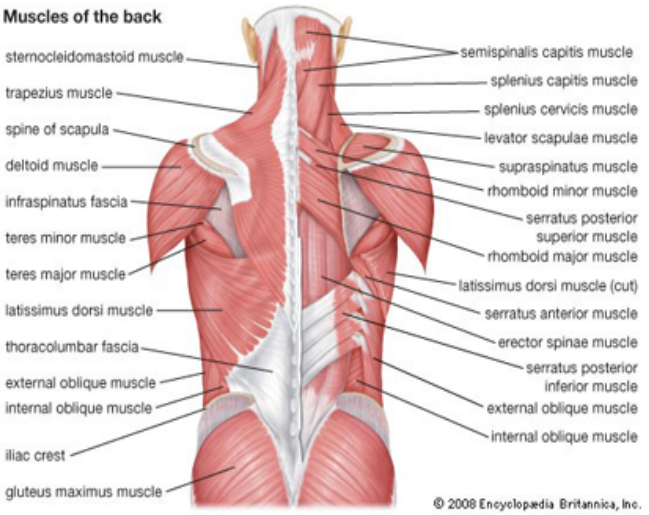
PART IV

THE SPINE:

A TOWER OF STRENGTH

In this chapter we will be focussing on the spine “in isolation” and will cover the ENTIRE musculo-skeleta inter-connection later.

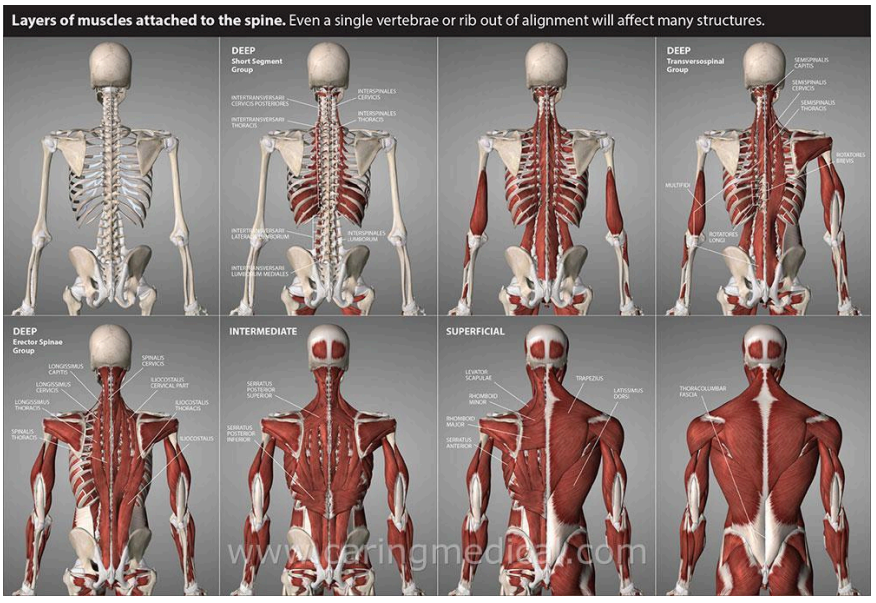
Introduction



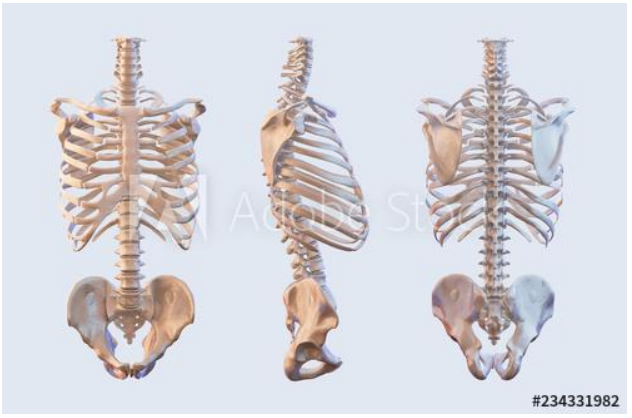
Approximately 400 muscles work together to stabilise your spine, maintain proper posture and allow movement. More than 1000 tendons connect these muscles to your bones. Ligaments are bands of connective tissue that attach bones to bones and help maintain stability and alignment.

The spine, a column of bones stacked on top of one another ?
Wrong !! The spine is a series of bones, but they form only part of the whole structure. Included in this “stack” are the *Sacrum [end of the spine which includes the coccyx]* and the *Ilium [the pelvis structure],* and up to the base of the skull.

To keep this complex arrangement of bones upright, balanced and supple, there are myriad and complex “long” muscles, ligaments and tendons “pulling” in various directions, complementing and “balancing” one another WITHOUT contending or “fighting” against the other, PLUS the many others that attach each unique section to the next or to other structures.

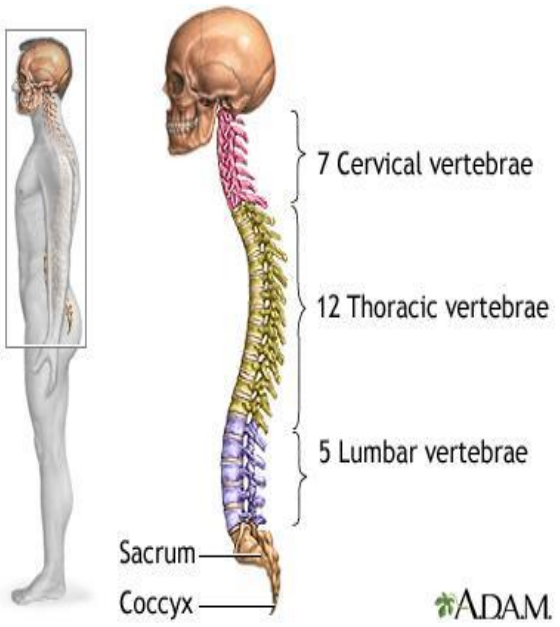


The 33 vertebrae, although individual structures, are cushioned and protected from one another by *cartilage* [the discs] whilst



connected by tendons and ligaments, forming an articulated structure that is able to move and flex in most directions to a certain degree. The bony protrubences, to the rear and sides of the vertebra, help protect the vertebra from impact injuries and over extension, and act as anchor points for the numerous muscles and tendons that support the spine and appendages. But they also provide obstructions or hindrances to EXCESSIVE bending to the back and sides. Protected within the vertebrae is the **spinal cord** [main nervous connection to all parts of the body – our fibre network].

The discs are “cushions” to protect the individual vertebrae from one another, to prevent any possibility of the spinal cord being “pinched” by the vertebrae, and also to allow the flexibility of the spine.



The curvature of the spinal column [5 – 7 curves, depending on how one counts] aids, through its counter-balancing curves, in keeping the body erect and yet both supple and strong. One must remember that most of the other skeletal / boney structures “hang” off the spiine, and are only connected with ligaments and tendons. The largest skeletal structure of the body is the *Iliac [Pelvis];* all other ‘members’ of the skeletal structure are only attached to one another by the ligaments and tendons.

The spine can bend forward further than it can backwards, due to the spinal processes which extend outwards [to the rear and side] of the vertebrae whilst there are no processes to the inward side of the spine. However, to keep the ligaments and muscles of the spine flexibile and resilient, we should not forget to stretch them both forwards and backwards and spirally, gently and as far as is comfortable without over-extending them].

Sadly, the spine is one part of the body which does not enjoy much attention as there are no “bulky” muscles associated with it, and yet, the entire body depends on the health of the spine.

When we maintain a “static” or a lazy, langourous lifestyle, our spines suffer from “lack of use” which can, sadly lead to many afflictions. The discs, of spongy, gelatinous

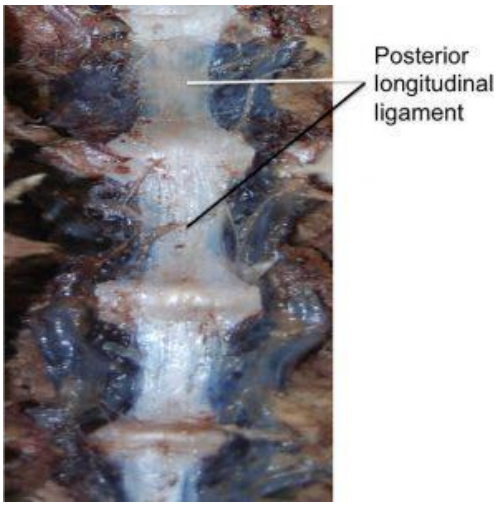
substance, act as cushions or shock absorbers between the vertebrae and facilitate bending without contact between the boney structures. Lack of use may result in them degenerating, calcifying, or any of a variety of other “break downs” which results in a dramatic lack of movement and mobility and, potentially, pain. The spine is designed to bend forwards and, to a lesser degree, rearwards, PLUS some flexibility to the sides. It is, however, NOT designed to spiral to any **extreme amount**, under stress, due to the structure of the bony protrubences along the posterior [back] of the vertebrae.

The Discs - By stretching upwards, one expands the disc space, and allows the discs to ‘expand’. Like “fluffing” a pillow: - By stretching **to the front**, the disc’s rearward part can expand, whilst the ‘inner’ is compressed. By stretching **backwards**, the front expands and the rear is compressed. By stretching **sideways**, the discs ‘expand’, AND the lateral muscles and ligaments of the torso are stretched, thus ensuring flexibility and elasticity to keep a mobile torso fully functional. Thus the disc is stretched in all possible directions without the pressure of bearing any “load”. If the discs degenerate excessively, the bone of the vertebra may touch, or may pinch the nerves, and result in dibilitating, and paralysing pain and lack of mobility of both the spine and all extremities that are connected, or anchored to the spine – our “central pillar” – resulting in a gradual “collapse” of the entire structure.

As in all the joints, gentle manipulation is essential for continued healthy joints, cartilage, ligaments and tendons. Uncontrolled or sudden violent manipulation of the spine, and all other joints, can result in severe injury which affects all physical activity.

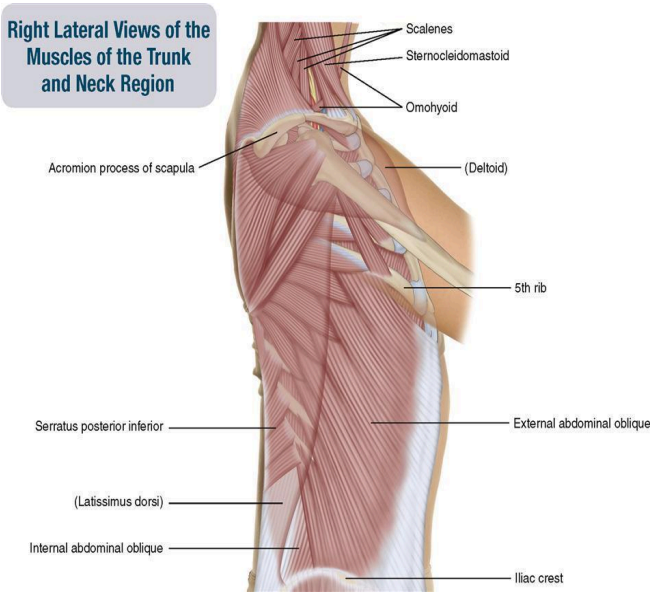
Spinal Ligaments / Muscles

The spinal column is held erect by an extensive system of ligments, tendons and long, stringy muscles. Their primary function being to keep the vertebra aligned with one another and able to flex in many directions, returning to “centre” on completion. [Illustration to the right and below]



Overlaid we find a number of “layers” of muscles which support the ribs, but allow flexibility, keeping the shoulders and scapula aligned, and also supporting and aligning the pelvic girdle and hips. [see illustration on page 1]

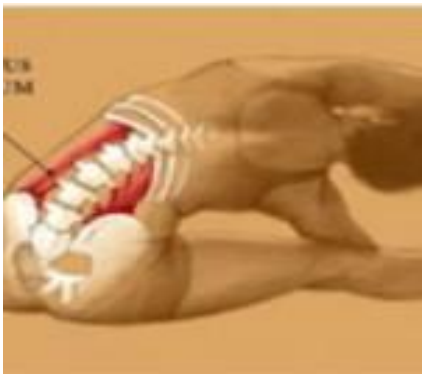
Along the sides of the torso are numerous “cross layered” thin muscles which aid in keeping the rib cage aligned and flexible, and also to support shoulder movement, and support the head and neck. [they are referred to as “obliques”]



All of these are interconnected and keep our torso and upper body aligned and vertical. HOWEVER, they are seldom “manipulated” sufficiently and will deteriorate with the passing of time, losing elasticity, resilience, ‘strength’, and alignment. One only has to see an elderly person, usually from the age of late 60s onwards, who has led a generally sedentary life-style with minimal physical activity, to see how the upper body / torso tends to “collapse” with the passing of time, and, eventually, the ability to walk comfortably is compromised and not possible without aids.

Dissecting the Parts of the Spine

Lower / Lumbar Spine



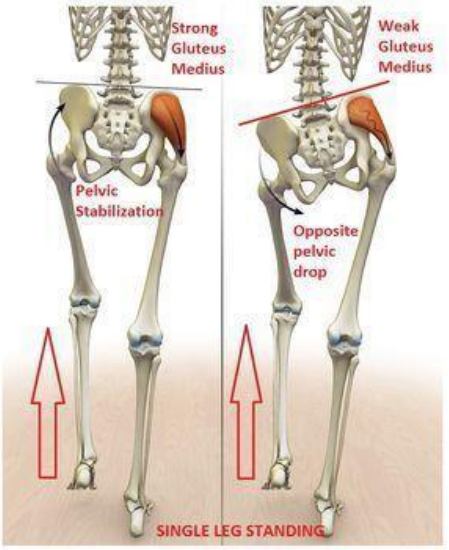
As we have mentioned in “The Hip”, the *lumbar spine* is an integral part of the hip / thigh combination and, thus, the art of motion. *[see illustration to the right]*

As most of us know, a painful lower back, caused by poor posture, sitting position, or over exertion, will directly affect our walking – in fact, most often, walking becomes painful. In the process we ‘favour’ one leg which promptly transfer the ‘misalignment’ and source of pain, to the other leg and even up the spine to the shoulders and neck. Conversely, a pain in any part of one leg will transpose into a *lumbar spine* discomfort resulting in exacerbated pain.

For physical therapy, yoga and Pilates to ‘work’, a person needs strong spinal ligaments. Strong spinal ligaments provide the resistance and resilience the spine and core muscles need to strengthen the core, provide stability, and make physical therapy more successful.

The muscles and ligaments that tend to get too tight and short, and may spasm, contribute to an unstable pelvis and lumbar spine, are the left and right *iliopsoas* and left *quadratus lumborum* muscles.

The muscles that tend to become too weak and let the pelvis and lumbar spine become more unstable are the *gluteus* muscles, the abdominal muscles and the hip abductor muscles.



One needs to stretch the muscles and ligaments that pull the pelvis and lumbar spine out of alignment (*iliopsoas and quadratus lumborum)* and strengthen the muscles that hold them in alignment (*gluteus, abdominal and hip abductors*). There are other muscles that become spasmed as a result of an unstable lumbar spine and pelvis, however they are usually compensating for the above.

Body mechanics that tend to create the above mentioned muscle imbalances are

- prolonged sitting, [especially hunched]
- repeated forward bending, using the back;
- sit-ups, [excessive or over-strained]
- over-working the *latissimus dorsi* muscles (including swimming) and
- bending backwards against resistance.

Sitting on a wallet can also contribute to an unstable/misaligned pelvis and lumbar spine

Why does this cause back pain?

The pelvis, being out of alignment, is the underlying cause of most neck and back pain. This may be as a result of standing for long periods with the weight on only one leg; an 'undetected' problem with either the hip, knee or foot on one side; carrying a heavy bag on one shoulder as a matter of habit; or a skeletal "misalignment" of the pelvis, shoulders or legs, even inherited *scoliosis*. The causes are many and varied, and isolating or addressing them is difficult UNLESS they are correctly identified and the appropriate 'treatment' followed.

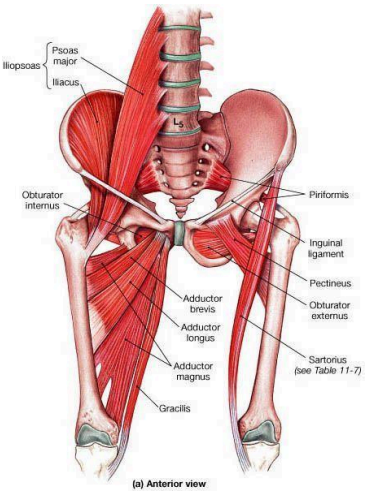
Having a level, stable pelvis with 'correct' alignment is key to avoiding back and neck pain as well as pain in related areas like *sciatica* and symptoms in the arms and hands. The pelvis is the foundation of the spine and the centre of gravity of the body. When body workers refer to "the core" they are really referring to the centre point of the pelvic girdle area.

Since the pelvis is the foundation of the spine it acts much like the foundation of other structures; for example, the foundation of a house. A pelvis that is out of alignment moves into an oblique, tipped position. When this foundation is tipped, it can cause the walls and ceiling to bend sideways, twist and crack. This is what happens to your spine when it is forced to compensate for a tipped, misaligned pelvis.

This misaligned pelvis causes the spine to bend sideways and rotate into a dysfunctional position causing joint dysfunction throughout the spine. Some professionals may refer to these dysfunctional joint positions as *subluxations*. This in

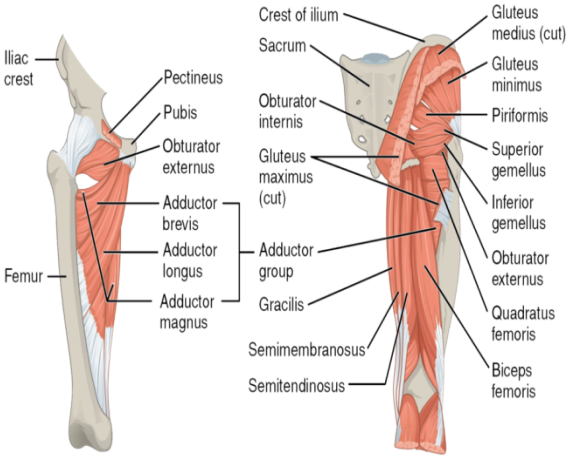
turn, causes the axis of motion to deviate. The “axis of motion” within the spine needs to be normal to be pain-free and healthy. You can think of the axis of motion much like the axle of an automobile.

When this axle is bent and the tires (much like the discs of the spine) are out of alignment it causes the tires to wear out much faster than normal and they may even rupture or blow out.



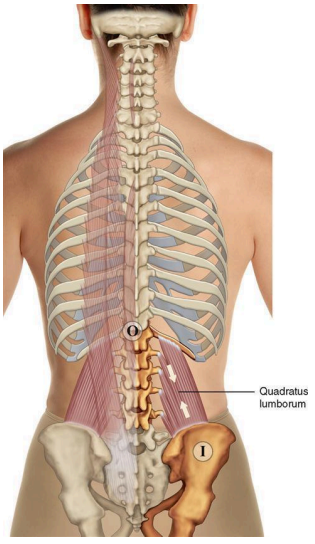
As one can see from the illustrations to the right, the *Iliopsoas* muscles directly connect the lumbar spine to the femur through the hip joint and pelvic girdle. Thus any misalignment of the hip will affect the lumbar spine and any misalignment of the lumbar spine, in fact any part of the spine, will affect the pelvic girdle, hips, and both walking and standing.

If one maintains a poor posture whilst sitting, the *iliopsoas* muscles will “collapse” and this will be carried down to the *femur,* and the alignment of the *femur,* through to the feet. Thus a person who, whilst walking, allows their lumbar spine to “relax” too much, or “collapse”, may gradually develop an ambling gait with a “knocked kneed” appearance. This then progressively affects the hips, knees and feet and, with time, may cause a semi-permanent posture deviation and inherent problems.



Lower Thoracic Vertebra

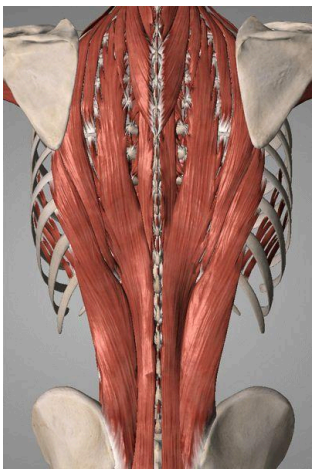
One could say ‘Moving up’ but that would be inaccurate, as much as the spine is a number of bones, the muscles of the back stretch from the base of the head all the way down to the feet and toes. Any consideration of any part MUST include all the other parts. But, using the boney structure as a reference, we move up from the lumbar vertebrae to the thoracic vertebrae.



As can be seen from the illustration on page 1, the muscles of the back are on multiple layers. As the spine is the “central tower” of the structure, it is imperative to keep it stable and erect, supple and yet strong. As all the upper appendages [limbs] are either directly or indirectly connected to the spine, the muscular structure is very diverse and complicated. Thus any injury to ANY muscle at any level CAN have a wide range of effects on the body.

Unfortunately, in our “normal” life style we take our backs for granted. Body builders will focus on the shoulder muscles,

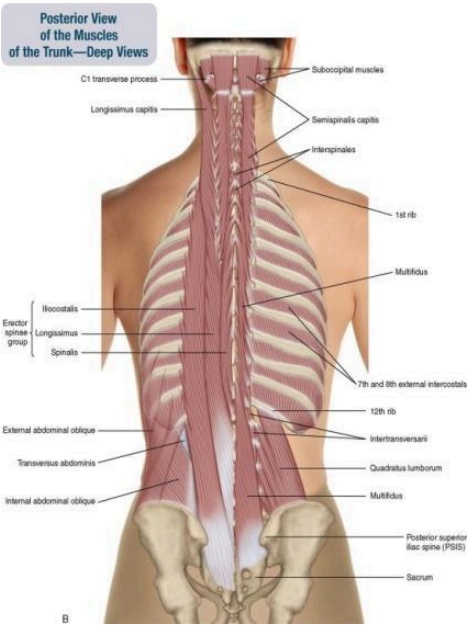
which are inherently “bulky” and yet ALL the muscles of the back are important to our physical well-being. [see illustration to the right]



The ‘upper lumbar vertebrae’ and lower thoracic vertebrae may be considered the “weakest”, or least supported of the vertebrae groups, and yet they are the most important when it comes to bending, turning and lifting. When we lift heavy loads, or lift with a stiff / straight back, it is usually the Lower thoracic vertebrae which are compromised, as the lumbar vertebrae are ‘connected’ to the sacrum / pelvis, and the upper thoracic vertebrae are ‘connected’ to the shoulders and neck and, in addition, have the ribs and intercostal muscles as support. Thus the lower thoracic vertebrae lack much support for their function, but this ensures that they are more “versatile” and flexible than the other groups. This also accentuates the importance of the concept of “rotating” or “spiralling” [involving the entire back, shoulders and hips], rather than “turning” which directly originates from and only involves twisting the spine.

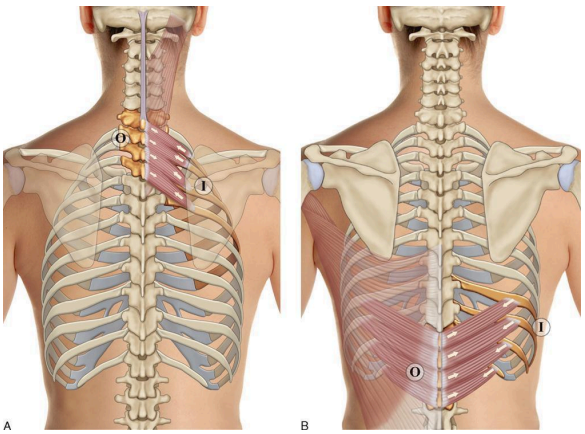
The ‘exposure’ of the internal organs of the abdomen – kidneys, liver, intestines, etc. – means that any rotation, bending, or turning has a direct massaging effect on the organs which, in the long run, helps with the functions of those organs. Any additional ‘manipulation’ of this area can only benefit the organs and assist them in their primary functions.

The muscles of the back have myriad functions – to keep the vertebra [and body] aligned and vertical; to allow movement and rotation of the body without compromising the chest area or the inner organs; to support and act as a foundation to the shoulders and arms; to provide a good, but flexible foundation for the muscles of the arms, all the way to the hands; with the *intercostal* muscles, to keep the chest / thoracic cavity “open” so that we are able to breathe freely.



The Prime function of the muscles of the back is to keep the vertebrae vertically aligned, and to support the torso and thoracic cavity and organs. In the process “weak spots” or “weaknesses” are created which are very susceptible to “injury” and pain. We all know the results of sitting in a bad position with the spine twisted, or with a cold breeze blowing on to the back. The pain is intense and it directly affects all our movements. The area so affected is usually the lower thoracic vertebrae and associated muscles, which are linear, and thus susceptible to diagonal ‘strains’.

The diagonal muscles [obliques] are primarily for maintaining the structure and security of the abdominal cavity, through the ribs, the organs and lower torso. [*see illustrations right and above]*

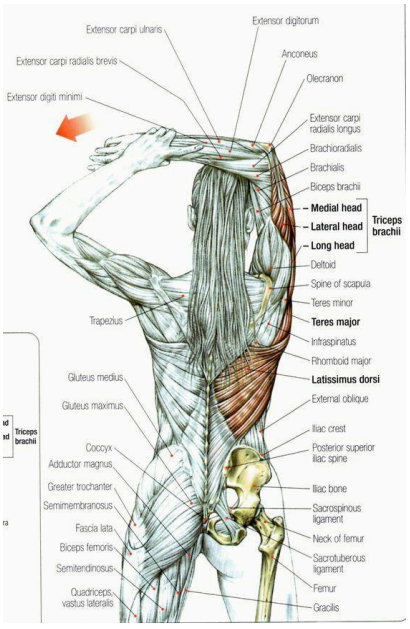


In our normal daily activities, we are more likely to bend forwards or twist at the waist, from one side to the other. Thus the complex arrangement of muscles gets very little 'manipulation' which is essential to maintain the elasticity of tendons, fascia, ligaments and muscles. As a result of the interconnected aspect of all parts of the musculo-skeletal structure, a relatively minor 'strain' in the thoracic vertebrae region can be "translated" into extensive pain or "stiffness" through the entire back and hip / thigh system. Often one treats the symptom in the pelvic region when the actual problem is located in the lower thoracic vertebrae.

From a purely physical view point, Qi Gong forms are focussed on addressing the suppleness and elasticity of the tendons, ligaments, fascia and muscles of both the upper body and lower body PLUS all appendages, by gentle manipulation through the full range of motion of both the skeletal system and the associated muscles and muscle groups. None of the movements are "sudden", thus giving the muscles, tendons and ligaments a slow and steady stretch and "twist" to ensure that all aspects of that particular selection are 'manipulated'. *Yi Jin Jing* and *Ba Duan Jin* are very versatile in this regard, although *Ba Duan Jin* is more gentle and "general" than *Yi Jin Jing.*

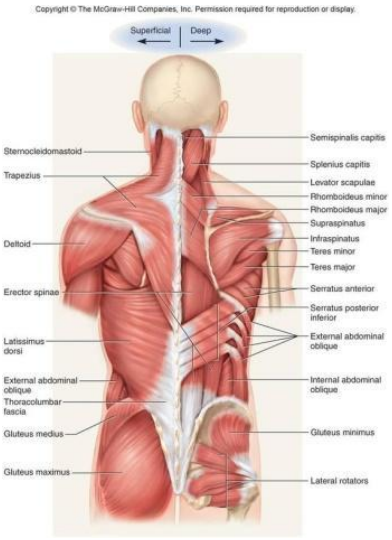
Both of these forms 'manipulate' the entire structure, although *Yi Jin Jing* is more focussed on the stretching, extension, twisting, bending of the spine and all the associated muscles, through its spiralling movements both extending and contracting gently to the extremes. When the spine / back is strong and healthy, then the rest of the body is strong, healthy, supple and resilient.

The transverse groups of muscles are seldom "manipulated" sufficiently to ensure their suppleness and elasticity which could be the basic cause of extreme pain when one moves in an "unfamiliar" way. These types of "injuries" would most frequently be found in physical sports disciplines such as rugby [scrums], Basketball [jumping and twisting], and others, and many of the more physical martial arts where the body may be twisted and stretched simultaneously, or the using of physical strength in a twisted posture.



By 'regular' stretching and 'manipulating', as in *Yi Jin Jing*, [*Ba Duan Jin* includes some stretching and turning movements] the muscles, tendons, and ligaments are kept supple, elastic, resilient and strong and thus the thoracic area, spine and internal organs are kept secure and "suspended" and less likely to suffer injury other than under extreme "assault". In addition, they also support the Upper Thoracic and the Cervical vertebra, shoulders and arms, by providing a sound, flexible, supple foundation for the upper skeletal system on which the bones are rooted / secured.

Upper Thoracic and Cervical Spine

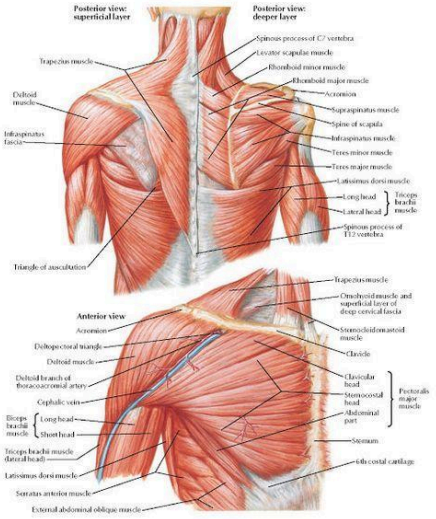


As one can see from the illustration right and below, the “diamond” [lower spinal area] is the ‘neutral’ area of the spinal construction where the support for the pelvic girdle and shoulders, arms and “upper thoracic” and lower cervical spine intersect, but do not really offer much support as they are primarily assigned to the pelvic girdle and arms.

The ‘waist’ has little or minimum musculature or support other than those oblique muscles / tendons which support and anchor the upper and lower “appendages” to the spine, both supporting the spine and facilitating the mobility of the arms. Even the abdominal muscle groups are primarily to support the spine and posture, and alignment.

With such a complex muscular system, one must understand how and why it is so essential to keep it well aligned, ‘manipulated’, supple, flexible, resilient, and elastic. Each muscle, and as you can see there are “several”, has its own set of tendons and anchor points on the skeletal system, and, in some cases inter-woven, or inter-laced with other muscles and tendons. The “failure” of any one may lead to progressive “failure” of any or many of the others as they try to compensate for “misalignment”. Where muscles overlap or inter-lace with others, the *fascia* comes into its own, preventing friction and the resulting pain. However, the *fascia* is NOT immune from ‘inflammation’ and this may result in extreme, debilitating pain which is often misdiagnosed and not correctly / effectively “treated”.

Thus, by ‘manipulating’ the spine though sideways extensions and gentle rotations, we exercise the muscles and, through them, the tendons. However, by “rotating / spiralling” and NOT ‘turning’ we further manipulate the ligaments of the shoulders and hips without straining the spinal structure and alignment. By “turning” at the waist and using ‘strength’ we adversely affect the *obliques* and, through them, the spine, whereas, by keeping the shoulders and hips aligned squarely, we do not strain the oblique or lateral muscles and tendons which allows us to utilize the ‘power’ that we can generate without ‘force’.

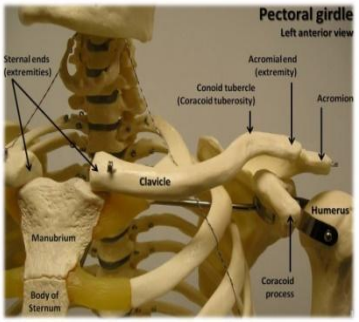


Upper Thoracic Spine + Shoulders

For simple ease of reference, let us say that the “upper thoracic spine” starts at the lower edge of the *scapula* [shoulder blade] extending up to shoulder level which is approximately where the *cervical spine* begins.

As can be seen from the illustrations to the right, the muscles of this area become even more complex as they now support, not only the spine, but also the

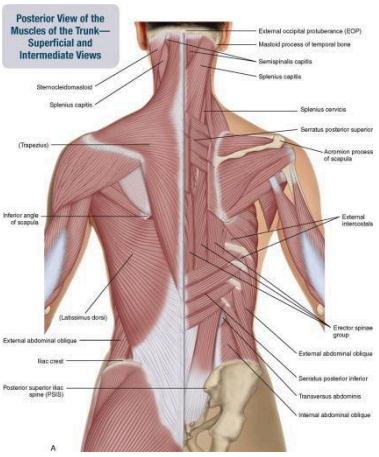
shoulders and neck / head, and allow movement and flexibility of these joints plus the arms.



This becomes more complex as the muscles of the upper torso and shoulder provide a complementary "counter force" to keep this complicated set of bones correctly aligned. Here we have some of the "bigger" muscle groups, the ones that tend to get more attention amongst those who are overly "body conscious".

The shoulders are able to 'fold' forwards in an embrace and also to 'expand' backwards to a certain degree, limited by the *clavicle [collar bone]*, with the ability of the shoulder joint [rotator cuff] to rotate vertically through nearly 360^0 and 180^0 laterally, whilst the spine is vertically aligned and not adversely affected.

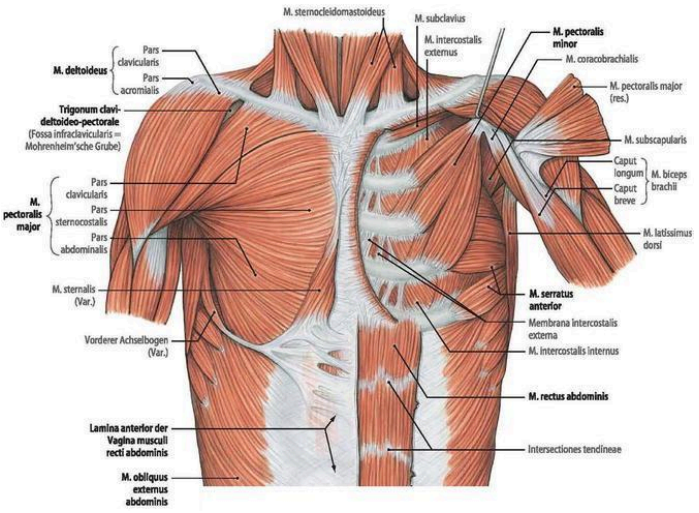
Referring to the illustrations to the right, from top to bottom, is the skeletal structure which shows that the bones of the spine, ribs, and shoulders are NOT connected OTHER than by ligaments and tendons. In other words one could think of them as "floating", and yet so much of what we do involves this complicated structure.



Observing or examining the layout, layers and orientation of the muscles of the back and their extensions; Note how the primary muscles of the spine are linear / vertical whereas the "diagonals" in the lower section of the *Thoracic* spine are aligned to keep the ribs stabilized, and those higher up are aligned to support the shoulder and, through the shoulder, the upper arm, neck and head.

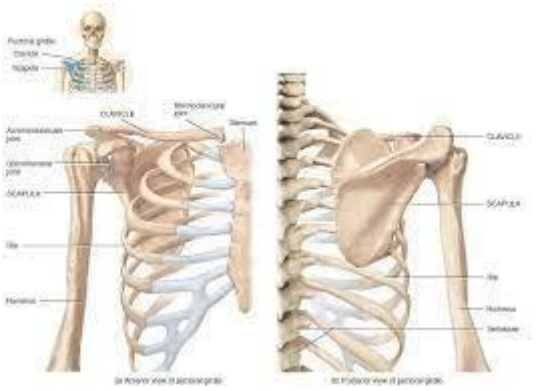
And Below that we see how the muscles of the torso [chest] 'overlay' and interweave with those of the back [spine].

Note how the muscles in the upper shoulders, anterior and posterior, are aligned to support the Cervical spine and sternum and, through that, the neck and head.



Thus, as we begin to understand the inter-connectedness of everything, we, hopefully, begin to grasp the essentials of keeping EVERY part of the body aligned, elastic, resilient, and how, a minor "problem" in any area can adversely affect "unrelated" parts of the body, muscular or skeletal.

Thoracic Spine and Shoulders



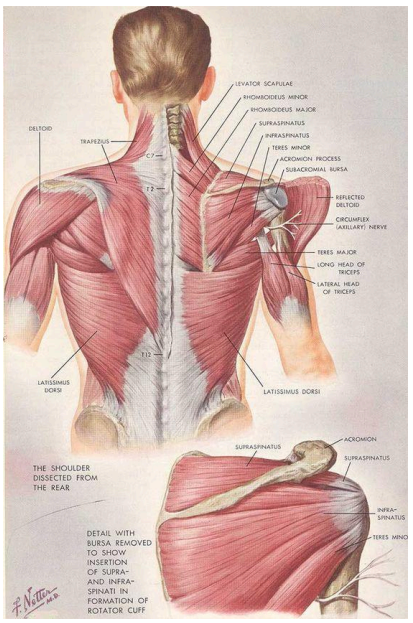
Looking at the illustration [Right] we can see how the shoulder is constructed with a number of “independent” bones, all held in place with *ligaments, muscles, tendons* which are all part of the “scaffolding” of keeping the body and spine vertical and evenly distributed.

In the posterior [rear] view, [right and page 10 bottom], we can see how tension in the neck can cause an adverse ‘action’ in the shoulder, or, adversely, how a lack of alignment or ‘tension’ in the shoulder can cause an adverse response in the neck and head;

- We can also see how, if we habitually ‘lift’ a shoulder, it will affect so much of the back, the spine and the opposite / opposing shoulder complex.
- And, how, in a simple, everyday situation, an external source of tensions [stress] can cause a muscular reaction which is manifest in a “splitting headache” [tension in the neck and head muscles];
- or, conversely, how tension in and around the head can manifest as a painful shoulder pain or stiffness.

In the illustration [page 10 bottom] we can see on the anterior layout, how the shoulder girdle is an anchor point for so much of both the thoracic muscles and the head, through the neck. If any part of the horizontal layout is compromised it will immediately translate into a widespread “problem” through the chest area to the lower ribs and even as far down as the abdomen.

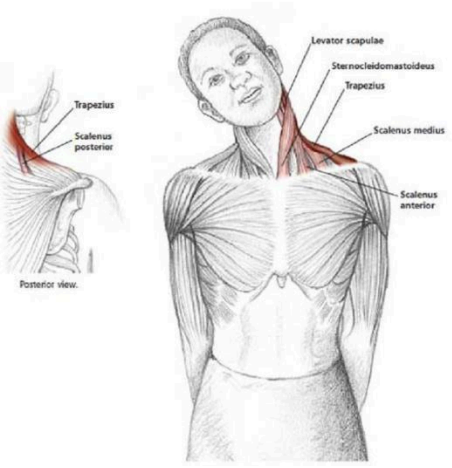
If / when the skeletal system is evenly balanced, then the entire range of muscles, ligaments and tendons can “relax” and not contend with one another – a state of “neutrality”, ‘stillness’, ‘balance’.



Thus, in the movements of Tai Qi, we are “manipulating” ALL of the interconnected muscles, ligaments and tendons which keep the skeletal system aligned and “balanced” throughout the entire structure. These muscles, tendons, ligaments are all interconnected to some degree and the compromising of ONE will affect all the others. Now, impose this ‘upper’ structure onto the lower structure and the interconnectedness and both relaxation and flexibility, becomes VERY important.

By gently warming up and stretching all the parts of the body, prior to the beginning of practice, we ensure that none of the interconnected parts is likely to be the cause of misalignment, over-stretching or over-tensioning of any other part. Often we can become

"over-enthusiastic" and start stretching BEFORE we have 'loosened' or 'warmed' up the entire structure. This is when a 'cold' muscle is over extended and conflicts with the other muscles and results in pain or 'disability'. Too often we forego 'warm ups' due to being late, and the resultant tension of being late can be the proximate cause of a painful 'injury' which we subsequently 'blame' on Tai Qi or Qigong, whereas it originates in 'stress' of being late.

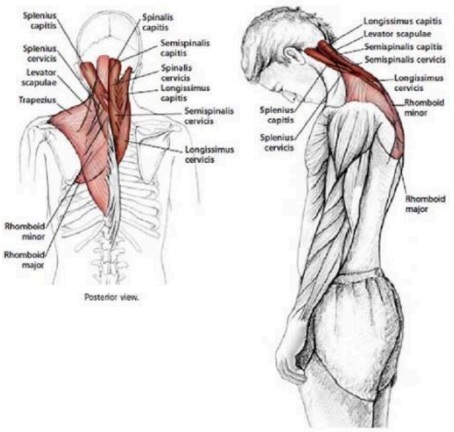


It is not for any other reason that we call the Spine the "Tower of Strength". Without a resilient, flexible, strong, balanced, correctly aligned spine, all other parts will be compromised AND, conversely, a misalignment during movement can adversely affect the spine and all the attached parts of the skeletal system.

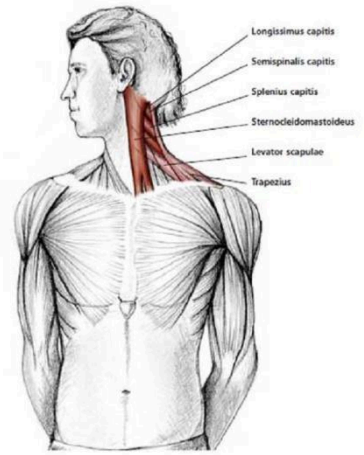
Caring for the Spine

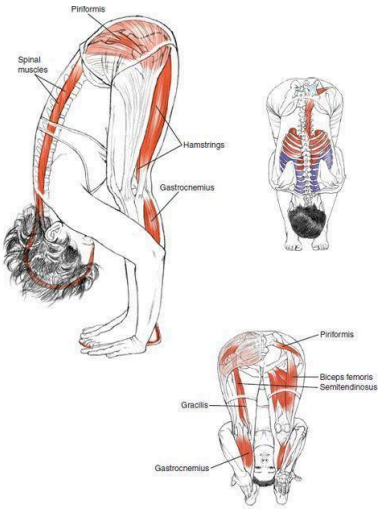
In view of the inter-connectedness of the spine and the muscles to ALL extremities, it is clearly very important to both 'manipulate' and care for the spine and the muscles, tendons, and ligaments that hold it together and erect.

In the warm-up phases the spine is stretched and "twisted" gently [torqued] to prepare it for more 'vigorous' activities. Even after warming up, one MUST be aware of the degree of 'strain' which may be exercised on the spine and, by "rolling" up from a bent over position, the spine is not over stressed, but gently relaxed to its vertical position. By trying to come erect with a rigid spine, one puts too much strain on the *Lumbar and Lower Thoracic* vertebrae and connecting muscles, tendons and ligaments. When coming erect from a bent over posture, starting at the knees, the knees are 'softened' and, as they soften the pelvic girdle is 'rotated' to a horizontal position, by tucking in the tail bone, and allowing the 'straightening' action to progress gently from one vertebra to the next, up to the head. In this process, the 'discs' are "manipulated" ensuring they stay flexible, resilient and 'soft', and cushion the vertebrae throughout the 'normal' activities.



As one bends forwards with a straight back, the 'extending' tendons and ligaments are stretched progressively and, on coming erect the 'counter' / contracting ligaments and tendons are stretched as the spine is 'rolled' erect. When one rotates at the hip joints, pelvic girdle and leans / stretches laterally [to the sides] the "*obliques"* are manipulated in the same way and the spinal discs are 'manipulated' in a lateral way.





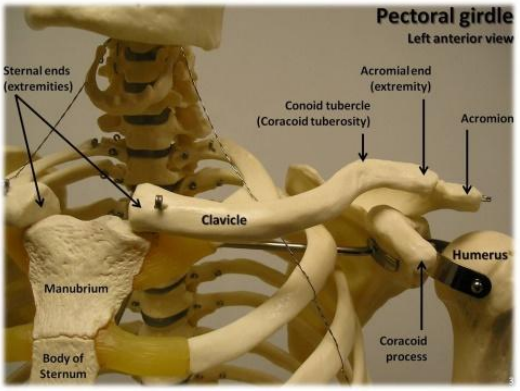
Throughout *Ba Duan Jin* and *Yi Jin Jing* the spinal column is gently stretched and manipulated in all directions so that, during the form work, the body is more supply and flexible as the ligaments and tendons are elastic and resilient. *Yi Jin Jing* is also known as "Muscle and Tendon Stretching" *Qigong,* and we must remember that neither Tai Qi nor Qigong are "designed' to build muscles, but to ensure that all tendons and ligaments are maintained as elastic and supple as possible.

Over and above addressing the spine as a "single unit" we must remember the inter-connectedness of the ENTIRE skeletal structure from feet to fingers and *Bai Hui,* the centre of the top of the head, and how the 'health' of any one part affects the health of the whole.

Upper Skeletal Structures

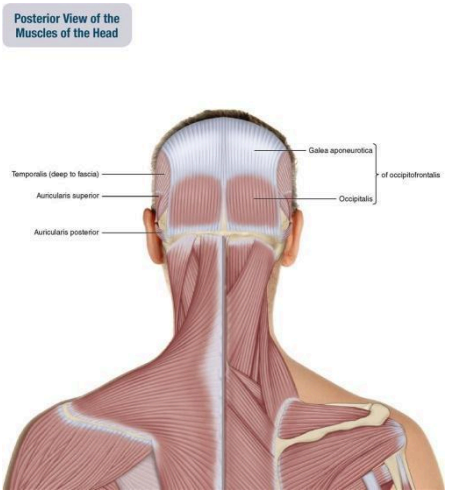
Shoulder Girdle

Having travelled up the spine, we must now examine the shoulder girdle and its connectedness with spine, arms, and the neck and head.

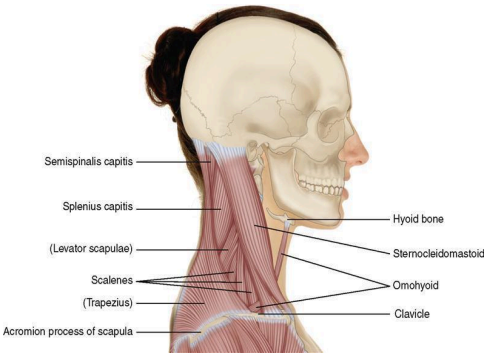


The muscles of the shoulder girdle, up through the neck, have myriad functions and, as a result, overlay and inter-twine across the entire skeletal structure; maintain the shoulders in position, enabling multi-directional movement, extending and contracting to hold / embrace and to 'reach' out either laterally, vertically, forward or rearward – using the full range of movement of the shoulder itself. To turn the head, rotate the head, to bend forward or backward and to maintain a steady, vertical orientation without compromising the upper vertebrae or shoulder structure.

Bearing in mind that the skull is not 'balanced' on top of the last vertebra, but is held in place by many muscles, tendons and ligaments, we must appreciate that the health of the spine and health of the head are inter-connected. "Tension headaches", which are "created" by tensing the shoulder and / or neck muscles [subconsciously] when under stress, can manifest as pain in specific spots of the head. However, a 'deep' massage on parts of the shoulder or neck can relieve the pain, or, more accurately, relieve the 'tension' of the muscle which is the cause of the "headache". Understanding this can help us to appreciate the delicate 'balance' and inter-connectedness of the body and specific areas of the body.

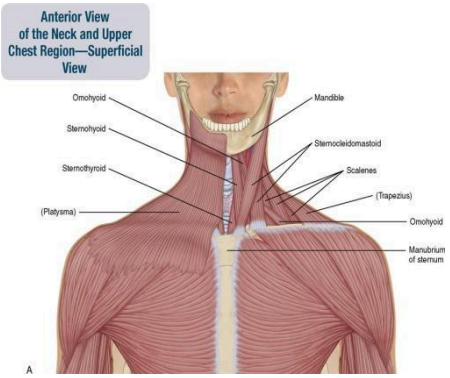


To pre-empt such aches and pains, one needs to ensure that all the ligaments, tendons and muscles are elastic, resilient and supple. In addition we must also remember that many pains of the shoulder girdle can be either muscular or related to the state of a joint or tendon which holds a joint in position. A typical example is the shoulder joint or "rotator cuff", which is often injured in over-exertion, or a severe fall on to the shoulder joint. We will not discuss a fracture, especially of the collar bone, which may occur in a severe fall as this is not part of this presentation.



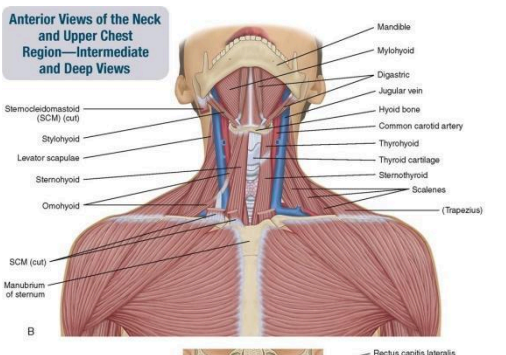
"Hunching" or "shrugging" the shoulders immediately places tension on the shoulders and the neck muscles that connect to the skull. This is then carried through the shoulder joint, upper arms and mid to upper cervical spine. To prevent or pre-empt this, the shoulders should be "dropped" to their natural position, where the 'conflicting' muscles are as neutral as possible, relieving any strain or tension on the cervical spine and through the entire shoulder structure.

Allowing the head to "hang" forwards places strain on the muscles connected to the lower skull area – the area that is part of *Yi Jin Jing – Bowing down in Salutation* – or "beating the drum", which "reduces brain fatique" and refreshes the brain. This can result in head aches, neck aches and even aches in the upper *cervical spine.* Jutting the chin forward causes stress on the entire muscular structure of the neck and directly affects the *Upper Cervical* spine into the *Cranium*. Pulling the chin backwards to extreme also results in tension of the muscles of the neck through to the upper cervical muscles which tense up and affect the spine.

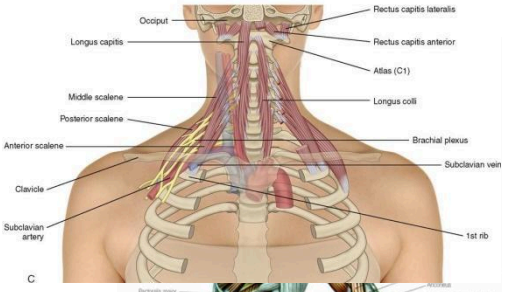


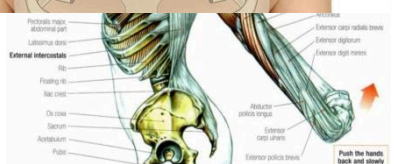
One needs to be aware of the state of tension in the muscles and be able to find the point where ALL the muscles in the shoulders and neck are relaxed and "neutral" to pre-empt any tension in the neck which 'travels' down into the spine and shoulders.

On the 'anterior' [front] the muscles stretch from the point of the shoulders up through the shoulders to the neck and head / jaw, thus any tension in this general area will be spread throughout the shoulder girdle and neck / head.



If the shoulders are 'hunched' forwards, they create lateral tension across the *scapula [*shoulder blades] and into the upper cervical spine, and can compromise the *clavicle* [collar bone]. Tension caused by pulling the shoulders rearwards creates tension across the spine into the shoulders and neck. However, by ensuring the shoulders are "down" one can "open" the chest, stretching



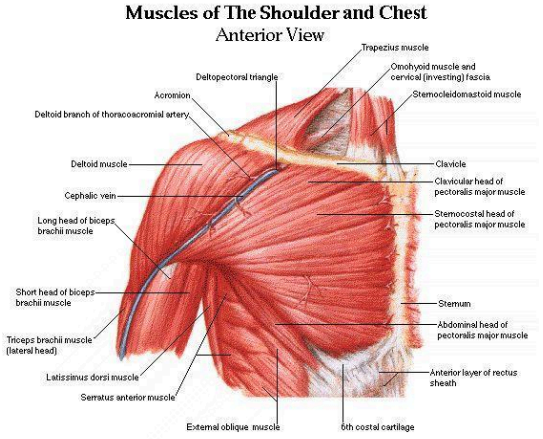


the chest muscles, intercostal muscles, keeping them flexible and resilient, which directly affects the ability to inhale deeply and, by expanding the chest, thus strengthening the lungs and heart and boosting their efficiency and resilience.

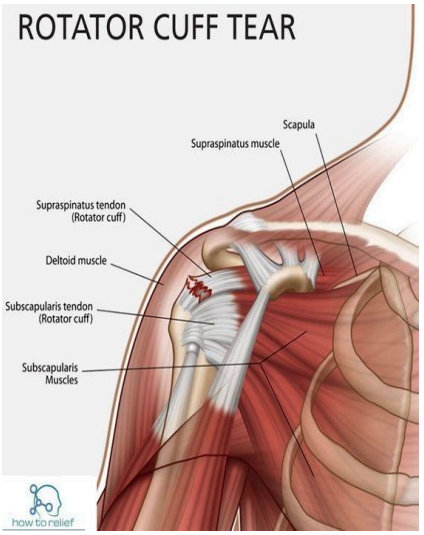
Shoulders

The shoulder girdle is more complex than the pelvic girdle due to its need and ability to be able to accommodate myriad actitivities, directions and functions and both strength, flexibility and resilience, whilst maintaining the safety / security / stability of the thoracic cavity, abdominal regions right down to the pelvic region, and being the anchor for so many of the functions of the arms and hands. Plus the fact that the skeletal structure is made up of a myriad bones which are all inter-connected and yet not rigid.

In our daily lives we seldom use the full range of motion of the shoulders and the combination of all of the whole structure and yet this combination is able to rotate vertically through 360 degrees and, horizontally, through nearly 270 degrees, much of which is dependent on the 'health' of the tendons, ligaments and muscles of the entire shoulder. It is only through gentle stretching in all directions that this suppleness and resilience can be maintained. However, this must be done carefully as an over-exertion of a stretch can strain or tear any one of the many tendons and ligaments that ensure the shoulder joint [ball and socket] stays secure and stable.

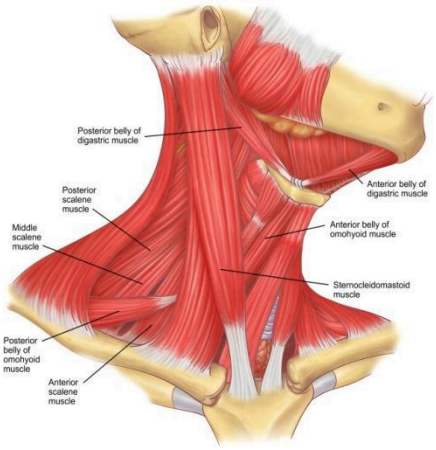


Rotator cuff tears that can be aggravated and require surgery; damage to the lining of the socket of the joint [arthritis]; impact damage to the joint and surrounds; due to its complex nature, the injuries are many and can be easily aggravated by a "simple" movement. It is essential that movements be gentle and yet to full extent to gain the greatest benefits. In both extending and retracting of the arms, one must be aware of the 'activity' and be gentle in movement. A sudden withdrawal or extension can easily result in a tear to a ligament – tennis elbow, rotator cuff tear, even dislocations – as the "snap" of the extension or retraction does not allow the ligament or tendon to "self adjust" smoothly. By moving gently and slowly the muscles, tendons and ligaments are taken to the full extent of movement and then allowed to gently retract / relax. As the stretches are practiced the muscles, tendons and ligaments become more and more flexible and supple and, thus, more elastic and resilient.



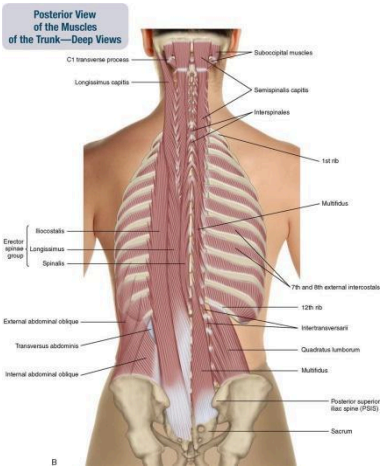
One cannot move on from the shoulder without repeating that ALL the movement of the arms and hands are rooted in and through the shoulder. And any injury to the shoulder girdle or cervical spine will affect the entire upper structure as one attempts to find a "counter balance" to the injury. With a compromised shoulder, the dexterity, suppleness and flexibility of the entire arm to fingers is directly affected. The reverse is also applicable – hand to shoulder ! And, because the shoulder girdle is made up of myriad

"loose" bones, it DOES NOT have a solid anchor and thus each and every muscle, tendon, and ligament must be kept supple, resilient, elastic and "healthy" to ensure the strength and stibility of the entire torso region.



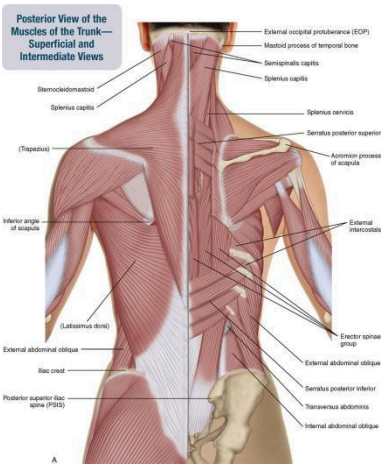
Neck and Head

As we can see from the illustrations to the right, the connection of head through spine to sacrum is clear. Thus, any "misalignment" of the pelvic girdle affects both the spine and neck / head. And the reverse, neck to pelvic region is also true.



Naturally, the alignment of the spine, vertically, will also affect the neck / head at the top, and the sacrum / pelvis at the bottom. Thus it is imperative that, for a healthy spine and associated structures, the natural alignment must be identified, adjusted, and maintained for the entire structure to be both vertically aligned and relaxed.

In addition, by enhancing the 'health' of the spine and all the associated muscles, tendons and ligaments, we also address the entire physical structure, skeletal frame and movement. In the long-term, by ensuring that the structure is correctly aligned and well maintained, the 'expected' deterioration of age can be greatly pre-empted. Thus "agility" in "old age" is promoted and enhanced. One only needs observe some of the "old" masters who 'perform' at contests and in public to see the long-term physical benefits, although the "health" benefits of the entire body and organs cannot be ignored.



As you peruse the illustrations, even if there is no explanation, I hope that you will get a better understanding of the inter-connection of EVERY part of the body, muscular as well as skeletal, and how important it is to take greater care of what is your most precious "possession".

In its 'simplicity' the body is a beautifully complex structure which demands our considered attention. As we LIVE, we will, from time to time over extend some part, but, understanding the inter-connectedness should enable us to 'understand' what is happening and enable us to better address the "corrections" that would be necessary.

Looking at the illustration to the right we can see how upper structure, "shoulder girdle" is both supported by, and also a support of both the head and spine. The muscles [and ligaments] counter-balance one another [Yin and Yang] thereby keeping the head up and evenly balanced by the multitude of muscles. When the head is "neutral" NO muscles should be tense – observe how they are aligned, vertically and

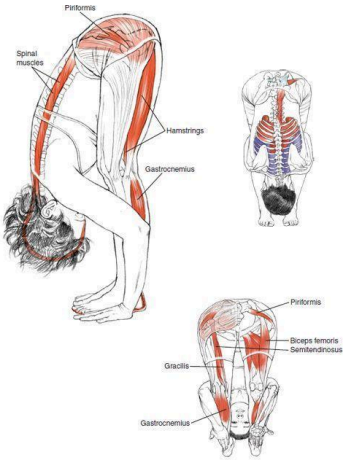
transversely – and the head should feel ‘balanced’ on top of the spine [although there is no real “physical connection” of the two.

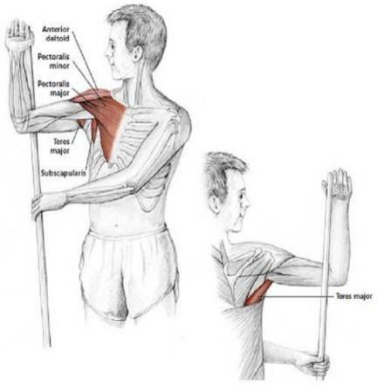
To keep the head “balanced” and neutral, the muscles, ligments and tendons need to be elastic and resilient. Our sedentary life style results in our head movements being very limited and this leads to restrictions that are aggravated when we do manipulate the head through its natural range of movement.

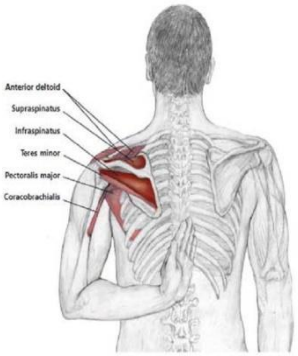
Interconnection of the Whole Body

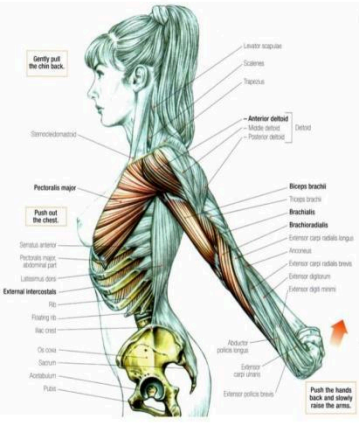
Referring to the illustrations to the right and below, we can, hopefully, now see how a simple forward bend directly affects ALL the muscles and tendons from the heels through to the base of the skull, and, below, how the shoulder girdle, supported by the torso / chest muscles, all the way through to the forearms, when carefully maintained, is better able to support the entire shoulder structure, thoracic spine, neck and head. Observe how, when you stretch the extended arms backwards and upward, you can feel a stretch in the neck and jaw.

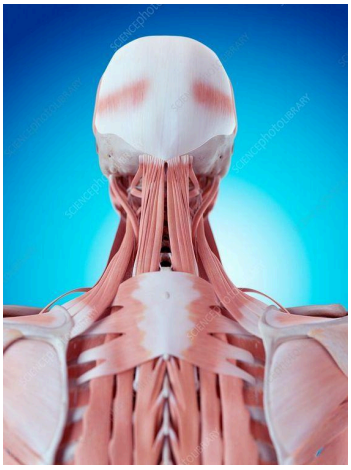
Studying these illustrations we should begin to understand how an unnaturally ‘raised’ shoulder can, and does, affect more than the errant shoulder and up through the neck to the head and down to the lower extremities, with possibility of adversely affecting the pelvic region, legs, and, ultimately the spine.

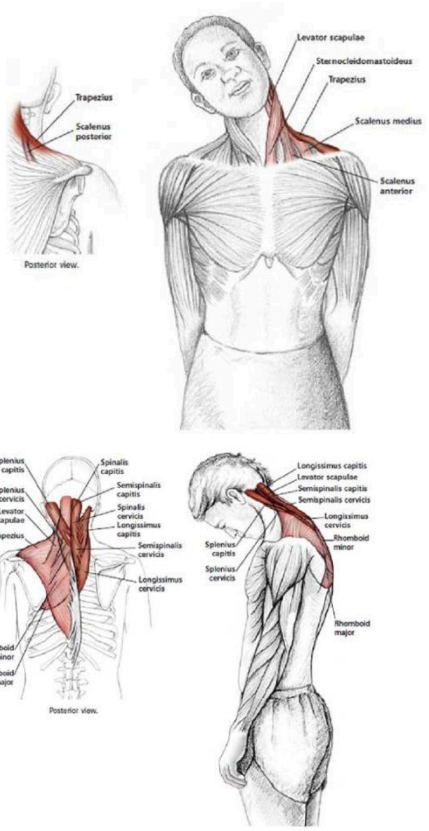












Further Studies

It is possible to work one's way through *Ba Duan Jin* and *Yi Jin Jing* with illustrations showing which muscles / tendons are being stretched, but this would over-complicate the purpose of these papers.

If one can simply understand the inter-connectedness of every part of the body, muscular and skeletal, then it should be a relatively simple task to "picture" and observe which parts are being affected by each individual posture. Ultimately this should also be possible throughout the forms of Tai Qi.

Of course this is the purely physical aspects of Tai Qi, the 'esoteric' or "*Qi* " development and 'movement' can also be 'imagined' as it courses through the bones, tendons, ligaments and muscles. Much like imagining electricity flowing through wires, we should then be able to "perceive" the flow of *Qi* and, later, the 'projection' of *Qi* "on demand".

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