

5 Physical Attributes of Elite Hitters



Eric Cressey

@EricCressey

<https://ericcressey.com/slugfest2019>

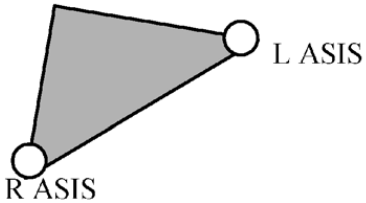
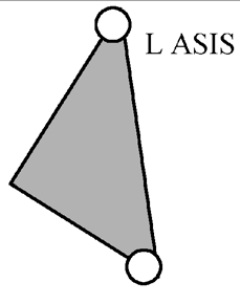
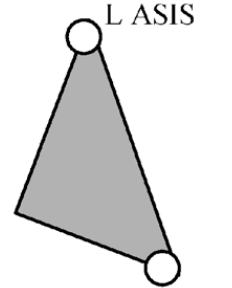
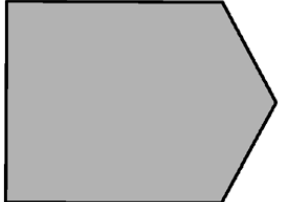
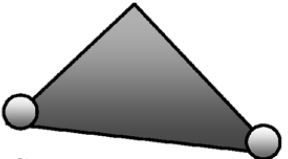
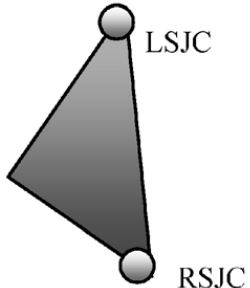
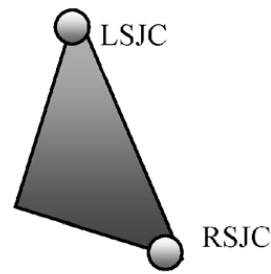


Boxes to Check

- Adequate Strength/Power
- Hip Mobility
- Core Control
- Thoracic Spine Mobility
- Glenohumeral (Shoulder) Joint Control



Nissen CW, et al. Adolescent baseball pitching technique: a detailed three-dimensional biomechanical analysis. Med Sci Sports Exerc. 2007 Aug;39(8):1347-57.

	Foot Contact	MER	BR	Home Plate
PELVIS	 <p>-64 ± 12°</p>	 <p>+11 ± 10°</p>	 <p>+18 ± 8°</p>	
THORAX	 <p>-92 ± 11°</p>	 <p>+10 ± 12°</p>	 <p>+25 ± 9°</p>	

Adequate Strength/Power

- Please download and read these reviews!!!!
- Cormie P, McGuigan MR, Newton RU.
Developing maximal neuromuscular power:
part 2 - training considerations for improving
maximal power production. Sports Med. 2011
Feb 1;41(2):125-46.



4 Key Principles for Power Development

- “...a fundamental relationship exists between strength and power, which dictates that an individual cannot possess a high level of power without first being relatively strong.”
- “...consideration of movement pattern, load and velocity specificity is essential when designing power training programmes.”
- “...it is vital to consider the individual athlete's window of adaptation (i.e. the magnitude of potential for improvement) for each neuromuscular factor contributing to maximal power production when developing an effective and efficient power training programme. A training programme that focuses on the least developed factor contributing to maximal power will prompt the greatest neuromuscular adaptations and therefore result in superior performance improvements for that individual.”
- “...a key consideration for the long-term development of an athlete's maximal power production capacity is the need for an integration of numerous power training techniques. This integration allows for variation within power meso-/micro-cycles while still maintaining specificity, which is theorized to lead to the greatest long-term improvement in maximal power.”



How do you build a sprinter?

Absolute Speed

Speed-Strength

Strength-Speed

Absolute Strength

Specific

IDEAL

General

Sprinting, Plyos

Jump Squats

Olympic Lifts

Squats, Deadlifts



Applied to Hitting

Absolute Speed

Speed-Strength

Strength-Speed

Absolute Strength

Specific

IDEAL

General

Hitting

Overload Bats

Medicine Balls

Strength Training



Power is Plane-Specific.

- Lehman G, Drinkwater EJ, Behm DG. Correlation of throwing velocity to the results of lower-body field tests in male college baseball players. J Strength Cond Res. 2013 Apr;27(4):902-8.
- “...this study found that lateral to medial jumps were consistently correlated with high throwing velocity in each of the throwing techniques, in both left-handed and right-handed throwers. This is the first study to correlate throwing velocity with a unilateral jump in the frontal plane, mimicking the action of the throwing stride.”



The Research!

- Szymanski DJ et al. Effect of torso rotational strength on hip, angular shoulder, and linear bat velocities of high school baseball players. J Strength Cond Res. 2007 Nov;21(4):1117-25.
- 12 week study of HS baseball players (mean: 15.4 years)
- Group 1: lifting and hitting only
- Group 2: lifting, hitting, and 3x/wk med ball program
- Group 2 had greater improvements in angular hip), angular shoulder, and linear bat-end velocities – and torso rotational strength – than Group 1.



The Research!

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- 12 week study of HS baseball players (mean: 15.4 years)
- Group 1: lifting and hitting only
- Group 2: lifting, hitting, and 3x/wk med ball program
- Although both groups made statistically significant increases ($p < \text{or} = 0.05$) in dominant (10.5 vs. 17.1%) and nondominant (10.2 vs. 18.3%) torso rotational strength and the medicine ball hitter's throw (3.0 vs. 10.6%), group 2 showed significantly greater increases in all 3 variables than group 1.



First Off-Season Month (Sep/Oct)

- Limited Rapid Elbow Extension
 - Anti-Rotation Work
 - Single-leg Balance
- Wouldn't even constitute true power training, so a volume calculation won't do it justice
- 4 days/week



Mid Off-Season (Oct– early Jan)

- All variations, but less 1-arm work
- 140-200 total throws per week
- Spread over three sessions
- Generally one rotational and one overhead variation per session
- Coincides with onset of throwing program and hitting (begins in Nov/Dec)



Late Off-Season (Jan 1 – March 1)

- Volume reduced
- More rotational scoops, fewer shotputs
- 2-3 shorter sessions per week
- 90-140 total throws
- Coincides with more aggressive throwing and hitting programs



Rotational Med Ball: Sample Progressions

- Half-kneeling Anti-Rotation Shotput
- Split-Stance Anti-Rotation Scoop Toss
- Rotational Shotput/Scoop Toss
- Figure 8 Shotput
- Step-Behind Scoop Toss
- 2-Hop to Scoop Toss
- Receive & Release Scoop Toss



Hip Mobility

- Welch et al. Hitting a baseball: a biomechanical description. J Orthop Sports Phys Ther. 1995 Nov;22(5):193-201.
- 714°/s rotation at the hips
- Stride length averaged 85cm - or roughly 380% of hip width.
- Hip control is probably a lot more important than absolute hip ROM.



Vad VB, et al. Low back pain in professional golfers: the role of associated hip and low back range-of-motion deficits. Am J Sports Med. 2004 Mar;32(2):494-7.

- “Range-of-motion deficits in the lead hip rotation and lumbar spine extension correlated with a history of low back pain in golfers.”
- Joint? Retroversion? Tissue Extensibility? Capsule? Motor control deficits?

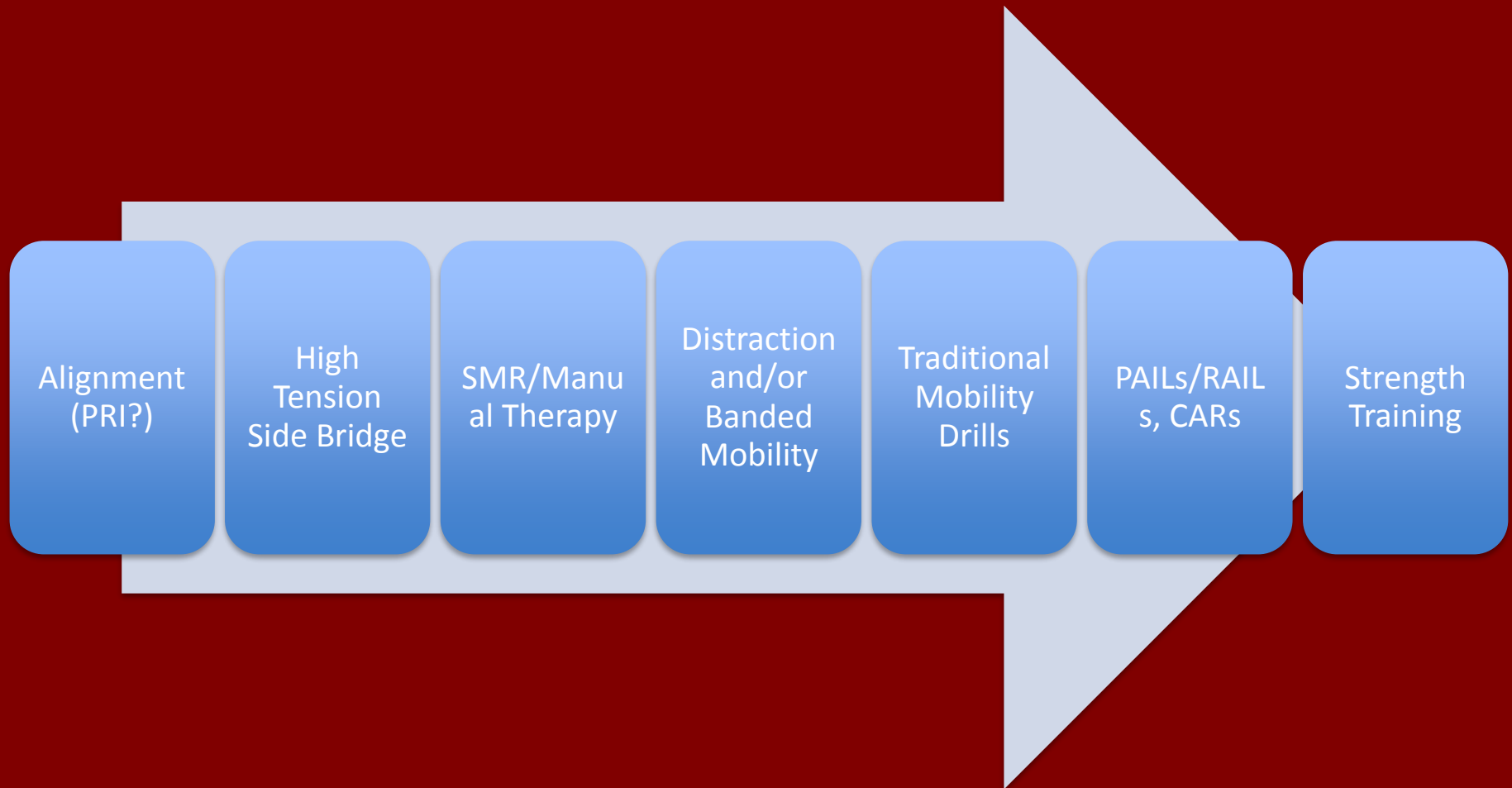


Glute Activation

- Prone Hip Extension
- Supine Bridge Variations
- Glute Wall March
- Side-Lying Clam



Hip Internal Rotation Flowchart



Watch for Extremes

- Retroversion
- Anteversion
- Hypermobility



Core Control



Core Control

- Shaffer B, Jobe FW, Pink M, Perry J. Baseball batting. An electromyographic study. Clin Orthop Relat Res. 1993 Jul;(292):285-93.
- EMG analysis of 12 muscles during the swing in pro hitters
- “There was no significant difference in activity between the lead and trail erector spinae during any phase.”
- “No significant differences in activity were found between lead and trail obliques.”
- It is about creating power in the hips, not the lumbar spine!



Anterior Core: Back to Wall Shoulder Flexion, Stability Ball Rollout

Rotary Stability: Half-kneeling Cable Lift, Half-kneeling Rotational Cable Lift, Wide-Stance Anti-Rotation Chop



Thoracic Spine Mobility

<u>Spinal Level</u>	<u>Degrees of Rotation</u>
T1-2	9
T2-3	8
T3-4	8
T4-5	8
T5-6	8
T6-7	8
T7-8	8
T8-9	7
T9-10	4
T10-11	2
T11-12	2
T12-L1	2
L1-2	2
L2-3	2
L3-4	2
L4-5	2
L5-S1	0-5



Thoracic Mobility

It matters for two reasons:

1. Adequate thoracic extension and rotation allows for effective hip-shoulder separation to allow the arms to lag behind
2. Adequate thoracic flexion and rotation delivers the scapula and, in turn, the arm



Assess, Don't Assume!

- Lumbar Locked Rotation
- Dr. Greg Rose: TPI
- Goals: 50-70° general population, 70-90° rotational sport athletes
- Hand behind back, Lumbar spine rounded



Thoracic Rotation



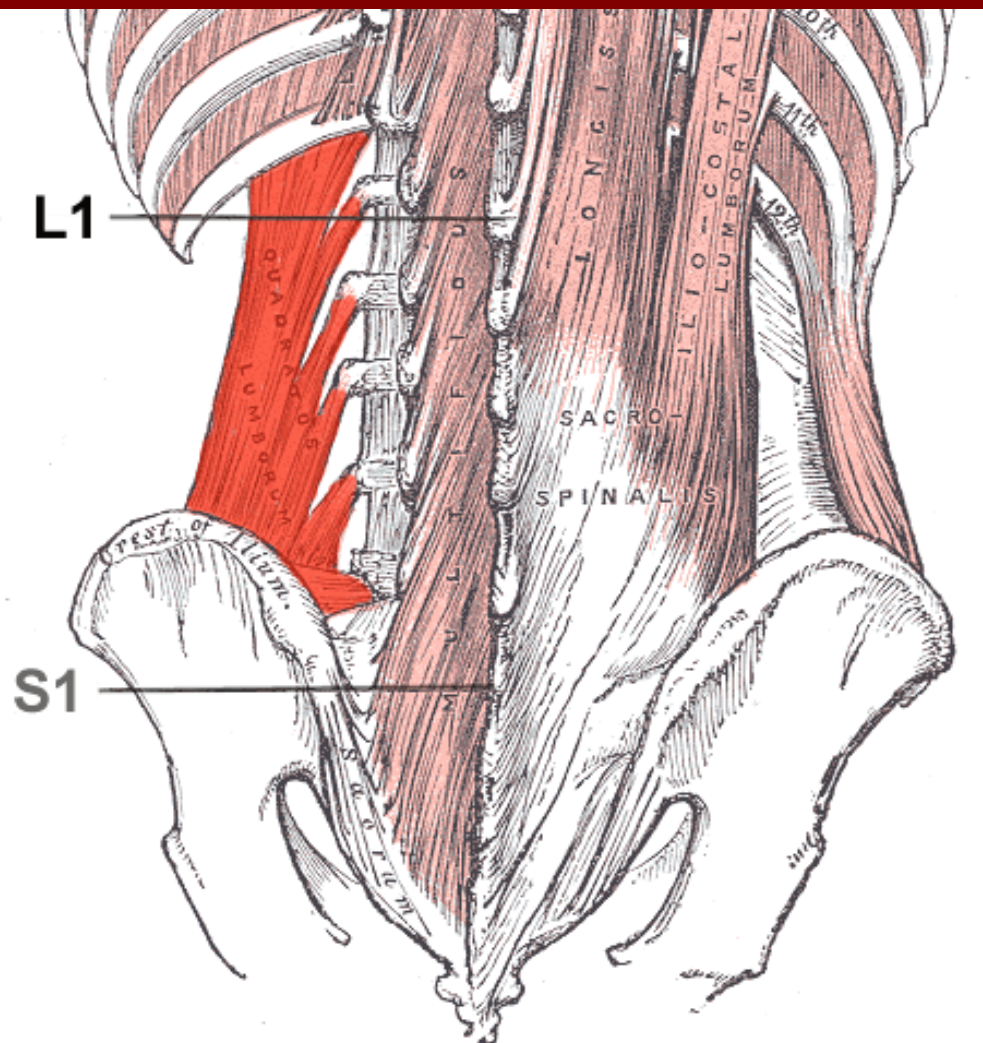
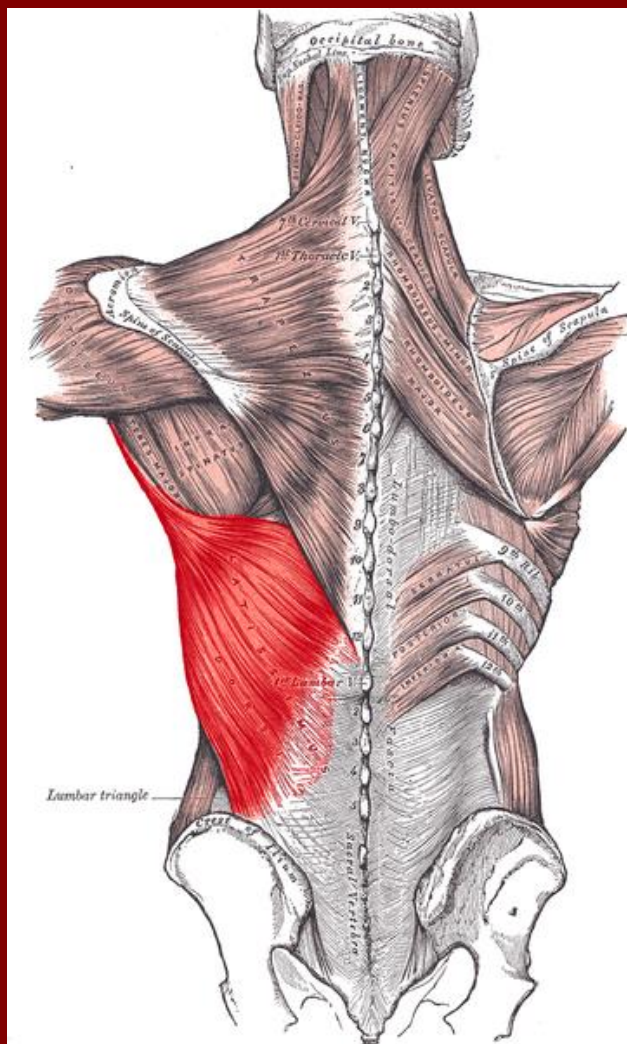
Active vs. Passive ROM



Different Findings

- If it's good actively, train!
- If it's poor actively, check passive range-of-motion.
- Limited active, good passive = motor control (stability/strength) issue
- Limited active, limited passive = dig deeper to determine whether it's a joint or tissue limitation







For Motor Control Deficits...

- Make it easier for them!
- Assist them into position
- Shorten lever arm
- Quadraped Assisted Thoracic Rotation
- Bent-over T-Spine Rotation w/Hip Hinge
- Adductor Stretch w/(Offset) Extension-Rotation



For Soft Tissue Limitations...

- Lean Away Lateral Line Stretch
- Side-Lying Windmill
- Bench T-Spine Mobs
- 1-arm Bench T-Spine Mobs



For the Flat Thoracic Spines...

- All Fours Belly Lift
- Bear Crawls
- Short Plank w/Reach Across & Under
- Serratus Wall Slides



Glenohumeral (Shoulder) Joint Control

- There is a large posteriorly directed force on the humeral head of the lead arm because of the amount of adduction present.
- Dugas et al 2012: >500 pounds of force
- This is magnified when pitches are away – or hitters swing and miss.
- Batter's Shoulder: posterior labral tear or posterior subluxation



Lead Shoulder Challenges

- “Soft Entry into the Zone” -Latta
- One-Hand Finishes
- Right-handed throwers who hit left handed, and vice versa
- Bigliani et al (1997): 61% of professional pitchers (and 47% of position players) have positive sulcus sign in throwing shoulder. Most have it in non-throwing shoulder as well.
- Natural Selection?
- Dives, Slides, and Collisions



Exercises

- Side-Lying Cross-Body Mobs on Acumobility Ball
- Prone Horizontal Abduction
- Side Bridge w/Horizontal Abduction
- 90/90 ER Holds
- Manual Resistance Through Swing
- 1-arm Cable Rotational Row



Thank you!

- <http://www.EricCressey.com/slugfest2019>
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