5.2: Resistance Exercise Programming

Designing a resistance exercise program can seem like a daunting task. However, the basics are very simple. The table below provides instructions for designing an effective resistance exercise program.

**Resistance Exercise Program**

<table>
<thead>
<tr>
<th>Frequency of Exercise</th>
<th>How Often</th>
<th>Beginner</th>
<th>Intermediate to High</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2-3 days per week</td>
<td>4-5 days per week; often perform split workouts (example: Monday and Thursday, work chest, shoulders, triceps, abdominals; Tuesday and Friday, work back, legs, biceps)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Full-body workout of all 6 body areas</td>
<td>48-72 hours of rest in-between workouts</td>
</tr>
<tr>
<td>Intensity of Exercise</td>
<td>How Hard</td>
<td>Beginner</td>
<td>Intermediate to High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60%–70% of maximum strength</td>
<td>70%–90% of maximum strength</td>
</tr>
<tr>
<td>Time of Exercise</td>
<td>How many</td>
<td>Beginner</td>
<td>Intermediate to High</td>
</tr>
<tr>
<td></td>
<td>reps</td>
<td>1-5 Sets</td>
<td>6-12 repetitions</td>
</tr>
<tr>
<td></td>
<td>How many</td>
<td>Endurance – 12-20+ Reps</td>
<td>Strength – 2-6 Reps</td>
</tr>
<tr>
<td></td>
<td>sets</td>
<td>2-3 Sets</td>
<td>3-5 Sets</td>
</tr>
<tr>
<td></td>
<td>How much</td>
<td>30 sec to 1 minute</td>
<td>2 to 5 minutes</td>
</tr>
<tr>
<td></td>
<td>time between sets</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note**

Specificity Principle - you must work each muscle group to have strength gains in that particular part of the body
Recommendations for Resistance Training Exercise

• **Perform a minimum of 8 to 10 exercises that train the major muscle groups.**
  ◦ Workouts should not be too long. Programs longer than one hour are associated with higher dropout rates.
  ◦ Choose more compound, or multi-joint exercises, which involve more muscles with fewer exercises.

• **Perform one set of 8 to 12 repetitions to the point of volitional fatigue.**
  ◦ More sets may elicit slightly greater strength gains, but additional improvement is relatively small.

• **Perform exercises at least 2 days per week.**
  ◦ More frequent training may elicit slightly greater strength gains, but additional improvement is relatively small since progress is made during the recuperation between workouts.

• **Adhere as closely as possible to the specific exercise techniques.**

• **Perform exercises through a full range of motion.**
  ◦ Elderly trainees should perform the exercises in the maximum range of motion that does not elicit pain or discomfort.

• **Perform exercises in a controlled manner.**

• **Maintain a normal breathing pattern.**

• **If possible, exercise with a training partner.**
  ◦ Partners can provide feedback, assistance, and motivation.

Position Stand on Progression Models in Resistance Training for Healthy Adults

• **Both concentric and eccentric muscle actions**
• **Both single and multiple joint exercises**
• **Exercise sequence**
  ◦ Large before small muscle group exercises
  ◦ Multiple-joint exercises before single-joint exercises
  ◦ Higher intensity before lower intensity exercises
• **When training at a specific RM load**
  ◦ 2-10% increase in load if one to two repetitions over the desired number
• **Training frequency**
  ◦ 2-3 days per week for novice and intermediate training
  ◦ 4-5 days per week for advanced training
• **Novice training**
  ◦ 8-12 repetition maximum (RM)
• **Intermediate to advanced training**
  ◦ 1-12 RM using periodization* (strategic implementation of specific training phases alternating between phases of stress and phases of rest)
- Eventual emphasis on heavy loading (1-6 RM)
- At least 3-min rest periods between sets
- Moderate contraction velocity
- 1-2 s concentric, 1-2 s eccentric

* For more information on using periodization for weight training, click on the link below:

**Periodization for Weight Training**

**Details**

- **Hypertrophy training**
  - 1-12 RM in periodized fashion, with emphasis on the 6-12 RM zone
  - 1- to 2-min rest periods between sets
  - Moderate contraction velocity
  - Higher volume, multiple-set programs

- **Power training (two general loading strategies):**
  - **Strength training**
    - Use of light loads
    - 30-60% of 1 RM
    - Fast contraction velocity
    - 2-3 min of rest between sets for multiple sets per exercise
    - Emphasize multiple-joint exercises especially those involving the total body
  - **Local muscular endurance training**
    - Light to moderate loads
    - 40-60% of 1 RM
    - High repetitions (> 15)
    - Short rest periods (< 90 seconds)

Recommendations should be viewed within the context of an individual’s target goals, physical capacity, and training status.

**Six Types of Resistance Training**

Each type of resistance training benefits muscles in a different way. While these types of resistance training are not new, they could be unique sources of resistance that you have not considered in your quest to add muscle to your frame. Using these forms of resistance alone, in combination with one another, or in combination with the more traditional resistance apparatus, can enable you to diversify your efforts to produce valuable and improved results.

In each type of training, you may use an apparatus to create an environment for resistance. The uniqueness of these sources is found in the way they are implemented. You might use a dumbbell for a particular exercise in some of these
alternative resistance methods, but the way you use the resistance through a range of motion may be altogether different.

In isokinetic training, resistance is steady while velocity remains constant. For example, isokinetics are at work with any machine that is hydraulically operated. The opposing forces mirror each other throughout the range of motion. A good example would be pressing down for triceps on a hydraulic machine and having to immediately pull up (the resistance is constant in both directions) into a biceps curl while maintaining the same speed. IKT often involves opposing body parts. Trainers can use a variety of apparatus with their clients to achieve isokinetic stasis between muscle groups.

- **Dynamic Constant Training**
  As the name suggests, the most distinctive feature of dynamic constant training (DCT) is that the resistance is constant. A good example of DCT occurs when you use free weights or machines that do not alter resistance, but redirect it instead. The emphasis shifts to different planes along the muscle group being worked. When you work on a shoulder-press machine, for example, the resistance remains constant over the entire range of motion. It is identical from the bottom of the movement to the top and back down again. Only the direction of the resistance varies. The resistance redirects itself through the arc and then redirects itself again when the shoulders let the weight come back down to the starting position.

- **Dynamic Progressive Training**
  In dynamic progressive training (DPT), resistance increases progressively as you continue to exercise. DPT is often used as a rehabilitative measure and offers the sort of resistance that builds gradually while remaining completely within the control of the person using it. Equipment includes rubber bands and tubing, springs, and an apparatus controlled by spring-loaded parts. They are low-cost items that are easily accessible and can be used anywhere. Though commonly employed for rehabilitation of torn ligaments, joints, muscles, and broken bones, it is also convenient for travelers on either vacation or business trips. When combined with traditional forms of resistance, this training creates a better-balanced program and provides the muscles with a welcome alternative from time to time.

- **Dynamic Variable Training**
  This form of resistance exercise takes up where dynamic constant training leaves off. Whereas DCT employs constant resistance, never varying to accommodate the body's mechanics, DVT can be adapted to the varying degrees of strength of a muscle group throughout a range of motion. Though very few machines succeed in this goal, a few have come close.

  Hammer Strength equipment emphasizes common fixed areas of resistance. However, the Strive line of equipment has been able to give the user much more choice in resistance levels during an exercise. Strive equipment uses the DVT principle most effectively because it allows the user to increase resistance at the beginning, middle or end of the range of motion. If your joints are stronger at the end of a movement (the top) or the beginning (the bottom), you can set the resistance accordingly. The Strive line is the most flexible yet of all gym equipment designed to adhere to the DVT principle. It lets you tailor-make your workouts based on your body's mechanics.

- **Isokinetic Training**
  In isokinetic training (IKT), the muscle is contracted at a constant tempo. Speed determines the nature of this resistance training, not the resistance itself; however, the training is based on movement carried out during a condition of resistance. IKT can be performed with the body's own weight.

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muscle groups.

• **Isometric Training**
  Familiar to most people, isometric training (IMT) is an excellent way to build strength with little adverse effect on joints and tendons commonly associated with strength training and lifting heavy weights. Though it appears simple in comparison to traditional resistance training, IMT should not be underrated in its effectiveness. IMT is a method in which the force of contraction is equal to the force of resistance. The muscle neither lengthens nor shortens. You may be wondering how any training occurs without lengthening and shortening the muscles. In IMT, the muscles act against each other or against an immovable object.

Isometric training is what you see swimmers do when they press their hands against a solid wall, forcing all their bodyweight into the wall. Another common IMT exercise is pressing the hands together to strengthen the pectorals and biceps. Pressing against the wall can involve muscles in the front deltoid, chest and biceps. Isometric training has been proven very effective for gaining strength, but this method usually strengthens only the muscles at the point of the isometric contraction. If the greatest resistance and force are acting upon the mid-portion of the biceps, that is where most of the benefit will occur. A comprehensive isometric routine can serve to increase strength in certain body parts.

• **Isotonic Training**
  This method demands constant tension, typically with free weights. Though this approach may sound a lot like dynamic constant training, it differs because it does not necessarily redirect the resistance through a range of motion, but rather, keeps tension constant as in the negative portion of an exercise. Complete immobility of the muscle being worked is required. For example, in the preacher curl, the biceps are fixed against the bench. They lift (positive), then release the weight slowly downward (negative), keeping the same tension on the muscles in both directions. This is one reason that free-weight exercise is considered the best form of isotonic training. Merely lifting a dumbbell or barbell, however, is not necessarily enough to qualify as isotonic. The true essence of isotonic training is keeping resistance constant in both the positive and negative portions of each repetition.

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**Exercise Order for Resistance Training**

The general guidelines for exercise order when training all major muscle groups in a workout is as follows:

- Large muscle group exercises (i.e., squat) should be performed before smaller muscle group exercises (i.e., shoulder press).
- Multiple-joint exercises should be performed before single-joint exercises.
- For power training, total body exercises (from most to least complex) should be performed before basic strength exercises. For example, the most complex exercises are the snatch (because the bar must be moved the greatest distance) and related lifts, followed by cleans and presses. These take precedence over exercises such as the bench press and squat.
- Alternating between upper and lower body exercises or opposing (agonist–antagonist relationship) exercises can allow some muscles to rest while the opposite muscle groups are trained. This sequencing strategy is beneficial for maintaining high training intensities and targeting repetition numbers.
- Some exercises that target different muscle groups can be staggered between sets of other exercises to increase workout efficiency. For example, a trunk exercise can be performed between sets of the bench press. Because different muscle groups are stressed, no additional fatigue would be induced prior to performing the bench press. This is especially effective when long rest intervals are used.  

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Resistance Training Conclusion

The most effective type of resistance-training routine employs a variety of techniques to create a workout program that is complete and runs the gamut, from basic to specialized. Learning different methods of training, different types of resistance, and the recommended order can help you acquire a balanced, complete physique. That does not mean that these training methods will help everybody to win competitions, but they will help you learn how to tune in to your body and understand its functions through resistance and movement. This knowledge and understanding develops a valuable skill, allowing you to become more adept at finding what works best for you on any given day.

For additional information on resistance exercises, click on the links below:

- [Exercise and Muscle Directory](https://med.libretexts.org/Courses/Prince_Georges_Community_College/Fitness_Concepts/05%3A_Muscular_Strength_and_Endurance_ACTIVITY)
- [Muscular Strength and Endurance Activity](https://med.libretexts.org/Courses/Prince_Georges_Community_College/Fitness_Concepts/05%3A_Muscular_Strength_and_Endurance_ACTIVITY)