PERIODIZATION
(Review)
&
OLYMPIC / POWER EXERCISES
&
PLYOMETRIC EXERCISES
(Chapter 17 and 23)
### Table 23.1
A Periodization Model for Resistance Training

<table>
<thead>
<tr>
<th>Period</th>
<th>Preparation</th>
<th>First transition</th>
<th>Competition</th>
<th>Second transition (off season)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase</td>
<td>Hypertrophy/</td>
<td>Basic strength</td>
<td>Strength/</td>
<td>Peaking</td>
</tr>
<tr>
<td>Variables</td>
<td>Endurance</td>
<td>High</td>
<td>Power</td>
<td></td>
</tr>
<tr>
<td>Intensity</td>
<td>Low to moderate</td>
<td>High</td>
<td>High</td>
<td>Very high</td>
</tr>
<tr>
<td>50-70% 1RM</td>
<td>60-80% 1RM</td>
<td>70-90% 1RM</td>
<td>&gt;95% 1RM</td>
<td>&lt;55-65% 1RM</td>
</tr>
<tr>
<td>Volume</td>
<td>High to moderate</td>
<td>Moderate</td>
<td>Low</td>
<td>Very low</td>
</tr>
<tr>
<td>Sets</td>
<td>3-6</td>
<td>3-5</td>
<td>3-5</td>
<td>3-5</td>
</tr>
<tr>
<td>Reps</td>
<td>10-20</td>
<td>4-8</td>
<td>2-5</td>
<td>1-5</td>
</tr>
</tbody>
</table>

Adapted from references 10, 18, 36, and 31.

### Diagram

The diagram illustrates the activity levels across different phases of training, including spring training, in-season, and off-season periods.

OLYMPIC / POWER EXERCISES
Olympic / Power Exercises

What are they?
- Three basic power exercises with many variations
  - Cleans (i.e., power clean, hang clean)
  - Snatches (i.e., power snatch, snatch squat)
  - Jerks (i.e., push jerks, split jerks)

What do they do?
- Increase power production through weighted explosive exercises

Where do they fit into a periodization paradigm?
- Sport-specific
  - Most often incorporated during the First Transition and Competition periods
  - Can be included in the Preparatory period for some sports (football, track-field, etc.)
- Experience-related
  - Although important for novice lifters, technique is the highest priority
    - Novice lifters should begin with sticks → PVC pipe
    - Unloaded bar weight

Appropriate Applications for power exercises:
- Sport, competition, or task-specific training programs
- Unless client/patient has specific interests in Olympic lifts, they are rarely utilized recreationally
- Requires the use of a platform
  - There are very few platforms in campus recreation weight rooms
Olympic / Power Exercises

What are the appropriate loading and volume schemes?
- Novice- and intermediate-trained individuals:
  - 30 – 60% 1RM
  - 1 – 3 sets, 3 – 6 reps
- Advanced individuals:
  - 30 – 60% 1RM
  - 3 – 6 sets, 1 – 6 reps

How do you determine 1RM loads for the power exercises?
- Actual 1RM testing
  - Advanced lifters only, much experience required
- 3, 5, 6, or 8RM load estimations
  - More typical for novice and intermediate lifters

When determining the order of exercises, when should power exercises occur?
- Always transgress from most demanding to least demanding
  - Power exercises (first) → multijoint primary exercises (second) → single-joint assistance exercises (last)
PLYOMETRIC EXERCISES

Plyometric Exercises

What are they?

- Any exercise that utilizes the stored elastic energy in the muscle and tendon and the stretch reflex to increase power production.
  - Skipping
  - Jumping rope

Two physiological models underlying plyometric exercises

- Mechanical Model:
  - Engaging a musculotendinous unit in the stretch–shortening cycle (SSC) and utilizing the stored energy within the series elastic component (SEC) to increase the force/power production.
Plyometric Exercises

Two physiological models underlying plyometric exercises

- Neural Model:
  - Utilizing the stretch (myotatic) reflex to potentiate the anticipated concentric (shortening) action.

There are 3 phases to the SSC during plyometric exercises:

- Eccentric phase
  - Stretching of the agonist
  - Elastic energy is stored, muscle spindles activated
- Amortization phase
  - Latency period between eccentric and concentric phases
    - Ia afferent nerves stimulate alpha motor neuron pool
    - Alpha motor neurons stimulate agonist to contract
- Concentric phase
  - Shortening of the agonist
    - Alpha motor neurons continue agonist stimulation
    - Elastic energy is released from the SEC

Appropriate Applications for Plyometric Exercises:

- Sport- and task-specific methods for increasing power production
- Greater combination of skill and strength
- Most often during incorporated late in the First Transition and Competition periods
- Due to high skill and strength requirements, plyometrics are often used to “peak” performance.
Plyometric Exercises

- Plyometric program design variables:
  - Mode
  - Intensity
  - Frequency
  - Recovery
  - Volume
  - Program length
  - Progression
  - Warm-up

Plyometric Exercises

- Mode
  - Upper body
    - Medicine ball throws, catches, and push-up variations
  - Lower body
    - Jumps in place
    - Standing jumps
    - Multiple hops and jumps
    - Bounds
    - Box drills
    - Depth jumps
  - Trunk (less physiological support...)
    - Medicine ball sit-ups

Plyometric Exercises

- Intensity
  - Factors that affect plyometric intensity:
    - Points of contact
      - One-legged drills vs. two-legged drills
    - Speed
      - Higher speed = higher intensity
    - Height of the drill
      - Higher center of gravity = higher force of landing
    - Body weight
Plyometric Exercises

Frequency
- Number of plyometric sessions per week
  ➤ 1 – 3 days per week
  - Depends on sport and periodization phase
  ➤ 48 – 72 hours of recovery

Recovery
- Proper work:rest ratios depend on the intensity of the drill
  ➤ 1:5 or 1:10 for drop jumps
  - 5 – 10 seconds rest between jumps
  - 2 – 8 jumps
  - 2 – 3 minutes rest between sets

Volume
- For novice:
  ➤ 80 – 100 contacts per session
- Intermediate:
  ➤ 100 – 120 contacts per session
- Advanced:
  ➤ 120 – 140 contacts per session
Plyometric Exercises

Warm-ups
- Important that warm-ups are specific to the plyometric drill
  ◦ Marching
  ◦ Jogging
  ◦ Skipping
  ◦ Footwork
  ◦ Lunging

Safety Considerations:
- Technique
  ◦ Landing is crucial, if center of gravity is not in line with base of support, injury can occur
- Strength
  ◦ For lower body plyometric exercises
    - 1RM squat ≥ 1.5 x body weight
  ◦ For upper body plyometric exercises
    - 1RM bench press ≥ 1.0 x body weight (large athletes)
    - 1RM bench press ≥ 1.5 x body weight (small athletes)

Safety Considerations:
- Balance
  ◦ Pre-activity balance tests required
    - One-legged stand for 30 sec (novice)
    - One-legged half squat for 30 sec (advanced)
- Landing Surface
  ◦ Shock-absorbing capabilities
    - Grass, suspended floors, and rubber mats
    - NOT concrete, tile, or hardwood