Introduction

There are six (6) types of resistance training:

1. Isometric force development
2. Concentric force development
3. Eccentric force development
4. Dynamic constant external resistance
5. Dynamic variable external resistance
6. Isokinetcs
Introduction

• The defining variables in terms of results may lie in how often a person trains and how they arrange the order and number of sets, repetitions (volume), and loads (intensity).

• Exactly how to vary the frequency, intensity, and duration within a periodization is the art of resistance-training program design.
Designing Resistance Training Programs

- Do not make the mistake of blindly adapting a program simply because it was used, for example, by a successful weight-trained athlete.

- There is no one optimal combination of sets and repetitions.

- Using and copying one style of training for both athletics and fitness is a common mistake when planning resistance-training programs.
Designing Resistance Training Programs

Train Smart: Implications for Training Clients

- Resistance training should be:
  - Planned and time efficient
  - Results-oriented
  - Functional and usable in relation to your clients’ personal lifestyles
  - Directed toward health and personal wellness
Designing Resistance Training Programs

- The American College of Sports Medicine (ACSM) recommends resistance training at a moderate-to-high intensity that is sufficient to develop and maintain muscle mass.

- Resistance training should be done at least two (2) days per week for a minimum of one set of 8-12 repetitions that are executed to fatigue. Each session should include 8-10 exercises that challenge the major muscle groups.
Designing Resistance Training Programs

• The ACSM’s minimal resistance training standards influence resistance-training programming in two (2) ways:
  1. They dictate the time it takes to complete a comprehensive, well-rounded program. (> 60 minutes = high dropout rates)
  2. Although more frequent training and additional sets (or varied combinations of sets and repetitions) elicit greater strength gains, the difference is usually small. (Strength training 2 days per week in accordance with ACSM guidelines produces about 80% of the strength gains seen when training 3 days per week.)
Designing Resistance Training Programs

• When designing programs for clients, use a simple needs-analysis process:
  1. What are the client’s goals?
  2. What are the requirements of the activities or sports your clients participate in?
  3. Is training dictated by the needs of the individual or the requirements of a sport or job?
  4. How much time will your clients commit?
MUSCULAR-STRENGTH, CARDIORESPIRATORY, AND FLEXIBILITY TRAINING ARE PRIMARY COMPONENTS OF A BALANCED APPROACH TO FITNESS. ALL THREE (3) REQUIRE DIFFERENT OVERLOADS TO ACHIEVE OPTIMUM RESULTS.

THE GENERAL GUIDELINE FOR OVERLOAD CHANGE (MUSCULAR-STRENGTH) IS A PROPER AND SPECIFIC OVERLOAD THAT USES A PROGRESSIVE INCREASE IN RESISTANCE OVER TIME, CAUSES THE TARGETED MUSCLE(S) TO FATIGUE IN ABOUT 30-90 SECONDS, AND CHALLENGES ALL OF THE MAJOR MOVEMENTS (JOINT ACTIONS) TO WHICH THE MUSCLE(S) CONTRIBUTE.
Five Program Design Scenarios

1. Health & Fitness Gains
2. Functional Training (coordination, range of motion, type of contraction, speed of movement)
3. Bodybuilding
4. Competitive Athlete
5. Core Training
Proper Intensity

- The key when determining proper intensity for a client is **not** how much absolute weight or resistance is used, but whether the overload is relative to the individual’s current strength level and whether the muscle can fatigue within the goal repetition framework.
Proper Intensity

• Intensity of effort related to strength training and best results can be demonstrated by a thorough understanding of motor units and their contribution to muscle contraction.

• There is no such thing as a weak or partial contraction from a motor unit - it simply fires "all-or-none."
Proper Intensity

- Varying the intensity of muscle contraction, or force gradation, occurs in two (2) ways:
  1. Raising the number of motor units recruited for activity
  2. Increasing their frequency of discharge
Proper Intensity

- Motor units are composed of two (2) distinct types of muscle fibers:
  1. Fast twitch (FT)
  2. Slow twitch (ST)
Proper Intensity

Motor unit recruitment order is important from a practical standpoint for several reasons:

1. To recruit fast-twitch fibers and achieve a training effect, the exercise must be higher in intensity.
2. The order of recruitment is fixed for a specific movement.
Proper Intensity

• For the average client, gains in strength will be best accomplished by moving the weight slowly (4-5 seconds per repetition) through a full range of motion, and accomplishing fast-twitch recruitment by using an appropriately intense overload.
Proper Intensity

• The benefits of controlling the speed of movement during a repetition are numerous:
  1. Consistent application of force
  2. More total muscle tension produced
  3. More total muscle force produced
  4. More muscle fiber activation (ST & FT)
  5. Greater muscle power potential through high-intensity force development and, subsequently, through controlled training
  6. Less tissue trauma
  7. Greater momentum increases injury potential and reduces the training effect on target muscle groups
Proper Intensity

- High-intensity resistance training relies primarily on the ATP-CP (adenosine triphosphate & creatine phosphate) and lactic acid energy systems, both of which are replenished during the recovery period using the aerobic energy system.

- The complete rebuilding of the ATP-CP energy system, which is depleted predominantly through short bursts of maximal effort, takes about 3-5 minutes.
Proper Intensity

- Light activity is encouraged to facilitate lactic acid removal more quickly (about 2 minutes of light activity).
Proper Intensity

- Active recovery - performing stretching exercises or working other body parts to facilitate recovery after intense exercise to allow for more productive use of exercise time.

- “Active rest” equates to accomplishing more total work in limited amounts of time.

- Adequate recovery allows individuals to prepare for and perform another quality effort or training set.
Proper Intensity

- To accomplish active recovery or “active rest”:

Have the client perform a chest exercise, then an abdominal exercise, then a lower-leg exercise. Although the client is continually active during all three (3) exercises, there is sufficient recover time for the chest musculature as the body performs the other exercises.
## Proper Intensity

### Training Specificity and Recovery Time

<table>
<thead>
<tr>
<th>Relative Loading</th>
<th>Outcome</th>
<th>% 1RM (rep max)</th>
<th>Rep Range</th>
<th># Sets</th>
<th>Rest Between Sets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Muscular Endurance</td>
<td>&lt; 70%</td>
<td>12-20</td>
<td>1-3</td>
<td>20-30 seconds</td>
</tr>
<tr>
<td>Moderate</td>
<td>Hypertrophy, strength</td>
<td>70-80%</td>
<td>8-12</td>
<td>1-6</td>
<td>30-120 seconds</td>
</tr>
<tr>
<td>High</td>
<td>Maximum strength/ power</td>
<td>80-100%</td>
<td>1-8</td>
<td>1-5+</td>
<td>2-5 minutes</td>
</tr>
</tbody>
</table>
Proper Intensity

• Recovery between workouts is based on the intensity of the workout and the individual recovery ability of the client.

• Generally, a period of about 48 hours between intense workouts is appropriate for positive adaptations in the neuromuscular system.

• Adequate recovery is essential to avoid overtraining and strength plateaus, and for progressive improvements in muscular strength and endurance.
The Right Time to Change Strength Programs

• Valid reasons for changing a resistance training program include:
  - Boredom
  - Lack of motivation
  - Lack of results
  - Desire for change in muscle strength, hypertrophy, muscle endurance or a change in training environment
The Right Time to Change Strength Programs

- Maintenance training is a positive state of training, wherein the trainer keeps the client’s fitness at their current level.
The Right Time to Change Strength Programs

- If an individual is bored, disinterested, or has lack of motivation, consider cross training within the muscle strength and endurance components of fitness.

- Cross training is characterized by variety and use of different exercises and equipment.
The Right Time to Change Strength Programs

- Exercise plateau - a period of training, with few or little results, when one cannot just keep increasing weight without any other changes in the exercise routine.

- To minimize the effect of plateaus,
  1. Change the exercise sequence or the exercise itself - keeping intensity the same.
  2. Manipulate frequency, intensity, and volume both up and down - keeping repetitions within 8-20.
  3. Utilize high-intensity techniques - make the muscles work harder, not longer. Quality reigns over quantity.
Periodization

- Periodization is the systematic application of overload through the preplanned variation of program components to optimize gains in strength while preventing overuse, staleness, overtraining, and plateaus.

- Periodization can be used to maximize the gains in muscular fitness achieved during training for any exercising client or to help athletes “peak” at the appropriate times for competitions.
Periodization

- Research shows that periodized programs are superior in eliciting strength and body-mass improvements when compared to traditional methods utilizing both single- and multiple-set designs.

- The ACSM recommends the use of a periodized model of progression for resistance training in healthy adults.
Periodization

• Three (3) different time frames are utilized to develop a periodized strength program:
  1. Macrocycles - longest time frame in periodization (6-12 months), designed for the long-term goal
  2. Mesocycles - mid-length time frame in periodization (3-4 months), stepped goals on the way to the long-term goal
  3. Microcycles - shortest time frame in periodization (1-4 weeks), short-term goals on the way to a mesocycle stepped goal.
Periodization

Periodization Model for Health & Fitness Improvement

1. Set the goal(s).
2. Determine how to achieve the goal(s).
3. Identify the training phases.
5. Regularly evaluate the periodization planning process.
Periodization

1. Set the goal(s).
   • Cardiorespiratory
   • Muscular strength
   • Muscular endurance
   • Flexibility
   • Other
Periodization

2. Determine how to achieve the goal(s).
   • Assess time availability
   • Identify types (mode) of activity
   • Match training to goals
   • Choose activities that the client enjoys
Periodization

3. Identify the training phases.
   • Training Phases
     • Macrocycle
     • Mesocycle
     • Microcycle
   • Exercise Plan
Periodization

   • Vary volume & overload on a cyclical basis
   • Allow for the restoration/recovery process
Periodization

5. Regularly evaluate the periodization planning process.
   • Monitor results & progress
   • Conduct fitness assessment
   • Recognize goal achievement
   • Maintain an ongoing dialogue with your clients
   • Observe client compliance and enthusiasm
Periodization

• The key to successful periodization is the ability to challenge the body with new activities and progressive overload (intensity).

• Ways to track a periodization program include:
  – Label file folders for macro-, meso-, and micro-cycles.
  – Create computer file folders for macro-, meso-, and micro-cycles.
Directing Results

• Each individual’s optimal potential can best be reached by the following:
  1. Design systems with specific goals in mind
  2. Fit all systems into the specificity chart
  3. Encourage consistent, regular, and varied efforts
  4. Teach the use of proper biomechanical techniques
  5. Allow for the recovery/building process
  6. Keep accurate records