1. The cervical spine reveals 3 dimensional spinal coupling with movement in any one plane of motion accompanied by movements in the other two planes.

2. There is tremendous wisdom in viewing the cervical spine from the bottom up as well as from the top down.

3. C1 and C2 demonstrate unique characteristics, with little to no rotation exhibited at the occiput/C1 junction and little to no lateral flexion between C1/C2.

4. Functional cervical spine testing can be accomplished with bottom up driving of three planes of motion and bottom up positioning in three planes of motion.

5. Effective functional manual therapy techniques involving the cervical spine concentrate on a bottom up approach in all three planes of motion, initially attacking the plainer planes that are most successful.

6. Specific cervical symptoms can be an isolated integrated problem or an integrated isolated problem.

7. With balance testing, allowing free pelvic motions, allows greater motion to be distributed up through the spine, ultimately into the cervical spine.

8. The three dimensional cervical matrix drives the hips, pelvis and head in the same direction and in opposite directions in all three planes.

9. A matrix strategy of tri-plane exercises, being driven from below, can be applied when utilizing a light resistance bungee cord with a head halter.

10. Functional manual therapy emphasizes utilizing the practitioners hands to reinforce biomechanically consistent motion of function, considering all three planes of motion.

11. The cervical spine may be the most inhibiting factor to a productive golf swing.

12. Functionally combining manual therapy techniques, stretching and strengthening, and integrated exercises, with an ongoing evaluative process is critical to effective cervical spine rehabilitation.

13. Subjective findings along with objective measurements must be combined to determine the effectiveness of functional research.

14. 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 CERVICAL SPINE

**FUNCTIONAL GUIDE**

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

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

To understand and appreciate the tri-plane principles as they apply to the cervical 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 cervical spine, with unique characteristics of C1 and C2.

STRATEGY 2
Strategically applying the understanding of 3 Dimensional Coupling in the cervical spine.

STRATEGY 3
Strategically understanding the eccentric loading of the cervical spine muscles in all three planes of motion to contribute to function throughout the body.

STRATEGY 4
Strategically appreciating the biomechanical reactions of bottom up dominated activity and top down dominated activity with respect to the cervical spine.

STRATEGY 5
Strategically preparing for all possible 3 Dimensional Coupling activities in the cervical spine.
STRATEGY 6
Strategically understanding the **Chain Reaction™** influences of foot speed on neck speed and training and conditioning and rehabilitation.

STRATEGY 7
Strategically taking advantage of functional manual therapy techniques which actively assistively reinforce function in all three planes of motion.

STRATEGY 8
Strategically realizing that the symptoms in the cervical spine may have a cause somewhere else in the functional chain.

STRATEGY 9
Strategically appreciating the various drivers that determine the motions in all three planes occurring at the cervical spine.
BOBBLE-HEAD DOLLS - TRI-PLANE HEADED DOLLS WITH A STABLE BASE

Even when we load a bobble-headed doll in one plane of motion, it reveals that plane of motion plus the other two as it “bobbles its head”.

THREE DIMENSIONAL SPINAL COUPLING OF THE CERVICAL 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 cervical spine, the three dimensional spinal coupling concept is significant.

- A significant amount of function is eye dominated and, therefore, most of the motion is “bottom up” dominated. Cervical motion is created from the “bottom up” without a lot of head motion.

ATTRACTOR WELL COUPLING: Is a preferred but not obligatory tri-plane coupling of spinal motion.

The cervical spine has a natural lordosis that facilitates further shock absorption. Vertical shock absorption is seen as additional extension. When all of the extension is “used up” then there is a decrease in shock absorption and a disruption of the other two planes of motion as well.

THE C1 VERTEBRAE AND THE C2 VERTEBRAE HAVE UNIQUE CHARACTERISTICS

- Between the occiput and C1 there is very little to no rotation
- Between C1 and C2 there is very little to no lateral flexion
- There are still rotational forces at the occiput/C1 junction and there are still lateral forces at the C1/C2 junction
- Between C2 and C3 there is a tremendous amount of frontal plane motion available

BECAUSE OF MOTIONS IN THE LOWER CERVICAL SPINE, AND THE MOTIONS DESCRIBED BETWEEN C2 AND C3, BETWEEN C1 AND C2, AND BETWEEN THE OCCIPUT AND C1, THERE IS SIGNIFICANT WISDOM AT LOOKING AT THE CERVICAL SPINE FROM THE BOTTOM UP.
FUNCTIONAL BIOMECHANICS: What is happening at the cervical spine and through the entire Chain Reaction™ must be appreciated three dimensionally.

There are also head dominated activities and therefore significant wisdom at viewing these activities from the top down with cervical motion being driven from the head.

We need to understand the cervical spine with respect to:
- 3D Coupling
- From the bottom up and the top down
- From the right and from the left
- Ground reaction forces and gravity
- The specific activity

As we biomechanically understand cervical symptoms and cervical dysfunction we need to appreciate the various drivers of cervical motion, and whether or not that motion is properly dealt with prior to getting to the cervical spine.

When leaving the thoracic spine and moving superior, moving into the cervical spine is going into “never never land”.

In order to effectively evaluate, rehabilitate, train and condition the cervical spine we need to know the loading and exploding capacities of the foot, knee, hip, pelvis, lumbar spine, thoracic spine, scapula and arms.

Because most of our patients, clients and athletes are involved in significant “bottom up activities” and significant “top down activities” we have a responsibility to biomechanically understand the cervical Chain Reaction™ from both ends.
CASE PRESENTATION - Gary's opportunity to evaluate Teri Faust

REVIEW OF SYMPTOMS
• Neck pain
• Headaches
• Swimming onset (left sided breather)
• Difficulty in follow through in golf swing

REVIEW OF WHAT TESTS HAVE ALREADY BEEN DONE
• Gait
• Foot biomechanics
• Leg length
• Hip excursion
• Posture
• Scapular
• Lumbar and thoracic

BALANCE TESTING
• Left leg balance, toe touch right, bilateral arm frontal plane swing
• Left leg balance, toe touch right, bilateral arm transverse plane swing
• Left leg balance, toe touch right, bilateral arm sagittal plane swing
• Right leg balance, toe touch left, bilateral arm frontal plane swing
• Right leg balance, toe touch left, bilateral arm transverse plane swing
• Right leg balance, toe touch left, bilateral arm sagittal plane swing

CERVICAL RANGE OF MOTION TESTING
• Right stride stance, trunk flexed, cervical flexion and extension
• Left stride stance, trunk flexed, cervical flexion and extension
• Symmetrical stance, right arm abducted, cervical lateral flexion
• Symmetrical stance, left arm abducted, cervical lateral flexion
• Symmetrical stance, arms horizontally rotated left, cervical rotation
• Symmetrical stance, arms horizontally rotated right, cervical rotation

PALPATION EXAMINATION WITH GENTLE MOBILIZATION
CERVICAL RANGE OF MOTION WITH PALPATION
- Symmetrical stance, arms horizontally rotated right, cervical rotation left
- Symmetrical stance, arms horizontally rotated left, cervical rotation right
- Symmetrical stance, left arm abducted, cervical lateral flexion
- Symmetrical stance, right arm abducted, cervical lateral flexion
- Golf stance, arms right handed backswing position, cervical rotation left
- Golf stance, arms left handed backswing position, cervical rotation right

DISCUSSION OF TRANSVERSE AND FRONTAL PLANE LIMITATION IN THE GOLF SWING

CERVICAL RANGE OF MOTION WITH PALPATION
- Symmetrical stance, arms flexing and extending, palpation exam
- Symmetrical stance, arms abducting and adducting, palpation exam
- Symmetrical stance, arms horizontally rotating, palpation exam

DISCUSSION OF PALPATION EXAM, ROTATED VERTEBRAE AND SYMPTOMS

“FIXING IT AND KEEPING IT FIXED” - G. GRAY

“THE TWO THINGS YOU CAN’T DO TODAY ARE THE TWO THINGS WE ARE NOT GOING TO DO TODAY” - G. GRAY

RECHECK EXAMINATION FOR SPECIFIC TEST MEASUREMENTS
- Symmetrical stance, arms horizontally rotated left, cervical reaction
- Symmetrical stance, arms horizontally rotated right, cervical reaction

SUMMARY OF CASE PRESENTATION AND ANTICIPATED GOALS

ANALYSIS DEBRIEF WITH BOB WIERSMA, P.T.
- An isolated integrated case
- Importance of history
- Cervical pain and headaches
- Hamstrings and headaches
- Balance testing, pelvic motions, swivel effect
- 3D bottom up driving
- Traditional range of motion tests
- 3D bottom up positioning
GARY’S OPPORTUNITY TO WORK WITH TERI

- Chain Reaction™ approach to treat problem
- Discussing the bottom up indirect approach
- Trying to get symmetrical rotation and symmetrical lateral flexion
- Discussing the successful sagittal plane in motion
- Home program to take advantage of what we accomplish during treatment session
- Getting rid of the headaches

FUNCTIONAL MANUAL THERAPY ON THE TRUESTRETCH™

- Hip flexion with cervical flexion
- Hip extension with cervical flexion
- Shoulders flexed, hip flexion, cervical flexed
- Shoulders flexed, hip extension, cervical extended
- Left shoulder abducted, left hip adduction, cervical laterally flexed left
- Right shoulder abducted, right hip adduction, cervical laterally flexed right
- Right shoulder abducted, right hip adduction, cervical laterally flexed left
- Left shoulder abducted, left hip adduction, cervical laterally flexed right
- Arms horizontally rotated right, right hip internal rotation, cervical rotation right
- Arms horizontally rotated left, left hip internal rotation, cervical rotation left

DISCUSSION OF PROGRESSION OF TREATMENT

HOMEWORKABLE EXERCISES

- Eyes fixed, alternate anterior lunges with bilateral arm overhead reach
- Eyes fixed, alternate anterior lunges with bilateral arm anterior reach
- Eyes fixed, alternate lateral lunges with bilateral arm overhead lateral opposite side
- Alternate posterior/lateral rotational lunges with bilateral arm rotational reach same side
DISCUSSION OF FREE WEIGHT OVERHEAD MATRIX AND 3D JUMPING JACK MATRIX

RECHECK EXAMINATION
• Golf stance, arms right handed backswing position, cervical rotation left
• Golf stance, arms left handed backswing position, cervical rotation right
• Symmetrical stance, right arm abducted, cervical lateral flexion right

REHABILITATION DEBRIEF WITH BOB WIERMSA, P.T.
• C7 rotated to the left
• Biomechanically driving the vertebrae back home versus “cranking it back”
• Bottom up approach
• Top down strategy . . . positioning three dimensionally below
• Pure passive mobilization
• Proprioceptively enriched manual therapy
• TrueStretch™ cheat sheets
• Consistency of treatment . . . “making me look good”
• Hands . . . reinforce the biomechanically consistent motion of function, considering all three planes of motion
• Discussion of anticipated progress
• “Proof of the pudding” - G. Gray
THREE DIMENSIONAL CERVICAL SPINE WORKOUT
The Matrix with enhanced cervical motion

THREE DIMENSIONAL CERVICAL MATRIX
• Anterior lunge, BL arm rotation same, cervical rotation same
• Anterior lunge, BL arm rotation opposite, cervical rotation opposite
• Anterior lunge, BL arm rotation same, eyes fixed anterior
• Anterior lunge, BL arm rotation opposite, eyes fixed anterior
• Anterior lunge, BL arm rotation same, cervical rotation opposite
• Anterior lunge, BL arm rotation opposite, cervical rotation same
• Lateral lunge, BL arm rotation same, cervical rotation same
• Lateral lunge, BL arm rotation opposite, cervical rotation opposite
• Lateral lunge, BL arm rotation same, eyes fixed anterior
• Lateral lunge, BL arm rotation opposite, eyes fixed anterior
• Lateral lunge, BL arm rotation same, cervical rotation opposite
• Lateral lunge, BL arm rotation opposite, cervical rotation same
• Posterior/lateral rotational lunge, BL arm rotation same, cervical rotation same
• Posterior/lateral rotational lunge, BL arm rotation opposite, cervical rotation opposite
• Posterior/lateral rotational lunge, BL arm rotation same, eyes fixed anterior
• Posterior/lateral rotational lunge, BL arm rotation opposite, eyes fixed anterior
• Posterior/lateral rotational lunge, BL arm rotation same, cervical rotation opposite
• Posterior/lateral rotational lunge, BL arm rotation opposite, cervical rotation same
HEAD HALTER BUNGEE CORD EXERCISES

- Anterior pull, two footed jumps - sagittal plane
- Anterior pull, two footed jumps - frontal plane
- Anterior pull, two footed jumps - transverse plane
- Posterior pull, two footed jumps - sagittal plane
- Posterior pull, two footed jumps - frontal plane
- Posterior pull, two footed jumps - transverse plane
- Lateral pull (both sides), two footed jumps in the sagittal, frontal, and transverse planes

Description of rotational pulls

- Anterior pull, two footed jumps - sagittal plane, transverse plane arms
- Anterior pull, two footed jumps - frontal plane, transverse plane arms
- Anterior pull, two footed jumps - frontal plane, frontal plane arms
- Anterior pull, two footed jumps - transverse plane, transverse plane arms
- Anterior pull, two footed jumps - transverse plane, sagittal plane arms
- Anterior pull, two footed jumps - transverse plane, frontal plane arms

Description of posterior, lateral and rotational pulls with same strategy

THANKING BRAD FOR HIS HARD WORK AND ENCOURAGEMENT
“The cervical spine in golf may in fact be the most inhibiting factor to a productive golf swing” - G. Gray

Limited cervical motion, which begins to drive motion of the head, will demand the eyes to tell the entire system to stop the backswing and begin the downswing, therefore preventing a powerful load.

The cervical spine can limit the ability of the body to get to the optimal transformation point.

On the other end of the swing, in the follow through, limited cervical motion can cause an early “bailing out”.

CERVICAL SPINE RELEASE DRILL

• Convince the body, the head and the eyes it is okay to move in the same direction as the pelvis and the trunk.

• Looking back drill - rotating head to the right during the backswing

• Looking forward drill - rotating the head to the left during the downswing
CERVICAL SPINE BIAS DRILL

• Looking at a ball placed behind my ball in order to facilitate a functional follow through mobilization

• Looking at a ball in front of my ball in order to facilitate a functional backswing mobilization

YES & NO DRILL

• Tweaking the cervical spine, head, eyes and proprioceptors by shaking the head yes during the entire golf swing and then shaking the head no during the entire golf swing.

“The cervical spine range drills transform the cervical spine from being the inhibiting factor to the full golf swing to the facilitating factor for a powerful golf swing.” - G. Gray
RESEARCH ROUNDTABLE WITH DR. DAVID TIBERIO

The challenge of the cervical spine

Discussion of research article
R. Evans, DC MS, G. Bronfort, DC, PhD, Brian Nelson MD, CH Goldsmith, PhD.
Two-Year Follow-up of a Randomized Clinical Trial Spinal Manipulation and Two Types of Exercise for Patients with Chronic Neck Pain. SPINE Vol. 27, Number 21, 2002: pp 2383-2389

This particular research article concluded that exercise, along with or in conjunction with manipulative treatment, was significantly helpful in substantially decreasing cervical pain, and that two years later the pain was still under control.

“Exercise has to be the common thread to all that we do.” - G. Gray

Because of compensations the ideal program combines functional mobilization with proper Chain Reaction™ exercises.

“Understanding the biomechanical feeding through the system, Chain Reaction™ therapy treats the foundation of cervical dysfunction.” - D. Tiberio

The cervical muscles get “turned on” by the slant of the shoulders and/or of the head.

The study was documented by subjective reports.

Objective functional test need to complement the subjective reports.

“The glitchin’ going on (measured objectively) many times precedes the subjective symptoms.” - G. Gray

Understanding relative rotation in all three planes

Discussion of preferred but not obligatory attractor wells of 3D Coupling

The need to prepare for all possible rotations, on the surface seems very complex, but actually is based on solid and simple biomechanical principles.
The strategy of cervical exercises including the following:

• Three planes of motion
• Driven from right and left, top and bottom
• Driven from gravity
• Quick and reactive
• Eye driven, breathing driven, reactive driven
• Application of tweaking
• What is best for each patient
• Treating the cause and compensations as well as the symptoms
• Feeding the neck good functional stimulation

“The key to neck rehabilitation may be ‘foot speed’ . . . the midtarsal joint might be the primary feeder for effective cervical spine functional feeding through the Chain Reaction™ with the proper application of tweaking.” - G. Gray

Thank you to Dr. David Tiberio