

## CURRICULUM VITAE

### **GLENN S. FLEISIG, PH.D.**

American Sports Medicine Institute  
833 St. Vincent's Drive, Suite 100  
Birmingham, Alabama 35205  
(tel) 205-918-2139  
(e-mail) glennf@asmi.org

#### **EDUCATION**

Ph.D.	UNIVERSITY OF ALABAMA AT BIRMINGHAM Birmingham, Alabama Major: Biomedical Engineering Dissertation: "The Biomechanics of Baseball Pitching"	1994
M.S.	WASHINGTON UNIVERSITY Saint Louis, Missouri Major: Mechanical Engineering	1988
B.S.	MASSACHUSETTS INSTITUTE OF TECHNOLOGY Cambridge, Massachusetts Major: Mechanical Engineering Thesis: "Analysis of a Mechanical Model of the Golf Swing"	1984

#### **PROFESSIONAL EXPERIENCE**

AMERICAN SPORTS MEDICINE INSTITUTE  
Birmingham, Alabama

Research Director	1991-1995, 2008-present
Smith & Nephew Chair of Research	1996-2007
Biomechanist	1987-1991

- Supervise biomechanical, clinical, and epidemiological research
- Supervise research efforts of staff members and medical fellows
- Initiate and coordinate research with various universities
- Procure external funding
- Manage research division's finances and personnel
- Supervise Student Researcher Program

UNIVERSITY OF ALABAMA AT BIRMINGHAM  
Birmingham, Alabama

Adjunct Professor in Biomedical Engineering 1997-present  
· Supervise student research for course credit or thesis  
· Give lectures, homework, and tests for selected classes

UNIVERSITY OF ALABAMA  
Tuscaloosa, Alabama  
Adjunct Faculty in Sports Medicine 2001-2006  
· Supervise student research for course credit or thesis  
· Give lectures to selected classes

TROY STATE UNIVERSITY  
Troy, Alabama  
Affiliate Faculty of Sports Medicine 1997-2005  
· Conduct research with Eminent Scholar in Sports Medicine  
· Supervise research projects for student athletic trainers

SINGER - KEARFOTT DIVISION  
Little Falls, New Jersey  
Mechanical Engineer 1984-1986

UNITED STATES OLYMPIC COMMITTEE  
Colorado Springs, Colorado  
Biomechanics Research Assistant 1984  
· Studied elite athletes in various sports  
· Wrote computer programs for data analysis

MIT LABORATORY FOR MATERIAL PROCESSING  
Cambridge, Massachusetts  
Student Researcher 1983  
· Wrote and tested digitized-based control software

MIT-INDUSTRY POLYMER PROCESSING PROGRAM  
Cambridge, Massachusetts  
Student Researcher 1981-1982

## **PROFESSIONAL HIGHLIGHTS**

- Developed research program and laboratories at ASMI.
- 280 presentations given within United States and abroad
- Author of 130 publications
- Countless local and national media interviews regarding sports performance and safety - including ESPN, CNN, FOX, Associated Press, Reuters, USA Today, Sports Illustrated, The New York Times, Discovery Channel, National Enquirer, WebMD, Slate, The Boston Globe, Chicago Tribune, Washington Post, ESPN Sport Science, Discovery Health Channel, Cleveland Plain Dealer, Golf Digest, MLB Network, MLB.com, This Week in Baseball, USA Today Sports Weekly, The Sporting News, Popular Mechanics, and many others.
- \$4.2 million of research grants and gifts procured during tenure as ASMI Director/Chair of Research
- Adjunct faculty position at UAB
- Created ASMI's Student Research Program, allowing gifted high school and college students to work in research lab.
- Provided biomechanical analyses to thousands of athletes of all levels, including pitchers with 25 Major League Baseball organizations.
- Helped institute pitch count safety limitations in Little League Baseball.
- Research emphasis on throwing, rehabilitation exercise, golf, sports medicine

## PUBLICATIONS

### Papers

1. Scillia AJ, Aune KT, Andrachuk JS, Cain EL, Dugas JR, Fleisig GS, Andrews JR. Return to Play After Chondroplasty of the Knee in National Football League Athletes. *Am J Sports Med* 2015 [Epub ahead of print]
2. Laughlin WA, Fleisig GS, Scillia AJ, Aune KT, Cain EL, Dugas JR. Deficiencies in Pitching Biomechanics in Baseball Players with a History of SLAP Repair. *Am J Sports Med* 42(12):2837-2841, 2014.
3. Plymale M, Fleisig GS, Kocaj SM, Cooney WP, Evans TJ, Cain EL, Dugas JR. Visualization and reduction of a meniscal capsular junction tear in the knee: an arthroscopic surgical technique. *Am J Orthop* 43(11):498-500, 2014.
4. Wilk KE, Macrina LC, Fleisig GS, Aune KT, Porterfield RA, Harker P, Evans TJ, Andrews JR. Deficits in glenohumeral passive range of motion increase risk of elbow injury in professional baseball pitchers: a prospective study. *Am J Sports Med* 42(9):2075-2081, 2014.
5. Warden SJ, Mantila Roosa SMM, Kersh ME, Hurd AJ, Fleisig GS, Pandy MG, Fuchs RK. Physical activity when young provides lifelong benefits to cortical bone size and strength in men. *Proc Natl Acad Sci* 111(14):5337-5342, 2014.
6. Yang J, Mann BJ, Guettler JH, Dugas JR, Irrgang JJ, Fleisig GS, Albright JP. Risk-Prone pitching activities and injuries in youth baseball: findings from a national sample. *Am J Sports Med* 42(6):1456-1463, 2014.
7. Fleisig GS, Hsu WK, Fortenbaugh D, Cordover A, Press JM. Trunk axial rotation in baseball pitching and batting. *Sports Biomech* 12(3):324-333, 2013.
8. Meisterling SW, Cain EL, Fleisig GS, Hartzell JL, Dugas JR. Return to athletic activity after plate fixation of displaced midshaft clavicle fractures. *Am J Sports Med* 41(11):2632-2636, 2013.
9. Paci JM, Dugas JR, Guy JA, Cain EL Jr, Fleisig GS, Hurst C, Wilk KE, Andrews JR. Cannulated screw fixation of refractory olecranon stress fractures with and without associated injuries allows a return to baseball. *Am J Sports Med* 41(2):306-312, 2013.
10. Urbin MA, Fleisig GS, Abebe A, Andrews JR. Associations between timing in the baseball pitch and shoulder kinetics, elbow kinetics, and ball speed. *Am J Sports Med* 41(2):336-342, 2013.
11. Reeser JC, Fleisig GS, Cools AM, Yount D, Magnes SA. Biomechanical insights into the aetiology of infraspinatus syndrome. *Br J Sports Med* 47(4), 239-244, 2013.

12. Fleisig GS, Andrews JR. Prevention of elbow injuries in youth baseball pitchers. *Sports Health: A Multidisciplinary Approach* 4(5):419-424, 2012.
13. Chu CR, Beynon BD, Dragoo JL, Fleisig GS, Hart JM, Khazzam M, Marberry KM, Nelson BJ. The feasibility of randomized controlled trials for early arthritis therapies (EARTH) involving acute anterior cruciate ligament tear cohorts. *Am J Sports Med* 40(11):2648-2652, 2012.
14. Dugas JR, Bilotta J, Watts CD, Crum JA, Fleisig GS, McMichael CS, Cain EL Jr, Andrews JR. Ulnar collateral ligament reconstruction with gracilis tendon in athletes with intraligamentous bony excision: technique and results. *Am J Sports Med* 40(7):1578-1582, 2012.
15. Escamilla RF, Ionno M, deMahy MS, Fleisig GS, Wilk KE, Yamashiro K, Mikla T, Paulos L, Andrews JR. Comparison of three baseball-specific 6-week training programs on throwing velocity in high school baseball players. *J Strength Cond Res* 26(7):1767-1781, 2012.
16. Fortenbaugh D, Fleisig G, Onar-Thomas A, Asfour S. The effect of pitch type on ground reaction forces in the baseball swing. *Sports Biomech* 10(4): 270–279, 2011.
17. Fleisig GS, Kwon Y-H. Editorial. *Sports Biomech* 10(4): 269, 2011.
18. Fleisig GS, Bolt B, Fortenbaugh D, Wilk KE, Andrews JR. Biomechanical Comparison of Baseball Pitching and Long-Toss: Implications for Training and Rehabilitation. *J Orthop Sports Phys Ther* 41(5): 296-303, 2011.
19. Wilk KE, Macrina LC, Fleisig GS, Porterfield R, Simpson CD 2nd, Harker P, Paparesta N, Andrews JR. Correlation of Glenohumeral Internal Rotation Deficit and Total Rotational Motion to Shoulder Injuries in Professional Baseball Pitchers. *Am J Sports Med* 39(2):329-335, 2011.
20. Fleisig GS, Andrews JR, Cutter GR, Weber A, Loftice J, McMichael C, Hassell N, Lyman S. Risk of Serious Injury for Young Baseball Pitchers: A 10-Year Prospective Study. *Am J Sports Med* 39(2):253-257, 2011.
21. Escamilla RF, Fleisig GS, Yamashiro K, Mikla T, Dunning R, Paulos L, Andrews JR. Effects of a 4-week youth baseball conditioning program on throwing velocity. *J Strength Cond Res* 24(12):3247-3254, 2010.
22. Benjaminse A, Gokeler A, Fleisig GS, Sell TC, Otten B. What is the true evidence for gender-related differences during plant and cut maneuvers? A systematic review. *Knee Surg Sports Traumatol Arthrosc* 19(1):42-54, 2010.

23. DeRenne C, Morgan CF, Escamilla RF, Fleisig GS. A choke-up grip facilitates faster swing and stride times without compromising bat velocity and bat control. *The Sport Journal* 13(2), www.thesportjournal.org, 2010.
24. Escamilla RF, Zheng N, MacLeod TD, Imamura R, Edwards WB, Hreljac A, Fleisig GS, Wilk KE, Moorman CT, Paulos L, Andrews JR. Cruciate Ligament Forces between Short-Step and Long-Step Forward Lunge. *Med Sci Sports Exerc* 42(10):1932-1942, 2010.
25. Robb AJ, Fleisig G, Wilk K, Macrina L, Bolt B, Pajaczkowski J. Passive ranges of motion of the hips and their relationship with pitching biomechanics and ball velocity in professional baseball pitchers. *Am J Sports Med* 38(12):2487-2493, 2010.
26. Shah VM, Andrews JR, Fleisig GS, McMichael CS, Lemak LJ. Return to play after anterior cruciate ligament reconstruction in national football league athletes. *Am J Sports Med* 38(11):2233-2239, 2010.
27. Reeser JC, Fleisig GS, Bolt B, Ruan M. Upper limb biomechanics during the volleyball serve and spike. *Sports Health: A Multidisciplinary Approach* 2(5):368-374, 2010.
28. Escamilla RF, Zheng N, Macleod TD, Inamura R, Edwards WB, Hreljac A, Fleisig GS, Wilk KE, Moorman CT, Paulos L, Andrews JR. Cruciate ligament tensile forces during the forward and side lunge. *Clin Biomech* 25(3):213-221, 2010.
29. Fleisig GS, Weber A, Hassell N, Andrews JR. Prevention of elbow injuries in youth baseball pitchers. *Curr Sports Med Rep* 8(5):250-254, 2009.
30. Escamilla RF, Fleisig GS, DeRenne C, Taylor MK, Moorman CT, Imamura R, Barakatt E, Andrews JR. Effects of Bat Grip on Baseball Hitting Kinematics. *J Appl Biomech* 25:203-209, 2009.
31. Escamilla RF, Fleisig GS, DeRenne C, Taylor MK, Moorman CT, Imamura R, Barakatt E, Andrews JR. A Comparison of Age Level on Baseball Hitting Kinematics. *J Appl Biomech* 25:210-218, 2009.
32. Chu Y, Fleisig GS, Simpson KJ, Andrews JR. Biomechanical Comparison Between Elite Female and Male Baseball Pitchers. *J Appl Biomech* 25:22-31, 2009.
33. Escamilla RF, Zheng N, Macleod TD, Brent Edwards W, Imamura R, Hreljac A, Fleisig GS, Wilk KE, Moorman CT 3rd, Andrews JR. Patellofemoral Joint Force and Stress during the Wall Squat and One-Leg Squat. *Med Sci Sports Exerc.* 41(4):879-888, 2009
34. Fleisig G, Chu Y, Weber A, Andrews J. Variability in baseball pitching biomechanics among various levels of competition. *Sports Biomech* 8(1):10-21, 2009.
35. Fortenbaugh D, Fleisig GS, Andrews JR. Baseball pitching biomechanics in relation to

- injury risk and performance. *Sports Health: A Multidisciplinary Approach* 1:314-320, 2009.
36. Escamilla RF, Zheng N, Imamura R, Macleod TD, Edwards WB, Hreljac A, Fleisig GS, Wilk KE, Moorman CT 3rd, Andrews JR. Cruciate Ligament Force during the Wall Squat and the One-Leg Squat. *Med Sci Sports Exerc* 41(2):408-417, 2009.
  37. Escamilla RF, Zheng N, Macleod TD, Edwards WB, Hreljac A, Fleisig GS, Wilk KE, Moorman CT, Imamura R, Andrews JR. Patellofemoral Joint Force and Stress between a Short and Long-Step Forward Lunge. *J Orthop Sports Phys Therapy* 38(11):681-690, 2008.
  38. Escamilla RF, Zheng N, MacLeod TD, Edwards WB, Hreljac A, Fleisig GS, Wilk KE, Moorman CT, Imamura R. Patellofemoral compressive force and stress during the forward and side lunges with and without a stride. *Clinical Biomechanics* 23:1026-1037, 2008.
  39. Dun S, Loftice J, Fleisig GS, Kingsley D, Andrews JR. A Biomechanical Comparison of Youth Baseball Pitches: Is the Curveball Potentially Harmful? *Am J Sports Med* 36(4):686-692, 2008.
  40. Zheng N, Barrentine SW, Fleisig GS, Andrews JR. Swing kinematics for male and female pro golfers. *Int J Sports Med*. 29(12):965-70, 2008.
  41. Zheng N, Barrentine SW, Fleisig GS, Andrews JR. Kinematic analysis of swing in pro and amateur golfers. *Int J Sports Med* 29(6):487-493, 2008.
  42. Reinold MM, Wilk KE, Macrina LC, Sheheane C, Dun S, Fleisig GS, Crenshaw K, Andrews JR. Changes in Shoulder and Elbow Passive Range of Motion After Pitching in Professional Baseball Players. *Am J Sports Med* 36(3):523-527, 2008.
  43. Dun S, Kingsley D, Fleisig GS, Loftice J, Andrews JR. Biomechanical comparison of the fastball from wind-up and the fastball from stretch in professional baseball pitchers. *Am J Sports Med* 36(1):137-41, 2008.
  44. Zheng, N., Fleisig, GS, Andrews, JR and Gao, B. Effects of active resistance knee brace on muscle activities in patients with patellofemoral joint pain: part I (Chinese). *Chin J Orthop* 28(6):526-528, 2008.
  45. Zheng, N., Fleisig, GS, Andrews, JR and Gao, B. Effects of active resistance knee brace on muscle activities in patients with patellofemoral joint pain: part II (Chinese). *Chin J Orthop* 28(7):610-612, 2008.
  46. Kerut EK, Kerut DG, Fleisig GS, Andrews JR. Prevention of arm injuries in youth baseball pitchers. *Journal of the Louisiana State Medical Society* 160(2):95-98, 2008.
  47. Reinold MM, Macrina LC, Wilk KE, Fleisig GS, Dun S, Barrentine SW, Ellerbusch MT, Andrews JR. Electromyographic analysis of the supraspinatus and deltoid muscles during 3

- common rehabilitation exercises. *J Athl Training* 42(4):464–469, 2007.
48. Hurowitz EJ, Gould JS, Fleisig GS, Fowler R. Outcome analysis of agility total ankle replacement with prior adjunctive procedures: two to six year follow-up. *Foot & Ankle International* 28(3):308-312, 2007.
  49. Dun S, Fleisig GS, Loftice J, Kingsley D, Andrews JR. The relationship between age and baseball pitching kinematics in professional baseball pitchers. *Journal of Biomechanics* 40:265-270, 2007.
  50. Escamilla RF, Barrentine SW, Fleisig GS, Zheng N, Takada Y, Kingsley D, Andrews JR. Pitching biomechanics as a pitcher approaches muscular fatigue during a simulated baseball game. *Am J Sports Med* 35:23-33, 2007.
  51. Fleisig GS, Phillips R, Shatley A, Loftice J, Dun S, Drake S, Farris JW, Andrews JR. Kinematics and kinetics of youth baseball pitching with standard and lightweight balls. *Sports Engineering* 9:155-163, 2006.
  52. Stodden DF, Fleisig GS, Langendorfer SJ, Andrews JR. Kinematic constraints in overarm throwing: part I: step and trunk actions. *Research Quarterly for Exercise and Sport* 77(4):417-427, 2006.
  53. Stodden DF, Fleisig GS, Langendorfer SJ, Andrews JR. Kinematic constraints in overarm throwing: part II: upper extremity actions. *Research Quarterly for Exercise and Sport* 77(4):428-436, 2006.
  54. Gould JS, Kneidal M, Wagner E, Fleisig GS, Fowler R. Technique and Results of Achilles Tendon Detachment and Reconstruction for Insertional Achilles Tendinitis. *Foot & Ankle International* 27(9): 677-684, 2006.
  55. Olsen SJ, Fleisig GS, Dun S, Loftice J, Andrews JR. Risk factors for shoulder and elbow injuries in adolescent baseball pitchers. *The American Journal of Sports Medicine* 34(6):905-912, 2006.
  56. Matsuo T, Fleisig GS, Zheng N, Andrews JR. Influence of shoulder abduction and lateral trunk tilt on peak elbow varus torque for college baseball pitchers during simulated pitching. *Journal of Applied Biomechanics* 22:93-102, 2006.
  57. Fleisig GS, Kingsley DS, Loftice JW, Dinnen K, Ranganathan R, Dun S, Escamilla RF, Andrews JR. Kinetic comparison among the fastball, curveball, change-up, and slider in collegiate baseball pitchers. *The American Journal of Sports Medicine* 34(3):423-430, 2006.
  58. Fleisig GS, Loftice J, Andrews JR. Elbow biomechanics during sports: 21<sup>st</sup> century research. *Techniques in Orthopaedics* 21(4):228-238, 2006.



59. Stodden DF, Fleisig GS, McLean SP, Andrews JR. Relationship of biomechanical factors to baseball pitching velocity: within pitcher variation. *Journal of Applied Biomechanics* 21(1):44-56, 2005.
60. Wagner E, Gould J, Bilen E, Fleisig GS, Wilk KE, Fowler R. Change in plantarflexion strength after complete detachment and reconstruction of the achilles tendon. *Foot & Ankle International* 25(11):800-804, 2004.
61. Reinold MM, Wilk KE, Fleisig GS, Zheng N, Barrentine SW, Chmielewski T, Cody RC, Jameson GG, Andrews JR. Electromyographic analysis of the rotator cuff and deltoid musculature during common shoulder external rotation exercises. *Journal of Orthopaedic & Sports Physical Therapy* 34(7):385-394, 2004.
62. Petty DH, Andrews JR, Fleisig GS, Cain EL. Ulnar collateral ligament reconstruction in high school baseball players: clinical results and injury risk factors. *The American Journal of Sports Medicine* 32(5):1158-1164, 2004.
63. Loftice J, Fleisig GS, Zheng N, Andrews JR. Biomechanics of the elbow in sports. *Clinics in Sports Medicine* 23(4):519-530, 2004.
64. Nicholls R, Fleisig G, Elliott B, Lyman S, Osinski E. Accuracy of qualitative analysis for assessment of skilled baseball pitching technique. *Sports Biomechanics* 2(2):213-26, 2003.
65. Fleisig G, Nicholls R, Elliott B, Escamilla R. Kinematics used by world class tennis players to produce high-velocity serves. *Sports Biomechanics* 2(1):51-64, 2003.
66. Elliott B, Fleisig G, Nicholls R, Escamilla R. Technique effects on upper limb loading in the tennis serve. *Journal of Science and Medicine in Sport* 6(1):76-87, 2003.
67. Gould JS, Ali S, Fowler R, Fleisig GS. Anchor enhanced capsulorrhaphy in bunionectomies using an L-shaped capsulotomy. *Foot & Ankle International* 24(1):61-68, 2003.
68. Lyman S, Fleisig GS, Andrews JR, Osinski ED. Effect of pitch type, pitch count, and pitching mechanics on risk of elbow and shoulder pain in youth baseball pitchers. *The American Journal of Sports Medicine* 30(4):463-468, 2002.
69. Escamilla R, Fleisig G, Barrentine S, Andrews J, Moorman C. Kinematic and kinetic comparisons between American and Korean professional baseball pitchers. *Sports Biomechanics* 1(2):213-228, 2002.
70. Fleisig GS, Zheng N, Stodden DF, Andrews JR. Relationship between bat mass properties and bat mass velocity. *Sports Engineering* 5(1):1-8, 2002.
71. Fleisig GS, Milliron K, Kempf C, Wolforth J. Special delivery: exploring the mechanics of softball pitching. *Sports Medicine Update* 16(4):16-18, 2002.

72. Andrews JR, Heggland EJH, Fleisig GS, Zheng N. Relationship of ulnar collateral ligament strain to amount of medial olecranon osteotomy. *The American Journal of Sports Medicine* 29(6):716-721, 2001.
73. Lyman S, Fleisig GS, Waterbor JW, Funkhouser EM, Pulley L, Andrews JR, Osinski ED, Roseman JM. Longitudinal study of elbow and shoulder pain in youth baseball pitchers. *Medicine & Science in Sports & Exercise* 33(11):1803-1810, 2001.
74. Escamilla RF, Fleisig GS, Zheng N, Lander JE, Barrentine SW, Andrews JR, Bergemann BW, Moorman CT. Effects of technique variations on knee biomechanics during the squat and leg press. *Medicine & Science in Sports & Exercise* 33(9):1552-1566, 2001.
75. Escamilla RF, Fleisig GS, Zheng N, Barrentine SW, Andrews, JR. Kinematic comparisons of 1996 olympic baseball pitchers. *Journal of Sports Sciences*, 19:665-676, 2001.
76. Jones K, Bishop P, Hunter G, Fleisig G. The effects of varying resistance-training loads on intermediate- and high-velocity-specific adaptations. *Journal of Strength and Conditioning Research* 15(3):349-356, 2001.
77. Escamilla RF, Fleisig GS, Lowry TM, Barrentine, SW, Andrews JR. A three-dimensional analysis of the squat during varying stance widths. *Medicine & Science in Sports & Exercise* 33(6):984-998, 2001.
78. Stodden DF, Fleisig GS, McLean SP, Lyman SL, Andrews JR. Relationship of pelvis and upper torso kinematics to pitched baseball velocity. *Journal of Applied Biomechanics* 17(2):164-172, 2001.
79. Matsuo T, Escamilla RF, Fleisig GS, Barrentine SW, Andrews JR. Comparison of kinematic and temporal parameters between different pitch velocity groups. *Journal of Applied Biomechanics* 17(1):1-13, 2001.
80. Fleisig G, Zheng N, Stodden D, Andrews J. Relationship between bat mass properties and bat velocity. In Blackwell JR (ed), *Proceedings of XIX International Symposium on Biomechanics in Sports: Oral Sessions* (ISBN 0-9715218-0-8), San Francisco, pp. 100-103, 2001.
81. Escamilla RF, Francisco AC, Fleisig GS, Barrentine SW, Welch CM, Kayes AV, Speer KP, Andrews JR. A three-dimensional biomechanical analysis of sumo and conventional style deadlifts. *Med Sci Sports Exerc* 32(7):1265-1275, 2001.
82. Sloboda W, Fleisig GS. High-tech biomechanics. *Sports Medicine Update* 15(2):16-19, 2001.

83. Fleisig G. The biomechanics of throwing. In Blackwell JR (ed), Proceedings of XIX International Symposium on Biomechanics in Sports: Oral Sessions (ISBN 0-9715218-0-8), San Francisco, pp. 91-94, 2001.
84. Reinold MM, Fleisig GS, Andrews JR, Wilk KE, Jameson GG. Biomechanics and rehabilitation of elbow injuries during throwing. *Athletic Therapy Today* 5(3):12-18, 2000.
85. Escamilla RF, Speer KP, Fleisig GS, Barrentine SW, Andrews JR. Effects of throwing overweight and underweight baseballs on throwing velocity and accuracy. *Sports Medicine* 29(4):259-272, 2000.
86. Wilk KE, Meister K, Fleisig G, Andrews JR. Biomechanics of the overhead throwing motion. *Sports Medicine and Arthroscopy Review* 8(2):124-134, 2000.
87. Andrews JR, Fleisig GS, Whiteside JA. Little leaguer's elbow: evaluation, treatment and prevention. *Sports Medicine Update* 14(3):11-15, 2000.
88. Fleisig GS, Barrentine SW, Zheng N, Escamilla RF, Andrews JR. Kinematic and kinetic comparison of baseball pitching among various levels of development. *Journal of Biomechanics* 32(12):1371-1375, 1999.
89. Zheng N, Fleisig GS, Andrews JR. Biomechanics and injuries of the shoulder during throwing. *Athletic Therapy Today* 4(4):6-10, 1999.
90. Jones K, Hunter G, Fleisig G, Escamilla R, Lemak L. The effects of compensatory acceleration on upper body strength and power. *Journal of Strength and Conditioning Research* 13(2):99-105, 1999.
91. Whiteside JA, Andrews JR, Fleisig GS. Elbow injuries in young baseball players. *The Physician and Sports Medicine* 27(6):87-102, 1999.
92. Reinold MM, Fleisig GS, Wilk KE. Open kinetic chain versus closed kinetic chain rehabilitation of the knee. *BioMechanics* (supplement):27-32, 1999.
93. Fleisig GS. Dangerous bats? A report on aluminum alloy bats used in amateur baseball. *Sports Medicine Update* 14(2):8-9, 1999.
94. Barrentine SW, Fleisig GS, Andrews JR. Armed forces. *BioMechanics* 6(4):12-22, 1999.
95. Zheng N, Fleisig GS, Escamilla RF, Barrentine SW. An analytical model of the knee for estimation of internal forces during exercises. *Journal of Biomechanics* 31(10):963-967, 1998.

96. Barrentine SW, Fleisig GS, Whiteside JW, Escamilla RF, Andrews JR. Biomechanics of windmill softball pitching with implications about injury mechanisms at the shoulder and elbow. *Journal of Orthopaedic & Sports Physical Therapy* 28(6):405-414, 1998.
97. Escamilla RF, Fleisig GS, Zheng N, Barrentine SW, Wilk KE, Andrews JR. Biomechanics of the knee during closed kinetic chain and open kinetic chain exercises. *Medicine and Science in Sports and Exercise* 30(4):556-569, 1998.
98. Barrentine SW, Matsuo T, Escamilla RF, Fleisig GS, Andrews JR. Kinematic analysis of the wrist and forearm during baseball pitching. *Journal of Applied Biomechanics* 14(1):24-39, 1998.
99. Escamilla RF, Fleisig GS, Barrentine SW, Zheng N, Andrews JR. Kinematic comparisons of throwing different types of baseball pitches. *Journal of Applied Biomechanics* 14(1):1-23, 1998.
100. Lyman SL, Fleisig GS, Andrews JR, Osinski ED. Youth pitching injuries: first-ever examination sheds light on arm injuries in youth baseball. *Sports Medicine Update* 13(2):4-9, 1998.
101. Andrews JR, Fleisig GS. Preventing throwing injuries: sports medicine community needs to take an active role. *Sports Medicine Update* 13(2):4-9, 1998.
102. Andrews JR, Fleisig GS. Preventing throwing injuries. *Journal of Orthopaedic & Sports Physical Therapy* 27(3):187-188, 1998.
103. Jameson GG, Fleisig GS. Ulnar collateral ligament demands: investigating the biomechanics of UCL injuries. *Sports Medicine Update* 12(3):4-7, 1997.
104. Wilk KE, Zheng N, Fleisig GS, Andrews JR, Clancy WG. Kinetic chain exercise: implications for the anterior cruciate ligament patient. *J Sport Rehab* 6:125-143, 1997.
105. Wilk KE, Escamilla RF, Fleisig GS, Barrentine SW, Andrews JR, Boyd ML. The comparison of tibiofemoral joint forces and electromyography during open and closed kinetic chain exercises. *The American Journal of Sports Medicine* 24(4):518-527, 1996.
106. Fleisig GS, Escamilla RF, Andrews JR, Matsuo T, Satterwhite Y, Barrentine SW. Kinematic and kinetic comparison between baseball pitching and football passing. *Journal of Applied Biomechanics* 12(2):207-224, 1996.
107. Fleisig GS, Barrentine SW, Escamilla RF, Andrews JR. Biomechanics of overhand throwing with implications for injuries. *Sports Medicine* 21(6):421-437, 1996.
108. Andrews JR, Fleisig GS. How many pitches should I allow my child to throw? *USA Baseball News* April, 1996

109. Fleisig GS, Escamilla RF. Biomechanics of the elbow in the throwing athlete. *Operative Techniques in Sports Medicine* 4(2):62-68, 1996.
110. Wilk KE, Escamilla RF, Fleisig GS, Arrigo CA, Barrentine SW. Open and closed kinetic chain exercise for the lower extremity: theory and clinical application. *Athletic Training: Sports Health Care Perspectives* 1(4):336-346, 1995.
111. Fleisig GS, Andrews JR, Dillman CJ, Escamilla RF. Kinetics of baseball pitching with implications about injury mechanisms. *The American Journal of Sports Medicine* 23(2):233-239, 1995.
112. Fleisig GS, Barrentine SW. Biomechanical aspects of the elbow in sports. *Sports Medicine and Arthroscopy Review* 3(3):149-159, 1995.
113. Wilk KE, Fleisig GS. Motion analysis and sports medicine. *Rehab Management Magazine* 7(4):69-73, 1994.
114. Werner SL, Fleisig GS, Dillman CJ, Andrews JR. Biomechanics of the elbow during baseball pitching. *Journal of Orthopaedic & Sports Physical Therapy* 17(6):274-278, 1993.
115. Dillman CJ, Fleisig GS, Andrews JR. Biomechanics of pitching with emphasis upon shoulder kinematics. *Journal of Orthopaedic & Sports Physical Therapy* 18(2):402-408, 1993.
116. Wick HJ, Dillman CJ, Wisleder D, Werner SL, Fleisig GS, Lemak LJ, Andrews JR. A kinematic comparison between baseball pitching and football passing. *Sports Medicine Update* 6(2):13-16, HEALTHSOUTH Sports Medicine Network, 1991.
117. Fleisig GS, Dillman CJ, Wick HS, Andrews JR. Biomechanics of throwing. *Scienze Motorie E Sportive* 3(1):72-76, 1991 (in Italian).
118. Fleisig GS, Dillman CJ, Andrews JR. A biomechanical description of the shoulder joint during pitching. *Sports Medicine Update* 6(3):10-15, HEALTHSOUTH Sports Medicine Network, 1991.
119. Fleisig GS, Dillman CJ, Andrews JR. Proper mechanics for baseball pitching. *Clinical Sports Medicine* 1:151-170, 1989.
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## **Books**

1. Fleisig GS, Kwon YH (eds), The Biomechanics of Batting, Swinging, and Hitting, Routledge, New York, 2014.

### **Book Chapters**

1. Fleisig GS, Escamilla RF, Andrews JR. Applied biomechanics of baseball pitching. In Magee DJ, Manske RC, Zachazewski JE, Quillen WS (eds), Athletic and Sport Issues in Musculoskeletal Rehabilitation, Elsevier, St. Louis, pp 350-384, 2010.
2. Fleisig GS, McMichael CS, Andrews JR. Baseball. In Caine DJ, Harmer PA, Schiff MA (eds), Epidemiology of Injury in Olympic Sports, Wiley-Blackwell, West Sussex (UK), pp 59-77, 2009.
3. Fleisig GS, Dun S, Kingsley D. Biomechanics of the shoulder during sports. In Wilk KE, Reinold MM, Andrews JR (eds), The Athlete's Shoulder, second edition, Churchill Livingstone Elsevier, Philadelphia, pp 365-384, 2009.
4. Lyman S, Fleisig GS. Baseball injuries. In Maffulli N, Caine DJ (eds): Epidemiology of Pediatric Sports Injuries: Team Sports, Karger, Basel (Switzerland), vol 49, pp 9-30, 2005.
5. Zheng N, Fleisig GS, Barrentine S, Andrews JR. Biomechanics of Pitching. In Hung GK, Pallis JM (eds), Biomedical Engineering Principles in Sports, Kluwer Academic / Plenum Publishers, New York, pp 209-256, 2004.
6. Barrentine SW, Fleisig GS, Dillman CJ, Andrews JR. Biomechanics of the elbow and throwing mechanisms. In Baker CL, Plancher KD (eds), Operative Treatment of Elbow Injuries, Springer-Verlag, New York, pp 29-39, 2001.
7. Andrews JR, Fairbanks JH, Wilk KE, Fleisig GS, Schwartz ML. Labral tears in throwing sports. In Garrett WE, Speer KP, Kirkendall DT (eds), Principles and Practice of Orthopaedic Sports Medicine, Lippincott Williams & Wilkins, Philadelphia, pp 457-477, 2000.
8. Fleisig GS, Jameson GG, Dillman CJ, Andrews JR. Biomechanics of overhead sports. In Garrett WE, Kirkendall DT (eds), Exercise and Sport Science, Lippincott Williams & Wilkins, Philadelphia, pp 563-584, 2000.
9. Fleisig GS, Escamilla RF, Barrentine SW. Biomechanics of pitching. In Andrews JR, Zarins B, Wilk KE (eds), Injuries in Baseball, Lippincott-Raven Publishers, Philadelphia, pp 3-22, 1998.

10. Fleisig GS, Escamilla RF, Andrews JR. Biomechanics of throwing. In Zachazewski JE, Magee DJ, Quillen WS (eds), Athletic Injuries and Rehabilitation, W.B. Saunders, Philadelphia, pp 332-353, 1996.
11. Dillman CJ, Fleisig GS, Andrews JR. Mechanics of throwing. In Hawkins R, Misamore GW (eds), Shoulder Injuries in the Athlete, Churchill Livingstone, New York, pp 23-30, 1996.
12. Fleisig GS. The Biomechanics of Golf. In Stover CN *et al.* (eds), Feeling up to Par: Medicine from Tee to Green, F.A. Davis Company, Philadelphia, pp 17-26, 1994.
13. Fleisig GS, Dillman CJ, Andrews JR. Biomechanics of the shoulder during throwing. In Andrews, JR, Wilk KE (eds): The Athlete's Shoulder, Churchill Livingstone, New York, pp 355-368, 1994.
14. Lemak LJ, Fleisig GS, Welch CM, Marting B, Zvijac JE. Usefulness of partial swings in the rehabilitation of a golfer. In Cochran, AJ; Farrally, MR (eds), Science and Golf II, Proceedings of the World Scientific Congress of Golf, St. Andrews (Scotland). E & FN Spon. New York, 1994, pp. 14-19.
15. Barrentine SW, Fleisig GS, Johnson H, Woolley TW. Ground reaction forces and torques of professional and amateur golfers. In Cochran, AJ; Farrally, MR (eds), Science and Golf II, Proceedings of the World Scientific Congress of Golf, St. Andrews (Scotland). E & FN Spon. New York, 1994, pp. 33-39.
16. Dillman CJ, Fleisig GS, Werner SL, Andrews JR. Biomechanics of the shoulder in sports: throwing activities. In Matsen FA, Fu FH, Hawkins RJ (eds): The Shoulder: A Balance of Mobility and Stability, American Academy of Orthopaedic Surgeons, Rosemont IL, pp 621-633, 1993.

### **Educational Materials**

1. Andrews JR, Chmielewski T, Escamilla RF, Fleisig GS, Wilk KE. Conditioning program for professional baseball pitchers. American Sports Medicine Institute, Birmingham, AL, 1997.
2. American Sports Medicine Institute (Fleisig GS, booklet ed). The fine arts of throwing and pitching: videotape and booklet. Alerion Films Inc, Birmingham, AL, 1994.
3. Dillman CJ, Fleisig GS, Werner SL, Andrews JR. Mechanics of the shoulder in sports: throwing activities. *Postgraduate Studies in Sports Physical Therapy*, Forum Medicum, Inc., 1991.

## **PRESENTATIONS**

### **Conference Presentations**

1. Recent Findings in Throwing Biomechanics. Major League Baseball Team Physicians Association Conference, San Diego, CA, December 6, 2014.
2. Biomechanics of the Thrower's Elbow. ASMI Weekly Conference, Birmingham, AL, September 29, 2014.
3. Biomechanics of the Thrower's Shoulder. ASMI Weekly Conference, Birmingham, AL, August 25, 2014.
4. Prevention of Throwing Injuries in Youth Baseball. ASMI Weekly Conference, Birmingham, AL, April 7, 2014.
5. Medical Analysis and Injury Prevention. SABR Analytics Conference, Phoenix, AZ, March 13, 2014.
6. ASMI & USA Baseball Guidelines for Youth & High School Baseball. ASMI Injuries in Baseball Course, Atlanta, GA, January 26, 2014.
7. Biomechanics of the Shoulder during Throwing. ASMI Injuries in Baseball Course, Atlanta, GA, January 24, 2014.
8. Biomechanics of the Thrower's Elbow. ASMI Weekly Conference, Birmingham, AL, September 30, 2013.
9. How to Throw a Ball 100 mph without Ripping Your Arm Off. Jim Hay Memorial Award Lecture, 37<sup>th</sup> Annual Meeting of the American Society of Biomechanics, Omaha, NE, September 6, 2013.
10. Biomechanics of the Thrower's Shoulder. ASMI Weekly Conference, Birmingham, AL, August 26, 2013.
11. Pitch Counts and Injuries in Adolescent Baseball. Sabermetrics, Scouting, and the Science of Baseball, Boston, MA, August 18, 2013.
12. Baseball Pitching and Biomechanics. Sabermetrics, Scouting, and the Science of Baseball, Boston, MA, August 17, 2013.
13. Prevention of Throwing Injuries in Youth Baseball. ASMI Weekly Conference, Birmingham, AL, April 8, 2013.



14. Maximum Safety and Performance for Baseball Pitchers. STOP Sports Injuries Conference, Nanuet, NY, March 6, 2013.
15. Physical and Biomechanical Changes in Youth Pitchers: A Longitudinal Study. ASMI Injuries in Baseball Course, Birmingham, AL, January 27, 2013.
16. Science Update: Non-Wood Bat Testing and Regulations. ASMI Injuries in Baseball Course, Birmingham, AL, January 27, 2013.
17. The Biomechanics of Long-Toss. ASMI Injuries in Baseball Course, Birmingham, AL, January 26, 2013.
18. Biomechanics of the Thrower's Elbow. ASMI Weekly Conference, Birmingham, AL, October 1, 2012.
19. Biomechanics of the Thrower's Shoulder. ASMI Weekly Conference, Birmingham, AL, August 27, 2012.
20. Prevention of Throwing Injuries in Youth Baseball. ASMI Weekly Conference, Birmingham, AL, April 23, 2012.
21. Shoulder ROM, Strength, and Playing Time in Warm and Cold Weather for High School Players. ASMI Injuries in Baseball Course, Birmingham, AL, January 29, 2012.
22. Curveballs, Pitch Counts, and Youth Pitching Injuries. ASMI Injuries in Baseball Course, Birmingham, AL, January 29, 2012.
23. Testing a Pitcher's Biomechanics. ASMI Injuries in Baseball Course, Birmingham, AL, January 28, 2012.
24. Hip Range of Motion and Pitching. ASMI Injuries in Baseball Course, Birmingham, AL, January 28, 2012.
25. Biomechanics of the Thrower's Shoulder. ASMI Weekly Conference, Birmingham, AL, August 29, 2011.
26. Flat Ground Throwing Biomechanics with Implications for Rehab and Training. American Sports Medicine Fellowship Society Biennial Meeting, Callaway Gardens, GA, June 2, 2011.
27. Prevention of Throwing Injuries in Youth Baseball. ASMI Weekly Conference, Birmingham, AL, May 9, 2011.
28. Comparison of Overhead Throws/Hits: Baseball, Football, Volleyball, Tennis. Rehabilitation Institute of Chicago Symposium, Chicago, February 26, 2011

29. Injury Risk Factors for Youth Pitchers. Rehabilitation Institute of Chicago Symposium, Chicago, February 25, 2011
30. Comparison of Flat Ground and Pitching Mechanics. ASMI Injuries in Baseball Course, Tampa, FL, January 30, 2011.
31. Youth Baseball - Pitching Mechanics and Injury Risk. ASMI Injuries in Baseball Course, Tampa, FL, January 30, 2011.
32. Pitching Changes after Biomechanical Evaluation ASMI Injuries in Baseball Course, Tampa, FL, January 29, 2011.
33. Biomechanics of the Shoulder during Pitching. ASMI Injuries in Baseball Course, Tampa, FL, January 28, 2011.
34. Biomechanics of the Thrower's Shoulder. ASMI Weekly Conference, Birmingham, AL, August 19, 2010.
35. Biomechanics of Baseball Pitching: Implications for Injury and Performance. International Society of Biomechanics in Sports Conference. Marquette, MI, July 22, 2010.
36. Translational Research on Youth Baseball Injuries: Application to Your Practice and Recommendations to the Public. American Orthopaedic Society for Sports Medicine. Providence, RI, July 18, 2010.
37. Pitching Biomechanics. Baseball Science Seminar. Osaka, Japan, June 5, 2010.
38. Risk Factors for U.S Youth Baseball Pitchers. Osaka, Japan, June 5, 2010.
39. Overhand Throwing Biomechanics: Implications for Injury and Performance. Conference of Science, Medicine and Coaching in Cricket. Gold Coast, Australia, June 1, 2010.
40. Prevention of Throwing Injuries in Youth Baseball. ASMI Weekly Conference, Birmingham, AL, April 26, 2010.
41. The Science behind Youth Pitching Rules and Injury Prevention. Little League International Congress, Lexington, KY, March 14, 2010.
42. 10-Year Youth Pitching Study: 1999-2008. ASMI Injuries in Baseball Course, Birmingham, AL, January 24, 2010.
43. Elite Pitching Biomechanics. ASMI Injuries in Baseball Course, Birmingham, AL, January 23, 2010.

44. Arm Injuries in Youth Baseball. American Baseball Coaches Association Youth Division Meeting, Dallas, TX, January 7, 2010.
45. Prevention of Pitching Injuries through Strength & Conditioning. Professional Baseball Strength and Conditioning Coaches Society meeting, Indianapolis, IN, December 6, 2009.
46. Prevention of Throwing Injuries in Youth Baseball. ASMI Weekly Conference, Birmingham, AL, April 13, 2009.
47. Biomechanical Analysis of the Throwing Athlete. 2008 Wisconsin Upper Extremity Symposium, La Crosse, WI, November 14, 2008.
48. Throwing Mechanics and Injury Prevention Ideas. 2008 Wisconsin Upper Extremity Symposium, La Crosse, WI, November 14, 2008.
49. Biomechanics of the Thrower's Shoulder. ASMI Weekly Conference, Birmingham, AL, August 15, 2008.
50. Pitching Injuries in Youth Baseball. ASMI Weekly Conference, Birmingham, AL, July 7, 2008.
51. Biomechanics of Baseball Pitching. 2008 meeting of the Southeast American College of Sports Medicine, Birmingham, AL, February 15, 2008.
52. Biomechanical Comparison of Pitching from the Windup and Stretch. ASMI Injuries in Baseball Course, Columbia, SC, January 27, 2008.
53. Can Women Pitch Like Men? A Biomechanical Study. ASMI Injuries in Baseball Course, Columbia, SC, January 27, 2008.
54. Are Curveballs Okay for Youth Pitchers? ASMI Injuries in Baseball Course, Columbia, SC, January 26, 2008.
55. Should Baseball Pitchers Ice after Pitching? Opinions from Major League Baseball. Alabama State Association for Health, Physical Education, Recreation, and Dance Fall Conference, Birmingham, AL, November 13, 2007.
56. Biomechanical Evaluation of Baseball Pitchers for Injury & Performance. ASMI Weekly Conference, Birmingham, AL, September 21, 2007.
57. Pathomechanics of Thrower's Injuries of the Elbow. ASMI Weekly Conference, Birmingham, AL, September 6, 2007.
58. Biomechanics of the Thrower's Shoulder. ASMI Weekly Conference, Birmingham, AL, August 16, 2007.

59. Throwing Mechanics across the Life Span. National Athletic Trainers Association Annual Meeting, Anaheim CA, June 27, 2007.
60. Understanding & Preventing Arm Injuries in Youth Baseball. Tenth meeting of the American Sports Medicine Fellowship Society, Birmingham AL, June 9, 2007.
61. Throwing Biomechanics: 20 Years in 20 Minutes. Tenth meeting of the American Sports Medicine Fellowship Society, Birmingham AL, June 8, 2007.
62. Neuromuscular and Biomechanical Risk Factors for Shoulder Injuries Related to Throwing. Symposium for Injury Prevention in Exercise and Sports, Ann Arbor MI, April 26, 2007.
63. Pitch Counts, Pitching Mechanics, and Prevention of Injuries. Little League International Congress, Houston TX, April 15, 2007.
64. Prevention of Throwing Injuries in Youth Baseball. ASMI Weekly Conference, Birmingham AL, April 13, 2007.
65. Pitching Injuries in Adolescent Baseball Players. Southeast Athletic Trainers Association 32<sup>nd</sup> Annual Clinical Symposium, Franklin TN, March 24, 2007.
66. ASMI Biomechanics: 20 Years in 20 Minutes. ASMI Injuries in Baseball Course, Birmingham AL, January 28, 2007.
67. Current Concepts in Elbow Biomechanics. ASMI Injuries in Baseball Course, Birmingham AL, January 27, 2007.
68. Current Concepts in Shoulder Biomechanics. ASMI Injuries in Baseball Course, Birmingham AL, January 26, 2007.
69. Injury Risk Factors for Adolescent Baseball Pitchers. Drayer National Conference for Rehabilitation & Sports Medicine, Hilton Head Island SC, October 14, 2006.
70. Analysis and Correction of Throwing Mechanics. Drayer National Conference for Rehabilitation & Sports Medicine, Hilton Head Island SC, October 14, 2006.
71. Pathomechanics and Clinical Evaluation of the Thrower's Elbow. ASMI Weekly Conference, Birmingham AL, August 28, 2006.
72. Pathomechanics and Clinical Evaluation of the Thrower's Shoulder. ASMI Weekly Conference, Birmingham AL, August 17, 2006.
73. How ASMI is Working with Major League Baseball Teams. ASMI Injuries in Baseball Course, Los Angeles CA, January 21, 2006.

74. Biomechanics of the Elbow in Pitching. ASMI Injuries in Baseball Course, Los Angeles CA, January 21, 2006.
75. The Pitcher's Shoulder: Biomechanics and Injury Mechanisms. ASMI Injuries in Baseball Course, Los Angeles CA, January 20, 2006.
76. Pathomechanics and Clinical Evaluation of the Thrower's Elbow. ASMI Weekly Conference, Birmingham AL, November 11, 2005.
77. Pathomechanics and Clinical Evaluation of the Thrower's Shoulder. ASMI Weekly Conference, Birmingham AL, August 26, 2005.
78. How ASMI is Working with Major League Baseball Teams. Ninth meeting of the American Sports Medicine Fellowship Society, Birmingham AL, June 3, 2005.
79. Preventing Youth Pitching Injuries. ASMI Weekly Conference, Birmingham, AL, April 15, 2005.
80. Youth Baseball Injury Prevention. Henry Ford Health System Sports Medicine Symposium, Detroit MI, February 5, 2005.
81. Pitching Biomechanics and Injury. Henry Ford Health System Sports Medicine Symposium, Detroit MI, February 5, 2005.
82. USA Baseball Guidelines for Adolescent Pitchers. ASMI Injuries in Baseball Course, Phoenix AZ, January 15, 2005.
83. Biomechanics of the Elbow. ASMI Injuries in Baseball Course, Phoenix AZ, January 15, 2005.
84. Shoulder Biomechanics and Injury Mechanisms. ASMI Injuries in Baseball Course, Phoenix AZ, January 14, 2005.
85. Pathomechanics and Clinical Evaluation of the Thrower's Elbow. ASMI Weekly Conference, Birmingham, AL, August 30, 2004.
86. Pathomechanics and Clinical Evaluation of the Thrower's Shoulder. ASMI Weekly Conference, Birmingham, AL, August 27, 2004.
87. Anatomy and Biomechanics. Shoulder Surgery and Rehabilitation Course. Concordia Hospital for Special Surgery, Rome, Italy, May 22, 2004.

88. Biomechanics of Throwing: with clinical implications. (Keynote Presentation.) Ninth annual Gait and Clinical Movement Analysis Society meeting, Lexington, KY, April 24, 2004.
89. Upper Extremity Symposium. Ninth annual Gait and Clinical Movement Analysis Society meeting, Lexington, KY, April 24, 2004.
90. Biomechanics of Throwing: with clinical implications. ASMI Weekly Conference, Birmingham, AL, April 16, 2004.
91. Biomechanics of the Fastball, Change-up, Curveball, and Slider. ASMI Injuries in Baseball Course, Orlando, FL, January 30, 2004.
92. Should kids pitch lighter baseballs? ASMI Injuries in Baseball Course, Orlando, FL, January 30, 2004.
93. Pitching Injuries in Youth Baseball. American Baseball Coaches Association 59<sup>th</sup> annual convention, San Antonio, TX, January 2, 2004.
94. Pathomechanics and Clinical Evaluation of the Thrower's Elbow. ASMI Weekly Conference, Birmingham, AL, October 3, 2003.
95. Serve Kinematics and Kinetic used by World Class Tennis Players. Ninth Annual Meeting of the Society for Tennis Medicine and Science, Hilton Head Island, SC, September 13, 2003.
96. Making Your Research Meaningful and Important. American Medical Society for Sports Medicine's Research Workshop for Sports Medicine Fellows, Birmingham, AL, July 19, 2003.
97. Biomechanics of the High Velocity Tennis Serve. Eighth meeting of the American Sports Medicine Fellowship Society, Birmingham, AL, June 7, 2003.
98. Prevention of Throwing Injuries in Youth Baseball. ASMI Weekly Conference, Birmingham, AL, May 5, 2003.
99. Comparison of Adolescent and Adult Pitching Biomechanics. ASMI Injuries in Baseball Course, Atlanta, GA, January 25, 2003.
100. Safety Issues of Aluminum Baseball Bats. ASMI Injuries in Baseball Course, Atlanta, GA, January 24, 2003.
101. Preventing Injuries in Major League Baseball. ASMI Injuries in Baseball Course, Atlanta, GA, January 24, 2003.

102. Biomechanics of the Shoulder in Pitching. ASMI Injuries in Baseball Course, Atlanta, GA, January 23, 2003.
103. Pathomechanics and Clinical Evaluation of the Thrower's Elbow. ASMI Weekly Conference, Birmingham, AL, September 30, 2002.
104. Kinematics and Kinetics of the High-Velocity Tennis Serve. Sixth International Olympic Committee World Congress, St. Louis, MO, May 29, 2002.
105. Prevention of Pitching Injuries in Youth Baseball. ASMI Weekly Conference, Birmingham, AL, May 3, 2002.
106. Proper Mechanics and Guidelines for High School Pitchers. ASMI Injuries in Baseball Course, Birmingham, AL, January 26, 2002.
107. 2001 USA Baseball Safety Recommendations. ASMI Injuries in Baseball Course, Birmingham, AL, January 25, 2002.
108. Biomechanics of the Shoulder. ASMI Injuries in Baseball Course, Birmingham, AL, January 24, 2002.
109. How to Minimize Pitching Injuries Through Proper Mechanics. American Baseball Coaches Association Annual Convention, Orlando, FL, January 5, 2002.
110. Biomechanics of Throwing and Related Injuries. Alabama State Association for Health, Physical Education, Recreation and Dance Fall Conference, Birmingham, AL, November 12, 2001.
111. Biomechanics of the Thrower's Shoulder. ASMI Weekly Conference, Birmingham, AL, August 13, 2001.
112. The Biomechanics of Throwing. International Society of Biomechanics in Sports Annual Meeting, San Francisco, CA, June 22, 2001.
113. Relationship between Bat Mass Properties and Bat Velocity. International Society of Biomechanics in Sports Annual Meeting, San Francisco, CA, June 22, 2001.
114. Understanding & Preventing Arm Injuries in Youth Baseball. American Sports Medicine Fellowship Society Bi-Annual Meeting, Birmingham, AL, June 9, 2001.
115. Knee Forces and Muscle Activity During Open and Closed Kinetic Chain Exercises. American College of Sports Medicine Annual Meeting, Baltimore, MD, June 1, 2001.
116. Relationship between Bat Inertial Properties and Bat Speed. American College of Sports Medicine Annual Meeting, Baltimore, MD, May 31, 2001.

117. Biomechanics and Epidemiology of Throwing Injuries. Southeastern Athletic Trainers Association, Atlanta, GA, March 25, 2001.
118. Relationship between Pitching Mechanics and Joint Forces. ASMI Injuries in Baseball Course, Phoenix, AZ, January 25, 2001.
119. Biomechanics of Throwing. ASMI Weekly Conference, Birmingham, AL, October 30, 2000.
120. Biomechanics of the Shoulder. Clinical Orthopaedic Society Annual Meeting, Birmingham, AL, September 15, 2000.
121. Biomechanics of the Elbow. Clinical Orthopaedic Society Annual Meeting, Birmingham, AL, September 15, 2000.
122. Biomechanics of the Thrower's Shoulder. ASMI Weekly Conference, Birmingham, AL, August 28, 2000.
123. Factors Related to Pitching Injuries in Youth Baseball. Duke University K-Lab Sports Performance Enhancement Workshop, Durham, NC, July 8, 2000.
124. Biomechanics of Throwing. Duke University K-Lab Sports Performance Enhancement Workshop, Durham, NC, July 8, 2000.
125. Evaluation and Treatment of Shoulder Injuries in the Overhead Athlete. American Orthopaedic Society for Sports Medicine, Sun Valley, ID, June 18, 2000.
- 126.** Longitudinal Study of Youth Baseball Pitching. American College of Sports Medicine Annual Meeting, Indianapolis, IN, June 3, 2000.
- 127.** Clinical Biomechanics of Throwing. American College of Sports Medicine Annual Meeting, Indianapolis, IN, June 2, 2000.
- 128.** Validation of Rehabilitation Exercises with EMG. American College of Sports Medicine Annual Meeting, Indianapolis, IN, June 2, 2000.
129. Biomechanics of the Golf Swing. Engineering Council of Birmingham seminar, Birmingham, AL, April 20, 2000.
130. Biomechanics of the Golf Swing. Southeast Athletic Trainers Association Annual Meeting, Atlanta, GA, March 31, 2000.
131. Electromyographic Management of Shoulder Rehabilitation Exercises. ASMI Weekly Conference, Birmingham, AL, March 13, 2000.



132. How to Video-Analyze Pitching Mechanics. ASMI Injuries in Baseball Course, St. Petersburg, FL, January 30, 2000.
133. Biomechanical Differences Between Adult and Youth Pitchers. ASMI Injuries in Baseball Course, St. Petersburg, FL, January 29, 2000.
134. Pitching Biomechanics and Injuries. Alabama Baseball Coaches Association, Birmingham, AL, January 15, 2000.
135. Biomechanics of Throwing. ASMI Weekly Conference, Birmingham, AL, December 17, 1999.
136. Kinematic Differences Between High-Skilled and Less-Skilled Baseball Pitchers. American Society of Biomechanics, Pittsburgh, PA, October 22, 1999.
137. Biomechanics, Physical Exam and Arthroscopic Treatment of the Thrower's Shoulder. ASMI Weekly Conference, Birmingham, AL, August 30, 1999.
138. Enhancing Throwing Performance and Safety Through Biomechanics. International Society of Biomechanics, Calgary, Alberta, Canada, August 10, 1999.
139. Evaluation and Treatment of Shoulder Injuries in the Overhead Athlete. American Orthopaedic Society for Sports Medicine, Traverse City, MI, June 19, 1999.
140. The Elbow in the Athlete. International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine, Washington, D.C., June 1, 1999.
141. The Relationship Between Bat Weight and Bat Speed. ASMI Injuries in Baseball Course, Birmingham, AL, January 24, 1999.
142. An Ounce of Prevention is Worth a Pound of Fastballs: Biomechanics of the Elbow and Shoulder in Throwing. National Strength and Conditioning Association's Sport Specific Training Conference, Nashville, TN, January 10, 1999.
143. Biomechanics, Physical Exam and Arthroscopic Treatment of the Thrower's Shoulder. ASMI Weekly Conference, Birmingham, AL, October 30, 1998.
144. Muscle Activity During Shoulder Rehabilitation Exercises. (Poster) North American Congress on Biomechanics, Waterloo, ON, Canada, August 16, 1998.
145. Correlations Between Bat Speed and Mass Properties. (Poster) North American Congress on Biomechanics, Waterloo, ON, Canada, August 16, 1998.

146. Evaluation and Treatment of Shoulder Injuries in the Overhead Athlete. American Orthopaedic Society for Sports Medicine, Vancouver, BC, Canada, July 12, 1998.
147. Shoulder and Elbow Conditioning & Injury Management. National Strength and Conditioning Association Annual Meeting, Nashville, TN, June 24, 1998.
148. Baseball Pitching Injuries: Biomechanics and Treatment. American College of Sports Medicine Annual Meeting, Orlando, FL, June 4, 1998.
149. Baseball Pitching Biomechanics at Various Levels of Development. American College of Sports Medicine Annual Meeting, Orlando, FL, June 4, 1998.
150. Recognition and Treatment of Shoulder Injuries in the Overhead Throwing Athlete. Live Satellite Broadcast to HealthSouth centers nationwide, May 20, 1998.
151. Biomechanics of Shoulder Exercises. Southeast Athletic Trainers' Association Annual Symposium, Atlanta, GA, March 27, 1998.
152. Timing of the Pelvis and Upper Torso Kinematics in Baseball Pitching. Southeast Athletic Trainers' Association Annual Symposium, Atlanta, GA, March 27, 1998.
153. Biomechanics of Knee Rehabilitation Exercises. ASMI Weekly Conference, Birmingham, AL, March 9, 1998.
154. Shoulder Biomechanics. Shoulder & Elbow Injuries in the Throwing Athlete Seminar, Columbia, SC, February 17, 1998.
155. Elbow Biomechanics. Shoulder & Elbow Injuries in the Throwing Athlete Seminar, Columbia, SC, February 17, 1998.
156. Biomechanics of the Elbow. ASMI Injuries in Baseball Course, Birmingham, AL, January 25, 1998.
157. Pitching Mechanics from Youth League to Major League. ASMI Injuries in Baseball Course, Birmingham, AL, January 23, 1998.
158. Biomechanics of Shoulder Exercise. ASMI Injuries in Baseball Course, Birmingham, AL, January 22, 1998.
159. Minimizing Injury and Enhancing Performance in Throwing. ASAHPERD Fall Conference, Birmingham, AL, November 18, 1997.
160. Biomechanics Research and Application. ASMI Weekly Conference, Birmingham, AL, November 17, 1997.

161. Kinematic and EMG Changes in Baseball Pitching During a Simulated Game. American Society of Biomechanics Annual Meeting, Clemson, SC, September 27, 1997.
162. Baseball Pitching Biomechanics at Various Levels of Development. (Poster) American Society of Biomechanics Annual Meeting, Clemson, SC, September 24, 1997.
163. Introduction to Biomechanics. ASMI Sports Medicine and Science Camp, Birmingham, AL, July 10, 1997.
164. Introduction to Biomechanics. ASMI Sports Medicine and Science Camp, Birmingham, AL, June 26, 1997.
165. Ten Years in Twenty Minutes: Conclusions from Ten Years of Throwing Research. American Sports Medicine Fellowship Society Meeting, Birmingham, AL, June 6, 1997.
166. Ten Years in Twenty Minutes: Conclusions from ASMI's Throwing Research. Southeast Athletic Trainers' Association Annual Symposium, Atlanta, GA, March 21, 1997.
167. Biomechanics of the Elbow. ASMI Injuries in Baseball Course, Birmingham, AL, January 25, 1997.
168. Application of Biomechanics to Baseball. ASMI Injuries in Baseball Course, Birmingham, AL, January 25, 1997.
169. Ten Years in Twenty Minutes: Conclusions from ASMI's Research. ASMI Injuries in Baseball Course, Birmingham, AL, January 24, 1997.
170. Kinematic and Kinetic Comparison of Full-Effort and Partial-Effort Baseball Pitching. (Poster) American Society of Biomechanics Annual Meeting, Atlanta, GA, October 17, 1996.
171. Kinematic and Kinetic Comparison of Baseball Pitching and Throwing. (Poster) American Society of Biomechanics Annual Meeting, Atlanta, GA, October 17, 1996.
172. Biomechanics of Overhand Throwing. ASMI Weekly Conference, Birmingham, AL, October 14, 1996.
173. Pathomechanics of Throwers' Injuries of the Elbow. ASMI Weekly Conference, Birmingham, AL, September 27, 1996.
174. Biomechanical Aspects of Soccer. The Sports Medicine and Soccer Symposium, Birmingham, AL, July 26, 1996.
175. Introduction to Biomechanics. ASMI Sports Medicine and Science Camp, Birmingham, AL, July 11, 1996.

176. Clinical Biomechanics. Recent Advances in Rehabilitation Course, Birmingham, AL, May 18, 1996.
177. Biomechanical Differences Between Throwing Drills and Pitching. Southeast Athletic Trainers' Association Annual Symposium, Atlanta, GA, March 21, 1996.
178. Biomechanics of the Elbow. 14th Annual Injuries in Baseball Course, Birmingham, AL, January 21, 1996.
179. Biomechanical Differences Between Pitching From a Mound and Throwing From Flat Ground. 14th Annual Injuries in Baseball Course, Birmingham, AL, January 19, 1996.
180. Video Analysis of the Pitching Motion. American Baseball Coaches Association Convention, Nashville, TN, January 5, 1996.
181. Biomechanics of the Shoulder During Sports. Recent Advances in the Evaluation and Treatment of the Knee and Shoulder Conference, Birmingham, AL, November 10, 1995.
182. Biomechanics of Throwing. ASMI Weekly Conference, Birmingham, AL, October 16, 1995.
183. Pathomechanics of Throwers' Injuries of the Elbow. ASMI Weekly Conference, Birmingham, AL, September 29, 1995.
184. Biomechanical Research Related to Orthopaedics. Fifth Annual Orthopaedic Update, Birmingham, AL, September 22, 1995.
185. Kinematic factors related to increased kinetics in baseball pitching. Third IOC World Congress on Sport Sciences, Atlanta, GA, September 20, 1995.
186. The Biomechanics of Tennis. U.S. Professional Tennis Association Southern Division Meeting, Birmingham, AL, August 11, 1995.
187. Introduction to Biomechanics. ASMI Sports Medicine and Science Camp, Birmingham, AL, July 26, 1995.
188. Biomechanics of the Thrower's Shoulder. American Academy of Sports Medicine Travelling Fellowship, Birmingham, AL, July 5, 1995.
189. Introduction to Biomechanics. ASMI Sports Medicine and Science Camp, Birmingham, AL, June 28, 1995.
190. Biomechanical Comparison of Open Kinetic Chain and Closed Kinetic Chain Exercises. American Sports Medicine Fellowship Society, Birmingham, AL, June 17, 1995.

191. Biomechanics and Electromyographic Analysis of Open and Closed Chain Rehabilitation. ASMI Injuries in Football and Basketball Course, Birmingham, AL, May 20, 1995.
192. Relationship Between Improper Baseball Pitching Mechanics and Increased Arm Forces. Southeast Athletic Trainers' Association Annual Symposium, Atlanta, GA, March 24, 1995.
193. Proper Pitching Mechanics. HealthSouth Peak Performance Series, Jacksonville, FL, February 25, 1995.
194. Biomechanical Analysis and Pathogenesis of Elbow Injuries. ASMI Injuries in Baseball Course, Birmingham, AL, January 22, 1995.
195. Use of High Speed Video for Pitching Fault Recognition. ASMI Injuries in Baseball Course, Birmingham, AL, January 21, 1995.
196. Relationship Between Improper Mechanics and Increased Arm Forces. ASMI Injuries in Baseball Course, Birmingham, AL, January 20, 1995.
197. Biomechanics of Throwing. ASMI Weekly Conference, Birmingham, AL, October 10, 1994.
198. Biomechanics of Throwing: Elbow and Shoulder. AOSSM Traveling Fellowship, Birmingham, AL, October 6, 1994.
199. Pathophysiology of Throwers' Injuries to the Elbow. ASMI Weekly Conference, Birmingham, AL, September 23, 1994.
200. Usefulness of Partial Swings in the Rehabilitation of a Golfer. World Scientific Congress of Golf, St. Andrews, Scotland, July 8, 1994.
201. Ground Reaction Forces and Torques of Professional and Amateur Golfers. World Scientific Congress of Golf, St. Andrews, Scotland, July 8, 1994.
202. Biomechanics of the Shoulder and Elbow During Pitching. AOSSM Traveling Fellowship, Birmingham, AL, June 21, 1994.
203. Usefulness of Partial Swings in the Rehabilitation of a Golfer. ASMI Weekly Conference, Birmingham, AL, June 20, 1994.
204. The Biomechanical Difference Between Throwing a Baseball and Throwing a Football. ASMI Injuries in Football and Running Course, Birmingham, AL, May 20, 1994.

205. Sliding Injuries and Breakaway Bases. Southeast Athletic Trainers' Association Annual Symposium, Atlanta, GA, March 25, 1994.
206. Biomechanics of the Elbow Joint During Throwing. ASMI Injuries in Baseball Course, Birmingham, AL, January 23, 1994.
207. Breakaway Bases and Injury Reduction. ASMI Injuries in Baseball Course, Birmingham, AL, January 22, 1994.
208. Biomechanics of Throwing. ASMI Weekly Conference, Birmingham, AL, October 18, 1993.
209. Biomechanics of Throwing: Elbow and Shoulder. American Orthopaedic Society for Sports Medicine (AOSSM) Tutorial: The Shoulder and Elbow in the Throwing Athlete, Birmingham, AL, October 7, 1993.
210. Pathophysiology of Thrower's Injuries of the Elbow. ASMI Weekly Conference, Birmingham, AL, October 1, 1993.
211. Biomechanical Evaluation of Baseball Pitching. AOSSM Traveling Fellowship, Birmingham, AL, July 7, 1993.
212. ASMI Research Overview. HEALTHSOUTH Shoulder Specialization Course, Birmingham, AL, June 18, 1993.
213. Biomechanical Evaluation of Overhand Throwing: Techniques for Use in the Training Room. National Athletic Trainer's Association Annual Meeting, Kansas City, MO, June 12, 1993.
214. Biomechanics: Throwing Sports. SEATA Student Athletic Trainer Clinical Symposium on Prevention of Athletic Injuries, Tuscaloosa, AL, February 6, 1993.
215. How to Video Analyze a Pitcher. ASMI Injuries in Baseball Course, Birmingham, AL, January 23, 1993.
216. Biomechanics of Fastball and Curveball Pitching. ASMI Injuries in Baseball Course, Birmingham, AL, January 22, 1993.
217. Kinetics of the Shoulder Joint During Throwing. ASMI Injuries in Baseball Course, Birmingham, AL, January 22, 1993.
218. Biomechanics of Throwing: Elbow and Shoulder. AOSSM Tutorial: The Shoulder and Elbow in the Throwing Athlete, Birmingham, AL, October 1, 1992.

219. Biomechanical Aspects of the Throwing Elbow. ASMI Fellows Conference, Birmingham, AL, September 11, 1992.
220. The Biomechanics of Pitching. ASMI Weekly Conference, Birmingham, AL, August 10, 1992.
221. Forces on the Knee During Running and Cutting. Alabama High School Athletic Association Coaching Clinic, Tuscaloosa, AL, July 29, 1992.
222. Biomechanics of Throwing. The HSS Sports Medicine / UCLA Family Practice Alumni Meeting, The Hospital For Special Surgery, New York, NY, April 16, 1992.
223. Biomechanics of the Elbow and Shoulder in Throwing. ASMI Weekly Conference, Birmingham, AL, April 13, 1992.
224. Biomechanics of the Elbow and Shoulder in Throwing. American Shoulder and Elbow Surgeons Specialty Day at the American Academy of Orthopaedic Surgeons Annual Meeting, Washington, DC, February 23, 1992.
225. Biomechanics of the Shoulder and Elbow. HEALTHSOUTH Sports Medicine Seminar, Dallas, TX, February 15, 1992.
226. High Speed Video and Computer Analysis of the Pitching Motion of a College Pitcher. ASMI Injuries in Baseball Course, Birmingham, AL, January 11, 1992.
227. Biomechanics of Proper Pitching. ASMI Injuries in Baseball Course, Birmingham, AL, January 10, 1992.
228. Kinetics of the Shoulder Joint During Throwing. ASMI Injuries in Baseball Course, Birmingham, AL, January 10, 1992.
229. Biomechanics of Throwing. AOSSM Tutorial, Birmingham, AL, October 3, 1991.
230. Biomechanical Analysis of Pitching. ASMI Weekly Conference, Birmingham, AL, August 5, 1991.
231. Principles of Biomechanics. ASMI Weekly Conference, Birmingham, AL, July 8, 1991.
232. Biomechanics of Throwing. Biomechanic and Sports Movements Conference, Terni, Italy, April 6, 1991.
233. Review of the Model of Pitching. ASMI Injuries in Baseball Course, Birmingham, AL, January 25, 1991.
234. Biomechanics Review. ASMI Weekly Conference, Birmingham, AL, August 16, 1990.

235. The Biomechanics of Proper Pitching. Collegiate Baseball Super Clinic, Cocoa Beach, FL, August 10, 1990.
236. ASMI Biomechanics Research Overview. Korean Society of Sport Biomechanics, Seoul, Korea, June 2, 1990.
237. ASMI Clinical Evaluation of Pitching. ASMI Injuries in Baseball Course, Birmingham, AL, January 26, 1990.
238. Overview of the Mechanics of Pitching. ASMI Injuries in Baseball Course, Birmingham, AL, February 17, 1989.
239. The Throwing Act. ASMI Injuries in Baseball Course, Birmingham, AL, February 12, 1988

### **Guest Lectures in Classroom and Community**

1. The Science of Baseball: Maximizing Performance and Preventing Injury. Indian Springs School, Birmingham, AL November 1, 2014.
2. Physics Master Class: Sports Biomechanics. Horace Mann School, Bronx, NY, March 7, 2013.
3. Measurement approaches in biomechanics. UAB rehabilitative sciences class, Birmingham, AL, September 18, 2012.
4. Sports Injuries. UAB epidemiology class, Birmingham, AL, March 15, 2012.
5. Sports Injuries. UAB epidemiology class, Birmingham, AL, March 10, 2011.
6. Comparison of Overhead Throws/Hits: Baseball, Football, Volleyball, Tennis. UAB Department of Physical Medicine and Rehabilitation (PM&R) Grand Rounds, Birmingham, AL, March 4, 2011.
7. Biomechanics of Baseball Pitching: Implications for Injury and Performance. UAB biomedical engineering seminar, Birmingham, AL, August 27, 2010.
8. Biomechanics of Baseball Pitching: Injury Mechanisms and Risk Reduction, UAB Department of Physical Medicine and Rehabilitation (PM&R) Grand Rounds, Birmingham, AL, April 2, 2010.
9. Sports Overuse Injuries. UAB epidemiology class, Birmingham, AL, March 11, 2010.



10. Public Health in Sports Medicine: Throwing Injuries in Youth Baseball. UAB epidemiology class, Birmingham, AL, March 31, 2009.
11. Dynamic Analysis of Baseball Pitching. UAB biomedical engineering seminar, Birmingham, AL, April 3, 2008.
12. Biomechanics of the Curveball: Is It Okay for Youth Pitchers to Throw? UAB epidemiology class, Birmingham, AL, March 6, 2008.
13. Biomechanics of Baseball Pitching. UAB Biomedical Engineering Seminar, Birmingham, AL, September 14, 2007.
14. Overuse Sports Injuries. Epidemiology class, UAB, October 25, 2005.
15. Biomechanics and Epidemiology of Pitching Injuries in Baseball. Epidemiology class, UAB, October 19, 2004.
16. Technology in Sports Medicine. Internet Professionals Society of Alabama, October 7, 2004.
17. Biomedical Research at the American Sports Medicine Institute: Biomechanics of the Tennis Serve, Biomedical Engineering seminar, University of Alabama at Birmingham, February 14, 2003.
18. Biomechanics Research and Scholarly Publication. Sports Medicine Health Care class, University of Alabama, October 28, 2002.
19. Biomechanics and Epidemiology of Pitching Injuries in Baseball. Epidemiology class, UAB, October 1, 2002.
20. How to Minimize Pitching Injuries through Proper Mechanics. Functional Fitness Certification, ASMI - Absolute Performance Group, May 7, 2002.
21. Biomechanics in Sports Medicine. Advanced Applied Exercise Physiology class, UAB, February 19, 2002.
22. Pathomechanics of the Shoulder and Elbow in Baseball Pitching. Functional Fitness Certification, ASMI - Absolute Performance Group, February 5, 2002.
23. Biomechanics of Throwing. Biomedical Engineering seminar, UAB, November 9, 2001.
24. Epidemiology and Sports Medicine. Epidemiology class, UAB, October 2, 2001.
25. Biomechanics in Sports Medicine. Sports Medicine Health Care class, University of Alabama, September 26, 2001.

26. Biomechanics in Sports Medicine. Kinesiology class, Samford University, March 9, 2001.
27. The Importance of Research in Allied Health. Sports Medicine Health Care class, University of Alabama, October 23, 2000.
28. Upper Extremity Biomechanics. Kinesiology class, Samford University, March 15, 2000.
29. Epidemiology & Biomechanics in Sports Medicine. Injury epidemiology class, UAB, October 26, 1999.
30. Careers in Biomechanics. McWane Center, April 24, 1999.
31. Analytical Modeling of Knee Internal Forces. Joint Mechanics class, UAB, February 3, 1999.
32. Upper Extremity Biomechanics. Kinesiology class, Samford University, October 8, 1998.
33. Joint Tissue Biomechanics. Soft Tissue Biomechanics class, UAB, February 24, 1998.
34. Research at the American Sports Medicine Institute. Department of Physical Education and Kinesiology, University of Hawaii, Manoa, HI, January 14, 1998.
35. Motion Analysis. Experimental Biomechanics class, UAB, February 20, 1997.
36. Kinematics and Kinetics. Experimental Biomechanics class, UAB, February 18, 1997.
37. Biomechanics and Sports Medicine. Analysis of Human Movements class, UAB, February 11, 1997.
38. Experimental Biomechanics. Anatomy and Kinesiology class, Samford University, Birmingham, AL, December 4, 1996.
39. Biomechanics of the Upper and Lower Extremities. Anatomy and Kinesiology class, Samford University, Birmingham, AL, December 2, 1996.
40. Proper Pitching Biomechanics. Aruba Rockets coaches meeting, Oranjestad, Aruba, July 29, 1996.
41. Sports Injuries. Epidemiology of Injury Course, UAB, Birmingham, AL, May 9, 1996.
42. Biomechanics and Sports Medicine. Career Day, Mountain Brook Elementary School, February 27, 1996.
43. Motion and Forces. Kinesiology class, UAB, January 11, 1996.

44. Biomechanics and the Upper Extremity. Anatomy and Kinesiology class, Samford University, October 9, 1995.
45. Elbow Mechanics. Joint Biomechanics class, UAB, February 28, 1995.
46. Shoulder Mechanics. Joint Biomechanics class, UAB, February 23, 1995.
47. Kinematics, Kinetics, and Newton's Laws of Motion. Kinesiology class, UAB, November 3, 1994.
48. Anatomy and Biomechanics of the Shoulder. Biomechanics of Hard Tissue Reconstruction class, UAB, February 22, 1994.
49. The Biomechanics of Baseball Pitching. UAB Biomedical Engineering Weekly Seminar, Birmingham, AL, September 27, 1994.
50. Improvement of Pitching Mechanics Using Biomechanical Evaluation. Chicago White Sox Spring Training Organizational Meeting, Sarasota, FL, March 7, 1993.
51. Biomechanics of Pitching: Current and Future Research. UAB Biomedical Engineering Seminar, Birmingham, AL, April 23, 1991.
52. Current Studies in Pitching Biomechanics. Chicago White Sox Pitching and Conditioning Coaches, Sarasota, FL, October 7, 1991.
53. Biomechanics of the Golf Swing and the Baseball Pitch. Department of Physical Education, Yonsei University, Seoul, Korea, June 4, 1990.
54. Engineering Methods Used in Biomechanics. UAB Chapter of the American Society of Mechanical Engineers, Birmingham, AL, March 31, 1989.
55. The Biomechanics of Swimming. YMCA Advanced Swimming class, Colorado Springs, CO, July 12, 1984.

## **RESEARCH GRANTS AND GIFTS**

### 2014

Pitching Biomechanics in Professional Pitchers with a History of UCL Reconstruction  
Major League Baseball

Kinematic Changes when Pitching with Bauerfeind Elbow Brace  
Bauerfeind USA

Humeral Fracture After Sub pectoral Biceps Tenodesis: A Biomechanical Comparison of  
Torque to Failure in Two Fixation Techniques  
Arthrex, Inc.

Cyclic Load Testing and Ultimate Pull-Out Strength of a Small Diameter Biocompatible vs.  
All-Suture Anchor for Labral Repair in Hip Arthroscopy  
Smith & Nephew

Biomechanical Evaluation of Augmented UCL Repair  
Arthrex, Inc.

Long-term Outcomes for Adolescent Baseball Pitchers after UCL and Rotator Cuff Surgery  
Michael J. Axe, M.D.

Correlation between ACL Tunnel Placement and Isometry  
Smith & Nephew

Effect of Capsulorrhaphy on Dynamic Glenohumeral Contact Pressure  
Biomet

### 2013

Motion Analysis System Upgrade  
American Sports Medicine Fellowship Society

Biomechanics of the Swing XP Baseball Bat  
5 Star, LLC

### 2012

Biomechanical Comparison of Suture Anchors for Transosseous Equivalent Rotator Cuff Repair  
Cayenne Medical

Biomechanics of the Swing XP Baseball Bat: A Pilot Study  
5 Star, LLC

Assessment of Fracture Risk after Subpectoral Biceps Tenodesis  
Arthrex

2011

Pitching Biomechanics Research  
3P Sports

Fellowship Research Awards  
American Sports Medicine Fellowship Society

2010

Influence of Number and Spacing of Anchors in Failure of Labral Repair of the Shoulder,  
Biomet Sports Medicine

Fellowship Research Awards  
American Sports Medicine Fellowship Society

2008

CR-Plug during the Osteochondral Autograft Transfer System (OATS) Procedure  
RTI Biologics

Pitching Biomechanics  
US Athletics Corporation

Fellowship Research Awards  
American Sports Medicine Fellowship Society

2007

Various Research Projects  
Smith & Nephew

ACE Power Band Training Study  
A Change of Pace

Fellowship Research Awards  
American Sports Medicine Fellowship Society

2006

Various Research Projects  
Smith & Nephew

Biomechanical Comparison of Plantar-to-Dorsal and Dorsal-to-Plantar Screw Fixation Strength  
for Subtalar Arthrodesis  
Synthes USA

Broadening and Dissemination of Orthopaedic Sports Medicine Information through an  
Interactive Online Forum  
inSCOPE Orthopedic Fellowship Awards Program (Pfizer Inc.)

SportMotion Project for Baseball Motion Analysis  
XOS Technologies

Comparison between Topical and Oral NSAIDS for Recovery Time Needed for a Lateral Ankle  
Sprain  
Medaus Compounding Center

Fellowship Research Awards  
American Sports Medicine Fellowship Society

2005

Various Research Projects  
Smith & Nephew

Effect of Pulsing Electromagnetic Fields on Shoulder Pain of At Least 3 Months Duration  
Healthonics, Inc.

Ankle Stabilization During Soccer  
Bledsoe (Medical Technology, Inc.)  
Gift-in-Kind

Fellowship Research Awards  
American Sports Medicine Fellowship Society

2004

Various Research Projects  
Smith & Nephew

Biomechanics of the Shoulder Capsule after Plication  
Mitek Worldwide

Biomechanical Comparison of Ankle Stabilizers  
Professional Products, Inc.

Fellowship Research Awards  
American Sports Medicine Fellowship Society

2003

Various Research Projects  
Smith & Nephew

Comparison between Two-Layer Arthroscopic Versus Mini-Open Rotator Cuff Repair  
Mitek

Anatomy and Dimensions of the Ulnar Collateral Ligament  
Arthrotek

Fellowship Research Awards  
American Sports Medicine Fellowship Society

2002

Unrestricted Research  
Smith & Nephew

Research Chair  
Smith & Nephew

Unrestricted Research  
Bionx Implants

Biomechanical Comparison of the “Anatomic Repair” versus Suture Anchor Rotator Cuff Repair  
Arthrotek

JVA Scan Diagnostic Tool – Sports Medicine Applications

Biomet Company

Biomechanical Comparison of Soft Tissue Screws and Suture Anchors Rotator Cuff Repair  
Mitek

Kinematic Changes in Pitching with the ThrowMAX Flexible Arm Brace  
ThrowMAX

Shoulder Instability  
Arthrex Inc.

Efficacy of Permacol Porcine Skin Graft for Rotator Cuff Repair  
Tissue Science Laboratory

Biomechanical Comparison of Soft Tissue Screws and Suture Anchors Rotator Cuff Repair  
Opus Medical

Bowflex Exercise Equipment  
Direct Focus Inc.  
Gift-in-Kind

Fellowship Research Awards  
American Sports Medicine Fellowship Society

Unrestricted Research  
Douglas J. Moran, M.D.

## 2001

Unrestricted Research  
Smith & Nephew

Research Chair  
Smith & Nephew

Clinical Research  
BREG

Unrestricted Research  
American Sports Medicine Fellowship Society

Cadaver specimens  
Mitek Products  
Gift-in-Kind



Open vs. Arthroscopic Rotator Cuff Repair  
Surgical Dynamics

Fellowship Research Awards  
American Sports Medicine Fellowship Society

2000

Unrestricted Research  
Smith & Nephew

Research Chair  
Smith & Nephew

Explosive Power Assessment System  
Advanced Sports Technologies  
Gift-in-Kind

Biomechanics of the Knee Capsule and the Effects of Thermal Shrinkage on Patella Tracking  
Mitek Products

Fatigue and Implications for Injury in Tennis Serving  
International Olympic Committee

Clinical Research  
BREG

Extracorporeal Shock Wave Treatment for Lateral Epicondylitis  
HealthTronics

Extracorporeal Shock Wave Treatment for Chronic Heel Pain  
HealthTronics

Fellowship Research Award  
American Sports Medicine Fellowship Society

1999

Unrestricted Research  
Smith & Nephew

Research Chair

Smith & Nephew

Extracorporeal Shock Wave Treatment for Chronic Heel Pain  
HealthTronics

Unrestricted Research  
American Sports Medicine Fellowship Society

Fellowship Research Award  
American Sports Medicine Fellowship Society

1998

Prevention of Arm Injuries in Youth Baseball Pitchers  
USA Baseball Medical and Safety Advisory Committee

Unrestricted Research  
Smith & Nephew

Research Chair  
Smith & Nephew

Extracorporeal Shock Wave Treatment for Chronic Heel Pain  
HealthTronics

Prevention of Arm Injuries in Youth Baseball Pitchers  
USOC Sport Science and Technology Committee

Hi-speed Video of the Fast-Arm Exercise Device  
Progressive Fitness, Inc.

1997

Unrestricted Research  
Smith & Nephew

Research Chair  
Smith & Nephew

Personal computer hardware and software  
MedPartners  
Gift-in-Kind

Biomechanics of the Spine in Pitching  
Dr. Jeff Young *et al.*

Research for Children  
Connie & Robert Chapman

Laptop computers  
*HEALTHSOUTH* Corporation  
Gift-in-Kind

Unrestricted Research  
American Sports Medicine Fellowship Society

### 1996

Unrestricted Research  
Smith & Nephew

Research Chair  
Smith & Nephew

Biomechanical Evaluation of the PPI Protonics Exercise System  
Professional Products Incorporated

Biomechanical Evaluation of the ITC Protonics Exercise System  
Inverse Technology Corporation

The Influence of Bat Mass, Center of Gravity, and Inertia on Baseball Bat Swing Velocity  
National Collegiate Athletic Association

The Influence of Bat Mass, Center of Gravity, and Inertia on Softball Bat Swing Velocity  
National Collegiate Athletic Association

### 1995

Unrestricted Research  
Biodex Corporation

Unrestricted Research  
American Sports Medicine Fellowship Society

Biomechanical Comparison of Palmaris Longus & Patellar Tendon UCL Reconstruction Grafts  
Arthrex Inc.

1994

Unrestricted Research  
Smith & Nephew

DataGlove Wrist Motion Measurement System  
Greenleaf Medical Systems  
Gift-in-Kind

Serious Knee Injuries in College Football  
National Collegiate Athletic Association

The Biomechanics of Open Kinetic Chain and Closed Kinetic Chain Exercises  
Biodex Corporation

1993

Unrestricted Research  
Smith & Nephew

Unrestricted Research  
Professional Products

Biomechanics of Baseball Pitching  
Chicago White Sox

Exercise Equipment  
BodyMaster  
Gift-in-Kind

1992

Unrestricted Research  
Smith & Nephew

Biomechanical Differences Between Classic and Dry-Joy Shoes During a Golf Swing  
Titleist and Foot-Joy Worldwide

Clinical Research  
Smith & Nephew

Biomechanics of Baseball Pitching  
Chicago White Sox

Serious Knee Injuries in College Football  
National Collegiate Athletic Association

Evaluation of Golf and Baseball Training Devices  
Specific Athletic Movement Emulators, Inc.  
Gift-in-Kind

1991

Unrestricted Research  
Smith & Nephew

Clinical Research  
Smith & Nephew

Exercise Equipment  
Hoggan Health Industries  
Gift-in-Kind

Biomechanics of Baseball Pitching  
Chicago White Sox

Serious Knee Injuries in College Football  
National Collegiate Athletic Association

Foot Pressure Patterns of PGA Golfers  
Golf Digest Magazine

Evaluation of Hirsch-a-matic Exercise Machine  
Hirsch Training Systems

## **PROFESSIONAL AWARDS AND HONORS**

Fleisig GS. Jim Hay Memorial Award for Research in Sports and Exercise Biomechanics. American Society of Biomechanics, 2013.

Fleisig GS. Fellow. International Society of Biomechanics in Sports, 2011.

Fleisig GS. James R. Andrews, M.D., Award for Excellence in Baseball Sports Medicine, American Sports Medicine Institute, 2008.

Fleisig GS, Andrews JR. Biomechanics & Injuries of Overhand Throwing. Electronic media education award winner, American Academy of Orthopaedic Surgeons, 2000.

Jameson GG, Fleisig GS, Zheng N, Andrews JR, Lemak LJ. Electromyographic responses to programmable resistance (Protonics™) knee braces. Clinical Biomechanics finalist, American Society of Biomechanics, 1998.

Andrews JR, Escamilla RF, Fleisig GS, Azar FM. Biomechanics of the throwing shoulder. Videotape award winner, American Academy of Orthopaedic Surgeons, 1996.

Andrews JR, Fleisig GS. Kinematics of throwing: elbow/shoulder. Videotape award winner, American Academy of Orthopaedic Surgeons, 1996.

Zheng N, Fleisig GS, Escamilla RF, Barrentine SW, Wilk KE, Andrews JR. Forces of the knee during open and closed kinetic chain exercises. Clinical Biomechanics finalist, American Society of Biomechanics, 1996.

## **PROFESSIONAL ORGANIZATION MEMBERSHIPS**

- American Society of Biomechanics, 1990-present.
- American Sports Medicine Fellowship Society, 1995-present.
- International Society of Biomechanics in Sports (Fellow), 2000-present.
- International Sports Engineering Association, 2001-present.
- American College of Sports Medicine, 1999-2008.
- American Society of Mechanical Engineers, 1990-1994.
- International Society of Biomechanics, 1990-2009.

## **PROFESSIONAL COMMITTEES**

- USA Baseball Medical & Safety Committee
  - Chair, 2013-present.
  - Committee member, 1998-2013.
  - Bat Advisory Sub-Committee, 2008-present
- Major League Baseball Elbow Task Force

- Committee member, 2014-present.
- ASMI Injuries in Baseball Course
  - Co-Chair, 2006-present.
  - Organizing Committee member, ASMI Injuries in Baseball, 1990-present.
- American Sports Medicine Fellowship Society
  - Research Awards Committee Chair, 2003-present.
- American Society of Biomechanics
  - Program Committee member, 2012.
  - Co-chair of Southeastern Meeting, 2008
  - Conferences & Special Events Committee member, 1998-2000.
  - Abstract reviewer for annual meeting, 1999, 2009
- International Society for Biomechanics in Sports
  - Abstract reviewer for annual meeting, 2009, 2014
- North American Congress on Biomechanics
  - Abstract reviewer for meeting, 2008

## **JOURNAL ACTIVITIES**

- Sports Biomechanics
  - Associate Editor, 2011-2013.
  - Guest Editor, 2011
  - Editorial Advisory Board member, 2002-2010.
- The American Journal of Orthopaedics
  - Editorial Review Board member, 1997-2013.
- Sports Medicine Update
  - Contributing Editor, 1997-2007.
- Injuries in Baseball, Lippincott-Raven Publishers, Philadelphia
  - Section Editor, 1998
- Journal Reviewer
  - The American Journal of Orthopaedics, The American Journal of Sports Medicine, Annals of Biomedical Engineering, BioMechanics, Gait & Posture, IEEE Transactions, International Journal of Sports Medicine, Journal of Applied Biomechanics, Journal of Biomechanics, Journal of Orthopaedic & Sports Physical Therapy, Journal of Orthopaedic Research, Journal of Sports Sciences, Medicine & Science in Sports & Exercise, Sports Biomechanics, Pediatrics, Sports Engineering, Sports Health

## **CONSULTANT**

- MomsTEAM Institute
  - Advisory Board Member, 2014-present.
- Motus Global
  - Board Member, 2014-present.



- Little League Baseball and Softball
  - Pitching Safety Consultant, 2006-present.
- National Pitching Association
  - Advisory Board Member, 2002-present.
- Absolute Performance Group
  - Research Coordinator, 2002-2003
- Tampa Bay Rays
  - Consultant, 1997-2003
- Bowflex
  - Legal Consultant, 2002

### **COMMUNITY SERVICE**

- MIT Educational Council
  - Councilor 1991-1999
  - Regional Chair, 2000-present.
- Temple Emanu-El
  - Treasurer, 2007-2008.
  - Member of the Board of Directors, 2006-2008.
  - Chairman of the Facilities Committee, 2006-2007.
  - Member of the Communications & Technology Committee, 1999-2000.
- Alabama School of Fine Arts
  - Member of Math & Science Advisory Board, 2007-present.
- Magic City Performing Arts for Children
  - Member of the Board of Directors, 2003-2004.
  - President of the Board of Directors, 2004-2005.
- Horace Mann School
  - Member of the Physical Education & Athletics Committee, 2001.
- Hilltop Montessori School
  - Vice President, Hilltop Montessori School PTO, 1999-2000.
  - Treasurer, Hilltop Montessori School PTO, 2000-2001.
- ASMI Sports Medicine and Science Camp, 1995-2000.
  - Instructor
- Alabama Alliance for Minority Participation Summer Program
  - Mentor, 1993-1994.
- International Science and Engineering Fair
  - Judge, 1994.

## STUDENT SUPERVISION

### Thesis Committees

Zaineb Ahmad, UAB	(M.S., Mechanical Engineering)
Jeanne Broussard, UAB	(M.S., Physical Therapy)
Dean Brown, Victoria U. of Tech.	(M.S., Human Performance)
Ronda Childress, U. of Alabama	(Ph.D., Health Studies)
Heather DeRocher, UAB	(M.S., Physical Therapy)
Kenny Dinnen, Berry University	(M.S., Biomechanics)
Douglas Doud, UAB	(M.S., Biomedical Engineering)
Dave Fortenbaugh, U. of Miami	(Ph.D., Industrial Engineering)
Ken Jones, University of Alabama	(Ph.D., Physical Education)
Ingrid Kalkofen, UAB	(M.S., Physical Therapy)
Ankit Kaushik, UAB	(B.S., Engineering Honors Program)
Stephen Lyman, UAB	(Ph.D., Epidemiology)
Randy Phillips, Arkansas State	(M.S., Physical Therapy)
Rich Ramirez, Rocky Mtn U	(Ph.D., Athletic Training)
Andrew Shatley, Arkansas State	(M.S., Physical Therapy)
Matt Streicher, U. of Akron	(M.S., Biomedical Engineering)
Scott Wuertzer, UAB	(M.S., Biomedical Engineering)

### Student Researcher Program

#### Supervised Starting in 2015

Leo Taarea, Philadelphia College of Osteopathic Medicine

#### Supervised Starting in 2014

Matt Beidleman, University of Alabama School of Medicine

Kiran Kanwar, Logan University

Joe Kelling, Creighton U School of Medicine

Brian Krinsky, UAB

Kylie Mason, Allegheny College

Evan McConnell, Clemson U

#### Supervised Starting in 2013

Jihoon "Tony" Choi, Creighton U School of Medicine

Becky Ellis, U Delaware

Wil Gilmore, University of Alabama School of Medicine

Stuart Hoyle, UAB

Bill Johnson, UAB

Monica Milanovich, Lafayette College

Meshark Okunbor, UAB

Richard Royal, Medical University of South Carolina

Travis Tubbs, U Michigan

Jake Virgo, Rosalind Franklin U

Supervised Starting in 2012

Jake Cordover, Mountain Brook High School

Jared Davis, Union U

Tim Evans, Creighton U School of Medicine

Charlie Forsythe, U Kansas

Micah Garcia, Grand Valley State U

Ben Hansen, Marquette U

Cody Mahaffey, Mississippi State U

Justin Silverman, Wilfrid Laurier University

Alex Smith, Auburn U

Murphy Walters, Sewanee: U of the South

Supervised Starting in 2011

Gene Bellin, University of Minnesota

Stephanie Duncan, Rosalind Franklin U

Matthew Goddard, Marshall University

Kristina Lee, Marquette University

Philip Musa, UAB

Dishita Patel, Wright State University

Todd Raines, UAB

Mike Urbin, Auburn University

Darcie Yount, Auburn University

Supervised Starting in 2010

Andrew Chappell, Southwestern University

Taylor Hughes, Clemson University

Ryosuke Ito, Troy University

Ankit Kaushik, UAB

Victor Leslie, Duke University School of Medicine

Luke O'Steen, Medical University of South Carolina

Supervised Starting in 2009

Hikel Boohaker, University of Alabama School of Medicine

Mike McNally, East Carolina University

Wes Pennington, Indiana University

Supervised Starting in 2008

Nathan Fedor, University of Alabama

Stephen Higgins, Nova Southeastern College of Osteopathic Medicine

Supervised Starting in 2008

Andrea Beaulieu, University of Florida

Amelia “AC” Davis, Mercer University  
Ciara Floyd, Samford University  
Aly Goldfarb, Birmingham Southern College  
Sara Herrington, Mississippi State University  
Andrew Robb, Canadian Memorial Chiropractic College  
Dheepa Sekar, University of Pennsylvania  
Rachel Sharpe, Samford University  
Carmen Walker, Tennessee State University  
Chad Watts, University of Nevada School of Medicine

Supervised Starting in 2007

Zaineb Ahmad, Washington University  
Jesús Eslava, Pamplona, Spain  
Brian Hixon, Wake Forest University  
Andrew Kuykendall, Wake Forest University  
Elizabeth Lebeau, Auburn University  
Wasef Muzaffar, UAB  
Matthew Parker, UAB  
Matthew Pizzi, Fitchburg State College

Supervised Starting in 2006

Justin Brillante, UAB  
Yungchien Chu, University of Georgia  
LeAnn Jones, United States Sports Academy  
Farah Khan, MIT  
Tiffany Lowery, Fultondale High School  
David Lurie, Oceanside High School (NY)  
Lacey Marder, St. Vincent’s Fitness Center  
Brittney Mensen, University of West Georgia  
Matt Streicher, University of Akron  
Adam Weber, Yale University  
Matt Wetherell, Oceanside High School (NY)

Supervised Starting in 2005

Anne Benjaminse, Hanze University Groningen (The Netherlands)  
Joe Reda, Byram Hills High School  
Sammi Taylor, UAB

Supervised Starting in 2004

Mark Pantoni, University of Florida  
Raj Ranganathan, University of Iowa

Supervised Starting in 2003

Barbara Edwards, Troy State University

Heather Kaiser, Troy State University  
Sohail Khan, Georgia Institute of Technology  
Eric Law, University of Alabama  
Randy Phillips, Arkansas State University  
JaMisha Ruffin, UAB  
Andrew Shatley, Arkansas State University

Supervised Starting in 2002

Chad Corrigan, UAB  
Kenny Dinnen, Berry University  
Kris Milliron  
Mark Reddington, Lambrith University  
Derek Weichel, Southwest Missouri State U

Supervised Starting in 2001

Derrick Bumpers, UAB  
Danielle Beddows, Wakefield College (England)  
Ronda Childress, UAB  
Carl DiLella, Philadelphia College of Osteopathic Medicine  
Sandra Garber, Northeastern University  
Pegah Kannar, Homewood High School  
Brian Kirk, Alabama School of Fine Arts  
Mary Beth Lorson, University of Alabama  
Whitney Miller, Samford University  
Carl Richards, Wakefield College  
Wes Sharp, Samford University  
Philip Sidebottom, Wakefield College  
Kei Suzuki, Cornell University  
Tara Wilson, Wakefield College

Supervised Starting in 2000

Blake Boggess, UAB  
Barry Dale, University of Alabama  
Richard Dent, Wakefield College  
Takahiko Kusunoki, University of Alabama  
Tony Lewis, Leeds High School  
Paul Marvar, Northern Illinois University  
Gillian McFadden, Wakefield College  
Chris Miles, Huffman High School  
Brian Ragan, University of Illinois at Urbana-Champaign  
Ian Wright, Wakefield College  
Mitsuhiro Yoshida, University of Alabama

Supervised Starting in 1999

Rhondrea Copeland, UAB  
Stephanie Feldman, Shades Mountain Christian School  
Kyle Gilbreath, Berry High School  
Steven Hardy, Jefferson County International Baccalaureate High School  
Rochelle Nicholls, University of Western Australia  
Mike Reinold, Northeastern University

Supervised Starting in 1998

David Bryan, UAB  
Jon Nason, Louisiana State University  
Caroline Sebley, Elon College  
Bill Sloboda, Pennsylvania State University  
Adam Thomas, University of Montevallo

Supervised Starting in 1997

Mandy Kimball, HealthSouth  
Ben Murphy, University of Alabama  
David Stodden, Iowa State University  
Scott Wuertzer, UAB

Supervised Starting in 1996

Monika Bhuta, Mississippi State University  
Jeanne Broussard, UAB  
Peter Czuwala, UAB  
Greg Dakin, UAB  
Heather DeRocher, UAB  
Ken Jones, University of Alabama  
Ingrid Kalkofen, UAB  
Robert Lampkin, Jr., Harvard University  
Stephen Lyman, UAB  
Jill Seaman, Wellesley College

Supervised Starting in 1995

Melissa Boyd  
Jerome Coleman, Ramsay High School  
Eric Lydon, University of Massachusetts  
Angela Mayberry, Huffman High School

Supervised Starting in 1994

Steve Canfield, UAB  
Benjamin Dix, UAB  
Sharon Donato, UAB  
Marcie Douglas, UAB  
Chad Gilliland, UAB

Freida Hackel, University of Georgia  
Dewey Jones, UAB  
Alli Small, UAB

Supervised Starting in 1993

Michael Bonamy, UAB  
Terri Chmielewski, HealthSouth  
Kimberly Cook, UAB  
Michael Dry, UAB  
Stacey Kelpke, UAB  
Amy Montgomery, UAB  
Patrick Morgan, Shades Valley High School  
Alice Nelms, UAB  
Brian Overbay  
Dawud Rasheed, Shades Valley High School  
Scott Strand, UAB