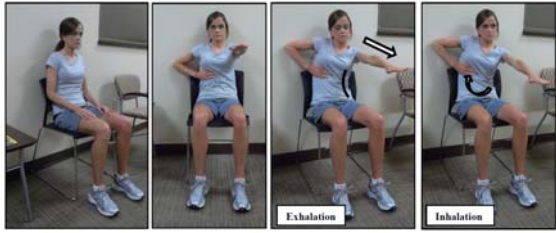
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Standing Left Centering with Right Thoracic Rotation, Bilateral Rib Sensory Awareness and Inhalation and Exhalation Integration



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Seated Right Thoracic Rotation with Bilateral Rib Sensory Awareness and Inhalation and Exhalation Integration



Exhalation Inhalation

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PRI Technique Considerations for Those Individuals Experiencing Poor Sense of Right Chest Wall Rotation During Left Body Stabilization

Standing Left Centering with Right Thoracic Rotation, Right Rib Sensory Awareness and Inhalation Focus



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