

Microdosing: Refining in - Season Training Methods for Field Players

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Abstract: *In - season training presents challenges for field players in various sports, with limited time for recovery and adaptation. To optimize performance and reduce the risk of overtraining, innovative methods are needed. Microdosing, derived from pharmacology, involves administering low - volume, high - impact training sessions strategically to induce targeted adaptations. This article explores the theoretical frameworks supporting microdosing, including hormesis, mitochondrial biogenesis, neural adaptations, and overtraining prevention. The programming strategy involves dividing training volume into more frequent and shorter sessions. Microdosing can sustain or enhance physical qualities during intense competition periods. Practical application involves adjusting variables like session length, frequency, and loading. Adhering to principles like optimal timing for speed work, technical considerations, and individualization is essential. Embracing the concept of doing less and recognizing broader training advantages contributes to sustained progress. Microdosing offers a valuable tool for strength and conditioning coaches to enhance athletes' speed, strength, and resilience within the constraints of in - season training.*

Keywords: Microdosing, in - season training, field players, performance optimization, overtraining prevention, programming strategy, practical application.

1. Introduction

In - season training poses significant challenges for field players in various sports. With a dense schedule of matches, tournaments, and competitions, athletes often struggle to maintain peak performance while avoiding the risk of overtraining and injuries. Traditional training approaches may not always be suitable for in - season periods due to the limited time for recovery and adaptation. As a result, there is a need for innovative and effective training methods that can optimize player performance while minimizing the risk of burnout and physical strain.

The success of field players during the in - season period directly impacts team performance and competitive outcomes. In many sports, field players are required to maintain high levels of skill, speed, endurance, and decision - making throughout the season. A well - structured training schedule can significantly enhance players' physical and mental attributes, leading to improved game performance and reduced chances of injuries. Thus, maximizing training effectiveness during the in - season becomes crucial for teams and athletes aiming to achieve their goals and maintain a competitive edge.

2. Main Body

Microdosing in sports training refers to the practice of administering small, precise doses of training stimuli to athletes throughout the training period. The concept of microdosing originally emerged from the field of pharmacology, where it was applied to the administration of subtherapeutic doses of drugs to elicit specific physiological responses without causing significant side effects. In the context of sports training, microdosing involves strategically planning and delivering low - volume, high - impact training sessions to induce targeted adaptations in athletes' bodies. The origins of microdosing in sports can be traced back to elite endurance athletes in the 20th century who

experimented with alternative training methods to optimize performance while minimizing the risk of overtraining. Over time, the concept has evolved, and researchers and coaches have explored its potential benefits for various sports disciplines, including team sports like soccer, rugby, and field hockey [1].

The effectiveness of microdosing in sports training can be explained by several theoretical frameworks and underlying mechanisms:

- **Hormesis:** Microdosing operates on the principle of hormesis, which states that low doses of stress or stimuli can trigger adaptive responses that enhance an organism's resilience and performance. By subjecting athletes to carefully calibrated doses of training stress, microdosing stimulates the body's adaptive mechanisms, leading to improved physiological and psychological capacities.
- **Mitochondrial Biogenesis:** Microdosing may promote mitochondrial biogenesis, the process by which cells produce new mitochondria (the cellular powerhouses responsible for energy production). Increased mitochondrial density and function can enhance athletes' endurance and overall aerobic capacity.
- **Neural Adaptations:** Microdosing can elicit neural adaptations, optimizing motor skill learning and neural plasticity. This may lead to improved coordination, reaction times, and decision - making abilities on the field.
- **Recovery and Overtraining Prevention:** By providing sufficient recovery time between microdosing sessions, athletes can avoid the negative consequences of overtraining, such as fatigue, decreased performance, and an increased risk of injuries.

3. Programming Strategy

Programming strategy involves dividing the typical training volume of a microcycle into more frequent and shorter sessions. Another approach is to use specific programming

strategies like post - activation performance enhancement (PAPE) or resistance priming stimuli, which can help maintain the overall training volume while potentially reducing fatigue compared to traditional in - season training methods. By adopting a micro - dosed approach, it may be possible to sustain or even enhance physical qualities that tend to decline during periods of intense competition, such as maximal speed, as the focus shifts towards prioritizing recovery over resistance training application [2].

As mentioned by Cunanan et al. [3], programming in training involves adjusting various training variables such as frequency, density, volume, and load. Additionally, it incorporates the use of advanced programming strategies like phase potentiation, planned overreaching, and tapering. Micro - dosing is one such programming strategy that can be employed either independently or in combination with these advanced methods. For instance, concentrated volume loads (also known as planned overreaching) can be used to elicit a delayed training effect, while specific training residuals can trigger phase potentiation [4, 5]. This concept aligns with the block periodization approach advocated by Issurin and Yessis [6], where "mini - blocks" are utilized to enhance specific training factors. These mini - blocks serve to extend the residual effects of a preceding mesocycle, effectively acting as a form of micro - dosing [7].

When dealing with sports characterized by both extended seasons and dense fixture schedules, a combination of traditional training sessions and micro - dosed strength training sessions may be more suitable. Traditional sessions, when time allows, can be used to generate an intense and concentrated load within a relatively short duration. On the other hand, micro - dosed strength training sessions can be incorporated when necessary to accumulate volume without causing excessive fatigue. This approach can be implemented by front - loading the training week, scheduling longer duration (higher volume) sessions further away from competition, and placing micro - dosing sessions closer to the competition to optimize recovery. It is important for practitioners to be aware that increasing the frequency of training sessions may also lead to training monotony, especially if appropriate exercise variation is not provided.

The concept of the minimum effective dose should not be confused with micro - dosing, as exercise prescription can vary along a spectrum from minimum to maximum effective dosing. Implementing the minimum effective dose can be beneficial during periods of fixture congestion to minimize training - induced fatigue while still maintaining physical characteristics. The duration of time during which the minimum effective dose is employed in training will depend on the presence of training residuals and the athlete's current training status.

Recent research has examined the minimum effective dose for different populations to prevent detraining [8], increase strength [9, 10], or promote hypertrophy [10]. Iversen et al. [10] provided prescriptions suggesting that to improve maximal strength capacity, it is necessary to complete ≥ 4 sets per muscle group in the 4 - 6 repetition range at approximately 85% of one repetition maximum (RM) per

week. However, regardless of the sets, repetitions, and frequencies recommended in this research, the authors concluded that training to volitional fatigue is necessary, which may not be practical for in - season exercise prescription, especially during dense competition schedules, and is not essential for hypertrophy or strength development [11, 12].

Understanding these loading paradigms can still offer valuable insights into determining the volume load (sets x repetitions x load) required for the minimum effective dose and how to distribute these loads throughout a microcycle.

4. Practical Application

In programming applications, variables refer to the adjustable elements that play a crucial role in designing effective training sessions. These variables include the session length, which typically lasts between 20 to 30 minutes, ensuring optimal focus and engagement without causing exhaustion. The weekly frequency is another vital variable, with training sessions recommended to be conducted 2 to 4 times per week, allowing sufficient time for recovery and progress.

Regarding loading, the balance between low volume and high intensity is emphasized. This approach ensures that the intensity of exercises remains challenging while keeping the overall volume manageable to prevent overtraining [13]. The timing of training sessions is also an essential variable to consider, offering flexibility for coaches and athletes to incorporate workouts as pre - game or pre - practice routines, post - game or post - practice for recovery, as part of warm - up protocols, or even on off - days to maintain momentum and consistency.

Furthermore, the physical qualities to be trained form a crucial set of variables. Strength, power, speed, agility, mobility, and stamina are the key attributes that athletes aim to develop through their training regimen. Each of these qualities contributes to enhanced athletic performance, and tailoring workouts to address these specific attributes is fundamental in achieving well - rounded and successful athletic outcomes. By carefully adjusting and optimizing these variables, coaches and athletes can create tailored programming that maximizes the potential for improvement and success in their chosen sport or physical activity.

By adhering to these straightforward principles, you can effectively incorporate anywhere from 16 to 48 extra hours of training to your current season's plan. This calculation is based on adding 20 minutes of training per session, twice a week for 24 weeks (minimum scenario), or 30 minutes of training per session, four times a week for 24 weeks (maximum scenario).

5. Practical Recommendation

It is essential to approach the following suggestions cautiously, considering the limited supporting evidence. Coaches should maintain open communication with their athletes and be receptive to trying out different approaches in training. Experimenting with various microdosing

techniques while actively engaging in discussions with athletes can help understand their immediate and delayed responses and sensations, thus enabling the development of personalized and up - to - date references. These references can aid in determining whether the microdosing regimen is too conservative or too intense for each individual.

When focusing on maximal efforts, microdosing should likely involve reducing the daily training volume while increasing the frequency of training sessions each week [14]. On the other hand, for nonmaximal efforts, coaches can explore different combinations of load parameters, including volume, intensity, frequency, and complexity, among others.

As of now, it is advisable to use microdosing strategies sparingly, as they might not be optimal for long - term athletic development. However, the challenge lies in balancing this approach with congested competitive calendars, where the implementation of microdosing may face obstacles.

Principles to adhere

When it comes to incorporating a suitable microdosing regimen involving speed and power training, it is essential to adhere to the following principles:

Optimal Timing for Speed Work: Prioritize scheduling speed work before or during the early stages of practice, ideally as part of the warm - up routine. Performing speed work when athletes are fatigued from the main portion of practice can hinder the quality of their efforts. As a result, attempting to implement speed work after practice is discouraged as athletes may be unwilling to engage, and the risk - to - reward ratio becomes unfavorable. By conducting speed work early in the session, athletes are more likely to feel "activated" and engaged throughout the practice. This activation can have positive implications for their overall performance during the training session and contribute to better skill development and execution. Following the regular warm - up routine, incorporating three to four repetitions of quality sprint efforts can be beneficial [15]. These well - structured sprint efforts should be performed with proper technique and focus to maximize their effectiveness. By getting the speed work done early on, the coaching staff can concentrate on addressing their specific goals and objectives during the rest of the practice session. This streamlined approach ensures that both physical preparation objectives and coaching goals are met, resulting in a win - win situation for the entire team.

Incorporating technical considerations is of utmost importance when implementing quality sprinting in a microdosing program. Vigilance is essential during this phase, as it provides a valuable opportunity to observe and make small adjustments to athletes' technique, which can significantly enhance overall performance and movement efficiency. Coaches should closely monitor their athletes during sprinting sessions, ensuring that proper form is maintained. To address any technical issues that may arise, simple drills can be seamlessly integrated into the microdosing program. These drills serve as targeted interventions to refine specific aspects of technique, ultimately contributing to improved sprinting proficiency.

Additionally, coaches must not underestimate the significance of addressing mobility concerns, particularly concerning the hips. Restricted mobility in this area can adversely affect power output during sprinting and other explosive movements. Therefore, emphasizing hip mobility exercises and flexibility training becomes paramount in optimizing athletes' performance and reducing the risk of potential injuries. By prioritizing technical supervision and addressing mobility issues within the microdosing program, coaches can fine - tune athletes' sprinting mechanics and enhance their overall athletic abilities.

Embrace the concept of doing less if athletes do not exhibit the desired responses to the training workloads in the microdosing program. As a coach, it is essential not to be bound by any fixed notion that a specific number of sprints or repetitions is the ultimate solution. Instead, adopt a dynamic approach and continually assess the athletes' performance and progress.

If athletes show signs of sluggishness or reduced performance, it is crucial to be open to discontinuing certain workloads and exploring alternative training methods. Rather than increasing the volume of sprints or exercises, focus on emphasizing the quality of the training sessions. Ensuring that each repetition is executed with precision and optimal effort can prove more effective in eliciting the desired adaptations and improvements. By being flexible and attentive to the athletes' responses, coaches can fine - tune the microdosing program to suit individual needs, promote better outcomes, and foster an environment conducive to sustained progress. Remember, the key to success lies in constant evaluation and adjustment, ensuring that the athletes are consistently working to their full capabilities without succumbing to unnecessary fatigue or burnout.

Always take into account the broader advantages of the training regimens you prescribe. In a time when there is a tendency to overly focus on specificity in training, shifting towards a more "general" approach seems to yield more substantial and enduring benefits. While sprinting holds specific advantages for speed - based sports, it also confers general neuromuscular benefits that extend to other crucial aspects such as agility, explosive power, and overall strength. The central nervous system's adaptive response to the stress imposed by maximal sprinting can create a foundation for enhancing various athletic qualities. Similarly, the general benefits of tempo running can have a positive impact on athletes' recuperative abilities and overall fitness levels. By incorporating tempo running into the microdosing program, athletes can improve their ability to recover effectively between intense training sessions and competitions, thereby contributing to enhanced overall performance. By recognizing and harnessing the "general" benefits of certain training modalities, coaches can design more holistic microdosing programs that encompass a wide array of valuable adaptations. Combining specific training with broader neuromuscular improvements ensures a well - rounded approach that optimizes athletic performance and lays the groundwork for long - term success.

6. Conclusion

The "micro - dosing" approach proves to be a valuable tool for strength and conditioning coaches who face limitations in altering the head coach's preferred practice content and structure. In an ideal scenario, all coaches would design training sessions based on sound sport science principles rather than tradition or long - standing practices. Unfortunately, physical preparation coaches must navigate these constraints and devise innovative strategies to achieve their primary objectives of enhancing athletes' speed, strength, and resilience without burdening them with excessive workloads. Sprint and power training offer straightforward methods to attain these goals without requiring elaborate equipment. However, the micro - dosing concept can extend beyond these modalities to encompass other high - intensity training modes like plyometrics, explosive medicine ball throws, and various maximal weightlifting movements, as long as coaches adopt the philosophy that "less is more." The cumulative impact of low - dose, high - intensity training can yield significant long - term results. The key lies in finding the precise balance of high - intensity work that propels athletes forward without impeding progress. For coaches considering implementing this concept, my advice is to begin with one or two training modes, applied in a straightforward manner, enabling easy monitoring of the program's effectiveness. As coaches become more adept at identifying optimal dosages, they can gradually introduce other high - intensity exercises to provide a diverse range of stimuli, ensuring athletes remain in an adaptive state and continue to make progress.

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