

Sports Medicine

UPDATE

JANUARY/FEBRUARY 2012



INJURY SURVEILLANCE SYSTEMS

**CONSENSUS
STATEMENT:
Concussion
and the
Team
Physician**

**Research
Grant Award
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**Traveling
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SPORTS MEDICINE UPDATE is a bimonthly publication of the American Orthopaedic Society for Sports Medicine (AOSSM). The American Orthopaedic Society for Sports Medicine—a world leader in sports medicine education, research, communication, and fellowship—is a national organization of orthopaedic sports medicine specialists, including national and international sports medicine leaders. AOSSM works closely with many other sports medicine specialists and clinicians, including family physicians, emergency physicians, pediatricians, athletic trainers, and physical therapists, to improve the identification, prevention, treatment, and rehabilitation of sports injuries.

This newsletter is also available on the Society's website at www.sportsmed.org.

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Peter A. Indelicato, MD

A REMARKABLE ATTRIBUTE OF AOSSM'S MEMBERSHIP is that 95 percent serve as team physicians for professional, collegiate, high school, and community sports teams. Consequently, members are recognized not just for their surgical skills, but also for their clinical expertise in managing orthopaedic and non-orthopaedic conditions that present in the clinic and training room and on the sidelines. This issue of *Sports Medicine Update* provides important guidance on one of the most important issues for all team physicians — concussion management.

Concussion (Mild Traumatic Brain Injury) and the Team Physician: A Consensus Statement — 2011 Update provides important guidance and recommendations based on the latest science since the statement was first released in 2006. The joint statement reflects the participation and support by AOSSM, the American College of Sports Medicine, American Medical Society for Sports Medicine, American Osteopathic Academy of Sports Medicine, American Academy of Orthopaedic Surgeons, and the American Academy of Family Physicians, along with noted researchers and clinicians in the field. Everyone who has cared for athletes understands that concussions can be one of the more vexing and critical conditions to manage, especially at this time of heightened sensitivity and conflicting evidence. I encourage you to take the time to read the updated Consensus Statement and incorporate it into your team coverage.

Part of incorporating this information into your coverage is to ensure that the other professionals on our health care team also are kept apprised on the latest clinical evidence in caring for athletes. Passing along the Consensus Statement is an obvious first step. Another, more substantive way of keeping your athletic trainers and others current on the latest news and research is to purchase a gift subscription for them to *Sports Health: A Multidisciplinary Approach*. As an exclusive benefit for our members, AOSSM is providing a special \$45 gift subscription that you can purchase for one or more of the athletic trainers who work with you. This low price will provide them with print and electronic access to the journal for one full year. Go to www.sportsmed.org/shj and give them a valuable resource that will benefit them all year long.

On a final note, I'd like to point out that as 2011 came to a close, a number of promising prospects emerged for our STOP Sports Injuries campaign. In December, senior staff and I met with executives from ESPN Wide World of Sports in Orlando, along with other sports medicine leaders to discuss ways that we could collaborate in promoting youth safety, as well as discuss other potential projects. Earlier that same month I also presented to the National Alliance for Youth Sports on the STOP Sports Injuries program, with Marje Albohm, ATC, President of NATA and Council of Champions member, and Robert Masson, MD, President of Neurospine Institute and another member of our Council of Champions. Also in December, the AOSSM executive director and I went to Washington, D.C., to participate in the Youth Sports Safety Alliance sponsored by the NATA. Finally, Mike Konstant, STOP Sports Injuries Director, presented at the MLB winter meeting about ways the teams can participate in the campaign. Youth sports safety is front and center, as is AOSSM with the STOP Sports Injuries campaign.

AOSSM is the leader in orthopaedic sports medicine. While that leadership is frequently recognized in the operating room, being on the sidelines serving as the team physician is as important as being in the OR and clinic. Your Society is actively working to provide you with the resources to exercise that leadership. Get involved and take advantage of all of these opportunities.

Peter A. Indelicato MD





SPORTS INJURY SURVEILLANCE SYSTEMS

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Injury Surveillance Systems (ISSs) provide the foundation for effective injury prevention efforts, rules and equipment changes, focused treatment alternatives, and interventional assessments. Injury surveillance information now plays a critical role in determining our subspecialty's clinical, administrative, and financial priorities. All members of the sports orthopaedic community should have an understanding of the basic concepts of injury surveillance and the currently active ISS programs. This article will overview these concepts, discuss the most recognized ISS programs, and suggest how clinicians and researchers may partner with these entities to develop research and practice building opportunities.

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As sports participation in the United States continues to grow the healthcare burden associated with athletic related injury increases proportionately. Annually, sports related injuries to children and young adults result in nearly three million ER visits, 30,000 hospitalizations, and billions in healthcare expenditures.^{1,2,3} Currently hot topics such as the mechanisms and rates of sports related concussions, catastrophic injuries in cheerleading, appropriate pitch counts in youth baseball, and game specific head and face protection in women's lacrosse all have their genesis in information gathered from ISS efforts. Information gathered on injury types, rates, mechanisms, and risk factors in large populations of athletes allow an objective assessment of the risks of sports participation. Such information provides the insights for us to partner with the sporting community to make athletic participation safer at all levels of play.

There are a number of well established injury surveillance systems in the United States which are contributing to this effort. Historically, early injury surveillance efforts focused on catastrophic injury in singular sporting groups or activities. Today's injury surveillance systems capture data on an expanded range of injury severity and a wide scope of participants. Injury surveillance programs/data entry tools can now be coupled with software packaging that afford not only basic data injury for research but also allow administrative functions, outcomes assessments, and coordination of patient care. ISSs offer an opportunity for our subspecialty to participate in a growing area of sports medicine research. A combined team of sports medicine physicians, allied health professionals, epidemiologists, and health administrators provide the best opportunity to make injury surveillance efforts appropriately focused, pertinent to current clinical practice, and applicable to the real world of sports injury.

Basic Concepts

Injury surveillance consists of an ongoing, standardized collection of data describing the occurrence of and risk factors associated

with injury in large population groups. It provides the who, what, where, when, and how information which is the basis of descriptive epidemiology. By its nature, data from ISS can be broad in scope, often missing uniform detail, and sometimes lacking context. This information needs

ISS information can bring “objective light” to long held misconceptions, isolate injury clusters, or individual experiences regarding sporting injuries.

to be tempered with a clinical mindset, focused research questioning, checked for real world relevance, and serve as one tool in a multifaceted approach to answering important health related questions.

Surveillance information is important for a number of reasons. First, it establishes the foundation of effective prevention efforts. Only with a true understanding of injury types and specific mechanisms can priorities be defined, resources appropriately allocated, and targeted prevention programs planned. ISS information can often bring some much needed “objective light” to long held misconceptions, isolate injury clusters, or individual experiences regarding sporting injuries. Once prevention programs are underway, data collection must continue to demonstrate a program's effectiveness and cost efficiency.

Second, ISS information helps define the injury risk and burden associated with various type of sports participation. This is important in issues such as deciding which sports to play, relative safety of one sport versus another, overall health benefits of sports participation versus injury risk, and risk of team or individual sports versus other recreational activities.

The success of any injury surveillance program is dependent upon the utilization and understanding of standardized, reliable, and valid methodology; most importantly pertaining to definitions of injury occurrence, severity, exposure, and at risk populations. Readers and researchers must be aware of the nuances of ISS databases when reviewing results and conclusions.

There is not yet full consensus on the definition of a reportable injury. In the NCAA ISS a reportable injury is defined as one that occurs as a result of participation in an organized intercollegiate practice or competition, requires medical attention by a team certified athletic

trainer or physician and results in restriction of the student athlete's participation or performance for one or more calendar days beyond the day of injury.⁴

Other surveillance programs may utilize a more inclusive approach defining injury as any incident which has the athlete interface with medical professionals be it physician or athletic trainer, whether time is lost from participation or not. These two definitions would obviously result in different pictures of injury priorities and common injuries in the same sport.

Next is the concept of injury severity. Many databases now include concepts of injury severity based on time lost from participation in practice or play. However, the same injury may not result in lost play time for one athlete as opposed to another given their specific demands. For an example, a metacarpal fracture which could be splinted and played with for a soccer player, causing minimal days of lost time may result in significant long-term loss of play with a baseball catcher. Other markers for severity have included not only time lost from play, but injuries that have resulted in ER visitation, hospitalization, or surgical intervention.

Risk exposure is another basic concept. This is in an attempt to define the amount of time in which an athlete is exposed to potential injury. The NCAA ISS defines it as one student athlete participating in one practice or competition in which he or she was exposed to the possibility of injury, regardless of the time associated with that participation. Only participants with actual

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playing time are counted as having game exposures, but the actual amount of “active” participation time in a game or practice is not accounted for. Other databases have utilized the concept of a set number of hours of exposure, to try to address the issue that different sports may have different length practices.

Injury reports without the number of at risk population as a denominator data are really only transferring frequency data. Injury rates cannot be generated without knowledge of the exposed population. Injury rate is a measure of the number of injuries in a particular divided by the number of athletic exposures. Injury rates are often generated for game situations and practice situations for a given team and the vast majority of sports show a significantly higher rate of injury in games versus practices.

Another important consideration is data entry and quality controls. Data entered by medical professionals is of higher quality than that entered by coaches or parents. Also there is the sense that data entered as part of a job description or as part of an administrative database also tends to have higher quality than data entered for research purposes alone. Data that can also be entered on a real time or daily basis rather than an accumulated weekly or monthly basis shows improvement. Data that can be entered in an online or computerized format certainly has higher long-term quality than requiring paper applications. Another issue is the tracking of injury versus illness. Definable discrete injuries are easier to track with regard to mechanism, time, player and team activity versus ongoing subacute or chronic medical conditions.

There is also an issue of athletes being tracked by an ISS experiencing symptoms during play as the result of an injury incurred outside of team play or during athlete free time. The quality of data concerning injury mechanism, specific body areas, and specific definition or injury types also is significantly improved if there is regular review of the data, quality management of the data or if the data is being used for specific research queries.

Athletic Data Management Tools (SIMS, NEXTT, ATS)

Currently available athletic training injury management software such as the SIMS, NEXTT and ATS (see table on page 7) not only allow for injury surveillance data entry but couple this with administrative, outcomes, and practice management tools. These providers also function as export engines to the Datalys managed NCAA Injury Surveillance System in which relevant injury surveillance data can be directly downloaded from their system rather than having to be separately entered into the Datalys Web-based system. This does away with the need for “double” data entry.

SIMS is a division of Flantek located in Iowa City, Iowa. It is an advanced injury documentation and management software application designed to streamline the recording requirements in athletic training rooms and other sports facilities. It allows comprehensive data entry with regard to injury type, location, severity, and mechanism.

NEXTT Solutions in South Bend, Indiana, is a sports technology software company with services tailored specifically for sport franchises and athletic organizations. The software involves a highly intuitive complete athletic health recording system, focuses on overall work flow in the typical day in the athletic training room, allows multi-site and multi-web use. It allows the incorporation of MRIs and other imaging studies, is Internet based and allows for follow-up treatment sessions, a master calendar and reports generation.

Athletic Training Services (ATS) is based in Grove City, Pennsylvania and is an information system designed to be flexible and customizable in assisting athletic trainers and other health professionals to track and report information relating to athletes, students and their employees. This information has most to do with injuries but also includes evaluation, rehabilitation, drug testing and purchasing orders.

Example of Current Injury Surveillance Systems

NCAA/Datalys

The NCAA has maintained a nationally representative (but not random sample) injury surveillance system for intercollegiate athletics since 1982. This covers a wide variety of both men’s and woman’s sports. A primary focus has been the collection and assessment of relevant injury data to drive appropriate injury prevention health policy and evidence based decision making with regard to health and safety issues. Participation in the NCAA ISS is voluntary but all NCAA institutions are invited to participate. Athletic trainers at selected schools have been responsible for data collection and entry.⁴ The NCAA has recently outsourced its ISS system to Datalys, a national nonprofit organization which conducts injury research, specific to injury surveillance and sport research. Datalys houses and manages the data which remains the property of the NCAA. Datalys also works with other organizations, to provide injury surveillance data information, including the Fairfax County Public School system discussed on the next page.

David Klossner, NCAA Director of Health and Safety, feels this relationship has resulted in improved oversight and data integrity and will lead to improved collaboration and data access in the future.⁵ AOSSM leadership has also served on the Board of Directors for Datalys. Datalys has recently instituted a Web-based program for data entry which has streamlined the data collection and entry process. A new addition is the concept of an export engine in which athletic trainers can download injury surveillance directly from their existing commercial athletic training room software applications (see above).

Advantages of the NCAA injury surveillance system is that it is a long-standing system which allows comparison of injury rates and trends over a 10–20 year period. It has well-defined injury occurrence, severity, and exposure methodology. It is a nationally representative study of Division I,

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II and III NCAA schools and tracks a wide range of men's and women's sports. Disadvantages are that it only tracks athletes at the intercollegiate level and it does not follow club, intramural or recreational athletes in the college setting. Currently there are some issues with regard to ease of data access. Some databases such as NEISS are easily accessible on the Web. The NCAA and Datalys maintain a tighter hold on the data and require research partners to go through a Web application process reviewed by both partners. Application for Data Request forms are available at www.disc.datalyscenter.org. Applications are initially reviewed by Datalys and if approved sent to NCAA for second level of review. If approved NCAA data 2004–2009 which is housed online at DISC (Datalys Injury Statistics Clearinghouse) is made available. Annual summary reports on individual sports are no longer provided to the general public but are utilized within the NCAA. Example studies utilizing the NCAA ISS include: Head, face, and eye injuries in scholastic and collegiate lacrosse⁶ and comparing the incidence of ACL injury in collegiate lacrosse, soccer, and basketball players: implications for ACL mechanism and prevention.⁷

Center for Injury Research and Policy RIO — Reporting Information Online

This is an Internet based surveillance system under the direction of Dr. Dawn Comstock at the Research Institute at the Nationwide Children's Hospital in Columbus, Ohio. The RIO system was developed in 2004 and is currently the only surveillance system of all time loss injuries and a national sample of U.S. high school athletic teams. It has been designed to closely duplicate the NCAA injury surveillance systems. High schools across the country are invited to participate on an annual basis. Approximately 100 schools currently do so.

The database is used to describe rates, patterns and trends of high school sport related injuries. It covers both a wide range of both boys and girls sports. It utilizes athletic trainers as data entry reporters. The database has been used for multiple



epidemiologic studies. Dr. Comstock and her staff are available to partner with potential researchers (see table on page 7). Annual summary reports are available online to the public. Researchers interested in more detailed data need to fill out a data utilization agreement with Dr. Comstock and research review and co-authorship is often utilized. Data can be pulled on specific areas such as specific body part, specific sporting activities or other demographic data and can be sent to potential researchers in SPSS or SAS format. Small data queries can be done by the RIO staff and RIO staff can also be subcontracted to work on specific projects.

A potential weakness of the RIO system is that it is primarily an injury surveillance data entry program and it does not couple with the export type engines that Datalys and NCAA now allow. It currently provides information only on high school athletes but in the future will strive to look at elementary and middle school aged children. Examples of studies utilizing the RIO ISS include: Shoulder injuries in U.S. high school baseball and softball athletes 2005–2008;⁸ A comparison of high school sports injury surveillance data reporting by certified athletic trainers, coaches, and athletes;⁹ Compliance with return to play guidelines following concussion in U.S. high school athletes 2005–2008.¹⁰

Fairfax County Public School System Injury Surveillance Database

This database has been run for the past ten years under the direction of John Almquist in Falls Church, Virginia. Fairfax County, Virginia has two certified athletic trainers at each of 25 high schools in the county. As part of their job description the athletic trainers utilize a modified SIMS computerized injury data collection system for administrative as well as injury surveillance data entry. More than 25,000 athletes participate each year in 27 different sports. Computerized injury tracking and an on-site research coordinator who oversees all data entry result in high quality data. Athletes are followed throughout their four year career and record keeping can be modified to incorporate specific research projects. The system has more than ten years of cumulative data representing more than 15 million athletic exposures. Mr. Almquist is available on a contractual basis to collaborate with research partners either in specific smaller query to the database or in accessing larger parts of the database (see table on page 7). The system has been used extensively to look at lacrosse injuries and concussive incidents in high school athletes.

Advantages of the database are high quality data control, 25 high schools within the same school system which decrease variables across the system as far as

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interventional studies. A potential concern is that it is limited to a single geographic area in Virginia. Example of studies utilizing the Fairfax ISS include: Epidemiology of lacrosse injuries in high school aged girls and boys: a 3 year prospective study¹¹ and Trends in concussion incidence in high school sports: a prospective 11 year study.¹²

National Center for Catastrophic Injury Research

This program is based in Chapel Hill North Carolina and is under the direction of Fred Mueller. The center collects and disseminates data on death and permanent disability sports injury data that involved brain and/or spinal cord injuries. The center partners with the NCAA, the American Football Coaches Association and the National Federation of High School Associations. Research has been conducted since 1965. Annual reports are administered on catastrophic sport injury and catastrophic football injury. Reports are available online at no cost. Dr. Mueller is available to discuss research questions (see table on page 7). His staff can run limited queries and they are available to discuss any of the online data. Data is gathered on catastrophic injuries from information provided from the National High School Federation, NCAA ISS, United States Lacrosse, print newspaper services and Google searches. By its nature data is limited to catastrophic injuries and doesn't represent a full picture of all injuries in any single sport. Cases are typically followed up by phone conversation

or questionnaire to track more detailed information. Potential HIPPA or litigation issues can sometimes limit access to pertinent medical information. Recall bias can be an issue when following up cases long-term. Example studies from the catastrophic injury database are: Catastrophic head injuries in high school and college football players¹³ and Catastrophic cheerleading injuries.¹⁴

U.S. Product Consumer Product Commission National Electronic Injury Surveillance System — NEISS

For the past 30 years the U.S. Consumer Product Safety Commission has operated surveillance systems of U.S. emergency rooms. Data is gathered from approximately 100 hospitals. Data is triggered by emergency room admissions and has historically involved some type of consumer product. Recent changes in the database have expanded data collection to include injuries which do not include specific products. There is demographic data, data concerning the injury type/severity/location, product involved, and vignette information concerning the mechanism of injury. Periodically the NEISS is redesigned to update improved sample and to reflect improved product coding. If longitudinal studies are planned one must make sure that the product codes go across the time interval investigated. The NEISS data is available online. The NEISS product code drop down at the website also provides all product coding information. Queries can be made based on a given product

or demographic information. The database is currently directed by Thomas Schroeder (see table for contact information)

Dr. Schroeder and his staff are available to answer any questions concerning the data which is available online or to discuss projects and to also assist in data queries.

Limitations of the Consumer Product Safety data are the fact that it is triggered by emergency room visitation, so it gives a skewed view of sport injury in any given sport. Data is often not available from the narrative sections or varies quite a bit in quality in the narrative section with regards to injury mechanisms. It is often hard to determine whether the injuries occurred during organized sporting events, unorganized sporting events or activities of daily living i.e. a baseball bat may result in injury in many different scenarios. Strengths are that it provides a nationally representative sample and it can be followed in a longitudinal fashion. Examples of studies from the NEISS include: Football related injuries among 6 to 17 year olds treated in U.S. emergency departments 1990–2007¹⁴ and Basketball related injuries in school aged children and adolescents from 1997–2007.¹⁵

Conclusion

Sports orthopaedic surgeons can partner with the above or other injury surveillance systems to build research and practice outreach opportunities. Many of these databases are available online and most have helpful, interested directors and staff which are available to assist you with your research queries and interest. Injury surveillance is playing a significantly increased role in prioritizing the financial, administrative, and clinical priorities of sports medicine and sports orthopaedics. Partnering with a local school system or other organization to implement injury surveillance programs can serve as a practice builder by helping those entities address medical/legal concerns, administrative issues, streamline athletic training care and position you as a knowledgeable partner in providing high quality medical care for athletes.

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Injury Surveillance System Resources and Contacts

Datalys Center for Sports Injury Research and Prevention
 Indianapolis, Indiana
 Thomas P. Dompier, PhD, ATC, President
 317/275-3666
www.datalyscenter.org

Datalys Injury Statistics Clearing House (DISC)
www.disc.datalyscenter.org
 Application for Data Request Form

Center for Injury Research and Policy
 Reporting Information Online
 Columbus, Ohio
 Dawn Comstock, PhD, Director
highschoolrio@nationwidechildrens.org
dawn.comstock@nationwidechildrens.org
 617/722-2400

Fairfax County Public School System Athletic Training Program
 Falls Church, Virginia
 Jon Almquist, ATC, VATL, Director
 571/423-1264

National Center for Catastrophic Injury Research
 Chapel Hill, North Carolina
 Frederick Mueller, Director
mueller@email.unc.edu
 919/962-5171

Consumer Product Safety Commission NEISS
 Bethesda, Maryland
 Thomas Schroeder, Director
clearinghouse@cpsc.gov
 301/504-7431

Athletic Data Management Software Provider

Sports Injury Monitoring System (SIMS)
 Iowa City, Iowa
 888/352-6824
support@flantech.net

Athletic Trainer Services (ATS)
 Grove City, Pennsylvania
 724/458-5289
Athletictrainersystem.com

NEXTT
 South Bend, Indiana
 547/233-6695
sates@nexttsolutions.com

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CONCUSSION (MILD TRAUMATIC BRAIN INJURY) AND THE TEAM PHYSICIAN: A CONSENSUS STATEMENT—2011 UPDATE

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This document is a revision to the team physician consensus statement published in 2006 in *Medicine & Science in Sports & Exercise*[®] and other publications.

Key revisions appearing in this paper include the following:

- No same-day return-to-play (RTP).
- Neurological examination emphasizing cognitive function and balance.
- Role and limitations of neuropsychological (NP) testing.
- Utility of standardized baseline and postinjury assessments.
- Importance of preseason planning.
- Acknowledged importance of cognitive rest.
- Acknowledged emerging technologies and their role in concussion research.
- Recognition of long-term complications of concussion.
- Legislation and governing body regulations for concussion.

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Definition

Concussion or mild traumatic brain injury (MTBI) is a pathophysiological process affecting the brain induced by direct or indirect biomechanical forces.

Common features include the following:

- Rapid onset of usually short-lived neurological impairment, which typically resolves spontaneously.
- Acute clinical symptoms that usually reflect a functional disturbance rather than structural injury.
- A range of clinical symptoms that may or may not involve loss of consciousness (LOC).
- Routine neuroimaging studies are typically normal.

Goal

The goal is to assist the team physician in providing optimal medical care for the athlete with concussion.

To accomplish this goal, the team physician should have knowledge of and/or be involved with:

- Biomechanics and pathophysiology
- Epidemiology
- Preseason planning and assessment
- Same-day evaluation and treatment
- Post-same-day evaluation and treatment
- Diagnostic testing
- RTP
- Complications of concussion
- Prevention
- Legislative actions

Summary

This document provides an overview of select medical issues that are important to team physicians who are responsible for athletes with concussion. It is not intended as a standard of care and should not be interpreted as such. This document is only a guide and, as such, is of a general nature, consistent with the reasonable, objective practice of the healthcare professional. Individual treatment will turn on the specific facts and circumstances presented to the physician. Adequate insurance should be in place to help protect the physician, the athlete, and the sponsoring organization. This statement was developed by a collaboration of six major professional

associations concerned about clinical sports medicine issues; they have committed to forming an ongoing project-based alliance to bring together sports medicine organizations to best serve active people and athletes. These organizations are the American Academy of Family Physicians, the American Academy of Orthopaedic Surgeons, the American College of Sports Medicine, the American Medical Society for Sports Medicine, the American Orthopaedic Society for Sports Medicine, and the American Osteopathic Academy of Sports Medicine.

Introduction

It is essential the team physician understand:

- The recognition and evaluation of the athlete with concussion.
- After assessment by a health care provider, athletes suspected of or diagnosed with a concussion are removed from practice or competition at that time. There is no same-day RTP, even if the athlete's initial symptoms resolve as the athletic event evolves.
- In the absence of assessment by a health care provider, athletes suspected of concussion are removed from practice or competition, and there is no same-day RTP. There is no subsequent RTP until the athlete is medically cleared by a health care provider.
- Management and treatment of the athlete with concussion be individualized.
 - Concussions are unique to each athlete. Symptoms may vary with each concussion an athlete sustains.
- The factors involved in making RTP decisions after injury should be based on clinical judgment in conjunction with individual modifiers known to influence concussion recovery.
- A same-day medical plan specific to concussion injuries be developed.
- The need for documentation.
- While helmet materials and design are improving, there is no concussion-proof helmet.

It is desirable the team physician:

- Coordinate a systematic approach for the evaluation and treatment of the athlete with concussion.
- Implement a treatment program.
- Understand the potential sequelae of concussive injuries.

- Understand prevention strategies.
- Educate athletes, parents/guardians, coaches, caregivers, and others.

Epidemiology

- Concussions occur commonly in helmeted and nonhelmeted sports and account for a significant number of time loss injuries.
- There are up to 3.8 million concussions occurring among participants in sports and recreational activities each year.
- Published reports indicate recognized concussion injuries occur frequently.
 - Football, ice hockey, soccer, and lacrosse tend to have the highest concussion incidence rates when calculated by athlete exposure.
 - Competition concussion incidence rates are consistently higher than practice rates.
 - In sports with the same rules (basketball and soccer), recent research suggests the reported incidence rate of concussion is higher in female athletes.
 - The data demonstrating a difference between the reported incidence of concussion in adolescents and adult athletes are inconclusive.
- Self-report and trained observer data suggest significantly higher incidence of concussion.

Biomechanics and Pathophysiology

- Concussions occur as a result of imparted linear and rotational accelerations to the brain.
- Because of modifying factors (e.g., concussion history, neck strength, anticipatory reaction and varying magnitudes, frequency, and locations of impact), there is currently no known threshold for concussive injury.
- Metabolic changes that occur in the animal model and thought to occur in humans include the following:
 - Alterations in intracellular/extracellular glutamate, potassium, and calcium.
 - A relative decrease in cerebral blood flow in the setting of an increased requirement for glucose (i.e., increased glycolysis). This mismatch in the metabolic supply and demand may potentially result in cell dysfunction and increase the vulnerability of the cell to a second insult.

Continued on page 10



Preseason Planning and Assessment

It is essential the team physician understand:

- The emergency medical action plan, including guidelines specific to concussion management.

It is desirable the team physician:

- Coordinate and be involved with a baseline assessment for high-risk sports and activities.
- Incorporate a standardized baseline assessment tool for concussion that includes prior concussion history, risk factors for prolonged or complicated recovery (Table 1), symptom checklist, and neurological examination emphasizing cognitive function and balance (Appendix 1).
- Coordinate a team for concussion management (e.g., physicians, certified athletic trainers and other health care providers, neuropsychologists, school officials, emergency response personnel).

TABLE 1. Risk factors that may prolong or complicate recovery from concussion.

Factors	Modifier
Concussion History	Total number, proximity, severity (duration)
Symptoms	Total number, severity (intensity and especially duration)
Signs	Prolonged LOC (> 1 minute)
Susceptibility	Concussions occurring with lower impact magnitude and/or requiring longer recovery
Age	Youth and adolescent athletes may recover more slowly
Preexisting Conditions	Migraine, depression, anxiety/panic attacks, attention deficit/hyperactivity disorder, learning disabilities

Same-Day Evaluation and Treatment

It is essential the team physician:

- Implement the same-day medical action plan specific to concussion.
- Understand the indications for cervical spine immobilization and emergency transport.

On-Field

- Evaluate the injured athlete on-the-field in a systematic fashion:
 - Assess for adequate airway, breathing, and circulation (ABCs)

- Perform a focused neurological assessment emphasizing mental status, neurological deficit, and cervical spine status
- Determine initial disposition (emergency transport vs sideline evaluation)
- There is no RTP on the same day if a concussion is suspected or diagnosed.

Sideline

- Obtain a more detailed history and perform a more detailed physical examination.
 - Assess for cognitive, somatic, and affective signs and symptoms of acute concussion with particular attention paid to the number and severity of symptoms because of their prognostic significance (Table 2).
- The athlete should not be left unsupervised until a disposition decision is made.
- Perform and repeat neurological assessments, with particular emphasis on cognitive function, cranial nerve, and balance testing (32) (Appendix 1).
- Determine disposition for symptomatic and asymptomatic athletes, including postinjury follow-up (options include home with observation or transport to hospital).
- Provide postevent instructions to the athlete and others (e.g., regarding alcohol, medications, physical and cognitive exertion, and medical follow-up).

It is desirable the team physician:

On-Field

- Have a plan to protect access to the injured athlete.
- Have emergency medical personnel on-site.
- Have medical supplies on-site for rescue, immobilization, and transportation (1).

Sideline

- Delineate the mechanism of injury.
- Perform a more detailed assessment using a standardized concussion assessment tool (34) (Appendices 1 and 2)
- Coordinate the care and follow-up of the concussed athlete with certified athletic trainers and other health care providers.
- Discuss status of athlete with parents/guardians, caregivers, coaches, and others within disclosure regulations.

Post-Same-Day Evaluation and Treatment

This is the period to monitor for improvement, as well as change in severity or the development of new signs or symptoms (Table 2).

It is essential the team physician:

- Obtain a comprehensive history of the current concussion.
 - Brief LOC (seconds, not minutes) is associated with specific early deficits but does not predict the severity of injury; therefore, classification systems or RTP guidelines based solely on brief LOC are not accurate.
 - The number and duration of additional signs and symptoms are more accurate in predicting severity and outcome. RTP guidelines that address these issues are more useful.
 - Duration of symptoms is a major factor in determining severity; therefore, severity of injury should not be determined until all signs and symptoms have cleared.
- Understand risk factors may affect recovery (Table 1).
- Perform a neurological examination with particular emphasis on cognitive function, cranial nerve, and balance testing.
- Determine the need for further evaluation and consultation.
- Understand the role and limitations of NP testing.
- Determine RTP status. The treatment of and the RTP decision for the athlete with concussion must be individualized.

It is desirable the team physician:

- Coordinate the care and follow-up of the athlete.
- Compare findings to standardized baseline assessment.
- Educate the athlete, parents/guardians, caregivers, and others about concussion.
- Coordinate the care and follow-up of the concussed athlete with certified athletic trainers and other health care providers.
- Discuss status of athlete with parents/guardians, caregivers, coaches, and others within disclosure regulations.
- Work in collaboration with the neuropsychologist to interpret NP testing.

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Diagnostic Testing

Imaging

It is essential the team physician understand:

- The limited value of plain skull radiographs, head computed tomography, or magnetic resonance imaging for concussion.
- Indications for head computed tomography or magnetic resonance imaging (e.g., decreasing level of consciousness, increasing severity of signs and symptoms, persistent focal neurologic deficit) to assess associated injuries including intracranial bleed, cerebral edema, diffuse axonal injury, and/or skull fracture.
- Indications for the use of cervical imaging when cervical spine injury is suspected.

It is desirable the team physician:

- Review the results of the imaging studies.
- Recognize that advanced testing, such as functional magnetic resonance imaging, diffusion tensor imaging, and magnetic resonance spectroscopy, represents research tools that may one day be clinically applicable.

NP Testing

It is essential the team physician understand:

- NP testing is recommended as an aid to clinical decision-making but not a requirement for concussion management.
- NP testing is one component of the evaluation process and should not be used as a stand-alone tool to diagnose, manage or make RTP decisions in concussion.

It is desirable the team physician understand:

- The indications and limitations of NP testing.
 - Postinjury NP test data are more useful if compared to the athlete's preinjury baseline.

- It is unclear what type and content of test data are most valid and valuable.
- Value of NP testing is enhanced when used as part of a multifaceted assessment and treatment program.

Additional Tests

Biomarkers

- Investigation in the area of biomarkers (e.g., S-100 proteins, neuron specific enolase, tau protein) is inconclusive for identifying individuals with concussion and represents research that may one day be clinically applicable.

Event- and evoke-related potentials

- Electrophysiologic research using event- and evoke related potentials is inconclusive for the clinical management of concussion at this time and represents research that may one day be clinically applicable.

RTP Decision

The RTP decision should be individualized and not based on a rigid timeline. The team physician is ultimately responsible for the RTP decision (1).

Same-Day RTP

It is essential the team physician understand:

- There is no same-day RTP for the concussed athlete.

Post-Same-Day RTP

It is essential the team physician understand:

- Before resuming exercise, the athlete must be asymptomatic or returned to baseline symptoms at rest and has no symptoms with cognitive effort.
 - Amnesia surrounding the event may be permanent.

- An athlete should no longer be taking medications that may mask or modify concussion symptoms.
- The athlete's clinical neurological examination (cognitive, cranial nerve, and balance testing) have returned to baseline before resuming exercise.
- If performed, NP testing returns to at-least baseline before resuming contact/collision activities.
- Progressive aerobic and resistance exercise challenge tests should be utilized before full RTP (27,34).
 - This process may take days, weeks, or months.
 - Recurrence of symptoms and/or signs warrants additional rest and monitoring.
- Certain risk factors may affect RTP decision making (Table 1).
- Additional factors may affect RTP decision making:
 - Risk-taking behaviors
 - Type of sport

It is desirable the team physician:

- Coordinate a team to implement sport-specific progressive aerobic and resistance exercise challenge tests before full RTP.
- Facilitate academic accommodations for symptomatic student athletes.
- Discuss status of athlete with parents/guardians, caregivers, certified athletic trainers, coaches, school officials, and others within disclosure regulations.

Complications of Concussion

Concussion may cause a wide range of short- or long-term complications, affecting thinking, sensation, language, or emotions. These changes may lead to problems with memory, communication,

TABLE 2. Selected acute and delayed signs and symptoms suggestive of concussion.

Cognitive	Somatic	Affective	Sleep Disturbances
Confusion	Headache	Emotional lability	Trouble falling asleep
Anterograde amnesia	Dizziness	Irritability	Sleeping more than usual
Retrograde amnesia	Balance disruption	Fatigue	Sleeping less than usual
LOC	Nausea/vomiting	Anxiety	
Disorientation	Visual disturbances (photophobia, blurry/double vision)	Sadness	
Feeling "in a fog," "zoned out"	Phonophobia		
Vacant stare			
Inability to focus			
Delayed verbal and motor responses			
Slurred/incoherent speech			
Excessive drowsiness			

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personality changes, as well as depression and the early onset of dementia. Other complications of concussion are also addressed in this section.

- Prior concussions may increase risk for subsequent concussions.
- Postconcussion syndrome
 - Persistent postconcussion symptoms lasting 3 months or longer
 - Indicator of concussion severity
 - Precludes RTP while present
 - Increased risk of depression
- Convulsive motor phenomena
 - Tonic posturing or convulsive movements within seconds of the concussion
 - Dramatic, but usually benign
 - Require no management beyond on-field ABCs
 - No anticonvulsant therapy required
- Posttraumatic seizures
 - Seizures occur days to months after concussion
 - Does require seizure management and precautions
 - Usually requires anticonvulsant therapy
- Second-impact syndrome
 - Occurs within minutes of concussion in athlete still symptomatic from prior brain injury, which can be earlier in same event.
 - Vascular engorgement leads to massive increase in intracranial pressure and brain herniation resulting in severe brain damage or death.
 - May occur with associated small subdural hematoma.
 - Except for boxing, most cases in literature are adolescents.
- Chronic traumatic encephalopathy
 - A progressive neurodegenerative disease (tauopathy) caused by total brain trauma, and is not limited to athletes who have reported concussions.
 - The incidence and prevalence is unknown.
 - Diagnosed only after death by distinctive immunoreactive stains of the brain for tau protein and is not the same disease as Alzheimer.
 - Typical signs and symptoms include a decline of recent memory and executive function, mood, and behavioral disturbances (especially



depression, impulsivity, aggressiveness, anger, irritability, suicidal behavior, and eventual progression to dementia).

- Initial signs and symptoms do not typically manifest until decades after trauma received (ages 40–50 yr).
- A small subset of individuals with chronic traumatic encephalopathy have developed chronic traumatic encephalomyopathy, a progressive motor neuron disease characterized by profound weakness, atrophy, spasticity, and fasciculation similar to amyotrophic lateral sclerosis.
- Depression
 - Increased risk after a history of multiple concussions
 - May predate concussion and/or occur independent of concussion.
 - Athletes with depression who later sustain concussion may experience worsening symptoms.
- Mild cognitive impairment
 - Increased risk later in life after a history of multiple concussions.
 - May predate concussion and/or occur independent of concussion.
 - Multiple concussions have been associated with an earlier onset of mild cognitive impairment.

It is essential the team physician understand:

- Short- and long-term complications of concussion may be life threatening or life altering.
- Proper management may mitigate concussion complications such as second-impact syndrome and postconcussion syndrome.

It is desirable the team physician:

- Counsel the athlete about the significance of the long-term consequences of concussion, especially recurrent concussion.
- Facilitate assessment and treatment of complications.
- Discuss status of athlete with parents/guardians, caregivers, certified athletic trainers and coaches, and others within disclosure regulations.

Prevention

Concussions cannot be completely prevented.

It is essential the team physician understand:

- Helmets do not prevent concussion, although they decrease the incidence of skull fracture and major head trauma.
- There is currently no evidence to support the use of other personal protective equipment to prevent concussion and their use for this purpose may create a false sense of security.
 - Mouth guards decrease risk of dental or oral injury.
 - Head gear for soccer, rugby, wrestling, and boxing may decrease risk of lacerations and soft tissue trauma.
- Improper use of the head and improper fit of helmet or protective equipment may increase the risk of concussion.
- There are rules that prohibit hits to the head and other conduct that may decrease the incidence of concussion (e.g., spearing, head-to-head contact, leading with the head).

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It is desirable the team physician:

- Educate athletes, parents/guardians, and coaches regarding the significance of concussion, specifically to:
 - Understand short- and long-term health consequences
 - Recognize and report signs and symptoms of concussive injury
 - Understand earlier medical assessment and management promotes recovery
- Work with coaches and administrators to implement a concussion prevention program and policy, with emphasis on the importance of reporting concussion.
- Discuss the enforcement of rules to limit concussion with coaching staff, athletes, and officials before practice and competition.
- Discuss with athletes and coaches techniques that may increase the risk of concussion.
- Promote a safe playing environment that may lower the risk of head injury (e.g., field conditions, soccer goals, pole vault landing pits).

- Work with coaches, athletes, and parents to change the culture of intentional acts of unsportsmanlike conduct that causes injury.

Legislation and Governance Issues

Many states have passed laws regarding concussion, and governing bodies have adopted rule changes and developed guidelines. The team physician is affected by legislation and governance issues both administratively and clinically.

It is essential the team physician understand:

- The laws of the state in which he or she is practicing regarding concussion.
- Rules and regulations from governing bodies regarding concussion.

It is desirable the team physician:

- Participate with state athletic associations in advocacy (interscholastic associations).
- Participate in the education of the athlete, parents/guardians, caregivers, and others.



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The authors report no conflicts of interest.

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STOP Sports Injuries Begins New Year with New Goals and Outreach

As holiday celebrations become a memory and a winter chill begins to fall on our office, we reflect on yet another year of success for the STOP Sports Injuries Campaign. In 2011, we grew to more than 250 supporting groups, helped the efforts of nearly 200 youth sports safety events and held our first official community event during AOSSM's Annual Meeting in San Diego this summer. We enter 2012 with great momentum – along with greater goals. As always, thank you for supporting the campaign – and we hope you will join us for the ride this year. If you have any suggestions or would like to become involved, please contact Mike Konstant at michael@stopssportsinjuries.org or 847/292-4900.

New Resources Available

- **Coaches Curriculum** — This guide, created by Nathan Littauer Hospital in Gloversville, New York, is designed to provide coaches with in-depth information on how to talk with parents and athletes, about injury prevention. The comprehensive guide covers major topics, including overuse injuries, heat illness, and concussions. To download the guide, visit the Resources section of the website at www.STOPSportsInjuries.org.
- **New Tip Sheets** — Five new tip sheets have recently been developed and are now available for purchase or download on the website. The new topics include: in-line skating, nutrition, water polo, cycling, and conditioning. Other tip sheets to be developed in the upcoming months will be steroids, weightlifting and stretching. If you have suggestions on additional topics, please send an email to lisa@aossm.org.

Community Events Spark Interest

Our grassroots efforts for the STOP Sports Injuries campaign rely heavily on the hard work of the campaign's supporting organizations. We applaud the following groups for their great efforts in recent weeks to help bring sports safety education to their communities:

- **Preventing Sports Injuries in Young Athletes, Nathan Littauer Hospital, Gloversville, New York** — Some 60 attendees including doctors, students, parents, athletes, school nurses and local coaches took time to hear a number of presentations and discussion on topics ranging from ligament injuries to concussion prevention. In addition, the first training of local coaches using the Coaches Curriculum also took place with 17 individuals completing the two-hour course.



- **D1 Sports Medicine Open House, D1SportsMedicine, Birmingham, Alabama** —

More than 50 attendees including doctors, student athletes, and athletic trainers joined Dr. Geoffery Connor,



STOP Sports Injuries supporter, for a look at D1's new facilities and an overview of the STOP Sports Injuries Campaign. Attendees were provided copies of tip sheets and other resources.

We encourage member supporters of the campaign to build on this precedent and hold a youth sports safety event in your community. April is Youth Sports Safety Month and is the perfect time to host an event. The campaign has an easy and free, downloadable toolkit to help set up a local event. For more information, visit the Resources section of the website and submit your event!

Campaign Hits the Road (Again)

STOP Sports Injuries Campaign Director, Mike Konstant, brought 2011 to a close on an exciting note as he traveled across the country to present the campaign and meet organizational leaders at various meetings, including the National Alliance for Youth Sports Congress (NAYS), and the ESPN Wide World of Sports facilities, both in Orlando, Florida, and the Major League Baseball Team Physicians meeting in Dallas, Texas. These trips were a great opportunity to share an overview of the campaign with new faces, catch-up with current supporters, and learn more about other organizations with similar aims.

If you would like to organize a local community event and need assistance, please contact Mike Konstant, Campaign Director at mike@stopssportsinjuries.org or call 847/655-8623.



NIH Awards \$2.9 Million Grant to Pitt's Irrgang and Fu for Anatomic Double-Bundle ACLR RCT



Dr. Fu



Dr. Irrgang

Congratulations to AOSSM Research Committee Member, James J. Irrgang, PhD, and AOSSM Past

President, Freddie Fu, MD, of the University of Pittsburgh who have been awarded a \$2.9 million grant from the National Institute of Arthritis, Musculoskeletal and Skin Diseases (NIAMS) for their project, "Single- vs. Double-Bundle ACL Reconstruction: A Prospective Randomized Trial."

The investigators will conduct a double-blind randomized clinical trial with 160 patients that will compare anatomic single-bundle (SB) versus anatomic double-bundle (DB) ACL reconstruction on both dynamic knee function and clinical outcomes at a 2-year follow-up. The study will utilize a unique combination of high-speed biplane radiography (for accurate assessment of knee kinematics) and 3D imaging (MRI and CT, to define joint and cartilage morphology) to characterize joint kinematics and cartilage surface interactions during functional tasks. Clinical outcomes will include laxity, range of motion, functional strength and patient-reported symptoms, function and activity. If the results show a clear benefit of anatomic DB ACL reconstruction, then a sound basis will have been established for future studies to assess the benefits of anatomic DB ACL reconstruction on long-term clinical outcomes and joint health. Dr. Scott Tashman of the University of Pittsburgh is also a co-Principal Investigator on this study.



Young Investigators Urged to Apply for USBJI Grant Mentoring and Career Development Program

The United States Bone and Joint Initiative (USBJI) and Bone and Joint Decade Canada are dedicated to increasing research of musculoskeletal diseases. The USBJI has developed a grant mentoring and career development program to provide early-career investigators an opportunity to work with experienced researchers to assist them in securing funding and other survival skills required for pursuing an academic career.

This program is open to promising junior faculty, senior fellows or post-doctoral researchers nominated by their department or division chairs. It is also open to senior fellows or residents that are doing research and have a faculty appointment in place or confirmed. Basic and clinical investigators, without or with training awards (including K awards) are invited to apply. Investigators selected to take part in the program attend two workshops, 12–18 months apart, and work with faculty between workshops to develop their grant applications. The unique aspect of this program is the opportunity for attendees to maintain a relationship with a mentor until their application is funded.

Deadline to apply for the Spring 2012 Workshop is January 15, 2012. The next workshop is scheduled to take place April 13–15, 2012, in Toronto, ON. To apply for this program, please visit www.usbji.org/rd/?yii.

CORRECTION

In the November/December issue of *SMU*, Edward Wojtys, MD, was inadvertently omitted from a list of AOSSM members who have been principal investigators on NIH R01 grants.

RESEARCH GRANT DEADLINES

AOSSM/MTF Meniscal Allograft Transplantation Grant

Deadline April 1, 2012

AOSSM/Smith & Nephew Innovative Outcomes Assessment Grant

Deadline April 17, 2012

New AOSSM/MTF Meniscal Allograft Transplantation Grant Available

The purpose of this new grant is to foster research for clinically relevant biomechanical studies, basic science studies, preclinical or clinical studies related to meniscal transplantation. A list of potential research priorities related to this field and identified by leaders in this field are listed below, but applicants do not need to limit their studies to only these issues. Proposed studies need to relate specifically to meniscal transplantation. Projects related solely to meniscus repair or preservation, meniscus regeneration, collagen implants, and other such topics will not be considered for this grant.

Applications will be reviewed for the potential impact on the field of meniscal transplantation, but the quality of the study approach, and the ability of the investigator(s) and site(s) to conduct and complete the proposed research within the time frame noted will be strictly assessed.

Research Priorities:

- Biological enhancement of meniscal allograft transplantation
- Clinical outcomes of isolated and combined meniscal allograft transplantation
- Treatments to improve the long-term survival of meniscal allograft transplantations



- Objective assessment of meniscal allograft biology and the effect on articular cartilage biochemistry
- Quantitative MRI of articular cartilage following transplantation
- Optimization of quantitative sizing for meniscal transplantation
- Validation of clinical outcome scores for meniscal transplantation
- Simplification of surgical techniques and biomechanical validation of meniscal transplantation

This grant is specifically designed to give a one-time grant of \$300,000. Any investigative team pursuing this

grant must include at least one member of AOSSM in good standing. No AOSSM board officer (president, vice president, treasurer, etc.) may be a named investigator on the application.

For more information and to apply, visit www.sportsmed.org/researchgrants or contact Bart Mann, Director of Research, at bart@aossm.org.

You must complete your submission no later than 11:59 p.m. CST, April 1, 2012, to be considered for this program.



AOSSM thanks MTF for the generous support of the Meniscal Allograft Transplantation Grant.

AOSSM Joins Biomarkers Consortium of the Foundation for NIH

The AOSSM Board of Directors recently approved a recommendation to join the Biomarkers Consortium of the Foundation for the NIH (FNIH) as a scientific member. FNIH was founded by Congress in 1990 as an independent non-profit organization to raise funds to support the mission of the National Institutes of Health. The FNIH supports and manages numerous diverse programs and events, including medical research partnerships and wide-ranging global health initiatives that span many NIH institutes and centers.

Relevant to sports medicine research, the Foundation funds human subject clinical research that might not fare well

in traditional NIH study sections. Among their key initiatives is the Biomarkers Consortium for which they are raising more than \$3 million in concert with the Arthritis Foundation to support the OA Biomarkers Project. By joining the Consortium, AOSSM will be able to nominate a member to serve on the Consortium's Steering Committee which will allow participation in the development and execution of new projects. This relationship could potentially facilitate funding partnerships with FNIH for future AOSSM research initiatives.



AOSSM Announces Winners of 2011 Osteoarthritis Grants



C. Benjamin Ma, MD, of the University of California at San Francisco (UCSF) has been awarded the AOSSM/Genzyme Osteoarthritis Clinical Research Grant for his project, “ACL Injury, Gender, and Cartilage Degeneration.”

This grant will provide \$150,000 over three years to develop reliable imaging and kinematic markers to assess injury severity, detect early degeneration and predict post-traumatic osteoarthritis in ACL-reconstructed knees. The objective of this study is to examine early changes in cartilage matrix composition and joint kinematics using quantitative MRI, and to explore the relationship between cartilage degeneration, joint laxity (in particular rotational laxity) and gender in ACL-injured and reconstructed knees. The investigators hypothesize that initial injury during ACL rupture and abnormal joint movement after ACL-reconstruction lead to accelerated knee cartilage degeneration, and that females have worse outcomes than males using current ACL reconstruction techniques. In his application, Dr. Ma proposed a novel integration of quantitative MRI and kinematic MRI to evaluate longitudinally both biochemical and biomechanical markers of persistent injuries and early degeneration in ACL-injured knees over two years post-reconstruction, and their potential relationship with gender. Successful implementation of this study will help to determine important imaging and kinematic markers that can be used in a prospective evaluation of ACL-injured knees. Identifying the potential effect of gender on outcomes will have significant clinical impact on optimizing gender-specific patient management.

Dr. Ma is currently an Associate Professor and Chief of Sports Medicine and Shoulder Service at UCSF. He completed his undergraduate education in bioelectrical engineering at Brown University and went on to earn his medical degree from Johns Hopkins University. He completed his residency in orthopedic surgery at the University of Pittsburgh, where he also completed a one-year musculoskeletal research fellowship. Following his residency, Ma completed a second fellowship in shoulder and knee surgery and sports medicine at the Hospital for Special Surgery in New York.



The AOSSM/Genzyme Osteoarthritis Basic Science Grant was awarded to **Heinz R. Hoenecke, MD**, of the Scripps Clinic for his study, “Directing in vivo Tissue Regeneration with Nanomagnets.”

The \$50,000 grant will support a project that will attempt to improve cell-based repair methods of cartilage defects by uniquely combining a number of technologies that will form organized repair tissues directly in the region requiring repair or regeneration. Their novel approach utilizes iron oxide ferromagnetic particle (FMP) labeled cells (chondrocytes or mesenchymal stem cells) suspended in a viscous liquid alginate hydrogel, which is injected into the defect site. An external magnetic field is used to organize the cells into specific three-dimensional patterns that emulate the natural tissue before conversion into a solid gel in the defect site for repair. Alginate, which is biocompatible, is not rejected by the body: it supports cartilage formation and is used in other medical applications. Direct cell transplantation using these clinically accepted materials would circumvent many pitfalls using in vitro protocols that will lead to more clinically relevant procedures. This approach should reduce the overall costs by lessening the number of surgical interventions, accelerating healing times, and producing higher quality and longer lasting replacement repair tissues. The properties of magnetically responsive materials can be exploited in many ways, not only to label and arrange cells into specific organizations, but to retain cells in the defect site, to non-invasively track cells and finally to non-invasively monitor tissue regeneration using magnetic resonance imaging (MRI).

Dr. Hoenecke earned his medical degree from the University of Arizona where he also completed a residency in orthopaedic surgery. He completed a fellowship at the Steadman Hawkins Sports Medicine Clinic in Vail, Colorado. Dr. Hoenecke is the assistant program director for the San Diego Arthroscopy and Sports Medicine Fellowship program and is the head team physician for the San Diego Padres Baseball organization.



AOSSM thanks Genzyme Biosurgery for their generous support of the Osteoarthritis Clinical Research and Basic Science Grants.





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Are you looking for a unique gift for your athletic trainer? Give them a year's subscription to *Sports Health*! This award-winning journal, sponsored by AOSSM, NATA, SPTS, and AMSSM allows your staff to stay up to date on the latest research in sports medicine from a multitude of angles for just \$45.

Purchasing gift subscriptions is a quick and easy way to cross that special staff member off your list. Just log in at www.sportsmed.org/shj and complete the transaction. For questions or more information, contact Kristi Overgaard at kristi@aossm.org.

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Self Assessment 2011 includes 125 new questions, provides Maintenance of Certification credit and is online only. To order, visit the website at www.sportsmed.org/selfassessment. Any additional questions, contact Susan Brown Zahn at susan@aossm.org.

Annual Meeting Live Surgical Demonstrations Online

Did you miss the live surgical demonstrations at the 2011 Annual Meeting on upper extremity injuries? If you attended the demonstrations, you can view the video for free. If you were unable to attend, you can now purchase and view the afternoon course, including full videos and presentations. Visit the website at www.sportsmed.org/online meetings for more information and to order.

Start the Year Off Right and Become a Fan

AOSSM, AJSM and *Sports Health* are all on Facebook. Learn about the latest news and articles from AJSM and *Sports Health*. Stay up to date on Society happenings and deadlines at AOSSM. Join the conversation and become a Fan or follower:



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Join an AOSSM Committee

Are you looking for a great way to get involved with AOSSM? Volunteer for a committee. Check out the vacancies on the AOSSM home page and submit your application by February 1 to Camille Petrick at camille@aossm.org.

Got News We Could Use? *Sports Medicine Update* Wants to Hear from You!

Have you received a prestigious award recently? A new academic appointment? Been named a team physician? AOSSM wants to hear from you! *Sports Medicine Update* welcomes all members' news items. Send information to Lisa Weisenberger, AOSSM Director of Communications, at lisa@aossm.org, fax to 847/292-4905, or contact the Society office at 847/292-4900. High resolution (300 dpi) photos are always welcomed.

Current Concepts + CME = Optimal Care for Every Patient

Most practitioners are so deeply enmeshed in patient care that finding the time to keep up with the tidal wave of information about new theories and techniques is very difficult. Yet, every busy practitioner knows those new theories and techniques are the pathways to providing optimal care to each patient. *AJSM* Current Concepts has a solution to this problem.

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If you haven't tried this CME activity, your *AJSM* subscription includes two complimentary journal CME opportunities. Check out the table of contents in this month's issue of *AJSM* and look for the Current Concepts article. It takes just a few minutes to complete the online quiz and evaluation. Claim CME and stay current as you pursue the goal of providing optimal care to every patient with *AJSM* Current Concepts.



Claim Your CME Credits for the AOSSM 2012 Specialty Day and AOSSM/POSNA Joint Session



AOSSM staff will email all AOSSM 2012 Specialty Day registrants, including the AOSSM/POSNA Joint Session, the transcript/certificate information within a few weeks of the meeting.

The AAOS kiosk will not have continuing education transcripts for registrants of AOSSM 2012 Specialty

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For more information, contact Lisa Weisenberger, Director of Communications at lisa@aossm.org.

NAMES IN THE NEWS

AOSSM Member Arnoczky Honored with ACVS Founders' Award from American College of Veterinary Surgeons



AOSSM member and Michigan State University College of Veterinary Medicine faculty member, Steven Arnoczky, DVM,

was recently honored with the Founders' Award for Career Achievement from the American College of Veterinary Surgeons (ACVS). The Founders' Award is given to ACVS diplomats who have distinguished themselves in the pursuit of surgery by making significant contributions to the development of surgical techniques and methodology, and disseminating knowledge to colleagues, residents and students. This award has only been bestowed to five other individuals. Dr. Arnoczky was recognized for his unmatched career in comparative orthopaedic disease and for being the most recognized veterinarian in human orthopedics nationally and internationally. Congratulations!



Hit a Home Run in Historic Baltimore at AOSSM 2012 Annual Meeting

Start planning now for the AOSSM 2012 Annual Meeting in Baltimore, July 12–15. AOSSM President Peter A. Indelicato, MD, and Program Chair Darren L. Johnson, MD, invite you to join us for all the meeting entails, including:

- Thursday Afternoon Workshop:
 - Live Knee Surgical Demonstrations
- Great scientific sessions featuring:
 - Update: Role of Allografts in Knee Ligament Surgery
 - Point/Counterpoint: SLAP Lesions in Overhead Athletes
 - 27 exciting instructional courses
- *AJSM* Reviewers' Workshop
- Presidential Guest Speaker, Lee Corso, former college football coach and longtime ESPN college football analyst
- Research Workshop on The Maturing Athlete: Breakthroughs in Understanding and Treating the Effects of Aging in Active Patients
- The always popular: Young Sports Medicine Specialists' Workshop
- All of Baltimore's exciting family tourist attractions from the aquarium to the shopping to the fantastic food.

Housing information is available online at www.sportsmed.org/meetings. Online registration will be available in early March.



AOSSM TRAVELING FELLOWSHIP REPORT | September–October 2011
By Robert Wang, MD

DESTINATION >>>> **ASIA-PACIFIC RIM**

This year's Asia-Pacific Rim traveling fellowship started in the Philippines and ended in New Zealand. We visited six cities in three weeks. The fellows, Dr. John Tokish (JT), Dr. Mark Slabaugh, and Dr. Robert Wang and our godfather, Dr. Champ Baker Jr., met in Honolulu where JT and his family hosted us with a delicious steak meal while we watched the Oklahoma-Florida State football game. We got acquainted, and our illustrious godfather set the game plan for the rest of the traveling fellowship.

Manila, Philippines

Our first stop was one of the most densely populated cities in the world with an estimated population of 16.3 million. We arrived at our hotel, and were greeted by Dr. Gar Eufemio, who is the incoming president of the Philippines Orthopaedic Society for Sports Medicine (POSSM).

We toured Dr. Eufemio's surgery center, Mega Clinic, an impressive multidisciplinary facility located inside one of Manila's largest malls, Mega Mall. In the Philippines, surgical implants are charged to the patient. Dr. Eufemio has furthered the use of an implant-less ACL reconstruction technique, thus allowing more patients the benefit of this surgery. Using a tibial tubercle bone block-patellar tendon graft, Dr. Eufemio demonstrated the technique of press fitting the bone block into the femoral tunnel while tying the tibial fixation over a bony bridge.

An evening of presentations and discussions with other local surgeons and former traveling godfather Dr. Antonio Rivera took place. We learned that in Manila, MACIs were quite popular and were one third of the cost of that in the United States.

The evening's activities took place at La Cocina, a former mansion that had been the home of a legendary physician Dr. Alejandro Rocas Legarda. At dinner,

we were treated to many local Philippine delicacies—one of which was lechón, a pork dish.

Cebu, Philippines

The next day, we spent with Dr. Jose Antonio San Juan (Tony), who was a former Asian traveling fellow to the U.S. Tony's excellent presentation on double-bundle ACL technique was comprehensive in its basic science background and clinical application. One of our most memorable days was spent boating and snorkeling and dining at a floating restaurant.

Jakarta, Indonesia

Upon our arrival in Jakarta, Dr. Jeffery Tedjajuwana greeted us and took us to Hotel Kristal. Jeffery was an APOSSM traveling fellow to the U.S. in 2010. We also met Dr. Andrew Pontoh and Dr. Nicolaas Budhiparama. In addition to being a renowned arthroplasty surgeon, Dr. Budhiparama is an entrepreneur and an established musician. We feasted at a beautiful Indonesian restaurant with a truly unique décor and ambience. There was a talented live band, and we came close to getting JT to showcase his talents on stage. We also spent a day with Ms. Ria Budhiparama, who helped us tremendously in selecting gifts for back home by shopping for authentic Indonesian scarves.

At Fatmawati Hospital, we gave our presentations and met the Indonesian residents and fellows. We heard their case presentations, which included recurrent shoulder instability and AC joint separation. We learned that most of the cases the trainees were exposed to were actually trauma. The residents and fellows asked many insightful questions and taught us about their health care system and training program.

Sydney, Australia

Upon arrival in Sydney, we were taken to the Mater private hospital by Dr. Justin Roe and met renowned surgeons Drs. Leo Pinczewski and Merv Cross. We observed a primary ACL reconstruction and the first stage revision ACL reconstruction. Dr. Pinczewski's preference is hamstring autograft with metal screw fixation in the femur and tibia. It was impressive to see his ACL patient's ambulation and range of motion just a few hours after surgery. Dr. Pinczewski described his accelerated ACL rehab protocol: immediate full weight bearing and knee range of motion.

There has been resurgence in the use of synthetic ACL graft (LARS) with the rationale being a faster return to play at approximately three months after surgery. The point was made that LARS was a temporary solution acting as an internal splint/stabilizer with the understanding

Continued on page 23





of the need for a later definitive ACL reconstruction.

Another interesting concept was that of live parent-donor hamstring grafts being used in the pediatric population. Dr. Justin Roe also presented his data on transphyseal ACL reconstruction in the pediatric population with no growth arrest, deformity, or leg-length discrepancy at two-year follow up. We also saw navigation used in HTO and learned of its advantage, particularly in judging correction through varying degrees of knee flexion.

During our time away from orthopaedics, we learned the game of league and union rugby and Australian rules football and the Australian Football League (AFL). We also viewed Sydney Harbour from a luxurious yacht arranged by Merv Cross.

Melbourne, Australia

Drs. John Bartlett, Tim Whitehead, and Julian Feller greeted us upon our arrival. We had dinner at Dr. Bartlett's home. The following day we saw Dr. Feller perform an ACL reconstruction, a PCL reconstruction, and an MPFL reconstruction. Dr. Whitehead performed a HTO using navigation, and Dr. John O'Donnell demonstrated an arthroscopic acetabular labral repair. We were all very impressed with their advanced surgical techniques.

One of the highlights of our trip was attending the AFL grand final breakfast and game. The breakfast was attended by the nation's leaders and celebrities, and the game itself was spectacular. The magnitude of this event in Australia can be likened to the U.S. Super Bowl.

Auckland, New Zealand

Drs. Barry Teitjens and Stuart Walsh met us in Auckland and our first evening was spent watching the rugby league grand final and having dinner with a number of surgeons including: Drs. Mark Clatworthy, Andy Williams, and William van der Merwe.

We had some free time to explore, and the four of us hiked through the city to see the Auckland museum before heading to the university to give our talks. There we learned about the New Zealand rotator cuff registry and shoulder instability in contact athletes. Dr. Teitjens enlightened us with his presentation on ACL tears in skiers and snow boarders.

Queenstown, New Zealand

We stayed at the beautiful Millbrook resort and were hosted by Drs. Russell Tregonning and Tim Lynskey. The traveling fellowship culminated at the combined New Zealand and Australian Knee Society meeting. Presentations included deep MCL tears, osteoconductive interference screws for ACL reconstruction, and surgical outcomes after treatment of patellar instability. We also met Dr. Lars Engebretsen who taught us about pediatric ACL tears and cutting edge chondral repair techniques.

Between the academic sessions, some of us took the jet boat through Dart River traveling up to 80 km/hr through narrow waters nestled between great mountains. Others enjoyed a trip to Milford Sound in the south. There, we saw the beautiful land featured in the *Lord of the Rings*.

The entire Australian–New Zealand experience concluded with heart felt thanks and good-byes to our colleagues and a commitment to furthering our relationships. This was a packed three weeks of orthopaedic sports medicine, cultural exchange, and building of friendships. We feel privileged and honored to have represented the AOSSM on this journey. We thank the AOSSM for this opportunity, our wonderful hosts and friends overseas.

AOSSM thanks DJO Global for their generous support of the traveling fellowship program.



Photo on Page 22: Cebu. Drs. John Tokish, Tony San Juan (host), Champ Baker, Mark Slabaugh, and Robert Wang.

Top Photo: Manila, Mega Clinic Operating Theatre. Drs. Robert Wang, John Tokish, Champ Baker, Mark Slabaugh, and Gar Eufemio (host).

Middle Photo: Melbourne. Drs. Robert Wang, John Tokish, Mark Slabaugh, Julian Feller (host), and Champ Baker.

Bottom Photo: Auckland. Drs. Barry Teitjens (host), Robert Wang, Mark Slabaugh, John Tokish, Champ Baker, and Stewart Walsh (host).



Upcoming Meetings and Courses

For more information and to register, visit www.sportsmed.org/meetings.



Specialty Day

February 11, 2012
San Francisco, California

2012 Annual Meeting

July 12–15, 2012
Baltimore, Maryland

AOSSM/AAOS Review Course for Subspecialty Certification in Orthopaedic Sports Medicine

August 10–12, 2012
Chicago, Illinois

Keep Your Edge: Hockey Sports Medicine in 2012

August 24–26, 2012
Toronto, Canada



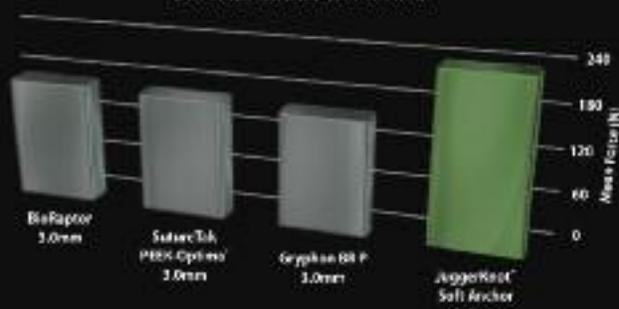
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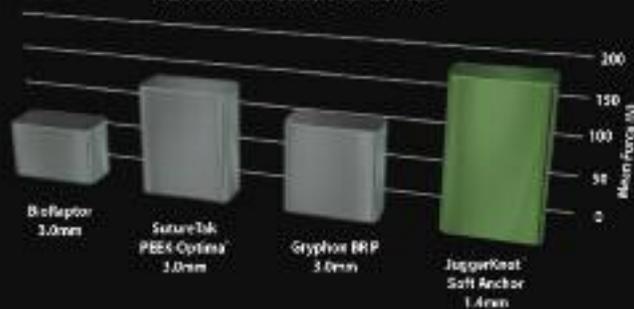


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1. Barber FA, Herber MA, Beavis RC, and Oio TB; "Suture Anchor Materials, Eyelets, and Design: Update 2008" Arthroscopy Vol. 24, No. 8 pp 839-867, 2008

2. Barber FA, Herbert MA, Haps C, Rasley JH, Barber CA, Dynam JA, Hmack SA; "Suture Anchor Update 2010" Arthroscopy 2010; In Press.

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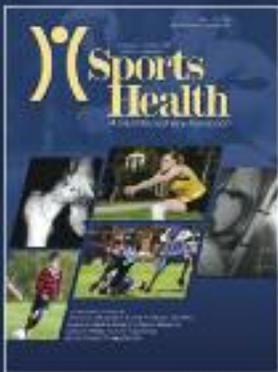
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