



# STRENGTH RATIO

## BETWEEN INTERNAL AND EXTERNAL ROTATORS DEFINED

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A five year study presented at the American Orthopedic Society for Sports Medicine's (AOSSM) Annual Meeting in Keystone, Colorado measured the preseason shoulder strength for all pitchers in a professional baseball organization over a five-year period (2001-2005). The outcomes of this study revolutionize the way throwing athletes should approach rotator cuff strengthening.

Over a five-year period, 144 major and minor league baseball pitchers were evaluated using a specific protocol by a single athletic trainer. Prone internal rotation (IR), prone external rotation (PER), seated external rotation (SER) and supraspinatus (SS) strength were assessed during spring training prior to each season. The players were then followed throughout the season for occurrence of throwing related injury.

A significant component of the study illustrates that if the external rotators and supraspinatus (decelerating muscles in throwing athletes) are weak, then the incidence of throwing related injuries is greater: "The study illustrates a significant association between PER (prone external rotation), SER (seated external rotation) and SS (supraspinatus) strength with throwing related injuries requiring surgery."

When observing baseball players performing "traditional" rotator cuff exercises on the field, they typically perform an equal number of exercises for their internal and external rotators. For example, the athlete will do internal rotation at 0 degrees (elbow down by the side) followed by external rotation at 0 degrees. Next, they will perform internal rotation at 90 degrees (elbow at the height of the shoulder in a throwing

motion) and then external rotation at 90 degrees. In this format, the athlete is strengthening the accelerators and decelerators equally.

This would be the perfect formula to create balance in the shoulder if the internal and external rotators were equally as strong. However, throwing athletes are inherently stronger in their accelerators. Studies on the IR/ER typically report a 3:2 strength ratio between glenohumeral IR and ER in throwing athletes meaning their internal rotators are one and a half times stronger than their external rotators.

Most injuries occur when the strength of the internal rotators exceeds the 3:2 ratio of the external rotators. Since the IR accelerator muscles are so much larger than the ER decelerator muscles, the ratio will never be equal. The goal is not to balance the internal rotation and the external rotation strength; it is to prevent the ratio between the IR/ER from exceeding 3:2.

Since throwing athletes are inherently stronger in their accelerators, they should modify their rotator cuff workout to create a healthier balance between their IR/ER strength. Throwing athletes would benefit more by placing a greater emphasis on strengthening their external rotators, because the internal rotators are sufficiently strengthened by performing the sport itself. The Crossover Symmetry Rotator Cuff System was specifically designed to target the decelerating muscles of the throwing motion. To reduce the risk of injury, focus on strengthening the external rotators to improve the balance of the strength ratio between the accelerators and decelerators.



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