Principles of RAW: Strength, Endurance and Movement Skills

2011
Components of RAW

- Functional Fitness
  - *Strength*
  - *Endurance*
  - *Movement skill*

- Performance Nutrition
  - Nutrient needs
  - Ideal body composition
  - Supplements

- Sports Medicine
  - Prevention
  - Early intervention
  - Multi-disciplinary team

- Mental Toughness
  - Ideal Performance State
  - Fatigue counter-measures
  - Endurance events
Ranger Strength

• What Strength do Rangers need?

  – Bench 350 lbs?

  OR

  – Carry 100+ pound combat load during INFIL/EXFIL for 2-6 hours
Ranger Strength

*It is about the movement, not the muscle.*

- Rangers, like athletes, need strength for lifting, carrying, fighting, lunging, climbing, and jumping.

- The concern is for the power of the movement, not the size or appearance of the muscle.
  - Goal is mission accomplishment, not beach muscles
Benefits of Strength Training

• Performance:
  • Can you perform in full kit, over rough terrain, while controlling your weapon system
  • Can you negotiate obstacles?
  • Can you evacuate your Ranger buddy?

• Injury Prevention
  - Can your muscles control the forces acting on your body before those forces damage your joints and connective tissues?
Strength Training
How to Get Stronger:

• **Improve Coordination** (Neural Adaptation)
  – nerve to muscle messages improve
  – starts early in the training cycle

• **Grow Muscle** (Muscular Hypertrophy)
  – training stimulates bigger muscle fibers
  – usually takes a couple months of training
Strength Continuum

Low

“Resistance”

“Repetitions”

High

High

Low

ENDURANCE

STRENGTH
Strength Training
What is Functional Strength?

- Strength in 3D versus a single plane
  - Examples: Turkish Get Ups, Lunges with rotation
- Multiple-joint, multi-muscle
  - Examples: Squat, Ground Base
- The exercise looks like the task and presents similar balance demands
  - Example: Deadlift
Stabilization

• Prerequisite for all training

• You should be able to support internal resistance (body weight) before you use external resistance

• Control core muscle group before loading external muscle groups

• Proximal stability before distal mobility
Power

- Power means creating force rapidly
- Form is IMPORTANT for performance and safety
- Requires *Stabilization*

Example: Rising from the ground and sprinting to the next covered position.
RAW Functional Fitness
End State

• **Strength** sufficient for
  – load carriage
  – Individual movement
    • Climb
    • Crawl
    • Sprint
    • Squat
    • Lunge
    • Plant/cut
    • Jump/land
  – CASEVAC
Strength Training

• Heavy Resistance
  – Traditional push/pull lifts
  – Based on 4-rep max

• Power Endurance
  – Mid-level reps/resistance
  – Ground Base equipment
  – Functional positions

• Muscular Endurance
  – Body-weight
  – Higher reps
  – Calisthenics, ropes, etc
Essentials of RAW Strength Training

Muscle Endurance
- Body-weight Resistance
Power-Endurance
- Medium Resistance
  - Ex: Ground Base
Heavy Resistance
- Traditional lifts
  - Push, Pull, Upper/Lower Body
  - Based on 4RM
Ranger - Athlete – Warrior

Endurance Training
ENDURANCE
Aerobic vs. Anaerobic

• Endurance = ability to sustain activity
• Aerobic Activities are:
  – Sustained, sub-maximal
• Anaerobic Activities are:
  – Intermittent, near maximal to maximal effort
Endurance Training

**Aerobic**
- Continuous
- Low-Mod Intensity
- Distance Running, Roadmarching

**Anaerobic**
- Intermittent
- High-Intensity
- Intervals, calisthenics, jumping, lifting

Most activities are a combination of the two.
# ENDURANCE
## Energy System Continuum

<table>
<thead>
<tr>
<th>Activity</th>
<th>Aerobic</th>
<th>Anaerobic</th>
</tr>
</thead>
<tbody>
<tr>
<td>440 yards sprint</td>
<td>5%</td>
<td>95%</td>
</tr>
<tr>
<td>1 mile run max effort</td>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td>2 mile run going for broke</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>10k run personal best effort</td>
<td>80%</td>
<td>20%</td>
</tr>
</tbody>
</table>
ENDURANCE
Aerobic vs. Anaerobic Training

• **Aerobic training** does little to enhance anaerobic capacity
  - Marathoners get winded quickly playing basketball, soccer, etc
  - However, aerobic fitness improves recovery from anaerobic events

• **Anaerobic training** does enhance one’s aerobic capacity.
  - Power-endurance intervals improve 5-mile run time.
Muscle Recruitment by Fiber Type

![Graph showing muscle recruitment by fiber type](image-url)
Effect of Exercise Intensity on Metabolism
Oxygen Deficit and Oxygen Debt
Effect of Detraining

HR and LA increased for the same submaximal work test during detraining.
Essentials of RAW
Endurance Training

- Intervals
  - 30/30s, 400M, 800M
  - Tabata intervals
    - 20s work/10s rest
    - Repeat x8
- 30-60 min. Sustained Runs
  - Fast Continuous (tempo run)
  - Slow Continuous
- Fartlek Run
- Foot March
  - Traditional
  - Short, fast, light
- Swimming
- Cardio Machines
- Hybrid Drills
  - Power + Endurance
  - CrossFit, Gym Jones, etc.
Sample Hybrid Workout

• Turkish Get-Ups
  – 8-12 reps with each arm
• Ground Base Combo Twist (L/R, 3x20s)
• Kettle-Bell Swings (3-4x15)
• MedBall Throws (variable parameters)
• AirSquat/Push-ups/Pull-ups
  – 15/10/5 reps per minute x 15-30 minutes
• Anaerobic Big Finish (race pace)
  – Row (500M), Run (400/800M), Bike (max distance in 2-minutes)
Lower Extremity X-Training

• Pool (swimming and deep-water running)
  – Benefit: Unloads the skeleton while strengthening the running muscles
  – Drawbacks: Relatively slow speed

• Bike
  – Benefit: Allows for fast movement at light or moderate resistance
  – Drawbacks: Seated posture is unlike most other athletic movements
Lower Extremity X-Training

• Step
  – Benefit: Low stress on joints; improves endurance/strength of climbing muscles
  – Drawbacks: Short stride

• Elliptical
  – Benefit: Low stress on joints; allows striding
  – Drawbacks: Finding correct stride; some machines feel “too easy”
Ranger - Athlete – Warrior

Movement Skills
Movement Skills

- Balance
- Coordination
- Lunge
- Squat
- Lifting
- Pushing
- Pulling

- Climb
- Crawl
- Plant and cut
- Jump and land
- Run efficiently
- Throwing
- Core Stability
Movement Skill Training

• Teach technique; demand proper execution

• You need to be fresh to master complex movements
  – Don’t smoke your guys and then expect them to do well with agility/power drills or with obstacles.

• Schedule movement skills training right after Movement Prep
The effect of mobility and stability on power

Load.......in order to..... Unload
LE Chain Effects

1. Poor pelvic stability
2. Femoral IR
3. Knee valgus
4. Tibial IR
5. Foot pronation
Balance
Stability on the Ground
Stability on Your Feet
Reactive Stability
Integrating Mobility & Stability

Lifting from the Ground to Overhead
Integrating Mobility & Stability

Turkish Get Up

Kettle-Bell Swings
Agility

Mastering body lean…integrating legs and trunk
Triple Extension
Mobility-Stability Assessment

• Assesses kinetic chain function
• Evaluation is an on-going process
  – all exercises are evaluated all of the time
  – execution of the movements and overall response to the training challenges determines the direction of future rehab events.
• Tools such as the Functional Movement Screen (FMS) can be useful
  – If you don’t score a “3” on the deep squat, you shouldn’t overhead squat
Foot

- Primary stability deficit: Control of pronation

- Mobility is seldom an issue
  - Key exception: Extension of hallux

- Key interventions
  - Single-leg stance activities
  - Bare feet increases the sensory stimulus
  - Train lateral movements
  - Systematically train on uneven terrain
Ankle

- Primary mobility deficit: *Dorsiflexion*

- Primary stability deficit: *Control of inversion*

- Key interventions
  - 2-part, multi-planar calf stretch
  - Single-leg stance activities
  - Bare feet increases the sensory stimulus
  - Systematically train on uneven terrain
Knee

• Primary stability deficit
  – Control of medial collapse
Knee

- Key interventions
  - Integrated stimulus to trunk, hip and knee stabilizers
  - Single-leg activities
Hip

• Key interventions
  • Single-leg stance activities
  • Lateral steps with resistance bands
  • Lateral hops
  • Lunges with rotation
  • Systematically train on uneven terrain
Low Back

Key interventions

• Awareness of neutral spine position

• Awareness of bracing maneuver

• Awareness of breathing and modulation of stiffness
Thoracic Spine

• Primary mobility deficit
  • *Thoracic rotation*

• Stability of this region is generally not a concern

• Lack of mobility forces other segments to compensate
  • L-spine, GHJ

• Primary Intervention
  • Use of foam roll, stretching, or manipulation
Shoulder Girdle

• **Stability Demands**
  • Control of the shoulder blades
  • Control of the ball in the socket
Shoulder Girdle

Key Functions:

- **Transfer of power from legs, through the trunk, to the hands**
- **Stabilize a load**
There are many ways to succeed…and there are a few ways to fail.

If you understand and apply the principles of training, you will succeed.