

### Abstract

The purpose of this case study is to discuss and establish evidence to support and further the field of golf fitness and physical therapy. The ultimate goal for a golfer is to achieve proper, speed, accuracy and consistency by bringing a large number of segments into action in the correct sequence. Physical limitations in the areas of mobility, flexibility, stability and strength can limit the ability of the golfer to execute a biomechanically efficient golf swing. Most of the game's best athletes are currently re-defining golf to include not only golf professionals, but health professionals as well. Case patient is a 62 year old male who has been playing golf for 20 years. Prior to initiating programming, the patient's chief complaint was bilateral hip pain and muscular restriction feeling when performing physical activity. The patient experienced intermittent pain in bilateral hips which was exacerbated with axial loading and during rotational movements while standing. A 20 week periodized program designed to fulfill all aspects of a golf specific strength and conditioning program was used. Flexibility and strength were highlighted in this program. Lower body stability accomplish through hip balance and strengthening exercises coupled with tissue extensibility techniques. By week 10, the patient was able to complete a full round of golf with minimal to no pain in bilateral hips.

### Case Description

Age: 62  
Sex: Male  
Handicap: 15  
Height: 5-11 1/2  
Weight: 178  
DOB: 10/01/1950  
Years Playing Golf: 20  
Right or Left Handed: R  
Plays Golf: R

Patient describes his pain as being day-to-day with intensity. On average pain can range from 4-6/10 upon waking up being the worst. Functional mobility has decreased secondary to pain and muscular restrictions. Patient does exercise 3-5 x/week; however, programming is not written nor does it address functional limitations and biomechanical inefficiencies related to his current physical status. Mr. Smith's goal is to decrease pain to 2-3/10 by 6 weeks and be able to complete a round of golf with minimal to no pain in 12 weeks.

### Intervention

Phase 1: Adaptation	Week One		Golf	
Workout 1	Workout 2	Workout 3	Workout 4	Workout 5
Cardio Warmup	Cardio Warmup	Cardio Warmup	Cardio Warmup	Cardio Warmup
Foam Roll	Foam Roll	Foam Roll	Foam Roll	Foam Roll
Injury Prevention	Injury Prevention	Injury Prevention	Injury Prevention	Injury Prevention
Hip maintenance	Hip maintenance	Hip maintenance	Hip maintenance	Hip maintenance
Shoulder maintenance	Shoulder maintenance	Shoulder maintenance	Shoulder maintenance	Shoulder maintenance
Circuit	Circuit	Circuit	Circuit	Circuit
	Sets	Reps	Sets	Reps
Pull Ups (Wide Grip)	1	12	X Pull Downs	1 12
Incline DB Bench	1	9	DB Rows	1 6 ea
PhysioBall leg curls	1	12	Decline Pushups	1 12
Single Leg DB RDL	1	6 ea	Leg Curl	1 12
Split Squats	1	6 ea	Star Rows	1 9
Side Lunges	1	6 ea	Single leg squat	1 6 ea
Single leg chest flys	1	12	Lunges	1 6 ea
Curly Press	1	6	X Step Ups	1 6 ea
Side Planks	2	30 s	Push Pull	1 12
PhysioBall bridge	2	12	Side Step Ups	1 9 ea
Bicycle Crunches	2	20	Hip Ups	2 30 s
			Kneers to chest	2 15
			Prone Planks	2 30 s
			Deadbugs	2 15
			Heels to Ceiling	2 15

This 20 week program was designed to fulfill all necessary aspects of golf specific strength and conditioning. Flexibility and strengthening were highlighted in this periodized program. Lower body stability will be accomplished through hip balance and strengthening exercises coupled with tissue extensibility techniques. Also, trunk rotation is a focus point because of the obvious relationship with the swing itself. By using the rotational strengthening component, our goal is to establish motor learning.

### Stability: Lower Body

In order to develop stability of the lower body, it is imperative that the health professional and golf professional establish unrestricted motion in the ankle, knees and hips. Closed chain exercises are of great importance because they correlate with the golf swing.



### Stability: Upper Body

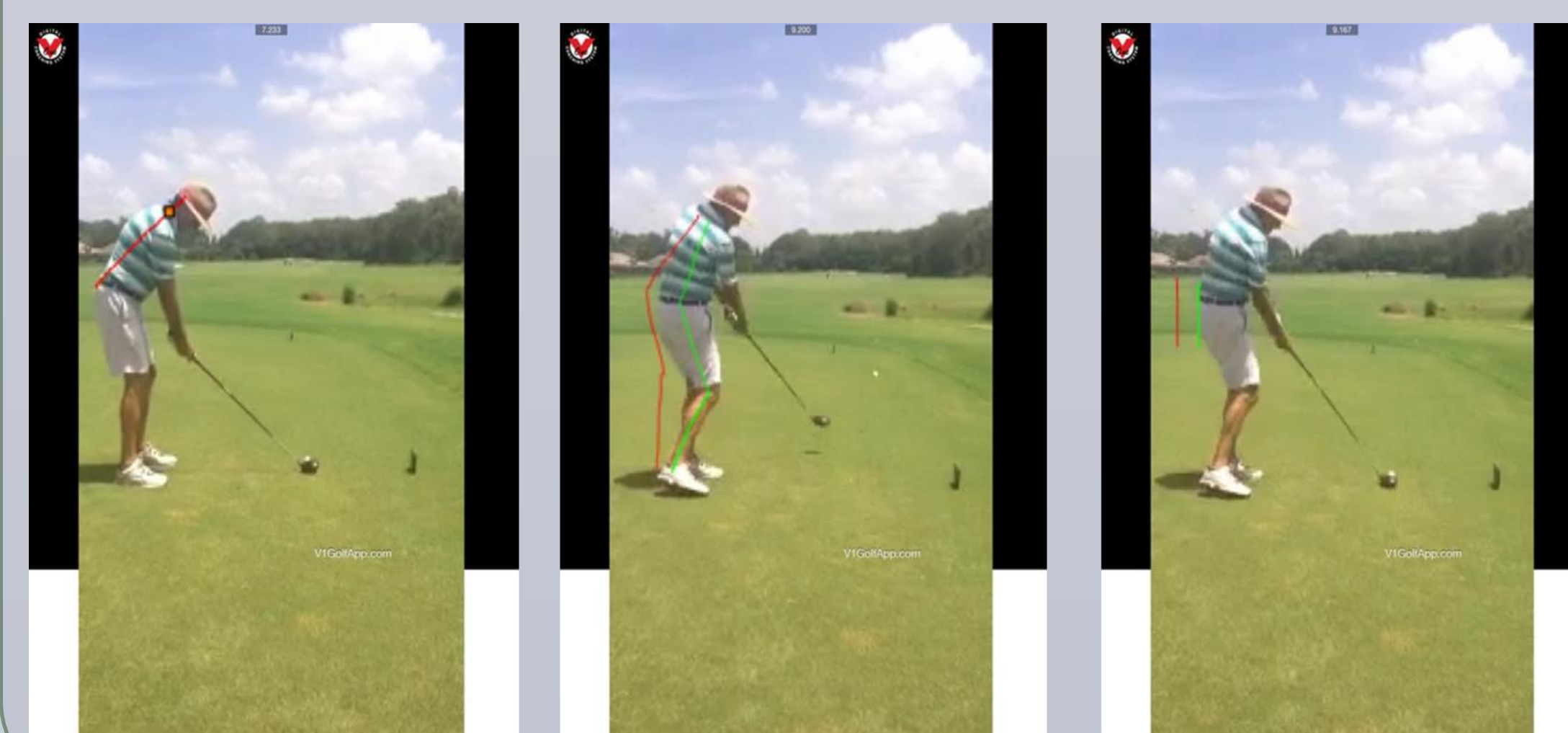
Having proper stability of the upper body will ensure proper motion in the biomechanical properties of the swing itself. The shoulder complex is of great importance considering the fact that it is such a vulnerable and complex joint.



### TPI Screen: Pre-Program

Pelvic Tilt Test: Starting pelvic tilt- C-posture  
Limited motion (arching/flattening); shake and bake movement quality  
Pelvic Rotation Test: Limited mobility bilateral, lateral motion  
Torso Rotation Test: Limited mobility bilateral  
Overhead Deep Squat Test: Arms crossed limited with right dorsiflexion limited  
Toe Touch Test: Limited toe touch bilateral – 3"  
90/90 Test: Right Standing: Equal to spine angle – loses motion in golf posture  
Left Standing: Equal to spine angle– loses motion in golf posture  
Wrist Four Ways Test: WNL  
Single Leg Balance Test: 0-5 seconds bilateral  
Lat test: covers the nose bilateral  
Cervical Rotation Test: limited bilateral  
Seated Trunk Test: < 45 degrees bilateral  
Half-Kneeling Rotation Test: 31-40 bilateral bar behind back  
Thomas Test: tight bilateral (quadriceps and hip flexor)  
Reach Roll and Lift Test: WNL  
Hip Abduction Test: Glute medius inhibited bilateral  
Leg Lowering Test: Pressure drops with core activation  
Bridge with Leg Extension Test: Glutes weak bilateral  
Active Straight Leg Raise Test: 54 degrees right, 56 degrees left  
Hip Rotation Test: 35 int. and 42 ext. right, 36 int. and 48 ext. left

### Swing Faults: Pre-Screen



### Stability: Core

This thoracolumbar and abdominal area form the core loop which helps provide the stability throughout each phase of the swing. Increasing and role and activation capabilities of this muscular group can increase one's ability to protect their spine and have direct performance enhancement applications.



### TPI Screen: Post Program

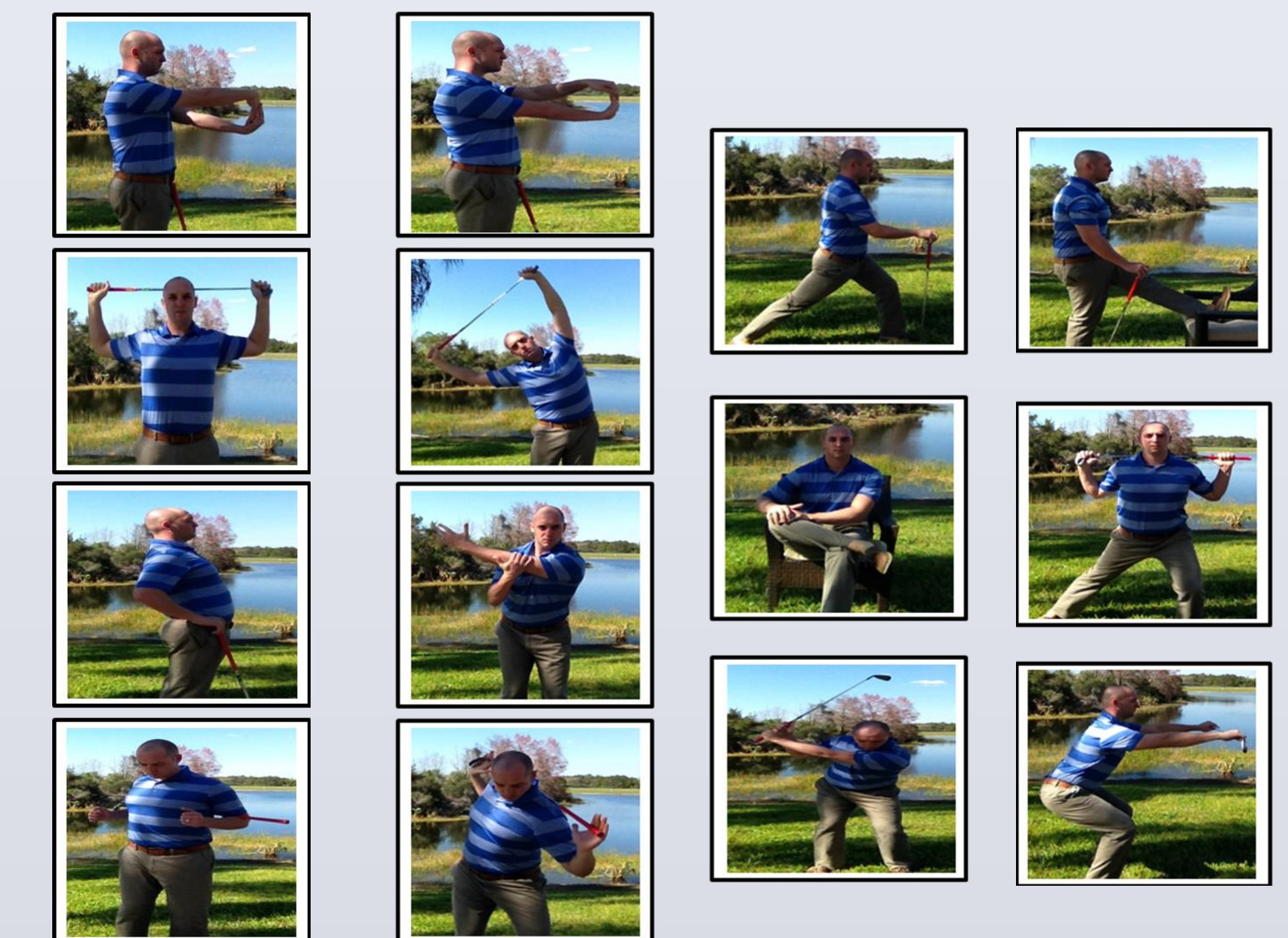
Pelvic Tilt Test: Starting pelvic tilt- Reduced C-Posturing  
Arching/Flattening has improved: No "shake and bake" movement  
Pelvic Rotation Test: Improved (left rotation into lead hip)  
Torso Rotation Test: Minimal lateral sway: improved mobility  
Overhead Deep Squat Test: Right DF continues to be limited  
Toe Touch Test: Limited toe touch bilateral – improved  
90/90 Test: Right Standing: Equal to spine angle – improved ROM and stability in golf posture  
Left Standing: Equal to spine angle– improved ROM and stability Wrist  
Four Ways Test: WNL  
Single Leg Balance Test: 10 seconds bilateral  
Lat test: covers the nose bilateral  
Cervical Rotation Test: limited bilateral  
Seated Trunk Test: Equal to 45 degrees bilateral (ER Rt Downswing; IR Rt Backswing)  
Half-Kneeling Rotation Test: 45 bilateral bar behind back  
Thomas Test: Decreased quadriceps tightness bilateral  
Hip Abduction Test: Glute medius force production increased drastically (decreased sway/slide)  
Leg Lowering Test: Pressure drops below 40 lbs with core activation  
Bridge with Leg Extension Test: Glute Normal Bilateral  
Active Straight Leg Raise Test: 68 degrees right, 65 degrees left  
Hip Rotation Test: 40 int. and 43 ext. right, 38 int. and 48 ext. left

### Swing Faults: Post-Screen



### Outcomes

The increase of external rotation and strength in bilateral hips allows patient to swing the club more consistently and with increased power. Shoulder range of motion improvements and decreased stability/mobility concerns allow him to now swing the club around his body and elicit proper downswing sequencing in order to create power with his core musculature instead of secondary musculature. Improved sequencing and core musculature not only improved overall power/strength, but also improved ability to replicate swing and provided accuracy. The improved ability to demonstrate rotary power has now reduced reliance on upper extremities and allows disengagement of arms and hands in the golf swing. A larger shoulder movement with a settling of the upper body has led to a dramatic improvement in consistency based on reported findings during play.



### Summary and Conclusions

The golf swing is a very complex series of movements that involves the movement of the upper body around a stable pelvic base. The ultimate goal for a golfer is to achieve proper speed, accuracy and consistency by bringing a large number of segments into action in the correct sequence. Power is dependent on two things; mobility and strength. This is what the basis of a golf specific training program should be focused around for performance benefits and injury prevention.

Performance integration into the game of golf requires the health professional to evaluate the results of a detailed examination in order to provide the necessary strengthening, flexibility and various other treatment approaches to their athlete.

Prior to initiating the program, Mr. Smith's goal was to decrease pain to 2-3/10 by 6 weeks and be able to complete a round of golf with minimal to no pain in 12 weeks. By week 10 Mr. Smith was able to complete a full round of golf with minimal to no pain in bilateral hips. Mr. Smith no longer reports pain during golf swing and reports increased ability to produce consistent power throughout all 18 holes.

### References

- Behm, D. G., & Sale, D. G. (1993, June). Velocity specificity of resistance training. *Sports Medicine*, 15(6), 374-88. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/8341872>
- Brandon, B., & Pearce, P. Z. (2009, May/June). Training to prevent golf injury. *Current Sports Medicine Report*, 8(3), 142-6. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/19436170>
- Chen, B., Lam, W.K., Mok, D., Yeung, F., Hung, J., Dale, R.B. A three-week conditioning program for improved golf performance. *Athletic Therapy Today*, 2010 Jul; 15 (4): 22-6.
- Doan, B.K., Newton, R.U., Kwon, Y.H., Kraemer, W.J. Effects of physical conditioning on intercollegiate golfer performance. *J Strength Cond Res*. 2006 Feb; 20(1): 62-72.
- Gordon, B.S., Moir, G.L., Davis, S.E., Witmer, C.A., Cummings, D.M. An investigation into the relationship of flexibility, power and strength to club head speed in male golfers. *J Strength Cond Res*. 2009 Aug; 23(5): 1606-10.