Periodizing a College Sprint Program: Theory and Practice

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AN OUTSTANDING ASPECT OF periodization theory is its ability to adapt to any sport. Whether it is football, basketball, gymnastics, cycling, track and field, or virtually any other sport, the same basic principles apply when designing a training program.

However, a few problems can develop when planning the training program. While working with more than one coach, and in most cases more than one athlete, the general terminology and concepts of periodization can become confused. Sometimes it is just a problem of semantics, but other times it is a basic misunderstanding of the underlying principles of periodization.

Compounding this obstacle is the old-school approach of some coaches. Decisions on training must be based on sport-specific biomechanics and physiology as well as on previous experience, not solely on the latter.

Assuming all the concepts and terminology of periodization are understood, there are still the real-world time constraints to deal with when working with college athletes. These time constraints help translate training theory into practical training.

This article reviews the basic concepts of periodization and discusses a highly effective training program for college sprinters.

■ Basic Periodization Terminology

In order to properly design and implement a training program, one must use common terminology. Different authors have different ways of defining the cycles of periodization (2). Presented below are the cycles of training and their appropriate definitions which we will use in this article.

- Macrocycle
- Mesocycle
- Microcycle
- Volume of training
- Intensity
- Basic training categories
- Peaking
- Active rest

The *macrocycle* is a period of training that encompasses several months to 1 year, ending with a peak at the most critical event of the year. A macrocycle usually contains more than one peak. Within a sprinter's training program there is typically a peak for the indoor season and a peak for the outdoor season, resulting in a two-peak macrocycle. Macrocycles begin with a high volume and low intensity of training, then end with a low volume and high intensity of training (2, 7).

A *mesocycle* is a duration of a few months which begins with a high volume training period and ends with a high intensity training period. A macrocycle could contain four to six mesocycles (2, 7).

A *microcycle* is a 1-week training period in which volume, intensity, load, and exercise selection are varied on a daily and weekly basis. Within a microcycle, train-

ing intensity varies with heavy and light days (2, 7).

The *volume of training* refers to the amount of work involved in training. In a weight training program, volume can be noted by the total number of repetitions but is more accurately depicted by the training load (repetitions × weight lifted). Volume is thereby represented in kilograms, a better way of expressing total work than repetitions alone (7).

In a running program, volume may be defined as the total distance covered. The units of volume would then be in meters (3). If time were factored in for the runs, then a representation of training "load" could be determined.

Intensity is the power output of the training. In weight training, intensity can be defined by the amount of weight (kg) lifted for a given exercise. For running, the intensity can be designated by the time of the run (sec).

Training can be broken up into *basic training categories*. The general preparation training period is the time of higher volume/lower intensity work, the goal being to improve the athlete's overall condition and prepare him or her for more specific higher intensity training (3).

The special preparation phase prepares the athlete more specifically for the event. The biomechanics of the event is more closely reproduced in all aspects of training, while technique training and conditioning become more specific to the event (3).

The competition phase of training is noted with low volume and high intensity training. Technique assumes the highest importance and training is focused primarily on the actual event. It is during the competition season, then, that the event is accomplished.

Peaking or tapering can be completed in 1 to 3 weeks. This phase is to prepare specifically for the most important competition. It is very much like the competition phase except that there are further reductions in training volume.

Maintenance or *active rest* is a phase that lasts 1 to 4 weeks. During this time the training volume and intensity are kept relatively low to allow the athlete to recover from previous workloads and competitions.

■ Training Principles

The principle of overload is the key to improving performance. An increased training load is necessary if the athlete hopes to reach a new level of performance. The load must be sufficient to tax the athlete's current capabilities. The body will then overcompensate for the load. The training load serves as a stimulus, or stress, and the body responds by becoming fatigued (Figure 1).

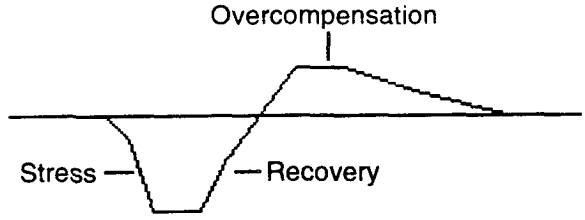

Figure 1 **Performance capability with an applied training load.**

When the athlete is allowed to recover sufficiently, overcompensation occurs and the body achieves a higher status than before the stimulus. Then, if a new training load is applied at the appropriate time of the overcompensation, an even higher status may be achieved. This is the chief aim of a well-designed training program.

Specificity is the most important principle of training. The training effect is mediated by the type of training load. Therefore the requirements of the event should mandate the training methods.

Mechanical specificity refers to the methods of training closely mimicking the actual event, while metabolic specificity concerns the physiological demands of the event. Training methods should take into consideration both the mechanics of the event and the metabolic demands placed on the body.

■ Training Design

Armed with an understanding of the basic training principles, one can then plan a good training program. However, the details of the athlete's specific situation also determine the structure of the program. For our purposes here, the case of the sprinters at Appalachian State University will be covered.

The most important issue to keep in mind when designing a training program is the goal of the event. For sprinters the goal is speed, whether it's the 100- or 400-m. This goal will be the predominant factor in determining the direction of the athlete's training program.

Once the goal is determined, the competition dates must be

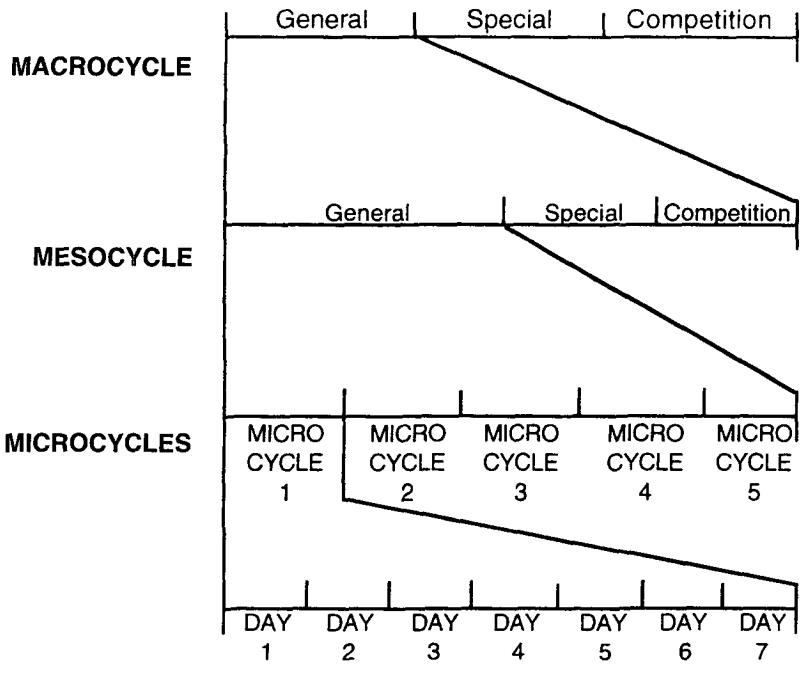

Figure 2 **Breakdown of training cycles in a periodized program.**

decided. An athlete cannot compete at peak levels in all the competitions within a year, thus the most important meets must be determined in order to have the athlete peak for these events. This will set the basic structure of the macrocycle.

The macrocycle is then broken down into appropriate mesocycles in order to prepare the athlete (Figure 2).

In the general preparation mesocycle of the macrocycle, more time will be spent in general preparation and there will be less emphasis on special preparation and competition. Although the athlete might be competing during this mesocycle, the emphasis is still on preparing for more specific training and the more critical competitions later.

During the competition mesocycle of the macrocycle, more time will be spent in the competition phase.

Microcycles are planned based on the phases of the mesocycle. The general preparation microcycles of the general preparation mesocycle might show a trend of increasing volume with an unload microcycle at the end.

The load within these microcycles is very important. One must not start an athlete at too high of a training load. And the training load must be constantly increasing at an appropriate level in order to elicit desired adaptations. Also, an unloading microcycle must be planned or the athlete may become overtrained and reach a performance plateau.

Within the microcycle are planned the actual training days, that is, the type, volume, and intensity of training for a given day.

Careful attention must be paid to how the particular microcycle being planned fits into the loading scheme in that phase of the mesocycle. If too many high-load days are planned in a microcycle, a low-load week can become a high-load week and throw off the whole loading/unloading plan of the phase.

■ Application

The primary goal of speed development is what sprinters focus on. Yet the results of a race really depend on several components: reaction time, rate of force development, acceleration, maximum speed, and speed endurance. Since all are facets of speed that will determine the outcome of the race, these are the areas to focus on throughout the training year.

The time that sprinters are actually in school and thus available for training is the focus of this macrocycle. From the first day of training until the outdoor conference championship, the sprinter has 34 weeks of training:

- Mesocycle I, Aug. 25–Dec. 9: More emphasis on general preparation training.
- Mesocycle II, Dec. 10–Feb. 28: More emphasis on specific preparation.
- Mesocycle III, Mar. 1–Apr. 18: Greatest emphasis on competition training.

The peak events occur on Dec. 9 (home meet), Feb. 28 (indoor championships), and April 18 (outdoor championships). Again, while all meets are important, an athlete cannot maintain the same level of performance for all competitions (3, 7). Therefore these three meets were chosen as the most important dates of the year.

The first mesocycle will then be a general preparation cycle of 15 weeks, the second one will be a special preparation mesocycle of 12 weeks, and the third one will be a 7-week competition cycle. Each mesocycle will contain all three

phases of training—general preparation, special preparation, and competition.

The mesocycle phases can now be planned with the number of microcycles per phase. In Mesocycle I (general prep) the emphasis will be on preparing for greater workloads and more specific training. Strength-endurance and general conditioning are the goals of this phase.

Table 1 shows the phase breakdown of each mesocycle. Keeping in mind the practical aspects of training, notice that Mesocycle II includes a 4-week maintenance phase. This is due to Christmas break when the athletes will not be in school. They will have a training program, but no coaches available to see them through that part of their training. This maintenance phase can actually contain aspects of general and special preparation.

Since Mesocycle II is a special-preparation mesocycle, speed-endurance should be the focus (5). Mesocycle III also contains 1 week of maintenance, due to spring break and the previous taper.

It is very important to be aware of the weeks during which college athletes will not be available for training. When making a detailed plan, be cognizant of all possibilities that could interfere with training. This mesocycle gives the most time to the peaking or tapering phase to allow for the athlete's best performance of the year.

Table 1
Phase Breakdown of Mesocycles

Mesocycle I (15 wks)		**Mesocycle II (12 wks)**		**Mesocycle III (7 wks)**	
Phase	*Wks*	*Phase*	*Wks*	*Phase*	*Wks*
Gen. Prep.	5	Maintenance	4	Maintenance	1
Spec. Prep.	5	Gen. & Spec.	1	Gen. Prep.	1
Competition	4	Competition	5	Spec. Prep.	1
Taper	1	Taper	2	Competition	1
				Taper	3

Table 2
General Preparation Phase for Sprint Training

Week	**150-m**	**200-m**	**250-m**
		100-Sprint	
1	5×/1:7	4×/1:8	3×/1:5
2	5×/1:7	4×/1:8	3×/1:5
3	Decrease time 0.5 sec	Decrease time 0.5 sec	Decrease time 0.5 sec
4	6×/1:7	5×/1:8	4×/1:5
5	5×/1:7	4×/1:8	3×/1:5
Week	**200-m**	**300-m**	**500-m**
		400-Sprint	
1	5×/1:7	2×/1:6	1×/1:4
2	5×/1:7	3×/1:6	2×/1:4
3	Decrease time 1.0 sec	Decrease time 1.0 sec	Decrease time 1.0 sec
4	6×/1:7	3×/1:6	3×/1:4
5	4×/1:7	2×/1:6	1×/1:4

Specifics

Now for the details of the general preparation phase of Mesocycle I, in order to demonstrate the variables and principles that must be considered when planning the training year:

This phase was determined to be 5 weeks long. It contains four loading microcycles and one unloading microcycle to allow for recovery from previous workloads and to prepare for a higher level of training. There are essentially two types of workouts for sprinters—running workouts and weight training workouts. Running is the sprinters' event, so this should be a priority in planning their workout.

Since the athletes are in the general preparation phase of Mesocycle I, the running workouts should focus on building high-intensity exercise endurance. This can be accomplished by increasing the volume of training with a low to moderate intensity (1, 3, 7).

In the past, many high level sprint programs incorporated aerobic workouts during the general preparation phase (4, 5, 8).

Table 3
Lift Selection for General Preparation

Day 1	Day 2	Day 3
Squat	Clean pull (floor)	Squat
1-Leg squat	Romanian deadlift	1-Leg squat
Push press	Bent barbell row	Push press
Abdominal	Abdominal	Abdominal

However, research suggests that aerobic training can have detrimental effects on anaerobic energy production, maximum strength, and speed-power performance.

Interval training with appropriate work-to-rest ratios can improve the use of the phosphagen, glycolytic, and oxidative energy systems (6). The general training program must be suitable for athletes of different experience levels. Table 2 shows the proposed running programs for 100-m and 400-m sprinters. These programs were established with the following in mind:

- Begin with a light load to prepare for harder training.
- Use the proper work-to-rest ratio to tax the appropriate energy system for the event.
- Increase the load throughout the phase.
- Allow an unload microcycle at the end of the phase for recovery.

The weight training program design was based on the muscles used in sprinting. Hip and leg strength and power are crucial for sprinters. Table 3 lists the exercises that were selected. Squats were chosen to improve overall hip and leg strength, one-legged squats to help in single-leg drive, push presses for overall explosiveness, and abdominal training for trunk strength and stability. Only a few fundamental lifts were initially chosen to keep the load at a practical level for the first phase of training.

Each workout will have a different intensity and volume of training. These must be carefully laid out in the microcycle to allow for adequate recovery and prevent overwork.

Figure 3 suggests ways to vary the load to allow for maximum work. In order to follow this pattern, the 100-m sprinters' workout (see Table 2) would be arranged so that the 250-m would be run on Tuesday, the 200-m on Thursday, and the 150-m on Saturday. The 400-m workout would be organized so that the 500-m would be run on Tuesday, the 300-m on Thursday, and the 200-m on Saturday.

Table 4 shows how the weight training could be varied throughout the phase and for each training day within each mesocycle.

Going by Figure 3 and Table 4, the weight session for Day 1 would involve the heavy repetition maximum (RM) percentages, Day 2 the moderate RM percentages, and Day 3 the light RM percentages. Given these training loads, variation can be accomplished within the microcycle for both the running and weight training programs.

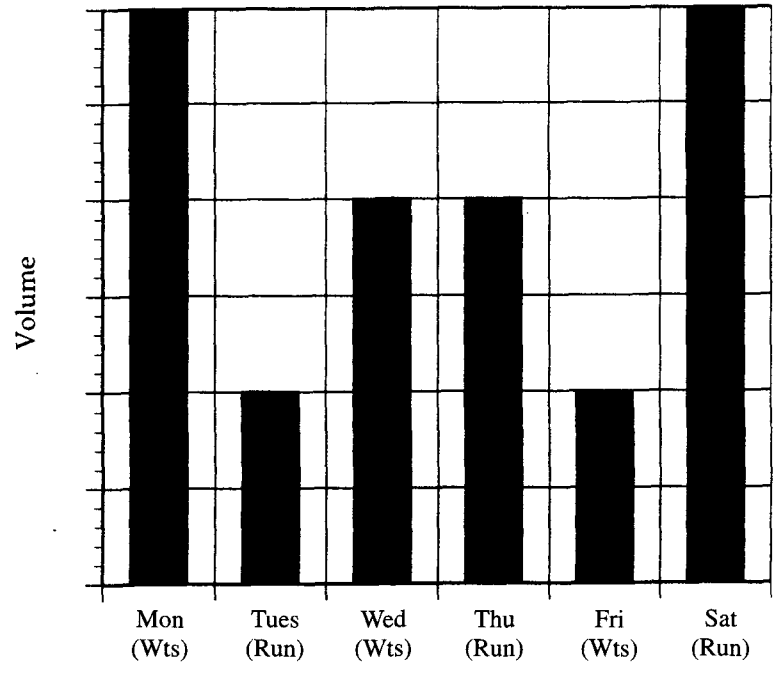

Figure 3 **Training distribution throughout the microcycle.**

Table 4
Variation of Weight Training Load

Week	Sets × Reps	Heavy (%RM)	Moderate (%RM)	Light (%RM)
1	3 × 5	90	80	75
2	3 × 10	85	80	75
3	5 × 10	80	80	70
4	3 × 5 (1 × 10)	70	75	60
5	3 × 5	85	80	70

The next step is to plan the training program for the special preparation phase of the first mesocycle.

Keeping in mind the purposes of each cycle and phase of training, the main goal of the sport, the principle of overload and recovery, and mechanical as well as physiological specificity, the coach and the athlete can plan every detail of each day of training. ▲

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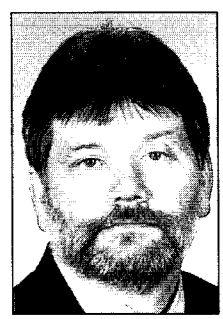

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Coaches' Estimates of Drug Use and Disordered Eating: A Blind Spot?

Note: This quiz may be used by the CSCS and NSCA-Certified Personal Trainer to acquire 0.5 CEUs.
The article for this quiz begins on p. 31.

All the questions below specifically refer to the content and opinion of the corresponding article.

1. Which of the following statements did the surveyed coaches *most strongly* agree with? "Anabolic steroids can . . .
   A. cause acne."
   B. stunt growth."
   C. cause growth of facial hair in females."
   D. increase muscle size."

2. The surveyed coaches felt that all of the following topics should be taught to female student-athletes *except*:
   A. aerobic training
   B. sports nutrition
   C. eating disorders
   D. strength training

3. Which of the following drugs is most often abused by female athletes?
   A. acetaminophen
   B. laxatives
   C. anabolic steroids
   D. diuretics

4. Which of the following did the surveyed coaches feel is the most prevalent among their adolescent athletes?
   A. disordered eating
   B. alcohol consumption
   C. anabolic steroid abuse
   D. cigarette smoking

5. Which of the following describes the "halo effect"?
   A. a coach giving extra attention to the team captain
   B. a younger athlete looking up to an older teammate
   C. a coach feeling his or her athletes are better than nonathletes
   D. an athlete working harder for the approval of the coach

6. Which of the following statements did the surveyed coaches *least strongly* agree with? "Anabolic steroids can . . .
   A. cause acne."
   B. stunt growth."
   C. cause growth of facial hair in females."
   D. increase muscle size."

7. Which of the following is a reason why coaches underestimate the prevalence of disordered eating among their athletes?
   A. athletes have better conduct when around the coach
   B. coaches have greater expertise in dealing with this issue
   C. the rate of incidence of disordered eating among athletes is lower
   D. the higher degree of objectivity in the coach/athlete relationship

8. Which of the following is the most referred to source of information of the surveyed coaches?
   A. media
   B. journals
   C. formal education
   D. other colleagues

9. Disordered eating is most prevalent among which of the following groups?
   A. athletic women
   B. sedentary women
   C. athletic men
   D. sedentary men

10. Which of the following is the most common behavior associated with disordered eating among adolescent athletes?
    A. vomiting
    B. pill taking
    C. choosy eating
    D. fasting

The answers to this quiz will appear in Vol. 20(4).

Answers to the CEU Quiz in Vol. 20(2) of *Strength and Conditioning*
1. A; 2. C; 3. B; 4. B; 5. D; 6. D; 7. A; 8. C; 9. C; 10. A.