| 1. | The thoracic spine is a functional 3 dimensional cage capable of reacting, compensating & causing significant reactions in all other parts of the body. |
| 2. | 3 Dimensional Spinal Coupling in the thoracic spine is movement in any one plane of motion accompanied by movements in the other two planes. |
| 3. | The primary plane of dysfunction and/or compensation in the thoracic spine can be most effectively treated through reactions in the other two planes of motion. |
| 4. | Rotational balance reach test, utilizing the arms as drivers, can begin to differentiate potential causes and compensations through the thoracic spine. |
| 5. | Functional testing techniques can be efficiently and effectively performed to begin to determine the cause, compensation, and symptoms of the thoracic spine involvement. |
| 6. | The baseball swing to golf ball swing drill expands the zone on both sides of the golf swing, primarily in the transverse plane. |
| 7. | Neurological mobilization emphasizes enhancing functional proprioceptively enhanced motion. |
| 8. | Driving the feet in all 3 planes of motion and driving the hands in all 3 planes provides unlimited opportunities to create a thoracic spine dominant workout. |
| 9. | The thoracic spine is the key link to providing appropriate tri-plane loading to the trunk in order to take advantage of the powerful hips in the golf swing. |
| 10. | Functionally combining manual therapy techniques, stretching and strengthening, integrated exercises, with an ongoing evaluative process, is critical to effective thoracic spine rehabilitation. |
| 11. | A kyphotic, or slouched posture inhibits the function of the scapula as well as the humerus. |
| 12. | **Chain Reaction** strategies involve creating the appropriate environment in order that proprioceptors are functionally stimulated in order to create the right reaction before an effective action. |
OBJECTIVES FOR THE THORACIC SPINE FUNCTIONAL GUIDE

To assimilate up-to-date information and knowledge of the thoracic spine and its dependencies on the rest of the body.

To learn how to apply effective functional techniques when testing, training and rehabilitating the thoracic spine.

To understand and appreciate the tri-plane Chain Reaction principles as they apply to the thoracic spine.

HOW TO USE THIS FUNCTIONAL GUIDE

This functional guide can be used as a convenient summary of the program’s contents to take with you after viewing. You can also use this guide as a notebook; space has been provided so that you can make notes on relevant tracts as you watch them.
STRATEGY 1
Strategically appreciating the three dimensional capacity of the thoracic spine.

STRATEGY 2
Strategically understanding the loading of the trunk through the thoracic spine in the same direction as the pelvis and in the opposite direction as the pelvis.

STRATEGY 3
Strategically applying the understanding of three dimensional coupling.

STRATEGY 4
Strategically taking advantage of the thoracic spine and its relationships to all other parts of the body.
STRATEGY 5
Strategically taking advantage of the *Chain Reaction* role of the thoracic spine.

STRATEGY 6
Strategically realizing the ability to influence one or two planes of motion to get to the third.

STRATEGY 7
Strategically blending exercise and stretching.

STRATEGY 8
Strategically evaluating and then treating and then evaluating and then treating spectrum.
THE THORACIC SPINE IS A FUNCTIONAL THREE DIMENSIONAL CAGE

The thoracic spine is the less popular, yet significant friend to the lumbar and cervical spines as well as the rest of the body.

“The thoracic spine can do a lot of everything.” - G. Gray

PROPORTIONAL MOTIONS OF THE THORACIC SPINE

• Frontal plane equal motions throughout the thoracic spine
• Proportionately more sagittal plane motion inferiorly with progressively less motion as we move superiorly
• Inferior thoracic spine has minimal transverse plane motion with progressively greater amounts proportionately as we move superiorly

Three dimensional spinal coupling of the thoracic spine; functionally understanding that movement in any one plane of the vertebral column is accompanied by movement in the other two planes. With the three dimensional capacity of the thoracic spine, the three dimensional spinal coupling concept is significant.

With its ability to react in all three planes, the thoracic spine has the capability of feeding “good things” or “bad things” below and above itself.

Dysfunction in any of the three planes of motion of the thoracic spine will inhibit the tri-plane loading of the trunk and therefore will inhibit the tri-plane loading of the hips and pelvis as well as the scapula and cervical spine.

The thoracic spine typically causes a breakdown “outside of itself” with evidence being found “within itself”.

RELATIVE ROTATIONS
Relative rotations in all three planes are dependent upon the primary drivers, whether they are from the top or from the bottom, and how much motion is being driven proportionately to accomplish the functional activity.

With the body in the upright position, functional activities are dependent upon the intrinsic shock absorption system of lordosis in the lumbar spine, kyphosis in the thoracic spine, and lordosis in the cervical spine.

In gait, with an understanding of relative rotation and segmental rotation, we have concurrent lateral flexion to both sides going on in the thoracic spine, concurrent flexion/extension going on within the thoracic spine, as well as concurrent rotation going on in both directions.

To simplify our three dimensional understanding, analysis and training of the thoracic spine, we will appreciate the motion of the thoracic spine as being in-sync or out-of-sync with what is happening below it and above it.

The thoracic spine is special because of its significant amount of motion in all three planes with a certain degree of intrinsic stability. There needs to be a comprehensive Chain Reaction understanding in order to understand the causes, compensations and symptoms relative to the thoracic spine and the rest of the body. Many times the thoracic spine will give evidence of who the cause versus the compensation versus the symptoms are.

The thoracic spine is no different than any other part of the body, simply being a biomechanically arranged group of “reactive” bones. The thoracic spine reacts to ground reaction forces, gravity, momentum, muscle forces, proprioceptors, what the rest of the body is doing, the eyes, the feet, the hands.

Because of the three dimensional, tri-plane capabilities of the thoracic spine, utilizing the strategy of attacking one plane of motion in order to facilitate the other two is an extremely effective strategy when dealing directly with the thoracic spine, and any of its surrounding neighbors.

Understanding the foot to thoracic spine Chain Reaction relationship.
CASE PRESENTATION - Gary's opportunity to evaluate T.C. (Tom Carlson)

REVIEW OF SYMPTOMS:
• Complaint of generalized mid back pain
• Generalized ache during sitting
• Periodic pain with working out
• Discomfort intermittently migrating into neck and low back

REVIEW OF TWEAKING THE GAIT
• Fast walk
• Toe in walk
• Toe out walk
• Side to side arm swing walk
• Shoulder height side to side arm swing walk

STANDING EXAM
• Bilateral foot inversion/eversion
• Right ankle dorsiflexion excursion
• Left ankle dorsiflexion excursion
• Bilateral ankle dorsiflexion excursion with foot inversion

BALANCE REACH TESTING
• Left leg balance, bilateral overhead posterior reach
• Right leg balance, bilateral overhead posterior reach
• Left leg balance, trunk extension
• Right leg balance, trunk extension

EXCURSION TESTING
• Left hip internal/external rotation excursion with toe touch right
• Right hip internal/external rotation excursion with toe touch left
• Left hip internal/external rotation excursion with balance
• Right hip internal/external rotation excursion with balance

BALANCE REACH TESTING
• Right leg balance, right arm right rotational reach at shoulder height
• Right leg balance, left arm right rotational reach at shoulder height
• Left leg balance, left arm left rotational reach at shoulder height
• Left leg balance, right arm left rotational reach at shoulder height

LUNGE TESTING
• Right anterior lunge with bilateral overhead posterior reach
• Left anterior lunge with bilateral overhead posterior reach
• Right anterior lunge with bilateral arm fly
• Left anterior lunge with bilateral arm fly
• Right anterior lunge with bilateral right rotational reach at shoulder height
• Right anterior lunge with bilateral left rotational reach at shoulder height
• Left anterior lunge with bilateral left rotational reach at shoulder height
• Left anterior lunge with bilateral right rotational reach at shoulder height
• Left lateral lunge with left overhead right medial reach
• Right lateral lunge with right overhead left medial reach
• Right lateral lunge with left overhead right lateral reach
• Left lateral lunge with right overhead left lateral reach

**EXCURSION TESTING**
• Right hip internal/external rotation with arms crossed in front of chest
• Left hip internal/external rotation with arms crossed in front of chest
• Right hip internal/external rotation with arms abducted 90 degrees
• Left hip internal/external rotation with arms abducted 90 degrees

**BILATERAL STANCE TESTING**
• Bilateral stance with bilateral overhead posterior reach
• Bilateral stance with trunk extension
• Bilateral stance with alternate anterior/lateral reaching
• Bilateral stance with alternate anterior/lateral reaching while progressively "coming up" into extension

**LUNGE TESTING**
• Right lateral lunge with left arm downward reach
• Left lateral lunge with right arm downward reach

**DISCUSSION OF FINDINGS WITH T.C.**
• Impressed with most of what is seen and evaluated
• Discussion of upper body stiffness
• Feet look good and ability to "get through" the hips
• Discussion of kyphosis and inability to "get through" the thoracic spine
• Adding the arms as a driver reduces the thoracic spine ability
• The culprit is anteriorly
• Facilitating motion into extension therefore rotation
• "Scratch our head" . . . is it that simple?
• Discussion of rotational reach test
• Treatment primarily will include revising workout
• Anticipation of outcome and thanking T. C.

**ANALYSIS DEBRIEF WITH BOB WIERMSA, P.T.**
• Description of other traditional tests
• Rule out the "big and bad" and look for the "big rocks"
• Discussion of being "anteriorly driven" with transverse plane inhibition
• Anticipation of other glitches
• Description of abnormal kyphosis relative to functional testing
• 3D evaluative techniques
• Treat - evaluate - treat strategy
• Acute examination - isolated integration
• What came first
• The "squeezed accordion" in the sagittal plane
Looking forward to working with T.C.

• Anticipated response to the treatment program
• “Waking up” the thoracic spine by attacking the frontal plane successes
• The strategy of stretching, mobilizing and strengthening as an integrated system

FUNCTIONAL MANUAL THERAPY ON THE TRUE STRETCH™

• Bilateral stance with right overhead left lateral reach with right hip adduction
• Bilateral stance with left overhead right lateral reach with left hip adduction (evaluation of scapular and pelvis translation)
• Left stride stance with left arm right rotational reach at shoulder height
  Pelvis drive, thoracic distraction and rotational drive
• Right stride stance with right arm left rotational reach at shoulder height
  Pelvis drive, thoracic distraction and rotational drive
• Left stride stance with right arm right rotational reach at shoulder height
  Right anterior chest wall drive and thoracic rotational drive
• Right stride stance with left arm left rotational reach at shoulder height
  Left anterior chest wall drive with thoracic rotational drive

Discussion with T.C. of getting two planes of motion to get to the third

• Right stride stance with left arm right rotational reach at shoulder height
  Contract - relax left scapular drive with pelvis rotational drive
• Right stride stance with right arm right rotational reach at shoulder height
  Contract - relax left scapular drive with pelvis rotational drive
• Left stride stance with right arm left rotational reach at shoulder height
  Contract - relax right scapular drive with pelvis rotational drive
• Left stride stance with left arm left rotational reach at shoulder height
  Contract - relax right scapular drive and pelvis rotational drive
• Rotational pectoralis stretch with hip drive
DUMBBELL EXERCISES

• Left leg dominant, alternate overhead reaches with dumbbells
• Right leg dominant, alternate overhead reaches with dumbbells
• Left leg balance, alternate overhead reaches with dumbbells
• Right leg balance, alternate overhead reaches with dumbbells
• Bilateral stance, alternate bilateral diagonal reaches, knee to overhead

• Bilateral stance, alternate rotational reaches at shoulder height
• Bilateral stance, alternate diagonal reaches, knee to overhead

Discussion of progressions with T.C.

Recheck examination to reveal progress and to encourage T.C.

Discussion of tweaks to workouts and exercises

A big thanks to T.C.

REHABILITATION DEBRIEF WITH BOB WIERMSA, P.T.

• Extension/retraction traditional treatment versus a Chain Reaction functional treatment strategy
• Taking advantage of two planes of motion to get to the other
• Building upon the successes of the patient
• Stretching; sustained versus varied repetitive stretching
• Neurological mobilization . . . enhancing functional motion
• Blending of exercising and stretching
• Drivers and tweaking relative to scoliosis
• Deskwork, static postures, ergonomic considerations
• Motion is the name of the game
• Discussion of the eyes as drivers

• Chain Reaction mobilization response
GARY’S OPPORTUNITY TO WORK OUT WITH KARA

THORACIC SPINE DOMINATED WORKOUT
• The shoulders and hips being driven from the hands and the feet in all three planes.

3 DIMENSIONAL JUMPING JACK MATRIX

Feet | Hands
---|---
Frontal plane - out of sync | Frontal plane - out of sync
Frontal plane - in sync | Frontal plane - out of sync
Sagittal plane - out of sync | Sagittal plane - out of sync
Sagittal plane - in sync | Sagittal plane - in sync
Transverse plane - out of sync | Transverse plane - out of sync (out of sync)
Transverse plane - in sync | Transverse plane - in sync (in sync)
Frontal plane - in sync | Frontal plane - out of sync
Sagittal plane - out of sync | Frontal plane - out of sync
Transverse plane - in sync | Sagittal plane - out of sync
Transverse plane - out of sync | Sagittal plane - in sync
Transverse plane - in sync | Transverse plane - in sync (out of sync)
Transverse plane - in sync | Transverse plane - in sync (in sync)

Descriptions of the various combinations available with the 3D Jumping Jack Matrix
For information on the QUEST video entitled “3D Jumping Jack Matrix” contact 800-230-8300 or visit our website at www.functionaldesign.com.

3D JUMPING JACK MATRIX WITH RANDOM PULLS & PUNCHES WITH BUNGEE CORD TWEAK

• Jumping in place with random alternate pulls
• Frontal plane - in sync jumps with random alternate pulls
• Sagittal plane - in sync jumps with random alternate pulls
• Transverse plane - in sync jumps with random alternate pulls
• Jumping in place with random alternate punches
• Frontal plane - in sync jumps with random alternate punches
• Sagittal plane - in sync jumps with random alternate punches
• Transverse plane - in sync jumps with random alternate punches

Descriptions of positioning laterally relative to the pull of the bungee cord in each direction

Description of one footed hops in all three planes with the pulls and punches

PUNCHING GLOVES REACTION DRILL
• Jumping in place with straight punches
• Jumping in place with cross punches
• Transverse plane - out of sync jumps with cross punches
• Sagittal plane - in sync jumps with cross punches
• Frontal plane - in sync jumps with cross reactive punches

Description of lateral and posterior punching

• One footed sagittal plane hops with cross punches
• One footed frontal plane hops with cross punches
• One footed transverse plane hops with cross punches

Thanking Kara for her hard work and encouragement
• The two major masses in golf are the pelvis/hips and the chest.

• These are interconnected through the lumbar spine, the thoracic spine, rib cage, and the cervical spine.

• This interconnection involves a number of huge muscles.

• If the trunk muscles are properly loaded in all three planes, their power can be released, revealing the power from the hips to the ground, and transforming the power to the hands and ultimately to the golf club.

• In order for the thoracic spine to take advantage of the pelvis/hip mass, and to fully load the trunk musculature, it must create an effective three dimensional load.

• We need the mobility and the stability in the thoracic spine (3D Cage) to create the load for powerful transformation.

BASEBALL TO GOLF DRILL
• Create primarily the transverse plane motion in the thoracic spine
• Exaggeration of the transverse plane load with a baseball backswing
• Demonstration of the baseball transverse plane load transforming to the golf swing
• “Expanding the zone” on both sides in the transverse plane
• Demonstration of opposite side baseball transverse plane load transforming to the golf swing
• “Expanding the zone” for a more effective follow through
MEDICUS HINGED CLUB

• If the hip motion is combined with properly timed and greater amount of thoracic spine 3 dimensional motion, there will be no "break" in the hinged club.
• Demonstration of the proper loading of the thoracic spine, and therefore the trunk, and therefore the medicus club
• Demonstration of the same medicus drill on the opposite side
• Bringing out the "big dog"
RESEARCH ROUNDTABLE WITH DR. DAVID TIBERIO

Discussion of the importance of the thoracic spine

"The thoracic spine talks to all parts of the body and all parts of the body talk to the thoracic spine" - G. Gray

Peltrunkula concept - understanding the direct relationship between the pelvis, the trunk, and the scapula. Emphasizing the importance of the 3-dimensional thoracic cage capability... the friend to everyone.

Understanding the peltrunkula concept... the message has to "get through" the thoracic spine.

The thoracic spine is a significant messenger "whether or not the message is right or wrong"

Discussion of research article

This particular research article looked at the ability to elevate the arm in the frontal plane, comparing a sitting, relatively erect posture versus a sitting, relatively slouched posture.

FOUR SIGNIFICANT FINDINGS
1. Raising the arms in the frontal plane between 0 and 90 degrees with a slouch posture, the scapula elevates excessively.

This demonstrates a lack of dynamic scapula reaction before action in the sagittal and frontal planes, therefore the muscles instead of primarily pulling the humerus up, the muscles primarily pull the scapula up, causing excessive elevation.
2. Completing the elevation in the frontal plane from 90 degrees on up, the posterior tilting of the scapula was decreased in the slouch posture.

There is a need to effectively load before the ability to unload is realized.

The effective elevations associated with dynamic posterior tilting as a result of reaction in the opposite direction.

Beginning in a relatively loaded posture, ie; slouched position, doesn't allow any additional load required for a productive unload.

You need a moving, loading structure . . . not a static rigid structure.

3. The total range of motion was decreased by 23 degrees with the slouched posture.

Discussion of causes of impingement

“So why did you get in the way scapula?”

Most causes of impingements are not at the impingement site.

4. Isometric forces at 90 degrees in the slouched posture were decreased by 16 percent.

Discussing “turning the phone lines on” . . . the proprioceptors have to be stimulated in order to create the right reaction before an effective action.

Discussion of the immediate gain of “functional strength”

“If a muscle is “whining” for help, we have to go to its friends . . . not directly to it.”

- G. Gray

Chain Reaction strategies require understanding the full biomechanical implications of “why” a muscle would be unsuccessful.

Thank you to Dr. David Tiberio