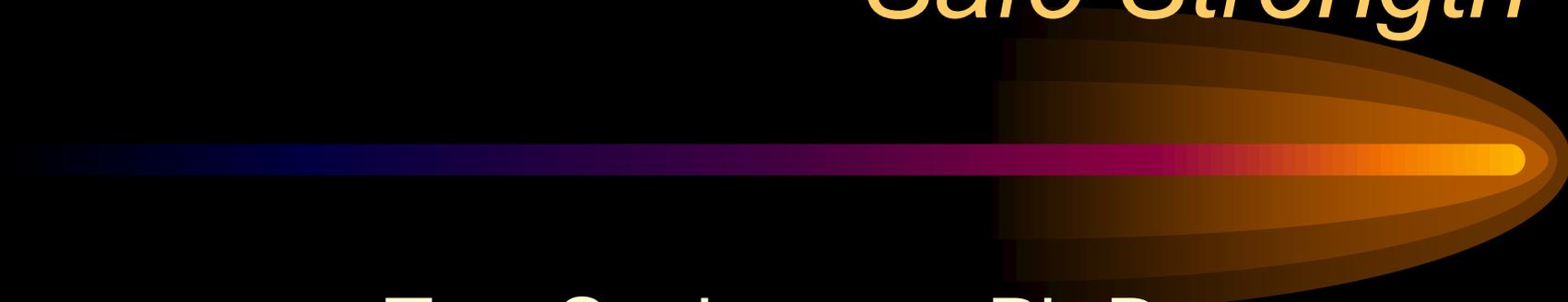


Safe Strength



Tom Seabourne, Ph.D.

- 
- *“Scientific research cannot support the novel systems that pop up in magazines and on the Internet at an astounding rate. You will do well to ignore fads and follow well-tested approaches validated both by research and in competition.” – Tudor Bompa*

TRADITION



- **1960s Universal and Nautilus** - resistance machines to **isolate muscles**.
- Isolation of body parts, **high training volumes**, moderate to high intensity.

AESTHETICS



- The **aesthetics** of bodybuilding has not optimized performance for coaches, athletes and individuals looking for better **function**.

FUNCTION



- **Train movements not muscles.**
- **Mimic the movement** one is trying to improve - enhances coordination, rhythm and timing of a movement, provides greater transfer from the training to the target activity.

COSMETIC VS. FUNCTION

- Laboratory movement vs. Real move
- Artificial moves vs. Natural
- Rigid structure vs. Flexible
- Isolating muscles vs. Integration
- No gravity vs. Gravity
- No proprio vs. Proprio
- Link-like vs. Chain-like

PERIODIZATION



- Structuring the client's program:

anatomical adaptation,

hypertrophy,

maximum strength

muscle definition

transition (rest)

ONE REP



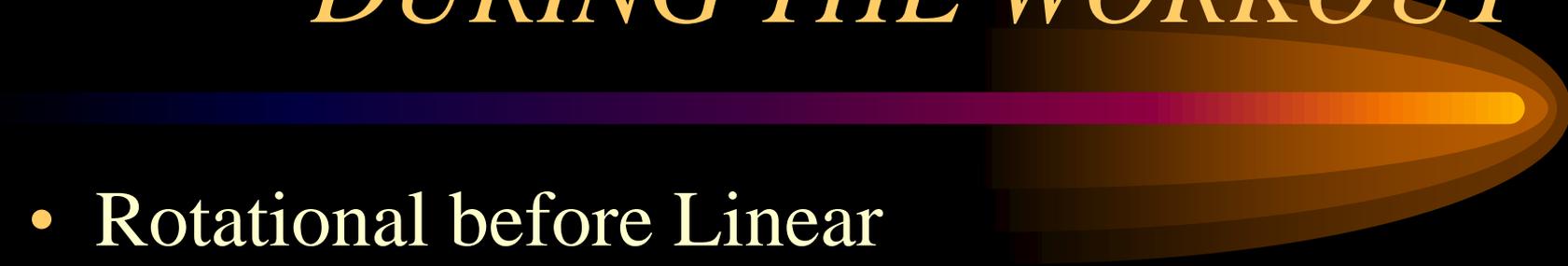
- | | |
|--------------|------------|
| • Load | Unload |
| • Stretch | Shorten |
| • Absorb | Propel |
| • Decelerate | Accelerate |
| • Eccentric | Concentric |
| • Pronate | Supinate |

Over Time, Progress from:

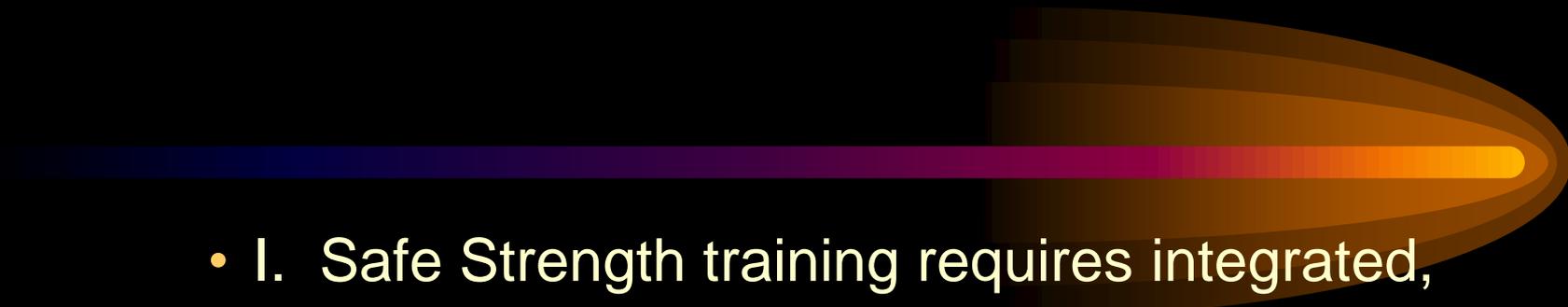


- Easy to Hard
- Simple to Complex
- Body weight before External Weight
- Stable before Unstable

DURING THE WORKOUT



- Rotational before Linear
- Integrated movement patterns before basic
- Internal before External
- Power before Endurance

- 
- I. Safe Strength training requires integrated, multi-planar movement involving acceleration, deceleration, and stabilization.

- **PICK UP CHAIR NO ONE WATCHING**
- **OVERLOAD PRINCIPLE, GOLGI TENDON ORGAN**

- 
- Properly accomplished, resistance training produces concentric force, isometric stabilization, and eccentric deceleration force in all three planes
 - **CONCENTRIC, ACTIN/MYOSIN**
 - **ISOMETRIC – POSTURAL SWAY**
 - **ECCENTRIC, LENGTHENING**

Tools

- b. Strength training is not an isolated event in a single plane of motion
- **BODY WEIGHT, TUBING, AIREX MATS, FOAM ROLLS, BODY BLADE, CABLES, STABILITY BALLS, MEDICINE BALLS, BANDS, BODY WEIGHT, FREE WEIGHT, DYNA DISCS, DUMBBELLS, FOCUS MITTS**

BREATHING

- “The **Valsalva maneuver** associated with breath-holding plays a vital role in increasing the intra-abdominal pressure to support and stabilize the lumbar spine during heavy lifting.” - Mel Siff

INTER- INTRAMUSCULAR COORDINATION

- c. Neuromuscular efficiency is the ability of all muscles in the kinetic chain (agonists, antagonists, synergists, stabilizers).
- **TIMING - SERAPE EFFECT**
- **THROWING A BALL, SERVING A BALL**
- **TENNIS ELBOW? MUSCLES WEAK**
- **SHOULDER PROBLEMS, ABS**

FLEXIBLE STRENGTH

- d. All muscles operate within a muscle action spectrum
- **STEP OFF CURB, HAMSTRING**
- **INCREASE AI STRENGTH TO INCREASE ROM**
- **INCREASE ROM WITHOUT STRENGTH = INJURY**

OPTIMAL RANGE OF MOTION

- **Length-tension relationship-** length at which muscle produces greatest force.
- Optimal muscle length at which actin and myosin filaments in the sarcomere have the **greatest degree of overlap**
- 1.2 X Resting length: Myosin to make **maximal amount of connections with actin.**

BALANCE AND IMBALANCE

- e. You may be very strong and flexible, but if the nervous system isn't activating all of your muscles correctly - imbalance
- **ROUND SHOULDERS, PELVIC TILT, "MUSCLE HEAD" - NO TRANSVERSE, FRONTAL PLANE MOVE**
- **STRONG MUSCLES-STRONGER, WEAK MUSCLES-ATROPHY**

PREVENTING INJURY



- 1. FOOT PROBLEM
- 2. GLUTEUS GETS WEAK...
- 3. HIP FLEXOR HYPERTONIC
- OVERUSE INJURIES - MAY BE PROBLEM OTHER THAN SPECIFIC AREA; JOINT ABOVE OR BELOW INJURY SITE.

BALANCE OF STRENGTH AND FLEXIBILITY

- OLDER ADULTS SAGITTAL, LOSE FRONTAL AND TRANSVERSE; DOC SAYS, “DON’T TWIST”.
- TIGHT MUSCLES CAN’T WORK IN ALL PLANES, INHIBIT ANTAGONIST.
- ABS WEAK, BACK MUST WORK HARDER.

STRETCH OR STRENGTHEN?

- **INCREASE ABS STRENGTH = INCREASE ROM OF SIT AND REACH**
- **DON'T STRETCH PRIOR TO ACTIVITY = LESS CROSS BRIDGING**
- **KNEE "GIVES OUT" BODY RECOGNIZES NOT GOOD POSITION**



Abs

- ABS DECELERATE MOTION IN THREE PLANES, THEN ACCELERATE
- ABS DECELERATE SPINAL EX.
- HIP EXTENSION - ABS - THROW

POSTURE

- *Screening fundamental movements will demonstrate significant limitations and asymmetries, and will also help to narrow the focus of problem areas within the human body.*

POSTURE

- *Correction of posture takes precedence over aesthetic, gender driven exercises such as men wanting to do bench press and biceps curls, and women over indulging in abductor and adductor exercises.*

KNEE OVER TOE?



- SQUAT -
- High arch: knee goes varus (lateral)
- Flat foot: knee goes valgus (medial)

ASSESSMENTS

- *Muscle imbalance findings must influence exercise selection. The alternative is chronic, re-occurring muscle and joint injury*
- *The sport or activity being performed will serve as the foundation from which your biomechanical assessment determines exercises selected*

GOALS

- *Client goals will influence exercise selection, BUT SHOULD NOT BE THE SOLE DRIVING FORCE BEHIND THE SELECTION PROCESS*
- *A CLIENT'S GOALS MAY NOT BE THE BEST THING FOR THEIR MUSCULOSKELETAL HEALTH*

RE-INJURY

- *Orthopedic injury will certainly hamper exercise selection. The client presenting incomplete recovery from injury can be very easily re-injured.*
- ***THIS IS THE GREATEST PREDICTOR OF INJURY***

STABILITY



- f. Stabilization is as important as strength.
- **BODY SENSES STABILITY, IT RELAXES (E.G. STAND ON ICE)**

STRENGTH AND STABILITY



- **WEAK MUSCLES = INSTABILITY, STRONG MUSCLES OVERWORKED = PAIN**
- **STABLE ROM - BE SURE YOU HAVE THE STRENGTH**

COMPENSATION

- II. KINETIC CHAIN CONCEPTS
- a. If one muscle is weak (gluteus maximus) then other muscles (erector spinae and hamstrings) compensate - synergistic dominance.
- **YOU WILL GET TO REFRIGERATOR**
- **WE ARE COMPENSATION MASTERS**

HOLISTIC APPROACH TO TRAINING



- **'ITIS' HAS A MUSCULAR ROOT – (EG PATELLAR TENDINITIS)**
- **MUSCLES – ANKLE SPRAIN**
- **GLUTEUS MEDIUS WEAK, GLUTEUS MAXIMUS IS OVERWORKED, TONIC.**
- **PAIN NOT ALWAYS WHERE WE THINK IT IS, KNEE PROBLEM FROM FOOT**

STRETCH TIGHT MUSCLES

- one muscle is tight (psoas) than the functional antagonists (gluteus maximus, transverse abdominus, internal oblique, multifidus, and deep erector spinae) demonstrate decreased neural drive and delayed onset.

STRETCH OR STRENGTHEN?

- **PLANTAR FASCITIS LEADS TO OVERWORKED HIP FLEXOR**
- **TRAPS TIGHT STRETCH?
STRENGTHEN SERRATUS ELEVATE
SCAPULA**

PROGRESSIVE OVERLOAD



- Proper exercise progression is important when designing a safe strength-training program. The integrated continuum utilizes the following concepts for progression-

SMART STAGES



- **Slow to fast**
- **Simple to complex**
- **Static to dynamic**
- **Correct execution to increased intensity**
- **Body weight before external weight**

STRENGTHEN THE RIGHT MUSCLES

- **PREPARE THE BODY FOR WHAT WE ASK IT TO DO**
- **PROGRESSIVE EXERCISE CAN MAKE US DYSFUNCTIONAL**
- **CHIROPRACTOR WEEKLY BECAUSE MUSCLES AREN'T HOLDING**

FLEXIBLE STRENGTH



- **STRENGTH + FLEXIBILITY =
MARTIAL ARTIST; DANCERS
INJURED**

- **IF TIGHT BICEPS, WEAK TRICEPS**

TWEAKING THE PROGRAM



- **PAIRED EXERCISE -SUPERSETS**
- **PERIODIZATION PRINCIPLES**
- **DEVELOP A FOUNDATION FIRST**
- **ADEQUATE REST INTERVALS**

FIND THE RIGHT ANGLE

- **48-72 HOURS REST BETWEEN SESSIONS**
 - d. Simply stated, no muscle works alone to produce movement.
 - **ALTER ROM ON AN EXERCISE TO STAY BELOW PAIN? DUMBBELLS**

BALANCE THE BODY

- **BODY STAYS IN STRONG ROM**
- **STRONG MUSCLES STAY STRONG,
WEAK STAY WEAK**
- **2 MUSCLES DOING WORK OF 3 =
PAIN, ALL MUSCLES**

ANTAGONIST MUSCLE GROUPS



- e. In order to properly accelerate and decelerate joint motion in all directions it is necessary to have opposing prime movers or muscles that act opposite of each other.
- **TIB ANTERIOR/GASTROC**
- **QUAD/HAM**

AGONIST/ANTAGONIST



- **ABS/QL**
- **CHEST/BACK**
- **ROTATOR CUFF EXERCISES, IF ONE IS WEAK AND ONE IS TOO STRONG?**
- **“I NEED TO STRETCH HAMS” – NO YOU NEED TO STRENGTHEN QUAD**

LINK OR CHAIN?



- f. Consider your client's body a power chain.
- **OKAY TO TRAIN ISOLATED BODY PARTS**
- **CAN THE MUSCLE CONTRACT NOW!**

POWER TRAINING

- III. ECCENTRIC PLYO POWER, IS IT SAFE?
 - a. The speed in which the eccentric force occurs following a concentric force is also important to athletic performance.

PLYOPUSHUPS, PRE-STRETCH TO 1.2 x RESTING LENGTH, CABLE

DEVELOP GOOD HABITS



- b. A stronger athlete is a better athlete.
- **DEVELOP A MOTOR PROGRAM**
- **1000'S OF REPS**

SPECIFICITY OF TRAINING

- IV. GET READY TO RUMBLE
- Most athletes have a hard time understanding sports specific training.
- **WHERE IS THE BODY VULNERABLE? PROTECT IT**
- **MUSCULAR ENDURANCE SPECIFIC**
 - **PIANIST CAN'T RUN A MILE**

THE REAL WORLD

- **BAD ALIGNMENT CAUSES PAIN (POSTURE)**
- **“DON’T LET KNEE GO PAST BIG TOE?” –WALKING DOWN STAIRS?**
 - a. Balance is a very important part of your agility.
- **PROGRESS FROM DAY 1 - BALANCE DRILLS**

TO WEAR SHOES OR NOT

- *Modern running shoes reduce sensory feedback, apparently without diminishing injury-inducing impact—a process Robbins and Gouw (1991) described as the "perceptual illusion" of athletic footwear. A resulting*

ARE SHOES GOOD OR BAD?

- *“Once the natural foot structures are weakened by long-term footwear use, people have to rely on the external support of the footwear, but the support does not match that provided by a well functioning foot” - Yessis*

TO BRACE OR NOT



- **WEIGHT BELTS?**
- **KNEE BRACES?**
- **ANKLE BRACES?**
- **ORTHOTICS?**

EXERCISE FOR PERFORMANCE



- b. If you are leaning in one direction, your opponent will beat you in the other direction.
- **REACTION TIME DRILLS**
- **ONE LEGGED CABLE EXERCISE**

AGILITY



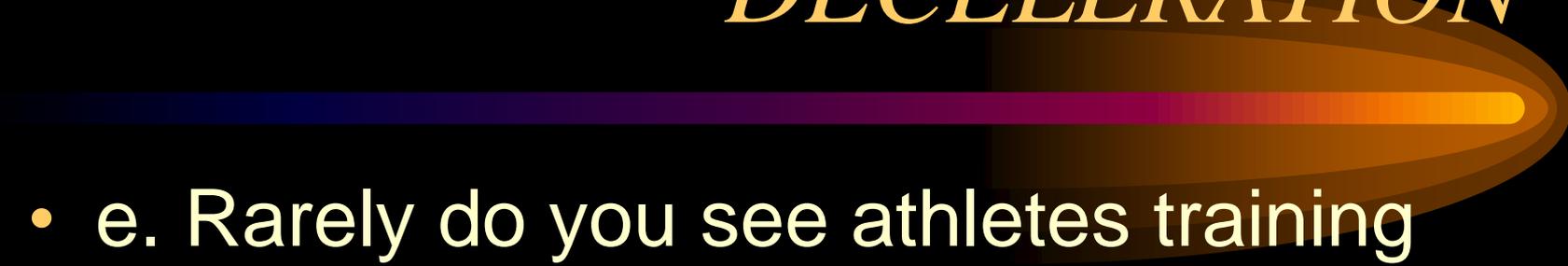
- c. Agility is the ability to change your body position or direction in a fast, fluid way.
- **SLIP A PUNCH**
- **DEFENSIVE SIDE KICK**

ACCELERATION



- d. Acceleration is the ability to increase speed quickly.
- **RACKET HEAD SPEED**
- **SHUFFLE DRILLS**
- **Bench press - without preload?**

DECELERATION



- e. Rarely do you see athletes training deceleration.
- **SHORT STEPS FORWARD/BACK**
- **STOP A PUNCH WITH FOCUS**

NEURAL BRAIN POWER



- The best way to improve **muscle power** is **to train with faster movements**. There are several reasons for this difference, one of which is the brain. It seems that our brains organize fast and slow movements differently and may be evidence for neural adaptation.

POWER LIFTING

- **STARTING METHODS**

- **Static Start.**
- **Unprestretched Static Start.** Hands gripping the bar, body fixed in typical fairly upright starting position, lifter applies a well controlled, steady upward pulling force.
- **Prestretch Static Start.** Hands gripping bar, butt/hips raised, lifter slowly lowers butt, pretenses all relevant muscles and starts a well-controlled upward pull.

POWER LIFTING

- **Dive Start from Standing Position.** Hands not on bar, lifter aims grip at bar and tries to pull the bar rapidly off the platform.

- **Dive Start from Crouching ("Get Set") Position.** Hands on the bar, butt high, lifter dips the hips suddenly, strongly prestretches the quads, glutes etc and tries to pull the bar rapidly upwards.

POWER LIFTING

- **Rocking or Bouncing Start.** Hands on the bar, the lifter powerfully ‘bounces’ the butt up and down for one or more repetitions in an attempt to strongly prestretch all muscles directly connected with the pull, such as the glutes, hamstrings and quadriceps. Russian research has shown that a quick double prestretching dip tends to give the best results, but that timing of the bounces is vital.

POWER SEQUENCE

- **Jump squats/push throws** are exercises that requires jumping/throwing (a pressing motion with a release of the resistance) with an external load (– i.e. **medicine ball**) of low to moderate intensity (10-40% of 1 RM), which will depend on the level of the client.

POWER LIFTING

The parts of Olympic lifts with the highest power outputs:

- **2nd pull** – bar moving from knees to chest–
- **The jerk**
- If power output is the main focus of your training then performing the **full version** of the Olympic lifts may **not be necessary**.

COMPLEX TRAINING

- **Complex training** is the combined use of a **high intensity (85-100%) strength exercise** (squat, bench, etc.) followed by a **low intensity, high-speed exercise** or a **plyometric exercise**. An example of complex training would be performing squats followed by jump squats.