Developing Athletic Abilities
Learning Outcomes

- Implement Training Protocols and Methods
- Adapt them to Athletes’ Development and Experience
- Adapt training to Phase in Yearly Program
- Evaluate Athlete’s Performance and use Results to Adapt Training
Look for these symbols

Reference Material
pages 1-2

Coach Workbook
pages 1-3
The Five NCCP Core Competencies

- Valuing
- Problem-solving
- Interacting
- Leading
- Critical Thinking
Workshop Topics and Activities

- Review of athletic abilities and energy systems;
- Testing athletic abilities;
- Training principles and training methods;
- Interpreting test results;
- Redefining sport training.
Review of Athletic Abilities

2.1 Profiling My Athletes’ Sport
What is Athletic Ability (AA)?

The capacity to carry out the efforts, movements, or tasks that support performance in sport.
DEVELOPING ATHLETIC ABILITIES

Categories of “AA”

- Physical
- Motor
- Tactical
- Mental
The Demands of My Athletes’ Sport

Terminology Review

p. 2

p. 5
Athletic Abilities - Conclusions

During this workshop:

• What athletic abilities should be emphasized in training?
• What is the best way of training these abilities?
Athletic Abilities and Energy Systems
DEVELOPING ATHLETIC ABILITIES

Energy Systems

Aerobic: with oxygen

Anaerobic lactic: *no oxygen, with lactic acid*

Anaerobic alactic: *no oxygen, no lactic acid*
## General Characteristics of the Three Energy Systems

<table>
<thead>
<tr>
<th>Energy System</th>
<th>Energy Source(s)</th>
<th>Power</th>
<th>Capacity</th>
<th>Delay</th>
<th>Critical Duration or Endurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaerobic Alactic</td>
<td>ATP, CP (Phosphagens)</td>
<td>Highest</td>
<td>Very Low</td>
<td>0 - 1 second</td>
<td>6 seconds</td>
</tr>
<tr>
<td>Anaerobic Lactic</td>
<td>Glucose Glycogen</td>
<td>Second Highest</td>
<td>Low</td>
<td>About 2 seconds</td>
<td>30 - 45 seconds</td>
</tr>
<tr>
<td>Aerobic</td>
<td>Glucose Glycogen, Fat Amino Acids from Proteins</td>
<td>Lowest</td>
<td>Extremely High</td>
<td>60 - 75 seconds</td>
<td>6 - 8 minutes</td>
</tr>
</tbody>
</table>

- **Anaerobic Alactic**
  - Power: Highest
  - Capacity: Very Low
  - Delay: 0 - 1 second
  - Critical Duration or Endurance: 6 seconds

- **Anaerobic Lactic**
  - Power: Second Highest
  - Capacity: Low
  - Delay: About 2 seconds
  - Critical Duration or Endurance: 30 - 45 seconds

- **Aerobic**
  - Power: Lowest
  - Capacity: Extremely High
  - Delay: 60 - 75 seconds
  - Critical Duration or Endurance: 6 - 8 minutes
Energy Systems as Reservoir Systems

- **Aerobic System**
  - Large Supply
  - Low Production Rate
  - Long Duration
  - Fat
  - Protein
  - Glycogen
  - Glucose

- **Alactic System**
  - Very Small Supply
  - Very High Production Rate
  - Very Short Duration
  - Creatine Phosphate

- **Lactic System**
  - Small Supply
  - High Production Rate
  - Short Duration
  - Glycogen
  - Glucose
  - ATP

At Rest
Energy-system dominance depends mainly on:

- Exercise intensity;
- Duration of effort;
- Number of efforts;
- Recovery, if any, between efforts, as well as duration and type of recovery.
Common Patterns of Effort

• Single, maximum efforts of various duration;

• Continuous efforts of varying intensity;

• Repeated efforts of various duration interspersed with recovery periods.
Single, Maximum Efforts of Various Duration

<table>
<thead>
<tr>
<th>Exercise Duration</th>
<th>Contribution (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 sec</td>
<td>100</td>
</tr>
<tr>
<td>30 sec</td>
<td>90</td>
</tr>
<tr>
<td>1 min</td>
<td>80</td>
</tr>
<tr>
<td>2 min</td>
<td>70</td>
</tr>
<tr>
<td>10 min</td>
<td>60</td>
</tr>
<tr>
<td>1 hr</td>
<td>50</td>
</tr>
<tr>
<td>4 hr</td>
<td>40</td>
</tr>
</tbody>
</table>

- Anaerobic alactic
- Anaerobic lactic
- Aerobic (glucose and glycogen)
- Aerobic (fat)
Continuous Efforts of Varying Intensity

Intensity
- All-out
- High
- Moderate
- Low

Time
Repeated Efforts of Various Duration Interspersed with Recovery Periods

• Intensity;
• Duration and type of recovery between work intervals;
• Duration of each work interval or repetition;
• Duration and type of recovery between groups of work intervals, or sets.
Resistance Training: Energy Source

• Just a few reps: anaerobic alactic system supplies most of the energy;

• Lactic system kicks in as the number of reps increases;

• If work is very low resistance, then aerobic system contributes.
## Energy Systems and Athletic Abilities (AA)

<table>
<thead>
<tr>
<th>Athletic Ability</th>
<th>Athletic Ability Subset</th>
<th>Primary Energy Systems and Components</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Speed</strong></td>
<td>Maximum speed (6 sec or less)</td>
<td>Anaerobic alactic (Power)</td>
</tr>
<tr>
<td><strong>Speed-endurance</strong></td>
<td>Speed-endurance (20 - 30 sec)</td>
<td>Anaerobic alactic (Capacity/Endurance)</td>
</tr>
<tr>
<td></td>
<td>Speed-endurance (45 - 75 sec)</td>
<td>Anaerobic lactic (Power)</td>
</tr>
<tr>
<td><strong>Aerobic Stamina</strong></td>
<td>Maximum aerobic power (MAP)</td>
<td>Aerobic (Power)</td>
</tr>
<tr>
<td></td>
<td>Aerobic endurance (Moderate duration)</td>
<td>Aerobic (Endurance)</td>
</tr>
<tr>
<td></td>
<td>Aerobic endurance (Long duration)</td>
<td>Aerobic (Endurance)</td>
</tr>
<tr>
<td><strong>Strength and Muscular Qualities</strong></td>
<td>Maximum strength (Neural activation)</td>
<td>Anaerobic alactic (Power)</td>
</tr>
<tr>
<td></td>
<td>Maximum strength (Hypertrophy)</td>
<td>Anaerobic alactic (Capacity/Endurance)</td>
</tr>
<tr>
<td></td>
<td>Speed-strength (Light resistance)</td>
<td>Anaerobic alactic (Power)</td>
</tr>
<tr>
<td></td>
<td>Speed-strength (Moderate resistance)</td>
<td>Anaerobic alactic (Power)</td>
</tr>
<tr>
<td></td>
<td>Strength-endurance</td>
<td>Anaerobic alactic (Capacity/Endurance)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anaerobic lactic (Power and Capacity/Endurance)</td>
</tr>
</tbody>
</table>
Activity 3.3.1: 15 Generic Activities
Section 4
Training the Athletic Abilities

p. 22-34

p. 11
Testing Athletic Abilities

• Determine level of development of AA;
• Determine adequacy of level of development of AA;
• Identify factors that explain performance levels;
• Identify AA to emphasize in training.
Testing Athletic Abilities

- Select appropriate training methods;
- Set training intensities;
- Monitor effectiveness of training program.
Activity

4.1 Testing the Athletic Abilities
Testing AA’s - Debrief

- What conclusions can you draw about your testing procedures?

- What did you actually do with the information from your tests?
Regular Testing and Evaluation…

- Motivates athletes;
- Provides objective reference points for setting training goals;
- Helps athletes understand why certain types of training are used;
- Provides data on athletes’ physical characteristics.
Regular Testing and Evaluation…

• Helps guide athletes into the positions and sports they are best suited for;

• Helps athletes and coaches set performance goals;

• Helps spot possible signs of incomplete recovery, excessive fatigue, or overtraining.
DEVELOPING ATHLETIC ABILITIES

Types of tests

- Lab tests
- Lab-like tests
- Field tests
Lab Tests

• Provide direct measures of specific physiological variables
  – e.g.: VO$_2$ max test.

• Issues:
  – Performed away from the playing field;
  – Require trained personnel;
  – Involve detailed procedures;
  – Require sophisticated equipment;
  – Cost.
Field Tests

- Conducted in the athlete’s training environment;

- Measure sport performance – e.g. time to run a specific distance;

- Some physiological responses can be monitored:
  - e.g. heart rate.
DEVELOPING ATHLETIC ABILITIES

Lab-like Tests

• Measure a performance variable in standardized, controlled conditions;

• Results can be used to predict the value of a variable, highly correlated with performance.

  – e.g., Léger running tests determine the athlete’s maximal aerobic speed, and this value can be used to estimate/predict maximum oxygen uptake (VO$_2$ max).
Activities
4.1.2 and 4.1.3

p. 27-29
p. 14
DEVELOPING ATHLETIC ABILITIES

How Am I Doing?

• Relate your learning to the five NCCP core competencies:
  – Problem-solving
  – Valuing
  – Critical Thinking
  – Leading
  – Interacting

p. 15-16
Section 5
Training Principles and Training Methods

p. 17
Training Principles and Training Methods

The purpose of this section is to:

• Define training principles and apply them to specific situations;

• Identify training methods for the key AAs and energy systems in your sport;

• Clarify what training means to you.
Activities – 5.1.1 and 5.1.2
Definitions and principles

p. 17-21
Choose Training Methods Consistent with:

- Athletes’ training objectives;
- The demands of the sport;
- Athletes’ stage of growth and development;
- Athletes’ training background.
Choose Training Methods Consistent with:

- Athletes’ injury history;
- Athletes’ individual strengths and weaknesses;
- Time of year the training is occurring;
- The training environment.
Section 5.2
Training Methods
Activity 5.2.1 (Read or Jigsaw)

p. 35-43

p. 21
Activity 5.2.2
Statements

p. 22-23
Activity 5.2.3
Case Studies

p. 115, 118

p. 23-35
Case Studies - Debrief

• Each group presents its solution to the full group.

• How do you agree or disagree with the answers provided?

• Answers in: p. 127-141
Activity 5.2.4
Current Training Practices

p. 36-37
Current Training Practices - Debrief

• Share modifications to your original methods.

• Questions?
Section 6
Interpreting Test Results

p. 38
Interpreting Test Results

- Monitoring performance consists of having a planned approach and effectively using test results.

- Testing must occur regularly and at appropriate times.
Choose Tests for Appropriate Training Period

• Large battery of tests used before major training phases;
• A few tests used at the end of specific training cycles;
• Sprint times or circuit times used within the program on a weekly or bi-weekly basis.
Testing Considerations

Results can be a source of motivation, but they also have the potential to de-motivate.

Ensure poor test results do not distract or discourage.
Reference Material Overview

p. 39-40, 97-98
When analyzing and interpreting test results, consider:

• Actual results at the time the test is conducted;

• The way results for a given test evolve over time;

• The way specific variables tested, evolve relative to one another over time.
Pre-activity: How to Interpret Test Results

p. 99-105
Activity 6.1 or 6.2
Team Sport or Individual Sport

p. 142-145
p. 38-41
Activity Debrief

• Share your analysis with the full group and indicate any differences with the answer provided in the RM.

• Note: These are just examples of how to interpret test results.
Section 7
Redefining Sport Training

p. 42
Activities 7.1.1 and 7.1.2
Then and Now

p. 42
Sport Training Summary

Is a planned and organized undertaking that involves a cyclical process of:

• Analysis/assessment
• Forecasting
• Prescription
• Implementation
• Control
Sport Training Summary

Is based on an understanding of:

- The demands of the tasks athletes perform in competition;
- Athletes’ background;
- Athletes’ current status;
- Coaching context.
Sport Training Summary

• Aims to produce general and specific adaptations or learning that will enhance performance.

• Applies proven principles.
**Sport Training Summary**

- Uses methods that target specific athletic abilities and may cause significant short-term fatigue.

- Alternates overload and recovery throughout the training program.
How Am I Doing?

Relate your learning to the five NCCP core competencies:

• Problem-solving
• Valuing
• Critical thinking
• Leading
• Interacting

p. 43-44
Module Wrap-up
Reviewing, Self-assessment, Parking Lot

p. 45-47
Resources

Coaching Association of Canada: www.coach.ca

Developing Athletic Abilities
Reference Material
Developing Athletic Abilities