Dry-Land Training for Top US Swimmers

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Specific Areas to be Improved Through Resistance Training

• Start/Dive
• Streamline body position
• Powerful Strokes
• Stronger body rotation
• Power down and up-kicks
• Turns
Swimming Velocity – Land Strength (SD)

\[ Y = 2.315 - 2.6014e^{-0.0548X} \]

\( r = 0.847 \)
Swimming Velocity–Swimming Strength

\[ Y = 2.315 - 1.5769e^{-0.0720X} \]

\[ r = 0.926 \]
1 RM SNATCH AND CLEAN & C &J

**POWER**

30% 50% BASIC STRENGTH 1 RM

70% 80% SNATCH AND CLEAN 1 RM

**VELOCITY**

0 0.3 0.5 Fmax P\Po

FORCE
General Guidelines for Resistance Training

• Progressive overload should be the fundamental characteristic of all resistance-training programs
  – Individualized based on
    • Experience of athlete
    • Trained state of athlete
    • Capabilities of athlete
• Sports specific
  – Strength/power demands for the sport
  – Shorter events are more dependant on strength and power than longer events
• Periodization
• Include multiple sets
General Guidelines

• The benefits to women are equal to the benefits of men
• Due to similar physiological responses women should train for strength in the same basic way as men with similar:
  – Methodologies
  – Exercises
  – Programs
General Guidelines

• Properly designed resistance training programs are safe for children
  – Can increase strength in children
  – Can enhance motor skills of children
  – Can help to decrease injury in children

• Care should be taken for both younger and older athletes in regards to both volume and intensity
  – These athletes may take longer to recover from workouts
  – Follow the sensitive periods of development for younger athletes
Strength and Power Training

• The combination of strength and power training is superior to high-velocity high-power training alone
  – Superior gains in peak power
  – Superior gains in power range
  – This means that relatively heavy loads should be incorporated into the training of athletes striving for optimal improvements in strength and power
  – Jumps and medicine ball throws are not enough
Examples of Resistance Training at Key Points

• GP (8-16 WKS): typical heavy explosive weight training with a strength endurance emphasis – improve overall strength and stability – 3-5 d/wk – various types of squats, including overhead squats – rows, pulls, and presses – heavy emphasis on mid-section (reps 5- 10/set up to 5 sets) – work on flexibility
• SP (4-12 WKS): speed-strength (high RFD and power output) – 2-3 d/wk - complexes – weighted single and double legged jumps, bounds and medicine ball throws (reps 3- 5/set up to 5 sets)
• SP (12-20 WEEKS): speed – strength (high RFD and power output) – 2 d/wk - weighted single and double legged jumps, bounds medball throws(3 -5 reps up to 3 sets)
• Mini GP (4 WKS): some general prep – emphasis on power-endurance - weighted single and double legged jump, bounds and medball throws2 d/wk - (10 – 15 reps/set up to 3 sets).
• Mini SP (4 WKS): speed-strength (high RFD and power output) – 2-3 d/wk - complexes – weighted single and double legged jumps, bounds and medball throws (reps 3- 5/set up to 3 sets)
• Active rest (1-2 WKS)
General Example of Integration Swimming and Resistance Training

• As emphasis changes – remember to alter volume of swimming or resistance training
• Do not create excessive fatigue in the weight-room when swimming is being emphasized
• Do not use more than 1-2 large muscle mass exercises per session and more than 1-2 assistance – more may be counter productive by prolonging the training session and producing unnecessary fatigue. Strength training session should never go longer than 1 hr.
• Use summated microcycles to emphasise specific patterns of stimuli
• Do not forget to incorporate heavy and light days for both swimming and strength training
• During multiple session days the emphasis should be placed on the most important aspect to be trained. – literature is somewhat contradictory here – some studies indicate swimming should come first – other literature indicates that the last trained characteristic has the greatest training effect for that day.
Dryland Training Periodization (University of Michigan, Women)

• Dryland Training
  – Vern Gambetta (www.gambetta.com)
  – Practically no shoulder problems in 3 years!
  – No specific swimming movements
  – Greater strength, fitness, flexibility
  – Significantly faster swimming!
  – Swimmers really like the training! Except for circuit, most workouts last about 25 minutes.
Functional Strength Training Principles by Gambetta

- Train movements not muscles
- Train core before extremity strength
- Train synergists before prime movers
- Train with body before external resistance
- Train strength before strength endurance
Strength Training Periodization

• Strength training phases must correlate with the swimming workouts in season and in a week.
• They must not detract from the quality of the swimming workouts.
• Power is the most important component for the sprinters strength training.
Dryland Workload Design

[Graph showing volume in minutes over weeks for general dryland, specific dryland, and swimming with resistance, with a peak competition indicator at week 20.]
Dryland Training Periodization

- Basic principles
  - Multi-plane / directional
  - Four basic types
    - Upper body, Lower body, Core, Total Body
  - Non-swimming specific movements
- Systematic manipulation of volume, intensity, and density
  - Volume
    - What are the endurance capabilities of your athletes?
  - Intensity
    - Low intensity = higher volume
    - High intensity = lower volume
  - Density
    - Volume of work per unit of time
    - Time under tension
Training Periodization - Dryland

LEG / UPPER PERIODIZATION

Phase 4 Circuit

Hybrid Taper
Training Periodization - Dryland

• Tools
  – Hex Dumbbells
    • DB Complex
      – High pull - Alternate Press - Squat - Row
    • DB Combo
      – Curl & Press - Over the top - Wipe Your Nose - Row
Training Periodization - Dryland

- Gymnastic Rings (www.ringtraining.com) / Jungle Gym (www.lifelineusa.com)
  - Pull ups
  - Rowing
  - Dips
  - Push ups
  - Jacknifes
  - French Curls
- Beginner to advanced
Training Periodization - Dryland

• Lane Gainer Tubing  www.lanegainer.com
  – Core Training
    • High/Low
    • Side to Side
    • Chopping
    • Big Circles
  – Upper Body
    • Punching – Rowing – French Curls – Nordic Trac
Training Periodization - Dryland

• Medicine Balls (bounce) 3-4 kg./6.6-8.8 lbs.
  [www.lifelineusa.com]
  – Wall Series
  • Overhead – Soccer – Chest Pass – Down the side – Front Cross – Around the back

  – Core Series
  • Down the side – Front Cross – Half Chop – Around the back – Seated “V” toss – Seated sides toss – Sit ups
Training Periodization - Dryland

• Aerobic Steps
  www.wolverinesports.com
  – Upper Body
    • Arm step ups
    • Props for advanced ring / push up exercises
  – Lower Body
    • Step ups
Training Periodization - Dryland

• Leg Training
  – Exercises
    • Squat x 20 – Step up x 20 – Lunges x 20– Squat Jumps x 10
  – Circuit – all 4 exercises sequentially
    • Progressive in nature over 6 weeks
    • Start at 2 cycles, rest 2:00, then 1 more cycle
    • Build to 5 straight cycles with no rest between at end of 6 weeks
Bands Circuit for Cullen Jones (Mecklenburg AC)

- Standing core exercises: 2 x 20 reps
- One leg fast squat with lat pull back
- One leg reverse butterfly pull (both arms)
- One leg freestyle pull
- Band twist (right arm 10 reps + left arm 10 reps)
Medicine Ball Circuit for Cullen Jones (Mecklenburg AC)

• #1:
  – Wood Choppers Straight 1 x 20 reps
  – Standing Chest Pass  2 x 20 reps
  – Standing Overhead Pass 2 x 20 reps
  – One Hand Shot Put (Left and Right) 1 x 20 reps
  – Sitting Hip Toss (Left and Right) 1 x 20 reps
Medicine Ball Circuit for Cullen Jones (Mecklenburg AC)

• #2:
  – Kneeling Chest Pass 2 x 25 reps
  – Kneeling Overhead Pass 2 x 25 reps
  – Kneeling One Hand Shot Put (Left and Right) 1 x 20 reps
  – Sitting Half Twists 1 x 15 reps
  – Kneeling Hip Toss 1 x 15 reps
Medicine Ball Circuit for Cullen Jones (Mecklenburg AC)

• #3:
  – Wood Choppers Left and Right Knee 2 x 15 reps
  – Standing Russian Twists Throw Backs 2 x 15 reps
  – Sitting Chest Pass 2 x 25 reps
  – Sitting Overhead Pass 2 x 25 reps
  – Sitting One Hand Shot Put (Left and Right) 1 x 20 reps
Medicine Ball Circuit for Cullen Jones (Mecklenburg AC)

• #4:
  – Standing Figure 8’s 2 x 10 reps
  – Standing Chest Pass 2 x 25 reps
  – Kneeling Chest Pass 2 x 25 reps
  – Sitting One Hand Shot Put (Left and Right) 2 x 10 reps
  – Sit-Ups with Medicine Ball 2 x 25 reps
Floor Abs for Cullen Jones (Mecklenburg AC)

- Knee hugs x 15 reps
- V-ups x 10 reps
- Side-ups x 10 reps
- Russian twists x 20 reps
- Flutter kick x 30 sec
- V-ups x 10 reps
- Crunches x 10 reps
- Bicycles x 20 reps
- Sit-ups holds (middles, right and left sides)
- Legs toss/parallel leg raises
Physioball Abs for Cullen Jones (Mecklenburg AC)

- Bridge x 30 sec with leg lifts
- Bridge and leg curl x 10
- Plank hold x 30 sec with arm rotation
- Plank rotation x 20 reps
- Knee tuck x 20 reps
- Opposite prone x 20 sec
- Crunch x 20 reps alternating right and left sides
- Sit-up x 20 reps alternating left and right sides
- Pulls sitting on physioball x 40 pulls right and left arm
- Dumbbell rotation on physioball x 20 reps
General Warm-Up

- Increases functional potential of body, improves swimming technique, smoother muscles contractions.
- Consists of stretching and flexibility including most important joints: shoulders, lower back, knees, ankles
- Elevated temperature facilitates the stretching: warmer clothing, running/jogging before the stretching, warm surrounding temperature.
- Stretching usually takes about 10-15 minutes. Stretch longer with lower force.
- Greatest improvements in stretching are being maintained during the first 15 min after the stretching protocol. Thus, stretching should occur within the 15 min before the warm-up and before the race.
- Excessive stretching may be detrimental to sprint performances.
Static vs. Dynamic Stretching

• Static stretching programs (3 x (30 sec stretch + 15 sec rest)) reduce muscle force and power.
• Dynamic stretching programs (3 x (30 swings/30 sec + 15 sec rest)) didn’t reduce muscle force and power.
• Short dynamic stretch improves range of motion and doesn’t reduce force and power.

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Weekly Strength Training Plan for Cullen Jones (Mecklenburg AC)

• Monday:
  – Dynamic warm-up
  – Dumbbell rotation on physioball x 4 sets
  – Bench press 3 x 8 reps
  – Bands circuit
  – Legs throws 3 x 15 reps
Weekly Strength Training Plan for Cullen Jones (Mecklenburg AC)

• Tuesday:
  – Dynamic warm-up
  – Medicine ball circuit x 4 sets
  – Leg press 3 x 6 reps
  – Leg raise 2 x 10 reps
  – Lat pulldown 3 x 8 reps
  – Leg curls 3 x 8 reps
Weekly Strength Training Plan for Cullen Jones (Mecklenburg AC)

• Thursday:
  – Dynamic warm-up
  – Dumbbell rotation on physioball x 4 sets
  – Bench press 3 x 8 reps
  – Bands circuit
Weekly Strength Training Plan for Cullen Jones (Mecklenburg AC)

• Friday:
  – Dynamic warm-up
  – Medicine ball circuit x 2 sets
  – One leg squat 3 x 8 reps (left and right)
  – Leg raise 3 x 10 reps
  – Lat pulldown 3 x 8 reps
  – Leg curls 3 x 8 reps