

Shoulder Injury Prevention Program for Competitive Swimmers

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Learning Objectives:

1. Improve understanding of “swimmer’s shoulder”
2. Recognize that shoulder pain can occur during swim training and can be a precursor to shoulder injuries
3. Identify the risk factors that contribute to shoulder pain and injuries
4. Understand your role in preventing seasonal shoulder injuries in competitive swimmers

The Swimmer



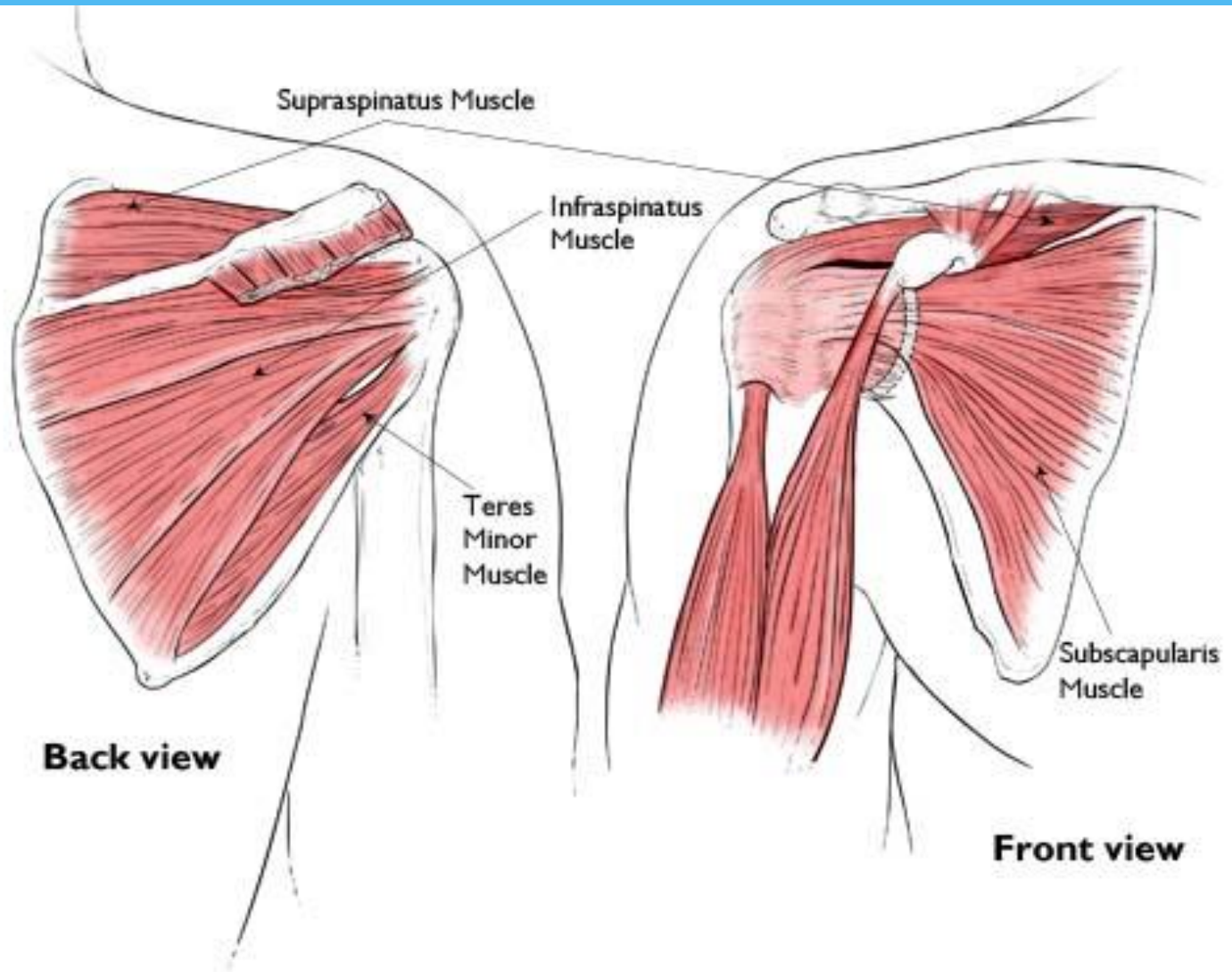
The Swimmer

- * The most common complaint is **shoulder pain**
- * Incidence of shoulder pain:
 - * 47% in swimmers 10-18 years old
 - * 66% in senior development swimmers

What is “swimmer’s shoulder”?

- * Shoulder pain in competitive swimmers that occurs during and after workouts
- * Shoulder pain and inflammation of the rotator cuff and biceps tendon from overuse

Quick Look at Anatomy



Is shoulder pain normal?

Swimming Culture

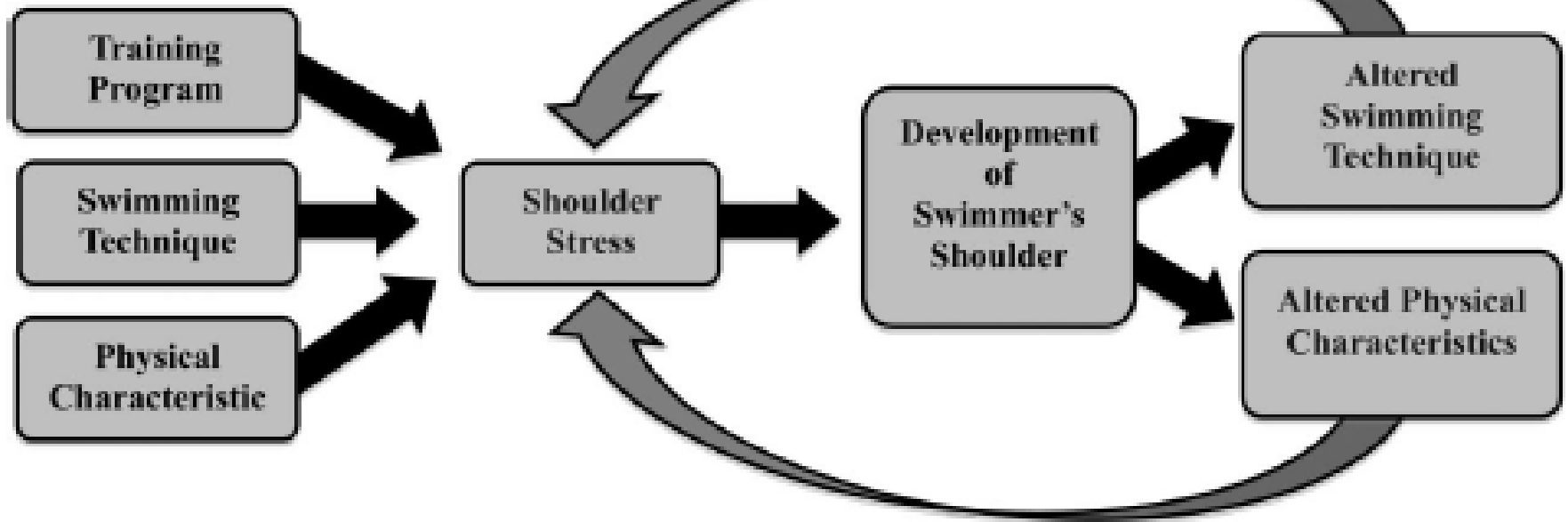
True or False:

- * Shoulder pain is normal and should be tolerated to achieve success
- * Shoulder pain is not associated with injury
- * Shoulder pain will go away during taper time

What's the big deal?

- * Shoulder pain can negatively influence:
 - * Swim technique and performance
 - * Muscle activation patterns
 - * Participation in practice and competitions

- * Ultimately leads to **injury**



How can you prevent
shoulder pain?

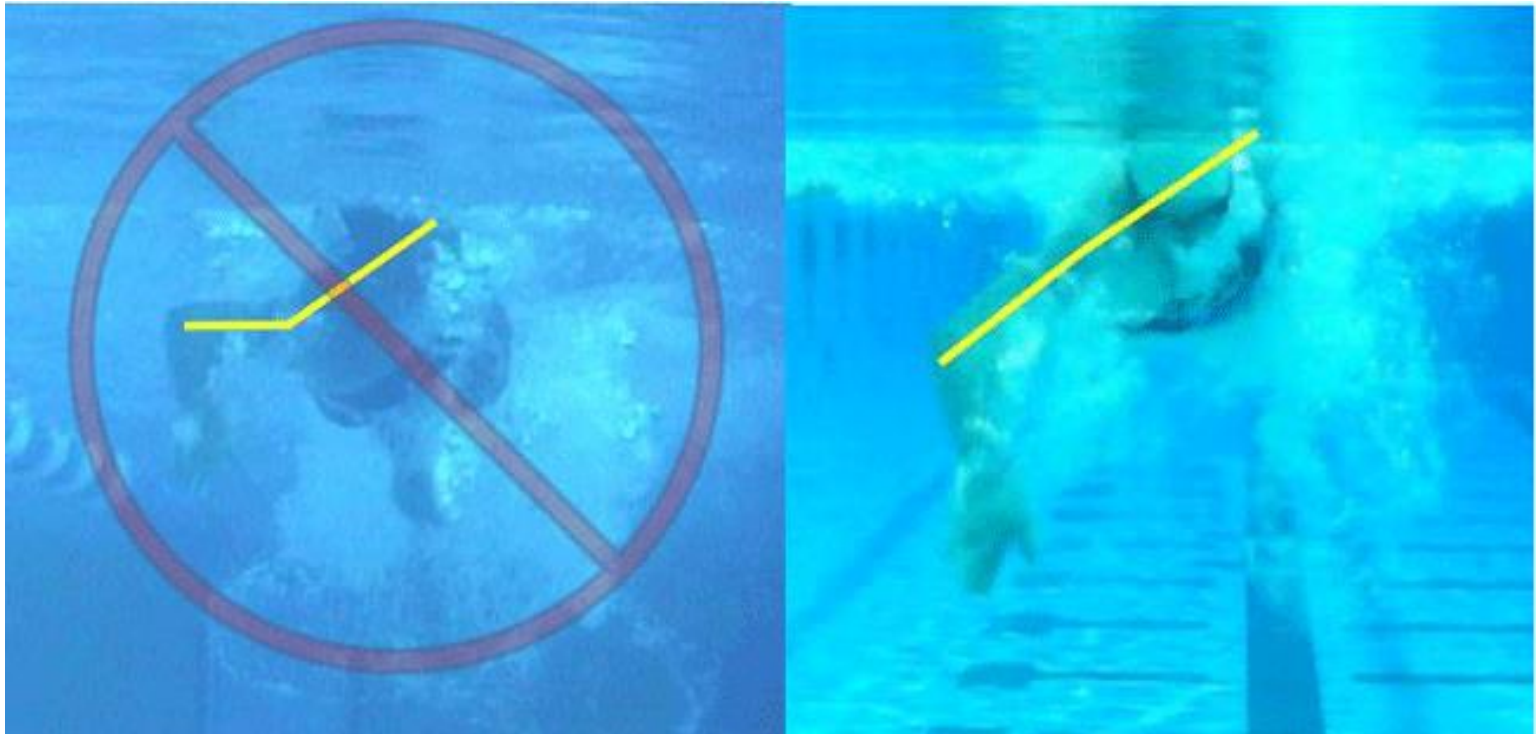
Identify Risk Factors

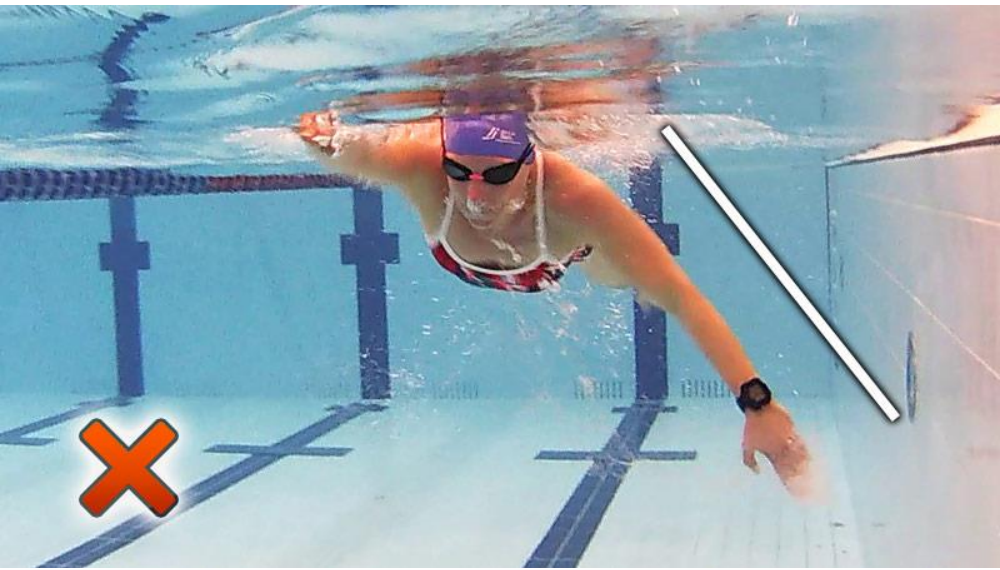
- * Strength deficits
- * Muscular imbalances
- * Scapular dyskinesis
- * Poor posture
- * Poor stroke technique
- * Fatigue
- * Intensity of training
- * Volume of training

Address Stroke Technique

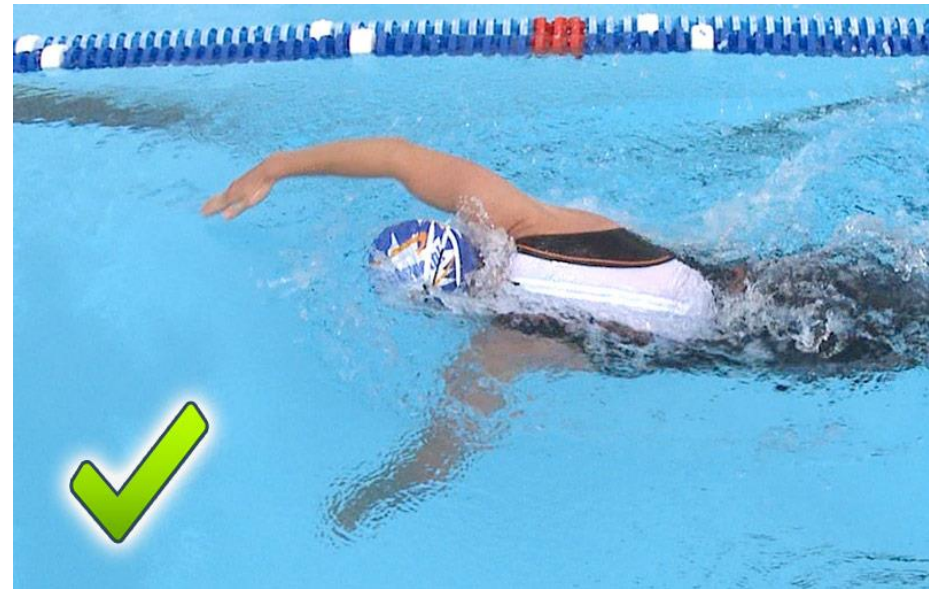
- * Dropped elbow on the catch, pull, and recovery phases of freestyle
- * Arm crossing over or drifting away from the center of the body during the catch phase
- * Excessive or decreased body roll
- * Shortened pull phase
- * Breathing pattern

Catch & Pull Phases

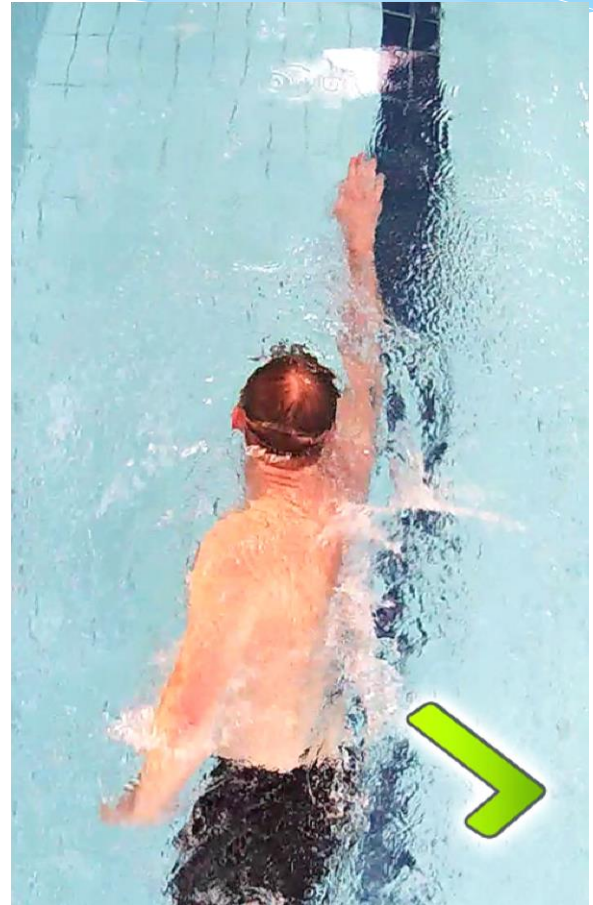




Hand Entry



Glide



Make Practice Modifications

- * Decrease training volume
- * Lower training intensity
- * Change strokes
- * Equipment changes
 - * Examples: hand paddles, fins, kickboard
- * Stroke drills
- * Rest
- * Physical Therapy

Begin a Prevention Program

- * Perform program 2-3 times a week for the entire swim season
- * Instruct the swimmers on proper exercise technique and resistance to maximize gains and for shoulder safety
- * Highly encourage swimmer participation

Shoulder Injury Prevention Program

Details:

- * 3 Phases that cover the entire swim season
- * 30 minutes
- * Contains:
 - * Shoulder strengthening
 - * Shoulder stretching
 - * Core activation
- * Exercise and Resistance Progression

Overview

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<p>Phase I Strengthening Exercises:</p> <ul style="list-style-type: none"> - Side lying ER & IR - Push Up Plus - Prone W, T, I <p>Start at 3x10 and progress to 3x15 based on:</p> <ul style="list-style-type: none"> - Proper technique - No pain or discomfort - Level of perceived effort <p>Phase I Stretching Exercises:</p> <ul style="list-style-type: none"> - Doorway/corner stretch - Sleeper stretch Perform 3 sets with 30 sec hold 					<p>Phase II Strengthening Exercises:</p> <ul style="list-style-type: none"> - Standing ER & IR - Standing Rows - Prone W, T, Y on ball <p>Start at 3x10 and progress to 3x15 based on:</p> <ul style="list-style-type: none"> - Proper scapular rhythm - No pain or discomfort - Level of perceived effort <p>Phase II Stretching Exercises:</p> <ul style="list-style-type: none"> - Cross body stretch Perform 3 sets with 30 sec hold - Chin tucks Perform 10 sets with 10 sec. hold 					<p>Phase III Strengthening Exercises:</p> <ul style="list-style-type: none"> - Standing ER in 90-90 - Prone Y to W on ball - Prone I to W on ball - Prone T to W to Y on ball <p>Start at 3x10 and progress to 3x15 based on:</p> <ul style="list-style-type: none"> - Proper scapular rhythm - No pain or discomfort - Level of perceived effort <p>Phase III Stretching Exercise:</p> <ul style="list-style-type: none"> - Towel or foam roller stretch - Sleeper stretch Perform 3 sets with 30 sec hold 					

Table 1: Exercise Progression throughout the 16 weeks

Phase 1

Exercises:

- * Shoulder external & internal rotation
- * Push up plus
- * Letters (W, T, I)
- * Corner and sleeper stretch

Parameters:

- * 3 sets of 10 – 15 reps
- * 3 sets of 30 sec. hold

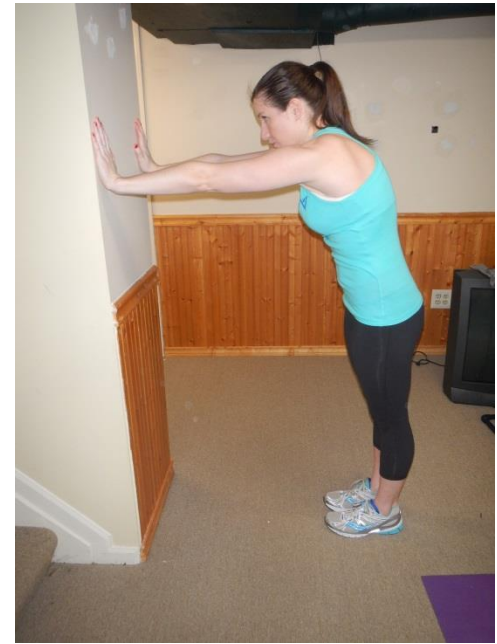
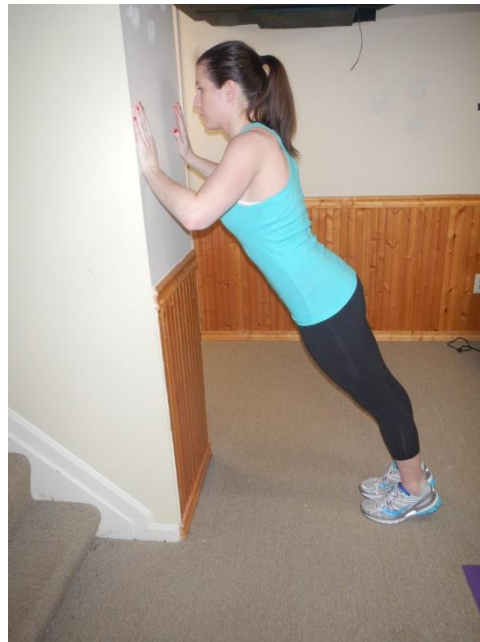
External Rotation



Internal Rotation



Incline Push Up Plus



Knee Push Up Plus



Toe Push Up Plus



Letters: W



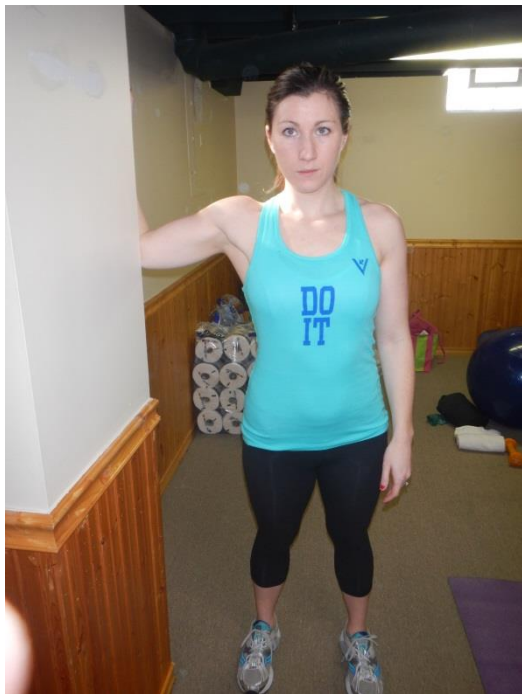
Letters: T



Letters: I



Stretches: Doorway and Sleeper



Phase 2

Exercises:

- * Shoulder external & internal rotation
- * Scapular rows
- * Letters (W, T, Y) on a ball
- * Cross body and chin tucks

Parameters:

- * 3 sets of 10 – 15 reps
- * 3 sets of 30 sec. hold, 10 sets of 10 sec. hold

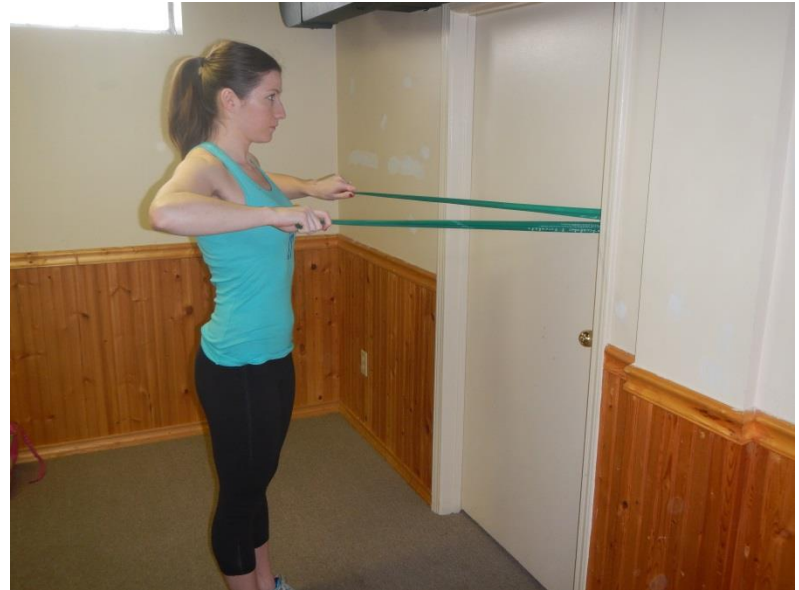
External Rotation



Internal Rotation



Scapular Rows



Letters: W, T, Y



Stretches: Cross body and Chin tucks



Phase 3

Exercises:

- * External rotation
- * Letter (Y, W, I, T) transitions on the ball
- * Foam/towel roller and sleeper stretch

Parameters:

- * 3 sets of 10 – 15 reps
- * 3 sets of 30 sec. hold

External Rotation



Letters: Y to W



Letters: I to W



Letters: T to W to Y



Stretches: Foam/Towel and Sleeper



Advanced Exercises

* Ball on Wall



* Quadruped



Advanced Exercises

* Walk Outs



* Step Overs



Summary

- * Competitive swimmers are at risk for shoulder injury
- * Coaches have a major role in prevention by:
 - * Identifying risk factors
 - * Correcting technique
 - * Modifying training
 - * Implementing a shoulder injury prevention program

Thank you!

References:

1. Hibberd EE, Myers JB. Practice habits and attitudes and behaviors concerning shoulder pain in high school competitive club swimmers. *Clin J Sport Med*. 2013;23(6):450-455. doi: 10.1097/JSM.0b013e31829aa8ff; 10.1097/JSM.0b013e31829aa8ff.
2. Ho S, Laskovski J. Swimmer's shoulder. Medscape Web site. <http://emedicine.medscape.com/libproxy.lib.unc.edu/article/93213-overview>. Updated 2012. Accessed February 8, 2014.
3. Rotator cuff tears. American Academy of Orthopaedic Surgeons Web site. <http://orthoinfo.aaos.org/libproxy.lib.unc.edu/topic.cfm?topic=a00064>. Updated 2011. Accessed February 8, 2014.
4. Heinlein SA, Cosgarea AJ. Biomechanical considerations in the competitive swimmer's shoulder. *Sports Health*. 2010;2(6):519-525. doi: 10.1177/1941738110377611.
5. Tovin BJ. Prevention and treatment of swimmer's shoulder. *N Am J Sports Phys Ther*. 2006;1(4):166-175.
6. Mark R. Shoulder problems: Fix your technique. USA Swimming Web site. <http://www.usaswimming.org/ViewNewsArticle.aspx?TabId=1504&itemId=4177&mid=8986>. Published February 14, 2012. Accessed February 21, 2014.
7. Newsome P. The four classic causes of shoulder pain and injury in swimming. Swim Smooth Web site. <http://www.feelforthewater.com/2013/02/the-four-classic-causes-of-shoulder.html>. Published February 1, 2013. Accessed February 21, 2014.
8. Gaunt T, Maffulli N. Soothing suffering swimmers: A systematic review of the epidemiology, diagnosis, treatment and rehabilitation of musculoskeletal injuries in competitive swimmers. *Br Med Bull*. 2012;103(1):45-88. doi: 10.1093/bmb/ldro39; 10.1093/bmb/ldro39.
9. Weldon EJ, 3rd, Richardson AB. Upper extremity overuse injuries in swimming. A discussion of swimmer's shoulder. *Clin Sports Med*. 2001;20(3):423-438.

References

10. Tate A, Turner GN, Knab SE, Jorgensen C, Strittmatter A, Michener LA. Risk factors associated with shoulder pain and disability across the lifespan of competitive swimmers. *J Athl Train*. 2012;47(2):149-158.
11. Tovin BJ. Prevention and treatment of swimmer's shoulder. *N Am J Sports Phys Ther*. 2006;1(4):166-175.
12. Hibberd EE, Oyama S, Spang JT, Prentice W, Myers JB. Effect of a 6-week strengthening program on shoulder and scapular-stabilizer strength and scapular kinematics in division I collegiate swimmers. *J Sport Rehabil*. 2012;21(3):253-265.
13. Niederbracht Y, Shim AL, Sloniger MA, Paternostro-Bayles M, Short TH. Effects of a shoulder injury prevention strength training program on eccentric external rotator muscle strength and glenohumeral joint imbalance in female overhead activity athletes. *J Strength Cond Res*. 2008;22(1):140-145. doi: 10.1519/JSC.ob013e31815f5634; 10.1519/JSC.ob013e31815f5634.
14. Lynch SS, Thigpen CA, Mihalik JP, Prentice WE, Padua D. The effects of an exercise intervention on forward head and rounded shoulder postures in elite swimmers. *Br J Sports Med*. 2010;44(5):376-381. https://auth-lib-unc.edu.libproxy.lib.unc.edu/ezproxy_auth.php?url=http://search.ebscohost.com.libproxy.lib.unc.edu/login.aspx?direct=true&db=c8h&AN=2010618332&site=ehost-live&scope=site. doi: 10.1136/bjism.2009.066837.
15. Kluemper M, Uhl T, Hazelrigg H. Effect of stretching and strengthening shoulder muscles on forward shoulder posture in competitive swimmers. *J SPORT REHABIL*. 2006;15(1):58-70. https://auth-lib-unc.edu.libproxy.lib.unc.edu/ezproxy_auth.php?url=http://search.ebscohost.com.libproxy.lib.unc.edu/login.aspx?direct=true&db=c8h&AN=2009114883&site=ehost-live&scope=site.
16. Van de Velde A, De Mey K, Maenhout A, Calders P, Cools AM. Scapular-muscle performance: Two training programs in adolescent swimmers. *J Athl Train*. 2011;46(2):160-7; discussion 168-9. doi: 10.4085/1062-6050-46.2.160; 10.4085/1062-6050-46.2.160.

References

17. Swanik KA, Swanik CB, Lephart SM, Huxel K. The effect of functional training on the incidence of shoulder pain and strength in intercollegiate swimmers. *JSportRehab*. 2002;11(2):140-154.
18. Bak K, Magnusson SP. Shoulder strength and range of motion in symptomatic and pain-free elite swimmers. *Am J Sports Med*. 1997;25(4):454-459.
19. Batalha NM, Raimundo AM, Tomas-Carus P, Barbosa TM, Silva AJ. Shoulder rotator cuff balance, strength, and endurance in young swimmers during a competitive season. *J Strength Cond Res*. 2013;27(9):2562-2568. doi: 10.1519/JSC.ob013e31827fd849; 10.1519/JSC.ob013e31827fd849.
20. Harrington S, Meisel C, Tate A. A cross-sectional study examining shoulder pain and disability in division I female swimmers. *J Sport Rehabil*. 2014;23(1):65-75. doi: 10.1123/jsr.2012-0123; 10.1123/jsr.2012-0123.
21. *Jupiterimages/Photos.com/Getty Images*. February 22, 2014.
22. Prevention of shoulder injuries in aquatics sports. USA Swimming Web site. <http://www.usaswimming.org/DesktopDefault.aspx?TabId=1551&Alias=Rainbow&Lang=en>. Accessed March 6, 2014.