

# **Functional Isometric Training for Sport**

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# Intro

- Schroeder
- Our Interpretation
- Not our entire system
- Think Critically

# Efficiency

- Acting or producing effectively with a minimum of waste, expense, or unnecessary effort.
- Movement, Energetics, Force Reduction/Production
- TRAINING

# Theory

- Positioning - Force Absorption
- Tension is the key to training
- Methods of increasing tension
- Isometrics to increase tension
- Maximal recruitment carry-over
- Increase strength at weak ROM's
- Injury Reduction

# Benefits

- Postural Results
- Mental Toughness - Confidence

# Benefits

- Maximal Recruitment of muscle fibers

-5% more recruitment with 6 second Iso

*(Babault et al. 2001)*

-recruit all fibers (theoretically) w/o wear  
and tear on joints

*(Allen et al. 1995, Allen et al. 1998, Belanger and McComas, 1981, De Serres and Enoka 1998, Gandeiva et al. 1998, Gandevia and McKenzie, 1988, Merton 1954, Newham et al. 1991, Yue et al. 2000)*

# Benefits

- Increased Lactic Acid Tolerance
- Hypertrophy w/o wear and tear on joints

*(Kanchisa et al. 2002)*

# Benefits

- **SAFE**

# Benefits

- Movement Screen – Assess weaknesses
- Flexibility/Mobility – EQI  
*(Theory and Application of Modern Strength and Power Methods by Christian Thibaudeau)*
- Develop Strength in Weak ROM's

# Drawbacks

- Intent Required
- Develop Strength in small ROM
- Difficult to Quantify
  - tough to convince athletes

# Maximal Muscular Tension

- **Maximal Effort Method** – lifting a max load
  - **Repeated Effort Method** – lifting a non-maximal load to failure; muscles develop maximum force possible in a fatigued state
  - **Dynamic Effort Method** – lifting (throwing) a non-maximal load with the highest attainable speed
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- *Zatsiorsky, V. Science and Practice of Strength Training. 1995.*

# Nervous System

- 3 Options for varying muscle force production:
  1. **Recruitment** — total force production result of adding or subtracting active motor units
  2. **Rate Coding** — changing the firing rate of motor units
  3. **Synchronization** — activation of motor units in a more or less synchronized way

*Zatsiorsky, V. Science and Practice of Strength Training. 1995.*

# Max Muscular Force

- Achieved when:
  1. Max number of ST and FT motor units are recruited
  2. Rate coding is optimal to produce a fused tetanus in each motor unit  
AND
  3. MU's work synchronously over the short period of max voluntary effort

# Psychological Factors

- Baby under Car (“life or death” situations)
- CNS increases the flow of excitatory stimuli or
- ↓ inhibitory influence to motor units or both
- Training can (hopefully) ↓ CNS inhibition; therefore increasing the number of recruitable motor units and therefore increase force production potential

# Types of Isometrics

- **Yielding** — eccentric in nature
- **Overcoming** — concentric in nature
- **Mixed Regime** — combined isometric and dynamic (iso-miometric or iso-ballistic)
- **NMA** — Partner or mechanically assisted to facilitate (“turn on”) muscles

# Isometric Positions

- PAP (Prime Anatomical Position)
  - Posture
  - Injury Reduction
  - Contracted Position
- CJP (Critical Joint Position)
  - Least Biomechanical Position
  - Force Manipulation Ability
  - Stretched Position

# Exercise Positions

- **SQUAT**
- **SPLIT  
SQUAT/LUNGE**
- **PUSHUP**

# Other Positions

- **GLUTE HAM**
- **INVERTED ROW**
- **BICEP CURL**
- **SLDL**
- **BALANCE EXERCISES**
- **CORE/TORSO EXCERCISES**

# Periodization/Progression

- Not the same all the time
- Bring athletes to higher levels
- Hypertrophy before Strength  
before Power before Power  
Endurance
- Progress to more dynamic

# Iso-Explosive Progression

- **Goals**
- **Phase 1**  
Yielding Iso
- **Phase 2**  
Overcoming Iso
- **Phase 3**  
EDI
- **Phase 4**  
Drop + Iso
- **Phase 5**  
Drop + EDI

# How do we do it?

- Goal dependent
- Activation – before speed/plyos/lift
- Strength – during training
- Hypertrophy/Mental Toughness – end of workout