Autologous Blood/ Platelet-rich Plasma

Clinical Expert

Kimberly G. Harmon, MD
Professor
Department of Family Medicine
Department of Orthopaedics and Sports Medicine
University of Washington
Seattle, WA
Disclosure

Any unmarked topic will be considered a “Yes”

<table>
<thead>
<tr>
<th>Potential Conflict Type</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>1. Salary or payments such as consulting fees or honoraria in excess of $10,000.</td>
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<td>2. Equity interests such as stocks, stock options or other ownership interests.</td>
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<td>3. Status or position as an officer, board member, trustee, owner.</td>
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<td>4. Loan or intellectual property rights.</td>
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<td>5. Research funding</td>
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<td>6. Any other relationship, including travel arrangements.</td>
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</tbody>
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If yes, list name of organizations that relationship(s) are with and for #6, describe other relationship:

____________________________________________________________________________________

____________________________________________________________________________________

If you believe that you do not have a conflict, but are concerned that it may appear that you do, you may attach additional sheets explaining why you believe that you should not be excluded.

I certify that I have read and understand this Conflict of Interest form and that the information I have provided is true, complete, and correct as of this date.

X

Signature

Date

Kimberly Harmon

Print Name

So we may contact you regarding this information, please provide the following:

Email Address: [Redacted]

Phone Number: [Redacted]
Kimberly G. Harmon, M.D.

University of Washington Sport Medicine Center at Husky Stadium
3800 Montlake Boulevard
Seattle, WA 98195
206-598-3294
kharmon@uw.edu

1) **Personal Data:**
   - Place of Birth: St. Louis, MO
   - Citizenship: U.S.A.
   - Date of Birth: November 6, 1966

2) **Education:**
   - B.S. in Pre-Professional Science, University of Notre Dame, May 1989
   - M.D., Indiana University School of Medicine, May 1993

3) **Postgraduate Training:**
   - Residency: Memorial Hospital Family Medicine
     South Bend, IN
     1993-1996
   - Fellowship: Ball Memorial Hospital Primary Care Sports Medicine
     Muncie, IN
     1996-1998

4) **Faculty Appointments:**
   - January 1998-June 2000
     Clinical Instructor
     Department of Family Medicine
     Department of Orthopaedics
     University of Washington
     Seattle, WA
   - July 2000-June 2005
     Clinical Assistant Professor
     Department of Family Medicine
     Department of Orthopaedics and Sports Medicine
     University of Washington
     Seattle, WA
July 2005- June 2010  Clinical Associate Professor  
Department of Family Medicine  
Department of Orthopaedics and Sports Medicine  
University of Washington  
Seattle, WA

July 2010 – March 2012  Clinical Professor  
Department of Family Medicine  
Department of Orthopaedics and Sports Medicine  
University of Washington  
Seattle, WA

March 2012 – present  Professor  
Department of Family Medicine  
Department of Orthopaedics and Sports Medicine  
University of Washington  
Seattle, WA

5) **Hospital Appointments:**

January 1998-present  Attending Physician  
University of Washington Medical Center  
Seattle, WA

6) **Honors:**

- Notre Dame Scholar, 1985-86  
- Notre Dame Athletic Trainer Scholarship, 1987-89  
- Mead Johnson Award for Graduate Education in Family Practice, 1995  
- Chief Resident, Memorial Family Practice, 1995-96  
- Fellow, American College of Sports Medicine, 2003-present  
- Board of Directors, American Medical Society for Sports Medicine, 2002-2006 (reelected 2004)  
- Chair, Membership Committee, American Medical Society for Sports Medicine, 2002-2006  
- Best Poster Presentation, AMSSM 15th Annual Meeting, Miami, FL.  
  Rothmier J, Harmon KG, O’Kane JW. Exertional ataxia in a college football player  
- 2nd Vice President, American Medical Society for Sports Medicine, 2007-2008.  
- Harry Galanty Young Investigator’s Award, Rendezvous II – An International Sports Medicine Meeting: “Details and Outcomes of Resuscitation Following Sudden

- 1st Vice President, American Medical Society for Sports Medicine, 2008 – 2009.
- President, American Medical Society for Sports Medicine, 2009-2010.
- Immediate Past President, American Medical Society for Sports Medicine, 2010-2011.
- Parker J. Palmer “Courage to Teach” Award for Program Director Excellence – finalist, 2011.
- Hall Health Primary Care Center Professional Staff Award, 2011.
- Parker J. Palmer “Courage to Teach” Award for Program Director Excellence – finalist, 2012
• Washington State Athletic Trainers’ Association (WSATA) Physician’s Award, July 2014
• Heroes for Young Hearts Award, Parent Heart Watch, January 2015.
• Member Pac-12 Conference Brain Trauma Task Force, March 2015 – present
• Pac-12 Student Athlete Health Board, July 2015 – present
• Medical Advisory Board of the National Basketball Players Association, August 2015 – present
• Strategic Advisory Board National Basketball Association, September 2015 - present

7) **Board Certification:**


8) **Licensure:**

State of Washington: MD00035714

9) **Professional Memberships:**

American Board of Family Practice
American Academy of Family Physicians
American Medical Society for Sports Medicine
American College of Sports Medicine

10) **Teaching Responsibilities:**

    **Clinical Instruction:**

School of Medicine:

Residency:
• Faculty Preceptor, Orthopedics & Sports Medicine, required rotations for PGYI and PGYII residents, University of Washington Family Medicine Residency. Supervise residents 1-2 half days per week in Sports Medicine clinics. (1998-present)
• Faculty Preceptor, Sports Medicine, elective rotation PGYII residents interested in applying to sports medicine fellowships, University of Washington Internal Medicine Residency (2005-present)
• Faculty Preceptor, Sports Medicine, elective rotation PGYII residents interested in applying to sports medicine fellowships, University of Washington Pediatrics Residency (2003-present)
• Faculty Preceptor, Sports Medicine, elective rotation for PGYII residents from outside programs applying to University of Washington Primary Care Sports Medicine Fellowship. Supervise visiting residents 2-3 half days per week for 2 week rotations, 1-5 visiting residents a year. (2000-present)
• Faculty Preceptor, Women’s Health, elective rotation PGYII residents, University of Washington Pediatric Residency. (1999-2000)

Fellowship:
• Faculty Preceptor, University of Washington Primary Care Sports Medicine Fellowship. Responsibilities include sports medicine continuity clinic (1 session 6-12 months a year), training room clinic (1 session per week 12 months a year) and event supervision of sports medicine fellow. (1998-present)
• Faculty Preceptor, required rotation for Physical Medicine and Rehabilitation Sports Medicine Fellow. ½ day a week for 2 months. (2009 – present)

Educational Administration:

Undergraduate:
• Faculty Sponsor, research project (Nels Carroll), University of Washington, Project entitled, “Incidences and effects of fatigue in collegiate distance running student athletes” (2006-2007)
• Faculty Sponsor, GEN ST 350 (Yvonne Tyler), University of Washington, Project entitled, “Stingers, Brachial Plexopathy and Transient Quadriplegia in College Football.” (2006)
• Faculty Sponsor, GEN ST 350 (Paul Homer), University of Washington, Project entitled, “Platelet Rich Plasma” (2009)

Residency:
• Faculty Sponsor, research project (William Callahan), University of Washington, Project entitled, “Ferritin Levels in Female Collegiate Distance Runners” (2006-2007)
• Liaison between UW Medical Center, the Department of Family Practice, and Hall Health Primary Care Center in assessing compliance with Medicare regulations and supervision requirements and establishing Hall Health as a non-hospital teaching site for the University of Washington Department of Family Medicine and Department of Pediatrics (2006-2013)
Fellowship:
- Director, Primary Care Sports Medicine Fellowship, University of Washington. (2004 – 2014) Responsibilities included:
  - Coordinate rotations, arrange preceptors, and adjust schedule as necessary.
  - Obtain, record, and discuss evaluations of the fellow by rotation preceptors.
  - Obtain, record, and discuss evaluations of the rotation and rotation preceptors by the fellow.
  - Ensure compliance with ACGME standards and policies
  - Ensure compliance with UWMC standards and policies
  - Ensure compliance with Medicare standards and policies
  - Negotiate and execute complex working agreements between Hall Health Primary Care Center, UWMC, and the Department of Family Practice
- Course Director, Sports Academic Conference, 2004 – 2008, four meetings monthly September through May including an imaging conference, journal club, and didactic presentations.
- Course Chair, Musculoskeletal Ultrasound Didactic Course, 2010, developed MSK US course in conjunction with PM&R and rheumatology in accordance with AMSSM curriculum for sports medicine, PM&R, rheumatology, and MSK radiology fellows and faculty.
- Co-Chair, MSK US Committee, 2010 – 2013, formed to ensure competence and collaboration among specialties performing MSK US

Didactic Presentations:
- University of Washington Physician’s Assistants Class
  - 1998 Eating Disorders
- University of Washington Family Medicine Residency:
  - 1999 Stress Fractures
  - 1999 Knee Exam and Common Problems of the Knee
  - 2001 Mild Traumatic Brain Injury
  - 2001 Joint Injections: Indications and Technique
  - 2001 Exercise-Induced Amenorrhea
  - 2002 Joint Injections: Indications and Technique
  - 2003 GI/GU Problems in Athletes
  - 2003 Evaluation and Treatment of Neck Pain
  - 2003 Evaluation and Treatment of Back Pain
  - 2003 Foot and Ankle Problems
  - 2004 Anemia and Low Iron in Athletes: Effect on Performance and Optimal Treatment
  - 2004 Concussion in Sport
  - 2005 Tendinosis and Tendinopathy: Pathogenesis and Emerging Treatments
  - 2006 Special Concerns of the Female Athlete
  - 2009 Emerging Treatments in Tendinopathy
- University of Washington Family Medicine Residency Faculty
  - 2010 Joint Injections
  - 2010 Emerging Concepts and Treatments in Tendinopathy
• University of Washington School of Medicine, HuBio 553
  o 1999  Knee, Hip, and Ankle, 1999
• University of Washington Physical Medicine and Rehabilitation Residency
  o 1999  Stress Fractures
  o 2001  Knee Exam and Common Knee Problems
  o 2004  Knee Exam and Common Knee Problems
  o 2009  Tendinopathy: Pathogenesis and Emerging Treatments
  o 2013  Platelet Rich Plasma in Musculoskeletal Injuries
• University of Washington School of Medicine, Orthp 585, Sports Medicine:
  o 1999  Concussion
  o 2000  Concussion in Sport
  o 2001  Mild Traumatic Brain Injury in Sport
  o 2002  Mild Traumatic Brain Injury in Sport
  o 2003  Concussion: Diagnosis and Return to Play
  o 2004  Concussion
  o 2005  Concussion in Sport
  o 2006  Concussion in Sport
  o 2006  GI/GU Problems in the Athlete
  o 2006  Anemia and Low Iron in Athletes: Effect on Performance and Optimal Treatment
  o 2007  Concussion in Sport
  o 2007  Special Concerns of the Female Athlete: Iron Deficiency, Exercise Associated Menstrual Dysfunction, and Eating Disorders
  o 2008  Concussion in Sport
  o 2008  Special Concerns of the Female Athlete: Iron Deficiency, Exercise Associated Menstrual Dysfunction, and Eating Disorders
  o 2009  Special Concerns of the Female Athlete: Iron Deficiency, Exercise Associated Menstrual Dysfunction, and Eating Disorders
  o 2009  GI Problems in Athletes
  o 2010  Special Concerns of the Female Athlete: Iron Deficiency, Exercise Associated Menstrual Dysfunction, and Eating Disorders
  o 2010  GI Problems in Athletes
  o 2011  Platelet Rich Plasma
  o 2011  Concussion in Sport
  o 2012  Concerns and Controversies in Concussion
  o 2012  Platelet Rich Plasma
  o 2013  Concerns and Controversies in Concussion
  o 2013  Platelet Rich Plasma
  o 2014  Concerns and Controversies in Concussion
  o 2014  Platelet Rich Plasma
• University of Washington Orthopaedic Sports Medicine Conference
  o 2002  Update on Mild Traumatic Brain Injury
• University of Washington Nurse School of Nursing, Nurs 501
  o 2003  Evaluating Common Musculoskeletal Problems
  o 2005  Evaluating Common Musculoskeletal Problems
  o 2006  Evaluating Common Musculoskeletal Problems
- University of Washington Internal Medicine Residency
  - 2005  Knee Exam and Common Knee Problems
- University of Washington Nurse School of Nursing, Nurs 5CLIN 500
  - 2006  Musculoskeletal Assessment
  - 2008  Comprehensive Musculoskeletal Assessment
- University of Washington Nurse School of Nursing, Nurs 510
  - 2004  Musculoskeletal Complaints
  - 2005  Musculoskeletal Complaints
  - 2006  Musculoskeletal Complaints
  - 2007  Musculoskeletal Complaints
  - 2008  Upper Extremity Injuries
- University of Washington Primary Care Sports Medicine Fellowship, Sports Medicine Academic Conference Series:
  - 2005  Sports Hernia
  - 2005  Tendinopathy: Pathogenesis and Emerging Treatments
  - 2005  Changing Paradigms in Concussion Management
  - 2005  Muscle Injury and the Use of Corticosteroid in Sport
  - 2006  Medical Legal Aspects of Sports Medicine
  - 2007  Concussion: Update and Controversies
  - 2008  Emerging Treatments in Tendinopathy
  - 2009  Inflammation: Friend or Foe. From Corticosteroids to Platelet Rich Plasma
  - 2010  Tendinopathy and Platelet Rich Plasma
  - 2011  Update on Platelet Rich Plasma
  - 2012  Sickle Cell Trait and the Athlete
  - 2013  Update on Platelet Rich Plasma
- University of Washington Masters in Sports Leadership Program, EDLP 598
  - 2007  Ethical and Institutional Issues in Sports Medicine
  - 2007  Ethical and Institutional Issues in Sports Medicine II
  - 2008  Medical Care in Collegiate Athletes
- University of Washington Pain Seminar
  - 2013  Platelet Rich Plasma in Musculoskeletal Injuries
- University of Washington Rheumatology Grand Rounds
  - 2015  Platelet Rich Plasma in Musculoskeletal Medicine

**Continuing Medical Education Attended:**

- University of Washington 29th Annual Advances in Family Practice, Seattle, WA 2001
• American College of Sports Medicine 49th Annual Meeting, St. Louis, MO, 2002
• American Medical Society for Sports Medicine 11th Annual Meeting, Orlando, FL, 2002
• American Medical Society for Sports Medicine 12th Annual Meeting, San Diego, CA 2003
• Providence Medical Center 10th Annual Sports Medicine Conference, Winthrop, WA, 2004
• American Medical Society for Sports Medicine 13th Annual Meeting, Vancouver, B.C. 2004
• American College of Sports Medicine 51st Annual Meeting, Indianapolis, IN 2004
• American Medical Society for Sports Medicine 14th Annual Meeting, Austin, TX, 2005.
• University of Washington Women’s Healthcare Update, Seattle, WA 2007
• American Medical Society for Sports Medicine 16th Annual Meeting, Albuquerque, NM, 2007
• Musculoskeletal Ultrasound, Mayo, MN 2008.
• American College of Sports Medicine 56th Annual Meeting, Seattle, WA 2009
• American Academy of Family Practice Board Review Course, Seattle, WA 2009.
• American Medical Society for Sports Medicine 19th Annual Meeting, Cancun, Mexico, April 2010
• Advanced Musculoskeletal Ultrasound Work-Shop, at the American Medical Society for Sports Medicine 19th Annual Meeting, Cancun, Mexico, April 2010
• American College of Sports Medicine 57th Annual Meeting, Baltimore, MD 2010
• American Orthopedic Society for Sports Medicine Annual Meeting, Providence, RI 2010
• American Academy of Physical Medicine and Rehabilitation Annual Meeting, Seattle, WA 2010
• Advanced Team Physician Course, Calvi, Corsica, France, 2011
• 3rd IOC World Congress on Injury and Illness Prevention, Monte Carlo, Monaco, 2011
• Swedish Society of Sports Medicine, Gotthenberg, Sweden, 2011
• American Medical Society for Sports Medicine 21st Annual Meeting, Atlanta, GA 2012
• 2nd International Scientific Tendinopathy Symposium, Vancouver, BC 2012
• American Medical Society for Sports Medicine 22nd Annual Meeting, San Diego, CA 2013
• 60\textsuperscript{th} Annual American College of Sports Medicine Annual Meeting, Indianapolis, IN 2013.
• 55\textsuperscript{th} American Society of Hematology Annual Meeting and Exposition, New Orleans, LA 2013.
• American Medical Society for Sports Medicine 23\textsuperscript{rd} Annual Meeting, New Orleans, LA 2014.
• 4\textsuperscript{th} IOC World Congress on Injury and Illness Prevention, Monte Carlo, Monaco, 2014
• The OrthoBiologic 5\textsuperscript{th} Annual Conference on Regenerative Medicine, Las Vegas, NV, 2014.
• American Medical Society for Sports Medicine 24\textsuperscript{th} Annual Meeting, Hollywood, FL, April 2014.
• 62\textsuperscript{nd} American College of Sports Medicine Annual Meeting, San Diego, CA 2015.

11) Editorial Responsibilities:

  o Developed series concept devoted to distilling essential diagnostic information into clinically applicable format with a focus on management and return to play issues.
  o Solicited, reviewed (also peer-reviewed) and edited articles for publication.
• Associate Editor, Current Reviews in Musculoskeletal Medicine, 2005 – 2008
  o Multi-disciplinary journal targeted to sports medicine professional from various backgrounds (family medicine, orthopedics, physical medicine and rehabilitation, pediatrics, internal medicine, physical therapy).
  o Appointed and managed five assistant editors.
  o Initial pre-launch quota of 35 submitted articles.
• Associate Editor, The British Journal of Sports Medicine 2008 – present
• Reviewer, Clinical Journal of Sports Medicine
• Reviewer, British Journal of Sports Medicine
• Reviewer, Medicine and Science in Sports and Exercise
• Reviewer, Annals of Internal Medicine
• Reviewer, Sports Health
• Reviewer, Circulation
• Reviewer, Pediatrics
• Reviewer, Scandinavian Journal of Sports and Exercise
• Reviewer, British Medical Journal
12) Special National Responsibilities:

- American Medical Society for Sports Medicine, Diversity Committee 1997-2000.
- Chairperson, Membership Committee, American Medical Society for Sports Medicine, 2002-2006.
- Board of Directors, American Medical Society for Sports Medicine, 2002-2004.
- Board of Directors, American Medical Society for Sports Medicine, 2004-2006.
- American College of Sports Medicine Committee on Women, Sport, & Physical Activity, 2004-07.
- American Medical Society for Sports Medicine, 2nd Vice President, 2007-2008
- American Medical Society for Sports Medicine, 1st Vice President, 2008 – 2009.
- Course Chair, Musculoskeletal Ultrasound Pre-Conference, Tampa, FL, 2009.
- American Medical Society for Sports Medicine, President, 2009 – 2010.
- Course Director, Musculoskeletal Ultrasound Pre-Conference, Cancun, Mexico, 2010.
- American Medical Society for Sports Medicine, Immediate Past President 2010 – 2011.
- American Medical Society for Sports Medicine, Education Committee, 2010 – present.
- Chair, American Medical Society for Sports Medicine, Executive Director Search Committee, 2010.
- Chair, American Medical Society for Sports Medicine Concussion Position Statement writing group, 2011.
- American Medical Society for Sports Medicine Foundation, Board Member, 2011 – present
- American Medical Society for Sports Medicine, Program Committee, 2010 – 2011.
- Participant, ACSM and CHAMP Summit on SCT: Mitigating Risks for Warfighters and Athletes, Washington D.C., September 2011.
- AMSSM representative to Inter-association task force of preventing sudden death in collegiate conditioning sessions, Colorado Springs, CO, January 2012.
• Writing Group, Summit on ECG Interpretation in Athletes. Sponsored by the American Medical Society for Sports Medicine in partnership with the European Society of Cardiology Section of Sports Cardiology, Pediatric & Congenital Electrophysiology Society (PACES), the FIFA Medical Assessment and Research Center (F-MARC), and the British Journal of Sports Medicine, the goal is to develop consensus standards and a comprehensive online training module to educate physicians around the world in ECG interpretation in athletes. Seattle, WA. February 2012
• Co-chair, American College of Sports Medicine Task Force on Sickle Cell Trait and the Athlete. Indianapolis, IN March 2012.
• American Medical Society for Sports Medicine, Program Committee, 2012 - present
• Chair, American Medical Society for Sports Medicine Task Force on Musculoskeletal Ultrasound Curriculum, 2013-2014.
• AMSSM representative to College Athletic Trainers Association/NCAA Safety in College Football Summit, Atlanta, GA, January 2014.
• Representative NCAA Task Force on Sudden Cardiac Death in Athletes, Sept 2014.
• Chair, AMSSM Academic Interest Group, July 2014 – present
• Cardiac Safety Research Consortium and the Federal Drug Administration Pediatric Think Tank Meeting, Bethesda, MD, February 2015.
• Pac-12 Conference Brain Trauma Task force, 5/2015 – present.
• Pac-12 Student Athlete Health Board, 7/2015 – present
• Chair, Medical Advisory Board, National Basketball Association Players Association, 9/2015 – present
• National Basketball Association Strategic Advisory Board – 10/2015 - present

13) Special Local Responsibilities:

**Department of Family Medicine**

• Clinical Faculty, 1998 – 2012
• Faculty Primary Care Sports Medicine Fellowship 1998 – present
• Director Primary Care Sports Medicine Fellowship 2004 – 2014
• Advancement Committee, 2012 – present
• Regular Faculty, February 2012 - present
• Sports Medicine Section Chief, July 2012 – present
• Clinical Chairs Advisory Committee, July 2012 – present
• Industry Relations Committee, July 2015 – present

**Hall Health Primary Care Center:**

• Medical Director, Eating Concerns Program, Hall Health Primary Care Center, 1998-1999.
• Unit Head, Hall Health Physical Therapy Clinic, University of Washington, 2003-2010.
• Director, Primary Care Sports Medicine Fellowship, Hall Health Primary Care Center, University of Washington, 2004-present.
• Unit Head, Hall Health Intercollegiate Athletic Department Clinic, University of Washington, 2006 – present.
• Co-chair, Sports Medicine and Rheumatology Essentials for the Primary Care Provider, 2006, 2008
• Musculoskeletal Services Director, 2010 – March 2013

**Medical School:**

Chair, Musculoskeletal Ultrasound Privileging Working group – April – July 2015
Appointments and Promotions Committee – July 2015 - present

**University:**

• Team Physician, St. Mary’s College, South Bend, IN, 1993-1996
• Assistant Team Physician, University of Notre Dame, South Bend, IN, 1993-1996
• Team Physician, Ball State University, Muncie, IN, 1996-1997
• Team Physician, University of Washington, 1998-present
• Associate Head Team Physician, University of Washington, 2004-present
• Committee Member, UWMC Seattle Marathon Medical Care and Coverage, 2006
• Event Physician and Medical Coordinator, Seattle Breast Cancer 3-Day Walk for the Cure, 2006 – 2009
• Head football physician, 2013 – present.

**Local Community**

• Team Physician, Washington High School, South Bend, IN, 1993-1996
• Volunteer Physician, National Youth Sports Program, South Bend, IN, 1993-1996, Pre-participation physicals
• Event Physician, Sunburst Triathlon, South Bend, IN, 1995
• Event physician for the 1995 NCAA Regional Men’s Tennis Tournament
• Event Physician, Gus Macker 3 on 3 Basketball Tournament, Muncie, IN, 1996, 1997
• Team Physician, York Town High School, Muncie, IN 1996-1997
• Team Physician, Muncie Southside High School, Muncie, IN, 1997
• Event Physician, State of Indiana Golden Gloves Tournament, Indianapolis, IN, 1997
• Event Physician, National Christian Collegiate Athletic Association Men’s National Basketball Tournament, 1997
• Event Physician, Big Ten Women’s Basketball Championship, Indianapolis, IN, 1997
• Event Physician, National Collegiate Athletic Association National Swimming and Diving Championships, Indianapolis, IN, 1997
• Event Physician, University of Washington Pac-8 Hockey Championship Tournament, 2004
• Event Physician, NCAA Regional Women’s Basketball Tournament, 2004
• Cardiac screening, Blanchet High School, 2008
• Pre-participation exams, Blanchet High School, 2008
• Event Physician, NCAA Regional Women’s Basketball Tournament, 2009
• Event Physician, NCAA Regional Women’s Basketball Tournament, 2010
• Pre-participation exams, Blanchet High School, 2010
• Cardiac Screening, Auburn High School, 12/2010
• Cardiac Screening Jackson High School, 2/2011
• Cardiac Screening South Whidbey Island High School, 3/2011
• Pre-participation exams, Blanchet High School, 2011
• Cardiac Screening Garfield High School, 8/2011
• Cardiac Screening Redmond High School, 10/2011
• Cardiac Screening Nathan Hale High School, 11/2011
• Cardiac Screening Franklin High School, 2/2012
• Cardiac Screening Burien High School, 4/2012
• Cardiac Screening Roosevelt High School, 5/2012
• Pre-participation exams, Blanchet High School, 2012
• Cardiac Screening Lindbergh High School, 7/2012
• Cardiac Screening Snohomish High School, 11/2012
• Medical Advisory Board, Nick of Time Foundation, 2013 - present
• Cardiac Screening Holy Names High School, 1/2013
• Cardiac Screening Edmonds-Woodway High School, 2/2013
• Cardiac Screening Bishop Blanchet High School, 4/2013
• Cardiac Screening Cascade High School, 5/2013
• Cardiac Screening Issaquah High School, 6/2013
• Cardiac Screening Shoreline Community Center, 8/2013
• Cardiac Screening Enum Claw High School, 10/2013
• Cardiac Screening Juanita High School, 11/2013
• Cardiac Screening Mercer Island High School, 12/2013
• Cardiac Screening Meadowdale High School, 2/2014
• Cardiac Screening Monroe High School, 3/2014
• Cardiac Screening Inglemore High School, 5/2014
• Cardiac Screening Marysville Pilchuck, 8/2014
• Cardiac Screening Pacific Northwest Ballet, 9/2014
• Cardiac Screening Bellingham High Schools, 10/2014
• Cardiac Screening Lake Washington High School, 11/2014
• Cardiac Screening Ingraham High School, 12/2014
• Cardiac Screening Garfield High School, 3/2015
• Cardiac Screening Bellevue High School, 4/2015
• Cardiac Screening Mariner High School, 5/2015
• Cardiac Screening Mountlake Terrace High School, 6/2015
• Cardiac Screening Lakeway Terrace High School, 8/2015

14) Research Funding:

• Harmon KG, Drezner JA. “Ultrasound Initiative” (Sonosite) for $450,000 (2013 – 2016)

• Edenfield K, Clugston J, Reifstek F, Harmon KG, Dillion M, Rogowski J. “Cardiovascular Screening with History, Physical, ECG and Echo in College Athletes. 5-Year Results from Two Division I Institutions” $10,448. (2016 – 2017)

15) Bibliography:

a. Manuscripts in Refereed Journals:


16. Drezner JA, Rao AL, Heistand J, Bloomingdale MK, Harmon KG. Effectiveness of emergency response planning for sudden cardiac arrest in United States high schools...


65. Drezner JD, Prutkin JM, Harmon KG, O’Kane JW, Pelto HF, Rao AL, Hassebrock JD, Peteck CT, Timonen M, Zigman ML, Owens DS. Cardiovascular Screening in College Athletes: A 4-year Analysis from the University of Washington. J Am Coll Cardiol. 2015;65(21);2353-5.


69. Harmon KG, Drezner JA. Pro: ECG Screening in the Young Athlete. PMR (accepted for publication)

71. Gingrich S, Kraback B, Zigman M, **Harmon KG**. Advanced patient age does not impair outcomes in platelet-rich-plasma treatment of tendinopathy. PMR (submitted for publication)

72. Asif I, **Harmon KG**. The Incidence and Etiology of Sudden Cardiac Death in Athletes. JAT. (Submitted for publication)

**b. Book Chapters:**


c. Published Books:
None

d. Other Publications:
None

e. Abstracts:


16) Other

a. Poster Presentations:


b. **Local and Regional Lectures by Invitation:**

1. **Harmon KG.** Anterior Cruciate Ligament Rupture in Women. Grand Rounds Ball Memorial Hospital, Muncie, IN, 1997.


c. National Lectures by Invitation:


6. **Harmon KG.** Pre-Participation Exam. UW 29th Annual Advances in Family Practice, Seattle, WA, 2001


10. **Harmon KG.** Gender Differences in ACL Injuries. Workshop presentation at AMSSM Annual Meeting in Buena Vista, FL, 2002


42. Harmon KG. Sickle Cell Trait and the Athlete. AMSSM Exchange Speaker at the American College of Sports Medicine, Baltimore, MD, May 2010.

52. Harmon KG. Epidemiology of Death Associated with Sickle Cell Trait in NCAA Athletes. Indianapolis, IN. March 2012.


57. Harmon KG. Causes of Sudden Cardiac Death in Athletes: Do We Have It Right?. Prevention of Sudden Cardiac Death in the Young. Seattle, WA, January 2013.


71. Harmon KG. “Evidence Based Perspectives on Cardiac Care and Screening.” National Athletic Trainer’s Association. Indianapolis, IN, June 2014.


d. International Lectures by invitation

Autologous Blood & Platelet-rich Plasma

May 20, 2016

Shana Johnson, MD
Physical Medicine & Rehabilitation
WA – Health Care Authority

Platelet-rich Plasma & Autologous Blood

- Promise as a regenerative therapy
- Local delivery of a high dose of growth factors and other bioactive proteins
Indications for PRP or ABI

Tendinopathies
- Lateral epicondylitis
- Achilles tendinopathy
- Patellar tendinopathy
- Rotator cuff tendinopathy

Plantar fasciitis

Acute musculoskeletal injuries

Osteoarthritis

Current State Agency Policy

**Medicaid** – Non-covered

**PEBB** – Investigational/Experimental

**Labor & Industries** – Non-covered

**Dept of Corrections** – Prior Authorization
Agency Medical Director Concerns – Emerging Therapy

Safety = Medium
Efficacy = Medium/ High
Cost = Medium

Agency Utilization

Unique Individuals, Number of Procedures, Procedures/Individual by Year
Centers for Medicare and Medicaid Services (CMS)

PRP – An autologous blood-derived product – will be covered only for the treatment of chronic non-healing diabetic, venous and/or pressure wounds.
Autologous Blood & Platelet-rich Plasma

Payers – Other

Aetna
• Considers autologous blood injection and platelet-rich plasma experimental and investigational for the treatment of tendinopathies (e.g., elbow, heel, knee, patella, and shoulder) and all other indications.

Cigna
• Does not cover the use of autologous platelet-derived growth factors (also known as PRP, platelet gel, platelet-rich concentrate, autogenous platelet gel, or platelet releasate) for ANY condition or indication because their use is considered experimental, investigational, or unproven.

Clinical Guidelines

Mixed recommendations. Some support use in lateral epicondylitis (4 guidelines). Other indications are not supported or not commented on.

• American College of Occupational and Environmental Medicine (2012) – Supports use for chronic lateral epicondylitis

• American Academy of Orthopaedic Surgeons (2013) – No recommendation regarding PRP use for knee OA
Health Technology Assessments

HTAs have noted inadequate evidence of efficacy or low quality of evidence.

NICE (2013/2014)
• Evidence of efficacy inadequate for tendinopathies, plantar fasciitis, knee OA

HEALTHPACT (2013)
• Low quality evidence for knee OA

CADTH (2014)
• Insufficient evidence to guide recommendations

Systematic Reviews

Systematic reviews have suggested benefit of PRP in knee OA

• Laudy (2014) knee OA--PRP injections more effective at improving function compared with HA and saline injections at 6 months

• Meheux (2015) knee OA--There is moderate evidence suggesting that PRP injections are more efficacious than HA and saline at improving function and pain up to 12 months post-injection (5/6 trials showed significant differences)

• Kanachanatwan (2015) Knee OA PRP was associated with better short-term (≤1 year) functional outcomes (WOMAC, IKDC, and EQ-VAS) than that of treatment with HA or placebo.
**Elbow Epicondylitis**

*Outcomes were the same or better with PRP or ABI versus control group*

**PRP vs Control** (Anesthetic, Steroid)
- Short-term—Pain and function were similar between groups
- Intermediate term—better with PRP (pain scores, pain success, function)
- Long-term—better with PRP (function scores, pain score, pain success)

**ABI vs Control** (steroid)
- Short-term—better with ABI (pain and function scores)
- Intermediate term—better with ABI (pain and function scores)

**PRP vs ABI**
- Short-term—better with PRP (pain and function)
- Intermediate term—better with PRP (function)

---

**Knee Osteoarthritis**

*Only knee OA had evidence of benefit with PRP*

**PRP vs HA**
- Short-term—no differences in pain or function
- Intermediate term—PRP better (function scores, pain success)
- Long-term—PRP better (pain and function success, function scores)

**PRP vs Saline**
- Short-term—better with PRP (pain and function scores)
- Intermediate-term—better with PRP (pain and function scores)
- Long-term—no data
Agency Recommendation

PRP and ABI are Non-covered for the following conditions:

- Achilles tendinopathy
- Patellar tendinopathy
- Rotator cuff tendinosis and/or partial tear
- Plantar fasciitis
- Acute injuries
- TMJ OA
- Hip OA

PRP is a covered benefit under the following conditions:

1. Diagnosis of chronic lateral epicondylitis
   a. After failure of conservative therapy
   b. No more than one without clinically meaningful improvement in pain and function
   c. Maximum of one in one year
2. Diagnosis knee osteoarthritis
   a. After failure of conservative therapy
   b. No more than three without clinically meaningful improvement in pain and function
   c. Maximum of three in one year
Autologous Blood & Platelet-rich Plasma

Questions?

More Information
www.hca.wa.gov/hta/Pages/Platelet-rich_Plasma.aspx
Order of Scheduled Presentations:

**Autologous Blood/ Platelet-rich Plasma Injections**

<table>
<thead>
<tr>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

No requests to provide public comment on the technology review were received.
Autologous Blood or Platelet-Rich Plasma Injections

May 20, 2016

Prepared by:
Robin Hashimoto, PhD
Andrea C. Skelly, PhD, MPH
Erika Brodt, BS

Background

• Platelet Rich Plasma (PRP) Injections & Autologous Blood Injections (ABI)
  • Both blood products are autologous
  • Both introduce growth factor-rich platelets to site of injury
    • PRP contains a supraphysiological concentration of platelets
    • Platelets contain over 30 growth factors that stimulate healing by recruiting stem cells and inducing cell proliferation, cell differentiation, and extracellular matrix formation
Indications for PRP and/or ABI
(in included studies)

• Tendinopathies
  • Tennis elbow (lateral epicondylitis)
  • Achilles tendinopathy
  • Patellar tendinopathy
  • Rotator cuff tendinopathy

• Plantar fasciitis

• Traumatic musculoskeletal injuries
  • Acute local muscle injury
  • Ankle sprain
  • Osteochondral lesions to the talus
  • Achilles tendon rupture
  • Temporomandibular joint (TMJ) dislocation

• Osteoarthritis
  • Knee
  • Hip
  • TMJ

• Low back pain:
  • No studies met inclusion criteria

PRP injection procedure

PROCESS OF PRP THERAPY

1. Collect blood
   - 9-40ml of blood is drawn from the patient’s arm.

2. Separate the platelets
   - The blood is then placed in a centrifuge. The centrifuge spins and separates the platelets from the rest of the blood components.

3. Extract platelet-rich plasma
   - Extract 3-fifth of plasma-rich plasma.

PRP is injected into and around the inflamed tendons.
Key Questions

1. What is the evidence of the short- and long-term **efficacy and effectiveness** of autologous PRP or whole blood injections compared with alternative treatment options or no treatment/placebo?

2. What is the evidence regarding short- and long-term **harms and complications** of autologous PRP or whole blood injections compared with alternative treatment options or no treatment/placebo?

3. Is there evidence of **differential efficacy, effectiveness, or safety** of autologous PRP or whole blood injections compared with alternative treatment options? no treatment/placebo? Include consideration of age, sex, race, ethnicity, socioeconomic status, payer, and worker’s compensation?

4. What is the evidence of **cost-effectiveness** of autologous PRP or whole blood injections compared with alternative treatment options?

---

Inclusion Criteria

- **Population:**
  - Patients with musculoskeletal soft tissue injuries, tendinopathies, osteoarthritis, or low back pain.
  - (skin wounds, bone fractures, maxillofacial surgery, dental conditions were excluded)

- **Intervention:**
  - Autologous PRP or whole blood injections
  - (injections used in conjunction with other procedures such as surgery were excluded)

- **Comparators:**
  - Alternative treatment(s), placebo, or no treatment
Comparators in included studies

- Conservative
  - Dry needling/pepperling
  - Corticosteroid and/or anesthetic injection
  - Saline injection
  - Hyaluronic acid (HA) injection
  - Dextrose prolotherapy injections
  - Exercise
  - Extracorporeal shock wave therapy (ESWT)
  - Low level laser therapy
  - Transcutaneous electrical nerve stimulation (TENS)
- Surgery

Inclusion Criteria

- Outcomes:
  - Primary outcomes:
    - Function
      - functional success (% patients)
      - function outcome measure scores
    - Pain
      - pain success (% patients)
      - pain outcome measure scores
    - Harms or complications
  - Secondary outcomes:
    - Time to recovery, return to normal activities (sports, work, or activity level), quality of life, patient satisfaction, recurrence, medication use, secondary procedures (e.g., surgery)
    - (Non-clinical outcomes were excluded)
- Follow-up definitions:
  - Short-term: ≤3 months
  - Intermediate-term: >3 to <12 months
  - ≥12 months
Inclusion Criteria

- Study design:
  - Focus was on studies with the least potential for bias.
  - KQ1 (efficacy, effectiveness)
    - RCTs
    - Nonrandomized comparative (cohort) studies
  - KQ2 (safety)
    - RCTs
    - Nonrandomized comparative (cohort) studies
    - Case series specifically designed to evaluate harms with N ≥ 100
  - KQ3 (differential efficacy and safety)
    - RCTs that stratified results for both treatment groups by patient characteristics of interest, e.g.:
  - KQ4 (cost)
    - Formal economic analyses:
      - Cost-effectiveness, cost-utility, cost-minimization, or cost-benefit studies

<table>
<thead>
<tr>
<th>Pain success</th>
<th>PRP</th>
<th>Steroid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>75% (75/100)</td>
<td>60% (60/100)</td>
</tr>
<tr>
<td>Female</td>
<td>80% (80/100)</td>
<td>75% (75/100)</td>
</tr>
</tbody>
</table>

Literature Search

1. Total Citations (n=2259)
2. Title/Abstract exclusion (n=2178)
3. Retrieved for full-text evaluation (n=81)
4. Excluded at full-text review (n=17*)
5. Publications included (n = 64)
   - 54 RCTs (in 56 publications)
   - 8 nonrandomized comparative studies
   - 0 case series
   - 0 economic evaluations

Search period: through November 23, 2015
Strength of Evidence (SoE)

- SoE for the overall body of evidence for primary outcomes was assessed based on the following domains:
  - **Risk of bias**: the extent to which the included studies have protection against bias
    - Appropriate randomization
    - Allocation concealment
    - Intention to treat analysis
    - Blind assessment of outcomes
    - Co-interventions applied equally
    - Adequate follow-up (≥80%) and similar % follow-up between groups (<10% difference)
    - Controlling for confounding
  - **Consistency**: the degree to which the included studies report results that are similar in terms of range and variability.
  - **Directness**: describes whether the evidence is directly related to patient health outcomes.
  - **Precision**: describes the level of certainty surrounding the effect estimates.
  - **Publication bias**: is considered when there is concern of selective publishing.

<table>
<thead>
<tr>
<th>Quality rating</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>High confidence that the evidence reflects the true effect.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Moderate confidence in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.</td>
</tr>
<tr>
<td>Low</td>
<td>Confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.</td>
</tr>
<tr>
<td>Insufficient</td>
<td>Very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of the effect.</td>
</tr>
</tbody>
</table>
KQ1: Efficacy and Effectiveness

Tendinopathies
Plantar Fasciitis
Acute Injuries
Osteoarthritis

Tendinopathies

Tennis Elbow
Achilles Tendinopathy
Patellar Tendinopathy
Rotator Cuff Tendinosis and/or Partial Tears
Tennis Elbow: PRP vs. ABI (1 of 4 slides)

- Evidence base: 4 RCTs
  - N=28-150 per trial

- Minimum symptom duration: 3-6 months
  - 3 months: 3 RCTs
  - 6 months: 1 RCT

- Number of injections: 1-2
  - Single injection: 3 RCTs
  - 2 injections: 1 RCT

Tennis Elbow: FUNCTION PRP vs. ABI (2 of 4 slides)

### 1.3.1 Short-term

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>PRP Mean</th>
<th>SD</th>
<th>Total</th>
<th>ABI Mean</th>
<th>SD</th>
<th>Total</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creaney 2011</td>
<td>89.5</td>
<td>6</td>
<td>95</td>
<td>83.1</td>
<td>6</td>
<td>89</td>
<td>0.50</td>
</tr>
<tr>
<td>Raeissadat 2014*</td>
<td>79.5</td>
<td>12</td>
<td>91</td>
<td>72.6</td>
<td>12</td>
<td>84</td>
<td>0.34</td>
</tr>
<tr>
<td>Raeissadat 2014@</td>
<td>82.4</td>
<td>13.2</td>
<td>95.6</td>
<td>77.2</td>
<td>16.5</td>
<td>93.7</td>
<td>0.35</td>
</tr>
<tr>
<td>Thanasa 2011</td>
<td>9.2</td>
<td>0.9</td>
<td>10</td>
<td>8.7</td>
<td>0.7</td>
<td>9.4</td>
<td>0.60</td>
</tr>
<tr>
<td><strong>Subtotal</strong> (95% CI)</td>
<td>136</td>
<td></td>
<td>151</td>
<td>124</td>
<td></td>
<td>147</td>
<td><strong>0.21 (0.04, 0.38)</strong></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau² = 0.00; Chi² = 0.86, df = 3 (P = 0.83); I² = 0%

Test for overall effect: Z = 2.48 (P = 0.01)

### 1.3.2 Intermediate-term

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>PRP Mean</th>
<th>SD</th>
<th>Total</th>
<th>ABI Mean</th>
<th>SD</th>
<th>Total</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creaney 2011</td>
<td>-35.8</td>
<td>23.7</td>
<td>59</td>
<td>-31.5</td>
<td>19.6</td>
<td>70</td>
<td>0.51</td>
</tr>
<tr>
<td>Raeissadat 2014*</td>
<td>81.2</td>
<td>16</td>
<td>97</td>
<td>74.9</td>
<td>16</td>
<td>91</td>
<td>0.39</td>
</tr>
<tr>
<td>Thanasa 2011</td>
<td>9.3</td>
<td>0.5</td>
<td>10</td>
<td>8.9</td>
<td>0.9</td>
<td>9.8</td>
<td>0.64</td>
</tr>
<tr>
<td><strong>Subtotal</strong> (95% CI)</td>
<td>116</td>
<td></td>
<td>132</td>
<td>104</td>
<td></td>
<td>118</td>
<td><strong>0.48 (0.21, 0.75)</strong></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau² = 0.00; Chi² = 0.17, df = 2 (P = 0.92); I² = 0%

Test for overall effect: Z = 3.49 (P = 0.0005)

### 1.3.3 Long-term

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>PRP Mean</th>
<th>SD</th>
<th>Total</th>
<th>ABI Mean</th>
<th>SD</th>
<th>Total</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raeissadat 2014*</td>
<td>78.2</td>
<td>18</td>
<td>104</td>
<td>73.2</td>
<td>18</td>
<td>91</td>
<td>0.27</td>
</tr>
<tr>
<td><strong>Subtotal</strong> (95% CI)</td>
<td>31</td>
<td></td>
<td>135</td>
<td>30</td>
<td></td>
<td>125</td>
<td><strong>0.27 (0.23, 0.31)</strong></td>
</tr>
</tbody>
</table>

Heterogeneity: Not applicable

Test for overall effect: Z = 1.07 (P = 0.29)

Outcome measures reported:
- Creaney: inverse of ∆PRTEE (thus PRTEE (0-100: best))
- Raeissadat 2014a, 2014b: MMCPIE (0-100: best)
- Thanasa: Liverpool elbow score (0-10: best)
Tennis Elbow: PAIN
PRP vs. ABI (3 of 4 slides)

### VAS Pain

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>PRP</th>
<th>ABI</th>
<th>Mean Difference</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>1.4.1 Short-term</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raissasat 2014a</td>
<td>3.3</td>
<td>2.1</td>
<td>3.1</td>
<td>2.1</td>
</tr>
<tr>
<td>Thanasas 2011</td>
<td>1.9</td>
<td>1</td>
<td>2.8</td>
<td>1</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>66</td>
<td>64</td>
<td>100.0%</td>
<td>-0.8 [-1.3, -0.2]</td>
</tr>
<tr>
<td>Heterogeneity: Tau² = 0.03; CH² = 0.40, df = 2 (P = 0.82); I² = 0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 1.7 (P = 0.08)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SoE: LOW

| SoE: LOW |

1.4.2 Intermediate-term

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>PRP</th>
<th>ABI</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Raissasat 2014a</td>
<td>2.9</td>
<td>2.5</td>
<td>3.1</td>
</tr>
<tr>
<td>Thanasas 2011</td>
<td>1.78</td>
<td>1.3</td>
<td>2.5</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>46</td>
<td>44</td>
<td>100.0%</td>
</tr>
<tr>
<td>Heterogeneity: Tau² = 0.03; CH² = 0.00, df = 1 (P = 0.77); I² = 0%</td>
<td></td>
<td></td>
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<tr>
<td>Test for overall effect: Z = 1.74 (P = 0.08)</td>
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</table>

SoE: LOW

1.4.3 Long-term

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>PRP</th>
<th>ABI</th>
<th>Mean Difference</th>
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<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Raissasat 2014a</td>
<td>3.3</td>
<td>2.4</td>
<td>3.1</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>31</td>
<td>30</td>
<td>100.0%</td>
</tr>
<tr>
<td>Heterogeneity: Not applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 0.98 (P = 0.33)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

SoE: INSUFFICIENT

---

Tennis Elbow: PRP vs. ABI (4 of 4 slides)

- Insufficient evidence:
  - Pain success: no difference between groups (short-, intermediate-, and long-term)

- No evidence:
  - Function success

- Secondary outcomes:
  - No difference between groups
    - Surgery (intermediate-term): 1 RCT
    - Composite of function success and no surgery (intermediate-term): 1 RCT

---
Tennis Elbow:
PRP vs. Control (1 of 10 slides)

- Evidence base: 8 RCTs + 2 cohort studies
  - N=25-240 per RCT

- Control group:
  - Steroid injections: 5 RCTs
  - Anesthetic injections: 2 RCTs
  - Dry needling: 1 RCT (compared PRP + DN vs. DN)

- Minimum symptom duration: 1.5-6 months
  - 1.5 months: 1 RCT
  - 3 months: 3 RCTs
  - 6 months: 3 RCTs

- Number of injections: 1-2
  - Single injection: 5 RCTs
  - 2 injections: 1 RCT

---

Tennis Elbow: FUNCTION SUCCESS
PRP vs. Control (2 of 10 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function success (various measures)</td>
<td>Short-term</td>
<td>1 RCT N=99</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>RR 1.0 (95% CI 0.7, 1.4) Conclusion: No difference between PRP and steroid groups.</td>
<td>⬤⬤◯◯ LOW</td>
</tr>
<tr>
<td></td>
<td>Intermediate-term</td>
<td>1 RCT N=99</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>RR 1.0 (95% CI 0.8, 1.3) Conclusion: No difference between PRP and steroid groups.</td>
<td>⬤⬤◯◯ LOW</td>
</tr>
<tr>
<td></td>
<td>Long-term</td>
<td>2 RCTs N=199</td>
<td>RoB (-1) Inconsistency (-1) Imprecision (-1)</td>
<td>Conclusion: Insufficient results preclude firm conclusions.</td>
<td>@○○○ INSUFFICIENT</td>
</tr>
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</table>
## Tennis Elbow: Short-term FUNCTION

PRP vs. Control (3 of 10 slides)

<table>
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<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function (various measures)</td>
<td>Short-term</td>
<td>7 RCTs N=545</td>
<td>RoB (-1) Inconsistency (-1) Imprecision (-1)</td>
<td>Conclusion: Insufficient strength of evidence precludes firm conclusions.</td>
<td>BBBBB INSUFFICIENT</td>
</tr>
</tbody>
</table>

### Study or Subgroup

<table>
<thead>
<tr>
<th>PRP vs. Sural</th>
<th>Mean</th>
<th>SD</th>
<th>Total</th>
<th>PRP</th>
<th>Mean</th>
<th>SD</th>
<th>Total</th>
<th>Weight</th>
<th>Mean Difference</th>
<th>95% CI</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gauden 2015*</td>
<td>33.6</td>
<td>5.1</td>
<td>15</td>
<td>34.3</td>
<td>3.3</td>
<td>15</td>
<td>20.5%</td>
<td>-0.70</td>
<td>[-3.77, 2.37]</td>
<td>0.000</td>
<td></td>
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<tr>
<td>Hough 2013*</td>
<td>16.6</td>
<td>10.2</td>
<td>20</td>
<td>13.8</td>
<td>16.2</td>
<td>20</td>
<td>7.4%</td>
<td>-2.06</td>
<td>[-10.16, 6.04]</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Gossens 2011*</td>
<td>21.9</td>
<td>22.1</td>
<td>51</td>
<td>23.2</td>
<td>21.7</td>
<td>49</td>
<td>11.1%</td>
<td>-1.10</td>
<td>[-9.37, 7.18]</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Leibitzchki 2010*</td>
<td>32.2</td>
<td>16.2</td>
<td>53</td>
<td>26.5</td>
<td>21.5</td>
<td>46</td>
<td>12.2%</td>
<td>-11.02</td>
<td>[2.68, 19.01]</td>
<td>0.000</td>
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<tr>
<td>Yauko 2010*</td>
<td>34.6</td>
<td>15.1</td>
<td>30</td>
<td>44.3</td>
<td>16.4</td>
<td>30</td>
<td>11.6%</td>
<td>-10.10</td>
<td>[8.32, 19.88]</td>
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<tr>
<td>Subtotal (95% CI)</td>
<td>169</td>
<td>160</td>
<td>166</td>
<td>-1.53</td>
<td>[-8.77, 5.71]</td>
<td>0.000</td>
<td></td>
<td></td>
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</tr>
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</table>

### Heterogeneity
- Tau² = 5.41, CH² = 20.11, df = 4 (P = 0.0000), I² = 80%
- Test for overall effect: Z = 1.41 (P = 0.08)

### Outcome Follow-up RCTs Reasons for Downgrading Conclusion Quality

### Function

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Mean</th>
<th>SD</th>
<th>Total</th>
<th>Control</th>
<th>Mean</th>
<th>SD</th>
<th>Total</th>
<th>Weight</th>
<th>Mean Difference</th>
<th>95% CI</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gossens 2011*</td>
<td>32.5</td>
<td>4.5</td>
<td>15</td>
<td>39.6</td>
<td>1</td>
<td>15</td>
<td>28.9%</td>
<td>-7.60</td>
<td>[-9.93, -5.27]</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Leibitzchki 2010*</td>
<td>27.8</td>
<td>20.4</td>
<td>51</td>
<td>37.6</td>
<td>23.1</td>
<td>49</td>
<td>11.6%</td>
<td>-9.85</td>
<td>[-16.17, -3.53]</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>14.2</td>
<td>13.4</td>
<td>119</td>
<td>14.7</td>
<td>22</td>
<td>119</td>
<td>18.9%</td>
<td>-2.07</td>
<td>[-7.61, 3.51]</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

### Heterogeneity
- Tau² = 3.56, CH² = 2.32, df = 1 (P = 0.13), I² = 27%
- Test for overall effect: Z = 1.50 (P = 0.13)

### Total (95% CI)
- 205 | 200 | 100% | -0.35 | [-0.27, -0.53] | 0.000 | |

## Tennis Elbow: Intermediate-term FUNCTION

PRP vs. Control (4 of 10 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function (various measures)</td>
<td>Intermediate-term</td>
<td>5 RCTs N=372</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>Conclusion: Significantly greater improvement with PRP vs. control.</td>
<td>BBBBB LOW</td>
</tr>
</tbody>
</table>

### Study or Subgroup

<table>
<thead>
<tr>
<th>PRP vs. Sural</th>
<th>Mean</th>
<th>SD</th>
<th>Total</th>
<th>PRP</th>
<th>Mean</th>
<th>SD</th>
<th>Total</th>
<th>Weight</th>
<th>Mean Difference</th>
<th>95% CI</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gauden 2015*</td>
<td>32.5</td>
<td>4.5</td>
<td>15</td>
<td>39.6</td>
<td>1</td>
<td>15</td>
<td>28.9%</td>
<td>-7.60</td>
<td>[-9.93, -5.27]</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Gossens 2011*</td>
<td>27.8</td>
<td>20.4</td>
<td>51</td>
<td>37.6</td>
<td>23.1</td>
<td>49</td>
<td>11.6%</td>
<td>-9.85</td>
<td>[-16.17, -3.53]</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Leibitzchki 2010*</td>
<td>14.2</td>
<td>13.4</td>
<td>119</td>
<td>14.7</td>
<td>22</td>
<td>119</td>
<td>18.9%</td>
<td>-2.07</td>
<td>[-7.61, 3.51]</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>14.2</td>
<td>13.4</td>
<td>119</td>
<td>14.7</td>
<td>22</td>
<td>119</td>
<td>18.9%</td>
<td>-2.07</td>
<td>[-7.61, 3.51]</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

### Heterogeneity
- Tau² = 7.98, CH² = 3.91, df = 2 (P = 0.16), I² = 40%
- Test for overall effect: Z = 2.03 (P = 0.047)

### Outcome Follow-up RCTs Reasons for Downgrading Conclusion Quality

### Function

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Mean</th>
<th>SD</th>
<th>Total</th>
<th>Control</th>
<th>Mean</th>
<th>SD</th>
<th>Total</th>
<th>Weight</th>
<th>Mean Difference</th>
<th>95% CI</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gauden 2015*</td>
<td>-88.8</td>
<td>8.4</td>
<td>15</td>
<td>-71.4</td>
<td>8</td>
<td>9</td>
<td>16.8%</td>
<td>-17.40</td>
<td>[-24.14, -10.66]</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Leibitzchki 2010*</td>
<td>16.3</td>
<td>21.1</td>
<td>56</td>
<td>21.1</td>
<td>8</td>
<td>63</td>
<td>27.2%</td>
<td>-4.94</td>
<td>[-17.88, 8.00]</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>21</td>
<td>72</td>
<td>44.0%</td>
<td>-10.77</td>
<td>[-25.00, 3.56]</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Heterogeneity
- Tau² = 71.00, CH² = 11.00, df = 4 (P = 0.0000), I² = 91%
- Test for overall effect: Z = 1.73 (P = 0.08)

### Total (95% CI)
- 190 | 182 | 100.0% | -7.67 | [-11.67, -3.66] | 0.000 | |
Tennis Elbow: Long-term FUNCTION
PRP vs. Control (5 of 10 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function (various measures)</td>
<td>Long-term</td>
<td>3 RCTs N=223</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>Conclusion: Significantly greater improvement with PRP vs. control.</td>
<td>●●●□□ LOW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>PRP Mean SD Total</th>
<th>Control Mean SD Total</th>
<th>Mean Difference N, Random, (95% CI)</th>
<th>Mean Difference N, Random, (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gossens 2011**</td>
<td>17.6  24 51 36.5 23 49</td>
<td>30.3%</td>
<td>-18.0% (20.11, 9.69)</td>
<td>-18.0% (20.11, 9.69)</td>
</tr>
<tr>
<td>Lebertz et al. 2019*</td>
<td>9.9  17.1 53 14.4 20.2 46</td>
<td>33.0%</td>
<td>-4.90% (13.12, 4.12)</td>
<td>-4.90% (13.12, 4.12)</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>104  95 61.9%</td>
<td>-11.66% (23.71, 13.11)</td>
<td>-11.66% (23.71, 13.11)</td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 1.61 (p = 0.11)</td>
<td>Test for overall effect: Z = 1.61 (p = 0.11)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| PRP vs. LA | Belea 2015†† | -00.8  6 15 74.7 7.5 9 | 38.1% | -18.0% (23.86, -12.34) | -18.0% (23.86, -12.34) |
| Subtotal (95% CI) | 119  104 100.0% | -4.04% (22.75, -5.13) | -4.04% (22.75, -5.13) |
| Test for overall effect: Z = 0.15 (p = 0.00001) | Test for overall effect: Z = 0.15 (p = 0.00001) |

Tennis Elbow: PAIN SUCCESS
PRP vs. Control (6 of 10 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain success (various measures)</td>
<td>Short-term</td>
<td>1 RCT N=192</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>RR 1.1 (95% CI 0.9, 1.4) Conclusion: No difference between groups in the percentage of patients achieving a ≥25% decrease in VAS scores (75% vs. 66%).</td>
<td>●●●□□ LOW</td>
</tr>
<tr>
<td>Intermediate-term</td>
<td>1 RCT N=119</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>RR 1.2 (95% CI 1.2, 2.6) Conclusion: Significantly more PRP vs. steroid patients achieved a ≥50% decrease in VAS scores (82% vs. 60%).</td>
<td>●●●□□ LOW</td>
<td></td>
</tr>
<tr>
<td>Long-term</td>
<td>1 RCT N=100</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>RR 0.2 (95% CI 0.05, 0.9) Conclusion: Significantly more PRP vs. steroid patients achieved a ≥25% decrease in VAS scores without re-intervention (77% vs. 43%).</td>
<td>●●●□□ LOW</td>
<td></td>
</tr>
</tbody>
</table>
## Tennis Elbow: Short-term PAIN
PRP vs. Control (7 of 10 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>Short-term</td>
<td>7 RCTs N=471</td>
<td>RoB (-1)</td>
<td>Conclusion: No difference between groups.</td>
<td>★★★★★ MODERATE</td>
</tr>
</tbody>
</table>

### PRP vs. Control
<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Mean SD Total</th>
<th>Mean SD Total</th>
<th>Weight</th>
<th>RoB, Random, 95% CI</th>
<th>Std. Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRP vs. Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooney 2017</td>
<td>1.8 6 15</td>
<td>1.7 0.5 15</td>
<td>15 10.8%</td>
<td>0.02 (0.02, 0.02)</td>
<td></td>
</tr>
<tr>
<td>Gomes 2012</td>
<td>4.5 27.1</td>
<td>52 27.6</td>
<td>52 36.3%</td>
<td>0.16 (0.16, 0.16)</td>
<td></td>
</tr>
<tr>
<td>Knight 2015</td>
<td>2.16 16.8</td>
<td>20 14.9</td>
<td>20 14.9%</td>
<td>0.04 (0.04, 0.04)</td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>116</td>
<td>114</td>
<td>114 83.2%</td>
<td>0.08 (0.04, 0.04)</td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Tau² = 0.02, CV= 40.0%, df = 3 (P = 0.81), I² = 0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 1.21 (P = 0.09)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### PRP vs. LA
<table>
<thead>
<tr>
<th>Outcome Follow-up RCTs</th>
<th>RoB -1 Imprecision (-2)</th>
<th>Conclusion: No difference between groups.</th>
<th>Quality</th>
</tr>
</thead>
</table>

### PRP vs. DN
<table>
<thead>
<tr>
<th>Outcome Follow-up RCTs</th>
<th>RoB -1 Imprecision (-3)</th>
<th>Conclusion: No difference between groups.</th>
<th>Quality</th>
</tr>
</thead>
</table>

### PRP vs. steroid or LA
<table>
<thead>
<tr>
<th>Outcome Follow-up RCTs</th>
<th>RoB -1 Imprecision (-1)</th>
<th>Conclusion: Better pain with PRP.</th>
<th>Quality</th>
</tr>
</thead>
</table>

## Tennis Elbow: Intermediate-term PAIN
PRP vs. Control (8 of 10 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>Intermediate-</td>
<td>1 RCT N=25</td>
<td>RoB (-1)</td>
<td>Conclusion: No difference between groups.</td>
<td>★★★★★ INSUFFICIENT</td>
</tr>
<tr>
<td>(various measures)</td>
<td>term (PRP + DN vs. DN)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### PRP vs. Control
<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Mean SD Total</th>
<th>Mean SD Total</th>
<th>Weight</th>
<th>RoB, Random, 95% CI</th>
<th>Std. Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRP vs. Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooney 2017</td>
<td>1.6 5.5 15</td>
<td>2.9 1.2 15</td>
<td>15 27.7%</td>
<td>-1.30 (2.14, -5.7)</td>
<td></td>
</tr>
<tr>
<td>Gomes 2012</td>
<td>32.9 10.8</td>
<td>51 5.5</td>
<td>51 51.0%</td>
<td>-0.82 (1.23, -3.9)</td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>96</td>
<td>93</td>
<td>93 83.7%</td>
<td>-0.98 (1.48, -3.9)</td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Tau² = 0.22, CV= 11.4%, df = 1 (P = 0.23), I² = 3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 1.88 (P = 0.03)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### PRP vs. LA
<table>
<thead>
<tr>
<th>Outcome Follow-up RCTs</th>
<th>RoB -1 Imprecision (-2)</th>
<th>Conclusion: No difference between groups.</th>
<th>Quality</th>
</tr>
</thead>
</table>

### PRP vs. DN
<table>
<thead>
<tr>
<th>Outcome Follow-up RCTs</th>
<th>RoB -1 Imprecision (-2)</th>
<th>Conclusion: No difference between groups.</th>
<th>Quality</th>
</tr>
</thead>
</table>

### PRP vs. steroid or LA
<table>
<thead>
<tr>
<th>Outcome Follow-up RCTs</th>
<th>RoB -1 Imprecision (-1)</th>
<th>Conclusion: Better pain with PRP.</th>
<th>Quality</th>
</tr>
</thead>
</table>

### PRP vs. steroid
<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Mean SD Total</th>
<th>Mean SD Total</th>
<th>Weight</th>
<th>RoB, Random, 95% CI</th>
<th>Std. Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRP vs. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooney 2017</td>
<td>24.7 20.7</td>
<td>58 16.2</td>
<td>58 21.3%</td>
<td>-1.72 (2.73, -3.74)</td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>81</td>
<td>79</td>
<td>79 100%</td>
<td>-1.71 (1.71, -3.42)</td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Tau² = 0.01, CV= 34.2%, df = 2 (P = 0.16), I² = 45%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 2.22 (P = 0.027)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Tennis Elbow: Long-term PAIN
**PRP vs. Control (9 of 10 slides)**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain (various measures)</td>
<td>Long-term</td>
<td>2 RCTs N=124</td>
<td>RoB (-1) Impression (-1)</td>
<td>Conclusion: Better function with PRP.</td>
<td>⬜️⬜️☐☐ LOW</td>
</tr>
</tbody>
</table>

#### Pain (various measures)
- **Pain:**
  - **Outcome:** Pain
  - **Follow-up:** Long-term
  - **RCTs:** 2 RCTs N=124
  - **Reasons for Downgrading:** RoB (-1) Impression (-1)
  - **Conclusion:** Conclusion: Better function with PRP.
  - **Quality:** ⬜️⬜️☐☐ LOW

![Graph showing pain outcomes](image)

### Tennis Elbow: Secondary Outcomes
**PRP vs. Control (10 of 10 slides)**

- **Secondary outcomes:**
  - **Full recovery/no symptoms**
    - **Short-, intermediate-, long-term:** Worse outcome with PRP vs. steroid (1 RCT)
  - **Additional procedures**
    - **Long-term:** Better outcome with PRP vs. steroid (1 RCT)

![Graph showing secondary outcomes](image)
Tennis Elbow: ABI vs. Control (1 of 4 slides)

- Evidence base: 3 RCTs + 3 quasi-RCTs
  - N=50-80 per trial

- Control group:
  - Steroid injections: 6 trials
  - ESWT: 1 trial (trial had 2 control groups)

- Minimum symptom duration:
  - 6 months: 1 trial
  - (Mean symptom duration ranged from 1-10 months)

- Number of injections:
  - Single injection: 1 RCT

\[ \text{ABI} \text{ vs. Control (1 of 4 slides)} \]

Tennis Elbow: FUNCTION
ABI vs. Control (2 of 4 slides)

- SoE: LOW

- SoE: INSUFFICIENT

- No evidence: Function success
Tennis Elbow: Short-term PAIN
ABI vs. Control (3 of 4 slides)

SoE: LOW (for all)

Vas pain scores

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>ABI Mean</th>
<th>ABI SD</th>
<th>Steroid Mean</th>
<th>Steroid SD</th>
<th>Std. Mean Difference</th>
<th>Std. Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.7.1.1 Short-term</td>
<td>2.10</td>
<td>1.10</td>
<td>4.00</td>
<td>3.70</td>
<td>40</td>
<td>3.90</td>
</tr>
<tr>
<td>Jindal 2013*</td>
<td>1.50</td>
<td>1.30</td>
<td>25</td>
<td>2.30</td>
<td>13</td>
<td>25</td>
</tr>
<tr>
<td>Kazem 2010*</td>
<td>1.50</td>
<td>1.30</td>
<td>26</td>
<td>2.30</td>
<td>13</td>
<td>26</td>
</tr>
<tr>
<td>135</td>
<td>100.0%</td>
<td>-0.81 [-1.3, -0.3]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Tau² = 0.05; Chi² = 4.91, df = 3 (P = 0.18), I² = 29%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 4.90 (P = 0.00001)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tennis Elbow: Intermediate-term PAIN
ABI vs. Control (4 of 4 slides)

SoE: LOW (for all)

Vas pain scores

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>ABI Mean</th>
<th>ABI SD</th>
<th>Steroid Mean</th>
<th>Steroid SD</th>
<th>Std. Mean Difference</th>
<th>Std. Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.7.1.2 Intermediate-term</td>
<td>0.60</td>
<td>1.30</td>
<td>20</td>
<td>2.30</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>Doppe 2013*</td>
<td>0.50</td>
<td>1.90</td>
<td>30</td>
<td>1.80</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>70</td>
<td>70</td>
<td>100.0%</td>
<td>-0.40 [-1.2, -0.5]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Tau² = 0.00; Chi² = 0.57, df = 1 (P = 0.45), I² = 0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 4.50 (P = 0.00001)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Nirschl scores

• Insufficient evidence: short- and intermediate-term pain success
• No evidence: long-term pain success and pain scores
• Secondary outcomes: None reported
Summary: Tennis Elbow

- In general, outcomes were the same or better with PRP or ABI versus control groups.
  - **PRP vs. ABI**: Short-term benefit with PRP for pain and function (Low SoE), and in intermediate-term function (but no difference in pain) (Low SoE for all).
  - **PRP vs. Control**: Although pain and function (scores and success) were similar between groups in the short-term (insufficient to moderate SoE), by the intermediate-term they were better with PRP (pain scores & success, function) (but no difference in function success) (Low SoE). Long-term function scores and pain scores & success was better with PRP (Low SoE).
  - **ABI vs. Control**: Better short-term results with ABI with respect to pain and function scores, and similar results were seen for pain scores in the intermediate-term (Low SoE for all).

Achilles Tendinopathy:

PRP vs. Control (1 of 3 slides)

- Evidence base: 2 RCTs
  - N=20-54 per trial

- Control group:
  - Saline injection: 1 RCT
  - Exercise: 1 RCT

- Minimum symptom duration: 2-3 months

- Number of injections: not reported
Achilles Tendinopathy: FUNCTION
PRP vs. Control (2 of 3 slides)

Study or Subgroup | PRP | Control | Mean Difference
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD Total</td>
<td>Mean</td>
</tr>
<tr>
<td>1.6.1 Short-term</td>
<td>9.6</td>
<td>20.1</td>
<td>27</td>
</tr>
<tr>
<td>De Jonge 2011*</td>
<td>56</td>
<td>27</td>
<td>9</td>
</tr>
<tr>
<td>Kamey 2013†</td>
<td>36</td>
<td>37</td>
<td>100.0%</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>36</td>
<td>37</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
| Heterogeneity: Tau^2 = 0.00, Chi^2 = 0.22, df = 1 (P = 0.64); I^2 = 0%
| Test for overall effect: Z = 0.30 (P = 0.77) |

SoE: MODERATE

1.6.2 Intermediate-term
De Jonge 2011*   21.7 22.1 | 27 | 20.5 22.5 | 27 | 61.9% | 1.2 [-10.7, 13.1] |
Kamey 2013†     57   27  9  | 76 23  | 10 | 38.1% | -10.6 [-41.7, 3.7] |
Subtotal (95% CI) 36   37  100.0% | -6.5 [-25.7, 12.7] |
Heterogeneity: Tau^2 = 118.65, Chi^2 = 2.39, df = 1 (P = 0.12); I^2 = 56%
Test for overall effect: Z = 0.66 (P = 0.51)

SoE: LOW

1.6.3 Long-term
De Jonge 2011*†  31.6 24.8 | 27 | 25 18.6 | 27 | 100.0% | 6.6 [5.1, 18.3] |
Subtotal (95% CI) 27   27  100.0% | 6.6 [5.1, 18.3] |
Heterogeneity: Not applicable
Test for overall effect: Z = 1.11 (P = 0.27)

Achilles Tendinopathy:
PRP vs. Control (3 of 3 slides)

- No evidence:
  - Pain
  - Pain success
  - Function success

- Secondary outcomes:
  - No difference between groups
    - HR-QoL (short-, intermediate-term): 1 RCT, PRP vs. exercise
    - Overall health state (short-, intermediate-term): 1 RCT, PRP vs. exercise
    - Return to sport (short-, intermediate-, long-term): 1 RCT, PRP vs. saline
    - Patient satisfaction (short-, intermediate-, long-term): 1 RCT, PRP vs. saline
    - Secondary procedures (intermediate-term): 1 RCT, PRP vs. saline
Achilles Tendinopathy: ABI vs. Control (1 of 2 slides)

• Evidence base: 2 RCTs
  • N=40 tendons-53 patients per trial

• Control group:
  • Exercise: 1 RCT (compared ABI + exercise vs. exercise alone)
  • Dry needling: 1 RCT

• Minimum symptom duration: 3 months

• Number of injections: 1-2

---

Achilles Tendinopathy: ABI vs. Control (2 of 2 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(VISA-A (0-100 best))</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Short-term</td>
<td></td>
<td>1 RCT</td>
<td>RoB (-1), Imprecision (-2)</td>
<td>MD 9.3 (95% CI 2.1, 16.5) Conclusion: Greater improvement with ABI; insufficient strength of evidence prevents firm conclusion.</td>
<td>⬤◯◯◯ INSUFFICIENT</td>
</tr>
<tr>
<td>(ABI vs. exercise)</td>
<td>28 tendons</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Short-term</td>
<td></td>
<td>1 RCT</td>
<td>RoB (-1), Imprecision (-2)</td>
<td>MD 0.3 (95% CI -8.1, 8.7) Conclusion: No difference between groups; insufficient strength of evidence prevents firm conclusion.</td>
<td>⬤◯◯◯ INSUFFICIENT</td>
</tr>
<tr>
<td>(ABI vs. DN)</td>
<td>N=50</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Intermediate-</td>
<td></td>
<td>1 RCT</td>
<td>RoB (-1), Imprecision^4 (-2)</td>
<td>MD -1.2 (95% CI -10.2, 7.8) Conclusion: Insufficient strength of evidence prevents firm conclusion</td>
<td>⬤◯◯◯ INSUFFICIENT</td>
</tr>
<tr>
<td>term</td>
<td>N=50</td>
<td></td>
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</tr>
</tbody>
</table>

• No evidence: Function success, Pain success, Pain, long-term Function
• Secondary outcomes: no differences between groups in any outcome
  • Recovery, return to sport (intermediate-term): 1 RCT, ABI vs. DN

Comparators:
Bell: ABI vs. dry needling
Pearson: ABI + exercise vs. exercise
Patellar Tendinopathy: PRP vs. Control (1 of 4 slides)

- Evidence base: 2 RCTs
  - N=20-46 per trial

- Control group:
  - Extracorporeal shock wave therapy: 1 RCT
  - Dry needling: 1 RCT
    (compared PRP + DN vs. DN alone)

- Minimum symptom duration: 1.5-6 months

- Number of injections: 1-2

Patellar Tendinopathy: FUNCTION PRP vs. Control (2 of 4 slides)

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>PRP Mean</th>
<th>PRP SD</th>
<th>PRP Total</th>
<th>Control Mean</th>
<th>Control SD</th>
<th>Control Total</th>
<th>Mean Difference</th>
<th>Mean Difference</th>
<th>SoE: LOW</th>
<th>SoE: INSUFFICIENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Short-term</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vetrano 2013†</td>
<td>76.2</td>
<td>16.5</td>
<td>23</td>
<td>71.3</td>
<td>19.1</td>
<td>23</td>
<td>4.9 [5.4, 15]</td>
<td>7.4 [1.3, 16.2]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dragoo 2013†</td>
<td>66.4</td>
<td>20.2</td>
<td>9</td>
<td>52</td>
<td>20.3</td>
<td>12</td>
<td>74.2%</td>
<td>1.5 [3.1, 31.9]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>92</td>
<td>20.2</td>
<td>52</td>
<td>35</td>
<td>20.4</td>
<td>25.8%</td>
<td>71.3 [1.3, 16.2]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Tau² = 0.00, Chi² = 0.04, df = 1 (P = 0.36); I² = 0%</td>
<td></td>
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<tr>
<td>Test for overall effect: Z = 1.62 (P = 0.10)</td>
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</tr>
</tbody>
</table>

| 1.1.2 Intermediate-term |          |        |           |              |           |               |                |                | SoE: INSUFFICIENT |
| Vetrano 2013†    | 66.7     | 14.2   | 23        | 73.7         | 19.9      | 23            | 13.0 [3, 23]   |                | SoE: INSUFFICIENT |
| Dragoo 2013†     | 26.9     | 25.2   | 8         | 32.2         | 14        | 9             | 37.4%          | 4.2 [-24, 15]   | SoE: INSUFFICIENT |
| Subtotal (95% CI)| 31       | 14.2   | 31        | 32           | 14        | 9             | 4.2 [-24, 15]   | 6.5 [-0.9, 22.4]  | SoE: INSUFFICIENT |
| Heterogeneity: Tau² = 0.07, Chi² = 2.35, df = 1 (P = 0.12); I² = 58% |
| Test for overall effect: Z = 0.78 (P = 0.44) |

| 1.1.3 Long-term   |          |        |           |              |           |               |                |                | SoE: INSUFFICIENT |
| Vetrano 2013†    | 91.3     | 9.9    | 23        | 77.6         | 19.9      | 23            | 13.7 [4.6, 22.6]|                | SoE: INSUFFICIENT |
| Subtotal (95% CI)| 23       | 9.9    | 23        | 23           | 19.9      | 23            | 13.7 [4.6, 22.6]|                | SoE: INSUFFICIENT |
| Heterogeneity: Not applicable |
| Test for overall effect: Z = 2.96 (P = 0.003) |

*Vetrano: PRP vs. ESWT
†Dragoo: CR-PRP + DN vs. DN
Patellar Tendinopathy: PAIN
PRP vs. Control (3 of 4 slides)

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Favors PRP</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vetano 2013</td>
<td>3.2</td>
<td>1.8</td>
<td>23</td>
<td>3.9</td>
</tr>
<tr>
<td>Dragoo 2013</td>
<td>1.7</td>
<td>1.7</td>
<td>9</td>
<td>2.3</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>32</td>
<td>35</td>
<td>100.0%</td>
<td>-0.7 [-1.5, 0.2]</td>
</tr>
</tbody>
</table>

Heterogeneity: Tau² = 0.00; Chi² = 0.01; df = 1 (P = 0.91); I² = 0%
Test for overall effect: Z = 1.52 (P = 0.13)

SoE: LOW

1.2.2 Intermediate-term
Vetano 2013               | 2.4        | 1.9     | 23             | 3.9            | 2.3            | 23             | 70.0%          | -1.5 [-2.7, -0.3] |
Dragoo 2013               | -2.6       | 1.7     | 8              | -2.5           | 2.7            | 9              | 30.0%          | -0.1 [-2.2, 2.0] |
Subtotal (95% CI)         | 31         | 32      | 100.0%         | -1.1 [-2.3, 0.2] |
Heterogeneity: Tau² = 0.20; Chi² = 1.26; df = 1 (P = 0.26); I² = 20%
Test for overall effect: Z = 1.58 (P = 0.09)

SoE for each: INSUFFICIENT

1.2.3 Long-term
Vetano 2013               | 1.5        | 1.7     | 23             | 3.2            | 2.4            | 23             | 100.0%         | -1.7 [-2.9, -0.6] |
Subtotal (95% CI)         | 23         | 23      | 100.0%         | -1.7 [-2.9, -0.5] |

Heterogeneity: Not applicable
Test for overall effect: Z = 2.77 (P = 0.006)

SoE: INSUFFICIENT

*Vetano: PRP vs. ESWT
†Dragoo: LR-PRP + DN vs. DN

Patellar Tendinopathy: PRP vs. Control (4 of 4 slides)

- No evidence:
  - Function success
  - Pain success

- Secondary outcomes
  - HR-QoL (1 RCT, PRP vs. ESWT):
    - No difference (short-, intermediate-term)
  - Pain during sports (1 RCT, PRP vs. dry needling):
    - No difference (short-, intermediate-term)
    - Better outcome with PRP (long-term)
### Rotator Cuff Tendinosis and/or Partial Tear: PRP vs. Control (1 of 2 slides)

- Evidence base: 2 RCTs + 1 retrospective cohort study
  - N=39-40 per RCT

- Control group:
  - Saline injection: 1 RCT
  - Dry needling: 1 RCT (compared PRP + DN vs. DN alone)

- Minimum symptom duration: 3-6 months

- Number of injections: 2 (reported by 1 RCT only)

### Rotator Cuff Tendinosis and/or Partial Tear: PRP vs. Control (2 of 2 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
</table>
| Function SPADI (0-100) | Short-term | 2 RCTs N=72 | Imprecision (-1) | • MD -13.5 (95% CI -24.8, -2.2) (Rha)  
  • Median 27.6 vs. 45.3, p=NS (Kesikburun)  
  Conclusion: Greater functional improvement with PRP vs. control. | ⫠⫠⫠ MODERATE |
|         | Intermediate-term | 2 RCTs N=72 | Imprecision (-1) | • MD -11.8 (95% CI -22.5, -1.1) (Rha)  
  • Median 21.7 vs. 40.9, p=NS (Kesikburun)  
  Conclusion: Greater functional improvement with PRP vs. control. | ⫠⫠⫠ MODERATE |
|         | Long-term | 1 RCT N=40 | Imprecision (-2) | Median 14.6 vs. 15.4, p=NS  
  Conclusion: No difference between groups. | ⫠⫠○ LOW |

+ Insufficient evidence: Short- and intermediate-term pain
+ No evidence: Function success, Pain success, Pain, long-term Function, long-term Pain
+ Secondary outcomes: no differences between groups in any outcome
  - Recovery, return to sport (intermediate-term): 1 RCT, ABI vs. DN
Summaries

- Rotator Cuff Tendinosis and/or Partial Tears:
  - PRP vs. Control: Better function with PRP in the short- and intermediate-term (moderate SoE), but no difference by long-term (low SoE).

- Achilles Tendinopathy
  - PRP vs. Control: no differences between groups in function in the short-term (moderate SoE), or intermediate- or long-term (low SoE).

- Patellar Tendinopathy
  - PRP vs. Control: no differences between groups in pain or function in the short-term (low SoE).

Plantar Fasciitis
Plantar Fasciitis:
PRP vs. Control (1 of 3 slides)

• Evidence base: 5 RCTs + 3 prospective cohort study
  • N=21-60 per RCT

• Control group:
  • Steroid injection: 3 RCT
  • Prolotherapy: 1 RCT (compared PRP + DN vs. DN alone)
  • ESWT or conservative care: 1 RCT (two control groups)

• Minimum symptom duration: 4-12 months
  • 4 months: 2 RCTs
  • 6 months: 1 RCT
  • 12 months: 1 RCT

• Number of injections: 1-2

---

Plantar Fasciitis:
PRP vs. Control (2 of 3 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function (various measures)</td>
<td>Short-, intermediate-term</td>
<td>4 RCTs N=134</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>Conclusion: No difference between groups:  • 3 RCTs (N=94): no difference  • 1 RCT (N=40): better outcome with PRP vs. steroid (Monto)</td>
<td>@@ &amp;&amp; LOW</td>
</tr>
<tr>
<td></td>
<td>Long-term</td>
<td>2 RCTs N=86</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>Conclusion: Significantly greater improvement with PRP vs. steroid as evaluated by the AOFAS Ankle and Hindfoot scale:  • MD 13.4 (95% CI 4.6, 22.3), 1 RCT (N=46, 60 heels) (Jain)  • Median: 92 vs. 56 MD NR/NC†, p&lt;0.01‡, 1 RCT (N=40) (Monto)</td>
<td>@@ &amp;&amp; LOW</td>
</tr>
</tbody>
</table>

---

WA - Health Technology Clinical Committee
## Plantar Fasciitis: PRP vs. Control (3 of 3 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain VAS (0-100)</td>
<td>Short-, intermediate-term</td>
<td>4 RCTs N=174</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>Conclusion: No difference between groups: 3 RCTs (N=114): no difference 1 RCT (N=60): better outcome with PRP vs. steroid (Tiwari)</td>
<td>LOW</td>
</tr>
</tbody>
</table>

- Insufficient evidence:
  - Long-term function success
  - Long-term pain
- No evidence:
  - Short-, intermediate-term function success, Pain success, Pain, long-term Function, long-term Pain

- Secondary outcomes:
  - Symptoms (1 RCT, PRP vs. steroid):
    - No difference between groups (short-, intermediate-term)
    - Better outcome with PRP (long-term)
  - Disability (1 RCT, PRP vs. prolotherapy):
    - No difference between groups (short-, intermediate-term)

## Plantar Fasciitis ABI vs. Control (1 of 4 slides)

- Evidence base: 3 RCTs
  - N=44-75 per RCT

- Control group:
  - Steroid injection: 3 RCTs
  - Anesthetic injection + dry needling: 2 RCTs (two control groups)

- Minimum symptom duration: 6 months (reported by 2 studies)

- Number of injections: ≤3 (reported by 1 study)
# Plantar Fasciitis: PAIN

## Short-term

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>ABI</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>vs. Steriod</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kiiac 2009</td>
<td>4.3</td>
<td>3.9</td>
<td>25</td>
<td>21.5%</td>
</tr>
<tr>
<td></td>
<td>7.2</td>
<td>3.9</td>
<td>25</td>
<td>21.5%</td>
</tr>
<tr>
<td>SoE: LOW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity:</td>
<td>Tau² = 0, CI = [0.15, 2.75]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall</td>
<td>Z = 3.36 (P = 0.0008)</td>
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</tbody>
</table>

## Intermediate-term

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>ABI</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>vs. Steriod</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kiiac 2009</td>
<td>3.5</td>
<td>3.1</td>
<td>25</td>
<td>21.5%</td>
</tr>
<tr>
<td></td>
<td>7.2</td>
<td>3.1</td>
<td>25</td>
<td>21.5%</td>
</tr>
<tr>
<td>SoE: LOW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity:</td>
<td>Tau² = 0, CI = [0.15, 1.76]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall</td>
<td>Z = 1.81 (P = 0.07)</td>
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</tbody>
</table>

## Low-intensity

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>ABI</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>vs. Steriod</td>
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</tr>
<tr>
<td>Kiiac 2009</td>
<td>3.5</td>
<td>3.1</td>
<td>25</td>
<td>21.5%</td>
</tr>
<tr>
<td></td>
<td>7.2</td>
<td>3.1</td>
<td>25</td>
<td>21.5%</td>
</tr>
<tr>
<td>SoE: LOW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity:</td>
<td>Tau² = 0, CI = [0.15, 1.76]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall</td>
<td>Z = 1.81 (P = 0.07)</td>
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</tr>
</tbody>
</table>
Plantar Fasciitis: ABI vs. Control (4 of 4 slides)

- Insufficient evidence:
  - Function (intermediate-term)

- No evidence:
  - Function (short-, long-term)
  - Function success
  - Pain success

- Secondary outcomes:
  - Symptoms:
    - No difference (intermediate-term): 1 RCT, ABI vs. steroid, ABI vs. anesthetic + dry needling (2 comparisons)
  - Repeat injections:
    - No difference between groups (short-term) (1 RCT, ABI vs. steroid)
    - Mixed results (intermediate-term) (1 RCT, 2 comparisons):
      - Worse outcome with ABI vs. steroid patients
      - No difference between ABI and anesthetic + dry needling

Summary

- Plantar Fasciitis
  - In general, outcomes were the same with PRP or ABI versus control groups.
    - PRP vs. Control: Short- and intermediate-term pain and function results were similar between groups, although long-term function scores were better with PRP than steroid injections (Low SoE for all).
    - ABI vs. Control: Short-term pain was worse with ABI versus steroid, though intermediate-term pain was similar between groups (Low SoE).
## Acute Injuries

### Acute muscle injury
- Achilles tendon rupture
- Ankle sprain
- Temporomandibular joint dislocation
- Osteochondral lesion of the talus

### Acute Muscle Injury: PRP + conservative care vs. control (1 of 2 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
</table>
| **Function**  | Intermediate-term | 1 RCT N=80 | Imprecision (-2)         | MD -3 (95% CI -12, 7)  
Conclusion: No difference between groups as evaluated by HOS-Overall (0-100 (best)). | ⬤⬤⬤◯ LOW |
| **Pain**      | Intermediate-term | 1 RCT N=80 | Imprecision (-2)         | Conclusion: No difference between groups as evaluated the following HOS scales (0-100 (best)):  
• HOS-Soreness: MD -2 (95% CI -11, 7)  
• HOS-Pain: MD 1 (95% CI -9, 10) | ⬤⬤⬤◯ LOW |
Acute Muscle Injury:
PRP + conservative care vs. control (2 of 2 slides)

- Insufficient evidence:
  - Short-term function and pain; intermediate-term function
- No evidence:
  - Long-term function
  - Function success
  - Pain success
- Secondary outcomes:
  - Return to sports
    - Mixed results (short-term) (3 RCTs):
      - Better outcome with PRP + CC vs. CC (2 RCTs)
      - No difference between groups (1 RCT)
- Other outcomes, no difference between groups:
  - Recovery; patient satisfaction (short-term) (1 RCT)
  - Symptoms; HR-QoL; return to sport (intermediate-term) (1 RCT)
  - Re-injury (short-, intermediate-, long-term) (1 RCT)

Other injuries

- Ankle Sprain: PRP vs. saline (1 RCT, N=33)
  - Function; Pain:
    - No difference between groups (short-term)- Insufficient SoE
    - No evidence for any other outcome
- TMJ Dislocation: ABI vs. intermaxillary fixation (1 RCT, N=32)
  - Recurrent dislocation:
    - Greater risk of dislocation following ABI vs. IMF (long-term)- Insufficient SoE
    - No evidence for any other outcome
- Osteochondral Lesions of the Talus: PRP vs. HA (1 quasi RCT, N=29)
  - Function; Pain:
    - Better outcomes with PRP vs. HA (short-, intermediate-term)- Insufficient SoE
    - No evidence for any other primary outcome
Osteoarthritis

Knee osteoarthritis
Hip osteoarthritis
Temporomandibular osteoarthritis

Knee OA
PRP vs. HA (1 of 12 slides)

• Evidence base: 6 RCTs and 4 cohort studies
  • N=92-192 per RCT

• Minimum symptom duration: 3-6 months

• Radiographic classification: mild to moderate
  • Doesn’t necessarily correlate with symptom severity

• 2-3 injections per procedure
### Knee OA: Short-term FUNCTION
**PRP vs. HA (2 of 12 slides)**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function success</td>
<td>Short-term</td>
<td>0 RCTs</td>
<td></td>
<td>No evidence.</td>
<td></td>
</tr>
</tbody>
</table>
| Function success (various)   | Short-term| 4 RCTs N=575 | RoB (-1) | Conclusion: No difference between groups based on the following:  
- Lequesne Index: MD -0.20 (95% CI -1.0, 0.60); 2 RCTs (N=272) (Sanchez 2012, Vaquerizo).  
- WOMAC, IKDC: SMD 0.57 (95% CI 0.60, 1.75), 2 RCTs (N=303) (Cerza, Filardo).  
- KOOS subscales or Tegner scores : no difference between groups in 1 trial (Filardo) |              |

#### Lequesne Index (2 RCTs):

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>PRP Mean</th>
<th>PRP SD</th>
<th>PRP Total</th>
<th>HA Mean</th>
<th>HA SD</th>
<th>HA Total</th>
<th>Weight</th>
<th>Mean Difference IV, Random, 95% CI</th>
<th>Mean Difference IV, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term</td>
<td>5.2</td>
<td>3.4</td>
<td>89</td>
<td>5.4</td>
<td>3.3</td>
<td>87</td>
<td>64.7%</td>
<td>-0.20 [-1.19, 0.79]</td>
<td></td>
</tr>
<tr>
<td>Vaquerizo 2013</td>
<td>5.2</td>
<td>3.4</td>
<td>48</td>
<td>5.4</td>
<td>3.3</td>
<td>48</td>
<td>35.3%</td>
<td>-0.20 [-1.54, 1.14]</td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>137</td>
<td></td>
<td>135</td>
<td>135</td>
<td>100.0%</td>
<td>135</td>
<td>100.0%</td>
<td>-0.20 [-1.10, 0.60]</td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Test χ² = 0.00, df = 1 (P = 1.00), F = 2%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 0.49 (P = 0.62)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### WOMAC Total and IKDC (2 RCTs):

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>PRP Mean</th>
<th>PRP SD</th>
<th>PRP Total</th>
<th>HA Mean</th>
<th>HA SD</th>
<th>HA Total</th>
<th>Weight</th>
<th>Std. Mean Difference IV, Random, 95% CI</th>
<th>Std. Mean Difference IV, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerza 2012</td>
<td>-38.1</td>
<td>17.8</td>
<td>60</td>
<td>-57</td>
<td>11.7</td>
<td>60</td>
<td>49.4%</td>
<td>1.18 [0.79, 1.57]</td>
<td></td>
</tr>
<tr>
<td>Filardo 2015</td>
<td>63.2</td>
<td>16.6</td>
<td>94</td>
<td>63.5</td>
<td>15.2</td>
<td>89</td>
<td>50.6%</td>
<td>-0.02 [-0.31, 0.27]</td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>154</td>
<td></td>
<td>149</td>
<td>100.0%</td>
<td>100.0%</td>
<td>149</td>
<td>100.0%</td>
<td>0.57 [-0.66, 1.75]</td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Test χ² = 23.51, df = 1 (P &lt; 0.0001), F = 98%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 0.96 (P = 0.34)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Knee OA: Intermediate-term FUNCTION PRP vs. HA (4 of 12 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function success</td>
<td>Intermediate-term</td>
<td>2 RCTs N=272</td>
<td>Inconsistency (-1) Imprecision (-1)</td>
<td>Conclusion: It is unclear whether functional success is more common following PRP vs. HA.</td>
<td>@@@@@ LOW</td>
</tr>
</tbody>
</table>

OMERACT-OSARI responders (2 RCTs):

<table>
<thead>
<tr>
<th>Study</th>
<th>Events</th>
<th>Total</th>
<th>Risk Ratio</th>
<th>M-H, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRP</td>
<td>47</td>
<td>87</td>
<td>1.07 [0.90, 1.43]</td>
<td></td>
</tr>
<tr>
<td>HA</td>
<td>43</td>
<td>95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

>50% (or ≥30% decrease in WOMAC function WOMAC stiffness, Lequesne Index (1 RCT):

- In general, more PRP vs. HA patients achieved function success by these measures (same trial reporting more OMERACT-OSARI responders above)

Knee OA: Intermediate-term FUNCTION PRP vs. HA (5 of 12 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function (various)</td>
<td>Intermediate-term</td>
<td>5 RCTs N=747</td>
<td>RoB (-1)</td>
<td>SMD 0.84 (95% CI 0.19, 1.48) Conclusion: Significantly better function with PRP versus HA.</td>
<td>@@@@@ MODERATE</td>
</tr>
</tbody>
</table>

WOMAC total or IKDC scores:

<table>
<thead>
<tr>
<th>Study</th>
<th>PRP</th>
<th>HA</th>
<th>Std. Mean Difference</th>
<th>N, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRP</td>
<td>Mean</td>
<td>SD Total</td>
<td>Mean</td>
<td>SD Total</td>
</tr>
<tr>
<td>Intermediate-term</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cerda 2012</td>
<td>-36.5</td>
<td>17.9</td>
<td>60</td>
<td>-65.1</td>
</tr>
<tr>
<td>Vargas 2013</td>
<td>-27.2</td>
<td>15.1</td>
<td>48</td>
<td>-50.4</td>
</tr>
<tr>
<td>Sanchez 2012</td>
<td>-74</td>
<td>42.7</td>
<td>89</td>
<td>-78.3</td>
</tr>
<tr>
<td>Flabio 2015</td>
<td>65</td>
<td>16.1</td>
<td>94</td>
<td>63.5</td>
</tr>
<tr>
<td>Gomel 2016</td>
<td>55.5</td>
<td>8.4</td>
<td>83</td>
<td>44.6</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>374</td>
<td>373</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau^2 = 0.51; Chi^2 = 70.45; df = 4 (P < 0.00001); I^2 = 94% Test for overall effect: Z = 2.54 (P = 0.01)
## Knee OA: Long-term FUNCTION

**PRP vs. HA (6 of 12 slides)**

### Function success

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term</td>
<td>N=96</td>
<td>1 RCT</td>
<td>Imprecision (-2)</td>
<td>Conclusion: Significantly more PRP than HA patients achieved 30% and 50% or more decrease in WOMAC physical function, WOMAC stiffness, and Lequesne Index, however wide CIs suggest estimate instability.</td>
<td>![LOW]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Function (various)</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term</td>
<td>N=412</td>
<td>3 RCTs</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>Conclusion: Function may be more improved following PRP vs. HA.</td>
<td>![LOW]</td>
</tr>
</tbody>
</table>

### WOMAC Total and IKDC (3 RCTs):

### Pain success

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term</td>
<td>No evidence.</td>
<td>0 RCTs</td>
<td></td>
<td></td>
<td>![INSUFFICIENT]</td>
</tr>
</tbody>
</table>

### Pain KOOS Pain subscale

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term</td>
<td>N=192</td>
<td>1 RCT</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>Conclusion: No difference between treatments in pain based on the KOOS Pain subscale.</td>
<td>![LOW]</td>
</tr>
</tbody>
</table>
Knee OA: Intermediate-term PAIN
PRP vs. HA (8 of 12 slides)

Outcome | Follow-up | RCTs | Reasons for Downgrading | Conclusion | Quality
--- | --- | --- | --- | --- | ---
Pain Success (various) | Intermediate-term | 2 RCTs N=272 | Imprecision (-1) | Conclusion: Significantly greater improvement with PRP vs. HA based on >50% decrease in WOMAC pain score. | MODERATE

Knee OA: Intermediate-term PAIN
PRP vs. HA (9 of 12 slides)

Outcome | Follow-up | RCTs | Reasons for Downgrading | Conclusion | Quality
--- | --- | --- | --- | --- | ---
Pain (various) | Intermediate-term | 3 RCTs N=455 | Inconsistency (-1) | Conclusion: No difference between groups based on pooled WOMAC and KOOS pain subscales. | MODERATE
### Knee OA: Long-term PAIN PRP vs. HA (10 of 12 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
</table>
| Pain Success (WOMAC pain scores) | Long-term | 1 RCT N=96 | Imprecision (-2) | Conclusion: Significantly more PRP than HA patients achieved pain success:  
- ≥30% decrease: RR 4.9 (95% CI 2.1, 11.5)  
- ≥50% decrease: RR 13.3 (95% CI 1.81, 95) | ○○○○ LOW |

### Knee OA: Long-term PAIN PRP vs. HA (11 of 12 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
</table>
| Pain (various) | Long-term | 3 RCTs N=412 | RoB (-1) Inconsistency (-1) | SMD -0.49 (95% CI -1.16, 0.18)  
Conclusion: No difference between groups based on pooled WOMAC and KOOS pain subscales. | ○○○○ LOW |
**Knee OA: Secondary Outcomes**
PRP vs. HA (12 of 12 slides)

- **Secondary Outcomes**
  - **HR-QoL:**
    - Short-term: no difference between groups (1 RCT)
    - Intermediate-term: same or better (varied by outcome measure) (2 RCTs)
    - Long-term: better with PRP (2 RCTs)
  - **Patient satisfaction:**
    - Intermediate-, long-term: no difference between groups (1 RCT each)
  - **Medication use:**
    - ≥6 months: no difference between groups (1 RCT)

---

**Knee Osteoarthritis:**
PRP vs. Saline (1 of 2 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-term</td>
<td>1 RCT</td>
<td>N=78</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>Conclusion: Better function with PRP (% change from baseline):</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>WOMAC total score: -57% versus 12%, p&lt;0.05 (Patel)</td>
<td></td>
</tr>
<tr>
<td>Intermediate-term</td>
<td>2 RCTs</td>
<td>N=204</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>Conclusion: Better function with PRP (% change from baseline):</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>WOMAC total score: -47% versus 10%, p&lt;0.05 (Patel)</td>
<td></td>
</tr>
</tbody>
</table>

- No evidence: Long-term function, Function success
### Knee Osteoarthritis: PRP vs. Saline (2 of 2 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downgrading</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain (various measures)</td>
<td>Short-term</td>
<td>1 RCT N=78</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>Mean % change from baseline: -63% vs. 18% (p &lt;0.05) Conclusion: LP-PRP resulted in significantly improved pain versus saline.</td>
<td>☞☐☐☐ LOW</td>
</tr>
<tr>
<td>Intermediate-term</td>
<td>1 RCT N=78</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>Conclusion: LP-PRP resulted in significantly improved pain compared with saline based on: • WOMAC pain (% change): -50% vs. 25%, p &lt;0.05 • VAS (0-10): MD -2.3 (95% CI -2.7, -1.8)</td>
<td>☞☐☐☐ LOW</td>
<td></td>
</tr>
</tbody>
</table>

- No evidence: Long-term pain, Pain success
- Secondary outcomes:
  - Patient satisfaction (intermediate-term): higher in PRP group
  - HR-QoL (intermediate-term): better in PRP group

---

### Knee OA: Other comparators

- **PRP vs. steroid (1 RCT, N=41)**
  - Function; Pain:
    - Better results with PRP (short-, intermediate-term)- Insufficient SoE
  - No evidence for any other primary outcome

- **PRP vs. Exercise ± TENS (2 RCTs, N=45-65)**
  - Function; Pain:
    - No clear difference between groups (short-, intermediate-term)- Insufficient SoE
  - No evidence for any other primary outcome
## Hip Osteoarthritis: PRP vs. HA (1 of 2 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downing</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Function</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harris Hip Score</td>
<td>Short-term</td>
<td>1 RCT</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>MD -4.3 (95% CI -10.6, 1.99) Conclusion: No difference between groups.</td>
<td>⬣⬣◯◯ LOW</td>
</tr>
<tr>
<td></td>
<td>Intermediate-term</td>
<td>1 RCT</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>MD -5.5 (95% CI -12.0, 0.92) Conclusion: No difference between groups.</td>
<td>⬣⬣◯◯ LOW</td>
</tr>
<tr>
<td></td>
<td>Long-term</td>
<td>1 RCT</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>MD -6.8 (95% CI -14.1, 0.51) Conclusion: No difference between groups.</td>
<td>⬣⬣◯◯ LOW</td>
</tr>
</tbody>
</table>

## Hip Osteoarthritis: PRP vs. HA (2 of 2 slides)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-up</th>
<th>RCTs</th>
<th>Reasons for Downing</th>
<th>Conclusion</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pain</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VAS (0-10)</td>
<td>Short-term</td>
<td>1 RCT</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>MD 0.0 (95% CI -0.84, 0.84) Conclusion: No difference between groups.</td>
<td>⬣⬣◯◯ LOW</td>
</tr>
<tr>
<td></td>
<td>Intermediate-term</td>
<td>1 RCT</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>MD 0.25 (95% CI -0.59, 1.09) Conclusion: No difference between groups.</td>
<td>⬣⬣◯◯ LOW</td>
</tr>
<tr>
<td></td>
<td>Long-term</td>
<td>1 RCT</td>
<td>RoB (-1) Imprecision (-1)</td>
<td>MD 0.16 (95% CI -0.78, 1.1) Conclusion: No difference between groups.</td>
<td>⬣⬣◯◯ LOW</td>
</tr>
</tbody>
</table>

- No evidence: Function success, Pain success
- Secondary outcomes:
  - Medication use (short-, intermediate-, long-term): no difference between groups
TMJ Osteoarthritis:
PRP vs. HA

- 1 RCT (N=50)
- Function, pain
  - No differences between groups (short-, intermediate-, long-term)- Insufficient SoE
- No evidence:
  - Function success
  - Pain success
  - Secondary outcomes

Summary

- Osteoarthritis
  - Only knee osteoarthritis had evidence of benefit with PRP
    - PRP vs. HA: No short-term differences between groups in pain (low SoE) or function (moderate SoE). By the intermediate-term, function scores were better and pain success more common in the PRP (moderate SoE for both) (although there were no differences between groups in function success (low SoE) or pain scores (moderate SoE)). In the long-term, pain and function success was more common and function scores were better with PRP (but there were no differences between groups in pain scores) (low SoE for all).
    - PRP vs. Saline: Short- and intermediate-term pain and function scores were better with PRP (low SoE for all).
  - Hip osteoarthritis:
    - PRP vs. HA: No differences between PRP and HA groups in short-, intermediate-, or long-term function or pain scores (low SoE).
KQ2: Harms and Complications

Tendinopathies
Plantar Fasciitis
Acute Injuries
Osteoarthritis

Harms and Complications

• All included comparative studies were evaluated for harms

• No case series met the inclusion criteria
  • N≥100, specifically designed to evaluate harms

• Serious adverse events:
  • Across all included studies, there was no evidence of any serious harms in any intervention or control group.
  • SoE: LOW or INSUFFICIENT

• Non-serious adverse events:
  • The most common non-serious adverse event was injection-site pain (both during and after the injection) and was more common with PRP or ABI than other injections.
  • Otherwise, the majority of non-serious adverse events occurred relatively infrequently.
  • SoE: LOW or INSUFFICIENT
KQ3: Differential Efficacy and Safety

- No evidence: tendinopathies, plantar fasciitis, acute injuries, hip OA, TMJ OA

- Insufficient evidence:
  - Knee OA, PRP vs. HA (1 RCT, N=122)
    - Patients with early OA reported better function (IKDC) and better quality of life (EQ VAS) than those with advanced OA with PRP injection.
  
  - Knee OA, PRP vs. Saline (1 RCT, N=123)
    - Patients with early OA reported better function (IKDC) and better quality of life (EQ VAS) than those with advanced OA with PRP injection.

KQ4: Cost Effectiveness

No evidence.
Summaries

• Safety
  • No serious adverse events reported (low or insufficient SoE).
  • Non-serious adverse events:
    • Injection-site pain (both during and after the injection) and was more common with PRP or ABI than other injections.
    • Otherwise non-serious events occurred relatively infrequently.

• Differential efficacy and safety
  • Insufficient quality or no evidence

• Cost-effectiveness
  • No evidence

Questions?
Autologous Blood or Platelet-Rich Plasma Injections

Background

Platelet-rich plasma (PRP) and whole blood injections are treatments that have been utilized for a variety of healing applications in sports medicine and orthopedic medicine. Conditions where PRP or whole blood injections are commonly utilized include refractory acute or chronic ligament injuries, muscle strain injuries, cartilage injuries, osteoarthritis, and tendinopathies. In particular, the use of PRP and blood injections in sports medicine have seen a recent increase in public exposure, as many professional athletes have elected to receive these treatments, especially PRP, for sports-related injuries.

The rationale behind PRP and autologous blood injections (ABI) is to increase the concentration of growth-factor rich platelets around the injured area. These growth factors include platelet-derived growth factor (PDGF), insulin-like growth factors (IGF-I and IGF-II), and vascular endothelial growth factor (VEGF). This influx of platelets is thought to promote the healing process by enhancing regeneration and increasing angiogenesis. In particular, PRP preparations contain a concentration of platelets that is at least four-fold higher than that in blood to approximately one million platelets per microliter, a concentration that is thought to be clinically active. These therapies are outpatient procedures and utilize the patient's own blood to obtain the PRP or whole blood used in the injection. PRP is prepared by centrifugation of autologous blood to separate out the platelet-carrying buffy coat layer from platelet-poor plasma, red blood cells and white blood cells; the buffy coat layer and some of the plasma are then isolated and re-centrifuged to obtain the PRP to be used in the injection. Platelet-activating factors like thrombin may be added to PRP to stimulate platelets to release growth factors and increase recruitment of tissue repair factors. No such additional processing occurs for whole blood injections after venipuncture. It is common to add local anesthetic to PRP and whole blood samples to reduce pain at the injection site. Injection is usually performed under ultrasound guidance, and can be repeated if needed.

Despite the increased use of PRP and whole blood injections for healing applications, the efficacy and safety for PRP and whole blood injection treatments are not well established. In particular, there are additional issues regarding PRP: while the technology to obtain PRP is FDA-approved, PRP itself is currently not indicated for direct injection. Additionally, the number of PRP-preparation systems and lack of standardization for the platelet concentration of PRP also make establishing true efficacy difficult.
Policy Context

Platelet-rich plasma (PRP) and whole blood injections are proposed for a variety of healing applications. Concerns are considered medium for safety, medium/high for efficacy and medium for cost-effectiveness.

Scope of This HTA

To systematically review, critically appraise, analyze and synthesize research evidence evaluating the comparative efficacy, effectiveness, and safety of PRP in adults for treating musculoskeletal soft tissue injuries, tendinopathies, osteoarthritis, or low back pain. The differential effectiveness and safety of PRP for subpopulations will be evaluated, as will the cost effectiveness.

Population: Patients with musculoskeletal soft tissue injuries, tendinopathies, osteoarthritis, or low back pain.

Interventions: Autologous PRP or whole blood injections (that used in conjunction with other procedures such as surgery will be excluded)

Comparators: Alternative treatment(s), placebo, or no treatment

Outcomes: Function (primary), pain (primary), time to recovery, return to normal activities (sports, work, or activity level), quality of life, patient satisfaction, recurrence, medication use, secondary procedures (e.g., surgery), adverse events (primary), cost-effectiveness (e.g., cost per improved outcome), cost-utility (e.g., cost per quality adjusted life year (QALY), incremental cost effectiveness ratio (ICER) outcomes

Key Questions

In patients with musculoskeletal soft tissue injuries, tendinopathies, osteoarthritis, or low back pain:

1. What is the evidence of the short- and long-term efficacy and effectiveness of autologous PRP or whole blood injections compared with alternative treatment options or no treatment/placebo?

2. What is the evidence regarding short- and long-term harms and complications of autologous PRP or whole blood injections compared with alternative treatment options or no treatment/placebo?

3. Is there evidence of differential efficacy, effectiveness, or safety of autologous PRP or whole blood injections compared with alternative treatment options no treatment/placebo? Include consideration of age, sex, race, ethnicity, socioeconomic status, payer, and worker’s compensation?

4. What is the evidence of cost-effectiveness of autologous PRP or whole blood injections compared with alternative treatment options?
### Summary of Inclusion And Exclusion Criteria

<table>
<thead>
<tr>
<th>Study Component</th>
<th>Inclusion</th>
<th>Exclusion</th>
</tr>
</thead>
</table>
| **Population**  | Patients with any of the following conditions:  
- musculoskeletal soft tissue injuries  
- tendinopathies  
- osteoarthritis, or  
- low back pain: | • Cutaneous wounds  
• Bone fractures  
• Neurosurgery  
• Ophthalmological conditions  
• Cosmetic conditions  
• Maxillofacial surgery  
• Urological conditions  
• Cardiothoracic conditions  
• Dental conditions |
| **Intervention** | Autologous PRP or whole blood injections* | • PRP or whole blood injections used in conjunction with other procedures (i.e., surgery)  
• Other biologics (growth factor injections, etc.)  
• Whole blood injections for OA* |
| **Comparator**  | • Alternative treatment(s)  
• Placebo | |
| **Outcomes**    | • Function (primary)  
• Pain (primary)  
• Time to recovery  
• Return to normal activities (sports, work, or activity level)  
• Quality of life  
• Patient satisfaction  
• Recurrence  
• Medication use  
• Secondary procedures (e.g., surgery)  
• Adverse events (primary) | • Non-clinical outcomes |
| **Study Design**| Focus will be on studies with the least potential for bias.  
**Key Questions 1-2:**  
• High quality systematic reviews will be considered if available.  
• Randomized controlled trials (RCTs)  
• High quality non-randomized comparative studies  
**Key Question 2:**  
• KQ2: High-quality non-comparative studies (case series) designed specifically to evaluate harms/adverse events.  
**Key Question 3:**  
• RCTs which present results for both intervention and comparator such that they are stratified on patient or other characteristics of interest.  
**Key Question 4:**  
• Only full, formal economic studies (i.e., cost-effectiveness, cost-utility, cost-minimization, and indirect comparisons  
• Noncomparative studies (case series) (except as described to evaluate harms)  
• Incomplete economic evaluations such as costing studies  
• Studies with fewer than 10 patients per treatment group  
• Case reports  
• Studies in which <80% of patients have a condition of interest |
<table>
<thead>
<tr>
<th>Study Component</th>
<th>Inclusion</th>
<th>Exclusion</th>
</tr>
</thead>
</table>
| Publication     | - Studies published in English in peer reviewed journals or publically available FDA reports | - Abstracts, editorials, letters  
- Duplicate publications of the same study which do not report on different outcomes  
- Single reports from multicenter trials  
- White papers  
- Narrative reviews  
- Articles identified as preliminary reports when results are published in later versions |
Public Comment & Response

No comments were received.
HTCC Coverage and Reimbursement Determination
Analytic Tool

HTA’s goal is to achieve better health care outcomes for enrollees and beneficiaries of state programs by paying for proven health technologies that work.

To find best outcomes and value for the state and the patient, the HTA program focuses on three questions:

1. Is it safe?
2. Is it effective?
3. Does it provide value (improve health outcome)?

The principles HTCC uses to review evidence and make determinations are:

**Principle One: Determinations are evidence-based**

HTCC requires scientific evidence that a health technology is safe, effective and cost-effective\(^1\) as expressed by the following standards\(^2\):

- Persons will experience better health outcomes than if the health technology was not covered and that the benefits outweigh the harms.
- The HTCC emphasizes evidence that directly links the technology with health outcomes. Indirect evidence may be sufficient if it supports the principal links in the analytic framework.
- Although the HTCC acknowledges that subjective judgments do enter into the evaluation of evidence and the weighing of benefits and harms, its recommendations are not based largely on opinion.
- The HTCC is explicit about the scientific evidence relied upon for its determinations.

**Principle Two: Determinations result in health benefit**

The outcomes critical to HTCC in making coverage and reimbursement determinations are health benefits and harms\(^3\):

- In considering potential benefits, the HTCC focuses on absolute reductions in the risk of outcomes that people can feel or care about.
- In considering potential harms, the HTCC examines harms of all types, including physical, psychological, and non-medical harms that may occur sooner or later as a result of the use of the technology.
- Where possible, the HTCC considers the feasibility of future widespread implementation of the technology in making recommendations.

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\(^1\) Based on Legislative mandate: See RCW 70.14.100(2).

\(^2\) The principles and standards are based on USPSTF Principles at: [http://www.ahrq.gov/clinic/ajpmsuppl/harris3.htm](http://www.ahrq.gov/clinic/ajpmsuppl/harris3.htm)

\(^3\) The principles and standards are based on USPSTF Principles at: [http://www.ahrq.gov/clinic/ajpmsuppl/harris3.htm](http://www.ahrq.gov/clinic/ajpmsuppl/harris3.htm)
The HTCC generally takes a population perspective in weighing the magnitude of benefits against the magnitude of harms. In some situations, it may make a determination for a technology with a large potential benefit for a small proportion of the population.

In assessing net benefits, the HTCC subjectively estimates the indicated population's value for each benefit and harm. When the HTCC judges that the balance of benefits and harms is likely to vary substantially within the population, coverage or reimbursement determinations may be more selective based on the variation.

The HTCC considers the economic costs of the health technology in making determinations, but costs are the lowest priority.

Using evidence as the basis for a coverage decision

Arrive at the coverage decision by identifying for Safety, Effectiveness, and Cost whether (1) evidence is available, (2) the confidence in the evidence, and (3) applicability to decision.

1. Availability of Evidence:
   Committee members identify the factors, often referred to as outcomes of interest, that are at issue around safety, effectiveness, and cost. Those deemed key factors are ones that impact the question of whether the particular technology improves health outcomes. Committee members then identify whether and what evidence is available related to each of the key factors.

2. Sufficiency of the Evidence:
   Committee members discuss and assess the evidence available and its relevance to the key factors by discussion of the type, quality, and relevance of the evidence using characteristics such as:
   - Type of evidence as reported in the technology assessment or other evidence presented to committee (randomized trials, observational studies, case series, expert opinion);
   - The amount of evidence (sparse to many number of evidence or events or individuals studied);
   - Consistency of evidence (results vary or largely similar);
   - Recency (timeliness of information);
   - Directness of evidence (link between technology and outcome);
   - Relevance of evidence (applicability to agency program and clients);
   - Bias (likelihood of conflict of interest or lack of safeguards).

Sufficiency or insufficiency of the evidence is a judgment of each clinical committee member and correlates closely to the GRADE confidence decision.

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4 Based on GRADE recommendation: http://www.gradeworkinggroup.org/FAQ/index.htm
### Factors for Consideration - Importance

At the end of discussion a vote is taken on whether sufficient evidence exists regarding the technology’s safety, effectiveness, and cost. The committee must weigh the degree of importance that each particular key factor and the evidence that supports it has to the policy and coverage decision. Valuing the level of importance is factor or outcome specific but most often include, for areas of safety, effectiveness, and cost:

- Risk of event occurring;
- The degree of harm associated with risk;
- The number of risks; the burden of the condition;
- Burden untreated or treated with alternatives;
- The importance of the outcome (e.g. treatment prevents death vs. relief of symptom);
- The degree of effect (e.g. relief of all, none, or some symptom, duration, etc.);
- Value variation based on patient preference.

### HEALTH TECHNOLOGY EVIDENCE IDENTIFICATION

**Discussion Document:**

What are the key factors and health outcomes and what evidence is there?

<table>
<thead>
<tr>
<th>Safety Outcomes</th>
<th>Safety Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injection site pain</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Efficacy – Effectiveness Outcomes</th>
<th>Efficacy / Effectiveness Evidence</th>
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</thead>
<tbody>
<tr>
<td>Function</td>
<td></td>
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<tr>
<td>Function success</td>
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<tr>
<td>Pain</td>
<td></td>
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<tr>
<td>Pain success</td>
<td></td>
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<tr>
<td>Surgery (need for)</td>
<td></td>
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<tr>
<td>Composite (eg. Function success and no surgery)</td>
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</tbody>
</table>
Full recovery
Quality of life (QoL)
Return to activities
Satisfaction
Medication use

<table>
<thead>
<tr>
<th>Special Population / Considerations Outcomes</th>
<th>Special Populations/ Considerations Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early vs advanced osteoarthritis</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Cost Outcomes</th>
<th>Cost Evidence</th>
</tr>
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<tbody>
<tr>
<td>Cost</td>
<td></td>
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<tr>
<td>Cost effectiveness</td>
<td></td>
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</tbody>
</table>

**Medicare Coverage and Guidelines**

*From page 93 of the Final Report*

**Centers for Medicare Service (CMS): National Coverage Determination for Blood-Derived Products for Chronic Non-Healing Wounds**

The Centers for Medicare and Medicaid Services (CMS) has determined that PRP – an autologous blood-derived product – will be covered only for the treatment of chronic non-healing diabetic, venous and/or pressure wounds and only when (certain) conditions are met.

*From page 80 of Final Report- Table 2 Summary of Clinical Guidelines*

<table>
<thead>
<tr>
<th>Guideline</th>
<th>Evidence Base</th>
<th>Recommendation</th>
<th>Rating/ Strength of Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Colorado Division of Workers Compensation</strong>&lt;br&gt;Cumulative Trauma Conditions: Medical Treatment Guidelines (2010)**</td>
<td>NR</td>
<td>In patients with lateral or medial epicondylitis and symptoms lasting longer than 6 months:&lt;br&gt;• There is good evidence to support PRP injections (2 injections optimum)&lt;br&gt;• There is some evidence to support ABI (2 injections optimum)</td>
<td>NR</td>
</tr>
<tr>
<td>Guideline</td>
<td>Evidence Base</td>
<td>Recommendation</td>
<td>Rating/Strength of Recommendation</td>
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<tr>
<td>ACOEM</td>
<td>NR</td>
<td><strong>ACOEM recommends</strong> both PRP injections and ABI for the following pathologies:</td>
<td>Limited (C)† for both PRP and ABI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Chronic lateral epicondylitis</td>
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<td></td>
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<td><strong>ACOEM does not recommend</strong> – PRP injections for the following pathologies:</td>
<td>Moderate (B)†</td>
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<tr>
<td></td>
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<td>• Achilles tendinopathy</td>
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<td></td>
<td>• ABI for the following pathologies:</td>
<td>Limited (C)†</td>
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<td></td>
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<td>• Plantar fasciitis</td>
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<td><strong>ACOEM provides no recommendation</strong> for – PRP injections and ABI for the</td>
<td>Insufficient (I)†</td>
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<td></td>
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<td>following pathologies:</td>
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<td></td>
<td></td>
<td>• Ankle sprain</td>
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<td>• Knee sprains</td>
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<td></td>
<td>• Anterior and posterior cruciate ligament tears</td>
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<td>• Meniscal tears</td>
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<td></td>
<td>• Patellar tendinosis/tendinopathy</td>
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<td>• Anterior knee pain</td>
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<td></td>
<td></td>
<td>• Acute or subacute lateral epicondylitis</td>
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<td>PRP injections only for the following pathologies:</td>
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<tr>
<td></td>
<td></td>
<td>• Plantar fasciitis</td>
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</tr>
<tr>
<td>ICMS</td>
<td>Tendinopathies 3 studies (type NR) 1 animal study</td>
<td><strong>ICMS suggests the need for further research</strong> on the effects of PRP injections</td>
<td>NR</td>
</tr>
<tr>
<td>Section VII: Platelet Rich Plasma</td>
<td>Ligament Sprains 1 study (type NR) Muscle Sprains</td>
<td>on the following pathologies:</td>
<td></td>
</tr>
<tr>
<td>PRP Guidelines (2011)</td>
<td>1 study (type NR) Joints 1 study (type NR)</td>
<td>• Tendinopathies</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Ligament sprains</td>
<td></td>
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<td></td>
<td></td>
<td>• Muscle strains</td>
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<tr>
<td></td>
<td></td>
<td>• Joints</td>
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<tr>
<td></td>
<td></td>
<td>• Intervertebral discs</td>
<td></td>
</tr>
<tr>
<td>Hsu et al.</td>
<td>Cartilage Injuries 3 level I studies 1 level II</td>
<td><strong>Hsu et al. recommends</strong> the use of PRP injections in the following pathologies:</td>
<td>NR</td>
</tr>
<tr>
<td>Platelet-rich Plasma in Orthopaedic</td>
<td>study Chronic Tendinopathies 4 level I studies</td>
<td>• Elbow epicondylitis refractory to standard nonsurgical treatment</td>
<td></td>
</tr>
<tr>
<td>Applications: Evidence-based</td>
<td>1 level III study Rotator Cuff Repair 5 level I</td>
<td><strong>Hsu et al. suggests the need for further research</strong> on the effects of PRP on</td>
<td></td>
</tr>
<tr>
<td>Recommendations for Treatment</td>
<td>and level II studies Achilles Tendon Repair</td>
<td>the following pathologies:</td>
<td></td>
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<tr>
<td>(2013)</td>
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<td>• Cartilage injuries</td>
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<td></td>
<td></td>
<td>• Chronic tendinopathies (excluding elbow epicondylitis refractory to standard</td>
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<td></td>
<td></td>
<td>• Rotator cuff repair</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Achilles tendon repair</td>
<td></td>
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<tr>
<td>Guideline</td>
<td>Evidence Base</td>
<td>Recommendation</td>
<td>Rating/ Strength of Recommendation</td>
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</tbody>
</table>
| **Work Loss Data Institute**  
Ankle & Foot (acute & chronic) (2013)\(^{296*}\)  
Elbow (acute & chronic) (2013)\(^{297*}\)  
Hip & Pelvis (acute & chronic) (2013)\(^{298*}\)  
Low Back – Lumbar & Thoracic (acute & chronic) (2013)\(^{299*}\)  
Pain (acute & chronic) (2013)\(^{300*}\)  
Shoulder (acute & chronic) (2013)\(^{301*}\) | NR | Work Loss Data Institute **recommends** the use of both PRP injection and ABI for the following pathologies:  
• Acute and chronic elbow disorders (not further defined)  
Work Loss Data Institute **does not recommend**—  
PRP injection for the following pathologies:  
• Ankle and foot disorders (not further defined).  
• Low back pain (lumbar and thoracic)  
• Chronic pain, unless used in a research setting  
ABI for the following pathologies:  
• Ankle and foot disorders (not further defined).  
Work Loss Data Institute **provides no recommendation** for—  
PRP injections for the following pathologies:  
• Hip and pelvis injuries (not further defined)  
• Shoulder disorders (not further defined)  
ABI for the following pathologies:  
• Shoulder disorders (not further defined). | NR |
| **AAOS**  
Treatment of Osteoarthritis of the Knee (2013)\(^{34}\) | 2 studies of low SOE  
1 study of moderate SOE | AAOS **cannot make a recommendation** for or against the use of PRP and/or growth factor injections for patients with symptomatic osteoarthritis of the knee. | Inconclusive‡ |
Clinical Committee Findings and Decisions

Efficacy Considerations

- What is the evidence that use of the technology results in more beneficial, important health outcomes? Consider:
  - Direct outcome or surrogate measure
  - Short term or long term effect
  - Magnitude of effect
  - Impact on pain, functional restoration, quality of life
  - Disease management
- What is the evidence confirming that use of the technology results in a more beneficial outcome, compared to no treatment or placebo treatment?
- What is the evidence confirming that use of the technology results in a more beneficial outcome, compared to alternative treatment?
- What is the evidence of the magnitude of the benefit or the incremental value?
- Does the scientific evidence confirm that use of the technology can effectively replace other technologies or is this additive?
- For diagnostic tests, what is the evidence of a diagnostic tests' accuracy?
  - Does the use of the technology more accurately identify both those with the condition being evaluated and those without the condition being evaluated?
- Does the use of the technology result in better sensitivity and better specificity?
- Is there a tradeoff in sensitivity and specificity that on balance the diagnostic technology is thought to be more accurate than current diagnostic testing?
- Does use of the test change treatment choices?

Safety

- What is the evidence of the effect of using the technology on significant morbidity?
  - Frequent adverse effect on health, but unlikely to result in lasting harm or be life-threatening, or;
  - Adverse effect on health that can result in lasting harm or can be life-threatening?
- Other morbidity concerns?
- Short term or direct complication versus long term complications?
- What is the evidence of using the technology on mortality – does it result in fewer adverse non-fatal outcomes?

Cost Impact

- Do the cost analyses show that use of the new technology will result in costs that are greater, equivalent or lower than management without use of the technology?
Overall

- What is the evidence about alternatives and comparisons to the alternatives?
- Does scientific evidence confirm that use of the technology results in better health outcomes than management without use of the technology?

Next Step: Cover or No Cover

If not covered, or covered unconditionally, the Chair will instruct staff to write a proposed findings and decision document for review and final adoption at the following meeting.

Next Step: Cover with Conditions

If covered with conditions, the Committee will continue discussion.

1) Does the committee have enough information to identify conditions or criteria?
   - Refer to evidence identification document and discussion.
   - Chair will facilitate discussion, and if enough members agree, conditions and/or criteria will be identified and listed.
   - Chair will instruct staff to write a proposed findings and decision document for review and final adoption at next meeting.

2) If not enough or appropriate information, then Chair will facilitate a discussion on the following:
   - What are the known conditions/criteria and evidence state
   - What issues need to be addressed and evidence state

The chair will delegate investigation and return to group based on information and issues identified. Information known but not available or assembled can be gathered by staff; additional clinical questions may need further research by evidence center or may need ad hoc advisory group; information on agency utilization, similar coverage decisions may need agency or other health plan input; information on current practice in community or beneficiary preference may need further public input. Delegation should include specific instructions on the task, assignment or issue; include a time frame; provide direction on membership or input if a group is to be convened.

Clinical Committee Evidence Votes

First Voting Question

The HTCC has reviewed and considered the technology assessment and information provided by the administrator, reports and/or testimony from an advisory group, and submissions or comments from the public. The committee has given greatest weight to the evidence it determined, based on objective factors, to be the most valid and reliable.
Is there sufficient evidence under some or all situations that the technology is:

<table>
<thead>
<tr>
<th></th>
<th>Unproven (no)</th>
<th>Equivalent (yes)</th>
<th>Less (yes)</th>
<th>More (yes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective</td>
<td></td>
<td></td>
<td></td>
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<td>Safe</td>
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<td>Cost-effective</td>
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**Discussion**

Based on the evidence vote, the committee may be ready to take a vote on coverage or further discussion may be warranted to understand the differences of opinions or to discuss the implications of the vote on a final coverage decision.

- Evidence is insufficient to make a conclusion about whether the health technology is safe, efficacious, and cost-effective;
- Evidence is sufficient to conclude that the health technology is unsafe, ineffectual, or not cost-effective;
- Evidence is sufficient to conclude that the health technology is safe, efficacious, and cost-effective for all indicated conditions;
- Evidence is sufficient to conclude that the health technology is safe, efficacious, and cost-effective for some conditions or in some situations.

A straw vote may be taken to determine whether, and in what area, further discussion is necessary.

**Second Vote**

Based on the evidence about the technologies’ safety, efficacy, and cost-effectiveness, it is

_____ Not Covered _____ Covered Unconditionally _____ Covered Under Certain Conditions

**Discussion Item**

Is the determination consistent with identified Medicare decisions and expert guidelines, and if not, what evidence is relied upon.

**Next Step: Proposed Findings and Decision and Public Comment**

At the next public meeting the committee will review the proposed findings and decision and consider any public comments as appropriate prior to a vote for final adoption of the determination.

1) Based on public comment was evidence overlooked in the process that should be considered?

2) Does the proposed findings and decision document clearly convey the intended coverage determination based on review and consideration of the evidence?
**Next Step: Final Determination**

Following review of the proposed findings and decision document and public comments:

**Final Vote**

Does the committee approve the Findings and Decisions document with any changes noted in discussion?

If yes, the process is concluded.

If no, or an unclear (i.e., tie) outcome Chair will lead discussion to determine next steps.