



# Spinal Fitness

## Physics Demonstration of the Sit Up

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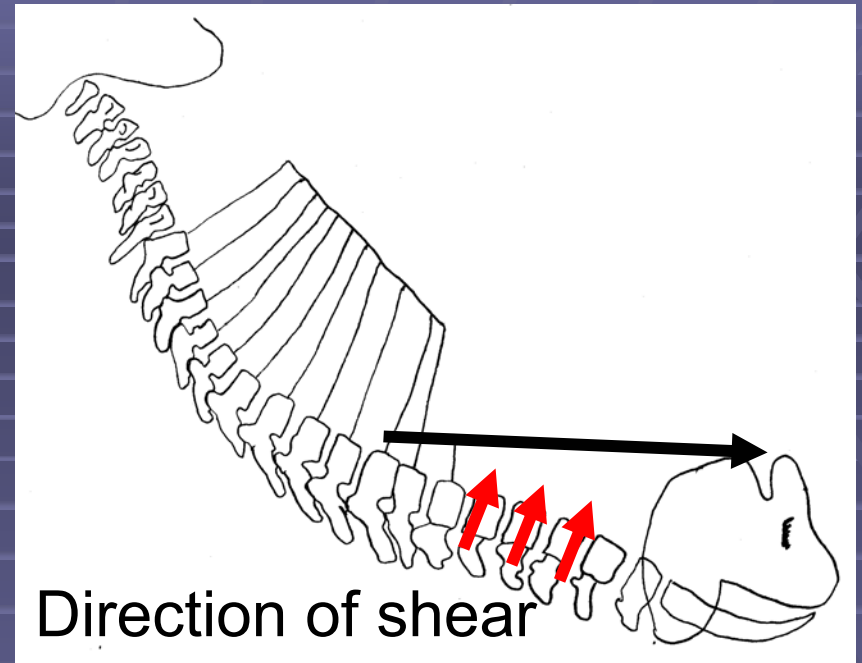
Athletic Spinal Fitness Institute

19321 NE 10th AVE

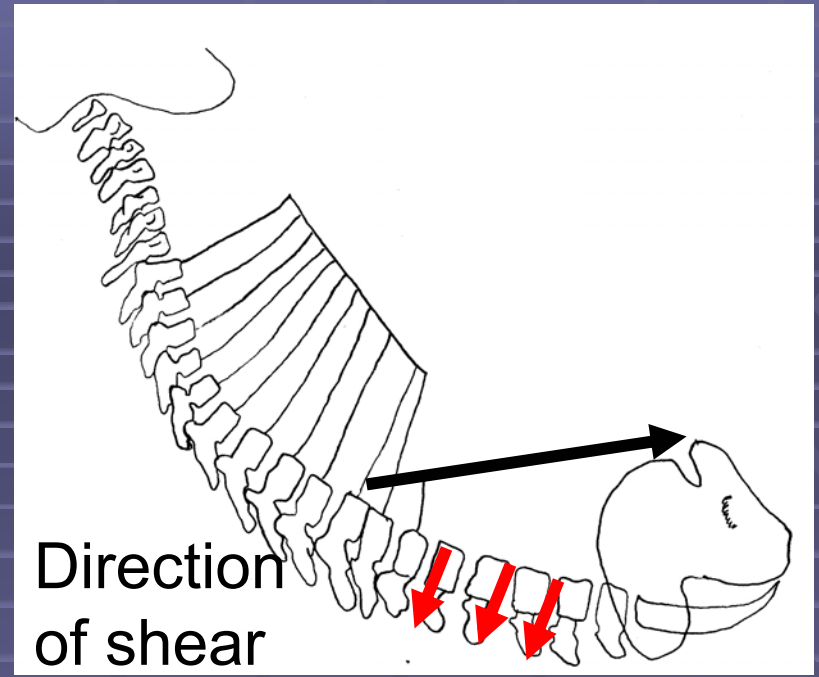
Ridgefield, WA 98642

(360) 887-8600

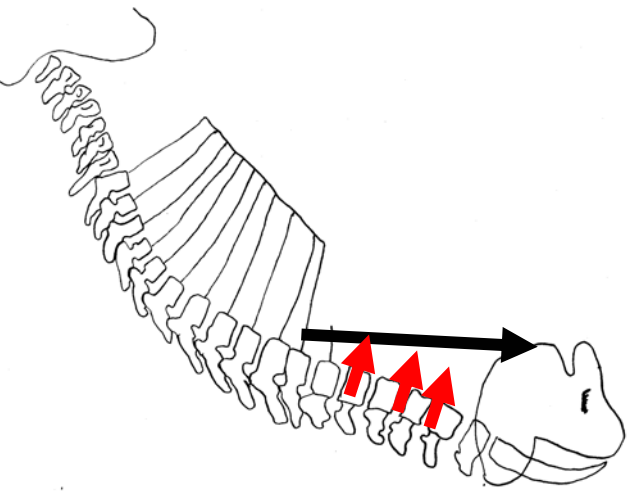
[www.spinalfitness.com](http://www.spinalfitness.com)



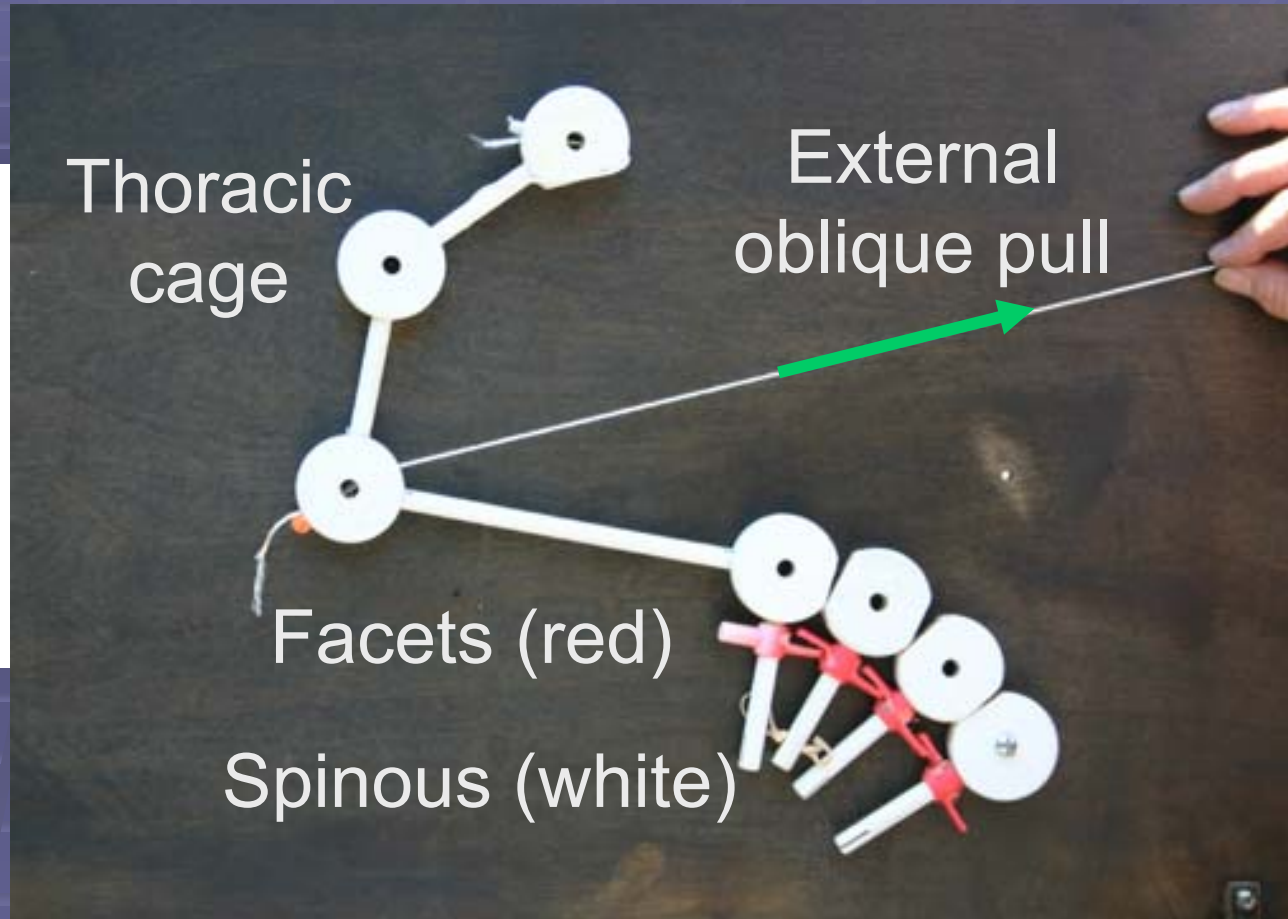
In our biomechanical studies of the abdominal muscular skeletal lever complex producing leverage to perform the sit up, we demonstrated that the proper curved spine produced the best mechanical advantage. We demonstrated that shear was to the anterior and was stabilized simply and effectively by the fixed bone facets.



The poor muscular skeletal system possessed shear that was to the posterior. This shear would cause dislocation of each vertebra at their fulcrum (joint) to the posterior in a downward direction. There was, however, no fixed method or other effective simple method of shear stabilization. Active stabilization via muscular co-contraction were necessary which also produced additional effort and forces created into the joints.



Direction of shear



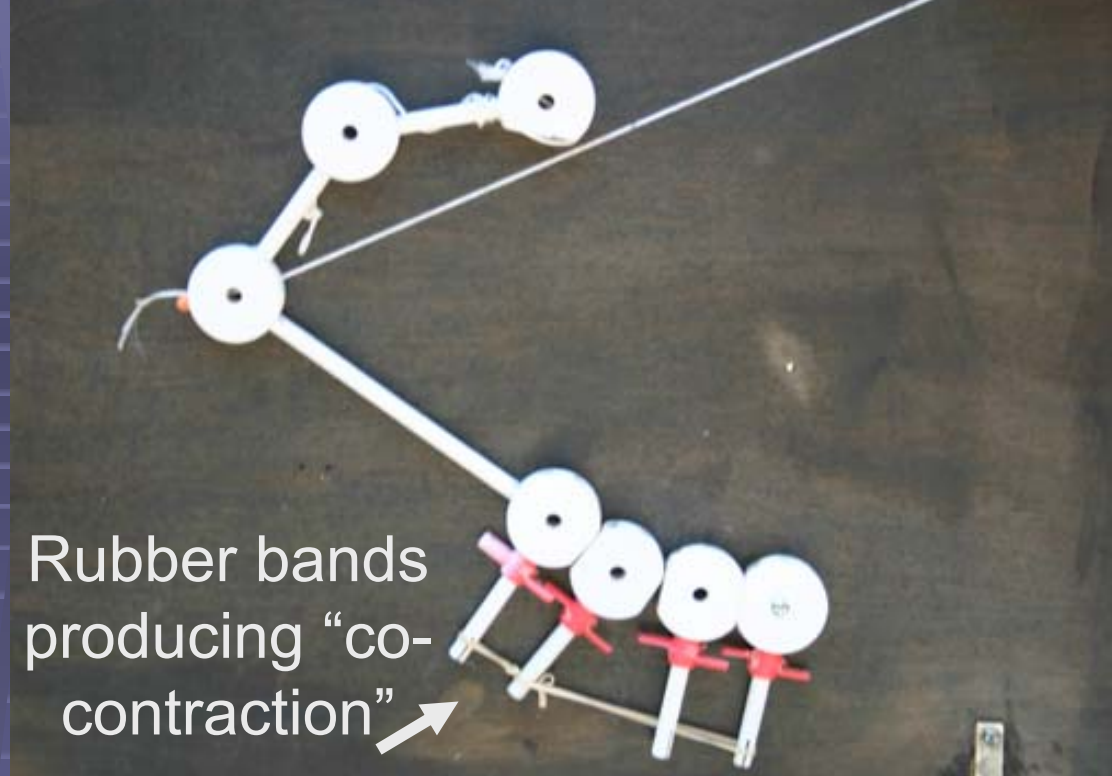
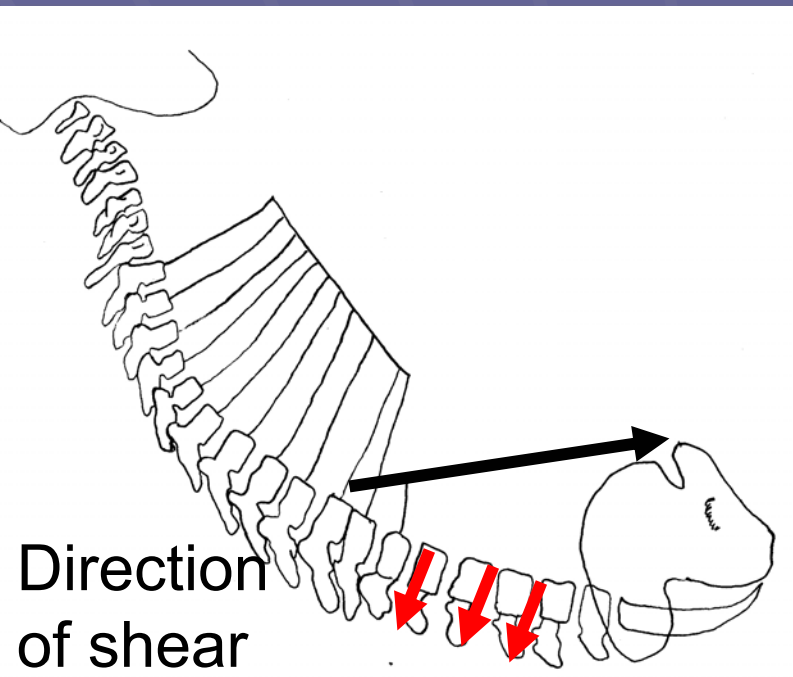
Thoracic cage

External oblique pull

Facets (red)

Spinous (white)

When lifting up the thoracic cage at each joint in the spine, shear created is anterior (upward) and is stopped by the lower facet of each upper vertebra being pushed and stabilized into the lower vertebrae's (including the sacrum) upper facet. This is a simple, stable position only requiring as much effort as needed by the external oblique to lift the upper body.



In this picture, the sit up is performed with a spine with poor posture. Notice rubber bands have been placed on the spinous processes to represent the necessary co-contraction that must create enough push upward to equal the initially created downward shear. This situation also creates more compression into each disc (fulcrum). This is why people with poor muscular skeletal abdominal complexes are weak, injury prone and subject to osteodegenerative back conditions.