MUSCLESOUND®

GLYCOGEN MUSCLE OPTIMIZATION SYSTEM

Injury Prevention and Muscle Recovery

The purpose of this paper is to detail the benefits of the MuscleSound® glycogen muscle optimization system as it relates to athletes with muscle damage, muscle injury and recovery. The MuscleSound® glycogen muscle optimization system includes a patented scientific methodology that uses portable, high-frequency ultrasound technology and cloud-based software to allow teams and athletes to rapidly, regularly and non-invasively test muscle glycogen content levels in real time.

It is well established that a damaged or injured muscle will not hold the same level of glycogen as a healthy muscle. It is also well established that low muscle glycogen content leads to greater protein breakdown in the muscle during moderate- to high-intensity activity, leading to non-contact soft tissue injuries. In essence, the muscle eats itself to feed itself. The MuscleSound® methodology provides muscle-specific data allowing for personalized nutritional recommendations and training requirements, as well as indications of overtraining and possible muscle damage.

Listed for reference are four different examples of athletes in different activities whose glycogen content shifted as a result of excessive training loads, injuries and recovery from injuries.

MuscleSound® is able to quickly determine glycogen indicator muscles, which may be different for each athlete. As an athlete's glycogen content decreases, attention to nutrition, sleep and exercise should be closely monitored. If nutrition or rest enables the muscle to recover quickly, resulting in increased glycogen content no further intervention is necessary.

The examples below illustrate the patented MuscleSound® methodology reflective of how the ultrasound images of the muscle vary from that seen when glycogen content is optimal versus when glycogen content is significantly reduced.

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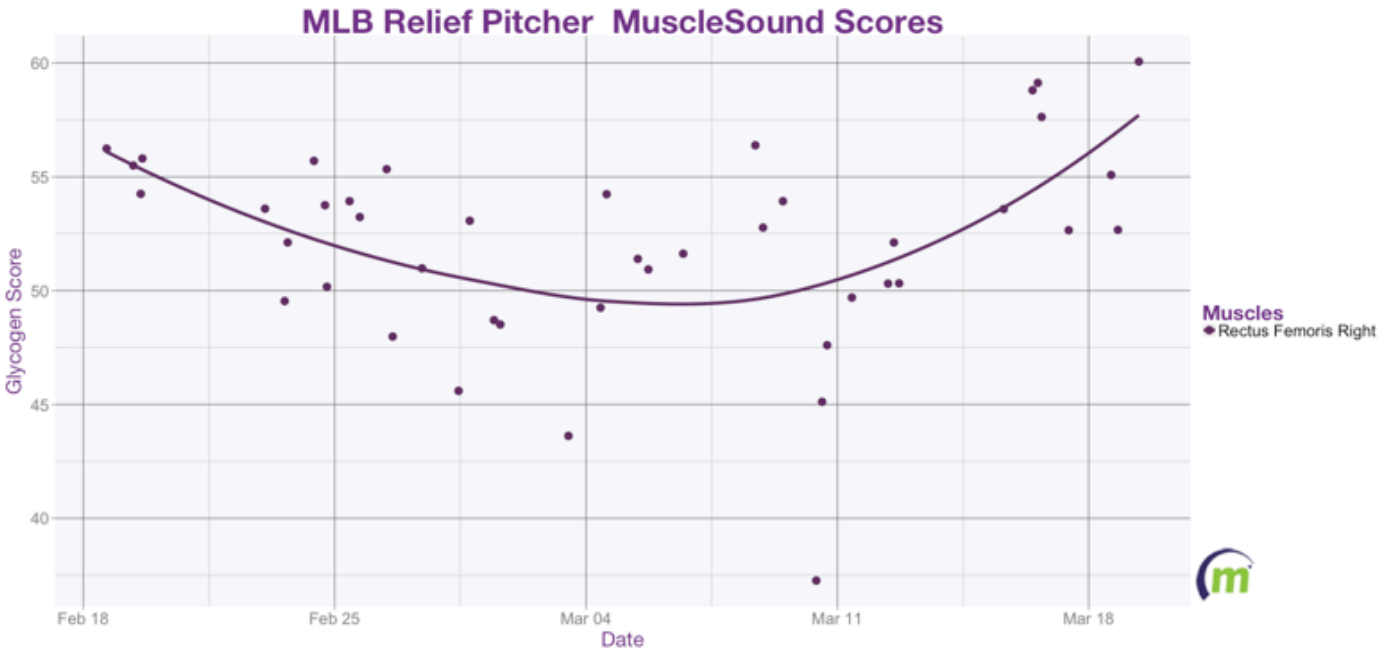
THE MUSCLESOUND® SYSTEM CLEARLY SHOWS MUSCLE RECOVERY

Example 1:

The graph below shows results of MuscleSound® scans of the rectus femoris muscle of a professional baseball relief pitcher during 2013 Spring Training. This athlete was performing strength training for his lower body twice per week in addition to the skills practice and running conditioning that was part of team and position activities. As the graph shows, there is an early downward trend of the glycogen score, which can indicate inadequate recovery of the muscle. After the athletic trainer's consultation with this athlete, he decided to reduce his leg training frequency from twice per week to once per week. This adjustment in cumulative training volume allowed his rectus femoris muscle to recover, as evidenced by the upward trend of his rectus femoris glycogen score.



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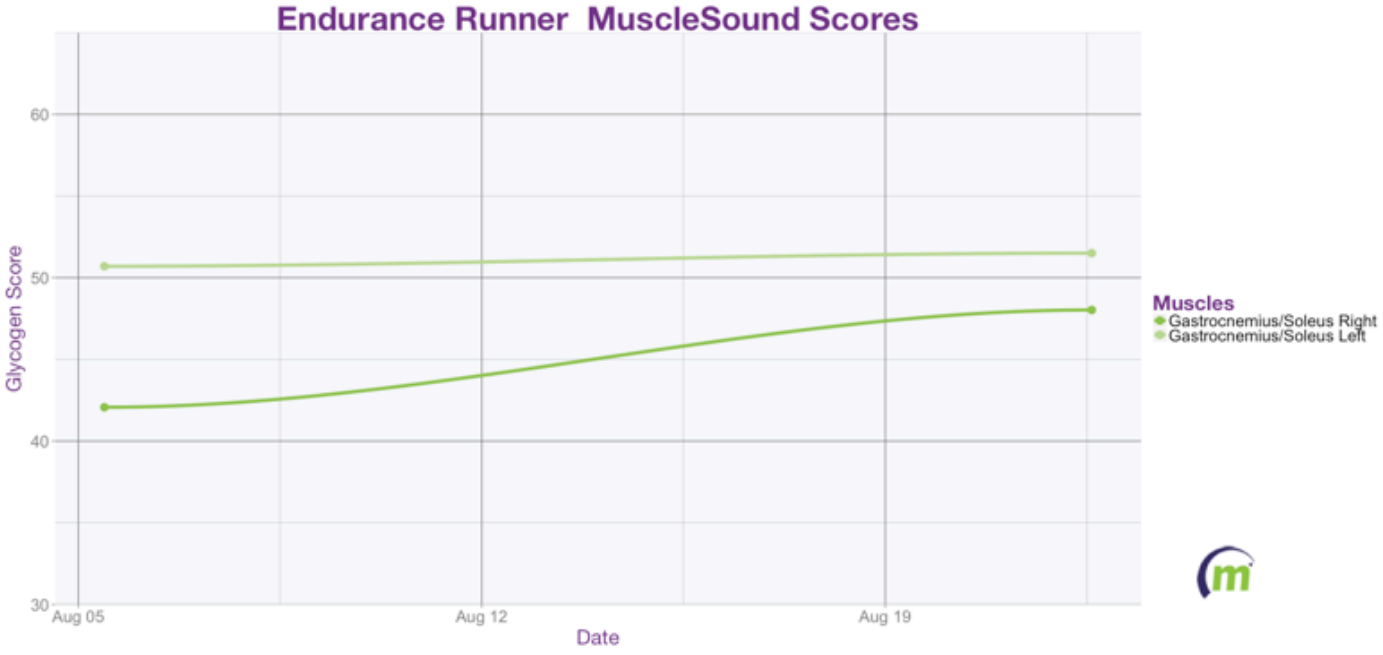
Example 2:

The graph below shows the right and left gastrocnemius/soleus muscle scans of an accomplished recreational runner. This athlete had a right gastrocnemius second-degree strain several days prior to the first scan. As seen on the graph, the damaged muscle scored significantly lower than the healthy muscle. After 17 days of recovery, the injured muscle recovered a significant glycogen storage capability, although it did not yet have the same capacity as the contralateral healthy muscle.



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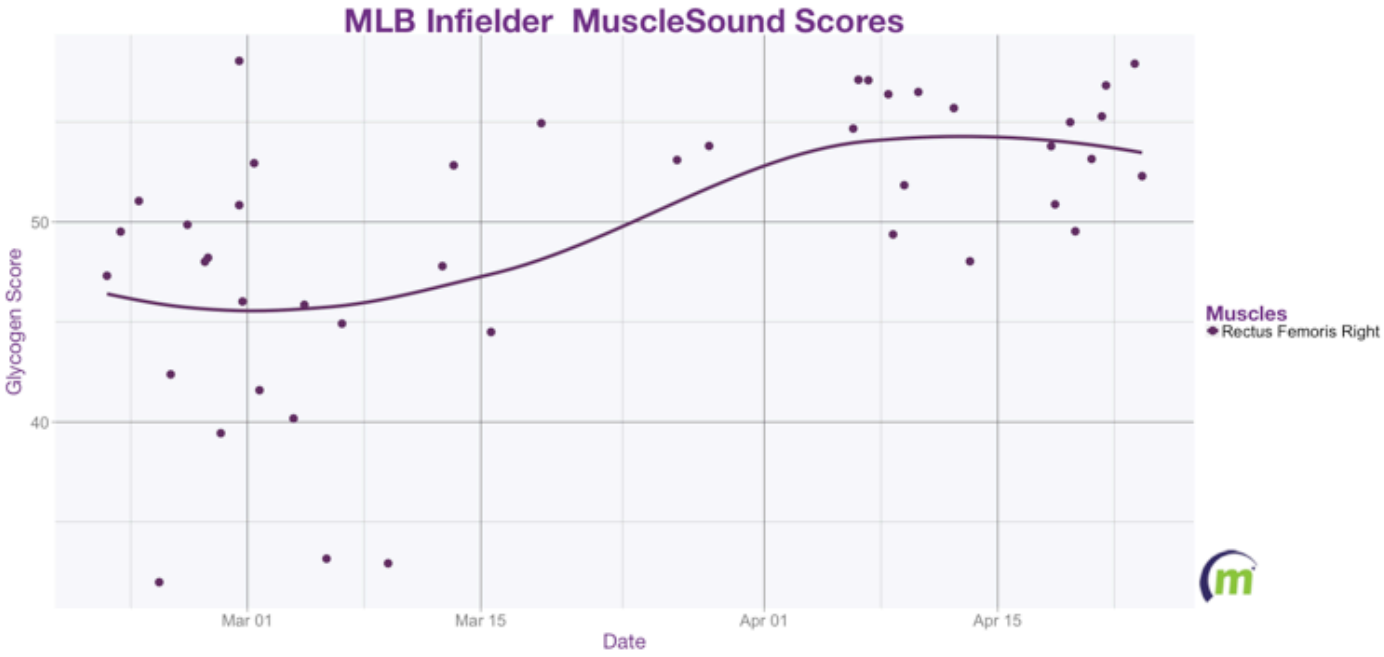
Example 3:

The graph below shows the glycogen scores of the rectus femoris muscle of a professional baseball infielder, starting during 2013 Spring Training and continuing into the early part of the regular season. This player had a grade II rectus femoris muscle strain at the end of the 2012 regular season. As shown in the graph, as this athlete returned to baseball-specific conditioning, the average glycogen score of his rectus femoris muscle increased while the glycogen drop during activity was reduced. This is indicative of a healthy muscle having both a greater capacity to store glycogen and a more efficient utilization of glycogen during activity.



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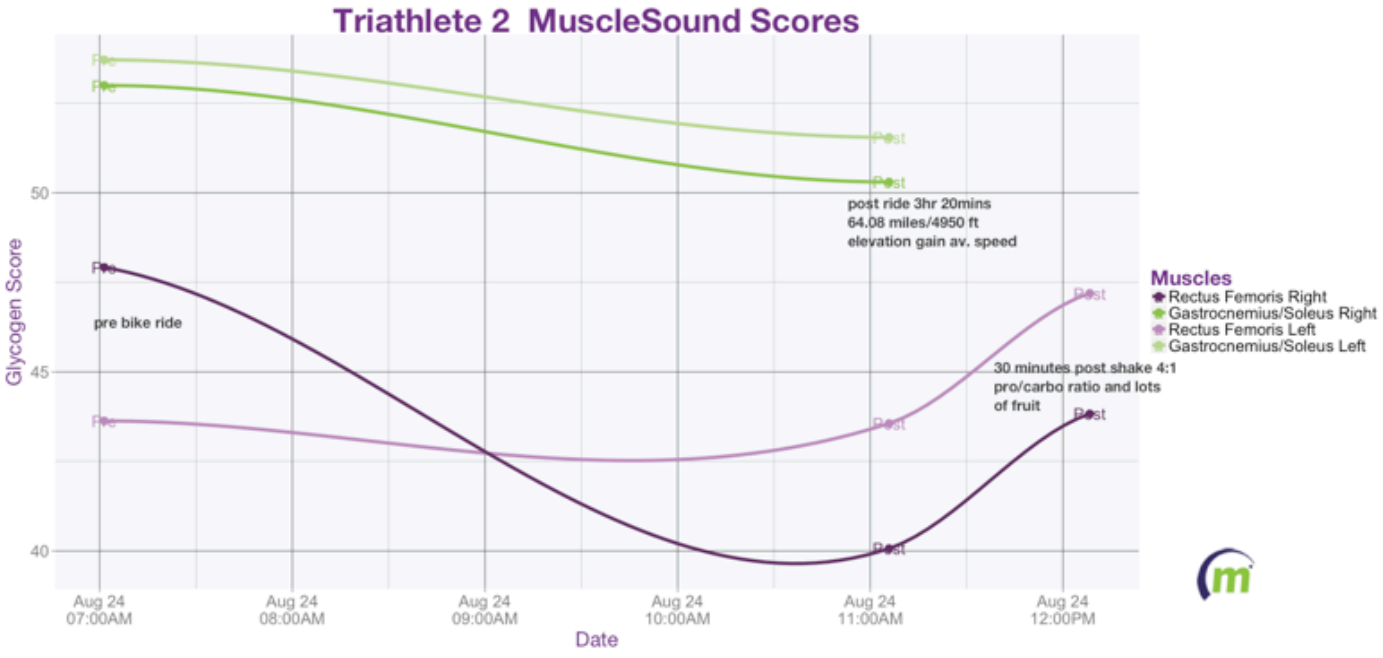
AS IMPORTANTLY, THE MUSCLESOUND® SYSTEM CAN INDICATE BIOMECHANICAL DIFFERENCES IN MUSCLES

Example 4:

The following graph shows results from a professional triathlete's bike ride, including training notes. The trajectories of the athlete's gastrocnemius muscles are very similar, but the athlete's right rectus femoris muscle shows greater glycogen depletion than the left. The biomechanical differences between the athlete's right and left leg are due to the athlete recovering from a left hamstring injury and the greater workload performed by, and resulting glycogen depletion of, the right leg to maintain performance goals and speed. Finally, 30 minutes after the athlete consumed carbohydrates, there was a measurable upward trend on the scanned rectus femoris muscles as they started to recover after the ride.



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CONCLUSION

The patented MuscleSound® methodology generates immediate data reflective of current muscle-specific glycogen content to help trainers, athletes and coaches identify the necessary amount of carbohydrates one must consume to fully restore one's glycogen content for optimal performance.

Unlike other performance technologies that only provide data after performance, MuscleSound® enables proactive and personalized direction to replenish muscle-specific energy supplies before performance, allowing for higher intensity exertion for longer periods of time. The MuscleSound® methodology also delivers immediate data to help athletes understand which muscles are used more predominantly (movement patterns).

Additionally, MuscleSound® delivers immediate data with post-performance scans that can identify the warning signs of muscle fatigue, muscle damage and overtraining. This post-performance insight allows for the concentrated muscle recovery necessary to optimize consistent future performance and prevent long-term muscle injury

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