

IWA

STRENGTH TRAINING PROGRAM DESIGN

I. INTRODUCTION

- A successful program includes safety, communication, and variety
- Step by step pattern to reach goals
- Customize program for the client

II. TEN STEP PROCESS

1. Information Gathering (the first step)

- Med hx: conditions & red flags
- Fitness testing: does not assess readiness to exercise. Stress test women >50 & men > 40

2. Balanced Physical Programming

- Multidimensional: include flexibility/strength/endurance

3. Cardio-respiratory Conditioning

- Weight training with lighter loads, high reps, and short rests can improve VO2 max

4. Muscular Strength & Endurance Conditioning

- Resistance/ Weight training: ↑ BMD, ↑ metabolism, ↑ HDL, ↓ LDL, ↓ blood pressure at rest
- Muscular endurance: perform repeatedly with moderate loads for an extended time.

5. Flexibility Testing

- When to stretch: before competition &/or 5-10 minutes after competition
- Static stretch: hold for 30 sec, 3-5x, > 2 x/week to the point of mild discomfort
- Dynamic stretch: taking muscles thru the sport-specific motion, not ballistic.

6. Active Rest

- Interval training: sprint-> walk/jog & repeat
- Sequencing exercises: alternate muscle groups or go from lower to upper body

7. Cross Training

- Decrease overuse injuries: distributes physical stress & changes physiological stimulus
- Variety: within a component or between components
- Adjust exercises: every 2 weeks

8. Special Needs for Healthy Populations

- Pregnancy, general population, exercise for a sport or competition
- Nutritional concerns: eating disorders

9. Success & Adherence

- Goals: avoid quitting by customizing program to the client's goals & get commitment
- Feedback: provide encouragement & correction of technique
- Lifestyle changes: same time every day & limit duration of workout, record workouts

10. Reality Factor

- Be flexible: Change with client's needs

III. MEASURING EXERCISE INTENSITY

1. % Maximum heart rate (MHR)

- $220 - \text{age} = \text{maximum heart rate}$
- take a % of MHR (between 65-90% based on age)

2. Karvonen Method of measuring heart rate

- $((220 - \text{age}) - \text{resting heart rate}) \times \text{exercise intensity} + \text{resting heart rate}$
- more accurate than % of max HR.

3. Rate of Perceived Exertion (RPE)

- Perception: how do you feel? Preferred Exertion- preference about how hard to work
- Talk test: should be able to talk but not want to, for beginners, use with the RPE
- Borg scale: 15 point scale from 6-20 (6= no exertion at all, 20= maximal exertion)

IV. HEART RATE & O₂ CONSUMPTION

1. Determining THR & THRR

- Stress Testing: most accurate, requires a lot of effort & is expensive.
- Maximal aerobic Capacity(MAC): improves if intensity > 70% MHR or 50-55% of max VO₂
- Heart-rate: take pulse for 10 seconds during exercise, 60 seconds @ rest
- Max VO₂: max O₂ you can get even if you ↑ the intensity & is the best indicator of fitness
- Monitoring HR: be precise with cardiac client or elite athlete, not as impt. with healthy adult

V. PROGRAM DESIGN: SPECIFICITY/PROGRESSION/OVERLOADING/OVERTRAINING

1. SPECIFICITY

- SAID (specific adaptation to imposed demands)
- Train muscles similar to sport
- 80% of strength gains are attributed to motor learning

2. PROGRESSION

- Use a 5% change when adding duration or resistance (more aggressive with athletes)
- Adaptation: 2 weeks for adaptation before making workout harder or longer
- Soreness: no residual soreness before changing program

3. OVERLOAD

- Intensity: beyond what the body is accustomed
- Decreases in cardio fitness after 2 weeks of inactivity, strength benefits lost after 6 weeks.
- Exercise cannot be stored. Weight training 1x/week to maintain benefits
- Variety: change activity, ↑ sessions/wk, ↑ sets, increase exercise complexity, ↓ rest periods

4. OVERTRAINING

- Results from excessive training volume & intensity combined with external stress
- Plateau in training response may be from ex's performed in fatigued state
- Overload stimulus-> acute fatigue-> overreaching->overtraining.
- Warning signs: ↓ desire to train, ↓ performance, ↑ mm soreness, decreased body weight, increased perceived exertion, sleep & eating disorders

- To prevent: ↓ volume when intensity ↑, add >1 recovery days/wk, avoid excessive eccentrics, ↑ sleep, eat properly, alternate aggressive & less aggressive training sessions.
- To dx: patient hx, ruling out other diseases, blood tests

VI. PERIODIZATION

“ The overall, long term cyclic structuring of training & practice to maximize performance” or “planned results”.

- Cycling the 1. Volume with the 2. Intensity
- Benefits: ↑ safety, prevent plateaus, enhance compliance
- Planning: daily workouts & LTG

1. PERIODIZATION CYCLES

A. **Microcycle**

- Time frame: 5-10 days, typically 7 days
- Daily & weekly variations of intensity/load/exercise selection throughout the annual plan
- Load increased mainly by increasing the # of days of strength training per week.

B. **Mesocycle**

- Time frame: 4-6 weeks up to months. Made up of 4-6 microcycles
- Starts high volume phase & ends with high intensity phase

C. **Macrocycle**

- Time frame: typically 1 year (made up of > 2 mesocycles)
- For average client macrocycle consists of preparation-> goal attainment-> recovery.

2. SPORTS & CONDITIONING PHASES/ POWER SPORT PHASES

A. Preparatory Period: off-season, peak volume, establish base level of conditioning

a) HYPERTROPHY PHASE

- Time: 1-6 weeks, 2-4x/wk
- Intensity: 50-75% of 1 RM
- Reps: 12-20 reps
- Sets: 1-6 sets

b) STRENGTH PHASE

- Time: 4-6 weeks
- Intensity: 80-90% of 1RM
- Reps: 4-8 reps
- Sets: 3-5 sets

c) POWER PHASE

- Time: 4-6 weeks
- Intensity: 75- 95% 1RM
- Reps: 1-5 reps
- Sets: 3-5 sets
- ↓ volume, ↑↑ intensity

B. 1st transition-

- Break between phases
- Incorporate all types of training
- ↑ specificity, ↓ volume, ↑ intensity

C. Competition

- Time: 1-3 weeks
- Intensity: > 93% of 1RM
- Reps: 1-3 reps
- Sets: 1-3 sets
- peak strength & power, skills techniques and game strategy

D. 2nd transition

- between competition and Prep phase
- Time: 1-4 weeks
- Intensity: low volume, low intensity

VII. DESIGNING A PROGRAM

Step 1 Analyze Client Needs

- Requirements of sport/work
- Requirements of client/athlete. current condition? time constraints?
- Set goals

Step 2 Select appropriate Exercises

- Primary/Core vs. Assistance exercises
- Agonist & antagonist
- Weights, bands, or machines?
- Open vs. closed chain

Step 3 Determine training frequency

- Training sessions per week: typically 3x/week but up to 6x/wk for trained athlete
- Days of rest: 1-3 days

Step 4 Order the exercises

- Order is important
- Core(multi-joint) -> assistance (single joint)
- Alternate upper & lower body or push & pulling
- Top-down approach: go through the whole body 1 set & then repeat sequence
- Horizontal approach: do all sets for 1 exercise b/f moving on to the next.

Step 5 Determining training load & Reps

- Testing: select weight-> perform reps-> adjust load-> retest
- Goals: power (< 10 RM), hypertrophy (6-12 RM), endurance (12-20RM)
- Sets: # of sets decreases as # of exercises increases
- ACSM recommendations: 8-12 reps 2-3x/week to maintain benefits

Step 6 Determine Volume

- Volume: total amount of weight lifted, sets x reps x weight lifted
- Research: 1 set to failure or 3 sets

Step 7 Determine Rest

- Determined by goals of program, intensity of workout, & the patients ability to recover
- Short rest: 30 sec- 1 minute, most common to improve local muscular endurance
- Medium rest: 1-2 min., long rest: 3-5 min

VIII. TYPES OF TRAINING

1. Isometric:
 - Static force, same muscle length

2. Concentric:
 - Helps develop absolute strength
 - Shortening of mm. during force

3. Eccentric:
 - Lengthening of mm. during force
 - Generates up to 30% more force than concentric contraction
 - Risk of injury & DOMS are greater

4. DCERT: Dynamic Constant External Resistance Training
 - External resistance stays the same but force changes throughout ROM

5. DVRT: Dynamic Variable Resistance Training
 - Resistance varies throughout the ROM

6. Isokinetic:
 - Constant speed

7. Isotonic:
 - Constant external resistance, force changes with joint angle

8. Plyometrics:
 - Precautions: weight > 220 lbs.
 - Allow 48-72 hours of recovery time
 - Do at the beginning of workout

IX. Training Techniques that add Variety

- Assisted training: spotter helps
- Negative training: control eccentrics
- Super slow sets: 10 seconds for 1 contraction
- Supersetting: 2 different ex's focusing on opposing muscle groups without rest
- Compoundings: 2 different exercises for the same muscle without rest
- Exhaustion sets: high weight to exhaustion followed by less weight to exhaustion
- Super Pump: 15-18 sets, 5-6 reps for each body part

X. Women and Resistance Training

- Total body strength: absolute strength of a female is 63.5% (about 2/3) of a male.
- No difference: muscle mass quality is the same but women have less than men.
- Training program: strengthening programs the same except for resistance used.

XI. Children and Resistance Training

- Medical clearance
- Use lower intensities and loads
- Begin resistance training @ level equal to maturity, goals, & physical abilities
- Controversy continues as to risk of growth attenuation with exercise.
- 1st establish rep range (ex. 10-12) & then determine load by trial & error
- Frequency: 2-3 training sessions per week
- Supervision & spotters
- Emphasize proper technique, focus on form & technique
- NSCA recommends: 5-7 basic light weight ex., 8-10 techniques, 11-15 more advanced

XII. Strength Training for Seniors

- Benefits: ↓ mm loss, ↑ mm mass, ↑ glucose metabolism, ↑ resting metabolic rate, ↑ BMD
- Aging: ↓ BMD, strength, endurance, & resting metabolic rate. It is never too late to exercise
- 1RM is safe to test older populations
- Medical clearance
- Warm up: 5-10 minutes
- Major muscle groups
- Rest: 48-72 hrs recovery between sessions, 2-3 minutes between sets
- Frequency: 1-3 sets x 8-12 reps at moderate intensity, 2x/week

XIII. Body Building

- Goal: to increase muscle size
- Split routines
- Sets: 6-12 reps to exhaustion, 3-15 sets, 30-90 sec. rest
- Train in isolation

XIV. Nutrition

- Empower your clients (eat right 80% of the time, slip 20% of the time)
- Transition into healthy food choices
- Consume calories evenly t/o the day
- Fat should be 15 to 30% of total calories for adult.
- Metabolism: will slow down if you decrease daily intake by > 20%
- Consumption: early morning 25%, midday 35%, evening 25%

XV. Vitamins & Minerals

- Vitamins: organic substances that cannot be synthesized by the body
- Minerals: important for bone health
- Vitamin A: promotes repair of skin & bone formation and night vision (RDA 800-1,000 mg)
- Vitamin C: RDA 250-500mg for antioxidant effect, safe up to 1,000 mg
- Vitamin B1: role in glycolysis & nerve conduction. Need increases with activity level
- Vitamin B6: nervous & immune system function, (RDA 1.3-1.7mg)
- Vitamin B12: nervous system and blood formation, (RDA 2.4mg)
- Calcium: assists muscle contractions, reduces risk of osteoporosis,(RDA1,000-2,000 mg)
- Iron: deficiency inhibits performance, more common in women & children. (RDA 10-15 mg).
- Zinc: functions in digestion, metabolism, reproduction, & wound healing. (RDA 12-15mg).
- Beta Carotene: lowers risk of cancer. (10,000-25,000IU per day)

XVI. Supplements/ Ergogenic Substances (performance enhancing)

- Chromium- boost metabolism (benefits not supported), no established RDA
- Creatine- ↑ strength by increasing intramuscular creatine phosphate & boosts performance.
- Choline: facilitate loss of body fat (not supported)
- Prohormone/androstenedione: increases testosterone

