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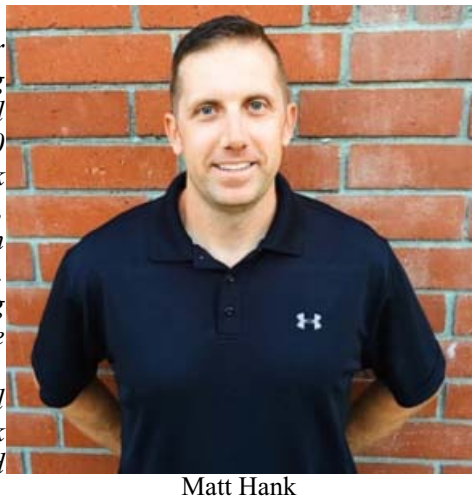
Speed Development & Hamstring Injuries

Matt Hank, Head Strength & Conditioning Coach – Santa Monica College

Matt Hank is in his 4th year as Head Strength and Conditioning Coach at Santa Monica College. Coach Hank brings 15 years of combined experience from the professional, college and youth levels. He is active in the strength and conditioning community and Southwest Regional Coordinator for the NSCA. Additionally, he is the owner of Elite Performance Club and KPERFORM™ Head of Strength & Conditioning.

Coach Hank previously worked at L.A. Pierce College where he was responsible for the athletic development of 12 teams as the Head Strength and Conditioning Coach. During his tenure the athletic department achieved tremendous success winning 3 women's volleyball state championships, 3 football bowl victories, 14 conference championships, while over 100 football players received football scholarships. Before coaching at Pierce College, Hank operated a sports performance business in Santa Clarita training various high school, club, travel, AAU and individual athletes. Additionally, he was at the collegiate level as Strength and Conditioning Coach at Cal State University Northridge and the University of San Diego. He also spent time in professional athletics working for the Los Angeles Angels, training their minor league affiliate in Cedar Rapids Iowa. Finally, Coach Hank worked in the private setting for sports performance and physical therapy clinic in San Diego (Rehab United).

Coach Hank is a Certified Strength and Conditioning Specialist with the National Strength and Conditioning Association (NCSA), USA Weightlifting Certified, and USA Track & Field Certified. He earned his Bachelor's Degree from San Diego State University and his Master's Degree from Cal State Northridge.



Matt Hank

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Speed kills! Sprinting in baseball doesn't literally kill you, but it can put you on the DL for an extended period of time if your body is not ready to handle the demands of high intensity sprints. In fact, "base running, specifically running to first base, was the top activity for sustaining a hamstring strain in both major and minor leagues, associated with almost two-thirds of hamstring strains (1)". As a strength and conditioning coach my goal is to enhance performance (improve sprinting capabilities) and reduce the chances of injury.

About 4 years ago I was introduced to the Frans Bosch methods after reading Strength Training and Coordination: An Integrative Approach. Recently, I was fortunate to spend 4 straight days with Frans and his colleagues in Los Angeles where I gained a better understanding of his methods. This article features many of the concepts, philosophies, and specific drills from Frans along my personal experience developing speed with baseball athletes. My intent is to illustrate the usefulness of Bosch drills when designing a speed program to enhance performance and reduce hamstring injuries in baseball athletes.

Old Approach

In the weight room my strategy was simple: attack the hamstring in multiple ways. My athletes would perform all types of posterior chain movements such as bridges, RDLs, kettlebell swings and glute/ham raises. Exercises with emphasis on the eccentric portion of the muscle action have been popular for some time when it comes to prevention and improved performance. In fact, there is evidence that including Nordic Hamstring Curls into baseball athlete's program can reduce the incidence of hamstring muscle in-

juries (3). Therefore, we did eccentric based RDLs (3-5 seconds to lower) and eccentric glute/ham raises (sometimes up to 8-10 seconds to lower) at some point during their program.

As for on field training, my programming always defaulted back to short accelerations (15-60 feet). I didn't want to be responsible for having one of my baseball athletes pull their hamstring during a training session, so the solution was to keep things shorter. We did all types of accelerations from different positions and would eventually ease into a few longer sprints after weeks of preparation.


Image 1: Isometric Hamstring Exercise

New Approach & Perspective

I understand what the research states and feel confident in the exercise prescription I deliver to my athletes. However, I am always looking for a new perspective or insight to a problem that continues to arise. The role of the hamstring in high speed running really caught my attention when reading Bosch's book. The perspective I gained was that the hamstring may not actually work eccentrically during high speed sprinting as I previous understood. Therefore, I wasn't including enough training specificity for proper adaptation.

The new model I have adapted focusses on the hamstring transferring energy during sprinting. Instead of large changes to the muscle unit, it appears that the large change (lengthening) is coming from the elastic component. Therefore, the hamstring is in a state of extreme isometric tension during high speed sprinting. Remember, just because the attachment points move a part does not mean the muscle is lengthening. Additionally, at high running velocities it seems unrealistic to expect the hamstrings muscle to lengthen and contract at rapid speeds. The bioenergic demands of this process would be excessive just to run to first base out of the box. Instead, there must be a greater reliance on elastic energy to sprint at top speeds.


Image 2: Isometric Hamstring Exercise

With this new insight, the weight room exercises have evolved quickly. Isometric based hamstring exercises are now a critical part of my training program. Reference Images 1 & 2 for a sample of various exercises that are now incorporated during weight room sessions. It is important to note that my athletes still perform traditional hamstring exercises (RDLs, glute/ham raises, etc) in the early off-season. However, as specificity becomes more important leading up to the season all of the eccentric based hamstring work is replaced by exercises such as Images 1 & 2. Additionally, Nordic Hamstring Curls may not meet the intra and intermuscular demands of the hamstring during sprinting since this muscle works isometrically and in symphony with the glute max, adductor, and gastric. Also, during isometric exercises I feel it is easier to maintain neutral pelvic position compared to Nordics. Pelvic control also has a large impact on hamstring health during sprinting.

Co-contraction drills for the hip are now a staple in the training program for my athletes. A co-contraction around the hip is critical active attractor (key stable position) during sprinting. If there is no co-contraction around the hip this will lead to slack in the pelvis resulting in poor alignment of the muscles connecting to the pelvis (hamstrings). A few of the hip lock (co-contraction) drills used in our program are illustrated in Images 3, 4, & 5. Additionally, you can clearly see in Images 4 &5 that I am incorporating the Bubble Cheek™ method into the exercises to maximize power development and body alignment. See the footnote regarding the Bubble Cheek™.


Image 3: Co-contraction (Hip Lock)


Image 4: Co-contraction (Hip Lock)


Image 5: Co-Contraction (Explosive Hip Lock)

During movement training sessions that include sprinting many Frans Bosch methods are now a staple in the program. The hip lock philosophy is also incorporated on the field during various warm up drills such as marching. View Image 6 for an example. Another element adopted from Bosch is the use of PVC pipes during marching, skipping, and sprinting drills. Many of us have seen these variations on social media, however I didn't appreciate their importance until I spent time directly with Frans. It is not simply about how it looks, but also about the intent of the athlete. The PVC is added to freeze degrees of freedom and challenge the trunk, hips, and legs to perform technically sound movements.

The final piece of hamstring injury

prevention is sprinting! Seems obvious for strength coaches to sprint their baseball athletes. However, I am now including an acceleration day and a top end speed day with all my athletes including baseball. Acceleration training has not changed much for me over the last 15 years as a strength coach. Along with various starting stances and positions I now incorporate a few Bosch methods for short sprints. Specifically, plate and PVC pipe accelerations. View Images 7 & 8. However, I always bring these exercises back to context with regular body weight accelerations to end a session. Thus, it turns into a superset or contrast set. These two specific drills also help to freeze degrees of freedom (shoulder and arm movement) and place greater emphasis on swing leg retraction and torso/hip stability.

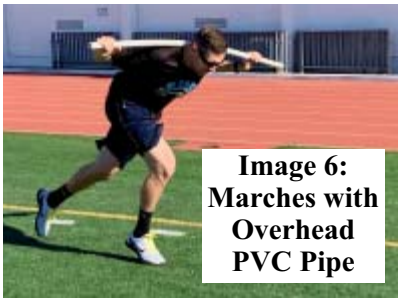

Image 6: Marches with Overhead PVC Pipe

The biggest change to my sprint program over the last 5 years has been increasing the number of top end speed drills and sprints over the course of the off-season and pre-season. Baseball athletes do not reach maximal sprint speed until they are upright with top end speed mechanics. Unless your athletes train at these intensities all sprints are submaximal. Similar to the concept of only lifting a weight that is 80% of your 1RM – by definition this cannot be considered high intensity, if intensity is classified as a percentage of your 1RM. Sprint training covering short distances (say 20-50 feet) are not far enough distances to reach maximal speeds for baseball athletes. I measure my athletes on a periodic basis with the Freelap Timing System at various distances and calculate speeds in mph or m/s. Short distances (under 60 feet) do not allow athletes to reach speeds similar near maximum velocity.

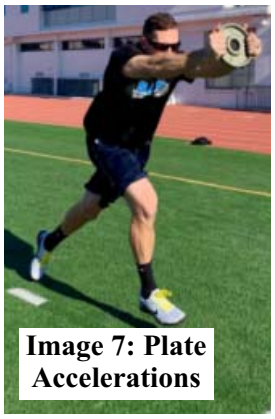

Image 7: Plate Accelerations

The methods I utilize to target top end speed are very simple and practical. The obvious way to get higher velocities from your baseball athletes is to extend sprints to 75-120 feet or 25-40 yards. Simply extending the distances provides valuable time to hit the Golden Position (Ralph Mann) more often which occurs at top end speed. The second method I incorporate into sprint training is flying starts. One of the typical flying start drills we use is a 10 yard fly, with 25 yard build up. Essential the athlete sprints (builds up) into a zone and maintains their fastest pace with top end speed mechanics. We conservatively extend the fly slow from 10 to 15, then 20 yards. The goal for this drill is to extend their high intensity sprinting over longer distances during the course of the off-season. The volume is extremely low, and the repetitions in a given training session may range from 2-4.

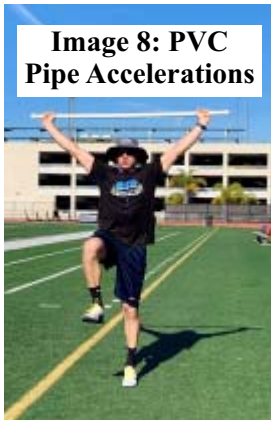

Image 8: PVC Pipe Accelerations

Summary

It is important to provide the stimulus of high intensity sprinting for baseball athletes in order for adaptations to occur. The specific adaptations include neural and elastic power and efficiency, along with reduced chances of soft tissue injury. Specific drills such as hip locks in the weight room or during warm ups may be advantageous for baseball athletes to train co-contraction of the hips. Additionally, this specific movement pattern must be integrated into sprint drills to have transfer. Overall, creating optimal hip and torso positioning during sprinting is critical when your goal is improved performance and reduction of hamstring injuries. O

Footnote:

The Bubble Cheek™ technique is a key piece to Precision Form Training™ (PFT). To understand more about this system, make sure to read: *Power in the Bubble Cheek™: What's Been Hiding in Plain Site! Precision Form TrainingTM (PFT) for Power Development*. **http://baseballstrength.org/wp-content/uploads/2018/09/SB-17-6-3.pdf**

Sources

1) Ahmad CS, Dick RW, Snell E, et al. Major and Minor League Baseball Hamstring Injuries: Epidemiological Findings from the Major League Baseball Injury Surveillance System. American Journal of Sports Medicine. April 2014.
2) Bosch F. (2015) *Strength Training and Coordination: An Integrative Approach*. 2010 uitgevers
3) Brukner P. Hamstring Injuries: Prevention and Treatment – An Update. *British Journal of Sports Medicine* 2015; 49: 1241-1244.