ISAKOS newsletter

WINTER 2011
Volume 15, Issue 1

INSIDE THIS ISSUE

International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine
2678 Bishop Drive, Suite 250
San Ramon, CA 94583 USA
Telephone: +1 (925) 807–1197
Fax: +1 (925) 807–1199
Email: isakos@isakos.com

www.isakos.com

join us...

8TH BIENNIAL ISAKOS 2011 CONGRESS
RIO DE JANEIRO • BRAZIL • MAY 15 - 19, 2011

The countdown has begun to the 8th Biennial ISAKOS Congress, to be held in Rio de Janeiro, Brazil on May 15–19, 2011! ISAKOS looks forward to welcoming all meeting attendees to this vibrant and exciting city.

The 5-day ISAKOS Congress will bring together the world leaders in arthroscopy, knee surgery and sports medicine. Our unique method of education includes Instructional Course Lectures, scientific papers, live surgical demonstrations, lectures, Socratic debates, symposia and electronic posters. Delegates from more than 75 countries are expected to participate in the 2011 Congress!

ISAKOS is also pleased to announce the addition of three Pre-Courses to the Congress scientific agenda to include: *Olympic Games: From Basic Science to the Gold Medal*; *Biologic Treatment Options for the Knee*; and *Spotlight on Top Orthopaedic Procedures in Sports Medicine*. These courses will be held on Saturday, May 14, 2011 at the Windsor Barra Hotel.

Another new addition to the ISAKOS Congress is a sports rehabilitation course entitled *Global Perspectives for the Physical Therapist and Athletic Trainer*. This course will be held at the Rio Centro Convention Center on May 15–17, 2011 and is intended for physicians, athletic trainers, physiotherapists and coaches concerned with the management or prevention of injuries to the team athlete as viewed from an international perspective. More information about the Pre-Courses, Sports Rehabilitation Course, and Congress Scientific Program can be found on the ISAKOS website – **www.isakos.com**.

We encourage you to attend the 8th Biennial ISAKOS Congress to experience the unique diversity and international exchange of knowledge offered at the ISAKOS Congress!

CONGRESS HIGHLIGHTS

- **Rotator Cuff Repair: Double vs. Single Row Constructs**
- **Hip Arthroscopy 2011: An International Perspective**
- **Extreme Sports**
- **ACL Reconstruction: Single vs. Double Bundle**
- **Cartilage Repair Options: Do We Need Cells to Restore Chondral Surface?**
- **New Horizons in Cartilage Repair: Fact or Fiction?**
- **Emerging Technology in Clinical Practice for Joint Regeneration**
- **Failure of ACL Reconstruction: Can We Prevent It?**
- **Tricks and Pearls on Visualization in Arthroscopy**
- **Meniscal Transplantation: Allograft vs. Xenograft**

EDITOR'S NOTE

WHY I'M GOING TO RIO:

The hardest working man in show business

LEGENDS

Fig. 1
Legend James Brown
Godfather of Soul

Fig. 2
Legend Andreas Imhoff
Program Chairman

American singer James Brown is known as the hardest working man in show business (Figure 1). James Brown, the Godfather of Soul, knew how to get down.

The hardest work working man in ISAKOS, lately, is Andreas Imhoff, Program Chairman (Figure 2).

That's why I'm going to Rio de Janeiro. Yes, no doubt we are going to have a great time on the beaches of Ipanema, and in the last editorial I reviewed favorite cultural aspects of Brazil including how to order a caipirinha, Brazil's national cocktail made with cachaca sugar and lime. This meeting will be a social experience bringing long term memories. The fabulous fact that Moises Cohen will be President of ISAKOS was an independent coincidence with the selection of his nation as our host nation, Brazil, and so through this good luck, Moises Cohen is our local host, and he is introducing a sports day which will include local VIP treatment for all who carry their kits.

The academic aspect of the meeting is critically important, and the real focus of the meeting.

Dr. Imhoff and his crew reviewed literally thousands of abstracts of very top quality, and faced the exhausting challenge of selecting only the best for the limited number of prestigious podium spots, and identified other studies of fine merit for electronic poster format. By the way, thank you to all who submitted. The Program Committee regrets that not every submission could be accepted, and assures blinded peer review which is a system designed to minimize bias.

When you study the program, note the emphases of a wide variety of topics, a diversity of educational formats, from instructional courses to high-technology live demonstrations, to scholarly symposia, to scientific sessions.

There are not enough positive things that can be said about ISAKOS President, Freddie Fu, except that his leadership is an example of hard work to all of us, setting the bar high for future ISAKOS leaders and mentors.

While we're talking about hard work, come to Rio, and try to meet the hard working team from the ISAKOS home office, particularly Director Michele Johnson and Newsletter Managing Editor Katie Anderson, without whom my tenure as newsletter editor might not be such a delightful task.

Lately, Andreas Imhoff has been reminding us of James Brown. Both are hard working, and looking at their smiles, they seem to enjoy what they do.

***James* H. Lubowitz, MD**
ISAKOS *Editorial Chair*, 2009–2011

PRESIDENT'S MESSAGE

It has been an extraordinary experience this year to visit so many of my colleagues and friends throughout the world. I am honored to be invited to speak at meetings but also to be able to represent ISAKOS. As president of ISAKOS I make it my priority to promote our society during all my national and international travel.

In Argentina I was invited to speak at the Combined American Orthopaedic Society for Sports Medicine (AOSSM)/Argentine Arthroscopy Association (AAA)/Association of Sports Traumatology (AATD) and Latin American Society of Knee Arthroscopy and Sports Medicine (SLARD) meeting, which was held in Buenos Aires in May of this year. This was a very large meeting that attracted orthopaedic surgeons from all over the world. I had the opportunity to speak to many orthopaedic surgeons from South America about ISAKOS. Our society is very important to them, and they are all very excited that our next meeting will be held in Brazil.

SBOT *Brazil – Paulo Lobo, Claudio Santili, Freddie Fu*

AAC *China – Freddie Fu, Changlong Yu, Mianyu Qu, Shiyi Chen, Yingfang Ao*

I also traveled to China to attend the 2010 International Summit Forum on Orthopaedic Sports Medicine and Arthroscopic Surgery, which is a highly recommended, ISAKOS-approved course, as well as the Asian Arthroscopy Congress in Beijing, China. Professor Ao invited me to speak during the opening ceremony as the president of ISAKOS and to discuss the importance of our society for Asia. The honor of promoting ISAKOS was also given to me when I visited Japan shortly thereafter to speak at the Japanese Orthopaedic Society for Sports Medicine Meeting (JOSSM). I was invited to speak at the evening reception as the current president of ISAKOS and to promote our upcoming meeting.

At the 14th European Society of Sports Traumatology, Knee Surgery and Arthroscopy (ESSKA) Congress in Oslo, Norway, I had the opportunity to spend time with many of my fellow ISAKOS members. I am proud to see collaboration between ISAKOS and ESSKA and to see how many surgeons have joined both our societies.

In Turkey I served as the keynote speaker at the 10th Turkish Sports Medicine Congress, held in Antalya, Turkey. This 5-day conference was supported by ISAKOS, in collaboration with ESSKA and EFOST, and featured speakers from all over the world. This event was attended by many Turkish as well as international surgeons, who took part in lectures and surgical demonstrations organized by ISAKOS.

S. *Gür, V. Lök, E. Altınel, A. T. Aydın, A. Sebik, F. Fu, A. Alturfan, M. N. Doral, Ü. Tanker, Ö. Taşer*

Endoscopy China – Freddie Fu & Shiyi Chen

In October I traveled to China to attend the Second World (and 20th Chinese) Conference of Endoscopy, and Second Macau and Hong Kong Surgery Conference, and World Endoscopy Expo. The meeting was attended by over 2,000 people. I gave a lecture on the goals of ISAKOS and the importance of the international character of our organization.

These large international meetings are very important to spread the philosophy of ISAKOS. However, I am often invited to smaller international meetings as well. These are also very relevant for our local membership, and many of the attendees are interested to hear about our society. This year I have had the honor of visiting UPMC Beacon Hospital in Dublin Ireland, Dutch Arthroscopy Society (NVA) in Noordwijk, Netherlands, the Extreme Anatomic ACL Symposium in Brussels, Belgium, the SIGASCOT National Congress in Verona, Italy, and the Brazilian Society of Orthopaedics and Traumatology in Brasilia, Brazil.

Piero Volpi, Freddie Fu & Matteo Denti

In addition to my international travel, I frequently attend meetings and visit institutions in North America. During these visits I always aim to promote ISAKOS. For example this year I traveled to the American Orthopaedic Society for Sports Medicine (AOSSM) meeting in Providence, the American Academy of Orthopaedic Surgeons (AAOS) meeting, the Orthopaedics Research Society (ORS) meeting in New Orleans, Indiana University, Dalhousie University, University of Illinois, Yale University, Ohio State University, the Western Orthopaedic Association meeting, the Hospital of Special Surgery in New York, McMaster University Canada, Duke University, McGill University and the University of Montreal in Canada.

Overall, these experiences over the past year have made me feel honored and blessed to be able to promote ISAKOS. ISAKOS takes pride in being an international society with members from countries all over the world. This allows for the opportunity to learn from each other. I myself have learned so much from meetings and spending time with health care professionals from all over the world. I am proud to be the president of ISAKOS and grateful for the support of all my fellow ISAKOS members.

Freddie H. Fu, MD, PhD
ISAKOS *President*, 2009–2011

ISAKOS WELCOMES NEW MEMBERS

Faris Abushaaban, QATAR
Adolfo Yañez Acevedo, MEXICO
Keivan Ahadi, IRAN
Maad Faisal Alsaati, FRANCE
Pedro Alvarez-Aiaz, SPAIN
Carlos Berckholtz, PERU
Sudarshan Bhandary, INDIA
Erkal Bilgic, TURKEY
Steve Bollen, UNITED KINGDOM
Andre Vieira Bousquet, BRAZIL
Fabio Veiga Carvalho, BRAZIL
Aleksandar Crnobaric, SERBIA & MONTENEGRO
Joaquin Donoso, CHILE
Samer El Hage, FRANCE
Roy Endenburg, SOUTH AFRICA
Reza Ganji, IRAN
Bradley Rael Gelbart, SOUTH AFRICA
Giovani Alberto Gravini Amador, COLOMBIA
Gilberto Guardia Guardia, BRAZIL
Barak Haviv, ISRAEL
Hidetoshi Hayashi, JAPAN
Stuart J. Hershon, USA
Greg Janes, AUSTRALIA
Jagannath Kaginalkar, INDIA
Adriano de Araujo Karpstein, BRAZIL
Hany Abdalla Keshk, SAUDI ARABIA
Najeeb Khan, USA
Michael Khazzam, USA
Miguel Angel Khoury, ARGENTINA
Jong-Seok Kim, KOREA
Byoung Won Ko, KOREA
Chad A. Krueger, USA
Carlos Tadashi Kunioka, BRAZIL
Christiane Lechner, SWITZERLAND
Brian M. Leo, USA
Fabrizio Margheritini, ITALY
Matthew J. Matava, USA
Daisuke Mori, JAPAN
Sedeek Mohamed Mosaid, SINGAPORE
Ronald Vale Mota, BRAZIL
Ignacio Mujica, CHILE
Hirotsugu Muratsu, JAPAN
Sergio Tadao Nishi, BRAZIL
Breno Nora, BRAZIL
Stephen James O'Brien, USA
Vitor Gustavo Oliveira, BRAZIL
Iain Nicholas Packham, UNITED KINGDOM
Geert Pagenstert, SWITZERLAND
Rocco Papalia, ITALY
Rodrigo Quiroz, CHILE
Craig Joseph Randall, USA
Bruce Reider, USA
Varqa Rouhipour, USA
David Sadigursky, BRAZIL
Yunhyung Seo, SOUTH KOREA
Arash Sharafatvaziri, IRAN
Daniel Cordeiro Silva Junior, BRAZIL
Sergiy Strafun, UKRAINE
Yasuhito Tanaka, JAPAN
Viktor Petrovich Torchynskyi, UKRAINE
Carlos Uribe Velez, COLOMBIA
Peter Walker, AUSTRALIA
Satoshi Watanabe, JAPAN
Yasuhiko Watanabe, JAPAN

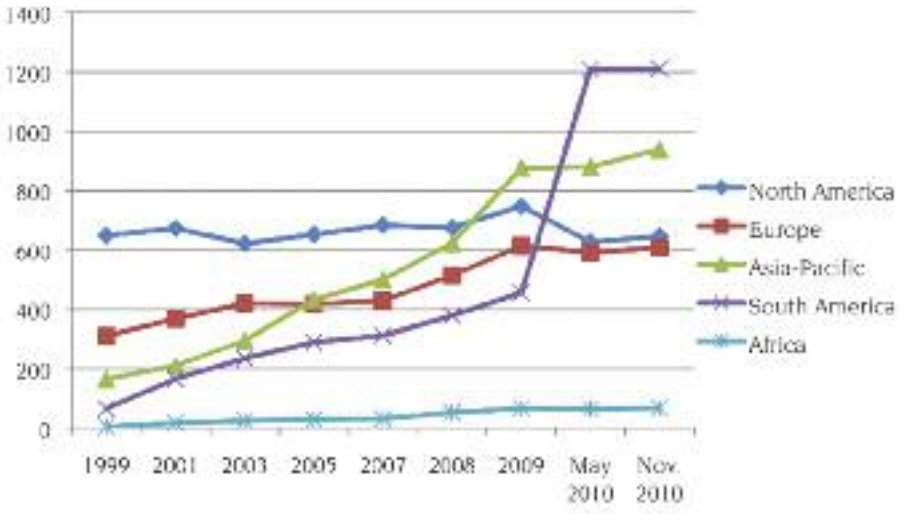
NEW MEMBERS

We depend on our members to make the society what it is today and to embrace the potential it has in the future. It is the responsibility of members to recruit NEW MEMBERS to join ISAKOS and its goal to reach across the world.

Download an application online at **www.isakos.com** or contact the ISAKOS office at +1 (925) 807–1197 for a NEW MEMBER Recruit Packet.

ISAKOS MEMBERSHIP GROWTH BY REGION 1999 TO NOVEMBER 2010

Growth by Region	1999	2001	2003	2005	2007	2008	2009	May 2010	Nov. 2010
North America	650	673	622	653	684	675	748	627	647
Europe	311	369	421	418	430	514	615	592	608
Asia-Pacific	165	211	293	433	500	624	876	881	939
South America	66	166	233	269	312	379	457	1209	1211
Africa	6	18	29	30	32	53	67	65	68
TOTAL	**1,198**	**1,437**	**1,598**	**1,828**	**1,958**	**2,245**	**2,763**	**3,374**	**3,473**



ISAKOS MEMBERSHIP REPORT – NOVEMBER 2010

# of Members	Country	# of Members	Country
53	ARGENTINA	3	LEBANON
115	AUSTRALIA	1	LIECHTENSTEIN
13	AUSTRIA	5	LITHUANIA
2	BANGLADESH	1	LUXEMBOURG
1	BELARUS	2	MACEDONIA
25	BELGIUM	36	MALAYSIA
2	BOLIVIA	20	MEXICO
1	BOSNIA AND HERZEGOVINA	1	MONACO
1054	BRAZIL	1	NEPAL
4	BULGARIA	25	NETHERLANDS
33	CANADA	25	NEW ZEALAND
62	CHILE	1	NICARAGUA
102	CHINA	10	NORWAY
10	COLOMBIA	1	OMAN
3	COSTA RICA	1	PAKISTAN
1	CROATIA	7	PERU
4	CZECH REPUBLIC	9	PHILIPPINES
10	DENMARK	46	POLAND
1	DOMINICAN REPUBLIC	14	PORTUGAL
5	ECUADOR	4	PUERTO RICO
19	EGYPT	1	QATAR
4	ESTONIA	6	ROMANIA
22	FINLAND	16	RUSSIA
92	FRANCE	18	SAUDI ARABIA
2	GEORGIA	2	SERBIA & MONTENEGRO
48	GERMANY	14	SINGAPORE
1	GIBRALTAR	1	SLOVAKIA
34	GREECE	6	SLOVENIA
1	GUATEMALA	44	SOUTH AFRICA
17	HONG KONG	34	SOUTH KOREA
2	HUNGARY	44	SPAIN
85	INDIA	20	SWEDEN
15	INDONESIA	36	SWITZERLAND
11	IRAN	15	TAIWAN
1	IRAQ	31	THAILAND
4	IRELAND	1	TUNISIA
28	ISRAEL	37	TURKEY
65	ITALY	13	UKRAINE
263	JAPAN	1	UNITED ARAB EMIRATES
1	JORDAN	64	UNITED KINGDOM
3	KENYA	1	URUGUAY
35	KOREA	579	USA
1	KUWAIT	18	VENEZUELA
5	LATVIA		

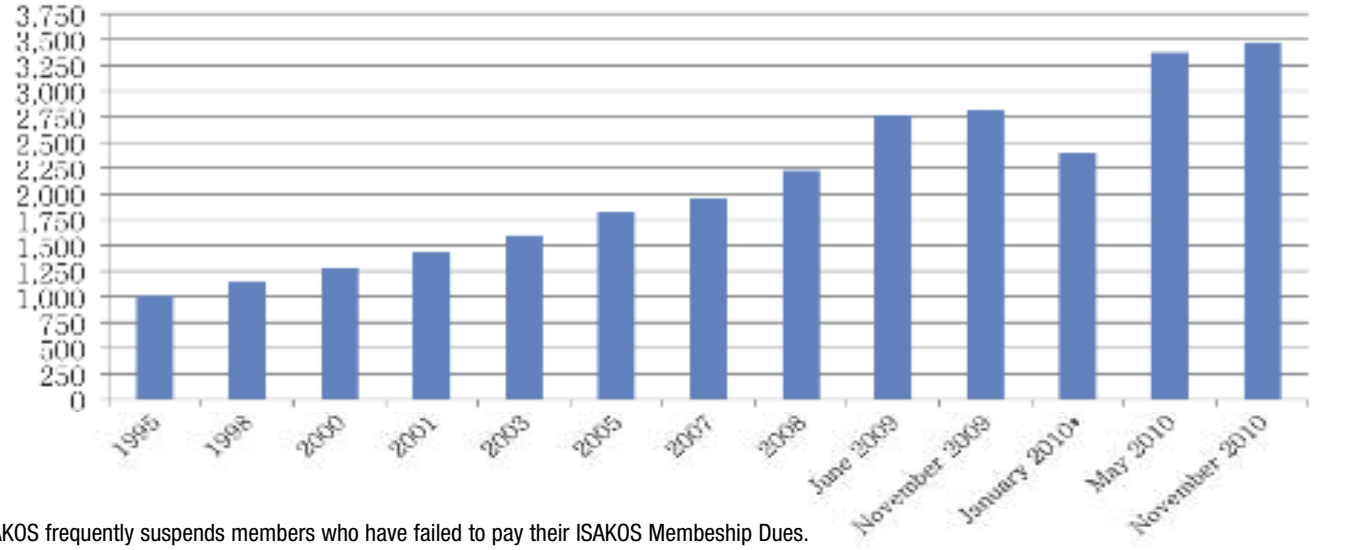
ISAKOS MEMBERSHIP BY CATEGORY

# of Members	Category
1399	Active
16	Affiliate
58	Applicant
995	Associate
808	Corresponding
183	Emeritus
13	Honorary
3472	**- Total Count -**

ISAKOS MEMBERSHIP GROWTH

Year	Total Members
1995	1,005
1998	1,141
2000	1,282
2001	1,437
2003	1,598
2005	1,828
2007	1,958
2008	2,231
June 2009	2,763
November 2009	2,809
January 2010*	2,396
May 2010	3,374
November 2010	3,473

TOTAL MEMBERS



* ISAKOS frequently suspends members who have failed to pay their ISAKOS Membeship Dues.

ISAKOS COMMITTEE MEETINGS

AAOS ANNUAL MEETING DATES: FEBRUARY 13 – 15, 2011
Manchester Grand Hyatt, San Diego, California

Sunday, February 13, 2011	Time	2010–2011 Committee	Room
	10:00 – 11:30	Finance	Emma A
	11:30 – 17:00	Executive	Emma A

Monday, February 14, 2011	Time	2010–2011 Committee	Room
	07:00 – 08:30	Committee Connection Meeting (2009–2011 & 2011–2013 Committee Chairs & Deputy Chairs)	Emma A&B
	08:30 – 10:20	Strategic Planning	Emma A&B
	08:30 – 10:20	Orthopaedic Sports Medicine	Madeleine A&B
	08:30 – 10:20	Membership	Madeleine C&D
	10:30 – 11:30	Site Selection	Emma A&B
	10:30 – 12:20	Knee	Madeleine A&B
	10:30 – 11:15	eLearning Task Force	Madeleine C&D
	11:15 – 12:20	Communications	Madeleine C&D
	12:30 – 16:30	Development	Emma A&B
	12:30 – 14:20	Arthroscopy	Madeleine A&B
	12:30 – 14:20	Education	Madeleine C&D
	14:30 – 16:20	Upper Extremity	Madeleine A&B
	14:30 – 16:20	Scientific	Madeleine C&D
	16:30 – 17:30	Journal Advisory	Madeleine A&B
	16:30 – 17:30	Newsletter	Madeleine C&D

Tuesday, February 15, 2011	Time	Event	Room
	07:30 – 08:30	Program	Madeleine A&B
	08:30 – 09:00	Break	Madeleine A&B
	09:00 – 10:50	BOD with Committee Chairs	Madeleine A&B
	11:00 – 12:30	BOD	Madeleine A&B

Wednesday, February 16 – Friday, February 18, 2011	Time	Event	Room
	09:00 – 17:00	Meetings with Industry	Location TBD

ISAKOS COMMITTEE MEETINGS

ISAKOS CONGRESS DATES: MAY 13 – 19, 2011
Rio de Janeiro, Brazil

Friday, May 13, 2011	Time	2010-2011 Committee	Room
	08:00 – 09:00	Finance	Windsor Barra Hotel Room TBD
	09:00 – 12:00	Executive	Windsor Barra Hotel Room TBD

Sunday, May 15, 2011	Time	2010-2011 Committee	Room
	10:00 – 12:00	Knee	Room 208 Riocentro
	10:00 – 12:00	Orthopaedic Sports Medicine	Room 209 Riocentro
	13:30 – 15:15	Education	Room 208 Riocentro
	13:30 – 15:15	Development	Room 209 Riocentro
	15:30 – 17:00	Communication	Room 208 Riocentro
	15:30 – 17:00	Membership	Room 209 Riocentro

Monday, May 16, 2011	Time	2010-2011 Committee	Room
	11:00 – 12:00	Journal Advisory	Room 208 Riocentro
	11:00 – 12:00	Bylaws	Room 209 Riocentro
	13:30 – 15:00	Newsletter Editorial	Room 208 Riocentro
	13:30 – 15:00	Arthroscopy	Room 209 Riocentro
	15:30 – 17:00	Scientific	Room 208 Riocentro
	15:30 – 17:00	Upper Extremity	Room 209 Riocentro

Tuesday, May 17, 2011	Time	Event	Room
	11:00 – 12:00	Site Selection	Room 208 Riocentro
	12:00 – 13:00	Strategic	Room 208 Riocentro

Wednesday, May 18, 2011	Time	Event	Room
	13:30 – 15:00	Program Committee Chairs and Staff Only	Room 208 Riocentro

Thursday, May 19, 2011	Time	Event	Room
	10:00 – 11:30	New Board of Directors Meeting	Room 208 Riocentro

YOUR COMMITTEES AT WORK

ARTHROSCOPY COMMITTEE

Our primary project over the last six years is the ISAKOS/ESSKA Standard Terminology Project. Great progress has been made over the last year with the elbow section completed under the leadership of Greg Bain (Australia) and the wrist section under Luigi Pederzini (Italy). The ankle, knee and shoulder sections are currently available in the Members Only section of the ISAKOS website and we encourage all members to visit this site. The elbow and wrist sections will be added soon while the hip section is nearing completion. This project is a living document. The next step is to further rationalize the project with a one page document stipulating one terminology for each condition.

This has been finalized for the knee. The wrist has also been completed and will be available shortly.

The natural progression from determining standard terminology is to rationalize outcome scores. Our aim is for all orthopaedic surgeons around the world to use the same terminology and outcome scores enabling us to collate, compare and contrast our data on various orthopaedic conditions. AOSSM has also put together a working party to gain consensus on outcome scores. The Arthroscopy Committee of ISAKOS is now working in collaboration with AOSSM to rationalize outcome scores.

Two years ago the Arthroscopy Committee completed a DVD series on the Normal Arthroscopic Anatomy of the Major Joints. This is available on the ISAKOS website Members Only section under Online Education. The next project is Arthroscopic Pathoanatomy of the Major Joints. Each joint will follow the Standard Terminology project joint categories and their common diagnoses. This will start with the Knee as the Terminology project is completed for this.

***Mark Clatworthy*, FRACS**
Arthroscopy Committee Chairman

COMMUNICATIONS COMMITTEE

The Communications Committee and Education Committee met during the ESSKA Congress in Oslo in June. Thank you to all members for attending and for the constant contribution to the shared goal of improving the ISAKOS Web and eLearning. All effort and input is very much appreciated.

Currently work is being carried out for eLearning content to include: technique-specific surgical skills demonstrations, current information on various topics, international perspectives, and how to do specific techniques or procedures.

The committees advanced the categorization process and agreed on the format that was presented. Everybody gave their opinions on possible problem areas and areas that require improvement. Above all, the objective of ISAKOS eLearning is to create a user-friendly tool providing access to information for our membership. It is a huge project and, when up and running, will provide users with a combination of social networking and learning.

The Communications Committee will meet again in San Diego, February 2011 and continue with the current projects.

***Ramon Cugat*, MD**
Communications Committee Chairman

KNEE COMMITTEE

The primary activity of the Knee Committee has been the *Biologic Treatment Options for the Knee* Pre-Course for the 2011 ISAKOS Congress in Rio de Janeiro. The Biologics Pre-Course will be held on Saturday, May 14, 2011. Tony Miniaci (USA) and his sub-committee of Martin Lind (Denmark), Fredrik Almqvist (Belgium) and Julian Feller (Australia) have put together a great one day program covering the use of biologics in the knee. The Pre-Course will cover bone, ligament, meniscus and articular cartilage and will provide an up-to-date review of the topics as well as a glimpse into the future. It will be well worth arriving in Rio a day early!

In addition to the Pre-Course, the committee has helped the Program Committee grade the abstracts for the ISAKOS Congress and will be involved in the grading of applications for various knee-related awards at the Congress. See you in Rio!

***Julian Feller*, FRACS**
Knee Committee Chairman

MEMBERSHIP COMMITTEE



Since the ability of ISAKOS to achieve the mission of advancing the world-wide exchange and dissemination of information depends on the number and diversity of its members, the Membership Committee is working hard on various projects to enlarge the ISAKOS Membership. Although ISAKOS is the biggest international society for arthroscopic surgery and orthopaedic sports medicine, our philosophy has been "never big enough!"

Previous newsletters have shown the dramatic growth of ISAKOS. The number of active members has tripled during the last ten years, with a current ISAKOS membership of **3,449**, *including* members from **87** countries! We are proud to see that our membership has increased more than 41-percent in the last two years. ISAKOS has experienced large membership growth in specific areas of the world, especially Asia-Pacific and South America including Japan, China, Australia and Brazil. Welcome to the new members!

As we've announced in recent Newsletters, the ISAKOS Office has developed the following new marketing initiatives: ISAKOS Marketing Sumo, Simplified Membership Application, ISAKOS Regional Coordinator Marketing and ISAKOS Approved Course Marketing. Membership Committee Members work hard to promote ISAKOS world-wide by advertising the Society and ISAKOS 2011 Congress at their lectures. We ask that you please remember that it is the **responsibility of all members to recruit colleagues to join ISAKOS**.

Please note that ISAKOS grants immediate Associate Membership to all current members of AANA, AOSSM, APOSSM, ESSKA and SLARD. Annual dues include automatic subscription to the official ISAKOS journal, ***Arthroscopy: The Journal of Arthroscopic and Related Surgery***. Moreover, ISAKOS Membership provides discounted ISAKOS Congress registration rates and gives opportunities to participate in ISAKOS Approved Courses and Teaching Centers, and ISAKOS Sponsored Courses. If you have collegues interested in attending the 2011 ISAKOS Congress in Rio de Janeiro, please remind them that they can apply online for ISAKOS Membership, and register for the Congress at the Member's Registration rate – a savings of US $250! Registration discounts are only available to ISAKOS active, associate and emeritus members. Our next Committee Meetings will be held in San Diego, then Brazil to create new projects!

Finally, thanks to Dr. Freddie Fu, President of ISAKOS and his Board Members for their efforts to ensure the future growth and success of ISAKOS!

Mahmut Nedim Doral, MD
Membership Committee Chair

Allen Anderson, MD
Membership Committee Deputy Chair

Mitsuo Ochi, MD
Membership Committee Deputy Chair

SCIENTIFIC COMMITTEE

The Scientific Committee is busy preparing new challenges and at the same time, doing our best to complete the day-by-day tasks. These day to day tasks include providing a continuous flow of articles for the ISAKOS Newsletter. In this issue you will see a couple of papers on scientific methods and for the spring 2011 issue, we are also preparing a clinically-oriented evidence-based paper on "Partial Rotator Cuff Ruptures," an interesting and constantly debated topic.

For the upcoming 2011 ISAKOS Congress, members of the Scientific Committee are involved in no less than 10 Symposia and Instructional Courses. One Instructional Course Lecture is solely devoted to good scientific methods and nothing else. We will discuss Evidence-based Medicine, methodology and biostatistics. This ICL can be considered as a continuation of what the Committee did in Osaka. The Committee has also worked on the ISAKOS Scientific Awards and will participate in the assessment and award judgement using revised rules at the Rio congress.

One of the major new aspects of the Committee work is to introduce new projects, like increased cooperation with ICRS. For the future, in addition to awards, we hope to offer competitive grants for researchers in different areas. The aim is to be able – in the name of ISAKOS – to offer grants based on geographic area, basic or clinical science and for young investigators. The grants would be awarded based on the quality of the application and the investigators ability to complete the work. The committee is currently working on the details of this important project.

A third and important project is the "Handbook of Research Methods," that currently is being worked on. All chapter co-authors are now in place and are currently hard at work on their assigned topics. We have seen the first chapters and we are excited with what we have seen. We will do our best to complete the book in cooperation with the Arthroscopy Journal in time for distribution at the 2011 ISAKOS Congress in Rio de Janeiro.

Jon Karlsson, MD, PhD
Scientific Committee Chairman

Robert Marx, MD, MSc, FRCSC
Norimasa Nakamura, MD,
Scientific Committee Co-Chairs

UPPER EXTREMITY COMMITTEE

The Upper Extremity Committee of ISAKOS met in Copenhagen, Denmark on June 6–8, 2010 for a Consensus Meeting on AC-Joint Disorders. The painful and unstable AC-joint is a common complaint in shoulder patients, and treatment strategies vary. The attendance was a success with 12 committee members present. In addition, Dr. Augustus Mazzocca from the University of Connecticut, Dr. Allessandro Castagna from Milan, Italy, and Dr. Eilif Larsen of Denmark were invited to share their invaluable and exclusive experience in this subject. Over twenty presentations were given and there was a lively discussion and debate about the many controversies. We are delighted to report that there were as many Current **Concerns** as Current Concept **Conclusions**. The Upper Extremity Committee is finalizing a summary of the meeting for the members of ISAKOS.

Guillermo Arce, ARGENTINA
Steven Cohen, USA
Giovanni Di Giacomo, ITALY
Mauricio Gutierrez COLOMBIA
Vicente Gutierrez, CHILE
Eiji Itoi, JAPAN
David Lintner, USA
Raffy Mirzayan, USA
Ettore Taverna, ITALY
W. Jaap Willems, NETHERLANDS
Benno Enjisman, BRAZIL
Eilif Larsen, DENMARK
Alex Castagna, ITALY
August Mazzocca, USA
Klaus Bak, DENMARK

On June 8th, the majority of the participants in the Current Concepts meeting continued to meet on a slow boat to Oslo, an evocative trip with more time for networking and discussions. On June 9th, the ISAKOS Upper Extremity Committee presented a symposium on AC-Joint Instability at the 14th ESSKA Congress.

After the Copenhagen Current Concepts meeting the ISAKOS Upper Extremity Committee has planned a worldwide multicenter study on AC-joint instability about classification, the treatment of acute AC-separation, and surgical methods for chronic instability. We hope that this study will give us some of the answers to the many questions and controversies.

The Upper Extremity Committee is looking forward to the ISAKOS Congress in Rio de Janerio, and we hope the Committee will be able to contribute to an exciting program attracting orthopaedic surgeons from all over the world.

***Klaus Bak*, MD**
Upper Extremity Committee Chairman

ISAKOS GLOBAL CONNECTION

A Campaign for Education, Research and Collaboration

education • research • collaboration

I am pleased to announce that during the opening ceremony of the 2011 Congress in Rio de Janeiro, ISAKOS will kick off the membership phase of its Global Connection Campaign!

This Campaign to support new and ongoing education and research initiatives will fund projects that are critical to fulfilling our mission and to the continued growth of our specialties worldwide. The ISAKOS leadership is committed to providing accessible, relevant and practical education to our members across the globe, but in order to do so, we need funds to achieve this goal, and will be asking our industry partners and members to pledge to this important campaign.

Among the education and research projects currently planned are the enhancement of our eLearning center – The Global Link, increased workshops and hands-on training, particularly in developing countries, growth in the number of ISAKOS teaching centers, traveling fellowships and the establishment of a research grant program. These are but a few of the initiatives that our Committees and Strategic Planning Committee have identified as priorities now, and in the upcoming years.

We have already begun our fundraising efforts with ISAKOS industry partners, and will recognize our leading corporate donors on stage at the 2011 Congress. At that time, the membership giving phase will officially begin, and as a first step, I will be asking all our volunteer leaders to participate in the Campaign, strongly encouraging 100% participation across the board.

I want to make special note that requests to support the Global Connection Campaign are separate from ISAKOS Annual Fund donations, a once a year request that accompanies your dues renewal, and that supports the day-to-day, general business operations of ISAKOS. Membership dues income alone cannot support our business operations, and I encourage you to consider donations to both the Annual Fund and campaign donations in your gift planning. I look forward to seeing you in Rio.

Best Regards,

***Freddie* H. Fu, MD, *Ph*D**
ISAKOS *President*, 2009 – 2011

8TH BIENNIAL

ISAKOS 2011 CONGRESS

RIO DE JANEIRO ▪ BRAZIL ▪ MAY 15–19, 2011

Congress Highlights

- Rotator Cuff Repair: Double vs. Single Row Constructs
- Hip Arthroscopy 2011– An International Perspective
- Extreme Sports
- ACL Reconstruction – Single vs. Double Bundle
- Cartilage Repair Options: Do We Need Cells to Restore Chondral Surface?
- New Horizons in Cartilage Repair– Fact or Fiction?
- Emerging Technology in Clinical Practice for Joint Regeneration
- Failure of ACL Reconstruction: Can We Prevent It?
- Tricks and Pearls on Visualization in Arthroscopy
- Meniscal Transplantation: Allograft vs. Xenograft

Pre-Congress Courses

- Olympic Games: From Basic Science to the Gold Medal
- Biologic Treatment Options for the Knee
- Spotlight on Top Orthopedic Procedures in Sports Medicine

Register Online Today!
www.isakos.com

International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine

2678 Bishop Drive, Suite 250
San Ramon, CA 94583 USA
Telephone: +1 (925) 807–1197
Fax: +1 (925) 807–1199

8TH BIENNIAL
ISAKOS 2011 CONGRESS
RIO DE JANEIRO ▪ BRAZIL ▪ MAY 15–19, 2011

MESSAGE FROM PROGRAM CHAIR

On behalf of the ISAKOS Program Committee, I cordially invite all members of the ISAKOS to attend the 8th Biennial ISAKOS Congress in Rio de Janeiro, Brazil on May 15–19, 2011. The ISAKOS Congress provides a unique and exciting opportunity for the exchange of knowledge and dissemination of research throughout the international community.

On behalf of the leadership of ISAKOS I would like to offer a special thank you to all members who submitted abstracts for consideration for the 2011 ISAKOS Congress. More than 2000 abstracts were received, which is a new ISAKOS record! We would also like to thank all the committee members who participated in the reviewing of all of these abstracts–your tireless efforts will ensure we have a fantastic scientific program.

The ISAKOS Program Committee has created a diverse and unique program featuring a wide array of interdisciplinary presentations by international experts in arthroscopy, knee surgery and sports medicine. The five day ISAKOS Congress will include a variety of educational opportunities such as symposia, Socratic debates, lectures, surgical demonstrations, podium presentations, more than 600 electronic posters, and instructional course lectures. Lunchtime Workshops and Lectures, as well as technical exhibits will also be available at the Congress. Each attendee will receive a CD-ROM of all paper and poster abstracts, as well as handouts of electronic posters, instructional course lectures, and symposia.

ISAKOS is very excited to bring our Congress to the vibrant and exciting city of Rio De Janeiro, Brazil. The tourism capital of Brazil, Rio de Janeiro, is famous for its breathtaking landscape, laidback beach culture and the annual Carnival. Located in the Southeast region of Brazil, with six million inhabitants, the creative spirit of Rio inspires and appeals to all tastes. Rio de Janeiro offers something for everyone, including beaches, mountains, forests, open air sports and many others. Packed with historical and cultural treasures, Rio is vibrant by day and dazzling by night.

Rio's many flavors and colors offer something for every taste, every age. Like its best known symbol, Christ the Redeemer, Rio welcomes the guests of ISAKOS with open arms. Rio de Janeiro will host many of the 2014 FIFA World Cup games, including the final, and the 2016 Summer Olympics and Paralympics, becoming the first South American city to host the Olympics.

We hope that a great number of orthopaedic surgeons and sports medicine professionals will gather at the 2011 ISAKOS Congress in Rio de Janeiro from all corners of the world. We strongly encourage you to visit the ISAKOS website at **www.isakos.com** for more information about the Congress.

We look forward to seeing you in Rio.

Andreas Imhoff, MD
Chair, Program Committee for the 2011 ISAKOS Congress

ISAKOS 2011 CONGRESS UPDATE

FAQ

If I am a presenter or member of the faculty, is my registration fee waived?
As the ISAKOS Congress is a biennial event and due to the large number of presenters participating in the ISAKOS Congress, presenters' registration fees are NOT waived. ISAKOS does offer a discounted registration rate for presenters. If you are a presenter who qualifies for a less expensive registration rate (ie – resident/fellow or ISAKOS member) please register at the less expensive registration rate.

If I am a member of an ISAKOS partner society, do I receive a discount for my registration fees?
ISAKOS does not offer discounted registration fees to the members of Partner Societies. Registration discounts are only available to ISAKOS Active, Associate and Emeritus members.

Does ISAKOS offer one day registration?
ISAKOS does NOT offer one day registrations for the 2011 ISAKOS Congress.

I have already registered for the 2011 ISAKOS Congress, and would like to change my ICL selections. How do I do this?
Please visit the online registration system to make any changes to your registration record. No payment will be required to change your ICL. Simply make any changes you would like to make, and submit your registration form again. Please note: you will receive a new confirmation email containing the changes/additions to your registration. If you are experiencing difficulties, please contact the ISAKOS office.

I have already registered for the 2011 ISAKOS Congress, and I would like to add a registration for a Pre-Course. How do I do this?
Please visit the online registration system. Additional payment of the pre-course registration free will be required.

I have registered online but have not received my confirmation email. Am I registered?
It is probable that your email address was entered incorrectly or your spam filter blocked the sending of the email. Please verify that the email was not placed into your spam folder. Please also visit the ISAKOS website to verify that your email address was entered correctly. To receive another copy of your registration confirmation email, please visit the registration website, search for your record, and request a copy of your receipt.

I did not include a registration for my spouse or accompanying persons when I completed my original registration. Can I add them?
Please visit the online registration system to make any changes to your registration record. Please note: additional payment for the Spouse and Guest Morning Cafe will be required. Simply make any changes you would like to make, and submit your registration form again. Please note that payment of US $40 will be charged for each accompanying person added to the registration. If you are experiencing difficulties, please contact the ISAKOS office.

What day are the ISAKOS Pre-Courses?
All ISAKOS Pre-Courses are being held on Saturday May 14, 2011 at the Windsor Barra Hotel. Early registration is recommended as space is limited. Please register online at www.isakos.com/2011congress/registration.

Where is the Sports Rehabilitation Concurrent Course being held?
The Sports Rehabilitation Concurrent Course is being held at the Riocentro Convention Center on May 15 – 17, 2011. Early registration is recommended as space is limited. Please register online at www.isakos.com/2011congress/registration.

TRAVEL INFO

Thank you for joining us for the 8th Biennial ISAKOS Congress in Rio de Janeiro, Brazil. The Official Travel Company of the ISAKOS Congress, FK Viagens & Eventos, has selected a variety of hotels as the Official Hotels for the ISAKOS Congress. Staying at one of these hotels provides a reduced rate for a 4-night stay including breakfast, a complementary shuttle to and from the Congress venue, and extended opportunity for social networking with your colleagues.

In addition, FK Viagens & Eventos is offering a number of day-tours, pre- and post-Congress tours, transfers to/from the airport, and discounted flight reservations within Brazil.

Please review the travel information provided on the ISAKOS website for hotel accommodations, day-tours, pre- and post-Congress tours, as well as, transportation. Please visit the FK Viagens & Eventos website to book your reservations. The ISAKOS Office is not involved in the booking of hotels or tours.

PLEASE NOTE: *The FK Viagens & Eventos website is in Portuguese; if necessary click on the British Flag in the upper right corner to convert the website to English.*

FK Viagens & Eventos
Av. Graça Aranha, 19 – Grupo 501
Rio de Janeiro – Cep 20.030 – 002 – Brazil
Telephone: + 55 (21) 3212 – 1300
Fax: + 55 (21) 3212 – 1301
E-mail: **fk@fkviagens.com**
Website: **www.fkviagens.com**

For more information on travel, including hotel information, day tour descriptions, and transportation, please visit the ISAKOS website at www.isakos.com.

ISAKOS 2011 CONGRESS UPDATE

PRE-COURSE INFO

ISAKOS is pleased to announce that three pre-courses will be held on Saturday, May 14, 2011, immediately preceding the 2011 ISAKOS Congress. All pre-courses will be held at the Windsor Barra Hotel. For more information, and a complete list of faculty, please visit the ISAKOS website at **www.isakos.com**.

Early registration is recommended as space is limited. Please register online at **www.isakos.com/2011congress/registration**. Please note – separate registration is required for each course. Registration is US $125 starting February 1, 2011.

BIOLOGIC TREATMENT OPTIONS FOR THE KNEE

ISAKOS is pleased to announce the *Biologic Treatment Options for the Knee* Pre-Course, to be held on May 14, 2011, preceding the 2011 ISAKOS Congress in Rio de Janeiro, Brazil. Be sure to register for this full day Pre-Course highlighting the future of biologic treatment and hear the perspectives from an international faculty.

The principal goal for this Pre-Course is to provide comprehensive coverage of the use of biologics for all anatomic structures in relation to the knee. A review of the biology of injuries of bone, cartilage, muscle and tendon will be discussed, as well as, the uses of some synthetic and biologic enhancement products and their effects on healing. Evidence based outcomes will be presented to help the attendees determine the current place, use and effectiveness of these enhancements in treating knee injuries.

OLYMPIC GAMES: FROM BASIC SCIENCE TO THE GOLD MEDAL

This Pre-Course aims to improve the knowledge of those involved in the professional treatment of athletes. Leading international specialists will discuss topics related to the basic science of the practice of sports medicine, injury prevention, and preparation for athletic competitions. Special emphasis will include the 2014 World Cup and the 2016 Summer Olympic Games. Professional athletes will share their experiences in competing for world championships and its relevance to sports medicine.

SPOTLIGHT ON TOP ORTHOPAEDIC PROCEDURES IN SPORTS MEDICINE

Join us for the *Spotlight on Top Orthopaedic Procedures in Arthroscopy and Sports Medicine* Pre-Course! This pre-course will include world leaders discussing the most prevalent and innovative orthopaedic procedures for your daily practice. Don´t miss your chance to become acquainted with the top tips for success. The primary goal of this course is to focus on surgical techniques. Surgical tips and tricks will be described in detail in order to improve participants' knowledge and skills. Indications, physical exam, and step by step surgical procedures will be presented by an outstanding faculty. The course will cover a wide variety of the main topics for the upper and lower limb. Both open and arthroscopic approaches will be addressed by a worldwide faculty who are experts in their fields of study.

SPORTS REHAB COURSE INFO

GLOBAL PERSPECTIVES FOR THE PHYSICAL THERAPIST AND ATHLETIC TRAINER

CONCURRENT COURSE

Course Chairs: *Moises Cohen*, MD, PhD BRAZIL
Mauricio Garcia, PT USA
James Irrgang, PT, PhD, ATC, FAPTA USA
Lynn Snyder-Mackler, PT, ScD, FAPTA USA

Location: Riocentro Convention Center
Rio de Janeiro–Brazil

Limited to: 500 participants

Language: English, Portuguese and Spanish

CME Hours

The 8th Biennial ISAKOS Congress will be planned and implemented in accordance with the essential areas and policies of the Accreditation Council for Continuing Medical Education (ACCME) through joint sponsorship.

CME Accreditation

This activity has been planned and implemented in accordance with the Essential Areas and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of the American Academy of Orthopaedic Surgeons and the International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine.

The American Academy of Orthopaedic Surgeons is accredited by the ACCME to sponsor continuing medical education for physicians. The American Academy of Orthopaedic Surgeons designates this educational activity for a maximum of 18 AMA PRA *Category 1 Credits*™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Course Objectives

Upon completion of this course, participants should be able to:

- Describe current developments in the management of knee, shoulder and elbow, hip, foot and ankle and muscle injuries in athletes
- Better evaluate and manage sideline or onsite issues in sports medicine
- Describe controversial issues concerning return to play in athletic events
- Understand different modalities and treatment strategies utilized in other nations when dealing with similar injuries
- Improve technical knowledge of the athlete's sports return
- Discuss the use and misuse of performance enhancement substances and techniques

Target Audience

This course is intended for physicians, athletic trainers, physiotherapists and coaches concerned with the management or prevention of injuries to the team athlete as viewed from an international perspective.

For more information and a complete program for the Sports Rehabilitation Course, please visit www.isakos.com

THE USE OF NAVIGATION IN ACL RECONSTRUCTION: AN OVERVIEW

Julian Feller, FRACS
Melbourne, Australia
La Trobe University
Musculoskeletal Research Centre
Email: jfeller@osv.com.au

Although navigation is most widely used in knee surgery in the setting of joint replacement, other potential situations in which it may be useful include osteotomy and soft tissue reconstruction. The use of navigation in anterior cruciate ligament (ACL) reconstruction was one of the sessions in the Masters Precourse on Knee Arthroplasty and Navigation in Knee Surgery at the 7th Biennial ISAKOS Congress in Osaka in 2009. Juergen Eichhorn (Germany), Philippe Colombet (France) and Patrick Yung (Hong Kong) all presented on how they use navigation in ACL reconstruction.

This article summarises the material presented and discusses some of the challenges in using navigation technology for this type of surgery.

Increasingly, the majority of ACL reconstructions are being done by surgeons performing only small numbers (less than 20 per annum). This may be associated with an increased number of failures due to technical errors. There are therefore increasing demands for documentation of tunnel position as well as aids to assist surgeons with tunnel placement.

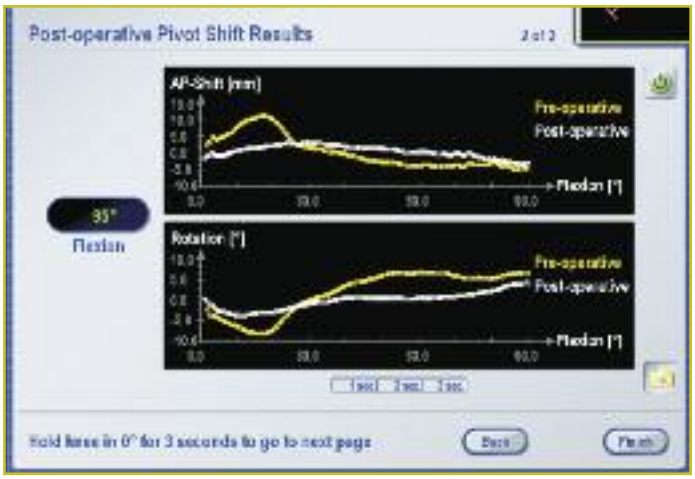
Options for documentation of tunnel position include intra-operative fluoroscopy, and post-operative imaging with plain radiographs, CT scans and MRI. All but MRI involve radiation and can also be time consuming and expensive.

Navigation can potentially be of use in a number of areas: tunnel placement relative to anatomical landmarks, prediction of graft behaviour with regard to impingement and length-tension behaviour (anisometricity), guidance during drilling and laxity measurements both pre-operatively and at the conclusion of the procedure. Laxity measurements include the anterior drawer test, the Lachman test, the pivot shift and the rotational envelope. In addition, navigation has been used as a research tool, both in cadaver laboratory studies and for in vivo analysis.

Photo courtesy of P Colombet

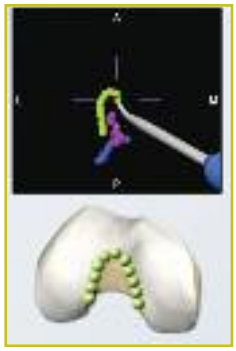
Although intra-operative fluoroscopy has been widely used to assist in tunnel placement, this has relied on two dimensional assessments only. Current navigation systems create a three dimensional model of the knee.

At present most systems used for ACL reconstruction are image-free systems. Like other navigation systems they are based on infra-red tracking of arrays of reflective markers fixed to the femur and tibia. After calibration, anatomical points are recorded using a probe to which reflective markers are attached. These points are both intra- and extra-articular. The computer software then generates a model of the femur and tibia.



There are essentially two approaches to the way in which navigation is used clinically. One is to simply use it as a tool to document laxity before and after the reconstruction procedure. This is really a form of quality control and, over time, can allow assessment of the impact of changes in surgical technique. The other approach is to use it as an aid in determining appropriate tunnel placement. This can be based on anatomical landmarks or observing the predicted behaviour of a graft using specific tunnel positions and making appropriate adjustments.

There are two fundamental potential problems with using navigation as an aid to tunnel placement. The first is that there continues to be considerable debate about what exactly constitutes ideal tunnel placement. Even groups such as the ACL Study Group have shown a wide diversity of opinion amongst their members. The second problem is that when navigation is used to predict graft behaviour, it has to be remembered that the prediction is being done in an ACL-deficient knee. The knee that is registered is by definition ACL-deficient and the kinematic patterns during flexion/extension and rotation are those of a deficient knee rather than those of one with the hypothetical graft imposing constraints.



For instance, it is known that in the ACL deficient knee the tibia has a tendency to subluxates anteriorly near extension. Thus, the tibial attachment of a "virtual" graft may be more anterior near extension than an implanted graft. This may give the impression of impingement of the graft on the roof of the intercondylar notch near extension during planning, when in reality none is present after the graft has been inserted and is imposing a restraint to anterior tibial translation.

Using navigation to locate tunnels with reference to anatomical landmarks eliminates the effect of such issues. This can potentially be particularly useful in double bundle techniques where complications such as posterior femoral tunnel blow out and convergence of tunnels on either the femur or tibia can be predicted and therefore avoided. In addition, navigation allows for location of femoral tunnel entry points at 80° knee flexion where there is good vision, but drilling via the anteromedial portal at higher degrees of knee flexion at which visualization of the lateral wall of the intercondylar notch can be impaired. In other words, having identified the target points, navigation provides feedback on the ability to reach those target points, much like navigation during knee replacement allows for verification of the tibial and femoral bone cuts.

Concerns about extra operative time and reliability of navigation are frequently raised. Although there is a learning curve to any use of navigation, a number of authors have reported that the extra time involved is generally less than 10 minutes. With regard to reliability, repeatability of measurements appears to be satisfactory, whilst sufficient accuracy has been established in cadaveric models.

To date limited clinical studies have not really demonstrated improved outcomes when navigated ACL reconstruction is compared to non-navigated techniques. Whether more recent methods of combining preoperative radiographic data and planning with intraoperative navigation remains to be seen. Of course, the more complex navigation becomes, the less likely it is to be of general use.

One of the significant potential values of navigation in ACL reconstruction is as a teaching tool. Navigation allows real time feedback on altering femoral and tibial tunnel locations and can be an effective way demonstrating the effects of poor tunnel placement. This can be done in both the cadaver laboratory as well as in the operating room, but, in the latter situation, without consequences for the patient.

Perhaps the greatest challenge facing navigation and, indeed, ACL reconstruction surgery in general, is the lack of agreement about what we are trying to achieve and how to measure the outcome – patient satisfaction, normal knee kinematics, reduced osteoarthritis in the long term – as well as how to assess tunnel placement post-operatively. It is clear that plain radiographs give us only a very superficial impression of tunnel location. 3-dimensional CT or MRI holds much promise but is expensive. If we don't know what our destination is when we start out, navigation alone cannot be expected to tell us where it is. It can help us get to a given point, but not give us the point!

Full article and references also available online at www.isakos.com.

TISSUE ENGINEERING AND CELL BASED THERAPY – PORCINE MANDIBULAR CONDYLE DERIVED CHONDROCYTES – XENOGRAFT IMPLANTATION, PRECLINICAL STUDY

***Gabriel Nierenberg*, MD**
Director of Sports Traumatology Service, Rambam Health Care Campus. Haifa, Israel

***Michael Soudry*, MD**
Chairman, Division of Orthopaedic Surgery, Rambam Health Care Campus. Haifa, Israel

G. Maor
Department of Cell Biology. Rappaport School of Medicine, Technion. Israel Institute of Technology. Haifa, Israel

INTRODUCTION

Following two decades of great progress in cartilage cell based therapy, the sense of achievement is incomplete. ACI presently celebrate 3rd generation products combining living cells in 3 dimensional scaffolds. Biomaterials are available by nano-processing. Genetic screening and selection are in clinical application. The one element that is not fully understood and is of paramount importance is the biological mode that the chondrocyte lay its hyaline matrix. Until such understanding is achieved, alternative pathways such as allogenic and xenogenic material may provide further progress.

ABSTRACT

A novel cell culture from porcine cartilage tissue retrieved from the mandibular condyle (MC) of a newborn SPF Sinclair minipig is described. Unlike other cartilage source-derived cells, neonatal MC- chondrocytes (MCDC) preserve the capability of in vitro, spontaneous differentiation into mature chondrocytes. Following a short period of intensive proliferation, these cells start to differentiate into polygonal shaped cells, expressing Cbfa1-the skeletal tissues specific transcription factor, type II collagen and cartilage proteoglycan; thus producing the ingredients of genuine hyaline cartilage. The cultured chondrocytes also preserve their responsiveness toward local and systemic regulating factors such as growth hormone, insulin, PTH and IGF1. The primary culture may be split twice without phenotype loose, enabling a remarkable cells expansion. Prolonged (12 day) MCDC cultures develop into an intact cartilage film that can be mechanically handled and re-plated while preserving its proliferation and differentiation activities, resulting in new cartilage production.

TISSUE ENGINEERING AND CELL BASED THERAPY – PORCINE MANDIBULAR CONDYLE DERIVED CHONDROCYTES – XENOGRAFT IMPLANTATION, PRECLINICAL STUDY *(cont.)*

MATERIAL & METHODS

Preclinical studies, conducted in 8 goats. A round 10 mm diameter full thickness cartilage lesion was induced in the medial femoral condyle of the right knee. The lesion was implanted with MCDC (non liquid jelly form) and covered with a bio absorbable membrane (Chondro-Gide, Geistlich, Wolhausen CH) anchored by sutures.

The lateral femoral condyle was used as control. A similar lesion was created, covered and sutured in the same technique but without any cell implant.

The animals were followed clinically, and blood samples were taken every 10 days for 3 month post operatively.

The animals were euthanized at 3, 6 and 12 months. Tissue was retrieved from the index knees, control lesions, lymph nodes and internal organs for pathology examination.

RESULTS

MCDC cells implanted in (pre-generated) knee articular full thickness lesions developed into proteoglycans and type II collagen containing surfacing tissue. Three months post implantation a thin continuous neo cartilage layer is already fully characteristic. At 6 months an almost full thickness layer is observed. The newly produced cartilage forms a close integration with both adjacent cartilage and sub chondral bone.

The nature of the newly developed cartilage determined by collagen typing with immune – histochemical analysis at 6 month indicate that collagen containing tissue has developed (Fig 2). No traces of type I collagen expression was noted, which would have implicated fibrocartilage development. These results indicate a genuine hyaline-like tissue development in the xenograft transplated lesion, identical to that found in the intact/control articular cartilage (Fig 1).

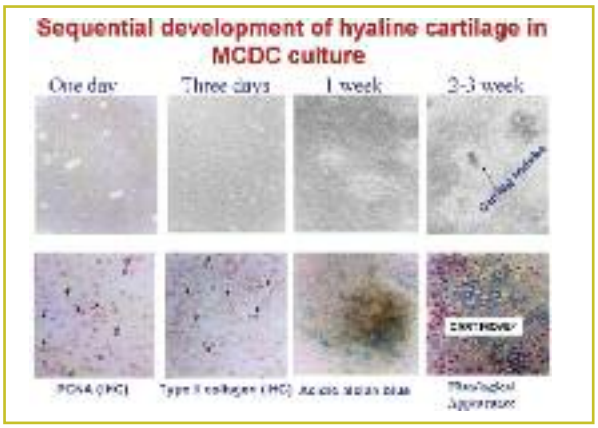


Figure 1. *The sequential and rapid pace of development of the neonatal mandibular condyle cartilage cells. PCNA (left) Proliferate Cell Nuclear Ag staining, indicate early intense cell proliferation. Follow, the presence of type II collagen and further, Alcian blue staining for proteoglycans. Finally, (right) the formation of the primitive cartilage nodule.*

Figure 2. *Histochemical analysis, grafted tissue (lower row) compared with normal, control tissue (upper row). Strikingly height resemblance in the absence of type I collagen indicating absence of fibrocartilage.*

No sign of cellular reaction was observed, both locally or systemically in any of the animals. Marked difference was observed between the gross morphology of the implanted samples compared to the controls.

Six months post implantation, the mandibular condyle cells in the treated lesion are fully covering the defect by a homogenous-Safranin O positive stained articular cartilage, while the non-treated lesion forms a thin, non-regular and low proteoglycans-containing surface tissue.

DISCUSSION

Tissue engineering has evolved immensely in the last two decades. However, cartilage regeneration technology, although in constant renewal and progress has not progressed significantly as a growing body of clinical evidence is available to show no substantial difference between existing treatment modalities compared to cell based therapy.

Hyaline cartilage is a highly specialized tissue; cultured implants offer only partial resemblance to the original hyaline cartilage. Presently, ACI technology result in "Hyaline-like" tissue with various proportions between 15% – 50% of fibrocartilage formation.

Attempts to improve cell response by growth factor such as FGFv in Biocart II (Prochon, Nes-Ziona, Israel) or genetic typing and cell selection like Tigenix (Louvain, Belgium) have resulted in an improved "Hyaline-like" tissue production. Many types of scaffolds with various spatial arrangement, different materials and production technologies are in clinical or experimental use as well in the attempt to create a better environment for cell growth and matrix production.

Removal of an adult chondrocyte from its natural environment by harvest, for tissue culture, will invariably result in dedifferentiation in vitro.

The cell, losing its characteristic phenotype, can no longer synthesize hyaline matrix. A lack of understanding of the biological process of de-differentiation, prevents us from actively controlling cell response in order to maintain true hyaline tissue production. Thus, the adult autologous chondrocyte is incapable presently to fully reproduce the hyaline structure of the matrix.

The rational for porcine Xenogenic origin cell use is complex and it is associated with many problems. One of the leading biologic reasons is the fact that the cells are harvested from a growth plate. The mandibular condyle of the mammalian neonate is a unique anatomic site. The cartilage tissue of the mandibular condyle serve a dual function, primary epiphyseal growth center as well as articular cartilage, all being part of the craniofacial complex that demonstrate intense and rapid development in the neonatal period. The apical location of the growth plate in the mandibular condyle provide easy access to the cells for harvest, otherwise locked in between two bony elements in long bones and difficult to access for harvest and laboratory processing. Finally, the existence of an animal source provides possibility for practically unlimited cell source. Moreover, cell base therapy is costly, surgically staged, and logistically complex. Cell based therapy is not recognized as first line of treatment, and yet it is the most advanced and promising treatment modality presently available. The possibility of finding and developing an alternative cell source for treatment of cartilage defects is stimulating and with careful attention it may materialize to clinical application.

SUMMARY

Although much has been achieved, the treatment of articular cartilage defects remains a challenge. The search for an unlimited "Universal" cell source continues. The xenogenic cell source is ever present in the background to be explored. The unique cell origin, the biological behavior, and the resulting tissue analysis in the study, suggest that Xenogenic neonatal porcine mandibular condyle cells are capable of replicating spontaneously true hyaline cartilage once implanted in a cartilage defect of a goat.

Full article and references also available online at www.isakos.com.

SURVIVAL ANALYSIS IN ORTHOPAEDIC SURGERY – A PRACTICAL APPROACH

Nahum Rosenberg MD, Michael Soudry MD
Department of Orthopaedic Surgery A
Rambam Health Care Campus
POB 9602
Haifa 31096 Israel
Email: nahumrosenberg@gmail.com

ABSTRACT

Survival analysis is an effective statistical tool for evaluating and comparing outcomes of orthopaedic procedures. This method is based on constructing a life-table of a cohort of patients after certain orthopaedic procedures. The life-table contains all the data relevant for the determination of the cohort at regular follow-up periods. The main outcome value in the life-table is the cumulative survival of the study group at each time interval with provision of 95% Confidence Intervals of distribution of cumulative survival values. The calculation of these values is based on the recognition of a number of patients who were lost to follow-up and determination of the uniform criteria for patients with failed outcome. If the latter parameters are similar in different studies a comparison of survival values can be done by the log-rank test. We describe the method for constructing a life-table for survival analysis and how to compare different survival analyses. For this purpose we adopted a practical approach for the description of the calculations that are required to use these methods.

INTRODUCTION

To evaluate the clinical outcome of orthopaedic procedures, two important and unique characteristics should be addressed: the relatively limited number of patients, below 100 patients in most studies, and the term of follow-up, i.e. usually several years. These requirements might challenge the effectiveness of traditional statistical tools for comparison of medical or surgical treatments used in other clinical areas, with involvement of large cohorts of patients with clear short-term outcomes that remain unchanged for long time periods. To answer this specific need, orthopaedic procedures are evaluated and compared by using survival analysis which has been especially adapted to the field of orthopaedic surgery. Initially this method was developed for the long-term follow-up of prosthetic implants, but it can also be used for other orthopaedic procedures.

There are two main methods for survivorship analysis. In the classic "product limit method" according to Kaplan and Meier, the survival, i.e. the success of the procedure, changes immediately following clinical failure. Using this method in relatively small groups of evaluated patients, the confidence intervals at the change points of the survivorship might be misleadingly overestimated or even show values above 100%.

SURVIVAL ANALYSIS IN ORTHOPAEDIC SURGERY – A PRACTICAL APPROACH *(cont.)*

Therefore, for more reliable evaluation of orthopaedic procedures with relatively small groups of patients who are followed at constant time intervals, for example on an annual basis in the arthroplasty follow-up, a need for special adaptation of this method is apparent. Exactly for this purpose, Murray et al popularized a method of survivorship analysis based on constructing of a "life-table" with the assumption that all the procedures were performed at the same time zero and the patients reevaluated at constant intervals, taking into consideration patients who were lost to follow-up; thus establishing a cumulative success rate for each time interval. Subsequently, according to these considerations, 95% confidence intervals (95% C.I.) of survival were determined. In this method 95% C.I. are more appropriate for a small group of patients and never exceed 100% of survivorship.

The authors' purpose is to avoid discussing theoretical issues but, according to the practical character of this presentation, will concentrate on the step-by-step instructions of how to perform the survival analysis that is efficient for long-term evaluation and follow-up of orthopaedic procedures.

VARIABLES

As an example of a life-table (Table 1), we use data published on survival analysis of 90 patients following total shoulder arthroplasty. According to the method presented here, the main outcome values are the cumulative survival rates for each time period with 95% C.I. distribution of these values. The survival values can be presented graphically as survival curves. In addition to these final outcome values, the life-table includes all the parameters that are required for the calculation of the main outcome values; thus, it contains all the data for independent evaluation of survivorship outcome, enabling critical review by readers and an ability to compare outcomes with other studies. The calculation method is shown in rows 1, 7, and 8 in Table 1.

TIME PERIODS OF FOLLOW-UP

In the first column of the life-table, the follow-up periods are given. As has been noted, the main characteristic of the presented survival analysis is the constant periods between patient evaluations according to the nature of the surgical procedure. In the presented example, since the life-table deals with the outcome of shoulder arthroplasty, one year between follow-up evaluations is a commonly used practice. Because the purpose of the survival analysis, among others, is a comparison between different cohorts of patients, the use of the established follow-up period for the particular procedure is recommended. An additional basic assumption of this method is that all the patients were treated at time zero. This does not mean that all the patients were actually operated on the same date, but the date of the surgery for each patient is considered as time zero following which all the calculations are performed. Accordingly, in row one of the life-table, the first column contains the values of one year, in row seven the value of seven years, and in row eight the value of eight years, i.e. 1, 7 and 8 years of follow-up.

NUMBER OF PATIENTS REMAINING FOR FOLLOW-UP AT EACH PERIOD (# AT START)

The number of patients at the start represents the number of patients who were available for evaluation at each time period. This value is a product of subtraction of the number of patients who were withdrawn from the number of patients at the start in the previous time period. Note that the number at the start in the first raw, i.e. in the first time period, represents the total number of patients enrolled in the study. The number of patients withdrawn for each time period is the sum of values given in columns 3, 4, 5 and 6 (success, lost, died, failed). The method to determine these values is given in the next section. Therefore, in our example, in year one, the number of patients at the start was 90 (the entire cohort), in year seven this value is 63, when the four patients "withdrawn at last review" (0+0+2+2=4) were subtracted from the original number; there were 67 patients in row six. Similarly, in row eight, the original number of patients is the product of subtraction of 8 patients (1+1+4+2=8 "withdrawn at last review" in row seven) from 63 patients, which is the original number of patients in row 7, giving a value of 55 patients.

WITHDRAWN AT LAST REVIEW

This section requires special attention since it is based on assumptions which can influence the entire life-table and can be manipulated according to special characteristics of the study group. This section contains four subsections (four columns)–"success", "lost", "died" and "failed"–which will be discussed separately.

SUCCESS

This might be misleading terminology, but it means that the patients reached their maximal follow-up time period and should be considered for withdrawal in the discussion of the next time period of the survival analysis. For example, in row seven, one patient reached the maximal follow-up of seven years; therefore, he cannot be discussed as part of the group of patients in row number eight. Additionally, from inspection of the life-table, the "success" column indicates the minimal follow-up time in the studied group and the number of patients who did not reach the maximal follow-up period, excluding those who were lost to follow-up and died, and at what quantitative extent. By looking at our example, we see that only nine patients reached the whole 11-year period of follow-up, as indicated in row number 11, and the minimal follow-up time was seven years, since the first "success" is indicated in row number seven.

LOST

The patients who were lost to follow-up are the main factor of uncertainty of a life-table and survival analysis. The designers of this method reasonably argued that this group might have a higher proportion of unsatisfied persons with failed procedures. We will address this topic in the following sections.

DIED

Two factors are crucial in the estimation of this group. It must be verified at the highest possible extent that the cause of death is unrelated to the procedure for which survival analysis is performed, because in that case the patient should be included in the "failed" group. Additionally, maximal effort should be exerted to verify that the persons who have died are not included in the "lost to follow-up" group. The reason for the latter is that the proportion of failures in patients who died might be overestimated. This might affect the other parameters of the life-table, as will be discussed later.

FAILED

The way this data is filled is determined by the survival analysis constructor and has the highest potential to be biased. Unfortunately, because different authors consider different criteria for determination of failure of the studied procedure, their life-tables might be difficult for meaningful comparison. The minimalistic approach for determination of failure and the most usually used is the eventual revision surgery. The maximalistic approach might involve clinical signs on imaging modalities, such as radiographic signs of prosthesis loosening, a certain level of pain, restricted range of movements, etc., without surgery. These signs can also be the reason for the decision on revision surgery and become part of the minimalistic approach. Therefore, a clear definition of the criteria of "failure" should be provided. It is also possible to perform a survival analysis with different failure definitions on the same group of patients in order to compare life-tables from different sources.

NUMBER OF PATIENTS AT RISK

This variable reflects the number of patients who are actually considered for evaluation in the certain period of time, according to the life-table design. These patients were available for follow-up at a certain time period and therefore were determined as a product of subtraction of unavailable patients, meaning those who died, were lost or reached the end of their follow-up (success), from the total number of patients at the start of this time period. These patients at risk can reach clinical failure as discussed before, and would be removed from further follow-up or could be considered as success and be followed in the next time period. The fact that not all the subtracted individuals were exposed to the risk during the total time period should be taken into consideration. It will be impossible to know the exact fraction of these patients; therefore, a reasonable estimation of 50% is used and subtraction of only half of the withdrawn patients is implemented for the life-table. In the example in Table 1, the number at risk in row one was 89.5 after subtraction of 0.5 ((0 success + 0 lost + 1 died)/2=0.5) from 90 (No. at start).

PROPORTION FAILING

This is a proportional value of failed cases from the number at risk. It is usually represented in percentages. In our example (Table 1), in post-op year 7, the proportion of failing was 3.3% (2(Failed)/60 (No. at risk)x100 = 3.3%).

PROPORTION OF SUCCEEDING

Naturally, the proportion of succeeding will be the reminder value from the proportion of failing to 100%. So, during the seventh post-op year, the proportion of succeeding is 96.7% (100%–3.3% (proportion failing) = 96.7%).

CUMULATIVE SURVIVAL

This is the main outcome value of the life-table and can be later represented graphically as a survival estimation at the given time period. Because it is cumulative in definition, this value is calculated by multiplying the proportion succeeding in the given time period by the cumulative survival proportion in the previous time period, expressed in percentages. In the first time period, the cumulative survival proportion is equal to the proportion of succeeding, since we consider the initial cumulative survival of the procedure as 100%, as expressed in the example in Table 1. Another example is the cumulative survival of 73.5% in post-op year 8 (1 (proportion of succeeding in year 8) x 0.735 (cumulative survival in year 7) x 100 = 73.5%).

95% CONFIDENCE INTERVAL

The last column to be filled in the life-table contains the confidence intervals of the cumulative survival and represents distribution of 95% of these values for every time period. The calculation of the confidence interval for a given time interval is based on determination of the "effective number of risk" (M), which contains information on the number of patients at risk from the previous time intervals according to the formula:

$$M = i / \sum 1/ni$$

when "i" is the time interval and "n" is a number of patients at risk in the time interval "i" (6).

Accordingly, the confidence limits (CL) are calculated according to the formula (5):

$$CL = \frac{M}{M + 1.96^2}\left[P + \frac{1.96^2}{2 \cdot M} \pm 1.96 \sqrt{P \cdot \frac{(1-P)}{M} + \left[\frac{1.96^2}{4 \cdot M^2}\right]}\right]$$

when "M" is an effective number at risk and "P" is a cumulative survival at the given time interval (expressed as proportion and not as percentage). This mathematical expression is based on the theoretical assumption presented by Rothman et al and popularized by Murray et al. The mathematical basis of these assumptions will not be discussed in this presentation which is more of a practical nature. The interested reader is referred to these extensive statistical reports which are given in the References.

As an example of the calculations of the confidence intervals, we will refer to the time interval eight (i=8, post-op year 8, Table 1). The "M" value is 69.739 according to the following calculation:

$$\frac{8}{\frac{1}{89.5}+\frac{1}{83.5}+\frac{1}{80}+\frac{1}{76}+\frac{1}{70}+\frac{1}{65}+\frac{1}{60}+\frac{1}{50.5}} = 69.739$$

SURVIVAL ANALYSIS IN ORTHOPAEDIC SURGERY – A PRACTICAL APPROACH *(cont.)*

The values of the confidence interval are calculated as follows (M = 69.739, P = 0.735):

For the upper limit –

$$\frac{M}{M+1.96^2}\cdot\left[P+\frac{1.96^2}{2\cdot M}+1.96\sqrt{P\cdot\frac{(1-P)}{M}+\frac{1.96^2}{4\cdot M^2}}\right]=0.824$$

For the lower limit –

$$\frac{M}{M+1.96^2}\cdot\left[P+\frac{1.96^2}{2\cdot M}-1.96\sqrt{P\cdot\frac{(1-P)}{M}+\frac{1.96^2}{4\cdot M^2}}\right]=0.621$$

Therefore, the 95% Confidence Interval for the cumulative survival of 73.5% in post-op year 8 (Table 1) is between 62.1% and 82.4%.

At this stage, when all the data are filled in the life-table the main outcome values, cumulative survival and its 95% Confidence Intervals can be presented graphically (Figure 1).

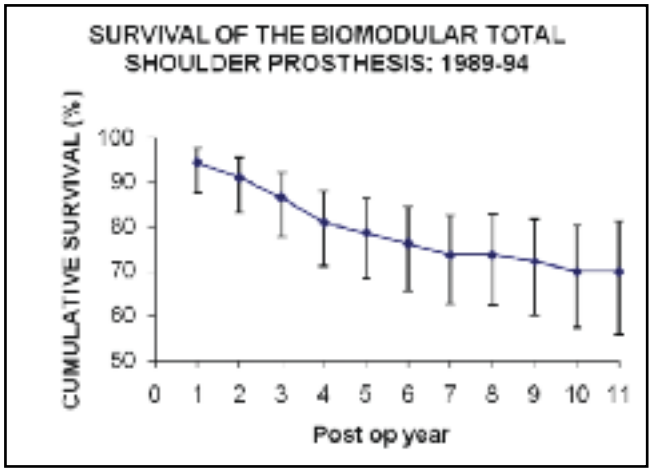


Figure 1. *Graphic representation of outcome values of survival analysis given in life-table 1. Vertical bars represent 95% confidence intervals (95% C.I.) of the cumulative survival rates.*

COMPARISON BETWEEN SURVIVAL ANALYSES

The last step of the process of evaluating the results in the life-table is the ability to compare it to the results of other survival analyses. It is clear that the prerequisite for such comparison will be the same determination for "failure" in the compared life-tables, similar numbers of the "lost to follow-up" and a similar method of life-table construction.

For comparison of two life-tables with relatively small number of patients with low failure rates, the log-rank test is usually used. The null hypothesis of this type of comparison is the same proportion of failures in every time interval for two compared treatments. By this test we will be able to compare the occurrence of failures in the two survival analyses in question. For this purpose a chi-square statistic (x2) is calculated. For comparing two life–tables, the chi-square distribution of values with one degree of freedom is assumed. In this case the value of x2 above 3.841 indicates a P value below .05; when above 6.635, the P value is below .01; and when the value of x2 is above 10.828, the P value is below .001. We will demonstrate the calculations by using two life-tables (Tables 1 and 2).

For calculation of the x2 statistic according to the log-rank test, additional variables are determined and summarized (Table 3). "Post-op year", "Number at risk" and "Observed failure" are taken from the life-tables that are compared.

"Total number at risk" is the sum of "No. at risk" from the two life-tables for each post-op year. For example, for year seven this value is 89.5 (60(Table 1) + 29.5 (Table 2)).

"Expected failure" for each of the life–tables for every post-op year is calculated according to the formula:

(observed failure) x (number at risk) / (total number at risk)

In our example, in post-op year seven in life-table 2, this value is 0.33 (1(observed failure) x 29.5(number at risk) / 89.5 (total number at risk)).

After the previously described variables are determined, the x2 statistic can be calculated according to the formula: ((observed failures)-(expected failures)) 2 / (expected failures) for each of the life–tables, after summering the values of "observed failures" and "expected failures" up to the discussed post-op year. In comparing two life-tables, x2 is equal to the sum of the results of this formula for each of them in the example above. If we compare the 11 year survival from life-tables 1 and 2, x2 equals 26.07 according to the calculation:

(25.00 (sum of observed failures until year 11 in Table 1) – 16.63 (sum of expected failures until year 11 in Table 1))2 / 16.63 (sum of expected failures until year 11 in Table 1) + (18.00(sum of observed failures until year 11 in Table 2) – 6.05 (sum of expected failures until year 11 in Table 2))2 / 6.05 (sum of expected failures until year 11 in Table 2)) = (25.00–16.63) 2 /16.63 + (18.00–6.05) 2/ 6.05 = 26.07.

This value of x2 is higher than 10.828, giving a P value <0.001. Therefore, the difference in the 11 year survival of the implanted shoulder prosthesis between these two groups of patients is highly significant.

CONCLUSION

In this study we presented a method for constructing and comparing survival analyses of orthopaedic procedures by using the life-table method. The method requires simple arithmetical calculations and can be further simplified by using basic computer software, such as commonly used spreadsheet software packages. The main issue that should be addressed in this method of survival analysis is a determination of the end point criteria for "failures".

		Withdrawn at last review								
Post- op year	No at start	Success	Lost	Died	Failed	No. at risk	Proportion failing %	Proportion succeeding %	Cumulative survival %	95% Confidence interval
1	90	0	0	1	5	89.5	5.6	94.4	94.4	87.6-97.6
2	84	0	0	1	3	83.5	3.6	96.4	91	83.1-95.4
3	80	0	0	0	4	80	5.0	95.0	86.5	77.6-92.2
4	76	0	0	0	5	76	6.6	93.4	80.7	70.9-87.8
5	71	0	0	2	2	70	2.9	97.1	78.4	68.1-86.0
6	67	0	0	2	2	66	3.0	97.0	76.1	65.5-84.3
7	63	1	1	4	2	60	3.3	96.7	73.5	62.4-82.2
8	55	7	0	2	0	50.5	0	100	73.5	62.1-82.4
9	46	4	0	1	1	43.5	2.3	97.7	71.8	59.9-81.3
10	40	18	0	0	1	31	3.2	96.8	69.5	56.8-79.8
11	21	9	0	1	0	16	0	100	69.5	55.3-80.7

Table 1. *Life-table of the patients operated in 1989–94 with BioModular® uncemented Total Shoulder Prosthesis. Shadowed rows represent the data discussed in the text.*

		Withdrawn at last review								
Post- op year	No at start	Success	Lost	Died	Failed	No. at risk	Proportion failing %	Proportion succeeding %	Cumulative survival %	95% Confidence interval
1	48	0	0	1	4	47.5	8.4	91.6	91.6	80.3-96.7
2	43	0	0	0	3	43	7	93	85.2	72.1-92.8
3	40	0	0	0	3	40	7.5	92.5	78.8	64.9-88.2
4	37	0	0	0	3	37	8.1	91.9	72.4	57.4-83.6
5	34	0	0	0	1	34	2.9	97.9	70.9	55.5-82.7
6	33	0	0	0	2	33	6.1	93.9	66.6	50.8-79.4
7	31	0	0	3	1	29.5	3.4	96.6	64.3	48.2-77.7
8	27	3	0	1	0	25	0	100	64.3	47.7-78.1
9	23	1	1	0	1	22	4.5	95.5	61.4	44.4-76
10	20	10	0	0	0	15	0	100	61.4	43.4-76.7
11	10	2	0	1	0	8.5	0	100	61.4	41.6-78

Table 2.
Life-table of patients with shoulder osteoarthritis operated in 1989–94 with BioModular® uncemented Total Shoulder Prosthesis

Post- op year	No. at risk: Table 1	Observed failure Table 1	No. at risk: Table 2	Observed failure Table 2	Total no. at risk	Expected failure Table 1	Expected failure Table 2
1	89.5	5	47.5	4	137	3.27	1.39
2	83.5	3	43	3	126.5	1.98	1.02
3	80	4	40	3	120	2.67	1.00
4	76	5	37	3	113	3.36	0.98
5	70	2	34	1	104	1.35	0.33
6	66	2	33	2	99	1.33	0.67
7	60	2	29.5	1	89.5	1.34	0.33
8	50.5	0	25	0	75.5	0.00	0.00
9	43.5	1	22	1	65.5	0.66	0.34
10	31	1	15	0	446	0.67	0.00
11	16	0	8.5	0	24.5	0.00	0.00

Table 3.
Variables required for comparison of survival data in Tables 1 and 2

Full article and references also available online at www.isakos.com.

IDIOTS GUIDE TO DRAPING FOR SHOULDER SURGERY

Dhirendra Mahadeva, BMBS BMedSci MSc MRCSEd
New Cross Hospital
Richard Dias, FRCS(Orth)
Allen Bruce, FRCA

ABSTRACT
Aseptic technique is paramount for any joint surgery. Among a myriad of techniques used is in the execution of draping. The choice of drape material and technique however differs between surgeons. In shoulder surgery the positioning of the patient becomes further factor. Traditional techniques include the use of woven (material), paper (disposable) and plastic adhesive drapes. We describe our experience with the use of the 3M Ioban Steri Drape Arthroscopy Sheet with pouch. This technique allows for full view of the shoulder by all members of the surgical team, including the anaesthetist who can note any alteration in the patient position early and make necessary changes. In a consecutive series of 526 cases, no surgical site infection, were encountered. Furthermore no nerve (hypoglossal or cervical plexus) or cerebral ischaemic events were encountered. We conclude that this technique is safe, easy to apply with encouraging results.

INTRODUCTION
In any joint surgery, aseptic technique is vital and shoulder surgery is no different. In an attempt to obtain a sterile surgical field the skin is usually prepared. However skin cannot be truly sterilized and this merely reduces the microbial count to lowest possible. Incise drapes are subsequently used to provide a sterile surface at the start of surgery. The principles of draping are clear, to isolate, create a barrier and provide a sterile surface. In addition it should help provide equipment cover and fluid control. Every surgeon has his or her opinion with regards what constitutes an acceptable drape technique and material.

In shoulder surgery, the positioning of the patient becomes of a further factor. Two common positions used are beach chair and the lateral decubitus position. With the former, the advantages include allowing the arm to be free. This allows for ease of anatomic orientation. From an arthroscopic perspective, visualization of the anterior, inferior, and superior glenohumeral structures, along with the subacromial space, is excellent. Patient placement is easily accomplished as no additional equipment is required, and a standard operating room table can easily adjust to the beach chair position. Furthermore, this is certainly the best option for open shoulder surgery, especially with regard to the deltopectoral approach, and for arthroplasty cases. Rotational control of the upper extremity in this position is optimal, particularly in cases of subscapularis tear repair and specific cases of rotator cuff tear repair and for precise positioning during cases involving rotator interval closure.

In this position, no traction is needed, which makes set-up easier and avoids the complication of brachial plexus strain, commonly seen in the lateral decubitus position. There are drawbacks with the beach chair position. Among them, it necessitates well positioned drapes. These are required to keep the arm in the appropriate position during the entire case. In this paper, we illustrate a simple technique as described by Badhe et al using the 3M Ioban Steridrape with pouch (St Pauls, Minnesota) and give an account of our experience with it.

DRAPING METHOD
The technique is best done with three pairs of hands but can be easily done with two. The drape that is used predominantly for dynamic hip screw fixation of the hip is utilized. The prepared arm is held by the scrub nurse and then placed through a window in the drape. The adhesive area is then secured, with all of the, adhesive segment placed onto the body by the surgeon and his/her assistant. The figures below illustrate this.

Figure 1. *Standard position of a patient in beach chair position*

Figure 2. 3M Ioban Steri-drape with pouch

Figure 3. *Hole in the middle of the drape*

Figure 4a/b. AP and lateral position after drape application

Figure 5. *Ease at which anaesthetist can alter the patient head/neck and trunk position*

RESULTS

In a consecutive series of 526 cases, no surgical site infection, were encountered. Furthermore no nerve (hypoglossal or cervical plexus) or cerebral ischaemic events were encountered. No accidental removal of lines occurred nor were there any problems with dislodgement of intubation at the end of the procedure. Despite a greater area of adhesion, there were no reported skin tears.

DISCUSSION

Infection

We have come a long way since Joseph Listers pioneering approach to the concept of antiseptic surgery. Still, surgical site infections are the second most common healthcare associated infection among hospitalized patients. Although we did not encounter a single case of infection, superficial or deep, to attribute this to the draping technique would be highly misleading. In reality, a multitude of factors contribute to reducing the risk of infection. This include preoperative measures like screening, intraoperative measure like operating in laminar flow environment, the use of antibiotics at induction and strict adherence to aseptic technique by the surgeon and postoperative measures such as wound care and isolating elective from trauma cases. There is evidence to suggest that plastic adhesive drapes are associated with increased incidence of infection but this was not found in our sizeable series. However that Cochrane review included all types of surgery and did not isolate elective orthopaedic procedures, which is mostly "clean" surgery. Our results suggest that it is as effective in minimizing infection risk.

Intraoperative view

In the conventional draping technique, the view of the patients head and neck is completely obscured to the surgeon. There have been reports in the literature showing that extravasation of fluid into the deltopectoral fascia can cause extrinsic compression onto the tracheobronchial system and subsequent respiratory failure. When patients have general anaesthesia, this may only become apparent too late which is, potentially life threatening.

Also, in moving the limb, the head and neck can alter position and have excessive rotation. This has been described as one of the reasons for why superficial nerves of the cervical plexus like the greater auricular nerve can be damaged or cause hypovascular incidents. Noting this early by various members of the staff including the anaesthetist, can help prevent and rectify the problem early. Also, in a drive to improve pain control, lines are sometimes inserted for continous interscalene infusions. These lines can get dislodged by the drapes but with it being under direct vision in this technique, it will be noted early and as before can be addressed.

Cost

The cost is cheaper. Each single 3M Ioban drape cost £16.23 and is approximately £5/- cheaper against conventional shoulder draping from a hip pack set which costs £21.86. It is even cheaper if compared to shoulder draping specific sets. We acknowledge however that prices can vary depending on the purchasing power of individual hospitals and relationships they forge with particular companies.

Material Properties and Ease of Application

The drape we used has some beneficial properties. Firstly it prevents strikethrough. It allows for fluid collection and is a fluid control absorbent material. However, a significant number of other draping products are made similarly. It is the drape design that really makes it stand out. The attractive aspect of this method is its ease of application. As opposed to a more conventional method, where 3 separate maneuvers are required to drape, this is single step and far simpler. Also, the square area of adhesive segment is greater. In both open and arthroscopic surgery, often the limb needs to be moved by an assistant to provide better access. This movement may cause possible lift off at the edge of the drape. This exposes the surgical field and may allow bacterial contamination. Lift off has been associated with sixfold increase in surgical site infection. Greater adhesive area limits that risk. When removing the drape, the view of all lines and the laryngeal intubation is evident to all members of the surgical team that if removed carefully, the likelihood of this being inadvertently removed are reduced.

CONCLUSION

In summary, our study confirms the safe, cheap and easy application of this drape. Our results are extremely encouraging, and recommend its use.

Full article and references also available online at www.isakos.com.

SINGLE TUNNEL ACL RECONSTRUCTION, WHICH TECHNIQUE WORKS BEST

Transtibial Technique Works Best

Stephen M Howell, MD
Sacramento, California, USA
Email: steve.howell@otismed.com

The three most important principles in placing an ACL graft are reestablishing the normal tension pattern of the intact ACL, avoiding impingement of the graft against the in-tercondylar roof in knee extension, and the use of fixation methods that resist slippage du-ring early aggressive rehabilitation. In the intact ACL, the tension normally increases in terminal flexion and terminal extension, but is negligible from 10–120 degrees of flexion. The intact ACL avoids abrasion or injury from roof impingement because the anteromedial fibers are slack in full extension. Assuming adequate fixation, the sine quo non for restoring full motion, stability, and avoiding an increase in anterior laxity is replicating the normal tension pattern in the intact ACL and avoiding roof impingement.

Although there are many in vitro studies reporting the tension pattern in the intact ACL and ACL graft, very few have measured graft tension throughout the full motion arc and it is these studies that are of clinical importance. The causes of a premature increase in graft tension in flexion are either impingement of the ACL graft on the posterior cruciate ligament or a non-isometric placement of the graft. Avoiding PCL impingement with the transtibial technique requires 1) a wallplasty until the space between the lateral femoral condyle and PCL is 1 mm wider than the diameter of the graft, 2) placement of the lateral edge of the tibial tunnel through the tip of the lateral tibial spine, 3) angling the tibial tunnel 60–65 degrees off the medial joint line of the tibia, and 4) placing the femoral tunnel through this tibial tunnel and centering the tunnel midway or 50% down and 50% up the side-wall of the notch (Figure 1). The arthroscopic checkpoint for confirming avoidance of PCL impin-gement is a triangular space between the ACL graft and PCL. Avoiding non-isometric place-ment placement of the graft requires a femoral tunnel with a thin 1 mm back-wall.

The premature increase in graft tension in extension is caused by placing the femoral tunnel too low down the side-wall (more than 50%) in the location of the posterolateral (PL) bundle in the double-bundle technique. The tension increase from placing the femoral tunnel too low down the side-wall causes stretch-out of the (PL) bundle, which is seen during second-look arthroscopy of so-called 'well-functioning' double-bundle reconstructions. The low femoral tunnel placement does not restore the pivot-shift better than the midway tun-nel placement. Surgeons preferring the AM portal technique should not place the femoral tunnel lower than 50% down the side-wall because of the risk of graft stretch-out from high tension and because the control of the pivot shift is not better than the midway tunnel placement.

Roof impingement occurs when the graft abrades against the intercondylar roof before the knee reaches terminal extension. The cause of roof impingement is the interaction between the sagittal placement of the tibial tunnel, the slope of the intercondylar roof, and the ultimate extension of the knee. The ACL footprint is a poor landmark for selecting where to place the tibial tunnel because the size and shape varies widely between subjects. Because both the slope of the intercondylar roof and knee extension vary widely between subjects there is no one ideal location for placing the tibial tunnel. Customizing the sagittal position of the tibial tunnel so that the anterior edge of the tunnel is just posterior to the slope of the intercondylar roof with the knee in full extension is the best method for placing the tibial tunnel in the sagittal plane. The arthroscopic checkpoint for confirming avoidance of roof impingement is free passage of an impingement rod or drill bit the same diameter of the graft through the tibial tunnel and into the knee with the knee in hyperextension. We do not agree with those AM portal enthisiasts that recommend placing the tibial more anteriorly because of the inevitable loss of extension and instabilty from roof impingement.

The advantage of the transtibial technique is that once the tibial tunnel is placed correctly in the coronal and sagittal planes the placement of the femoral tunnel is automatic. I prefer to use a tibial guide that keys off the intercondylar with the knee in maximum extension to customize the sagittal position of the tibial tunnel for the wide variability in knee extes and the slope of the intercondylar roof (Figure 2). The notch is widened by removing bo-ne from the lateral femoral condyle until the space between the lateral femoral condyle and PCL is 1 mm wider than the diameter of the graft. A rod inserted transversly in the handle of the guide is positioned parallel to the joint line, which sets the angle of the tibial tunnel in the coronal plane at 65 degrees. The use of this guide system with slippage resistant fixation enabled an early recovery of function after ACL reconstruction with a soft tissue allograft without a clinically important increase in anterior laxity and slippage at 1 year. We avoid the use of the AM portal because it results in a shorter femoral tunnel than the transtibial technique and places the femoral tunnel in softer cancellous bone where fixation is not as secure.

Full article and references also available online at www.isakos.com.

Figure 1. *The top row shows arthroscopic and radiographic checkpoints for verifying correct positioning of the tibial tunnel before drilling the femoral tunnel through the tibial tunnel. The notch has been widened and the impingement rod is centered midway or 50% from the top and 50% from the bottom of the notch in the arthroscopic view. The bottom row shows the correct position of the tibial tunnel after fixing the ACL graft in place. The arthrosopic checkpoint confirming avoidance of PCL impingement is the triangular space between the ACL graft and PCL.*

Figure 2. *The tibial guide is shown referencing the intercondylar roof with the knee in maximum extension, which avoids roof impingement by customizing the placement of the femoral tunnel in the sagittal plane. The transverse rod inserted in the handle of the guide (*) is aligned parallel to the joint line to set the tibial tunnel at an angle of 65 degrees of the medial joint line, which avoids impingement of the ACL graft against the PCL.*

SINGLE TUNNEL ACL RECONSTRUCTION, WHICH TECHNIQUE WORKS BEST *(cont.)*

Anteromedial Portal Technique for ACL Reconstruction

Mark Clatworthy, FRACS
Auckland, New Zealand
Email: markc@abjs.co.nz

The best technique for ACL reconstruction (ACLR) is the one that produces the best clinical outcome with the lowest failure rate.

In the last five years there has been a shift from the transtibial technique (TT) to the anteromedial portal (AMP) method to create the femoral ACL tunnel. This shift has been predicated by the belief that a more anatomical femoral tunnel is obtained which results in a better clinical outcome.

The evidence that an AMP ACLR has a better clinical outcome than a TT ACLR is very scant. Sadly, as is often the case for orthopaedics, there are no randomised controlled studies published.

There is only one comparative study. Alentorn-Geli et al published a sequential series comparing 21 TT with 26 AMP patients undergoing BPB ACLR. They found the AMP technique significantly improved the anterior-posterior and rotational knee stability, IKDC scores, and recovery time from surgery compared to the TT technique

In a separate meta-analysis by the same authors they collated the data from 21 studies to indirectly compare 859 patients undergoing BPB ACLR (257 AMP & 602 TT). They showed significantly greater knee stability and range of motion with the AMP group at 2 years however these benefits were not maintained at the 5 & 10 year follow up. The AMP group's rerupture rate was significantly higher at 5.7% vs 2.3% for TT. The value of this study with multiple surgeons using varying protocols with different evaluators however must be questioned.

There are no studies comparing hamstring ACLR's however tunnel widening is significantly less for AMP ACLR's

The evidence that a more anatomical femoral tunnel can be made with the AMP technique is becoming increasingly clear.

Intraoperative 4 cadaver and radiographic studies have shown that the AMP technique enables anatomic placement of the femoral ACL tunnel while the TT technique tends to superiorize and anteriorize the femoral tunnel. This results in a more vertical graft which gives less rotatory stability an increased rerupture rate1 and increased progression of osteoarthritis.

The AMP technique enables independant drilling of both the femoral and tibial tunnels enabling optimal positioning of both.

The anatomical femoral tunnel position can be obtained using the TT technique however compromises are often made to the tibial tunnel to achieve this. The tibial tunnel often needs to be posteriorly placed this can result in abutment of the ACL graft on the PCL which can lead to reduced knee flexion, graft laxity and a higher failure rate. To reach a lower femoral tunnel position the tibial tunnel needs to be shallow and oblique (fig 1). This may compromise graft fixation. A divergent interference screw can break out into the medial tibial plateau. Eccentric, posterolateral positioning of the guidewire in the tibial tunnel with the transtibial technique results in iatrogenic re-reaming of the tibial tunnel and significant intra-articular aperture expansion of 38%

Figure 1. *Shallow Oblique Tibial Tunnel using TT Technique*

The theoretical advantages of the AMP technique are compelling however there is a learning curve and there some critical steps and pearls.

1. For set up use a bolster and side post (Fig 2 & 3). Set the knee to 90° of knee flexion so the notch is correctly orientated to determine femoral tunnel placement. Don't use a leg holder as you need to hyperflex the knee when drilling the femoral tunnel to prevent posterior wall blow out and to maximize femoral tunnel length.
2. Make a lower more inferior medial portal to enable safe drilling of the tunnel (Fig 4) or an accessory medial portal
3. Mark the desired femoral tunnel position with a microfracture awl then tap the guidewire into this hole (Fig 5 & 6)
4. Hyperflexion of the knee can result in an obscured arthroscopic view so the drill depth markers can be determined off the skin at the anteromedial portal when drilling the tunnel (Fig 7 & 8).

At present there is no definitive evidence that one technique is superior to the other thus there is an urgent need for randomised clinical studies. The perceived belief the AMP technique enables anatomical placement of the ACL resulting in better outcome awaits clinical conformation.

Full article and references also available online at www.isakos.com.

Figure 2. *Setup*

Figure 3. *Ensure hyperflexion*

Figure 4. *Portal placement*

Figure 5. *Microfracture awl to create tunnel position*

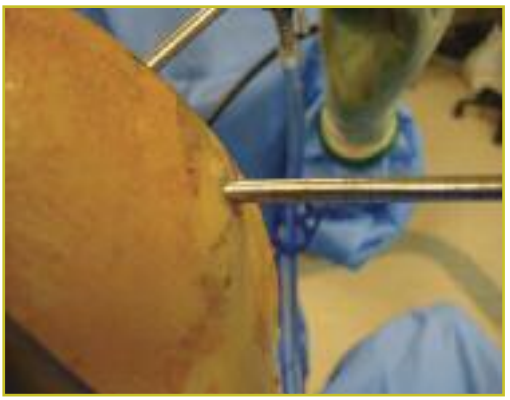


Figure 7. *Femoral Tunnel*
Depth measured at skin portal

Figure 6. *Guidewire inserted into awl hole*

Figure 8. *Femoral Tunnel*

DOUBLE BUNDLE "ALL INSIDE" PCL RECONSTRUCTION

Daniel Adolfo Slullitel, MD

Esteban Suarez, MD

Hernan L Galan, MD
Sanatorio de la Mujer, Rosario, Argentina

ABSTRACT

PCL reconstruction has a steep learning curve and several technically demanding points during the procedure; including tibial sided PCL proximity to the neurovascular bundle, difficulty of graft passage, and tibial fixation.

All inside technique has several advantages that can improve posterior cruciate ligament (PCL) reconstructions. We describe an all inside double bundle PCL reconstruction using the retrodrill technique. Standard portals are made, and a postero-medial one. Intraarticular distance should be precisely measured to avoid "bottoming out". Posterior capsule is pushed away with the Retrodrill Insertion Post, protecting neurovasculature. Through the anteromedial portal a Constant guide with a retrodrill is place over the PCL footprint and socket is drilled. Posteromedial socket is created using a 7mm retrodrill. An 8mm anterolateral socket is made through an anteromedial portal in a standard way. A retrobutton is tied to the graft. The graft is shuttled into the joint and fixed as the retrobutton flips over the medial tibial cortex. The posteromedial bundle is fixed first with a retroscrew at 30º of knee flexion. Anterolateral bundle is fixed with the knee in 90º flexion, in a standard way, with an interference screw. Key words: PCL reconstruction, all inside, retrodrill, retrobutton.

INTRODUCTION

In the past few years, the retrodrill technique has gained in popularity for anterior cruciate ligament (ACL) reconstruction. This technique has several advantages that can improve posterior cruciate ligament (PCL) reconstructions results as well.

There are biomechanical studies that suggested better restore antero-posterior stability compared with single-bundle reconstructions in cadaveric knees.

PCL reconstruction has a steep learning curve and several technically demanding points during the procedure; including tibial sided PCL proximity to the neurovascular bundle, difficulty of graft passage, and tibial fixation.

Puddu developed the rational of retrograde drilling, which was subsequently improved by Lubowitz for an "all-inside" ACL reconstruction.

The purpose of this technical note is to describe an "all inside" PCL reconstruction technique using a retrobutton fixation on the tibial side; a simple, single pass graft-passage fixation not previously described. This technique has the retrodrill advantages, and may decrease the incidence of concerning complications in PCL reconstruction.

SURGICAL TECHNIQUE

Special Equipment

The special equipment required for an all-inside PCL reconstruction is an arthroscopic cannulated retrograde drill (Retrodrill, Arthrex, Naples. FL). A Retrodrill threads onto a reverse-threaded guide pin (Retrodrill Guide Pin, Arthrex). This guide pin is placed percutaneously, and the Retrodrill is placed and threaded onto the pin via an arthroscopic portal.

Portal Establishment

Standard anterolateral (AL) and anteromedial (AM) portal are made. PCL footprint is not completely shaved to guide drilling. Later, an accessory posteromedial (PM) portal is created under direct visualization with an outside in technique. A cannula is left in this PM portal. Improved tibial PCL visualization can be achieved by shaving the torn PCL and posterior capsule surroundings.

Graft Preparation

Before creating the sockets, the appropriate graft size for each bundle is selected based on the insertion site measured. Two cadaveric anterior tibialis tendons are prepared as grafts using whipstitches. About 11-mm wide for the tibial side (four strands) and 7 and 8-mm for posteromedial and anterolateral bundles (two strands each). Intraarticular distance should be precisely measured using a Determinator (Arthrex). To prevent the graft from "bottoming out" during tensioning and fixation, graft length must be less than the sum of combined femoral tunnel, tibial tunnel, and the intra-articular PCL lengths.

Tunnels should be as long as possible, without violating the medial cortex, to have enough space to raise and adjust the grafts.

Sockets Preparation

As we drill a one side tunnel we call it socket instead. The arthroscope is switched to the PM portal and either the ACL Constant guide for retrograde drilling or the special PCL designed guide is used to drill the tibial socket. The Constant guide has the advantage of being stiffer and can be used to retract the posterior capsule, thus improving visualization and protecting the neurovasculature. In cases of acute rupture, remnants of the torn PCL can be used as an anatomic guide for socket placement.

TIBIAL SOCKET

An eleven millimeter Retrodrill (Arthrex) is loaded on Constant guide, introduced into the joint through the AM portal, and positioned over the tibial PCL footprint.

The arthroscope is placed through the PM portal. A cannulated Retro pin is inserted using the guide, and the retrodrill is assembled intra-articularly. (fig. 1)

Improved visualization and vessels protection can be done by pushing the posterior capsule with the tip of the Retrodrill Insertion Post. Drilling on forward, apply retrograde force (distally) to ream the tibial socket. The Retrodrill Guide Pin is calibrated and marked with a small Drill Depth Grommet (Arthrex), which allows precise measurement of the tibial socket depth. The tibial socket usually measures about 70 millimeters. Leaving 10 millimeters without reaming is recommended. Penetration of the tibial cortex is thereby avoided. The Retrodrill is brought back into the joint, and disengages the guide pin by

Figure 1. *Making the tibial socket over the PCL footprint. Retrodrill guide pin about to assemble the retrodrill. Neurovascular structures are protected by retracting posterior capsule.* (A) *PCL footprint.* (B) *Retrodrill guide pin.* (C) *posterior capsule.*

slow clockwise (reverse motion) into the Retrodrill Insertion Post. The Retrodrill is removed from the joint. Afterwards, a Fiber stick is passed through the cannulated guide pin, and retrieved through the PM portal, and used later as a traction suture for graft shuttle.

FEMORAL SOCKETS

The arthroscope is reintroduced through the AL portal. A low accessory AM inferior (AMI) portal is designed to allow drilling from inferior to superior, making it possible to create a longer femoral socket, about 40 millimeters. Care must be taken to allow an adequate 2-mm bony bridge between the two sockets to prevent convergence.

A regular 8-mm drill is used over a beath pin for the anterolateral socket, and a 7-mm retrodrill for the posteromedial one. Two different-colored fiber wires are left in each femoral socket. One should exit through the AL portal and the other through the AMI portal. This way the bundles can be distinguished before fixation.

Graft passage and fixation

Special care has to be taken to choose the retrobutton length. For example with a 70-mm tibial socket, using a 45-mm retrobutton loop will result in 25-mm of graft inside the socket; long enough for tibial fixation.

The traction suture left through the cannula 151 is retrieved from the AM portal and tied to the retrobutton one. The graft is shuttled into the joint and fixed as the retrobutton flips over the medial tibial cortex. (Fig. 2)

The posteromedial bundle is fixed first. The traction suture is tied with the graft stitches and a nitinol guide wire all together. Then the graft is passed into the PM socket. (Fig. 3) A Retroscrewdriver (Arthrex) is passed over the nitinol guide wire. (Fig. 4) Later, a fiberstick is advanced into the joint via the cannulated Retroscrewdriver, retrieved through the AM portal, and loaded with a 7-mm Retroscrew (Arthrex). The retroscrew is secured with a mulberry knot, introduced back into the joint with the use of a split Shoehorn Cannula, and loaded into the Retroscrewdriver. The graft is tensioned at 30° of knee flexion, anterior tibial subluxation (anterior drawer), and by pulling the free end of the bundle. Fixation is achieved by counterclockwise (reverse) screwing the Retroscrew to be flush with bone the joint line. (Fig. 5)

Afterwards, the anterolateral bundle is fixed with the knee in 90° flexion, in a standard way, with a bio-interference screw, from the anteromedial inferior portal. This is the usual tensioning formula for reproducing an anatomic PCL.(Fig. 6)

Postoperative care and rehabilitation

We recommend the use of a postoperative knee immobilizer for approximately 21 days, with partial weight bearing in crutches. Passive range of motion is then encouraged, avoiding hamstrings resistance exercises for 6 weeks. Straight ahead sports may be resumed after about 9 to 12 months.

DISCUSSION

PCL reconstruction is challenging. The "retrodrill technique" has several advantages that can make the procedure easier and safer. It leaves the tibial medial cortex intact and allows for a bottom fixation device and can be accomplished in only one pass, making tibial fixation easier an safer. The Retrobutton has proven to be better in ultimate load to failure in comparison to interference screws. Fixation with interference screws into tibial metaphyseal cancellous bone is the weakest, and also very difficult due to the depth of graft placement on PCL reconstructions.

Figure 2. *Graft shuttle through the AM portal.* (Wh) *Whipstitches,* (Ts) *retrobuttom traction suture.* (Fts) *Femoral socket traction suture.*

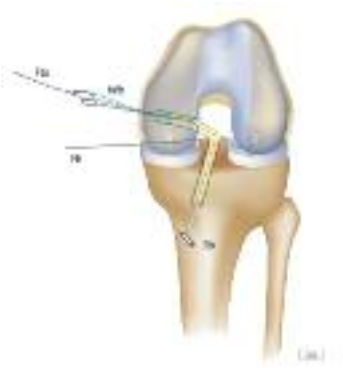


Figure 3. *Posteromedial band passage. Whipstitches and nitinol guide wire tied to a Fiber wire traction suture. In this way the posteromedial band can be shuttled into the femoral socket, and the nitinol guide wire allows Retrodriver passage. Retrobutton is fixed over the tibial cortex.* (Anterolateral band has been deleted to improve visualization). (Wh)*Whipstitches.* (Ni) *Nitinol guide wire.* (Fts) *Fiber wire traction suture.* (Rb) *Retrobutton.*

Figure 4. *Fixation of the posteromedial band. Passage of the Retrodriver through the nitinol guide wire.* (Wh) *Whipstitches.* (Ni) *Nitinol guide wire.* (R)*Retrodriver.*

DOUBLE BUNDLE "ALL INSIDE" PCL RECONSTRUCTION *(cont.)*

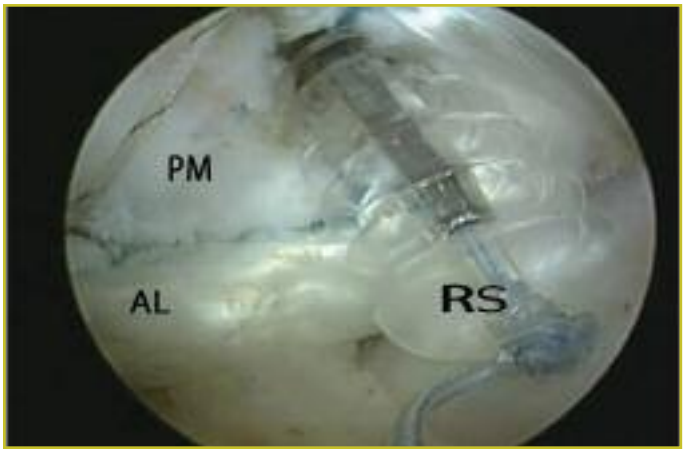


Figure 5. *Intraoperative image showing posteromedial band fixation, with a Retroscrew. Anterolateral band can also be seen, before fixation. (Rs)Retroscrew. (Pm)Posteromedial band. (Al)Anterolateral band.*

Dual energy x-ray absorptiometry scans of the tibia and femur show less bone mineral density in the tibia compared with the femur, with an apparent positive correlation between bone mineral density and mean load to failure of fixation. Additionally, the risk of neurovascular damage can be theorically diminished with the use of the retrodrill. The Retrodrill itself acts as a stop for the guide pin. With this technique, we drill towards the bundle only one time, instead of two with regular drilling.

Use of the Retrodrill for the tibial socket allows anatomic placement without guesswork because the retrodrill is placed directly on the footprint within the joint and prior to drilling. Improved visualization can also be achieved by pushing the posterior capsule with the tip of the Retrodrill Insertion Post.

Figure 6. *Reconstruction finished. Posteromedial band fixed with a Retroscrew, and anterolateral band with a bio-interference screw. (Rs) Retroscrew. (Bi)Bio interference screw.*

With this technique, patients experience decreased pain, possibly due to elimination of open bone tunnels and absence of hematomas, particularly with combined reconstructions (ACL, posterolateral corner). More rapid return to activities and better cosmesis have also been reported with the ACL reconstruction.

We have performed 23 PCL reconstructions (7 isolated PCL lesions, 7 associated with ACL reconstructions, 9 associated with posterolateral corner lesions). Early results are encouraging, but we need more cases and a longer follow up to completely evaluate the results.

Full article and references also available online at www.isakos.com.

IAS 2009:
8TH ANNUAL CONGRESS OF INDIAN ARTHROSCOPY SOCIETY

The 8th Annual Congress of the Indian Arthroscopy Society (IAS) was held on October 1–3, 2009 in Ahmedabad, India. This vibrant city was a workplace of Mahatma Gandhi, who is considered the Father of India. From here, he started the Indian Independence Movement in the 1930's. The organizing secretaries of this meeting were Dr. Nishith Shah and Dr. Nilesh Shah.

The Indian Arthroscopy Society has witnessed tremendous growth from its first meeting in the 1980s, where at many meetings there were more faculty members and fewer delegates. The IAS 2009 meeting was attended by more than 350 delegates coming not only from India but also from neighbouring countries as well as from Africa. 13 international and more than 30 National faculties were present at this meeting to spread the knowledge of arthroscopy.

For the first time in a meeting of The Indian Arthroscopy Society, four workshops were conducted simultaneously. These were on Basic knee, Advance Knee, Shoulder and Cartilage. We all have realized that successful restoration of articular cartilage is still a challenge. To promote the science of cartilage healing, cartilage workshops were organized. Each workshop had more than 50 participants. Indian cartilage society (ICS) was also launched during this IAS meeting.

10 live surgeries were telecasted in two different hospitals with live interaction between the operating surgeon and delegates. Simple menisectomy, ACL reconstructions, PCL avulsion fixation, Rotator cuff repair, Bankart's surgery, Microfracture, Mosaicplasty and MACI surgeries were performed by International and National faculties. Additional surgeries were demonstrated on cadavers. Each participating delegate was given hands-on training in the subject of their interest.

October 2nd & 3rd, witnessed discussions on various topics of arthroscopy, starting from meniscus repair to shoulder instability. The goal of this meeting was to deliver what is currently going on in the world of arthroscopy. Basic topics were already covered in pre-congress workshops. Difficult clinical cases were brought to the venue to take advantage of the knowledge of faculty members and to generate discussion. The highlight of this congress was that after each session there was a question and answer session with faculty members. 12 free papers were selected out of 50 submitted papers.

Dr. Nilesh Shah, Dr. Parag Sancheti & Dr. Nishith Shah

All submitted abstracts were scrutinized, not only by internal scientific committee but also by national faculties. A blinded coding system was developed and each abstract was gauged based on the scoring system. Submitted abstracts were also scrutinized by esteemed international faculties. 12 interesting posters were also selected that generated good interaction between the presenters and delegates.

During this meet an ISAKOS booth was set up which gave information about ISAKOS membership and various activities at ISAKOS.

IAS 2009 concentrated to deliver the best quality scientific program intermingled with social gathering. The President of IAS, Dr. Sripathi Rao delivered a guest lecture during this meeting. Dr. Parag Sancheti, Secretary of IAS stressed the importance of having association with ISAKOS and also the importance of IAS at an international platform. He also said that we should concentrate on increasing the current strength of IAS from 2,000 members to at least 3,000 members by the end of the year 2010. Dr. Parag Sancheti lauded the efforts of the organizing committee of the 8th Annual ISA meeting for having successfully organized this meeting.

ISAKOS APPROVED COURSES IN REVIEW

10th Turkish Sports Traumatology, Arthroscopy and Knee Surgery Congress

The **10th Turkish Sports Traumatology, Arthroscopy and Knee Surgery Congress** was held on October 12–16, 2010 at Gloria Hotels & Resorts in Antalya, Turkey. The Antalya branch of the Turkish Sports Traumatology, Arthroscopy and Knee Surgery Association was very proud to host the biannual congress.

This course was designed to feature novel subjects with intensive discussions and high levels of scientific research in Sports Traumatology, Arthroscopy and Knee Surgery. The latest developments were also discussed by distinguished national and international lecturers.

More than 525 participants attended the meeting, specializing in hip, shoulder, ankle and elbow arthroscopies and also cartilage disorder treatments. The Course included practical sessions and live operation transmissions.

Thank you to all who participated in the **10th Turkish Sports Traumatology, Arthroscopy and Knee Surgery Congress** – thanks to your support, we had a congress that reflects the quality of our association.

2010 Ligament Reconstruction Seminar and Live Surgery

The **2010 Ligament Reconstruction Seminar and Live Surgery** was held at the Hokkaido University Faculty House "Enreisou" in Sapporo, Japan on July 29–30, 2010. The Ligament Reconstruction Seminar and Live Surgery were held in Sapporo, Japan at the Department of Sports Medicine and Joint Surgery at Hokkaido University Graduate School of Medicine. The president of this course was Prof. Kazunori Yasuda.

The course included one day of theoretical lectures, and one day of live surgical demonstrations at the Yamanotedori-Yagi Hospital. A total of 22 participants took part in the 4th Ligament Reconstruction Seminar and Live Surgery. Theoretical lectures included the fundamentals of knee ligament reconstruction including clinical and biomechanical basis, basic techniques, and arthroscopic anatomy, principles of meniscal and chondral surgery and so on. The last day of the course was a live surgery day; participants observed anatomic double-bundle ACL reconstructions in an operating room and had opportunities to ask various questions to the instructors. After the completion of the 2010 Ligament Reconstruction Seminar and Live Surgery, an ISAKOS approved certificate was given to the participants.

ISAKOS Mission Statement

ISAKOS *advances the worldwide exchange and dissemination of education, research and patient care in arthroscopy, knee surgery and orthopaedic sports medicine.*

www.isakos.com

Kasr Al Aini Arthroscopy Course

The ***Kasr Al Aini Arthroscopy Course*** was originally designed to teach orthopedic surgeons the basic and advanced skills in knee arthroscopy as a two day course.

The first course was conducted at the Learning Resource Centre: Faculty of Medicine in 2007 and since has attracted many local, national, and regional delegates. The course is conducted biannually usually in April and December. The teacher to the participant ratio is 1:4. The course provides a unique and golden opportunity to learn the diagnosis and treatment of the common sports injuries with special emphasis on learning hands on skills using realistic models. Interactive discussions and live surgery are integral components of the course.

In 2010, a 3rd day was added to teach the basic and intermediate skills in shoulder arthroscopy. The course has been an ISAKOS Approved course since 2008.

The course was conducted at The Learning Resource Center, Kasr Al-Aini Faculty of Medicine on December 16–18, 2010. 14 delegates attended the basic course, 15 attended the advanced knee arthroscopy course, and 18 attended the Shoulder course.

The course objectives were achieved and an exciting, educational time was had by all. Special thanks to Course Directors, Prof. Ahmed Abdel Aziz and Prof. Khaled Shohayeb, and course convener Dr. Mohamed El Masry.

Orthopedic Surgery Controversies 2010

Napa, California was the setting for the second annual ***Orthopedic Surgery Controversies*** course, held October 14–16, 2010. Course chairmen Wesley M. Nottage, MD and Mark H. Getelman, MD welcomed over 100 orthopedic surgeons and healthcare professionals to the Silverado Resort to participate in this unique educational experience.

Based on the "controversies" format, the course allowed participants the opportunity to challenge conventional thinking. Open discussion periods were designed for both faculty and audience to voice their opinions and experiences. In this unique forum the questions posed did not have "correct" answers, but were meant to provide a springboard for valuable discussion sessions.

Participants were also asked to weigh in with their own opinions during case presentations. Audience response systems allowed them to become part of the diagnosis and treatment of a myriad of conditions.

PRP & Orthobiologics and Rehabilitation proved very popular with attendees as well. The course also featured a live surgery demonstration by Sumant "Butch" Krishnan, MD and an optional shoulder ultrasound workshop with Don Buford, MD.

Additional learning opportunities included industry-sponsored, product specific workshops, and hands-on mobile laboratories for both arthroscopic and open surgical procedures.

The third annual OSC course will be held October 5–7, 2011 at Silverado Resort in Napa, CA. Information for next year's course will be available soon at **www.orthopedicsurgerycontroversies.com**.

27th Annual Course: Arthroscopy, Arthroplasty, and Fractures

San Diego Shoulder Institute once again achieved educational excellence via its **27th Annual Course: Arthroscopy, Arthroplasty, and Fractures**. Approximately 400 surgeons representing 23 countries attended the June 2010 course. Held in San Diego, CA, the course offers an excellent venue and climate for learning. The intense, four day course starts off with hands-on skills arthroscopy model laboratories, followed by an interactive Total Shoulder and Fracture Fixation Workshop. San Diego Shoulder Institute partners with the University of California San Diego School of Medicine to provide hands-on skills cadaver laboratories that mirror a state of the art surgical setting. Students are partnered with expert faculty who provide individualized instruction to enhance surgical skills. Cadaver laboratory sessions focus on improving arthroscopy techniques, anatomy, open reconstruction, and arthroplasty.

Lecture topics focus on current research and new technological advances. San Diego Shoulder Institute integrates the highest level of orthopedic care known with identified current practice to provide a stimulating and impactful course session. Key concepts of arthroscopy, arthroplasty, and fracture management are detailed during four days of course lectures. Specialty sessions encourage advanced practice regarding prevention of complications, rehabilitative techniques, and practice pearls. An afternoon break-out session affords learners an opportunity to present individualized case studies to an expert panel. The panel subsequently provides specific feedback and practice strategies for the presenter and audience to improve future practice outcomes. Ample time is offered to view an extensive exhibit hall, composed of technological innovations and resources. The diverse cultural composition (from both faculty and attendee populations) from the course affords an excellent opportunity to network, collaborate, and ascertain best practice options from throughout the world.

Dr. James C. Esch, President of San Diego Shoulder Institute and Course Chair is actively involved in international teaching and collaboration with orthopedic experts in the field throughout the year to build the course content. Dr. Esch's stellar reputation provides the opportunity to recruit faculty of the highest level on behalf of our learners. Known as a leader and mentor in the orthopedic community, Dr. Esch continues to strive to improve the annual course to motivate and enhance the field of orthopedics.

Course evaluations confirm that the San Diego Shoulder Course is "the best shoulder course in the world". A research study, conducted during the course, validated that learners demonstrate improved skill as a result of course participation.

San Diego Shoulder Institute is pleased to announce our recent educational partnership with G9MD. Individuals who missed the 2010 San Diego Shoulder Course, or who desire content review from our exceptional lecture curriculum, are encouraged to view course lectures in their entirety. The site also provides onsite faculty interviews and additional pertinent practice information. To access this exciting site, visit **http://www.G9MD.com** and click on the San Diego Shoulder Course logo. Viewers will be able to view course lectures in their entirety, or select specific lectures of interest for review. San Diego Shoulder Institute provides CME credit for online course participation.

Plans are underway for the 2011 course, to be held June 22–25, 2011 in San Diego, CA. Lecture content truly reflects the cutting edge of shoulder care today. Learners will be able to individualize educational goals by various breakout sessions, workshops, and skills laboratories. An interactive ultrasound workshop has been added to the course this year, led by Dr. Donald Buford, a leading orthopedic expert and sports medicine authority. Once again, San Diego Shoulder Institute is pleased to present a course comprised of Internationally recognized experts in the field. To register for the 2011 San Diego Shoulder Course visit **www.shoulder.com**. For additional information, contact the San Diego Shoulder Institute office directly: Rebecca Quiring, Director of Operations at rebeccaq2@cox.net or +1 (760) 940–2066.

The Amsterdam Foot and Ankle Course

The ***Amsterdam Foot and Ankle Course*** is an annual event held in the Academic Medical Center (AMC) in Amsterdam. This course was first held in 2000, under the guidance of Dr. C. Niek van Dijk. Since then, professionals from all over the world have participated in this annual event. This annual course has its focus on surgical interventions of the Hindfoot and Ankle, featuring Cadaver Lab Sessions, Lectures, Interactive Computer Courses, Live Surgery, a Live Clinical Demonstration, a Live ankle dissection an Ankle Brace Workshop and a Fireside Quiz. Lectures and practical sessions are given by a national and international expert faculty. The lectures are interactive and supported by a Wireless Interactive Voting System. The Hands-on Sessions in the Cadaver Lab present the latest arthroscopic techniques in the Foot and Ankle. The course has a limited number of participants, allowing each participant ample opportunity to practice during the Cadaver Lab sessions and to interact with the faculty.

The 10th Foot and Ankle Course took place on the 24th and 25th of June, 2010. The feedback of the 78 participants was extremely positive. Some said it was the best course they ever attended. The average appreciation for the lectures was 4.65 (5 being the highest score possible). With an average of 4.8 the 3 cadaver practicals in the wet lab was most appreciated, followed by the live surgery (4.6) and the interactive computer session (4.4).

The course was exquisitely catered with Italian food, prepared on site by our Italian chef. The Thursday night program was localized in the old centre of Amsterdam, where dinner was served in the famous Weigh House. Afterwards there was a short walk through the historic old centre of Amsterdam and the participants were brought back to their hotel.

In 2011 the 11th Foot and Ankle Course will take place on the 16th and 17th of June.

For more information and booking for future courses surf to **www.ankle platform. com**

Instructions by Professor Niek van Dijk during the Foot and Ankle Course posterior Ankle Arthroscopy

Hands-on ankle Arthroscopy in the Cadaver Lab

31st International Congress of the French Arthroscopic Society

The 31st International Congress of the French Arthroscopic Society (SFA annual meeting) was held on December 2–4 in the Grand Théatre of Aix en Provence. Aix en Provence is a beautiful city and was the native land of the famous artist Paul Cézanne. This was a unique and beautiful location for this meeting with a lot of attractions. Great recreational activities and beautiful autumn weather was also part of the meeting directed by Dr. Francois Kelberine. This meeting was the first as an ISAKOS Approved Course with an excellent and high standard scientific level in the field of knee surgery, arthroscopy and sports traumatology.

The Hellenic Association of Arthroscopy (EAE) Knee Surgery and Sports Injuries was the guest society and we were very pleased to welcome N. Piskopakis, M. Antonogianakis, Ch. Giannakopoulos, and A Georgoulis. 45 invited speakers, including members of ISAKOS, gave more than 15 instructional courses on several topics and ISAKOS partner societies ESSKA. Also several speakers came from Italy, Poland, Morocco, Tunisia, Switzerland, Spain, Germany, and Greece.

Lectures were given about Osteoarthritis, Knee Laxity, the Subscapularis, and Biomechanical Aspects of Deficient Ligament Instability of the Knee, by expert faculty including F. Kelberine (Aix en Provence), L. Lafosse (Annecy), and A. Georgoulis (Ioannina - Grèce).

There were two symposiums about shoulder stiffness and treatment of osteochondral defects on the knee, and scientific sessions about muscle and rotator cuff tears, soft tissue healing and PRP (Platelet Rich Plasma), ankle, update in elbow arthroscopy and technical sessions on "How Do I Do It" for ACL revision and arthroscopic repair of the labrum.

Great speakers in each topic gave the most updated presentations. Special thanks to lecturers, to the other international faculties and to the 53 speakers of oral presentation.

There were more than 860 attendees and 127 nurses registered with more than 40 industrial companies. This was a real success and every year the number of attendees increases. The social program was also very fascinating with the Fiesta of the SFA with an excellent atmosphere of friendship and conviviality. The participants unanimously expressed their appreciation. We hope that more ISAKOS members can attend the 32nd Annual meeting, to be held on December 8–10, 2011 in Paris Marne la vallée. If you are interested in more information on the meeting, visit our website sofarthro.org.

UPCOMING ISAKOS APPROVED COURSES

HEALTH FOR THE FOOTBALL PLAYER
Convention Centre, Trade Fair District
Bologna, ITALY
March 12–14, 2011
For further information, please contact:
Cristina Zanetti
Email: congressi@isokinetic.com
Tel: +39–2986826
Fax: +39–2986898
Website: www.isokinetic.com

ASSIUT INTERNATIONAL SHOULDER ELBOW COURSE
Assiut University Hotel & Convention Center
Assiut, EGYPT
March 17–19, 2011
For further information, please contact:
Hatem G Said
Email: hatemgalal@yahoo.com
assiutshoulderelbow2011@gmail.com
Tel: +20–1762258
Fax: +20–2360674
Website: www.afm.edu.eg

ARTHROSCOPY 2011 - METCALF/AANA MEETING
Snowbird Ski and Summer Resort
Snowbird, USA
March 24–27, 2011
For further information, please contact:
Sue Duncan
Email: sue.duncan@hsc.utah.edu
Tel: +1 (801) 587–5457
Fax: +1(801) 587–7149
Website: www.metcalfmeeting.org

IMUKA 2011, MASTERCLASS IN ARTHROSCOPY AND RELATED SURGERY
Maastricht Exhibition & Conference Centre (MECC)
Maastricht, NETHERLANDS
April 20–22, 2011
For further information, please contact:
N.P. Kort
Email: n.kort@imuka.eu
Tel: +31–43–7114378
Fax: +31–43–7114370
Website: www.imuka.eu

11TH AMSTERDAM FOOT & ANKLE COURSE
Academic Medical Center
Amsterdam, NETHERLANDS
June 16–17, 2011
For further information, please contact:
Reilingh
Email: m.l.reilingh@amc.uva.nl
Tel: +31–5662463
Fax: +31–5669106
Website: www.ankleplatform.com

smith&nephew

The way to innovation is full of excitement

At Smith & Nephew, innovation is a vital part of who we are. Over the past year, we launched a host of new products and techniques that deliver significant advantages to clinicians and their patients. Contact us to learn more about our latest innovations. You'll understand why arthroscopy just got a little more exciting, and why we're always a stroke ahead.

To learn more visit **www.smith-nephew.com** or call 1 978 749 1140.

BIORAPTOR°
Knotless Suture Anchor

BIOSURE° SYNC
Tibial Fixation Device

DYONICS° POWER II
Control System

DYONICS° RF
Radiofrequency System

DYONICS° BONECUTTER° ELECTROBLADE°
Resector

FOOTPRINT Ultra
Suture Anchor

TWINFIX° Ultra PK
Suture Anchor

Endoscopy
Smith & Nephew, Inc.
Andover, MA 01810 USA

T +1 978 749 1000
www.smith-nephew.com

International Society of Arthroscopy,
Knee Surgery and Orthopaedic Sports Medicine
2678 Bishop Drive, Suite 250
San Ramon, CA 94583 USA

Telephone: +1 (925) 807–1197
Fax: +1 (925) 807–1199
isakos@isakos.com

join us...

8TH BIENNIAL

ISAKOS 2011 CONGRESS

RIO DE JANEIRO ▪ BRAZIL ▪ MAY 15–19, 2011

EARLY REGISTRATION DISCOUNT ENDS
January 31, 2011

REGISTRATION DEADLINE
March 31, 2011