



BILATERAL RIB FLARES (Inferior T-8 Syndrome)

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The concept of a Superior T-4 syndrome is well understood within the PRI framework: Right-side scalene muscles increase their accessory respiratory activity in an effort to aid in R upper ribcage expansion and thus elevate/externally rotate the first two-to-three ribs on the R side. When R upper rib elevation occurs during R stance (L AIC, R BC obligatory pattern) the end-result is turning of the C-spine and upper T-spine back toward the R. This turning occurs in opposition to the strong leftward rotational force prevalent throughout the spine and ribcage as a result of the L AIC, R BC pattern. The orientation of the upper thoracic and cervical facet joints is what actually allows this transverse plane rotation to occur. So as the R ribs elevate, the spine actually can and does turn to the R.

The T-4 pattern is usually noticed sooner among a population of tall athletes with longer torsos. This is because the narrow, long ribcage coupled with demands for more oxygen (athlete) compels the athlete to develop compensatory strategies to enhance airflow into the apex of the lungs more-rapidly than the non-athlete or the athlete with a shorter torso. This is not to imply that only this body-type acquires T-4 syndromes. The T-4 syndrome is a compensatory pattern that can be adopted by anyone or any body-type.

Other body-types can develop different compensatory strategies for enhancement of airflow. An alternate compensatory strategy for certain individuals is the inferior T-8 syndrome. The T-8 syndrome is marked by a tendency to begin to flare the R lower ribs instead of elevating the R upper ribs. Many, but certainly not all, of these individuals tend to appear to be less narrow in the chest and are many times very classic PEC patients. The T-8 syndrome can aid in the facilitation of the PEC pattern and vice versa.

PEC patients have developed a compensatory mechanism for improving airflow by increasing lumbar lordosis, forwardly rotating the R innominate, elevating the anterior ribcage, flattening the T-spine and, in some cases, paradoxically breathing through expansion of the abdomen. These postural factors are facilitated by activation of erector spinae, quadratus lumborum and latissimus muscles and neuro-mechanical inhibition and disadvantaging of abdominal obliques bilaterally. This actually sets the stage for feed-forward enhancement of paradoxical breathing. Increased belly-breathing results in greater abdominal oblique disuse and gradually restricted expansion of the apical portions of the chest wall through increased pectoralis activation and shortening of intercostal muscles. As these PEC individuals continue to restrict bilateral apical expansion, the desire for greater inhalation becomes more significant.



This desire for more air is paradoxically satisfied as individuals begin to develop a flaring of the R lower ribcage in order to draw more air into the R chest cavity. Rib flaring is facilitated by inhibition of the opposing abdominal obliques and creates a scenario leading to further tightness of the upper ribcage, increased forward rotation of the R innominate (as a result of decreased R IO/TA activity), increased compression of the posterior lumbar spine coupled with greater activation of PEC musculature.

According to Fryettes' law, with elevation of R ribs, the spine should turn to the right. This is well-understood in the Superior T-4 syndrome. Likewise, as with the typical L AIC, R BC patient, as the entire L anterior ribcage externally rotates, the spine can and does rotate to the L. Clinical examination of R rib flares, widened sternal angles and even Harrison's Grooves reveals that most of the R rib flares occur from Rib 8 through Rib 10. These "false" ribs can move more easily than the "true" ribs above. Greater mobility is likely due to the increased amount of costal cartilage attachment to the sternum which allows greater false-rib flexibility. At the T-spine the false ribs attach at T8 down to T-10. External rotation of these ribs should cause R rotation of the lower T-spine at about the T-8 or 9 level (similar to the occurrence with a Superior T-4 scenario). However, there is little available rotation in this section of the T spine due to the vertical orientation of the spinal facet joints (this is accounted for in *Nordin and Frankel Basic biomenchanics of the musculoskeletal system second edition*). Most of the available motion in the T-8-and-lower region of the spine is in the saggital plane (flexion and extension). The dominant force taking place throughout the entire spine is the tri-planar effort to correct for the originally R-oriented pelvis and lumbar spine. Thus L counter-rotation and R convexity scoliosis is the norm. The end-result of R lower rib flaring, because of the orientation of the facets and subsequent lack of rotary mobility of the lower T-spine and L-spine, is greater spinal extension, with subsequent deepening of the lumbar lordosis and further enhancement of the pathomechanical compensatory strategy.