With the ever increasing competitiveness of the conferences that our teams play in, there is always a focus to find better ways of improving physical performance to translate into more wins. Conditioning is continuously at the center of focus for our sports teams. We know that if our athletes can repeat their best effort more often throughout a game/match, then our chances of winning increase. With proper conditioning playing such a key role in wins and losses, it is necessary that we are training our athletes optimally. That is where Heart Rate (HR) training comes in.

HR training has been around for years, but more research has emerged with it implemented in team sport settings. HR training reveals correct intensity for developing aerobic and anaerobic energy pathways, the correct duration an athlete is within those energy pathways, as well as appropriate recovery periods during training intervals. The benefit of HR training is specificity of conditioning based on sports and positional demands. This allows for conditioning to be designed on an individual basis. HR training also helps athletes avoid possible injuries by monitoring their effort output. Arbitrary standards in timed conditioning may force an athlete to work harder than necessary. This can lead to soft tissue injuries or too great a fatigue in their central nervous system. HR training also keeps your athlete honest with their effort output. It forces your more “naturally gifted” athletes to produce the necessary intensity to increase their physical performance, rather than easily “cruise” through team conditioning times.

Here at San Jose State, I have primarily used HR training on an individual basis; either for injured athletes or athletes who need extra conditioning. My protocols have been based on the works of Dr. Ben Peterson, who is currently the Director of Sports Science for the Philadelphia Flyers. The first protocol is “Metabolic Push”. This is an aerobic based protocol where the HR is maintained at 65-70% of max heart rate (maxHR) for 20-45min. The goals of “Metabolic Push” are to make an athlete more efficient at using oxygen for energy and to help them recover faster between sprint bouts. The next protocol is “Metabolic Climb”, which requires an athlete to stay within 80-70% of max heart rate (maxHR) for 20-45min. The goals of “Metabolic Climb” are to make an athlete more efficient at using oxygen for energy and to help them recover faster between sprint bouts. The final protocol is “Metabolic Stretch”, in which athletes are instructed to maintain their HR at 95-100% of maxHR for short intervals of 2-4min for 3-4 sets. The rest periods are short, 1-3min, at 65% of maxHR. The “Metabolic Stretch” improves VO2 max while increasing lactic acid tolerance. Protocols are assigned to mimic the intensity of the team training day; aerobic protocols on lower intensity days, and anaerobic protocols on higher intensity training sessions. For our injured athletes, these protocols were implemented until they were cleared to rejoin the team for conditioning. With our “extra” conditioning athletes, these protocols were used until they could make the team conditioning times. Cardio machines such as the elliptical, rower, & Airdyne bike were used as the modality for conditioning.

What I found was that these protocols were effective with our athletes, helping to improve their physical performance. The benefits of HR training are clear, and it is an effective tool for coaches and athletes alike.
"Of all the factors affecting athletic performance, speed is one of the most vital."

“extra” conditioning athletes. They averaged about two weeks on these protocols before they were able to consistently make our team conditioning times. However, with the injured athletes I found that, while fit from a cardiac output, they had a harder time transitioning back to team conditioning drills. I believe this is because all their conditioning was machine based. All our machines are partial weight bearing, which means the load on the muscle is not the same as running. I first starting implementing these programs in the spring semester of 2017 and since then I have implemented these protocols while using more sport specific modalities (movement patterns and muscle recruitment) and seen better results. In preparation for his UFC Fight Night 113 bout, I have implemented these HR training protocols with former SJSU football player Justin Willis. Using the same protocols, we picked more sport specific modalities, but kept the parameters the same. This aided Justin to a win in his UFC debut.

I believe that these HR training protocols can be implemented in a team setting with great success. These protocols should be used in a General Physical Preparation (GPP) of the off-season. The modalities chosen should be specific to the movement patterns of the sports, as well a specific the mechanical loading that the muscle will endure.

VELOCITY BASED TRAINING: BAR SPEED 101

By Michael Tucker

What is Velocity Based Training?

Velocity based training is a method of training that determines the training load by measuring the speed of the barbell in a variety of movement patterns. The ability to specify the bar speed helps with individualization, gauges readiness of the athlete, and allows precise training loads and adaptations. Different speeds of the bar emphasize various training goals and can be measured using tools such as a Tendo Unit, GymAware, and numerous others. Although these units are fairly expensive they give immediate feedback on bar speed, increase motivation, and allow athletes to train in specific velocity zones for different training results.

- **Absolute strength**: towards the upper end that an individual is able to lift or maximal strength; an athlete will move the bar slower than 0.5 m/s (this equates to 85-100% of your 1 rep max).
- **Accelerative strength**: moving against a heavy load as fast as possible; an athlete will move the bar between 0.5 – 0.75 m/s (this equates to around 65-80% of your 1 rep max).
- **Strength-Speed**: the emphasis is strength but has a major speed component as well; an athlete will move the bar between 0.75 - 1.0 m/s (this equates to around 40-65% of your 1 rep max).
- **Speed-Strength**: the emphasis is speed but has a major strength component as well; an athlete will move the bar from 1.0 - 1.5 m/s (this equates to around 20-40% of your 1 rep max).
- **Starting Strength**: the ability to rapidly overcome inertia from a dead-stop; an athlete will move the bar faster than 1.5 m/s (this equates to less than 20% of your 1 rep max).

The Importance of Velocity Based Training

Of all the factors affecting athletic performance, speed is one of the most vital. Yes, sprints and plyometrics of varying distances, stances, and stimuli help develop this crucial component that is universal to all sports. However, what sometimes receives less attention is the development of acceleration and speed inside the weight room. This process is much more practical when coaches receive an immediate reading on how fast the bar is moving. As I pointed out earlier, these velocity ranges are associated with a percentage of an athlete’s 1 rep max and coaches can use their eye to tell to an extent, but it is very difficult and unreliable for a coach to make a call if a bar moving 0.7 m/s (accelerative strength) or 0.8 m/s (strength-speed).
VELOCITY BASED TRAINING CONT . . .

Getting stronger is only half of the equation, as Force=Mass
- Acceleration. Acceleration is equally, if not more important in producing force for athletes. “Speed” is a very global term and as athletic performance coaches we look to increase a number of the component of speed and athletic qualities through velocity based training including; first step quickness, ground reaction force, explosiveness, power, and rate of force development. Not to geek out too hard, but a refresher course from our 11th grade physics class will remind us of what power actually refers to.

Power = Work / Time. Work = Force • Distance. Essentially, how much force an athlete exerts and how much distance they cover results in their work production. Divide this by time and you ultimately get power (how much work an individual can do per a unit of time). Some leading researchers in the velocity based training field say the reliability of the velocity of the bar allows for a better development of these speed and power components. Since many sports happen in the blink of an eye (i.e. a 95mph fastball gets to the plate in under .5 milliseconds) or the sport is displayed in short explosive bursts (i.e. average college football play lasts 5.13 seconds) the development of muscular speed and firing rate are vital components to improving athletic performance. Thus, all movements in sports are time sensitive unless you are a powerlifter trying to deadlift 1000lbs with no time limit.

Gauging readiness is another great advantage to using velocity based training with athletes. If an athlete is not performing optimally for whatever reason; sickness, school related stress, poor nutrition, significant other just broke up with them etc., the approximate % for the exercise may be too high even when they are capable of doing it. Athletic performance coaches don’t just pull numbers for a day out of thin air. The numbers are carefully calculated and planned out in an annual plan or “macrocycle”, but as we all know, life happens, so if the weight on the bar for Athlete A is supposed to be moving 1.1 m/s to develop speed-strength but the weight is moving 0.7 m/s to develop accelerative strength, the weight can be adjusted so the bar speed is able to match the goal of that particular training session.

Some downsides to velocity based training may include costly equipment. Some people believe to optimize this training methodology you must purchase this expensive equipment. Another cause for concern is that velocity based training may be too advanced for some athletes. Does a middle schooler who has never completed a bodyweight exercise need to partake in something this advanced? Probably not, but some of the collegiate student athletes at San Jose State may see great benefits from this system.

Closing Thoughts

Our athletic performance staff uses a holistic approach to training all of our athletes. It is not just about lifting heavy weights, even though our athletes enjoy their fair share of that as well. We take into account everything that is involved in an athlete’s sport, including outside stressors and recovery when planning training programs. Strength is more muscular, were as speed is more related to neural firing which can be more specifically trained using specific velocity measures. At the end of the day, if you want to be fast, you have to train fast. Along with various medicine ball throws, plyometric jumps and different variations of starts and sprints, velocity based training inside the weight room using traditionally strength based movements can aid athletes in getting faster. This is yet another tool in our arsenal to optimally prepare our athletes when it comes to competition.

INTERMITTENT FASTING

BY MICHAEL NICOLINI

Usually when we hear of someone “fasting,” it is due to a short list of reasons such as a religious holiday or a medical procedure. We usually feel empathy for those that are fasting because we’ve all felt that strong feeling in the pit of our stomach called hunger. This unpleasant feeling of craving something to eat has created a negative connotation when it comes to the term “fasting.” Although most of us have this negative perception of fasting, recent research has shown multiple health benefits of this lifestyle choice. Some of the benefits of fasting include increased fat loss, enhanced cognitive function, and more energy throughout the day. Although the benefits can be numer
ous, there must be structure and organization to the fast in order to reap said benefits.

I stumbled across the term “intermittent fasting” about 3 ½ years ago. It started with the Nutrient Timing philosophy. Nutrient Timing is a nutrition philosophy that prioritizes the timing of macronutrient (carbohydrate, fat, & protein) intake around personal workouts. Under this philosophy, carbohydrates are limited to right before a workout until 4 hours after the workout. Any food consumed outside of that window must only contain fats and proteins. After adopting this philosophy in my personal life, I started seeing great results in my training and my body composition. Intrigued by my positive results, I decided to further my knowledge about nutrition. As I researched the cycling of carbohydrates around physical activity, I stumbled across intermittent fasting and its alleged ergogenic benefits. I started practicing intermittent fasting immediately, as the hypothesized health benefits were too appealing to pass up.

So intermittent fasting breaks your 24 hour day into a “fast” window and a “feed” window. The minimum required fast window would be 14 hours, leaving one with a 10 hour feeding window. If one sleeps the recommended 8 hours per night, then this would require a few hours before bed and few hours after rising of fasting. That doesn’t sound that bad, right?

But what if the hunger is insurmountable?

Intermittent fasting permits a couple options to help combat that hungry feeling: Coconut oil, Medium Chain Triglyceride (MCT) oil, heavy whipping cream (organic preferred), Branched Chain Amino Acids (BCAA) and spinach shakes are a few examples of foods that can be ingested that won’t break your fast. The reason these foods don’t break the fast is because they have no carbohydrate content and/or are considered a healthy fat (omega 3/6 fatty acids). I’ve utilized all these foods throughout the last 3 ½ years, but my personal favorite is drinking 2-3 cups of coffee in the morning with organic heavy whipping cream. It tastes just like you’re using half & half, and it strongly suppresses your appetite. Sometimes when my schedule gets crazy, my fast will extend to 20+ hours without a hint of hunger throughout.

This brings us into the different options of fast-feed windows. Coined the Warrior Diet, this process consists of a 20 hour fast and a 4 hour feed usually including 1 large meal plus a snack separated by the 4 hour window. There is another version of this diet that allows an 18 hour fast, a 6 hour feeding window, and 2 meals. Through my experience, a 14-16 hour fast and 8-10 hour feed is the most feasible, and it allows for enough time to eat 3 square meals during the feeding window. The idea of the fast stems from being “metabolically flexible.” If you are holding more fat on your body than you desire, then allow your body to eat one of the meals that your body consists of (i.e. body fat). In an extreme example, if all food disappeared from earth overnight, those with the highest amounts of body fat would avoid starvation longer than those with less body fat.

I know you have questions about the proposed mechanism behind intermittent fasting and its many benefits, so I’ve attached two short videos from YouTube that explain intermittent fasting and its benefits in great detail:

https://www.youtube.com/watch?v=vxX5oPZf3fw
https://www.youtube.com/watch?v=-rzx_LA6dk

**ATHLETE OF THE SUMMER**

**TROY KOWALSKI, FOOTBALL**

Troy has displayed exceptional effort and talent in the weight room. This resulted in a personal record of 645lb squat this summer.