



THE ULTIMATE GUIDE TO BUILDING ATHLETES:

# Nutrition, Recovery, & Sleep

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## CHAPTER 1: THE 4 (NOT SO) SECRET PILLARS OF ATHLETIC PERFORMANCE

If you have been in the strength and conditioning game for any length of time then you will quickly realize that this chapter is not groundbreaking.

These four principles are the foundation for all physiological adaptation if optimization is the desired outcome for any trainee (irregardless of age, training experience, or sport).

However, I would be willing to bet that many individuals miss the boat on at least one of these, especially in the high school sector. Focusing on power cleans, depth jumps, and triple extension is great for your track athletes but does any of that even matter if those athletes are only sleeping 4 hours per night? I would argue “no.”

Fundamentals first and foremost.

“ Can I jump over two or three guys like I used to? No. Am I as fast as I used to be? No, but I still have the fundamentals and smarts. That’s what enables me to still be a dominant player. As a kid growing up, I never skipped steps. I always worked on fundamentals because I know athleticism is fleeting.

- Kobe Bryant



## Nutrition

Most high school athletes are nutrient deficient to some extent. Heck, most adults are not consuming two weekly servings of fatty fish along with 7-10 daily servings of fruit and vegetables. So, are we really going to assume that high school athletes are well-nourished given their incessant diet of Pop-Tarts, Skittles, and Little Debbie Cakes?

It's time to ask the tough questions; this is much deeper than macronutrients, meal frequency, and Blender bottles. Here's a few suggestions which will get you started on the right path:

- **Do you consume a wide variety of minimally processed whole foods?**
- **Are you consuming red meat, eggs, and fatty fish throughout the course of any given week?**
- **Do you consume at least 5-7 servings (adapted for youth athletes) of fresh fruit and vegetables daily?**
- **Do you consume foods rich in potassium and salt your meals to taste (if eating bland foods)?**
- **Do you have a general idea on your protein intake and how many calories you consume on a daily basis?**

## Mindset

Building “monsters” does not begin in the weight room, it begins when you start to influence what’s in-between the athlete’s ears. Physiology may dictate what happens on the field but psychological changes stay with an athlete long after the scores have been written in the record books.

If you want to determine an athlete’s current psychological state, here are a few questions you might want to ask (internally at least):

- **Do you approach setbacks as challenges which are designed to make you stronger or are you typically discouraged by trials and hardships?**
- **Do you use visualization to mentally rehearse challenging situations, behaviors, or personnel?**
- **Do you find yourself resorting to an internal (“I’ll get through this.”) or external (“How could this happen to me?”) locus of control under stressful situations?**
- **Do you feel out of control and helpless when things do not go according to plan?**

## Movement

Notice I said “movement,” and not “exercise.” We need to stop thinking about movement as a solitary activity confined to only strength training sessions. Movement occurs along a wide continuum and we must respect the idea of individualization within functional anatomy.

Assessment determines capacity, not the other way around.

Our industry is plagued with the concept of dichotomy. We incorrectly assume that physiology, biomechanics, and anatomy are largely black and white. All of the individual differences present within a heterogeneous population can be summed up on the pages of a textbook.

For example, the back squat is common ground for disagreement. But, if you have spent any time inside a cadaver lab, you would quickly notice the large differences in the bony structures of each specimens hip, knee, and ankles. If you want to see a visual representation of this, consider the following [article](#) from Dr. Ryan DeBell which sums up the idea nicely.

- **Do you utilize movement variations which systematically load tissue in a graded and progressive manner to allow for proper execution?**
- **Do you train in multiple planes of motion and avoid common movement misconceptions (e.g. sagittal dominance)?**
- **Do you utilize specificity within your program design? Not only from a biomechanical perspective but also from an energy system, force production, and sport specific perspective?**
- **Do you train at both ends of the force-velocity curve?**

## Recovery

Welcome to the world of NormaTec, far infrared sleepwear (a la the folks at *Under Armour* – p.s. good luck with your \$100 pajamas), pulse oximeters, and Omegawave algorithms. This is the forefront of physiological adaptation. If you want to figure out how to make the biggest difference in an athlete's health and wellness, teach them what constitutes recovery and how to enhance it.

As a society, we are excellent at riding the sympathetic roller coaster, but it seems we never know when to get off. Incessant push notifications, lack of social connection, poor sleep hygiene, and altered circadian rhythms will all dampen an athlete's ability to handle high workloads and produce the desired adaptations.

Start with the basics:

- **Are you sleeping a *minimum* of 8 hours per night??**
- **Do you routinely go to bed before 11pm?**
- **Do you get at least 20-30 minutes of sun exposure daily on uncovered skin?**
- **Do you use any sort of mindfulness apps (HeadSpace, Calm, HeartMath, etc.) for 5-10 minutes daily?**
- **When was the last time you took a vacation?**
- **How often are you getting blood work and what specific markers are they examining to assess your health and wellness?**

Everyone sleeps but not everyone is well-rested. Everyone trains but not everyone is recovered. Everyone eats but not everyone is well-nourished. Everyone lives but how many truly thrive?

Dig deep, your athletes deserve it.





## **CHAPTER 2: NUTRITIONAL SCIENCE MADE SIMPLE FOR HIGH SCHOOL & COLLEGE ATHLETES**

Nutrition is a religion to some. The very epitome of their quintessential existence. Every meal planned, every macronutrient consumed, and every micronutrient met.

But, for many (especially those coaching or living in the high school and college realm), this is not the real world. Most days are filled with unexpected obstacles, limited budgets, and divisional time constraints.

Having spent the better portion of 5 years interning and working at the collegiate level, I can tell you first hand that scheduling is a nightmare. Not only that, nutrition is a mere afterthought as practice takes precedence over training sessions at some schools.

This chapter will not delve into the science behind ATP generation, insulin biochemistry, or HPA axis regulation. However, I will provide you with 4 simple strategies to improve performance and alter body composition in a positive manner.

# 1. Utilize A Liquid Form of Carbohydrates During Training

For any developing athlete, the biggest asset they can put in play for high workloads is the addition of liquid carbohydrates during training. Most assume liquid carbs only have a place within extreme endurance or high intensity sporting events. However, in the case of high school athletes, most will workout before school (6AM-ish) or immediately after their last class (3PM-ish).

Now, if you've ever worked with high school athletes, you know it is nearly impossible to get them to eat breakfast. Mornings are usually spent smashing the snooze button before scrolling through Instagram and wandering out the door 5 minutes late with a stale Eggo waffle.

Similarly, afternoon workouts are not typically completed until 3-4 hours after lunch and as such, liver glycogen and blood glucose will be low due to all the recent cranial processing taking place in the classroom.

As such, it might be wise to add 25-30g of liquid carbs in the form of a glucose or dextrose based analog (e.g. Gatorade, Powerade, etc.) to help offset the fatigue-inducing effects of training. If you have not had a chance to look into the research on the topic, here are a few benefits to consider:

- **Lower prevalence of upper respiratory tract infections (URTIs)<sup>1,2</sup>**
- **Improved muscle glycogen resynthesis<sup>3</sup>**
- **Blunted cortisol response<sup>4</sup>**
- **Improved T:C (testosterone:cortisol) ratio<sup>5</sup>**

## 2. Eat Mostly Home Cooked Meals (Whenever Possible)

Given the pace of our current society, this is not always possible—parents working multiple jobs, after-school practices ending late, and a general over commitment in all facets of life. Often, this leaves young athletes to fend for themselves.

However, whenever possible, try to eat the bulk of meals at home with family.

From a nutritional standpoint, this is a powerful tool to (hopefully) provide athletes with a variety of whole foods offering the largest nutritional “bang for their caloric buck” so to speak.

Physiologically and psychologically, this helps to offset many of the digestive and immunological complications from eating on the run by yourself. Humans were made to socialize and have relationships with those they are close to, do not neglect that if you can help it.

### 3. Eat Breakfast

Most high schoolers and young adults are poor time managers—unfortunately, that is just par for the course when you do not have much experience.

But, when it comes to missing meals and falling short of calories, breakfast is usually the culprit. Rather than trying to meal prep for the week or worrying about the newest frittata recipe on Food Network, just take a page out of my playbook:

- **1-2 Cups of oats**
- **1.5 Scoops of whey**
- **2 Tbsp of chia seeds**
- **2 Tbsp shredded coconut**
- **0.5 Cups of greek yogurt (I use less whey when I add GY)**
- **2 Tbsp of cocoa**
- **2 Servings of frozen or fresh fruit**
- **Liberal amounts of cinnamon**
- **Pinch of salt**

These are overnight oats and they are probably the single greatest breakfast invention since sliced bread. Admittedly, I was not the first to popularize them but I have experimented with them in some form or another for the last 6 years so I have had quite a bit of practice.

Dump everything in a bowl, add water/almond/coconut/cow's milk and stir until all the ingredients are well incorporated. Toss them in the fridge the night before and then pull them out for breakfast the next morning.

If you like them thicker (as I do), use less water and allow it to sit longer. If want them thinner, sub the chia seeds for another type of nuts (almonds, walnuts, cashews, sunflower seeds, etc.), eliminate the Greek yogurt, and use more liquid.

## 4. Try at Least 1 New Fruit and Vegetable Weekly

The gut microbiome is a pretty hot topic of conversation lately. It affects everything from immune function to circadian rhythms and everything in between. In the words of the great philosopher Hippocrates:

**All disease begins in the gut.**



Admittedly, if the athlete is in high school, this recommendation will likely require some education and lifestyle guidance on the part of the parents. But, if you're a college athlete, you need to step up and take responsibility for your own health and wellbeing.

You can post a pic of corn dogs, flamin' hot Cheetos, and Sprite to Instagram as the #DinnerOfChampions but the only person you are fooling is yourself. Eat like a child long enough and you will eventually have to deal with the long term metabolic and physiological consequences of your poor lifestyle choices.



## CHAPTER 3: SIMPLE SUPPLEMENTATION FOR THE HIGH SCHOOL ATHLETE (PART 1)

Have you ever noticed how social media brings out the “best and brightest” minds on the most controversial topics?

For example, I’m in a group on Facebook specifically dedicated to high school strength coaches. The other day someone posed a valid but somewhat debatable question:

**Q:** Should I provide creatine monohydrate for my high school athletes?

The responses poured in and the thread steadily grew with each passing minute. Here are a few of my personal favorites:

**A:** “Players can get all of their needs met from chocolate milk and squats.”

**A:** “This is a horrendous mistake; high school athletes don’t need supplements.”

**A:** “Good OL’ fashion red meat and nutrition should get them their needs in high school. Just not worth the conversation if they aren’t getting their daily needs in the first place.”

**A:** “Chocolate milk would be a better and more cost-effective option.”

For starters, there's no creatine in chocolate milk. I hate to burst your pro-dairy bubble but that is not the point of creatine.

Now, you and I both know that supplements will not take anyone from a lanky 5'10"/130lbs high school recruit to a stacked D1 superstar overnight.

But, there are specific compounds which can play a vital role in performance (e.g. creatine) and health (e.g. vitamin D, magnesium, etc), which adults are deficient in. So, you can bet teenagers do not get enough, given they're crushing McDonald's, Yoo-hoo's, and Little Debbie cakes on the daily.

I'm not one to push supplements and I think they can often be overused and over-relied upon; but, it's clear that the current educational background on supplementation and nutrition for many coaches in the high school sector is rather poor. As such, I hope this article will bring clarity on the fundamentals of the topic and provide some practical recommendations.

# 1. Whey Protein

I can hear the comments now: **“Athletes should get all of their basic needs met through food.”** Sure, that’s all fine and dandy if you have parents who understand performance nutrition and the macronutrient needs of young, developing athletes. Out of 100 average high school athletes, how many parents would fit that classification? You can probably count them on one (maybe two) hands.

Whey is not meant to replace anything, it is simply supplemental to a sound nutritional program designed with the health and performance of the athlete in mind. Most youth athletes are on the go and as such, they resort to simple, processed snacks instead of quality, nutritious options.

Enter whey protein and the “super shake” (a term coined by John Berardi and the smart folks at [Precision Nutrition](#)). Here’s a personal favorite of mine:

- 2 Frozen Bananas
- 2 Tbsp Hemp or Chia Seeds
- 2 Cups Chocolate Almond Milk
- 1 Cup Frozen Spinach
- 1.5 Scoops of Whey Isolate
- 2 Tbsp Natural Peanut or Almond Butter
- 2 Tbsp Cocoa Powder

Tons of healthy fats, complex and simple carbs, plenty of fiber, and a quality dose of protein. That’s what portable nutrition looks like for adults or high schoolers. Also, in case you were wondering, you’ll never taste the spinach so don’t worry about it.

**Takeaway:** If you’re a high school or college athlete, don’t be afraid to bolster your protein intake with liquid options. If you haven’t eaten before training, consider a shake with 25-30g of protein. Similarly, if you won’t be able to eat for 1-2 hours after training, a simple shake (better yet a “super shake” as described above) plus 1-2 pieces of fruit makes for a great, portable post-workout option.



## 2. Creatine Monohydrate

Creatine does much more than just influence rephosphorylation of ATP. There is a bevy of research implicating improvements to cognition, sleep quality (via cerebral oxygenation), and potentially even post concussive conditions.<sup>6,7,8,9</sup>

I'm sure we've all heard how creatine "leads to dehydration and kidney issues" when in fact the opposite is true - creatine acts as an osmolyte and actually INCREASES intracellular hydration, which enhances hypertrophy via anabolic signaling (mTOR).<sup>10</sup>

There is a litany of research showing nothing but positive benefits (from both a performance and a health standpoint) for healthy individuals with normal functioning kidneys. Even at high(er) doses (15-20g/day), you won't find any health complications aside from potentially higher markers of serum creatinine which is merely a metabolite of creatine.<sup>11,12,13</sup>

Many suggest that creatine can be acquired through dietary sources and supplementation is not necessary but if we do some math, that would equate to roughly 2.2lbs of beef or 3.3lbs of chicken PER DAY to reach ~5g of creatine. For reference, many of the current studies on creatine recommended dosages as high as 20g/day for neuroprotective effects and cognition improvements. That would equate to roughly ~9 lbs of beef or ~13 lbs of chicken per day. Good luck if you're trying to avoid the supplementation route.

**Takeaway:** 5g/day. Creatine monohydrate is dirt cheap and extremely beneficial. Don't believe everything you read or hear from others, think for yourself.

### 3. Vitamin D

In our current day and age, most individuals spend the vast majority of their day indoors in front of a screen or in a classroom. As such, we're seeing more and more adults and children presenting with vitamin D deficiency. This becomes a major issue in both an acute and chronic sense as vitamin D plays a major role in immune function and regulatory T-cell activity.<sup>18,19,20</sup>

“ Most cells involved in immune function carry receptors for vitamin D. Thus, more sun exposure will subsequently improve immune function via endogenous vitamin D production.

- Dr. Aristo Vojdani

”

Not only that, most forget that light exposure helps to establish circadian rhythms and influences a whole host of biochemical, metabolic, and neuroendocrine reactions.<sup>15,16,17</sup> Those who avoid natural light exposure by utilizing sunscreen and sunglasses constantly are preventing their skin from executing one of its most important functions.

Now, typically with vitamin D you might expect specific recommendations relative to bloodwork (>50ng/mL-100ng/mL if you want to get technical).<sup>14</sup> But, in the case of a high school athlete, you're going to run into issues with sustainability and bloodwork.

When was the last time you heard of a high school athletes getting blood work every 6-8 months to monitor vitamin D levels? My point exactly. As such, it's important that we examine and modulate lifestyle factors to help meet recommendations before defaulting to supplementation.

**Takeaway:** Seek out full spectrum sunlight as early in the day as possible (ideally first thing in the morning). Shoot for 30+ minutes of daily sun exposure without sunglasses.



## CHAPTER 4: SIMPLE, COST EFFECTIVE CRAMP SOLUTIONS S&C COACHES NEED TO KNOW

Pedialyte. Mustard packets. Pickle juice. Gatorade. Cramping is mainly due to (de)hydration, right? Only if your knowledge base is stuck in the 80s...

Most strength coaches and athletic trainers will routinely remind their players to drink more water throughout the day or even supplement with sports drinks during practice to enhance fluid balance and electrolyte ratio.

Originally, exercise-associated muscle cramping (EAMC) was attributed to electrolyte loss and interstitial fluid shifts which lead to hyperexcitability of skeletal muscle and spontaneous depolarization (aka the agonizing charley horse in your hamstring as you get out of the car).<sup>21,22</sup>

Thus, coaches believed that they could potentially reduce the likelihood and intensity of cramps by “front loading” electrolytes and fluid volume. Some coaches even believe that they can relieve cramps instantaneously with anecdotal solutions (e.g. pickle juice, mustard packets, etc).

However, keep in mind **“fluids and electrolytes are not absorbed immediately after ingestion; that is, even hypotonic fluids require at least 13 minutes to be absorbed into the circulatory system.”**<sup>23</sup> Not to mention, the research on pickle juice and mustard is sparse with mild (if any) positive conclusions.<sup>24,25</sup>

Placebos are powerful.

Don't blindly follow the crowd. Think critically, challenge everything. Let's dive in...

## The Hydration Hypothesis Hype

Consider this for a moment - if dehydration was truly the cause of cramps, why do individuals typically only experience cramps in a single, specific muscle group?

Similarly, why do cramps seem to only occur in muscles that exhibit high levels of localized fatigue after a bout of strenuous exercise?

If hydration was indeed the only relevant component associated with EAMCs then why don't we see cramps on a daily basis within most of the population given the typical lack of hydration?

Dig into the research, you'll quickly find the answer: cramps are multifactorial and hydration may only be one piece of the puzzle.

Can we completely negate hydration? No, while a correlation may not be directly present, there is still some evidence that athletes who experience EAMC also exhibit significant fluid deficits.<sup>26</sup> So, while this may not play a direct role within the occurrence of EAMCs, we cannot disregard its role in thermoregulation, cell swelling, blood pressure, or fluid balance.

Not to mention, research has shown that dehydration of greater than 2-3% can lead to marked decreases in endurance and strength performance, respectively.<sup>27</sup> Similarly, dehydration can also alter cortisol concentrations in subjects before, during, and after exercise.<sup>28</sup> Altering the hormonal environment around the training session affects much more than just EAMC so, hydration should not be discounted.

However, it's important that we fully understand all components of hydration, not just fluid intake. Think back to high school chemistry class, water follows salt, right? If an athlete has a chronically low electrolyte intake, then regardless of fluid intake, there is a pretty good chance they're still going to be dehydrated.

Thus, nutritional education for our athletes becomes of vital importance, here are a few suggestions:

- Advise players to salt pre- and post-game meals.
- Educate players on potassium-rich nutritional options: avocado, plantains, spinach, sweet potatoes, coconut water, bananas, acorn squash, wild caught salmon, dried apricots, etc.
- Add salt to fluids to promote rehydration and water retention.<sup>30,31</sup>

- › The National Athletic Trainers' Association recommends 3-0.7 g/L of salt.<sup>32</sup> Whereas others recommend higher amounts closer to 3.0-6.0 g/L.<sup>33</sup>

- › Keep in mind that research has shown some individuals lose more salt through sweat and may be more prone to 'heat cramping'.<sup>34</sup> Thus, they may need a higher concentration of solute (i.e. salt) and a higher fluid intake in general for replenishment.

If working with clients or athletes on an individual basis, one of the easiest solutions is to combine 8-12oz of coconut water with a ½ teaspoon of celtic/sea salt to promote cellular hydration. This has nearly FOUR times the amount of electrolytes as Gatorade and it's just as cheap. Win, win.

However, keep in mind as I mentioned in another article: **"This will likely taste less than pleasant (read: terrible). Add some crystal light and it will become much more palatable. Remember, you're drinking this for performance, not taste. It's not going to taste like a Pina Colada version of Gatorade."**

Remember, salt follows water - you need an adequate balance of sodium AND potassium to maintain electrolyte balance. There's a reason you have a cellular transmembrane pump for sodium and potassium. Don't forget about one or the other.

Electrolytes and hydration are important, but they should be considered a preventative strategy, not a reactive approach to EAMCs.

## The Neuromuscular Hypothesis Hype

An additional contributing factor to EAMCs may lie within the central nervous system, not the muscle itself. You see, research has shown that there may be an opportune window after a fatiguing event known as the “cramp-prone state”.<sup>35</sup> Essentially this means that you have an imbalance between excitatory muscle spindles and inhibitory golgi tendon organs relaying information to alpha motor neurons.<sup>36</sup>

Typically, when a muscle is placed in a shortened position, the imbalance between ascending input and descending output leads to a contraction and leaves you writhing in agony at 3am while trying not to shout 4 letter words loud enough for your neighbors to hear.

So, how much fatigue is too much? Can we monitor training load effectively to subsequently reduce the incidence of EAMCs within game or practice situations? Most likely no. To quote Miller et al. (2016):



Muscle fatigue is a continuum rather than an absolute condition. It is likely that the degree of fatigue required to elicit cramping is unique to each athlete. Because EAMC occur in a variety of situations, environmental conditions, and populations, it is unlikely that a single factor (eg, dehydration, electrolyte imbalance, or neuromuscular factors) is responsible for causing them directly. It is more likely that EAMC are due to a combination of factors that simultaneously occur under specific physiological circumstances in each athlete.

Be aware of how your athletes move – if a specific muscle group is cramping repeatedly, it may be due to overuse. Now the question remains, is this just due to overall volume or perhaps it's being overworked due to poor biomechanics or compensatory movement?

Here are a few additional considerations to keep in mind:

- **Larger, taller players may be at an increased risk for EAMC due to higher force demands placed upon their musculature.**
  
- **Utilizing carbohydrates during training may help to reduce the presence of central and peripheral fatigue.<sup>39</sup>**
  - **Peak glucose oxidation rate = 0.5-1g/min depending upon the intensity and volume of exercise.<sup>40</sup>**
  
  - **Thus, adding 30-60grams of carbohydrates per hour of exercise may help to lower the incidence of fatigue-related muscle cramps.**
  
- **An individual's prior cramp history likely predicts future events.<sup>41</sup> Those with prior issues (either personally or within their immediate family) are likely more susceptible to future EAMCs.**
  
- **There may be a genetic component to EAMCs – in other words, you may not be able to “fix” it, you may just have to be proactive and learn how to work around it.**
  - **Research has potentially linked two gene variations (COL5A122 and AMPD123) to EAMCs due to their role in altering fatigue and contributing to the neuromuscular fatigue hypothesis.**

## Understanding the Role of Magnesium

Magnesium has well over 300 functions within the human body but one of the most unique benefits occurs within the sarcomere itself.<sup>37</sup> You see, once actin and myosin form a cross bridge, they maintain that connection until ATP enters the equation to break the bond. You can see this in individuals who experience rigor mortis – actin and myosin couple but never release due to the lack of ATP post mortem.

However, what many don't realize is that magnesium is needed to introduce ATP to the actin-myosin complex.<sup>38</sup> Without getting too heavy into biochemistry or physiology, the take home point is: it is essential (not optional) to muscular relaxation. Not to mention, magnesium helps in the clearance of catecholamines (epinephrine, norepinephrine) which is kind of important given the fact that most of us live in a stressed out, social media-driven world.

But, we must address the question of practicality – what can I actually get my athletes to do? In an ideal world, they would use transdermal magnesium after they take a shower as this has a high absorption rate and bypasses any potential GI issues. They might also consider chelated magnesium in capsule form given this has a fairly high availability and is rather sustainability from a lifestyle perspective.

But, we don't always live in an ideal world. Here are some nutritional options if they don't feel like smearing mag gel on the bottom of their feet or popping a few capsule during the day:

- **Hemp seeds**
- **Spinach**
- **Swiss chard**
- **Pumpkin seeds**
- **Almonds**
- **Avocado**
- **Dark Chocolate (with >70% cocoa)**

Supplements are only as good as their application. As Hippocrates once said, **“Let food be thy medicine and medicine be thy food.”**



## “I’ve got a Cramp, Now What?!”

You’ve reached the point of no return. Your pec just cramped when you were brushing your teeth and now you can’t raise your arm above your head without excruciating pain. Now what?

1

### **Stretch.**

Provided the athlete doesn’t have any pre-existed medical conditions which would alter other factors we’ve discussed (hydration status, nutrient deficiencies, neurological issues, etc.) this is likely the first place to start.<sup>44</sup> It’s the oldest method in the book but research indicates that it works for most cramps.<sup>46,47</sup> However, keep in mind that there are different types of EAMCs and stretching isn’t a viable solution for heat cramps sustained in differing environmental conditions.<sup>45</sup>

2

### **Compression.**

Foam rolling, self-myofascial release, massage, etc. – whatever you want to call it, none of it is actually breaking up scar tissue or changing tissue integrity. You would need a scalpel for that, but that’s another article for another time.

However, by overloading mechanoreceptors (more specifically pacinian corpuscles and ruffini endings) within the muscle itself, you can essentially “reset” neural tone. Therefore, any changes which occur within foam rolling are primarily neural in nature, not physiological. But, given there is a neuromuscular component to EAMCs, this could be a very important tool in your toolbox. Use it wisely.

## Summing It All Up

- **Cramps are multifactorial by nature - there are physiological, neural, environmental, and genetic components which play a role in EAMCs.**
- **Hydration encompasses both fluid intake and electrolyte ratios (Na+:K+), don't neglect one or the other.**
- **Research indicates there may be an 8hr window known as the "cramp prone state" in which the nervous system produces EAMCs when fatigued muscle groups are placed in shortened positions.**
- **Micronutrients such as magnesium play a critical role in muscular relaxation and should not be overlooked in the treatment and prevention of EAMCs.**
- **Passive and active stretching and soft tissue modalities are both viable options in the immediate treatment of EAMCs. They may help to alter neurological tone via their influence on mechanoreceptors, muscle spindles, and golgi tendon organs.**

If you fail to address each component of the proactive system outlined above, then you will likely be forced to take a reactive approach once a EAMC sets in.

Pickle juice, pedialyte, mustard packets, etc. may "magically" alleviate the symptoms (at least temporarily), either via placebo or minor electrolyte shifts. However, there may be a larger nutrition/hydration related component which needs to be addressed.

Similarly, EAMCs may be more neurological in nature and that may require modalities (i.e. passive/active stretching, assisted soft tissue mobilization, self-myofascial release, etc.) to alter neural input and decrease peripheral output.



## CHAPTER 5: #RISEANDGRIND? NAH, SLEEP IN AND WIN

If you're a high school or collegiate strength/sport coach and you're not discussing sleep with your athletes, you are literally **crippling** their athletic potential.

In general, coaches are missing the point. For example, studies have shown that learning and retention rates are **40%** higher after a full 8 hours of sleep.

We report that a single night of sleep deprivation produces a significant deficit in hippocampal activity during episodic memory encoding, resulting in worse subsequent retention. Furthermore, these hippocampal impairments instantiate a different pattern of functional connectivity in basic alertness networks of the brainstem and thalamus. These results demonstrate that an absence of prior sleep substantially compromises the neural and behavioral capacity for committing new experiences to memory.



- (Yoo et al. 2007)<sup>49</sup>

Just to put that in perspective, that's the difference between an A and an F (40%). We're not just talking about scholastic achievements here, this is the retention rate of higher brain centers coordinating complex movement.

However, what most fail to realize is that we have a nation of high school athletes subsisting on 5-6 hours (sometimes less!) of sleep per night while the National Sleep Foundation recommends 9-10 hours for those who are experiencing growth and developmental changes.

““ The number of individuals who can survive on **6 hours of sleep or less** without any impairment (cognitive, physical, psychological, or emotional), rounded to a whole number, and expressed as a percentage is **ZERO**. ””

- Dr. Matthew Walker (Neuroscientist @ University of California, Berkley)

So now we have high schoolers experiencing slowed neural and cognitive processing rates, slight immune dysregulation, and altered autonomic states (highly sympathetic - aka "fight or flight") due to a general lack of sleep; but we want them to come in and learn hang cleans on day 1 of some coach's "world renowned" program.<sup>48</sup>

## The Grand Illusion of Sleep Deprivation

I know what you're thinking...

“ Well, if you're sleep deprived, you'll know it. ”

I recently overheard this golden nugget from an expert in exercise physiology who was discussing the impact of sleep deprivation on performance adaptations.

While the simplicity of that statement may seem rather logical to most, it's fundamentally flawed. Let's dive a little deeper.

After 2 weeks of sleep restriction to 4 hours time in bed per night, deficits in attention, working memory, and cognitive “throughput” were equivalent to those seen after two nights of total sleep deprivation. Similarly, 2 weeks of restriction to 6 hours time in bed per night resulted in cognitive deficits equivalent to those found after one night of total sleep deprivation. The cumulative cognitive deficits increased in a nearly linear manner over days of 4 and 6 hours time in bed.

“

Don't miss this next part...



Subjective sleepiness and fatigue ratings showed much smaller increases, suggesting an escalating dissociation between subjective perceptions of sleepiness and actual cognitive performance capability. - (Goel et al. 2009)<sup>50</sup>

In other words, despite a significant deprivation in sleep, subjects still rated themselves as somewhat well rested. However the data showed the exact opposite - there was quantifiable evidence that cognitive performance had diminished due to a lack of sleep.

You see, sleep deprivation is somewhat akin to alcohol consumption - your subjective sense of wellbeing is often a poor predictor of your objective performance (ex: drunk driving).

So, while sleep deprivation is often thought of as “common”, we must be careful not to associate common with normal.

“ Your ability to function on little to no sleep is more so a testament to your body’s resiliency, not its performance capacity. ”

- Jeff Nichols (High Performance Director and Former Navy SEAL)

Generally speaking, humans are relatively poor at assessing the long-term risks and benefits of their current lifestyle choices. Thus, it is rather dangerous to assume that a dark deprived, highly caffeinated, results driven society will naturally regulate their biological sleep needs.

## The Silent Epidemic

So then the question becomes - How do we change this attitude towards sleep? Why aren't parents helping to implement changes within their teenagers lives to optimize performance and health?

Long story short - they probably don't know any better. Most people lay down, close their eyes, and then get up when they open again. They have no idea what sleep affects, what affects sleep, and how to improve their sleep. On top of that we have a culture driven by productivity and the idea that a lack of sleep is a "red badge of courage" to proudly displayed on social media. #riseandgrind

Most adults are exceptionally poor sleepers so we can't expect them to improve their child's sleep hygiene if they can't even fix their own.

You're on your own here coaches, you **must** educate because the parents won't.

## Sleep In and Win

I could write an entire e-book on sleep as the subject is immensely complex and multifactorial. But for the sake of brevity, we're going to keep our focus on the basics.

1

### **Blue Light Sucks.**

Show this [video](#) to your athletes. Sit everyone down before a training session, have them take out their phones, and walk them through the process.

Every high schooler in America wastes way too much time on social media but this becomes especially deleterious as the day goes on given the influence of blue light on melatonin secretion.

2

### **Get Outside.**

I can't emphasize this enough - sunlight is one of the strongest regulators of circadian rhythms, opt for 20-30 minutes of direct exposure daily **without** sunglasses or long sleeves/pants (the earlier, the better).

Remember the vitamin D recommendation I made above within the nutritional analysis? Turns out that time spent outdoors actually serves another purpose besides just vitamin D.

Want to know the fastest way to jack up your sleep seemingly overnight? Stay indoors all day in a perfectly climate controlled environment and blast your retinas with incessant blue light once the sun goes down.

3

### **DO NOT Sleep With the TV On.**

I know quite a few folks who need white noise to fall asleep - that's perfectly fine but opt for a fan or a white noise machine rather than the TV.

Aside from the blue light exposure, you're also going to be encountering a variety of sounds in terms of frequencies and decibels. As such, this has the potential to alter brain wave patterning and potentially shift one out of a specific stage of sleep.

Opt for ear plugs and a fan if it's noisy but don't subject yourself to a TV, that's just asking for long term insomnia.



4

#### **Avoid Late Night Practices/Study Sessions**

This will take some education for the sport coaches as they likely aren't well versed in sleep hygiene but I've found this to be a common area of sleep disturbances.

Not only are players subjected to higher than normal catecholamine levels, they're also dropped underneath high voltage LED bulbs which closely mimic the intensity of light during the day. That's great if it's 12 noon but most definitely not ideal at 9pm.

If you have a bit of flexibility with scheduling, try to plan afternoon training and practice sessions. Not only will your athletes be well rested from the night before (due to the lack of a 5am training session), they will also have an opportunity to wind down after practice and recovery with restful sleep.

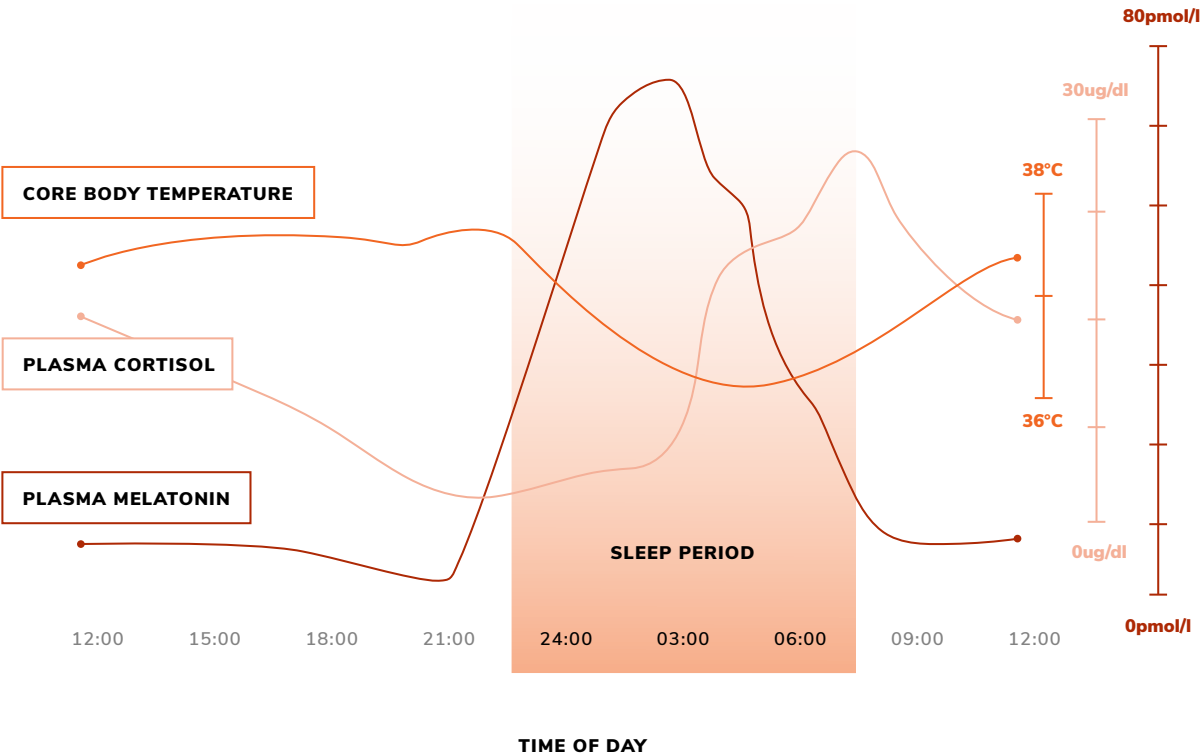
5

#### **Regularity is KING**

If you can get your athletes going to bed and waking up at the same time daily, you've already won the battle. Your body loves to function with routine - doing the same thing at the same time of day with the same intensity, frequency, and duration.

Circadian rhythms are no different. They're essentially your body's way of trying to keep everything on track with a daily schedule. These rhythms help to establish patterns of hormonal secretion to drive behavior change.

For example, consider the differences in the diurnal secretions of melatonin and cortisol throughout the day:



**FIGURE 3:** The normal synchronous relationships between sleep and daytime activity and varying levels of cortisol, melatonin and body temperature.

As cortisol drops, melatonin increases to help induce a state of wakefulness. However, both of these are typically driven by circadian rhythms orchestrated within the brain.

The more you can reinforce rhythms with regularity (in sleep and wake times), the easier it will be for other systems to function efficiently.



## CONCLUSION: TRAIN HARD, SLEEP WELL

We've only just begun to scratch the surface with sleep but this is sufficient for now. I wanted to paint a picture on sleep with broad strokes so that we begin to bring awareness to a severely underappreciated avenue of performance enhancement.

If this topic really intrigues you, keep an eye out as I may be dropping another e-book (specifically on sleep) within the next few months. However, until then, feel free to email me directly ([michaeljwines@gmail.com](mailto:michaeljwines@gmail.com)) if you have questions or want to learn more.



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