PAE

NASA Fitness

Anaerobic: Setting up a program

April 4 2016

Week 2 / 4

Overview

Periodization

Resistance Training Program Design Variables

Needs analysis

Exercise selection

Training frequency

Exercise order

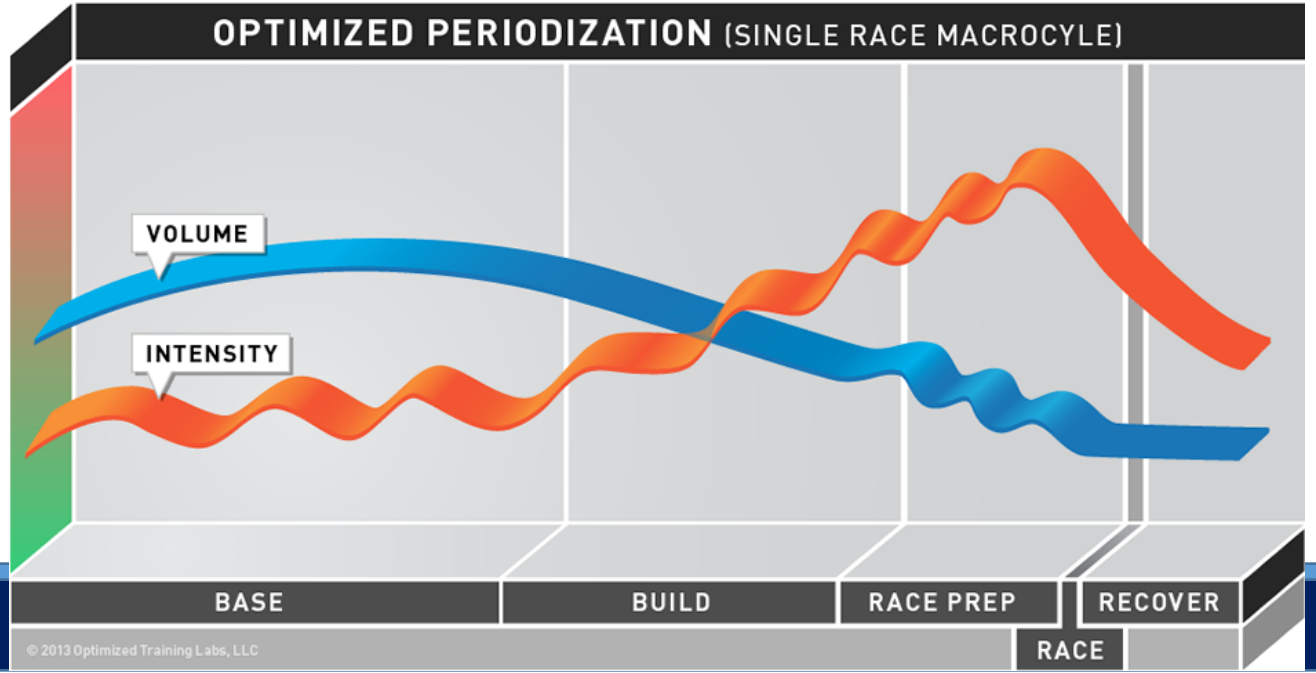
Training load and repetitions

Volume

Rest periods

Definition of Periodization

Periodization is an organized approach to training that involves progressive cycling of various aspects of a training program during a specific period of time to bring about optimal gains in physical performance.



Ideas Behind Periodization

1. Although training will produce positive outcomes, the desirable results can not continue indefinitely.

   General Adaptation Syndrome- the body's adaptation and reaction to short and long term stressors.

2. In order to gain any particular aspect of strength or conditioning, you need to overload your system with increased external stimulus

General Adaptation Syndrome (GAS)

1. Alarm- body is introduced to new or increased stress

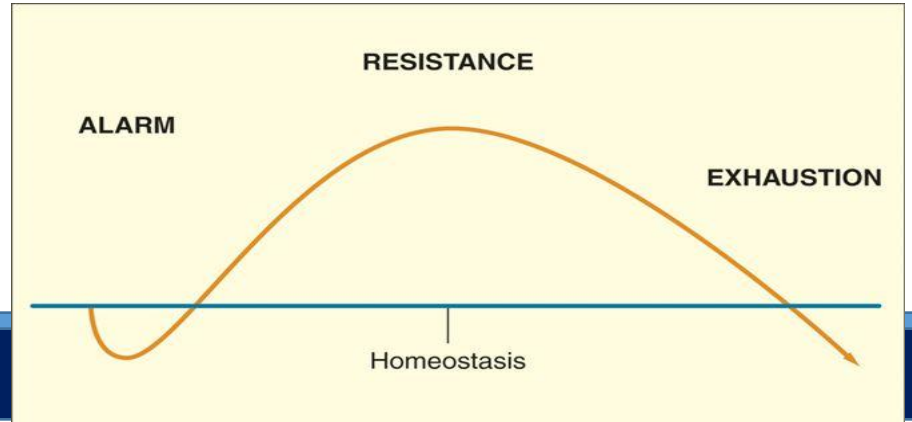
   Soreness, temporary drop in performance

2. Resistance Phase- body adapts to stimulus and returns to regular functioning

   "super compensation"- relies on neurological adaptations to continue training while muscle tissue undergoes biochemical, structural and mechanical adjustments

3. Exhaustion- overtraining

   Fatigue, soreness; non-training stress may aid in leading to this stage



Why is it programed this way?

Periodization is most widely used in resistance program design to avoid over-training and to systematically alternate high loads of training with decreased loading phases to improve components of muscular fitness (strength, strength-speed, strength-endurance) aiming to peak at the most advantageous time for an athlete

Various Aspects of Training

Many training variables can be manipulated in an attempt to optimize the exercise program:

1. # of sets per exercise
2. # of repetitions per set
3. Types, order and # of exercises per training session
4. Rest periods between sets and exercises
5. Resistance/Load
6. Type and tempo of muscle action (e.g., eccentric, concentric, isometric)
7. Frequency of training sessions

Resistance Training

Resistance Training Program Design Variables (7 steps)

1. Needs analysis
2. Exercise selection
3. Training frequency
4. Exercise order
5. Training load and repetitions
6. Volume
7. Rest periods

Step 1: Needs Analysis

Needs analysis is a two-stage process that includes an evaluation of the requirements and characteristics of the sport and an assessment of the individual.

Step 1: Needs Analysis

- Assessment of the Individual
  - Training Status
    - Type of training program
    - Length of recent regular participation in previous training program(s)
    - Level of intensity involved in previous training program(s)
    - Degree of exercise technique experience

PAE

NASA Fitness

TABLE 15.1

Example of Classifying Resistance Training Status

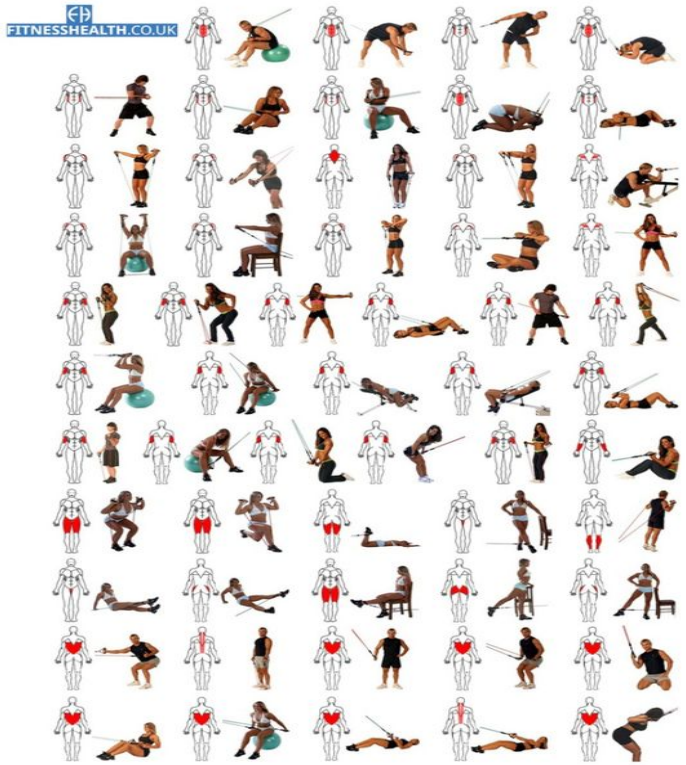
	RESISTANCE TRAINING BACKGROUND				
Resistance training status	Current program	Training age	Frequency (per week)	Training stress*	Technique experience and skill
Beginner (untrained)	Not training or just began training	<2 months	≤1-2	None or low	None or minimal
Intermediate (moderately resistance-trained)	Currently training	2-6 months	≤2-3	Medium	Basic
Advanced (well resistance-trained)	Currently training	≥1 years	≥3-4	High	High

*In this example, "training stress" refers to the degree of physical demand or stimulus of the resistance training program.

TRAINING AGE IS THE AMOUNT OF TIME AN INDIVIDUAL HAS BEEN TRAINING. THUS, **a 40 y.o. can have a training age of 2 months!**

Step 2: Exercise Selection

Step 2 involves choosing exercises for a resistance training program.



Step 2: Exercise Selection

Exercise Type

Core and Assistance Exercises

Core exercises recruit one or more large muscle areas, involve two or more primary joints, and receive priority when one is selecting exercises because of their direct application to the sport.

Assistance exercises usually recruit smaller muscle areas, involve only one primary joint, and are considered less important to improving sport performance.

Step 2: Exercise Selection

Exercise Type

Structural and Power Exercises

Structural exercises emphasize loading the spine directly or indirectly.

Power exercises are structural exercises that are performed very quickly or explosively.

Step 2: Exercise Selection

Movement Analysis of the Sport

Muscle Balance

agonist: The muscle or muscle group actively causing the movement.

antagonist: The sometimes passive muscle or muscle group located on the opposite side of the limb.

Step 3: Training Frequency

Training frequency is the number of training sessions completed in a given time period.

For a resistance training program, a common time period is one week.

Step 3: Training Frequency

Training Status

Training status affects the number of rest days needed between sessions.

Three workouts per week are recommended for many individuals to allow sufficient recovery between sessions.

Key Point!

The general guideline is to schedule training sessions so that there is at least one rest or recovery day—but not more than three—between sessions that stress the same muscle groups.

TABLE 15.4

Resistance Training Frequency Based on Training Status

Training status	Frequency guidelines (sessions per week)
Beginner	2-3
Intermediate	3-4
Advanced	4-7

Step 4: Exercise Order

Exercise order is the sequence of resistance exercises performed during one training session.

Upper and Lower Body Exercises (Alternated)

One method of providing the opportunity for individuals to recover more fully between exercises is to alternate upper body exercises with lower body exercises.

If the exercises are performed with minimal rest periods, this method is also referred to as *circuit training*.

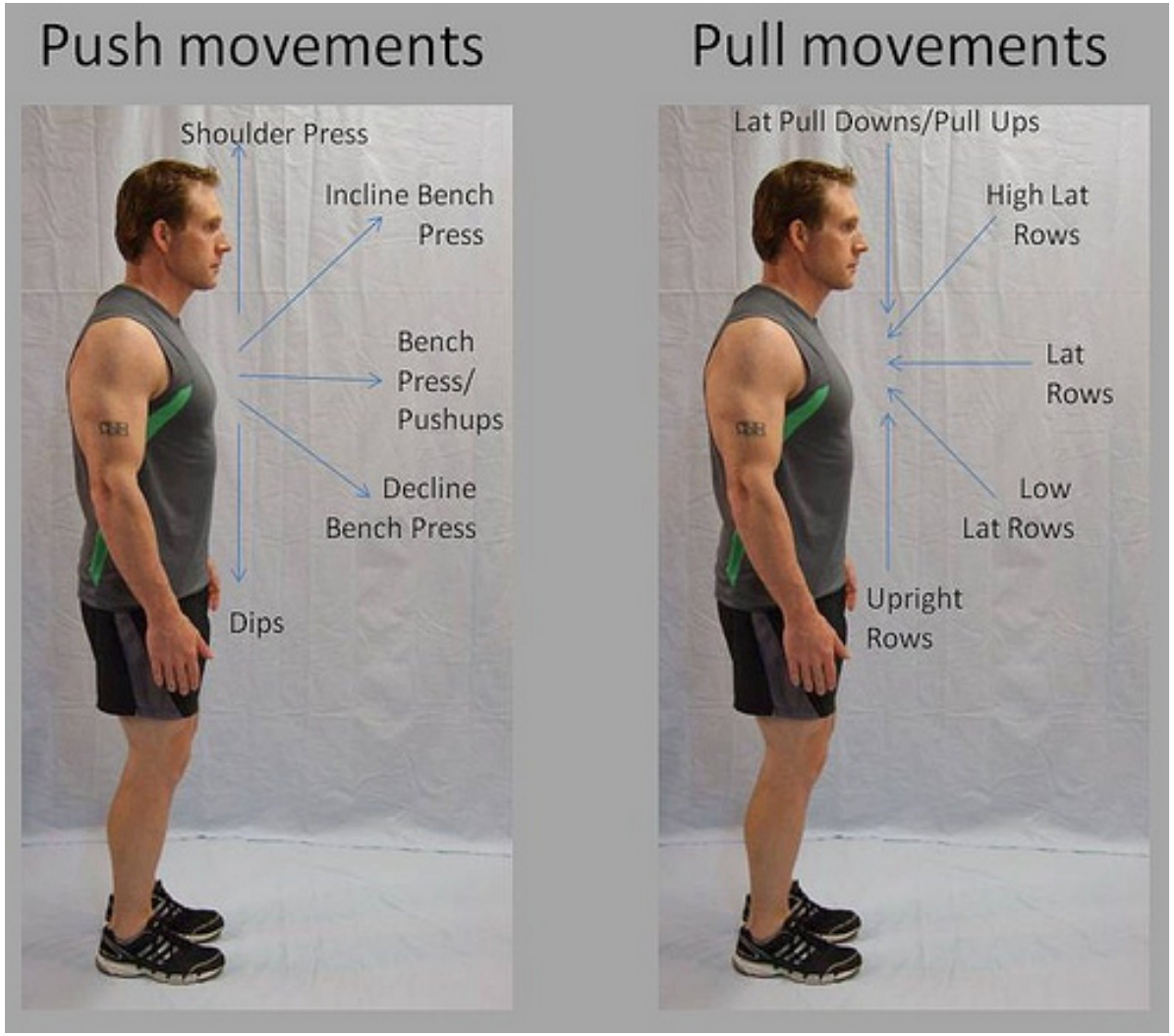
PAE

NASA Fitness

Step 4: Exercise Order

“Push” and “Pull” Exercises (Alternated)

Another method of improving recovery and recruitment between exercises is to alternate pushing exercises (e.g., bench press, shoulder press, and triceps extension) with pulling exercises (e.g., lat pulldown, bent-over row, biceps curl).

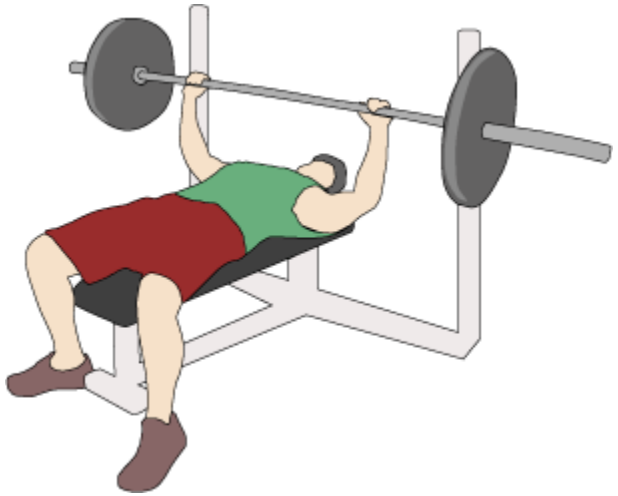


Step 5: Training Load and Repetitions (Reps)

Relationship Between Load and Repetitions

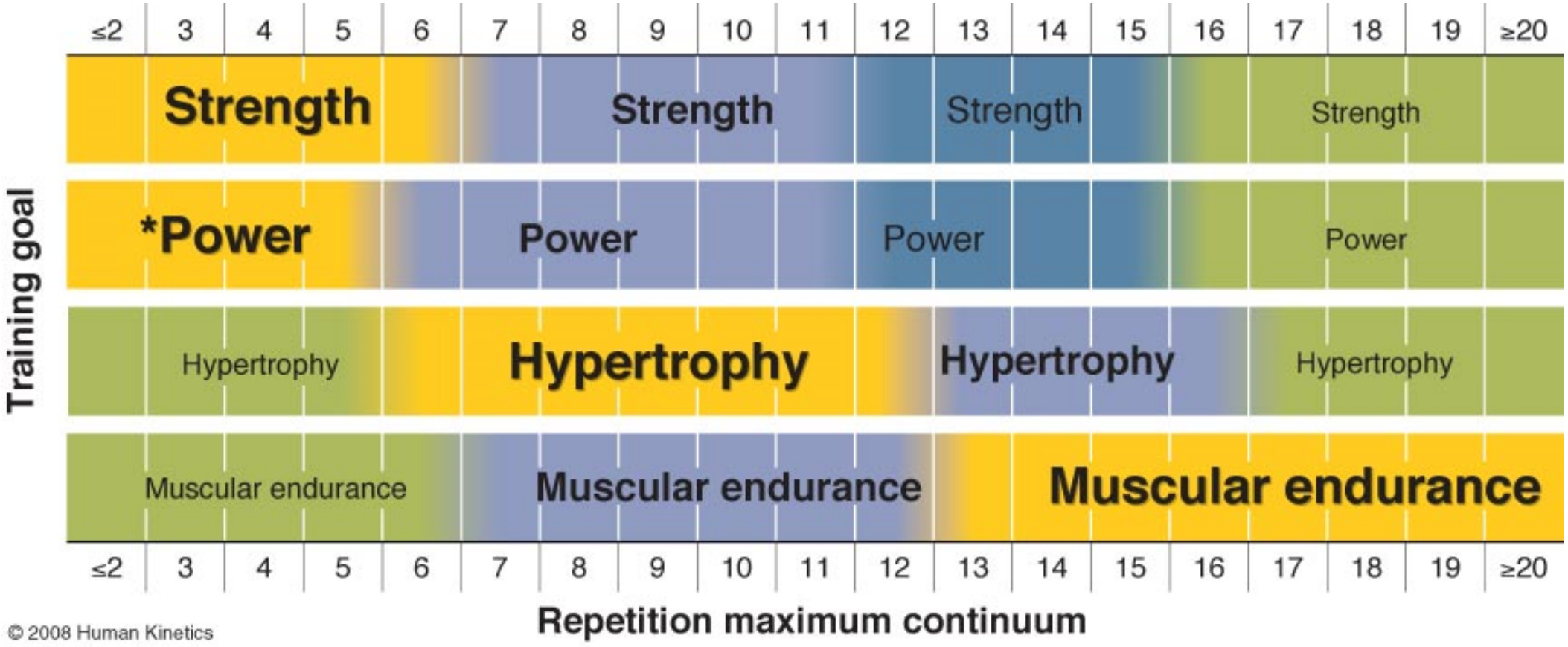
The heavier the load, the lower the number of repetitions that can be performed.

Load is commonly described as a percentage of a 1-repetition maximum (1RM) or as a repetition maximum (RM).



PAE

NASA Fitness



PAE

NASA Fitness

TABLE 15.9

Load and Repetition Assignments Based on the Training Goal

Training goal	Load (%1RM)	Goal repetitions
*Strength	≥85	≤6
†Power:		
Single-effort event	80-90	1-2
Multiple-effort event	75-85	3-5
Hypertrophy	67-85	6-12
Muscular endurance	≤67	≥12

*These RM loading assignments for muscular strength training apply only to core exercises; assistance exercises should be limited to loads not heavier than an 8RM (6).

†The load and repetition assignments shown for power in this table are *not consistent* with the %1RM–repetition relationship. On average, loads equaling about 80% of the 1RM apply to the two- to five-repetition range. Refer to the discussion of assigning percentages of the 1RM for power training on page 400 for further explanation.

Step 6: Volume

Training Status

It is appropriate for an individual to perform only one or two sets as a beginner and to add sets as he or she becomes better trained.

PAE

NASA Fitness

Step 6: Volume

Primary Resistance Training Goal

Strength and Power

Volume assignments for power training are typically lower than those for strength training in order to maximize the quality of exercise.

TABLE 15.11

Volume Assignments Based on the Training Goal

Training goal	Goal repetitions	Sets*
Strength	≤6	2-6
†Power:		
Single-effort event	1-2	3-5
Multiple-effort event	3-5	3-5
Hypertrophy	6-12	3-6
Muscular endurance	≥12	2-3

*These assignments do not include warm-up sets and typically apply to core exercises only (6, 58).

†The repetition assignments shown for power in this table are *not consistent* with the %1RM–repetition relationship. On average, loads equaling about 80% of the 1RM apply to the two- to five-repetition range. Refer to the discussion of assigning percentages of the 1RM for power training on page 400 for further explanation.

PAE

NASA Fitness

Step 6: Volume

Primary Resistance Training Goal

Hypertrophy

Increases in muscular size are associated with higher training volumes and performing three or more exercises per muscle group.

Muscular Endurance

Programs for muscular endurance involve many repetitions (12 or more) per set, lighter loads, and fewer sets.

TABLE 15.11

Volume Assignments Based on the Training Goal

Training goal	Goal repetitions	Sets*
Strength	≤6	2-6
†Power:		
Single-effort event	1-2	3-5
Multiple-effort event	3-5	3-5
Hypertrophy	6-12	3-6
Muscular endurance	≥12	2-3

*These assignments do not include warm-up sets and typically apply to core exercises only (6, 58).

†The repetition assignments shown for power in this table are *not consistent* with the %1RM–repetition relationship. On average, loads equaling about 80% of the 1RM apply to the two- to five-repetition range. Refer to the discussion of assigning percentages of the 1RM for power training on page 400 for further explanation.

Step 7: Rest Periods

The time dedicated to recovery between sets and exercises is called the *rest period* or *interset rest*.

The length of the rest period between sets and exercises is highly dependent on the goal of training, the relative load lifted, and the athlete's training status.

Step 7: Rest Periods

Strength and Power

- Maximal or near-maximal loads require longer rest periods.
- Guidelines range from 2 to 5 minutes.

Hypertrophy

- Short to moderate rest periods are required.
- Typical strategies range from 30 seconds to 1.5 minutes.

Muscular Endurance

- Very short rest periods of 30 seconds or less are required.

Step 7: Rest Periods

TABLE 15.12

Rest Period Length Assignments Based on the Training Goal

Training goal*	Rest period length
Strength	2-5 minutes
Power: Single-effort event Multiple-effort event	2-5 minutes
Hypertrophy	30 seconds-1.5 minutes
Muscular endurance	≤30 seconds

*Because there are occasions when the prescribed percentage of the 1RM for assistance exercises falls outside the range associated with the training goal (e.g., ≥8RM loads are recommended for assistance exercises as part of a muscular strength training program [6]), the strength and conditioning professional should examine the loads used for each exercise when assigning rest periods rather than generally applying the guidelines for a training goal.

Questionnaire

T Periodization involves progressive cycling of various aspects of a training program during a specific period of time.

T General Adaptation Syndrome is the body's reaction and adaptation to stress.

F Training age is the same thing as the chronological age of a person.

T The general guideline is to schedule training sessions so that there is at least one rest or recovery day—but not more than three—between sessions that stress the same muscle groups.

F The heavier the load, the higher number of repetitions that can be performed.

Questions?