PASIG MONTHLY CITATION BLAST: No.91 **March 2014**

Dear Performing Arts SIG members:

I would like to officially introduce myself, Brooke Winder, PT, DPT, OCS, as the new research chair for the term of 2014-2016, and thank Annette Karim, former research chair who has now transitioned to President of PASIG. I have been a member of PASIG for several years, joining as a physical therapy student, and have continued my membership as a research committee member as I transitioned into practice. My interest in caring for performing artists stemmed from my own background and experience as a gymnast and dancer, and I am happy to actively contribute to growing the body of resources for clinicians and students in this area as incoming research chair.

I hope many of you were able to make it to the APTA Combined Sections Meeting in Las Vegas this year, February 3rd-6th, 2014. Our PASIG business meeting was a productive time and we thank all who contribute their interest and time to the PASIG. During the meeting we transitioned two committee positions.

On behalf of the PASIG, we thank Julie O'Connell, 2011-2014 PASIG President, and Amanda Blackmon, 2011-2014 Nominating Committee Chair, for their 3 years of service to our SIG. Thank you, Julie and Amanda!!

Our current PASIG board and committee members are listed below:

SIG Governing Board	Terms	Email
Annette Karim, President	**2014-2017**	**neoluvsonlyme@aol.com**
Tom McPoil, Board Liaison	**2003-2016**	**tommcpoil@gmail.com**
Mark Sleeper, Vice President/Ed Chair	**2013-2016**	**M-sleeper@northwestern.edu**

SIG Committees: **Amy Humphrey, Student Scholarship Committee Chair**	**2012-2014**	**amymarieis@comcast.net**
Rosie Canizares, Nominating Chair	**2012-2015**	**Caniz002@duke.edu**
Elizabeth Chesarek, Nominating Committee	**2013-2016**	**Elizabeth.Chesarek@choa.org**
Janice Ying, Nominating Committee	**2014-2017**	**JaniceYingDPT@gmail.com**
Brooke Winder, Research Chair	**2014-2016**	**brookeRwinder@gmail.com**
Amanda Blackmon, Membership Chair	**2014-2016**	**Mandy@onetherapy.com**

We are currently looking for PASIG members to serve on our board and committees. Positions we would like to fill: **Treasurer, Education, Secretary, Bylaws, Practice, and PR chairs.** These are appointed positions decided upon by the current governing board and nominating committee. The chair of each committee can appoint their committee members, volunteers are welcome to initiate contact. PT students are welcome to participate and receive mentorship from committee members. This is a great way to grow into leadership positions.

We will also need candidates for one Nominating Committee position in 2015, an elected position, voted in by all orthopaedic section members.

If you are interested in serving in any way, or would like further information on each position's job description, please contact Rosie Canizares, Nominating Chair: Caniz002@duke.edu

Don't forget to update your Orthopaedic Section and PASIG membership! You will find links to the website for updating at the end of this blast. Also, please contact Amanda Blackmon, membership chair, to make sure she has your current information for receiving blasts and updates as well as confirming your membership: Mandy@onetherapy.com

Student Scholarships:
Congratulations to our CSM 2014 Student Scholarship recipients, Lindsey Seidelman, SPT, and Sarah Beckett, SPT from the University of Central Florida. They presented a poster: **INCIDENCE AND PREVALENCE OF MUSCULOSKELETAL INJURY AMONG COLLEGIATE MARCHING BAND AND COLOR GUARD MEMBERS**

If you are a student who is interested in submitting performing arts research content to CSM for poster or platform presentation, do so early. When your submission accepted for CSM 2015, you are eligible for this $400.00 scholarship, BUT you must apply for the scholarship separately, through PASIG, via Amy Humphrey: amymarieis@comcast.net

If you were not able to make it to CSM this year, please join us in May:

Our second **annual Orthopaedic Section Meeting will be May 15-17, 2014, in St. Louis, Missouri**, at the Hyatt Regency at the Arch. The two-day meeting will focus on: ***"The Triangle of Treatment: Integrating Movement System Impairments, Manual Therapy and the Biopsychosocial Approach in the Treatment of the Upper Quarter"***

More information will be posted soon at the following website:
http://www.orthopt.org/content/home

Research Call to action:

1. We need writers for the 2014 Citation blasts!!! These are put together on a monthly basis. Please contact me for more information, at brookerwinder@gmail.com. Go to the website to look at topics that have been covered, add new content or update old citation topics: http://www.orthopt.org/content/special_interest_groups/performing_arts/citations_endnotes
2. We need case reports and original research papers that focus on clinical applications to the care of performing artists to publish in our quarterly Orthopaedic Practice Magazine, in the PASIG pages. Orthopaedic Practice Magazine is a great way of getting your case reports, original research, and clinical pearls into the hands of our PASIG members. Please contact Annette Karim if you are interested in submitting your writing: neoluvsonlyme@aol.com
3. If you are seeking research participants, or are seeking a researcher to work with your potential participants, contact both Brooke Winder, Research Chair: Brookerwinder@gmail.com and Amanda Blackmon, Membership Chair: mandy@onetherapy.com
4. We are still looking into creating a brief dance screening as a resource for the PASIG website. The new contact for dance screening is Sarah Wegner: Sbw28@drexel.edu

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This month's citation blast is an update on hip labral tears, focusing primarily on articles published most recently (2013/2014) as a previous citation blast 2 years ago summarized prior research. I hope the articles are useful in your patient care!

The practice of compiling abstracts has been an easy way for interns and clinicians to provide content for a citation blast as well as prepare for a clinical inservice or case study report. Please consider compiling Performing Arts-related abstracts for a citation blast this year. It's easy to do, and a great way to become involved with PASIG! Just take a look at our Performing Arts Citations and Endnotes, look for

what's missing, and email me your contribution or ideas on future citation blasts. (brookeRwinder@gmail.com)

http://www.orthopt.org/content/special_interest_groups/performing_arts/citations_endnotes

Best regards,

Brooke

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Laura Reising, MS, PT, DPT, lbreising@gmail.com (EndNote Organizer)

PERFORMING ARTS CONTINUING EDUCATION, CONFERENCES, AND RESOURCES

Orthopaedic Section Independent Study Course. *20.3 Physical Therapy for the Performing Artist*.
Monographs are available for:
- Figure Skating (J. Flug, J. Schneider, E. Greenberg),
- Artistic Gymnastics (A. Hunter-Giordano, Pongetti-Angeletti, S. Voelker, TJ Manal), and
- Instrumentalist Musicians (J. Dommerholt, B. Collier).

Contact: Orthopaedic Section at: www.orthopt.org

Orthopaedic Section-American Physical Therapy Association,
Performing Arts SIG
http://www.orthopt.org/content/special_interest_groups/performing_arts
Performing Arts Citations and Endnotes
http://www.orthopt.org/content/special_interest_groups/performing_arts/citations_endnotes

ADAM Center
http://www.adamcenter.net/
Publications:

http://www.adamcenter.net/#!vstc0=publications
Conference abstracts:
http://www.adamcenter.net/#!vstc0=conferences

Dance USA
http://www.danceusa.org/
Research resources:
http://www.danceusa.org/researchresources
Professional Dancer Annual Post-Hire Health Screen:
http://www.danceusa.org/dancerhealth

Dancer Wellness Project
http://www.dancerwellnessproject.com/
Becoming an affiliate:
http://www.dancerwellnessproject.com/Information/BecomeAffiliate.aspx

Harkness Center for Dance Injuries, Hospital for Joint Diseases
http://hjd.med.nyu.edu/harkness/
Continuing education:
http://hjd.med.nyu.edu/harkness/education/healthcare-professionals/continuing-education-courses-cme-and-ceu
Resource papers:
http://hjd.med.nyu.edu/harkness/dance-medicine-resources/resource-papers-and-forms
Links:
http://hjd.med.nyu.edu/harkness/dance-medicine-resources/links
Informative list of common dance injuries:
http://hjd.med.nyu.edu/harkness/patients/common-dance-injuries
Research publications:
http://hjd.med.nyu.edu/harkness/research/research-publications

International Association for Dance Medicine and Science (IADMS)
http://www.iadms.org/
Resource papers:
http://www.iadms.org/displaycommon.cfm?an=1&subarticlenbr=186
Links:
http://www.iadms.org/displaycommon.cfm?an=5
Medicine, arts medicine, and arts education organization links:
http://www.iadms.org/displaycommon.cfm?an=1&subarticlenbr=5
Publications:
http://www.iadms.org/displaycommon.cfm?an=3

Performing Arts Medicine Association (PAMA)
http://www.artsmed.org/
http://www.artsmed.org/symposium.html
Interactive bibliography site:

http://www.artsmed.org/bibliography.html
Related links:
http://www.artsmed.org/relatedlinks.html
Member publications:
http://artsmed.org/publications.html

(Educators, researchers, and clinicians, please continue to email your conference and continuing education information to include in future blasts)

Hip Labral Tears

As we have all seen in the past few years, the medical community is beginning to discover more and more about the appropriate assessment and management of labral tears in the hip, and it remains a "hot topic" in orthopedics. Given the intensive repetitive strain undergone at the hip for many performing artists, especially dancers and gymnasts, it is important for us to stay current with any new research developed. As we have not had a citation blast dedicated specifically to hip labral tears in a few years, the focus of this blast is presentation of abstracts published recently (2013-2014). The abstracts included focus on diagnosis/imaging, surgical management, rehabilitation, and functional testing. Of course, we can see that more specific research on performing artists and this diagnosis is needed!

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Ayeni OR, Adamich J, Farrokhyar F, et al. Surgical management of labral tears during femoroacetabular impingement surgery: a systematic review. *Knee Surg Sports Traumatol Arthrosc.* Feb 12 2014.

Purpose: This systematic review explored reported outcomes addressing femoroacetabular impingement (FAI), specifically those comparing labral debridement to labral repair. In addition, the quality of the evidence was evaluated for the purposes of making treatment recommendations.
Methods: Three databases (MEDLINE, EMBASE, and PubMed) were searched for comparative studies involving labral repair and debridement during FAI surgery. Two reviewers conducted a title, abstract, and full-text review of eligible studies and the references of these studies. Inclusion and exclusion criteria were applied to the searched studies, data were extracted, and a quality assessment was completed for included studies.
Results: Six eligible studies involving 490 patients were identified. The most commonly reported outcome measure was the modified Harris hip score (MHHS) (50 %). All studies reported that labral repair had greater postoperative improvements in functional scores (modified Harris hip, non-

arthritic hip, hip outcome, and Merle d'Aubigne scores) compared to labral debridement. Five studies reported statistically significant improvements with labral repair. MHHS were pooled to demonstrate a clinically important difference in favor of labral repair by 7.4 points in three studies. The mean individual study quality can be considered fair. However, the overall quality of the body of evidence in this review is rated as low according to GRADE guidelines. Conclusions: This review demonstrates a reporting of better clinical outcomes with labral repair compared to labral debridement in all studies with five of six studies reporting statistically significant improvements (of repair over debridement). However, given the lack of high quality evidence and associated limitations in study design, these results should be interpreted with caution. Consequently, definitive treatment recommendations require further investigation with well-conducted clinical trials. This systematic review enables the discussion of best evidence practice for the surgical managing of a labral tear associated with FAI. (Level of evidence: III)

Ayeni OR, Alradwan H, de Sa D, Philippon MJ. The hip labrum reconstruction: indications and outcomes-a systematic review. *Knee Surg Sports Traumatol Arthrosc.* Dec 7 2013.

Purpose: With further understanding of the function and the importance of the hip labrum, greater attention has been paid to preserve and repair the damaged labrum. Hip labrum reconstruction has been described to optimize hip preservation when the labrum is deficient. This systematic review aimed to explore and identify the reported indications and outcomes in patients who undergo labral reconstruction of the hip joint. Methods: The electronic databases EMBASE, MEDLINE, and PubMed were searched for all available dates up to July 2013. Further hand search of the reference sections of the included studies was done. Two reviewers searched, screened, and evaluated the included studies for data quality using the Methodological Index for Non-Randomized Studies (MINORS) Scale. Data were also abstracted in duplicate, and agreement and descriptive statistics are presented. Results: There were 5 eligible studies (3 case series, 1 prospective cohort, and 1 retrospective chart review) with a total of 128 patients, and an average 11/16 quality on the MINORS score included in this review. All patients were diagnosed with femoroacetabular impingement and underwent labral reconstruction. Ninety-four patients were assessed at follow-up (73.4 % survivorship) between a reported mean range of 10 and 49 months. There was variability between the studies with regard to the graft types utilized (ilio-tibial band, Gracilis tendon, Ligamentum teres), surgical approaches [open (18.7 %) vs. arthroscopic (81.3 %)], and the reported outcome measures. Overall, improvement was observed in the patient-reported outcomes and functional scores (mHHS, HOS, UCLA, NASH, and SF-12). The failure

rate or conversion to THA rate in all available patients was 20 %. The most common indication for labrum reconstruction was a young, active patient with minimal arthritis and non-salvageable or deficient labrum. Other indications included instability, pain, and hypotrophic dysfunctional labrum. Conclusion: Based on the current available evidence, hip labrum reconstruction is a new technique that shows short-term improvement in patient-reported outcomes and functional scores post-operatively. The main indication for reconstruction was a deficient labrum due to previous surgical excision or irreparable tears in young patients with no significant arthritis. Long-term follow-up results with higher quality studies are still lacking based on this review. (Level of evidence II)

Boykin RE, Patterson D, Briggs KK, Dee A, Philippon MJ. Results of arthroscopic labral reconstruction of the hip in elite athletes. *Am J Sports Med.* Oct 2013;41(10):2296-2301.

Background: Femoroacetabular impingement (FAI) has been well characterized as a cause of hip pain and resultant damage to the acetabular labrum. It has become increasingly clear that an intact labrum is essential for normal joint mechanics, hip stability, and preservation of the articular cartilage. Elite athletes with a hypoplastic or irreparable labrum present a difficult clinical challenge. Purpose: To assess clinical outcomes and determine if elite athletes are able to return to a high level of function and sport after labral reconstruction. Study Design: Case series; Level of evidence, 4. Methods: A retrospective review of a prospectively collected registry identified 21 elite athletes (23 hips) with an average age of 28.0 years (range, 19-41 years) who underwent an arthroscopic iliotibial band labral reconstruction. Concomitant procedures included femoral and acetabular osteoplasty in all patients and microfracture in 9 of 23 hips. Clinical outcomes were assessed with the modified Harris Hip Score (MHHS), the Hip Outcome Score (HOS), the Short Form–12 (SF-12), and patient satisfaction (on a scale from 1-10). Return to play was determined, as well as level of return to play, based on sport-specific statistics. Results: Two patients progressed to arthroplasty. There were 2 revisions in this group of patients, both for lysis of capsulolabral adhesions in which the graft was found to be well integrated at the time of surgery. The rate of return to play was 85.7% (18/21), with 81% (17/21) returning to a similar level. Subjective follow-up was obtained from 17 of the remaining 19 patients (89%), with an average follow-up of 41.4 months (range, 20-74 months). The average MHHS improved from 67 to 84 (P = .026) and the average HOS Sport subscore from 56 to 77 (P = .009). The overall median patient satisfaction with outcome was 8.2 (range, 3-10). Conclusion: Arthroscopic labral reconstruction using an ipsilateral iliotibial band autograft provides good short-term clinical

outcomes, high patient satisfaction, and a satisfactory level of return to play in a select group of elite athletes.

Domb BG, El Bitar YF, Stake CE, Trenga AP, Jackson TJ, Lindner D. Arthroscopic labral reconstruction is superior to segmental resection for irreparable labral tears in the hip: a matched-pair controlled study with minimum 2-year follow-up. *Am J Sports Med.* Jan 2014;42(1):122-130.

Background: The acetabular labrum is an important structure that plays a significant role in proper biomechanical function of the hip joint. When the labrum is significantly deficient, arthroscopic reconstruction could provide a potential solution for the nonfunctional labrum. Purpose: To compare the clinical outcomes of arthroscopic labral reconstruction (RECON) with those of arthroscopic segmental labral resection (RESEC) in patients with femoroacetabular impingement (FAI) of the hip. Study Design: Cohort study; Level of evidence, 3. Methods: Between April 2010 and March 2011, all prospectively gathered data for patients with FAI who underwent arthroscopic acetabular labral reconstruction or segmental resection with a minimum 2-year follow-up were reviewed. Eleven cases in the RECON group were matched to 22 cases in the RESEC group according to the preoperative Non-Arthritic Hip Score (NAHS) and sex. The patient-reported outcome scores (PROs) used included the NAHS, the Hip Outcome Score (HOS), and the modified Harris Hip Score (mHHS). Statistical analyses were performed to compare the change in PROs in both groups. Results: There was no statistically significant difference between groups regarding the preoperative NAHS (P = .697), any of the other preoperative PROs, or demographic and radiographic data. The mean change in the NAHS was 24.8 ± 16.0 in the RECON group and 12.5 ± 16.0 in the RESEC group. The mean change in the HOS–activities of daily living (HOS-ADL) was 21.7 ± 16.5 in the RECON group and 9.5 ± 15.5 in the RESEC group. Comparison of the amount of change between groups showed greater improvement in the NAHS and HOS-ADL for the RECON group (P = .046 and .045, respectively). There was no statistically significant difference in the mean changes in the rest of the PROs, although there were trends in all in favor of the RECON group. All PROs in both groups showed a statistically significant improvement at follow-up compared with preoperative levels. Conclusion: Arthroscopic labral reconstruction is an effective and safe procedure that provides good short-term clinical outcomes in hips with insufficient and nonfunctional labra in the setting of FAI.

Duthon VB, Charbonnier C, Kolo FC, et al. Correlation of clinical and magnetic resonance imaging findings in hips of elite female ballet dancers. *Arthroscopy.* Mar 2013;29(3):411-419.

Purpose: To understand why professional female ballet dancers often complain of inguinal pain and experience early hip osteoarthritis (OA).

Goals were to examine clinical and advanced imaging findings in the hips of dancers compared with those in a matched cohort of nondancers and to assess the femoral head translation in the forward split position using magnetic resonance imaging (MRI). Methods: Twenty professional female ballet dancers and 14 active healthy female individuals matched for age (control group) completed a questionnaire on hip pain and underwent hip examination with impingement tests and measurement of passive hip range of motion (ROM). All had a pelvic 1.5 T MRI in the back-lying position to assess femoroacetabular morphologic features and lesions. For the dancers, additional MR images were acquired in the split position to evaluate femoroacetabular congruency. Results: Twelve of 20 dancers complained of groin pain only while dancing; controls were asymptomatic. Dancers' passive hip ROM was normal. No differences in α neck angle, acetabular depth, acetabular version, and femoral neck anteversion were found between dancers and controls. MRI of dancers while performing splits showed a mean femoral head subluxation of 2.05 mm. MRI of dancers' hips showed labral tears, cartilage thinning, and herniation pits, located in superior and posterosuperior positions. Lesions were the same for symptomatic and asymptomatic dancers. Controls had proportionally the same number of labral lesions but in an anterosuperior position. They also had 2 to 3 times fewer cartilage lesions and pits than did dancers. Conclusions: The results of our study are consistent with our hypothesis that repetitive extreme movements can cause femoral head subluxations and femoroacetabular abutments in female ballet dancers with normal hip morphologic features, which could result in early OA. Pathologic changes seen on MRI were symptomatic in less than two thirds of the dancers. Level of Evidence: Level IV, therapeutic case series.

Geyer MR, Philippon MJ, Fagrelius TS, Briggs KK. Acetabular labral reconstruction with an iliotibial band autograft: outcome and survivorship analysis at minimum 3-year follow-up. *Am J Sports Med.* Aug 2013;41(8):1750-1756.

Background: Injury to the acetabular labrum results from multiple causes including femoroacetabular impingement, dysplasia, and acute trauma. The patient's labrum can be reconstructed utilizing an iliotibial band autograft that is tubularized and fixed to the acetabular rim, substituting for the patient's own labrum. Purpose/Hypothesis: The purpose of this study was to evaluate the midterm results of this technique with a follow-up from 3 to 6 years after reconstruction. The hypothesis was that midterm results would show excellent patient-reported outcomes and high patient satisfaction with outcome. Study Design: Case series; Level of evidence, 4. Methods: A retrospective review of a prospectively collected registry was undertaken that identified 75 patients (76 hips) who underwent arthroscopic labral reconstruction using an iliotibial band autograft by a single surgeon from February 2005 to August 2008. Modified Harris Hip

Score (mHHS), Hip Outcome Score (HOS), and patient satisfaction level (on a scale of 1-10) were recorded preoperatively and postoperatively annually. Survivorship analysis curves were created to evaluate the effectiveness of this technique. Results: Among 76 hips, 19 progressed to total hip arthroplasty at an average of 28 months from the procedure. Mean survivor time (no arthroplasty) was 59.1 months (95% CI, 53.9-64.4). Follow-up on the surviving hips was available for 49 patients (86%) with a mean follow-up time of 49 months (range, 36-70 months). The mHHS significantly increased from a preoperative mean of 58.9 to the most recent follow-up score averaging 83 (P = .0001); HOS values in the sports and the activities of daily living subscales also increased significantly (P = .0001 and P = .001, respectively). Median patient satisfaction with outcome was 8. A joint space of ≤2 mm was found to be a poor prognostic factor for survival of the hip. Conclusion: Arthroscopic labral reconstruction using an iliotibial band autograft resulted in a survivorship of 56 months. Of the 76% of patients who did not require total hip arthroplasty, improvement in function and high satisfaction with outcome were reported. Joint space of ≤2 mm is a contraindication for acetabular labral reconstruction

Hauser RA, Orlofsky A. Regenerative injection therapy with whole bone marrow aspirate for degenerative joint disease: a case series. *Clin Med Insights Arthritis Musculoskelet Disord.* 2013;6:65-72.

Background: Acetabular labral tear is a debilitating condition for which there are few effective non-surgical treatment options. A number of studies in humans and in animal models suggest that the labrum may have a capacity for spontaneous healing, and that therapies that seek to exploit and facilitate this process may be beneficial. Regenerative injection therapies have shown promise in the treatment of several musculoskeletal disorders, but have not previously been applied to labral tear. *Methods*: We present an initial case series of 19 patients with labral tear that were treated in our clinic with intra-articular injections of hypertonic dextrose. Patient-reported assessments were collected by questionnaire between 1 and 60 months post-treatment (mean = 12 months). *Results*: All patients reported improvements in pain relief and functionality. Patients reported complete relief of 54% of recorded symptoms. Improvements did not show dependence on the time between treatment and follow-up. No adverse events were reported.

Conclusions: Regenerative injection therapy (prolotherapy) for acetabular labral tear appears to be a safe and potentially efficacious procedure that merits further investigation as a non-surgical option.

Hetsroni I, Dela Torre K, Duke G, Lyman S, Kelly BT. Sex differences of hip morphology in young adults with hip pain and labral tears. *Arthroscopy.* Jan

2013;29(1):54-63.

Purpose: To compare hip morphology between young men and women who presented with hip pain and labral tears. Methods: A retrospective review of our hip arthroscopy registry from March 2008 to June 2010 was completed. We identified 217 patients (249 hips) who were between the ages of 18 to 30 years. The inclusion criteria were (1) insidious-onset hip pain or worsening pain after low-energy sports trauma, (2) positive hip impingement sign, (3) Tönnis grades 0 to 1, (4) magnetic resonance imaging showing labral tear, and (5) primary hip arthroscopy confirming labral tear. Forty-five patients (52 hips) were excluded for the following reasons: (1) revision hip arthroscopy, (2) high-energy hip trauma, (3) history of surgery involving the femur or pelvis, (4) previous fractures of the femur or pelvis, (5) Tönnis grades 2 or above, (6) proliferative disease of the hip (i.e., synovial chondromatosis, pigmented villonodular synovitis), (7) neuromuscular disease (i.e., cerebral palsy), and (8) deformities related to Legg-Calvé-Perthes disease or developmental dysplasia of the hip. Therefore, the cohort study group included 105 (61%) men (123 [62.4%] hips) and 67 (39%) women (74 [37.6%] hips). Sex comparisons were made for the following variables measured on preoperative hip computed tomography scans: alpha angle, acetabular version, femoral version, lateral center-edge angle, and neck-shaft angle. Results: Women had smaller alpha angles (47.8° v 63.6°, $P < .001$), increased acetabular version (17.3° v 13.9°, $P < .001$), and increased femoral anteversion (14.4° v 12.1°, $P = .05$). Conclusions: In young adults with hip pain and labral tears, women have smaller alpha angles and hips that are generally more anteverted. Therefore, in women, cam lesions may be more subtle, preoperative hip version analyses should be encouraged, and rim trimming may need to be cautiously planned to avoid increasing contact stresses at weight-bearing areas after such a procedure. Level of Evidence: Level III, retrospective comparative study.

Kivlan BR, Carcia CR, Clemente FR, Phelps AL, Martin RL. Reliability and validity of functional performance tests in dancers with hip dysfunction. *Int J Sports Phys Ther.* Aug 2013;8(4):360-369.

Study Design**:** Quasi-experimental, repeated measures.
Purpose/Background: Functional performance tests that identify hip joint impairments and assess the effect of intervention have not been adequately described for dancers. The purpose of this study was to examine the reliability and validity of hop and balance tests among a group of dancers with musculoskeletal pain in the hip region. Methods: Nineteen female dancers (age: 18.90±1.11 years; height: 164.85±6.95 cm; weight: 60.37±8.29 kg) with unilateral hip pain were assessed utilizing the cross-over reach, medial triple hop, lateral triple hop, and cross-over hop tests on two occasions, 2 days apart. Test-retest reliability and

comparisons between the involved and uninvolved side for each respective test were determined. Results: Intra-class correlation coefficients for the functional performance tests ranged from 0.89-0.96. The cross-over reach test had a SEM of 2.79 cm and a MDC of 7.73 cm. The medial and lateral triple hop tests had SEM values of 7.51 cm and 8.17 cm, and MDC values of 20.81 cm and 22.62 cm, respectively. The SEM was 0.15 seconds and the MDC was 0.42 seconds for the cross-over hop test. Performance on the medial triple hop test was significantly less on the involved side (370.21±38.26 cm) compared to the uninvolved side (388.05±41.49 cm); $t(18) = -4.33$, $p<0.01$. The side-to-side comparisons of the cross-over reach test (involved mean=61.68±10.9 cm; uninvolved mean=61.69±8.63 cm); $t(18) = -0.004$, $p=0.99$, lateral triple hop test (involved mean=306.92±35.79 cm; uninvolved mean=310.68±24.49 cm); $t(18) = -0.55$, $p=0.59$, and cross-over hop test (involved mean=2.49±0.34 seconds; uninvolved mean= 2.61±0.42 seconds; $t(18) = -1.84$, $p=0.08$) were not statistically different between sides. Conclusion: The functional performance tests used in this study can be reliably performed on dancers with unilateral hip pain. The medial triple hop test was the only functional performance test with evidence of validity in side-to-side comparisons. These results suggest that the medial triple hop test may be a reliable and valid functional performance test to assess impairments related to hip pain among dancers. Level of Evidence: 3b. Non-consecutive cohort study

Krych AJ, Thompson M, Knutson Z, Scoon J, Coleman SH. Arthroscopic labral repair versus selective labral debridement in female patients with femoroacetabular impingement: a prospective randomized study. *Arthroscopy.* Jan 2013;29(1):46-53.

Purpose: The purpose of this prospective randomized study was to compare the outcomes of arthroscopic labral repair and selective labral debridement in female patients undergoing arthroscopy for the treatment of pincer-type or combined pincer- and cam-type femoroacetabular impingement. Methods: Between June 2007 and June 2009, 36 female patients undergoing arthroscopic hip treatment for pincer- or combined-type femoroacetabular impingement were randomized to 2 treatment groups at the time of surgery: labral repair or labral debridement. The repair group comprised 18 patients with a mean age of 38; the debridement group comprised 18 patients with a mean age of 39. All patients underwent the same rehabilitation protocol postoperatively. At a minimum of 1 year, all patients were assessed using a validated Hip Outcome Score (HOS) to determine hip function, and also completed a simple subjective outcome measure. Results: All 36 patients were available for follow-up at an average time of 32 months (range, 12 to 48). In both groups, HOSs for activities of daily living (ADL) and sports improved significantly from before surgery to the final follow-up ($P < .05$). The postoperative ADL HOS was significantly better in the repair group

(91.2; range, 73 to 100) compared with the debridement group (80.9; range, 42.6 to 100; P < .05). Similarly, the postoperative sports HOS was significantly greater in the repair group (88.7; range, 28.6 to 100) than in the debridement group (76.3; range, 28.6 to 100; P < .05). Additionally, patient subjective outcome was significantly better in the labral repair group (P 1⁄4 .046). Conclusions: Arthroscopic treatment of femoroacetabular impingement with labral repair in female patients resulted in superior improvement in hip functional outcomes compared with labral debridement. In addition, a greater number of patients in the repair group subjectively rated their hip function as normal or nearly normal after surgery compared with the labral debridement group. Level of Evidence: Level I, prospective randomized study.

Lynch TS, Terry MA, Bedi A, Kelly BT. Hip arthroscopic surgery: patient evaluation, current indications, and outcomes. *Am J Sports Med.* May 2013;41(5):1174-1189.

Arthroscopic surgery in the hip joint has historically lagged behind its counterparts in the shoulder and knee. However, the management of hip injuries in the athletic population has rapidly evolved over the past decade with our improved understanding of mechanical hip pathology as well as the marked improvement in imaging modalities and arthroscopic techniques. Current indications for hip arthroscopic surgery may include symptomatic labral tears, femoroacetabular impingement (FAI), hip capsular laxity/instability, chondral lesions, disorders of the peritrochanteric or deep gluteal space, septic joint, loose bodies, and ligamentum teres injuries. Furthermore, hip arthroscopic surgery is developing an increasingly important role as an adjunct diagnostic and therapeutic tool in conjunction with open femoral and/or periacetabular osteotomy for complex hip deformities.

Arthroscopic techniques have evolved to allow for effective and comprehensive treatment of various hip deformities. Techniques for extensile arthroscopic capsulotomies have allowed for improved central and peripheral compartment exposure and access for labral takedown, refixation, treatment of chondral injury, and osteochondroplasty of the femoral head-neck junction and acetabular rim. While favorable short-term and midterm clinical outcomes have been reported after arthroscopic treatment of prearthritic hip lesions, greater long-term follow-up is necessary to assess the efficacy of hip arthroscopic surgery in altering the natural history and progressive degenerative changes associated with FAI.

Malloy P, Malloy M, Draovitch P. Guidelines and pitfalls for the rehabilitation following hip arthroscopy. *Curr Rev Musculoskelet Med.* Sep 2013;6(3):235-241.

Rehabilitation guidelines following hip arthroscopy have been presented in

the literature with common themes consisting of initial protection, restoration of lumbo-pelvic stability, neuromuscular re-education, and return to sport training. The purpose of this review is to present hip arthroscopy guidelines in 4 phases and to address common pitfalls that may delay the rehabilitative process. The goal of phase 1 should be to protect healing tissues through activity modifications. Phase 2 intends to return the patient to pain-free community ambulation without compensation or irritation. A review of hip muscular actions during gait is presented to guide exercise progressions during this phase. Phase 3 should reestablish neuromuscular control through strength and endurance training to provide the foundation for return to functional activities or sports training progressions. The last phase of rehabilitation is dedicated to reestablishing power, speed, agility, and skill for advanced sports and advanced functions.

O'Donnell J, Economopoulos K, Singh P, Bates D, Pritchard M. The ligamentum teres test: a novel and effective test in diagnosing tears of the ligamentum teres. *Am J Sports Med.* Jan 2014;42(1):138-143.

Background: A ligamentum teres (LT) injury is a common finding at the time of hip arthroscopic surgery in patients with chronic groin and hip pain; however, LT tears have been difficult to identify before surgery. There have been no unique features identified on history assessment, physical examination, or imaging that reliably identify injuries of the LT preoperatively. Purpose: To report a new clinical examination to assess the presence of an LT tear: the LT test. Study Design: Cohort study (diagnosis); Level of evidence, 2. Methods: The study consisted of 75 patients undergoing hip arthroscopic surgery for multiple lesions. Each patient was evaluated by 2 independent examiners using the LT test, leading to a total of 150 tests being performed. The LT test is conducted with the hip flexed at 70° and 30° short of full abduction; the hip is then internally and externally rotated to its limits of motion. Pain on either internal or external rotation is consistent with a positive LT test result. Hip arthroscopic surgery was then performed and all intra-articular abnormalities noted. Arthroscopic images were taken of each LT and examined by a third independent examiner who determined the presence or absence of a tear. Clinical examination findings were compared with the arthroscopic findings to determine the sensitivity, specificity, and positive and negative predictive values. In addition, the presence of intra-articular pathological lesions was compared with the test results to determine if there was a correlation between the presence of an intra-articular pathological abnormality and a positive LT test result. Results: Of the 150 examinations performed, the test result was positive 55% of the time (77 examinations). The sensitivity and specificity of the test were 90% and 85%, respectively. The positive predictive value was 84%, and the negative predictive value was 91%. The presence of an LT tear, pincer

lesion, and labral tear that required repair was associated with a positive LT test result. The κ coefficient for interobserver reliability was .80. Conclusion: The LT test is an effective way of assessing the presence of LT tears with moderate to high interobserver reliability. In addition to an LT tear, the presence of a pincer lesion or labral tear requiring repair are also associated with a positive LT test result.

Reiman MP, Goode AP, Hegedus EJ, Cook CE, Wright AA. Diagnostic accuracy of clinical tests of the hip: a systematic review with meta-analysis. *Br J Sports Med.* Sep 2013;47(14):893-902.

Background Hip Physical Examination (HPE) tests have long been used to diagnose a myriad of intra-and extra-articular pathologies of the hip joint. Useful clinical utility is necessary to support diagnostic imaging and subsequent surgical decision making. Objective Summarise and evaluate the current research and utility on the diagnostic accuracy of HPE tests for the hip joint germane to sports related injuries and pathology. Methods A computer-assisted literature search of MEDLINE, CINHAL and EMBASE databases (January 1966 to January 2012) using keywords related to diagnostic accuracy of the hip joint. This systematic review with meta-analysis utilised the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) guidelines for the search and reporting phases of the study. Der-Simonian and Laird random effects models were used to summarise sensitivities (SN), specificities (SP), likelihood ratios and diagnostic OR. Results The employed search strategy revealed 25 potential articles, with 10 demonstrating high quality. Fourteen articles qualified for meta-analysis. The meta-analysis demonstrated that most tests possess weak diagnostic properties with the exception of the patellar-pubic percussion test, which had excellent pooled SN 95 (95% CI 92 to 97%) and good specificity 86 (95% CI 78 to 92%). Conclusion Several studies have investigated pathology in the hip. Few of the current studies are of substantial quality to dictate clinical decision-making. Currently, only the patellar-pubic percussion test is supported by the data as a stand-alone HPE test. Further studies involving high quality designs are needed to fully assess the value of HPE tests for patients with intra- and extra-articular hip dysfunction.

Spencer-Gardner L, Eischen JJ, Levy BA, Sierra RJ, Engasser WM, Krych AJ. A comprehensive five-phase rehabilitation programme after hip arthroscopy for femoroacetabular impingement. *Knee Surg Sports Traumatol Arthrosc*. Sep 28 2013.

Purpose Recent advancements in the understanding of hip biomechanics have led to the development of techniques to remove bony impingement and repair and/or preserve the labrum during hip arthroscopy. Although much attention in the literature is devoted to diagnosis and treatment,

there is little information about post-operative rehabilitation. Therefore, the purpose of this review is to (1) provide a five-phase rehabilitation protocol following arthroscopic treatment for FAI and (2) report clinical and functional outcomes of patients following this protocol at minimum 1-year follow-up, in order to provide the surgeon and therapist with a protocol that is supported by clinical data. Methods All consecutive patients undergoing hip arthroscopy and subsequent five-phase rehabilitation protocol at a single institution from 1 April 2011 to 1 April 2012 were analysed. Inclusion criteria were as follows: no prior ipsilateral hip surgery, completion of the five-phase rehabilitation protocol, minimum 1-year follow-up, and documented outcome scores. Prospective outcomes were assessed with modified Harris hip score (MHHS) and hip outcome score (HOS). Results Fifty-two patients (19 male and 33 female) met the inclusion criteria with a median age of 42 (range 16–59) years. Mean MHHS, HOS-ADL, and HOS-sport scores at a mean 12.5 (range 12–15) months were 80.1 ± 19.9 (0–100), 83.6 ± 19.2 (13.2–100), and 70.3 ± 27.0 (0–100), respectively. Conclusion This five-phase rehabilitation programme provides a framework where progression from surgery to increasing post-operative activity level can take place in a predictable manner. Patients following this rehabilitation protocol after hip arthroscopy demonstrated satisfactory clinical and functional outcomes, validating its implementation. Level of evidence Case series, Level IV.