

Welcome to Barcelona, where a diverse scientific programme awaits you! Within the newspaper, you'll find many of today's highlights, covering all of our clinical tracks: arterial, venous and aortic, as well as neurointerventions, interventional oncology, embolisation, non-vascular interventions and clinical management.

Featured too are many of the services offered by the congress and society – find out more about our useful app, our live stream, our onsite lounges and much more, and make sure you get the most from your time in Barcelona. Should you need any assistance during your stay, our onsite hostesses will be pleased to help.

So sit back, relax, and discover what the opening day of the congress has to offer you!

CIRSE 2016 – Barcelona
Saturday, September 10, 2016

CIRSE 2016

LEADING THE FIELD IN ENDOVASCULAR THERAPIES

ARTERIAL INTERVENTIONS

VENOUS INTERVENTIONS

AORTIC INTERVENTIONS IDEAS



Elias Broutzos
CIRSE President



Robert A. Morgan
Vice-President



Christoph A. Binkert
Scientific Programme
Committee Chairperson



Fabrizio Fanelli
Scientific Programme
Committee Deputy
Chairperson



Marta Burrel
CIRSE 2016 Local Host
Committee Chairperson



José Urbano
CIRSE 2016 Local
Host Committee
SPC Representative

Dear colleagues,

CIRSE returns to Barcelona for the third time, to celebrate the biggest annual event of European IR. Building on a three-decade history of continuous growth, high quality and rigorous scientific standards, this year's congress promises to be particularly memorable, with both tried-and-tested features as well as exciting new additions.

This year we have taken several steps to make it even easier for delegates to find the right sessions. Further underlining CIRSE's position as the leading endovascular meeting in Europe, this year's vascular sessions have been repackaged into the new Endovascular Programme, which comprehensively covers arterial, venous and aortic interventions. The latter will be presented within the Interdisciplinary Endovascular Aortic Symposia (IDEAS), which will return after last year's successful launch, with its unique mix of delegates from all disciplines.

Improved digital content

We have further improved our digital content to make this congress as productive and convenient as possible for you: for the first time, the CIRSE live stream will cover the entire CIRSE 2016 programme, streaming from every lecture room at CIRSE 2016. So even if you can't make it to a session in person, there is no reason you have to miss it! All webcasts will also be made available "on demand", so you can share exciting sessions with your colleagues back home.

To help organise and choose your sessions, we have also created a new online congress organiser, which you can use to build your personal schedule for CIRSE 2016. Our congress app (available for iPhone and Android) has also been expanded and improved – find floor-

plans, send questions to the moderators and submit your evaluations easily!

New session formats

CIRSE 2016 will also feature some new session formats. Expert Round Tables (ERT) will offer delegates unique insights into important IR issues and expert opinions in an informal setting with enough space for audience interaction.

Expert Case Discussions (ECD) on the other hand will start with interesting cases first being presented and then discussed by experts with different skills, views and approaches to problems. These interactive sessions provide an excellent learning experience on how to gain different perspectives on difficult cases and how to approach them from different angles.

In order to further support young interventional radiologists, residents and IRs-in-training, CIRSE 2016 will feature a dedicated session on building an IR career, where key opinion leaders of the IR community will share their knowledge and insights. This session will be a must for all IRs in or fresh out of their training. There also will be a designated lounge for resident delegates to meet, chat and expand their professional network.

Super Tuesday

Scientific research is the basis for any medical discipline and it is vital for every IR, and the discipline as a whole, to stay up to date with scientific development. Super Tuesday is a special session which aims to promote and highlight important scientific papers and trial results which every IR should be familiar with. A paper of special interest will be "10-years' outcomes from the randomized EMMY trial", a randomised trial run by the Academic Medical Center in Amsterdam that seeks to compare

the clinical outcome between uterine artery embolisation and hysterectomy through random assignment and follow-up.

Other scientific posters of note will be discussed in our new "Posters on Stage" sessions, taking place daily at 13:30 in the poster area of the exhibition hall. Each daily session will be dedicated to particular clinical theme, with endovascular interventions being discussed today, and embolisation, non-vascular interventions and interventional oncology taking centre stage tomorrow, Monday and Tuesday, respectively. Drop by to join the discussion!

CIRSE meets the EAU

"CIRSE meets..." sessions offer us the chance to hear from clinical colleagues about their work, and how it relates to our own IR practice. This year, CIRSE will meet the European Association of Urology (EAU), with a session on LUTS, prostate hyperplasia and PAE – a field that has been garnering much interest within the IR community.

As you can see, a diverse scientific programme awaits you, with clinical topics to fit everyone's practice. We also urge you to make use of the social and networking events afforded by this community gathering – come along to tonight's charity sports event, or use the Members' Lounge or Trainee Lounge to catch up with your colleagues.

We hope you'll enjoy your stay in Barcelona, and look forward to seeing you here!

Opening and Awards Ceremony – 14:30, Auditorium 1

**A very warm welcome to CIRSE 2016!
We hope you are geared up for 4.5 days
of science, education and innovation with
delegates from all over the globe at our 31st
annual congress!**

Please join us for the Opening and Awards Ceremony, which starts today at 14:30 in Auditorium 1. To open proceedings, a welcome address will be given by current CIRSE President Elias Broutzos, Local Host Committee Chairpersons Marta Burrel and José Urbano, and Scientific Programme Committee Chairperson Christoph Binkert, after which, six awards will be presented, including the Award of Excellence and Innovation in IR, the CVIR Editor's Medal, three Distinguished Fellow awards and the CIRSE Gold Medal. The event provides an ideal opportunity to highlight the achievements of select physicians

and researchers who have made exceptional contributions to the field.

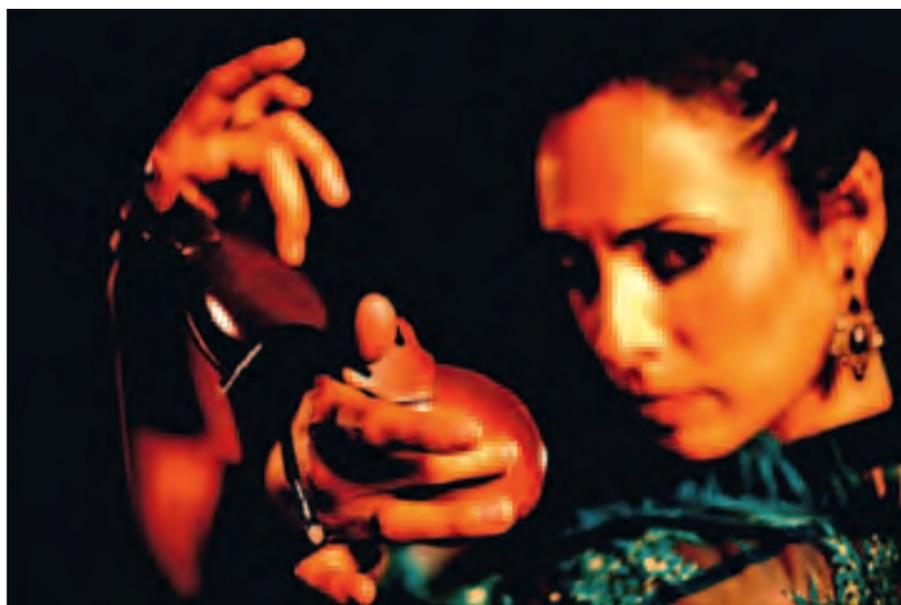
The event will once again feature live entertainment. This year, you are being treated to a fantastic flamenco performance by Barcelona's Quindalé dance company, who have choreographed an unmissable performance especially for our Opening and Awards Ceremony.

Quindalé was founded in 2010 by flamenco experts Angel Güell and Vicente Raquel. Both graduated from the Conservatory of Dance Theatre Institute of Barcelona and have a wide

knowledge of not just flamenco dancing but also classical, contemporary, folk, jazz, hip hop and salsa.

Flamenco is an art form native to the Spanish regions of Andalusia, Extremadura and Murcia which dates back to the 18th century. It is a highly expressive, emotional art, displaying *cante* (singing), *toque* (guitar playing), *baile* (dance), *jaleo* (vocalisations), *palmas* (hand-clapping) and *pitos* (finger snapping).

We hope you can join for what promises to be an outstanding event!



The Award of Excellence and Innovation in IR



The Award of Excellence and Innovation in IR is sponsored by the R.W. Günther Foundation, and seeks to reward and encourage exceptional research in the field of interventional radiology. The award is presented during the Opening and Awards Ceremony of the CIRSE Annual Meeting, bestowing recognition and a €5,000 prize to the best applicant.

This year, the award will go to Prof. Francisco Carnevale for his pioneering research on prostate artery embolisation (PAE) as an alternative treatment for symptomatic patients of enlarged benign prostate hyperplasia.

The Innovation

Prostate artery embolisation uses microspheres to embolise the prostatic artery, blocking the blood supply to the prostate in order to improve lower urinary tract symptoms caused by benign prostatic hyperplasia. This procedure has been gaining recognition and popularity around the world since it was first performed, with patient benefits already shown in short- and mid-term results, and long-term results now beginning to be published; however, more research and follow-up studies are needed to determine the most appropriate indications for this procedure and to achieve the best results.

Prof. Carnevale has been fundamental in providing thorough research and training on this new therapy through workshops, presentations and scientific papers. His published studies have analysed the benefits of the PAE procedure as well as the variations between transurethral resection of the prostate, original

PAE and his self-designed, PErFecTED PAE technique. He has significantly facilitated the establishment of PAE to help patients who are unsuitable for surgery to experience relief from the discomfort caused by symptoms of benign prostatic hyperplasia.

The Winner

This research was performed primarily by Prof. Francisco Carnevale from the University of São Paulo Faculty of Medicine Clinics Hospital in Brazil. Prof. Carnevale graduated from the Faculty of Medicine of the University of Mogi das Cruzes, São Paulo, in 1990, and carried out his residency at the Hospital das Clínicas at the University of São Paulo Medical School in 1994. His many research and clinical fellowships brought him from Charleston, Chicago, Pennsylvania, Houston and San Diego in the U.S. to Las Palmas and San Sebastian in Spain. He completed his PhD in Interventional Radiology, Faculty of Medicine of the University of São Paulo in 1999.

Prof. Carnevale first performed the PAE procedure there in June of 2008 and has since conducted several studies on this therapy which have been published in *CardioVascular*

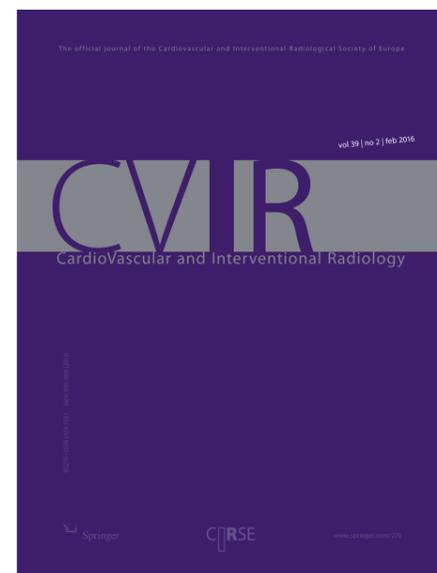
and *Interventional Radiology (CVIR)* and the *Journal of Vascular and Interventional Radiology (JVIR)*. These papers describe his innovative technique, and many other teams have been inspired to begin their own studies based on his well-established work.

He is a member of the Brazilian College of Radiology, and the Brazilian Society of Interventional Radiology and Endovascular Surgery (SoBRICE) where he was President from 2009 – 2010. Prof. Carnevale is also a member of the Society of Interventional Radiology (SIR), CIRSE and Intervencionismo (Sociedad Iberoamericana de Intervencionismo, SIDI).

He is the editor and author of the book *Interventional Radiology and Endovascular Surgery*, has published over 50 peer-reviewed publications and is a reviewer for *CardioVascular and Interventional Radiology*. He has presented over 100 lectures all over the world.

For the last three years, Prof. Carnevale has also served as a co-organiser of the Prostate Artery Embolisation course for the European School of Interventional Radiology, educating physicians on the PAE treatment.

CVIR Editor's Medal



This year's Editor's Medal will be presented to a European research group for their investigation into long femoropopliteal artery disease.

Sustained Benefit at 2 Years For Covered Stents Versus Bare-Metal Stents in Long SFA Lesions: The VIASTAR Trial

J. Lammer, T. Zeller, K. A. Hausegger, P. J. Schaefer, M. Gschwendtner, S. Mueller-Huelsbeck, T. Rand, M. Funovics, F. Wolf, A. Rastan, M. Gschwandtner, S. Puchner, U. Beschorner, R. Ristl, M. Schoder. CVIR 2015 (Jun) Vol 38: 779-780

Gold Medallist

Michael J. Lee

Laudation: Robert A. Morgan



Professor Mick Lee is currently a Fellow of the Royal College of Physicians in Ireland. He successfully entered the Irish radiology programme in 1985 and passed the Board of Radiology in both Ireland FFR (RCSI) and the UK (FRCR) in 1989.

During his radiology training he also completed a M.Sc. in Radiological Sciences, and published his first IR paper on lower limb angioplasty in the *Irish Journal of Medical Science* in 1988. He spent two years as a Fellow in IR and abdominal imaging at Massachusetts General Hospital (MGH) in 1989 and was promoted to staff for a further four years, as Assistant Professor at Harvard. During this time, he became very interested in research at MGH, publishing widely on IR and abdominal imaging. He returned to Ireland in 1995 as Professor of Radiology at the medical school of the Royal College of Surgeons in Ireland and as a consultant interventional radiologist at Beaumont Hospital in Dublin.

One of the original founders and first President of the Irish Society of Interventional Radiology, he was elected to the board of the Faculty of

Radiologists in Ireland from 1996-2001. He was also President of the International Society of Hepato-Biliary and Pancreatic Diseases. Professor Lee has held many positions in CIRSE including the Presidency in 2011-2013 and is currently a Fellow of both CIRSE and SIR. As well as being honorary fellow of the Chinese Society of Interventional Radiology (CSIR), the Interventional Radiology Society of Australasia (IRSA), the Hellenic Society of IR and the Czech Society of IR, he is also the secretary of the IR division at UEMS.

Having obtained the EBIR in 2010, he negotiated the acceptance of the EBIR and IR curriculum with both the IRSA and RANZCR in Australia and New Zealand respectively. Professor Lee has published widely on interventional radiology topics with almost 200 peer-reviewed publications and 80 chapters and reviews, and is co-editor for six books on techniques in interventional radiology. He has given over 200 lectures around the world on IR techniques and was chosen to give the eponymous Wattie Fletcher lecture at BSIR and the Tesla lecture at RCR.

Distinguished Fellow

Peter A. Gaines

Laudation: Anthony F. Watkinson



Born a proud Yorkshireman, Professor Gaines attended medical school in Manchester before pursuing clinical training around the UK. It was in 1981, whilst working as a medical registrar in London, that he recognised the advances being made in medical imaging and the potential for image-guided intervention. He was initially trained in both diagnostic and interventional radiology at Guy's Hospital under the inspirational guidance of Dr. Hugh Saxton and Dr. John Reidy.

During the 1980s in Sheffield, Professor David Cumberland developed a world-leading interventional vascular radiology unit with the hope of expanding the role of contemporary procedures and researching new techniques. Professor Gaines joined this team as a trainee in 1986. Following a year spent developing his imaging skills in Hong Kong in 1989, he returned to Sheffield Hospital as a consultant, where he remained until leaving the NHS in 2014. Working with his surgical colleagues, Professor Gaines developed the Sheffield Vascular Institute as the first autonomous combined surgical and IR unit, and which was awarded the UK Surgical Team of the Year in

1997, just two years after its establishment. The appointment of outstanding colleagues has allowed him time to research, write, teach and pursue other medical interests. He has contributed 125 peer-reviewed original scientific publications, and his textbook, *Vascular and Endovascular Surgery*, is in its fourth edition. He has also worked with MHRA, NICE and the National Imaging Board to develop image guidance, and with the Department of Health to establish coding and reimbursement systems for IR.

At CIRSE 2002, he delivered the Andreas Gruentzig Lecture. In 2006, he was made Honorary Professor at Sheffield Hallam University before becoming President of the British Society of Interventional Radiology from 2007 to 2009 and receiving their Gold Medal in 2013. Professor Gaines has worked as a device entrepreneur for the last ten years. Having developed the Emboshield carotid protection system with MedNova, he is now Chief Medical Officer with Veyan and Novate, developing novel stent and IVC filter devices.

Distinguished Fellow

Lizbeth M. Kenny

Laudation: Andy Adam



Professor Liz Kenny is a Senior Radiation Oncologist at the Royal Brisbane and Women's Hospital. In 2005 she was appointed Medical Director of the Central Integrated Regional Cancer Service. Prof. Kenny has been a champion for team development, understanding the need for not just technical expertise in teams but also the critical importance of interpersonal relationships. Her regional team has been very successful in attracting more than \$80 million in funding to expand regional cancer services in Queensland.

In 2015, she was appointed Medical Director for the Herston Imaging Research Facility. That same year, Professor Kenny was appointed as chairperson of the medical staff association of the Royal Brisbane and Women's Hospital. Liz Kenny is a senior member of the Royal Brisbane Head and Neck team, one of the busiest teams in Australia. She also chairs the Herston Head and Neck Cancer Research Collaborative. Prof. Kenny and her team have undertaken the planning and review of many cancer services, including a radiation oncology plan for the country of Cyprus. She is a member of the Medical School Governing Council, University of Cyprus Medical School and currently serves

as the Chair of the Queensland Statewide Cancer Clinical Network, and the Vice-Chair of the Asia/Oceania Regional Committee for the RSNA. She is also a member of CIRSE, providing advice regarding the acquisition of evidence for interventional oncology procedures and the development of a quality assurance framework. She has served as the President of the Clinical Oncology Society of Australia, Dean of the Faculty of Radiation Oncology for the Royal Australian and New Zealand College of Radiologists and the President of the Royal Australian and New Zealand College of Radiologists – the youngest and longest serving President in its history.

Prof. Kenny has been awarded Honorary Memberships of the European Society of Radiology and the Radiological Society of North America and has been awarded Honorary Fellowships of the American College of Radiology, British Institute of Radiology and the Royal College of Radiologists. In 2016, she was made an adjunct Professor of the University of Queensland.

Distinguished Fellow

Manuel Maynar

Laudation: José Ignacio Bilbao



Professor Manuel Maynar completed his medical education at the University of Zaragoza, Spain, in 1973, after which he specialised in paediatrics and electroradiology. In 1975, he started working in the area of minimally invasive surgery, completing residencies in radiodiagnostics in Zaragoza and in interventional radiology in Barcelona with Prof. Jose Maria Rius. A milestone in his education was training under Prof. Andreas Gruentzig for three months in 1980.

Professor Maynar performed Spain's first peripheral angioplasties in 1980 in Oviedo and the first endovascular repair of abdominal aortic aneurysm in Spain in 1994. In 1988, Prof. Maynar became a pioneer in the introduction of live transmissions from the angiosuite, broadcasting to local congress centres and, later, through satellite to Latin America. The objective of Prof. Maynar's clinical and investigative work has always been to remain innovative in the medical field, with the patient's needs always foremost. With this goal in mind, he has collaborated in multidisciplinary teams to introduce new techniques to Spain, including TIPS and fenestrated aortic grafting.

In 1990, he was a professor at the Louisiana State University (LSU) in New Orleans, and in 1991 became an associate professor at Portland Oregon University. Between 1994 and 1997 he was again a professor at LSU, and has continued as a gratis faculty since 2000. Since 1997, Prof. Maynar has been a professor at the University of Gran Canaria, in Spain. Professor Maynar remains Head of the Department of Minimally Invasive Surgery in Hospiten Rambla, Spain, and Head of the Endovascular Department of the Minimally Invasive Surgery Centre's Animal Lab in Caceres. Prof. Maynar is also Director of MOTIVA, a research project of the Canarian Agency of Investigation, Innovation and Information Society (ACIISI) "Minimally Invasive and Reconstructive Surgery". In 2004, he was named Local Host Committee Chairperson of the 2004 CIRSE Congress in Spain.

With over 100 indexed papers (more than 200 in total) and more than 1,000 international presentations, Prof. Maynar is an active contributor in the continuing education of IRs. He remains a member of many scientific societies and boards, and reviews journals such as *Stroke*, *JVIR* and *CVIR*.

YOUR PARTNER FOR COMPLETE PERIPHERAL EMBOLIZATION SOLUTIONS



Concerto™
Detachable Coil System



MVP™
Microvascular Plug System
for vessels from 1,5 mm to 7 mm



Onyx™
Liquid Embolic System
dedicated for peripheral indications

Join your peers and learn more on Embolization from the experts!

R. Morgan, Y. Boudjemline, P. Nicolini

NEW EMBOLIZATION MATERIALS AND TREATMENT TECHNIQUES FOR CONGENITAL HEART DISEASE AND PELVIC CONGESTION SYNDROME

Saturday, September 10 at 16:15, Auditorium 2

Prostate embolisation: anatomical variants

Francisco C. Carnevale

Prostate artery embolisation (PAE) is a new treatment option for lower urinary tract symptoms (LUTS) related to benign prostatic hyperplasia (BPH). For several reasons, PAE can be a technically challenging procedure. Anatomical features are especially important in this scenario, since identifying and catheterising target arterial branches are the most technically challenging and time-consuming steps. Although several previous reports have described male pelvic vascular anatomy and its frequent variations, interventional radiologists still lack a simple model that could facilitate recognition of target branches. Pelvic computed tomographic angiography and digital subtraction angiography have been used for prostate vascular anatomy identification.

Not recognising prostatic branches during the initial digital subtraction angiography of the internal iliac artery (IIA) can lead to unnecessary catheterisation of multiple vessels, which increases procedure time, use of iodinated contrast medium and radiation exposure. Moreover, embolisation of non-target arteries (i.e. bladder, rectal and penile branches) can result in major complications, such as organ ischaemia.

Recently, Assis et al. have proposed using the University of São Paulo's (USP) classification for the arteries feeding the prostate (Fig. 1). They were able to identify the most frequent patterns of the origins of the inferior vesical artery (IVA), which were classified into five subtypes in order of their cranial-caudal position (upper to lower branches). These included: **Type I** – IVA originating from the anterior division of the IIA, from a common trunk with the superior vesical artery; **Type II** – IVA originating from the anterior division of the IIA, inferior to the superior vesical artery (SVA) origin; **Type III** – IVA originating from the obturator artery; **Type IV** – IVA originating from the IPA; and **Type V** – less common origins of the IVA, including from an accessory IPA, the IIA anterior division trifurcation or quadrifurcation, the inferior epigastric artery, the posterior division of the IIA or from the distal segment of IPA. Double vascularisation was defined as cases in which the prostatic branches feeding the central gland and peripheral zone had independent origins in one pelvic side. In our experience, it was seen in 8%, and a single origin of prostatic branches was observed in 92%.

Among Type V, the most common origin of the prostatic artery was from the accessory IPA followed by the IIA anterior division trifurcation. Origins from the inferior epigastric artery, the posterior division of the IIA, the distal segment

of the IPA, a quadrifurcation of the anterior division of IIA and proximal third of the inferior gluteal artery were seen one time each. In some patients, no IVA or prostatic branches were seen during angiography, likely due to atherosclerosis. In about 40% of Type IV origins, a rectal branch was identified from a common trunk with the IVA, and some of these required selective embolisation with coils.

Even in instances of less common origins (Type V), the IVA and the prostatic branches were frequently recognised as originating from the accessory pudendal artery and from the IIA anterior division trifurcation (2.1% and 1.8% of total cases, respectively). Other direct origins from the posterior division of the IIA and from the inferior epigastric were rare (0.35% each), and possibly related to neovascularisation due to atherosclerotic occlusion of original arteries. This occurred primarily in elderly patients for whom prior MRI revealed central gland asymmetry related to atherosclerotic auto-occlusion of parent arteries. In such cases, prostatic vascularisation can be significantly harder to identify.

Origin of the IVA from the IPA (Type IV) was the most common pattern observed in our experience and has important implications for the PAE procedure. Although catheterisation is usually simple due to a favourable angle, in a considerable number of cases there is a rectal branch associated, usually adjacent or off a common trunk with a prostatic branch vascularising the apex and peripheral zone. In such cases, embolisation must be performed with caution, as rectal bleeding and ischaemic proctitis with ulcers after PAE have been previously described. Coiling the rectal component may be necessary to avoid reflux of the embolic agent that would otherwise result in non-target embolisation. Another option, when possible, is advancing the microcatheter far beyond the rectal branch's origin, so reflux would be less likely to occur. When the IVA has a short trunk, with or without associated rectal branches, care must be taken, since reflux to the IPA itself can lead to penile/corpus cavernosa ischaemia. As an anatomic consideration, we also observed that in the Type IV pattern the inferior gluteal artery originated from the posterior division of the IIA in 40.5% of cases. This resulted in a very short anterior division, extending from the IIA bifurcation to the origin of the SVA and then continuing on as the IPA itself.

The IVA and prostatic arteries originating from the anterior division of the IIA (Type II) and from the obturator artery (Type III) are less frequently

associated with clinically significant non-target embolisations in our group's experience, although this needs further confirmation. In Type II patterns, the long extension of the IVA trunk results in less reflux, while in Type III patterns, even in instances of short trunks, if there is reflux, it tends to migrate to pelvic bone and muscular structures with minor clinical relevance. Nevertheless, care must always be taken in order to avoid reflux to undesired structures, especially in small vessels where antegrade flow can be blocked by the presence of the microcatheter. Vasodilators may be useful in this scenario in cases of spasm or to improve antegrade flow, although they can also open pelvic arterial anastomoses.

Type I patterns are frequently difficult to catheterise. The common trunk of the superior and inferior vesical arteries is usually short and sometimes cranially oriented, followed by a caudal and lateral oriented curve. In these cases, microcatheterisation is difficult or impossible, especially if there are atherosclerotic changes or a large anterior IIA division. In such cases, a wider secondary curve in the micro-guidewire (Cobra-C2 or double-angled shapes) may facilitate catheterisation. Sometimes it is necessary to progress the microcatheter into the common trunk in order to get enough support to access the IVA. Use of Robert's (RUC) catheter (Cook Medical, Bloomington, IN) and curved-tip microcatheters can also help to direct the microwire into the IVA.

As a rule, the central area of the prostate gland is fed by the superior or antero-medial pedicle (central gland branch), and the inferior or postero-medial pedicle supplies the capsule and apex (capsular branch). This is supported by cadaveric and angiographic studies. Because the superior or antero-medial arterial pedicle vascularises the BPH nodules localised in the central, periurethral and transitional zones, it is the main artery to be embolised during PAE. Although the capsular branch predominantly

Don't miss it!

Prostate embolisation
Special Session

Saturday, September 10, 08:30-09:30
Room 117



Francisco Cesar Carnevale
University of São Paulo
Medical School
São Paulo, Brazil

Prof. Carnevale received his degree in medicine from the University of Mogi das Cruzes in São Paulo in 1990, after which he began his medical residency. In 1999, he earned his PhD in Interventional Radiology from the Faculty of Medicine of the University of São Paulo. He is the editor and author of the book *Interventional Radiology and Endovascular Surgery* and has published over 50 peer-reviewed publications. From 2009-2010, he served as the President of the Brazilian Society of Interventional Radiology and Endovascular Surgery, and he is currently the Chief of Interventional Radiology at his institution. For the last three years, Prof. Carnevale has also served as a co-organiser of the Prostate Artery Embolisation course for the European School of Interventional Radiology, educating physicians on the PAE treatment.

vascularises the peripheral zone and the prostatic apex, we have seen with cone-beam CT that it can also send small arterial feeders to the central gland.

Thorough knowledge of male pelvic anatomy is of paramount importance to achieve the best clinical outcomes, minimise complications and learning curve effects and reduce procedure times and radiation exposure. Evaluation of anatomical patterns in a systematic fashion following a standard classification can help to make PAE a more effective and safe procedure. Some examples of vascular anastomosis are observed in Figures 2 and 3.

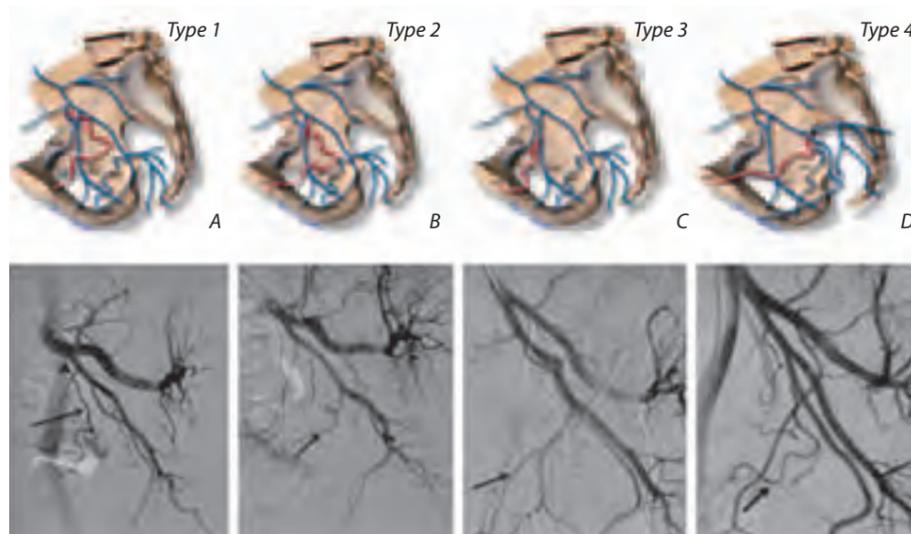


Fig. 1: Pelvic Arterial Anatomy Relevant to Prostatic Artery Embolisation and Proposal for Angiographic Classification. de Assis AM et al. *Cardiovasc Intervent Radiol.* 2015

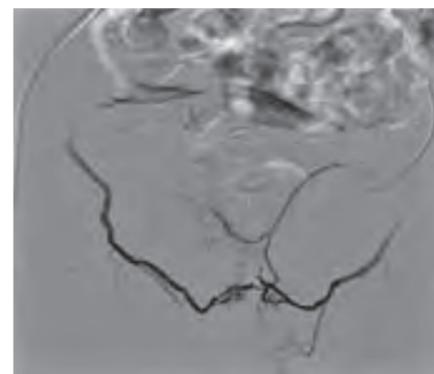


Fig. 2: Anastomoses of intraprostatic branches with bilateral internal pudendal arteries.



Fig. 3: Anastomosis of capsular prostatic branch with the internal pudendal artery.

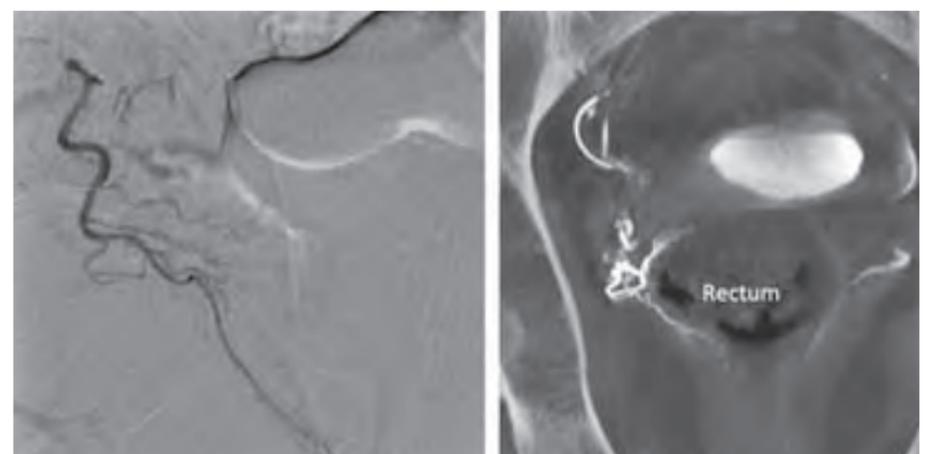


Fig. 4: Anastomosis of the capsular prostatic branch with the middle rectal artery confirmed by cone-beam CT.

VTVA Multi RF System & Octopus RF Electrode

Korean Engineering and Technology Advances in Radiofrequency Ablation that brings you devices specifically designed to enhance your procedural experience and clinical results.



- Uniquely different and powerful
- Effectively generate 2 electrodes at the same time
- Comparable to microwave result but safer and cost less
- Ideal for large and multiple lesions ablation



Taking the lead in Professional Education on Thyroid RFA

STARmed STARmed Co., Ltd. Korea | www.starmed4u.com inquiry@starmed4u.com

Have fun and do good! Take part in the

CIRSE 2016 CHARITY SPORTS EVENT

Run for the Health of it!
Saturday, September 10 at 19:00

Join us for the 3-km race and football cup: register on site or just come to cheer from the stands!

Changing rooms are available, and a delicious buffet will be provided from 19:45 until the end of the football cup. The event supports *Ärzte ohne Grenzen*, part of the *Médecins Sans Frontières*.

Buses leave from outside the congress centre at 18:15 – be sure to join us for an evening of fun and fund-raising!



CIRSE supports compliance with ethical standards. Therefore, CIRSE emphasises that the present invitation is directed to participants of CIRSE 2016, and recommends that participants who want to take part in the MSF Charity Evening bear any and all costs in this context (including donations) themselves.

Kindly note that participation in the MSF Charity Evening is NOT included in the CIRSE 2016 registration fee!

CIRSE

US-guided radiofrequency ablation for managing malignant thyroid disease

Jung Hwan Baek

Papillary thyroid carcinoma (PTC) is the most common subtype (>80% of all thyroid cancers) of thyroid malignancy with good prognosis and low mortality rate [1]. Although patients with PTC show an excellent outcome, tumour recurrence rate in the neck ranged from 20-59%. The standard treatment of choice for recurrent PTC is repeat surgery, followed by radioactive iodine therapy and thyroid hormone replacement therapy. However, repeat surgery can increase complications because of distortion of neck anatomy, with scar tissue formation from previous surgery, especially repeated neck dissections. For these patients, ultrasound (US)-guided treatment such as ethanol ablation (EA) [2-6], radiofrequency ablation (RFA) [7-11], and laser ablation (LA) [12-14] have been used as alternative methods. The goal of this review is to evaluate the role of US-guided RFA for managing recurrent thyroid cancers, based on the currently available scientific evidence and experts' opinions.

Indications

Recommendations by the Korean Society of Thyroid Radiology [15] suggest that RFA can be used for patients who are at high surgical risk or who refuse to undergo repeated surgery. Recently, an Italian opinion statement proposed similar indications for recurrent thyroid cancers [16], stating that patients with recurrent thyroid cancers are at high surgical risk. Before RFA, tumour recurrence should be confirmed by US-guided fine needle aspiration cytology with or without measurement of the washout thyroglobulin concentration.

Regarding US-guided treatment for recurrent thyroid cancers, two treatment strategies have been suggested: complete treatment and conservative treatment. Complete treatment is defined as treatment of any visible recurrent cancers on US. To achieve complete ablation, several studies have suggested that non-surgical treatment be restricted to patients with three or fewer recurrent thyroid cancers in the neck and no metastatic tumours beyond the neck at the time of treatment [2, 7, 11, 17]. Conservative treatment strategy is applied to the large recurrent cancers or cancers involving critical structures such as vessel, trachea or oesophagus, which are not able to be completely treated by RFA. The purpose of conservative treatment of recurrent

thyroid cancers is to improve cosmetic and/or symptomatic problems [18].

Devices

Two types of RFA electrodes have been introduced. One is a straight-type internally cooled electrode and the other is multi-tined expandable electrode [19-25]. Currently the straight-type internally cooled electrode is a mainstay of thyroid RFA [26]. Our thyroid RFA team developed a modified straight internally cooled electrode, which is short in shaft length (7 cm) and thin (18-19 gauge) to permit easy control [22]. Thin electrodes, especially 19-gauge, can also easily penetrate small metastatic tumours [7, 11]. There are various sizes of active tips (0.4 cm, 0.5 cm, 0.7 cm or 1 cm). The size of the electrode is chosen according to the tumour size and relationship with surrounding critical structures. The electrodes with small active tips, especially 0.4 cm and 0.5 cm, are effective for the treatment of small recurrent tumours or tumours that are close to adjacent critical structures [27].

Techniques

The patient is placed in the supine position with the neck extended. For anaesthesia, 1-2% lidocaine is used in most centres without pre-medication [7, 11, 17]. However, Monchik et al. [28] have reported the use of intravenous drugs, a combination of fentanyl citrate (100-400 mcg) and midazolam (1-4 mg).

To minimise complications, the vessels along the approach route and nerves around the tumour should be carefully evaluated before RFA. If the tumour is adjacent to nerves (or other critical structures), hydrodissection technique using 5% dextrose solution has been recommended rather than normal saline [7, 11, 17]. The moving-shot technique has been used to treat benign thyroid nodules and recurrent thyroid cancers [11, 15, 29]. Before starting ablation, the targeted tumour should be divided into multiple conceptual ablation units and RFA performed unit by unit by moving the electrode tip. For small tumours, however, the electrode should be fixed to the centre of the tumour without moving during the procedure. Ablation is started using 5-10 W of power in the 0.4 cm active tip, 10-15 W in the 0.5 cm, 20-30 W in the 0.7 cm, and 40-50

W in the 1 cm. If the patient cannot tolerate pain, additional lidocaine injection around the tumour can be used to relieve pain. Indications for repeated RFA during follow-up are as follows:

- 1) Presence of power Doppler signals on US or enhancing tumour portion on CT scan despite a reduction in tumour size [3, 4, 7, 11]
- 2) Tumour volume reduction less than 50% [6]
- 3) Presence of residual tumour confirmed by fine needle aspiration cytology [3, 6, 8].

Clinical outcomes

Efficacy of RFA is evaluated by several methods including measurement of tumour volume reduction [25], therapeutic success rate (volume reduction >50%) [30], complete disappearance of the treated tumour, serum thyroglobulin level, Doppler signal, and decreased echogenicity of the treated tumour [15]. Following RFA, several investigators have reported a mean volume reduction of 56-98% [7, 17, 18, 31], complete disappearance of 25-94% of tumours [7, 8, 17, 28, 32], therapeutic success rates of 75-97% [7, 8, 11, 28], improvement of symptoms in 64% of patients [18], and reduction in the serum thyroglobulin concentration [7, 8, 18, 28].

In meta-analysis including nine articles (189 patients with 255 tumour lesions), RFA achieved excellent tumour volume reduction and reduced serum thyroglobulin level [33]. Another recent meta-analysis concluded that both RFA and EA are acceptable management tools for locally recurrent thyroid cancers in terms of efficacy and safety. However, the mean number of RFA sessions was fewer than that of EA [34].

Complications

Various complications have been reported after RFA, including discomfort, pain, neck swelling, skin burn, and voice change [7-9, 11, 17, 18, 28, 31, 32, 35]. Overall complication rate reported is around 10%, which is higher than that reported in benign thyroid nodules. The most common complication after RFA is discomfort and pain in the neck. The majority of patients complain of discomfort and pain in the neck during RFA. Pain sometimes may radiate to the teeth, jaw, head and chest, but is usually resolved within several minutes

Don't miss it!

Thyroid ablation Special Session

Saturday, September 10, 08:30-09:30
Auditorium 2



Jung Hwan Baek
Asan Medical Center
Seoul, South Korea

Prof. Baek completed his residency at Hanyang University Hospital in 1997, after which, he worked at Daerim Saint Mary's Hospital for 11 years before becoming an Associate Professor at the Asan Medical Center. He is currently a Professor in the Department of Radiology at the Asan Medical Center. He is a committee member of the Korean Society of Radiology and the Korean Society of Thyroid Radiology, as well as being a member of the Asia and Oceania Thyroid Association, the Korean Society of Interventional Radiology and CIRSE. His specialties include thyroid and neck tumours, imaging and US-guided biopsy, and image-guided ablation (radiofrequency and ethanol ablation).

to hours after the procedure. To relieve pain during ablation, the ablation power can be reduced or stopped and/or local anaesthesia can be administered deep into the tumour or surrounding tissue [5, 6, 36]. Although serious complications such as damage of vagus nerve, spinal accessory nerve, phrenic nerve, sympathetic ganglion, oesophagus and trachea have not been reported, these are possible complications during the RFA of recurrent thyroid cancers [37-41]. To prevent serious complications, doctors should have knowledge and understanding of the anatomy of the neck, and always monitor the location of the tip of the electrode during the procedure.

Conclusion

RFA for treating recurrent thyroid cancers is a possible alternative in patients at high risk of surgery or those who refuse repeat surgery. To maximise the efficacy of RFA, it is essential to apply the standard technique and proper devices. Moreover, to minimise procedure-related complications, the operators should be aware of the various possible complications and preventive techniques.

References

1. Haugen BRM, Alexander EK, Bible KC, Doherty G, Mandel SJ, Nikiforov YE, et al. 2015 American Thyroid Association Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer. *Thyroid* 2016; 26:1-133
2. Hay ID, Lee RA, Davidge-Pitts C, Reading CC, Charboneau JW. Long-term outcome of ultrasound-guided percutaneous ethanol ablation of selected "recurrent" neck nodal metastases in 25 patients with TNM stages III or IVA papillary thyroid carcinoma previously treated by surgery and 131I therapy. *Surgery* 2013; 154:1448-1454; discussion 1454-1445
3. Heilo A, Sigstad E, Fagerlid KH, Haskjold OI, Grøholt KK, Berner A, et al. Efficacy of Ultrasound-Guided Percutaneous Ethanol Injection Treatment in Patients with a Limited Number of Metastatic Cervical Lymph Nodes from Papillary Thyroid Carcinoma. *J Clin Endocrinol Metab* 2011; 96:2750-2755
4. Kim BM, Kim MJ, Kim EK, Park SI, Park CS, Chung WY. Controlling recurrent papillary thyroid carcinoma in the neck by ultrasonography-guided percutaneous ethanol injection. *Eur Radiol* 2008; 18:835-842
5. Lewis BD, Hay ID, Charboneau JW, McIver B, Reading CC, Goellner JR. Percutaneous ethanol injection for treatment of cervical lymph node metastases in patients with papillary thyroid carcinoma. *Am J Roentgenol* 2002; 178:699-704
6. Lim CY, Yun JS, Lee J, Nam KH, Chung WY, Park CS. Percutaneous ethanol injection therapy for locally recurrent papillary thyroid carcinoma. *Thyroid* 2007; 17:347-350
7. Baek JH, Kim YS, Sung JY, Choi H, Lee JH. Locoregional control of metastatic well-differentiated thyroid cancer by ultrasound-guided radiofrequency ablation. *AJR Am J Roentgenol* 2011; 197:W331-336
8. Dupuy DE, Monchik JM, Decrea C, Pisharodi L. Radiofrequency ablation of regional recurrence from well-differentiated thyroid malignancy. *Surgery* 2001; 130:971-977
9. Guenette JP, Monchik JM, Dupuy DE. Image-guided ablation of postsurgical locoregional recurrence of biopsy-proven well-differentiated thyroid carcinoma. *J Vasc Interv Radiol* 2013; 24:672-679
10. Kim JH, Yoo WS, Park YJ, Park DJ, Yun TJ, Choi SH, et al. Efficacy and Safety of Radiofrequency Ablation for Treatment of Locally Recurrent Thyroid Cancers Smaller than 2 cm. *Radiology* 2015; 276:909-918
11. Lim HK, Baek JH, Lee JH, Kim WB, Kim TY, Shong YK, et al. Efficacy and safety of radiofrequency ablation for treating locoregional recurrence from papillary thyroid cancer. *Eur Radiol* 2015; 25:163-170
12. Mauri G, Cova L, Ierace T, Baroli A, Di Mauro E, Pacella CM, et al. Treatment of Metastatic Lymph Nodes in the Neck from Papillary Thyroid Carcinoma with Percutaneous Laser Ablation. *Cardiovasc Intervent Radiol* 2016
13. Mauri G, Cova L, Tondolo T, Ierace T, Baroli A, Di Mauro E, et al. Percutaneous laser ablation of metastatic lymph nodes in the neck from papillary thyroid carcinoma: preliminary results. *J Clin Endocrinol Metab* 2013; 98:E1203-1207
14. Papini E, Bizzarri G, Bianchini A, Valle D, Misischi I, Guglielmi R, et al. Percutaneous ultrasound-guided laser ablation is effective for treating selected nodal metastases in papillary thyroid cancer. *J Clin Endocrinol Metab* 2013; 98:E92-97
15. Na DG, Lee JH, Jung SL, Kim JH, Sung JY, Shin JH, et al. Radiofrequency ablation of benign thyroid nodules and recurrent thyroid cancers: consensus statement and recommendations. *Korean J Radiol* 2012; 13:117-125
16. Garberoglio R, Aliberti C, Appetecchia M, Attard M, Boccuzzi G, Boraso F, et al. Radiofrequency ablation for thyroid nodules: which indications? The first Italian opinion statement. *J Ultrasound* 2015; 18:423-430
17. Lee SJ, Jung SL, Kim BS, Ahn KJ, Choi HS, Lim DJ, et al. Radiofrequency ablation to treat loco-regional recurrence of well-differentiated thyroid carcinoma. *Korean J Radiol* 2014; 15:817-826
18. Park KW, Shin JH, Han BK, Ko EY, Chung JH. Inoperable symptomatic recurrent thyroid cancers: preliminary result of radiofrequency ablation. *Ann Surg Oncol* 2011; 18:2564-2568
19. Deandrea M, Limone P, Basso E, Mormile A, Ragazzoni F, Gamarra E, et al. US-guided percutaneous radiofrequency thermal ablation for the treatment of solid benign hyperfunctioning or compressive thyroid nodules. *Ultrasound Med Biol* 2008; 34:784-791
20. Baek JH, Jeong HJ, Kim YS, Kwak MS, Lee D. Radiofrequency ablation for an autonomously functioning thyroid nodule. *Thyroid* 2008; 18:675-676
21. Baek JH, Kim YS, Lee D, Huh JY, Lee JH. Benign predominantly solid thyroid nodules: prospective study of efficacy of sonographically guided radiofrequency ablation versus control condition. *AJR Am J Roentgenol* 2010; 194:1137-1142
22. Baek JH, Moon WJ, Kim YS, Lee JH, Lee D. Radiofrequency ablation for the treatment of autonomously functioning thyroid nodules. *World J Surg* 2009; 33:1971-1977
23. Lee JH, Kim YS, Lee D, Choi H, Yoo H, Baek JH. Radiofrequency ablation (RFA) of benign thyroid nodules in patients with incompletely resolved clinical problems after ethanol ablation (EA). *World J Surg* 2010; 34:1488-1493
24. Spiezia S, Garberoglio R, Milone F, Ramundo V, Caiazza C, Assanti AP, et al. Thyroid nodules and related symptoms are stably controlled two years after radiofrequency thermal ablation. *Thyroid* 2009; 19:219-225
25. Jeong WK, Baek JH, Rhim H, Kim YS, Kwak MS, Jeong HJ, et al. Radiofrequency ablation of benign thyroid nodules: safety and imaging follow-up in 236 patients. *Eur Radiol* 2008; 18:1244-1250
26. Gharib H, Hegedus L, Pacella CM, Baek JH, Papini E. Clinical review: Nonsurgical, image-guided, minimally invasive therapy for thyroid nodules. *J Clin Endocrinol Metab* 2013; 98:3949-3957
27. Baek JH, Kim YS, Sung JY, Choi H, Lee JH. Locoregional Control of Metastatic Well Differentiated Thyroid Cancer in the Neck by Ultrasonography-guided Radiofrequency Ablation. *AJR Am J Roentgenol* 2011; in press
28. Monchik JM, Donatini G, Iannuccilli J, Dupuy DE. Radiofrequency ablation and percutaneous ethanol injection treatment for recurrent local and distant well-differentiated thyroid carcinoma. *Ann Surg* 2006; 244:296-304
29. Ha EJ, Baek JH, Lee JH. Moving-shot versus fixed electrode techniques for radiofrequency ablation: comparison in an ex-vivo bovine liver tissue model. *Korean J Radiol* 2014; 15:836-843.
30. Sung JY, Baek JH, Kim YS, Jeong HJ, Kwak MS, Lee D, et al. One-step ethanol ablation of viscous cystic thyroid nodules. *AJR Am J Roentgenol* 2008; 191:1730-1733
31. Kim JH, Yoo WS, Park YJ, Park D, Yun TJ, Choi SH, et al. Efficacy and Safety of Radiofrequency Ablation for Treatment of Locally Recurrent Thyroid Cancers Smaller than 2 cm. *Radiology* 2015; 276:909-918
32. Wang L, Ge M, Xu D, Chen L, Qian C, Shi K, et al. Ultrasonography-guided percutaneous radiofrequency ablation for cervical lymph node metastasis from thyroid carcinoma. *J Cancer Res Ther* 2014; 10 Suppl:C144-149
33. Zhao Q, Tian G, Kong D, Jiang T. Meta-analysis of radiofrequency ablation for treating the local recurrence of thyroid cancers. *J Endocrinol Invest* 2016
34. Suh CH, Baek JH, Choi YJ, Lee JH. Efficacy and Safety of Radiofrequency and Ethanol Ablation for Treating Locally Recurrent Thyroid Cancer: A Systematic Review and Meta-Analysis. *Thyroid* 2016; 26:420-428
35. Long B, Li L, Yao L, Chen S, Yi H, Ye X, et al. Combined use of radioliodine therapy and radiofrequency ablation in treating postoperative thyroid remnant of differentiated thyroid carcinoma. *J Cancer Res Ther* 2015; 11 Suppl:C244-247
36. Ha EJ, Baek JH, Lee JH. The efficacy and complications of radiofrequency ablation of thyroid nodules. *Curr Opin Endocrinol Diabetes Obes* 2011; 18:310-314
37. Ha EJ, Baek JH, Lee JH, Kim JK, Shong YK. Clinical significance of vagus nerve variation in radiofrequency ablation of thyroid nodules. *Eur Radiol* 2011; 21:2151-2157
38. Ha EJ, Lee JH, Lim HK, Bae Kim W, Baek JH. Identification of continuity of transected nerve on sonography after neck dissection: direct sign of traumatic neuroma. *Thyroid* 2011; 21:1385-1387
39. Hong MJ, Baek JH, Kim DY, Ha EJ, Choi YJ, Choi YJ, et al. Spinal Accessory Nerve: Ultrasound Findings and Correlations with Neck Lymph Node Levels. *Ultraschall Med* 2014
40. Shin JE, Baek JH, Ha EJ, Choi YJ, Choi WJ, Lee JH. Ultrasound Features of Middle Cervical Sympathetic Ganglion. *Clin J Pain* 2015; 31:909-913
41. Ha EJ, Baek JH, Lee JH. Ultrasonography-Based Thyroidal and Perithyroidal Anatomy and Its Clinical Significance. *Korean J Radiol* 2015; 16:749-766

Radiation Protection Pavilion 2016



JOIN US:
RPP OPENING
CEREMONY
TODAY
12:30

CAN YOU HANDLE THE RISK?

Visit the Radiation Protection Pavilion

CIRSE's Radiation Protection Pavilion, located in the exhibition hall, is here for you during the entire Annual Meeting, offering informational material, interactive tools, ophthalmological check-ups, and opportunities to engage directly with experts in RP matters. Today's RPP Mini Talks, which feature short expert presentations, again cover a wide range of topics delving further into various aspects of radiation safety. We hope to see you there!

Prize draw

To help you get started in improving your department's radiation safety, we're giving away some great prizes. Taking part is simple: to be in with a chance of winning, all you have to do is complete the sticker that's been handed out with each copy of Congress News. Visit any of the RP Pavilion exhibitors: they will provide you with the missing part, which you can peel off and add to your sticker; the backing card acts as your "ticket". Simply fill in your name, ID number and email address, and hand it in. Pop the completed sticker on your jacket or congress bag to show that you can "handle the risk"!

Today's RPP Mini-Talks

12:30 – 13:00	RPP Opening Ceremony 2016	<i>W. Jaschke (Innsbruck/AT)</i>
13:00 – 13:15	Why not just cardiologists should be worried about head protection (MAVIG)	<i>A.-L. Uhlitz (Munich/DE) J. Nawrock (Munich/DE)</i>
14:00 – 14:15	Radiation safety: is my cath lab doing enough?	<i>E. Vano (Madrid/ES) G. Bartal (Kfar Saba/IL)</i>
14:15 – 14:30	Upcoming ICRP document on staff radiation protection for interventional radiology	<i>E. Vano (Madrid/ES)</i>
16:00 – 16:15	Key influencing factors to reduce the entrance skin dose (ZIEHM IMAGING)	<i>G. Stelzer (Nuremberg/DE)</i>

Aspects of radiation protection for the interventional radiologist

Nils Rathmann

Over the last decade, a lot of advances in intervention guidance were introduced, such as multi-angulation C-arm systems with the latest detector technique and cone-beam X-ray source, including C-arm CT scans (cone-beam computed tomography). Modern computed tomography systems have also changed not only in terms of gantry size, but also in gantry depth due to increase of slices and detector size. Additionally, modern needle guidance tools were introduced. Although these modern systems are in general more dose-efficient than older systems and thus generally result in lower radiation exposure for both patients and medical staff, the overall increase in both diagnostic procedures and available image-guided minimally invasive interventions require special care in dose management [2, 4, 5]. However, latest technical developments make it difficult to transfer current published data on radiation exposure of medical staff to each interventional setting. Familiarity with well-known standards such as the ALARA principle (to keep radiation exposure "as low as reasonably achievable") is thus paramount in order to keep radiation exposure to patients and medical staff as low as possible [1].

It is important to be familiar with all available aspects of dose reduction in order to obtain optimal radiation protection and satisfy ALARA, which is markedly more complex than simply paying attention to when to switch on and off of the X-ray source. Wearing of all available protective garments (vest, apron, thyroid protection and lead glasses) is the most obvious measure. In this context, personalised, optimally fitting lead vests and aprons are essential: radiation protective clothes that are too small result in an increase of radiation dose to the shoulders, chest and groin. Loose protective clothing also results in an increase in radiation dose due to gaps, e.g. under the armpits. Additionally, badly fitting radiation protection clothing may lead to a decrease in acceptance of protective garments by medical staff. Designating medical staff their own lead aprons can increase both acceptance and care-taking of the garment. In this context, custom-built, fancy-coloured lead aprons with a name badge could be helpful. Eye-protection was the aim of recent recommendations [3]. Again, personalised lead-eyeglasses increase acceptance of radiation protection measures from practitioners. The eyeglasses are also available as optically corrected glasses, keeping unnecessary extra weight off the head.

The interventional radiologist (IR) who is handling the X-ray device needs to be aware of the responsibility towards all people present inside the intervention suite when adjusting the device settings and switching the X-ray source on and off. To obtain optimal image quality,

the IR has to be well-orientated with the device and the software itself to not unnecessarily increase scatter radiation. Since latest imaging devices offer more possibilities for reduction of radiation exposure with different hard- and software options, old devices should be replaced. Flat panel detectors offer an increase in dose efficiency by better utilisation of X-ray photons compared to old image intensifiers, and therefore reduce scatter radiation. Additionally, different manufactures offer different possibilities, e.g. manipulating filter-settings. Latest devices offer automatic adjustment of dose production to decrease tube voltage and tube current, for example, depending on a patient's thickness. Lowering the detector close to the patient gives better usage of image-giving photons and, with automatic tube-current modulation, scatter radiation would be reduced. Functions like "last image hold", the reference-image function and simulated road mapping allow the operator to reduce the time of imaging. Simply reducing the pulse rate from continuous imaging to 7.5 images/s results in a 90% dose reduction [2]. Therefore, before buying a new X-ray device, one should inform oneself about all possibilities to reduce radiation exposure by the device of interest.

In respect to the inverse square law, the medical staff has to be aware of the position of the X-ray and scatter radiation source and main direction of scatter radiation. Usually the source of scatter radiation is the patient. Highest levels of scatter radiation are commonly just at the side of the X-ray source. If possible any angulation of the X-ray source should be on the opposite side of the medical

staff and the medical staff should position themselves at a distance to the source of scatter radiation if possible. Keeping the table at a low position and the detector close to the region of interest also allows the IR to maintain a distance from the source of scatter radiation: the patient. Arranging the screen in a position which allows the operator to take a relaxed and physiological position is important. But in this context again, the position of the operator is important, as a good view on screen might make the operator turn sideways in regard to the main source of scatter radiation: while state-of-the-art radiation protection clothing is often double-layered on the front (2 x 0.25 mm lead equivalent), it is only single-layered on the side and back to keep its weight low. Turning sideways thus leaves less protected body areas exposed. This is also important for the medical staff handling material or taking care of the patient: moving within the interventional suite may result in staff turning their backs towards the X-ray source – keeping distance is most important in such cases.

In conclusion, though modern imaging and interventional systems are highly dose-efficient, the increase in diagnostic procedures and interventions may still result in an overall increase in radiation exposure to patients and medical staff. Thus, medical staff, and especially the interventional radiologist, have to be aware of all options available for dose reduction. Here, proper protective clothing, use of lead shielding, efficient use of the X-ray source according to the ALARA principle, and staff training and awareness (inverse square law, positioning within the suite) are of utmost importance.



Don't miss it!

Intraprocedural radiation dose management
Special Session

Saturday, September 10, 08:30-09:30

Room 116



Nils Rathmann
Heidelberg University
Medical Center
Mannheim, Germany

Dr. Rathmann received his doctoral license in 2009, after which he began his placement as a resident at the Institute of Clinical Radiology and Nuclear Medicine until 2014. He received board certification as a radiologist in 2015 and has since been an Attending Radiologist at the Institute of Clinical Radiology and Nuclear Medicine. His research focus has been on the evaluation of minimally invasive therapies in regards to outcome, tolerability and radiation exposure of medical staff.

References:

1. The 2007 Recommendations of the International Commission on Radiological Protection. ICRP publication 103 2007. Ann ICRP, 37(2-4): 1-332
2. Hertault A, Maurel B, Midulla M, et al. Editor's Choice – Minimizing Radiation Exposure During Endovascular Procedures: Basic Knowledge, Literature Review, and Reporting Standards. Eur J Vasc Endovasc Surg 2015, 50(1): 21-36
3. Icrp, Rehani MM, Gupta R, et al. Radiological Protection in Cone Beam Computed Tomography (CBCT). ICRP Publication 129 2015. Ann ICRP, 44(1): 9-127
4. Rathmann N, Haeusler U, Diezler P, et al. Evaluation of radiation exposure of medical staff during CT-guided interventions. J Am Coll Radiol 2015, 12(1): 82-89
5. Rathmann N, Kostrzewa M, Kara K, et al. Radiation exposure of the interventional radiologist during percutaneous biopsy using a multiaxis interventional C-arm CT system with 3D laser guidance: a phantom study. Br J Radiol 2015, 88(1055): 20150151

Straub Symposium: September 11, 2:30 pm, Auditorium 2: "Mechanical debulking in arterial and venous occlusions – an important step in the optimization of endovascular therapy"



Peri-procedural filter catheter

Capturex® filters emboli from blood vessels during potentially embolizing procedures performed on the patient. For this purpose, Capturex® is placed in the vascular system temporarily through a suitable percutaneous transluminal access.

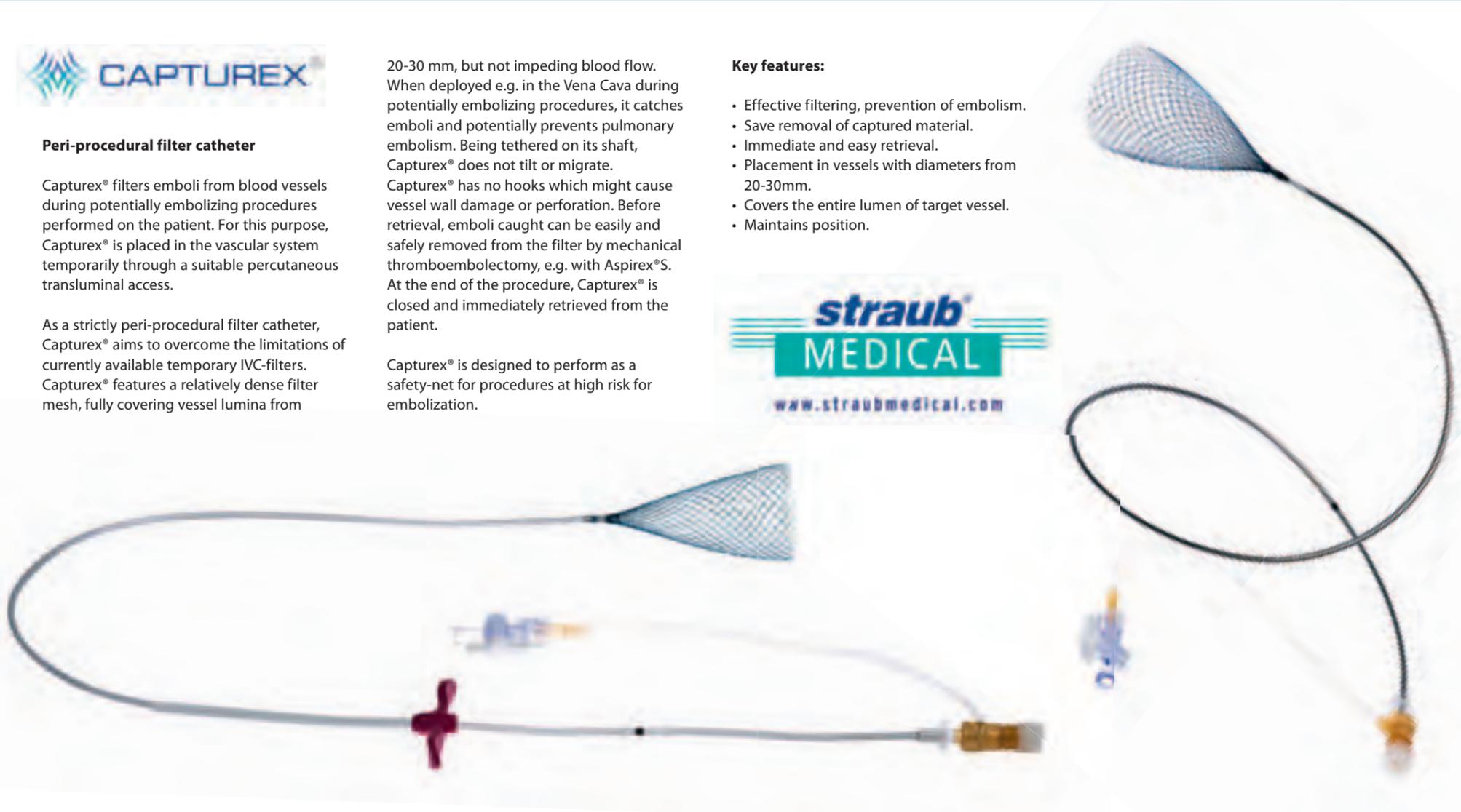
As a strictly peri-procedural filter catheter, Capturex® aims to overcome the limitations of currently available temporary IVC-filters. Capturex® features a relatively dense filter mesh, fully covering vessel lumina from

20-30 mm, but not impeding blood flow. When deployed e.g. in the Vena Cava during potentially embolizing procedures, it catches emboli and potentially prevents pulmonary embolism. Being tethered on its shaft, Capturex® does not tilt or migrate. Capturex® has no hooks which might cause vessel wall damage or perforation. Before retrieval, emboli caught can be easily and safely removed from the filter by mechanical thromboembolectomy, e.g. with Aspirex®S. At the end of the procedure, Capturex® is closed and immediately retrieved from the patient.

Capturex® is designed to perform as a safety-net for procedures at high risk for embolization.

Key features:

- Effective filtering, prevention of embolism.
- Safe removal of captured material.
- Immediate and easy retrieval.
- Placement in vessels with diameters from 20-30mm.
- Covers the entire lumen of target vessel.
- Maintains position.



Cardiovascular and Interventional Radiological Society of Europe

Have you downloaded the CIRSE Society app update?

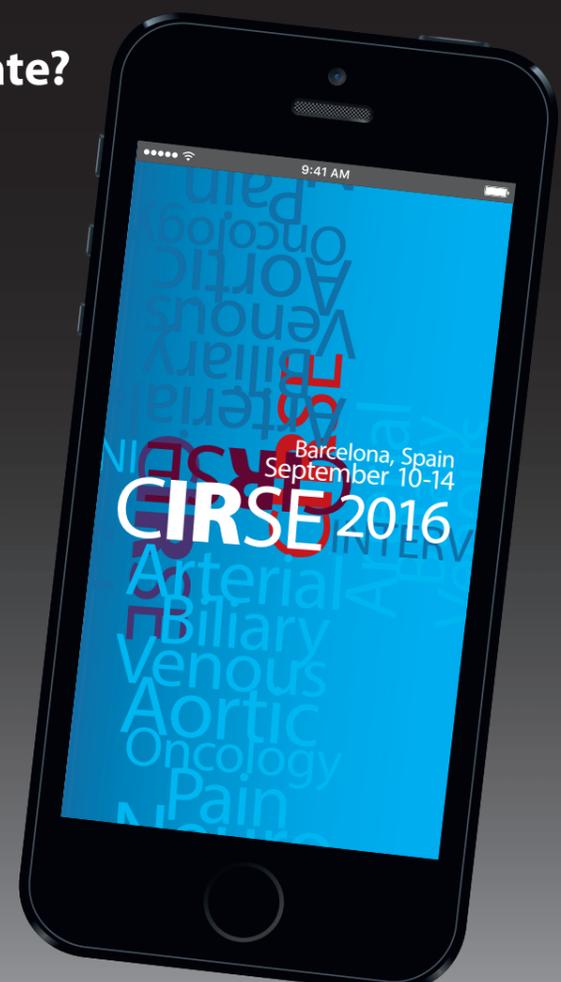
Install the CIRSE/IDEAS 2016 event and easily plan your personal programme! You can also...

- complete paperless session evaluations!
- browse the exhibition by product category
- take part in e-voting sessions
- send questions to the moderators
- ... and much more!

Be sure to submit your session evaluations in time!



Available for iOS and Android



INNOVATION | EDUCATION | INTERVENTION

Current status on drug-eluting devices in dialysis access

Marco Das

Background

Dialysis access fistulas and grafts are life-saving in patients with renal insufficiency and failure. The number of patients requiring haemodialysis has continued to rise over the last decades and is expected to rise further in the future, making interventional radiology an integral part of this life-saving procedure. Arteriovenous fistulas (AVF) or arteriovenous grafts (AVG – usually made of polytetrafluoroethylene) are surgically placed and need to maintain a blood flow of at least 400–500 ml/min in order to allow proper haemodialysis function. Problems occur due to the un-physiological blood pressure which induces stress to the venous vessel wall, inducing tangential and shear wall stress, which consecutively may lead to the development of neointimal hyperplasia (NIH) with consecutive stenosis resulting in reduced blood flow. Occurrence of stenosis frequently requires treatment, usually making use of percutaneous balloon angioplasty (PTA) and in the central venous system also resulting in stent placement as ultima ratio.

Current practice

In patients with suspected stenosis, PTA is usually the first method of choice, although primary patency rate after 6 months can be lower than 50%. Standard pressure PTA balloons are primarily used. In recurrent stenosis, high pressure balloons (HPB) or cutting balloons are often used, while stenting (including stent grafts) should be avoided as long as possible, although some authors have documented good results using stent grafts and higher patency rates using cutting balloons. These techniques are usually more aggressive and, therefore, represent treatment options more frequently used in patients with restenosis.

DEBs

Drug-eluting balloons (DEB) and drug-eluting stents (DES) have successfully been implemented in the treatment of coronary and peripheral artery disease. Using drugs like

Paclitaxel or Everolimus, which are coated on the balloon, should help to reduce the reactions induced in the vessel wall, especially suppression of proliferation of smooth muscle cells (SMC). These drugs belong to the group of cytotoxic (Paclitaxel) or immunosuppressant (Sirolimus) agents, which aim to reduce development of neointima, which consecutively causes stenosis. The challenge is to bring an appropriate amount of the agent to the vessel wall at the location of the stenosis and to have enough bioactive drugs in place over a sufficient time period. In DEB, the drug is usually put into a polymer matrix which degrades when the material comes into contact with the vessel wall. Between 2.5-3.5 µg of the therapeutic agent is placed on the balloon per mm². Appropriate sizing is therefore necessary for sufficient contact of the agent with the treatment area. As dialysis fistulas often show great variability in vascular configuration, the choice of the optimal material can be challenging, especially as larger DEB (> 7 mm) are still lacking or need to be custom made.

Results

Initial studies using DEB in peripheral artery disease compared to treatment with standard balloon angioplasty did show reduced restenosis rates of 12% in comparison to 28%. In dialysis, fistula evidence is less available, but current results in small patient cohorts are encouraging. Katsanos et al. performed a small prospective randomised trial comparing DEB and standard PTA in AVF and AVG using Paclitaxel-coated balloons which showed a primary patency rate of 70% versus 25%. A recent retrospective study by Swinnen et al. showed a 12-month reintervention-free percentage of 69% with the use of DEBs, while, without the use of DEBs, only 12% of patients did not need intervention during the one-year follow-up period. In a study of 26 patients by Patane, very high primary patency rates of up to 96% after 6 months were shown as well as 58% after 24 months, which is very high compared to standard PTA. Massmann et al. could show a significantly better freedom from target lesion revascularisation (TLR) with the use of DEBs in central vein stenosis.

Interval to restenosis was 9 months with the use of DEBs and 4 months with the use of a standard balloon. Recently, the results of a prospective randomised trial were published [2, 3] of 40 patients who were randomised to either treatment with a standard PTA or treatment using a DEB. Patients treated with DEBs had a significantly longer TLR-free survival. A prospective randomised multicentre trial is currently under way [4] aiming to include 211 patients, randomised to post-PTA treatment with or without DEB. Patients will be followed for one year to assess target lesion patency. As cost plays an important role in healthcare, cost effectiveness is always of great concern. Initial studies have presented results showing a cost benefit of DEB compared to PTA alone of about €1,000, mainly as a result of longer patency rates and less frequent reintervention.

Future outlook

Initial results on DEBs are promising. Unfortunately, data is still based on small sample sizes, heterogeneous input values and outcome measures. Yet, large, ideally prospective, randomised multicentre trials are lacking but are under way. Further research is mandatory to address several unanswered issues such as lack of different DEBs in terms of sizing, questions about optimal treatment of different anatomical locations (e.g. venous anastomosis vs. central vein stenosis) and unclear knowledge about primary use or secondary use of DEBs.

References:

1. Katsanos K, Karnabatidis D, Kitrou P, Spiliopoulos S, Christeas N, Siablis D. Paclitaxel-coated balloon angioplasty vs. plain balloon dilatation for the treatment of failing dialysis access: 6-month interim results from a prospective randomized controlled trial. *J Endovasc Ther* 2012 Apr; 19(2): 263-72
2. Kitrou PM, Katsanos K, Spiliopoulos S, Karnabatidis D, Siablis D. Drug-eluting versus plain balloon angioplasty for the treatment of failing dialysis access: final results and cost-effectiveness analysis from a prospective randomized controlled trial (NCT01174472). *Eur J Radiol* 2015 Mar; 84(3):418-23
3. Kitrou PM, Spiliopoulos S, Katsanos K, Papachristou E, Siablis D, Karnabatidis D. Paclitaxel-coated versus plain balloon angioplasty for dysfunctional arteriovenous fistulae: one-year results of a prospective randomized controlled trial. *J Vasc Interv Radiol* 2015 Mar; 26(3):348-54
4. Karunanithy N, Mesa IR, Dorling A, Calder F, Katsanos K, Semik V, Robinson E, Peacock J, Das N, Forman C, Lawman S, Steiner K, Wilkins CJ, Robson MG. Paclitaxel-coated balloon fistuloplasty versus plain balloon fistuloplasty only to preserve the patency of arteriovenous fistulae used for haemodialysis (PAVE): study protocol for a randomised controlled trial. *Trials* 2016 May 12; 17(1): 241
5. Massmann A, Fries P, Obst-Gleditsch K, Minko P, Shayesteh-Kheslat R, Buecker A. Paclitaxel-coated balloon angioplasty for symptomatic central vein restenosis in patients with hemodialysis fistulas. *J Endovasc Ther* 2015 Feb; 22(1):74-9
6. Patanè D, Giuffrida S, Morale W, L'Anfusa G, Puliauti D, Bisceglie P, Seminara G, Calcaro G, Di Landro D, Malfa P. Drug-eluting balloon for the treatment of failing hemodialytic radiocephalic arteriovenous fistulas: our experience in the treatment of juxta-anastomotic stenoses. *J Vasc Access* 2014 Sep-Oct; 15(5):338-43
7. Swinnen J, Lean Tan K, Allen R, Burgess D, Mohan IV. Juxta-anastomotic stenting with aggressive angioplasty will salvage the native radiocephalic fistula for dialysis. *J Vasc Surg* 2015 Feb; 61(2):436-42

Don't miss it!

Dialysis access
Special Session

Saturday, September 10, 11:30-12:30
Room 117



Marco Das
Maastricht University
Medical Centre
Maastricht, Netherlands

Since 2009, Prof. Das has worked for the Maastricht University Medical Center as an Interventional and Cardiovascular Associate Professor and Head of the CT Department. He completed his medical education at the Heinrich-Heine University in Düsseldorf in 2001 before working as a Research Fellow at the Surgical Planning Laboratory at the Surgical Planning Laboratory at Brigham and Women's Hospital for Harvard Medical School. He then became a resident in the Department of Diagnostic Radiology at RWTH Aachen University in 2003. His major research interests include cardiac imaging, contrast media optimisation in CT and interventional techniques.

Posters on Stage

Selected posters and their presenting authors will take centre stage in these sessions. The posters will be displayed and navigated on terminals which are specifically designed for poster discussions in small groups. Come and meet authors of top-rated posters in an informal and open setting, join in lively debates and ask questions!

Today at 13:30-14:15 in the Poster Area

Posters on Stage – Endovascular interventions

Moderators: A. Diamantopoulos (London/GB), F. Fanelli (Rome/IT)

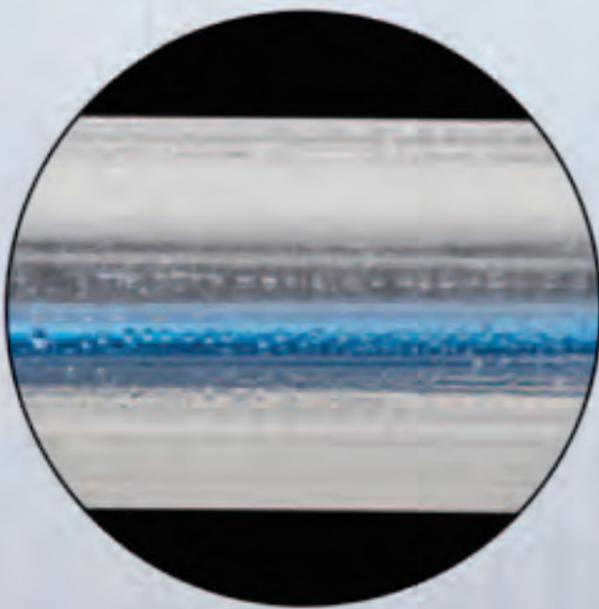
The below-listed posters will be discussed:

- P-476 A comparison of clinical outcomes for diabetic and non-diabetic patients following Misago Rx nitinol stent implantation in the e-MISAGO registry
S. Müller-Hülsbeck (Flensburg/DE)
- P-520 Long-term results of percutaneous endovascular treatment in patients with mesenteric ischaemia: bypass postponement... or renouncement?
T. Bulut (Enschede/NL)
- P-529 Endovascular management of renovascular hypertension in a paediatric population: a 12-year single-centre experience
N. Thulasidasan (London/GB)
- P-465 Predictors of clinical outcome following endovascular treatment of infrapopliteal disease in patients with critical limb ischaemia
L. Biasi (London/GB)
- P-292 Learning curve of the transradial approach of percutaneous carotid intervention
E.M. Végh (Budapest/HU)

UNSHAKEABLE COATING

LUTONIX® 035 coating formulation is designed to **limit drug flaking** during preparation and handling, helping to minimize potential unnecessary drug exposure to staff and patients **as compared to a Competitor DCB.**¹

0.05%
Drug Loss¹



LUTONIX® 035
Drug Coated Balloon PTA Catheter

10.61%
Drug Loss¹



COMPETITOR
Drug Coated Balloon

1. Dry Inflate/Shake and Simulated Clinical Use Bench Test data on file, Lutonix, Inc., New Hope, MN. Shake test measured the average drug content lost after balloon was inflated, and after lightly knocking each device against the sides of the centrifuge tube, left and right, five times, n=5 for both devices tested. The Simulated Clinical Use test measured average drug loss during simulated preparation and handling by performing a wipe test of the preparation area, using a swab method for quantifying trace amount of drug particles after simulated clinical use, n=5 for both devices tested. Bench test results may not be indicative of clinical performance. Different test methods may yield different results.

Please consult product labels and instructions for use relevant to your geography for indications, contraindications, hazards, warnings and precautions.

Bard and Lutonix are registered trademarks of C.R. Bard, Inc., or an affiliate. All other trademarks are property of their respective owners. Copyright © 2016, C.R. Bard, Inc. All Rights Reserved. LU/MPRO/0316/0005

Lutonix, Inc., a subsidiary of C.R. Bard, Inc. 9409 Science Center Drive, New Hope, MN 55428 USA Tel: 1 763 445 2352 Fax: 1 763 445 2353



1434

Safety in IR: the essential steps

Michael J. Lee

"The good physician treats the disease. The great physician treats the patient with the disease." – Sir William Osler

The aviation industry introduced safety checks before flying because of the many technical considerations that influence the safety of flight and the inability of the human mind to remember all of the complex factors that require checking before flying. This process began during the Second World War and has led to a very safe experience for travelers. Air safety is such that there is a 1 in 3 million chance of an accident occurring in an airplane, as opposed to a 1 in 300 chance of an accident happening in a hospital.

It is estimated that medical errors or adverse events occur in 8-12% of hospital admissions in Europe. The EU has estimated that strategies to reduce the rate of adverse events in the European Union would lead to the prevention of more than 750,000 harm-inflicting medical errors per year, leading in turn to over 3.2 million fewer days of hospitalisation, 260,000 fewer incidences of permanent disability and 95,000 fewer deaths. The EU has published a number of white papers and issued the Luxemburg Declaration on patient safety in recent years. Clearly, many of the errors alluded to relate to medication errors or super bug infection. However, surgical errors have been estimated to occur in approximately 3-17% of patients, peri-operatively with a death rate of 0.4-0.8%. It is estimated that half of these complications are avoidable. Under the auspices of the World Health Organisation, Haynes et al. published a study in *The New England Journal of Medicine* in 2009 showing that a surgical safety checklist, which was tested in eight centres worldwide, resulted in a 36% decrease in major complications and a 36% decrease in mortality after surgery. Surgical safety checklists have now become standard throughout the world.

The CIRSE Patient Safety Checklist

Some years ago, CIRSE also developed a patient safety checklist for the IR suite. Although the rate of complications is low, due to the minimally invasive nature of IR, the increasingly more complex procedures that are being performed, such as radioembolisation, prostate embolisation, visceral artery aneurysm management, stroke thrombectomy, etc. make the use of a patient safety checklist of paramount importance in IR as well. The CIRSE checklist has three components, which include a pre-procedure planning component, a sign-in component at the time of the procedure and a sign-out component, which is filled in after the procedure. The checklist is easy to implement in everyday practice and has been proven in many studies to reduce the error rate associated with IR. It is freely available on the CIRSE website, and can be adapted to suit your hospital set-up.

Not just a checklist

However, it is important to remember that patient safety is not just a checklist. Patients expect to meet a competent interventional radiologist who has the appropriate knowledge base, technical skills and clinical skills along with good decision-making skills, professionalism, communication skills and the

ability to work in multidisciplinary teams. Patients are expecting to meet a doctor, not a technician, who can take care of them in the peri-procedural and post-procedural time frames. Patients expect that anyone performing procedures on them has been well trained and, more importantly, that they have certified their training. IR training can now be certified in Europe by taking the European Board of Interventional Radiology (EBIR).

One of the most important skills that patients expect is that the doctor treating them has good decision-making skills. This implies that the IR is able to formulate a treatment plan by not only looking at imaging studies. A sound treatment plan should be based on taking a good clinical history of the patient's main complaint, performing a thorough clinical examination, assimilating information from the referrer, family members (if relevant), past medical history, social history and medication history. Questions the IR should ask before accepting procedures are shown in Table 1.

These are questions that all IRs should ask before performing any procedure. It is also important to involve the patient in the discourse. Inform the patient as to why you think the IR procedure is appropriate or, indeed, inappropriate. Use patient information leaflets liberally, and make sure that patients have the right information to make informed decisions. If the patient decides to go ahead with the procedure, you must obtain informed consent either yourself or from a suitably qualified doctor that you have delegated the task to. The ability to communicate effectively, make good decisions and uphold professionalism is vital to building a trusting relationship with patients.

Again, a safety checklist is not the panacea in terms of procedural outcomes. IR procedural outcomes can also be influenced by either individual influences, such as lack of sleep, memory loss, physical decline, for example, or system influences, which are sometimes more difficult for the IR to realise. System influences include lack of availability of appropriately trained nursing personnel, lack of appropriate equipment or devices, lack of a HDU or ICU in the hospital, lack of appropriate surgical cover, etc. It is important that IRs recognise and try to correct both system and individual influences or tailor their work practice to the limitations that they work with.

Table 2 lists some of the items that can influence the competence/performance continuum.

In summary, patient safety does not just mean implementing the use of a safety checklist. IRs should build and lead a safety culture by promoting incident reporting, by learning and sharing safety lessons through morbidity and mortality meetings or other appropriate avenues, by supporting staff in risk management activity and by implementing steps to prevent harm (Table 3). Above all, IRs need to embrace risk management and safety culture and become clinicians who take care of patients professionally and safely.

The CIRSE checklist can be accessed at www.cirse.org/Checklist

Table 1:
Questions the IR should ask before accepting procedures

- Is the procedure necessary?
- Is the patient suitable for the procedure?
- Will it help the patient?
- What is the potential for harm?
- Are there better alternatives?
- If the IR procedure is not performed, will the patient suffer harm?

Table 2:
Items that can influence the competence/performance continuum

- Define scope of IR practice by local hospital conditions, support services and current experience
- Consult with peers in regard to complex cases
- Recognise when further investigation or observation is necessary
- Know your limitations and call for help when required
- Refer patients with complex problems beyond your experience to expert centres
- Participate in audit and risk management
- Participate in analysis of adverse events

Table 3:
Steps to prevent harm:

- Use a safety checklist
- Mark the operative site
- Involve the patient in the decision-making process (informed consent)
- Make arrangements for appropriate proctoring for new procedures and technology
- Reduce distractions from pagers and telephone calls in the lab
- Maintain a distraction-free environment for everyone
- Know your limitations in terms of individual and system limitations

Don't miss it!

Safe and effective practice in interventional oncology
Special Session
Saturday, September 10, 10:00-11:00
Room 116

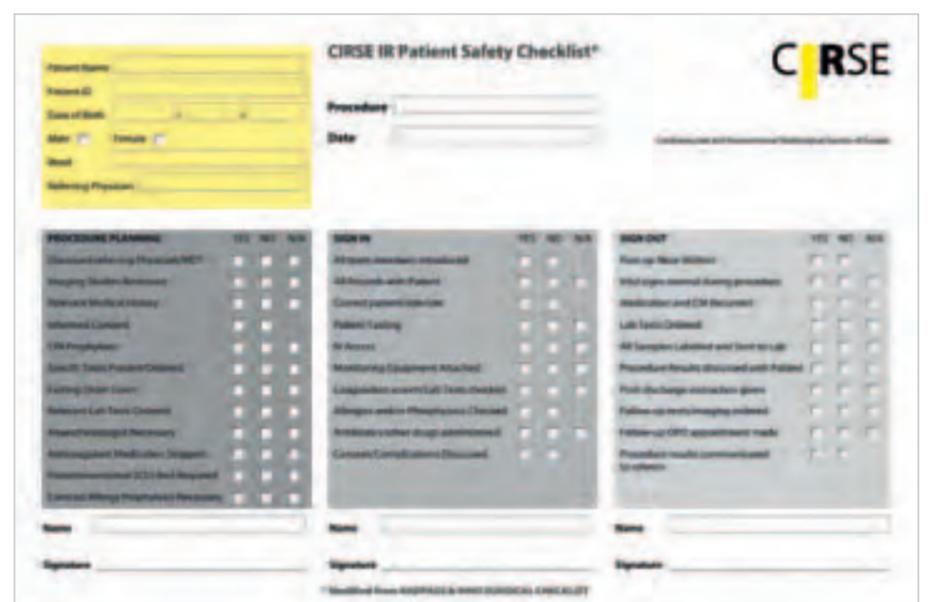


Michael J. Lee
Royal College of Physicians
and Beaumont Hospital
Dublin, Ireland

Prof. Mick Lee graduated from medical school at the University College Dublin in 1982 and completed his training with the Irish Radiology Training Programme in 1989. He spent six years as an assistant professor at Harvard before returning to Ireland in 1995, where he worked as a professor of radiology at the Royal College of Physicians in Ireland and as a Consultant Interventional Radiologist at Beaumont Hospital in Dublin. He has published widely on IR topics and has received recognition for his research with various awards from RSNA, BSIR, ESGAR and CIRSE, amongst others.

Suggested reading:

- Haynes et al. A surgical safety checklist to reduce morbidity and mortality in a global population. *NEJM* 2009; 360:491-9
- Lee et al. Patient safety in IR: A CIRSE checklist. *CVIR* 2012;35(2):244-6
- http://ec.europa.eu/health/patient_safety/policy/index_en.htm
- <http://pactforsafety.com/resources-for-action/>
- http://ec.europa.eu/health/patient_safety/policy/package_en.htm
- ec.europa.eu/health/ph_overview/Documents/ev_20050405_rd01_en.pdf



The CIRSE IR Patient Safety Checklist is free to download, and is available in a number of languages (English, German, French, Italian, Spanish and Dutch).



Procedural Sedation by Non-Anesthesiologists – Challenges & Solutions



Prof. Hans Knape
University Medical Center Utrecht,
Netherlands

Procedural sedation is widely used during interventional radiology procedures. In recent years, sedation is increasingly being administered by non-anesthesiologists. Keeping patients safe and comfortable requires a structured program of which respiratory monitoring is a key element.

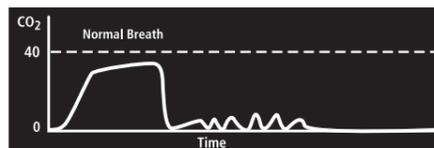
Risks of Sedation

Moderate to deep procedural sedation is very useful during procedures performed across the hospital, but associated with risk. Because the drugs used for moderate to deep sedation are usually a combination of an opioid, analgesic, and a hypnotic, the potential respiratory depressant effect may compromise vital functions; the most important being hypoventilation or upper airway obstruction. Hypoxemia and hypercapnia may ensue, especially when changes to ventilation are not observed or noticed. The patient's condition may deteriorate very rapidly, especially when the patient is not in good health or with significant comorbidity and therefore at heightened risk of adverse events. This may have a deleterious effect in cerebral or cardiac hypoxemia

It's very important to monitor these patients not only by direct observation, but also by cardiovascular and ventilatory monitoring.

Adverse Event Prevention

Most experienced anesthesiologists would say they have had to resuscitate or restore ventilation on an emergency basis during sedation. So that has been a driver to create a guideline focused on high quality and safe moderate to deep sedation. In addition to the major events with potential patient injury or deaths, when you have a busy procedure suite confronted with patients who are either under-sedated and not cooperative or over-sedated and having respiratory depression events, the procedure will take more time to perform and also working conditions for the proceduralist and team are suboptimal.



Sedation Monitoring

It is very important that a trained clinician be dedicated solely to administering the sedating drugs and observing the patient and appropriate monitors, especially ventilation monitoring. Our requirements include pulse oximetry and capnography to monitor ventilation. Why capnography? Well when a patient is hypoventilating or apneic, a pulse oximeter will reveal normal oxygenation for a very long

period of time. The adequacy of ventilation can best be monitored by use of the capnography waveform. There are now devices on the market which provide a semi-quantitative display of the expiratory capnogram in non-intubated patients. The sampling of exhaled gases using these modern disposable devices for general practice is more than adequate. Therefore, we believe that capnography and oximetry monitoring are pivotal for safe administration of moderate to deep sedation in addition to direct patient observation.

We put more emphasis on the waveform than the etCO₂ number, because the waveform can give you an immediate indication of the adequacy of ventilation, whether there is a regular breathing, interrupted breathing, hypoventilation, or an obstruction



Pulse Oximetry and Capnography Use

Measuring oxygenation is important. Oximetry is a very useful tool, but when a patient has stopped breathing or is hypoventilating due to sedatives or opioids, it may take several minutes before desaturation occurs. Although the patient is in danger, you have the impression that nothing is wrong because the oxygen saturation is still normal. By the time the oxygen saturation starts to drop you are very late in compensating and intervention. Capnography offers a much earlier sign of inadequate ventilation. It gives the sedation practitioner time to intervene during inadequate ventilation. When you do not have capnography, it would take several minutes before you are signaled by oximetry and that may be too late. In fact, by the time desaturation occurs, you are very concerned about damage to the heart or the brain from hypoxemia. This can be prevented quite easily by capnography, which provides a very early warning sign that something is going wrong with the patient's breathing.

Preference for Propofol Sedation

If you look at clinical practice, using propofol is preferable to benzodiazepine-opioid combination. Many patients who have been sedated by both regimens prefer propofol. Propofol makes sedation far easier to control for the trained sedation practitioner. Patients using Propofol are fully awake in the recovery room and may leave recovery far earlier than when Midazolam has been used. In my experience, propofol in combination with short-acting opioids is definitely preferred by over the use of Midazolam for most cases.

Program for Sedation by Non-Anesthesia Sedation Practitioners

In the Netherlands, there was a great need for practitioners who could provide moderate to deep sedation due to the growing number of sedation cases and a shortage of qualified physician anesthetists. The Minister of Health stimulates the idea of reshuffling responsibilities between doctors and non-physician practitioners regarding whether procedures currently performed by physicians can also be safely performed by well-trained practitioners.

We have a national program to train sedation practitioners. Upon completion of a one-year didactic and practical training program and passing a national exam, sedation practitioners are able to work in any area of care where sedation is provided.

The Dutch guidelines for this certification were finalized in 2012 and set up by a committee consisting of representatives from 21 medical societies representing the various disciplines involved with sedation.

The incidence of severe adverse events has decreased dramatically where sedation practitioners are employed. There is definitely a decrease in the number of events and in their severity in the Netherlands. This is also in part due to the requirement for sedation committees which review complications and events associated with sedation. I really hope that the European Guideline, which is about to be finished and published, will define best practices for moderate to deep sedation in terms of risk screening, training personnel, adequate monitoring, and adequate aftercare of these patients and that it will spread across Europe and provide improved quality and safety to patients.

¹ Toetsingskader sedatie en/of analgesie buiten de operatiekamer / February 2012 / http://www.igz.nl/Images/toetsingskader%20sedatie%20_tcm294-328212.pdf accessed July 2016

² L. Koers et al/National Audit Deep Sedation Performed by Sedation Practitioners / presented ESA 2016

Medtronic
Further, Together

MEDTRONIC Symposium | Sunday Sept 11th - 08:00am - 08:20am, Room 134

Advances in procedural sedation – preventing respiratory compromise

Moderator: Prof. Afshin Gangi (Strasbourg/FR)

Does capnography monitoring add to patient safety in moderate to deep sedation?

Prof. Hans Knape (Utrecht/NL)

Lower GI bleeding: patient preparation and imaging

José Urbano

Lower gastrointestinal bleeding (LGIB) represents 20% of all gastrointestinal bleeding and refers to blood loss originating from a site distal to the ligament of Treitz coming from small bowel or colonic sources. Annual incidence of LGIB is 0.03% and elderly patients are more frequently affected. In most cases of LGIB, colonic and rectal bleeding is self-limiting, resulting from benign pathology, and requires no specific therapy. Although most patients stop bleeding spontaneously and have favourable outcomes, morbidity and mortality increase in older patients reaching a global mortality rate of 2-4% in those with comorbid medical conditions.

Presentation

Speed, site and amount of bleeding will affect the clinical presentation and management of LGIB. Rectorrhagia is the expulsion of fresh bright red blood without stools and indicates acute bleeding from the left colon or rectum. Haematochezia is the expulsion of fresh blood in or with stools, usually associated with a right colon bleeding source. Melena is the passage of black, tarry stools and indicates bleeding from a lower source that occurs slowly enough to allow for enzymatic breakdown of blood. Although helpful, the distinctions based upon stool colour are not absolute since melena can be seen from both upper and lower GI bleeding, and haematochezia can be seen with massive upper GI bleeding. Approximately 15% of patients with presumed LGIB are ultimately found to have an upper GI source of bleeding.

Acute LGIB is a bleeding of recent onset causing signs of haemodynamic instability and shock (hypotension systolic BP of < 100, tachycardia > 100), anaemia and/or the need for blood transfusion. It is generally considered to require a transfusion of at least four units of blood within 24 hours or two units within the first two hours after admission. Chronic LGIB is the passage of blood per rectum over a period of several days or longer and usually implies intermittent or slow loss of blood. Patients with chronic LGIB present together with occult faecal blood, intermittent melena, or small amounts of bright red blood per rectum.

Diagnosis

Colonoscopy is the diagnostic test of choice in the case of chronic or minor LGIB when time and the patient's conditions allow for adequate bowel preparation. However, when acute LGIB produces a large amount of blood inside the

colon, endoscopic assessment is not possible. Colonoscopy is also not useful and does not reach the small bowel. In daily clinical practice, multidetector computed tomography (CT) is non-invasive, available 24-7, not operator dependent, reproducible and revisable and needs no preparation except patient stabilisation, when necessary. For these reasons, CT is, at present, the exploration of choice for the diagnosis and management of acute and massive LGIB, while for chronic and minor LGIB, CT has become a complementary colonoscopy exploration. CT angiography also provides accurate information about the presence or absence of active bleeding, its source, and its cause. This information helps shorten the total diagnostic time and minimises or eliminates the need for more expensive or invasive procedures.

CT with arterial and portal-venous phase is an accurate method for detection and localisation of active LGIB, and it is more sensitive than digital subtraction angiography. Active bleeding is viewed on CT as a contrast extravasation into bowel lumen that typically changes and increases from the arterial to the portal phase. In most cases of arterial bleeding, the culprit vessel can be identified by the presence of active extravasation, contrast blush, irregular vessel walls or pseudo-aneurysm. IV, non-contrast and delayed phases acquisition can help in bleeding diagnosis but are optional. When a CT is performed to evaluate acute gastrointestinal bleeding, oral contrast should be avoided. CT angiography provides valuable information that can be used to guide mesenteric catheterisation and embolisation if a bleeding source is localised. Nuclear scintigraphy is still considered the most sensitive radiologic test to determine if the patient is actively bleeding. However, CT scanning can be obtained in critical patients, as it is almost as sensitive, provides better localisation, and may define the pathologic cause of the bleeding. The current role of digital subtraction angiography as a diagnostic tool is limited for those cases with negative CT and clinical and endoscopic evidence of GI bleeding.

Treatment

As with the diagnosis, endoscopy is a key tool in managing gastrointestinal bleeding. However, interventional radiology is currently having to increase its role in the treatment of these patients. Transcatheter arterial embolisation (TAE) is already recognised as the

treatment of choice for upper gastrointestinal bleeding in cases of failure to control bleeding endoscopically. Upper abdominal organs have an extensive collateral circulation that permits safe embolisation with low risk of secondary ischaemia and perforation. Excluding haemorrhoidal irrigation, achieving terminal circulation with a minimum of collateral vessels is the rule for small bowel and colon and this is therefore the main reason for considering TAE of LGIB as a controversial and risky treatment. However the latest guidelines already recommend TAE in those patients with ongoing and massive LGIB unlike to tolerate bowel preparation and urgent colonoscopy or when endoscopy has already failed. It is mandatory in LGIB TAE to reach the bleeding site with a microcatheter and then to perform a superselective embolisation sparing every healthy vessel around the culprit vessel. Some experimental studies have demonstrated that up to three vasa recta can be occluded safely in the small bowel or colon without significant risk of ischaemic damage. If superselective occlusion is not possible, embolisation should be avoided or be done in agreement with surgeons as a haemostatic life-saving manoeuvre just before surgery.

Regarding when to embolise LGIB, although active bleeding confirmation on a CT is quite important in the decision making, it is not enough and embolisation should not be indicated only because a CT is positive. Embolisation is only useful when the bleeding site is focal. Inflammatory and haematologic conditions causing widespread gastrointestinal bleeding are not an indication for TAE. The patient's haemodynamic stability is a primary determinant, and acute LGIB causing signs of haemodynamic instability and shock is the key factor in the decision making. In any case, all parameters should be considered in conjunction with each individual's overall clinical condition and comorbidities before the final decision.

Lack of studies which generate clear evidence for embolisation in gastrointestinal bleeding is a drawback. As we can read in some current guidelines, TAE for LGIB has a "strong recommendation, low-quality evidence". This is partially explained because, as happens with many other processes, clinical practice is ahead of the evidence. It is however the responsibility of our interventional community to continue making this evidence stronger so that in future we will be able to read in the guidelines that TAE for LGIB has a "strong recommendation, high-quality evidence".

Don't miss it!

Embolisation for lower GI bleeding
Special Session
Saturday, September 10, 11:30-12:30
Room 112

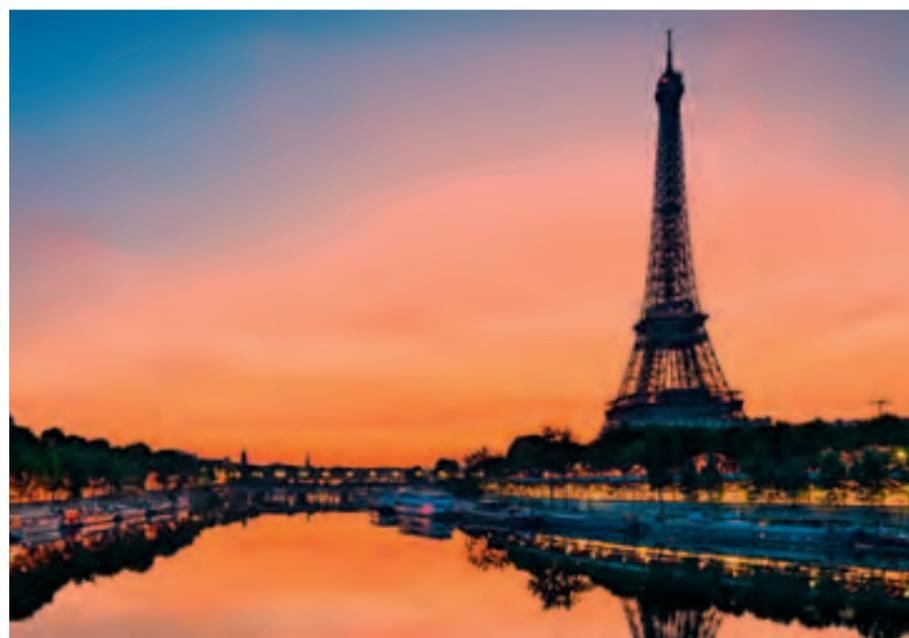


José Urbano García
Hospital Universitario
Fundación Jiménez Díaz
Madrid, Spain

Dr. Urbano García is the head of Vascular and Interventional Radiology at the University Foundation Hospital of Jiménez Díaz in Madrid, where he has been responsible for implementing a range of minimally invasive image-guided therapies since 1999. He has written over 140 publications; his research interests including renovascular hypertension, aneurysmal and occlusive arterial disease, hepatocellular carcinoma and portal hypertension. A CIRSE member since 1998 and this year's SPC representative in Barcelona, Dr. Urbano has attended every CIRSE annual meeting since 2001.

References:

- ACR Appropriateness Criteria: Radiologic Management of Lower Gastrointestinal Tract Bleeding. <https://acsearch.acr.org/docs/69457/Narrative> (last review 2014)
- Artigas JM, Martí M, Soto JA, Esteban H, Pinilla I, Guillén E. Multidetector CT angiography for acute gastrointestinal bleeding: technique and findings. *Radiographics* 2013; 33:1453-70
- Feuerstein JD, Ketwaroo G, Tewani SK, Cheesman A, Trivella J, Raptopoulos V, Leffler DA. Localizing Acute Lower Gastrointestinal Hemorrhage: CT Angiography Versus Tagged RBC Scintigraphy. *AJR Am J Roentgenol* 2016; Jun 15:1-7 [Epub ahead of print]
- Valek V, Husty J. Quality improvement guidelines for transcatheter embolization for acute gastrointestinal nonvariceal hemorrhage. *Cardiovasc Intervent Radiol* 2013; 36: 608-12
- Strate LL, Gralnek IM. ACG Clinical Guideline: Management of Patients With Acute Lower Gastrointestinal Bleeding. *Am J Gastroenterol* 2016; 111: 459-74
- ASGE Standards of Practice Committee; Pasha SF, Shergill A, Acosta RD, Chandrasekhara V, Chathadi KV, Early D et al. The role of endoscopy in patients with lower GI bleeding. *Gastrointest Endosc* 2014; 79: 875-85
- Ikoma A, Kawai N, Sato M et al. Ischemic effects of transcatheter arterial embolization with N-butyl cyanoacrylate on the colon in a Swine model. *Cardiovasc Intervent Radiol* 2010; 33: 1009-15



ESIR 2016 Course

European School of Interventional Radiology

Clinical Procedure Training
Prostate Embolisation
Paris (FR), November 29-30

Discover more about PAE by discussing aspects of benign prostatic hyperplasia, patient selection and the role of urodynamic testing. Live cases will take place along with a step-by-step explanation of the procedure.

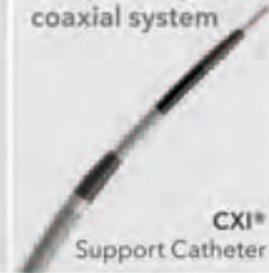
www.cirse.org/esir2016

SAVE LIMB

Your essential 4 Fr tools below the knee

Compatible 4 Fr products

4 Fr | 2.6 Fr | 2.3 Fr
coaxial system



CXI®

Support Catheter

4 Fr



Flexor®
Technology
Guiding Sheath

.014"



Approach®
Hydro ST
Microwire Guide

.014" compatible



Advance®
PTA Balloon
Dilatation
Catheter



4 FR
SYSTEM

TECHNOLOGIES FOR
BELOW THE KNEE



Download our infrapopliteal
procedure guide.
cookmedical.eu/cli

© COOK MEDICAL. IN 512798.01.17

Cardiovascular and Interventional Radiological Society of Europe

GEST 2017

E U R O P E



**Global Embolization
Symposium and Technologies**

**May 31 – June 03
Florence, Italy**

www.gest2017.eu

CIRSE foundation

ESIRonline: IR's educational platform

Michelle Weiss, CIRSE Office

As IR continues to grow as a subspecialty, ESIRonline provides a learning space for medical students and physicians alike to expand their knowledge of new procedures and recent research. As the largest online IR educational platform, ESIRonline creates a central location where webcasts and presentations can be uploaded from all of CIRSE's meetings and many other IR conferences around the world.

Recent Updates

Last year, at CIRSE 2015, ESIRonline introduced a new format which allowed users to watch selected webcasts instantly on demand, and this was greeted with such positive feedback that it will be done again this year and for future CIRSE annual congresses. This year, all sessions will also be live-streamed direct from the congress centre!

Another exciting change has been to include ESIRonline in every full registration to one of CIRSE's events! This means that members and non-members who attend a CIRSE event receive a one-year subscription and have full access to the extensive collection of educational materials available on the website. So

each delegate attending CIRSE 2016 will now have the capability to use this fantastic IR resource.

Package Compilation

One particularly valuable aspect of the ESIRonline platform is the compilation of packages which cover essential information on selected topics. Each package includes presentations from a diverse range of speakers often across a variety of sessions. This year, seven new packages have already been compiled, including:

- Venous stenting
- Oncologic interventions: colorectal liver metastases
- Oncologic interventions: bone
- Oncologic interventions: lung
- Embolisation of peripheral and pulmonary AVMs: an update
- SIRT for HCC and liver metastases: an update
- Prostate embolisation

These packages not only keep members updated on a wide variety of IR treatments and techniques, but also assist those interested in studying to pass the EBIR exam. Packages

include not only recent congress presentations, but standards of practice documents and other external references that are essential to know. The database contains more than 9,000 presentations and is regularly updated to encompass the best IR learning materials.

CIRSE Society YouTube Channel

A further project of CIRSE has also been to delve into subjects of specific interest with videos interviewing expert physicians in that field. These then often serve as an expert review video to showcase interesting lectures that will be included in an upcoming ESIRonline package. This year at the European Conference on Interventional Oncology, three videos interviewed prominent interventionalists on bone interventions, lung interventions and the treatment of colorectal liver metastases. These and many other videos can be viewed on our CIRSE Society YouTube channel: www.youtube.com/CIRSESociety.

Moving Forward

We are also proud to welcome the new Programme Director, Stefan Müller-Hülsbeck, who took over the position at the start of

2016 after Mario Bezzi passed the torch on to him. Under Prof. Bezzi's four-year tenure, ESIRonline changed from an unstructured group of diverse presentations to a carefully curated educational resource. The Committee and office staff have worked hard to improve the programming and interface, as well as to carefully index presentations so as to make them easily searchable by presenter, congress, topic and a number of other parameters.

Looking to the future with a new Programme Director and a new Programme Committee, ESIRonline will continue to assemble topic packages, as well as gather information on the IR community online education needs in order to optimise the site and work to extend the reach of the platform.

To explore packages, events and webcasts, visit www.esir.org

To watch CIRSE 2016 sessions live or on demand, visit <http://ondemand.esir.org>



ESIRonline

A WEALTH OF IR LEARNING



Over 9,000 recorded presentations from all congresses since 2006 are waiting to be watched.

ESIRonline is free for CIRSE members year-round, and all other congress attendees have free access for one year!

Log in at www.esir.org using your myCIRSE registration data.

www.esir.org

Cardiovascular and Interventional Radiological Society of Europe

Today's Featured Papers

will be presented in the Free Paper sessions below, taking place from 16:15-17:15 and from 17:30-18:30

16:15-17:15

FP 606 Dialysis intervention

Room 114
Creation of a percutaneous arteriovenous fistula (pAVF) for hemodialysis access
C.G. Radosa¹, N. Weiss¹, T. Hofmockel¹, J.C. Radosa², M. Laniado¹, C. Gatzweiler¹, R.-T. Hoffmann¹; ¹Dresden/DE, ²Homburg/DE

FP 607 Biliary intervention

Room 113
Biodegradable biliary stents: a single-center experience in the treatment of benign biliary strictures
Q. Ordi i Camprubi, I. Diez-Miranda, M. Perez Lafuente, C. Gonzalez-Junyent, D. Hernandez Morales, C. Parra-Fariñas, X. Merino-Casabiel, A. Segarra Medrano; Barcelona/ES

17:30-18:30

FP 705 Experimental work in IR

Room 133
In vivo realtime interventional MR elastography (MRE) and thermometry (MRT) during percutaneous thermal ablation of liver: a proof of concept
P.P. Rao, N. Corbin, J. Vappou, B. Elodie, B. Wach, M. De Mathelin, A. Gangi; Strasbourg/FR

FP 706 All about veins

Room 114
Results from VIVO-EU, a prospective study of the Zilver Vena venous stent in the treatment of symptomatic iliofemoral venous outflow obstruction: on behalf of the VIVO-EU investigators
G.J. O'Sullivan¹, J.A. McCann-Brown²; ¹Galway/IE, ²West Lafayette, IN/US

FP 707 Prostate embolisation and IRE

Room 116
Prostate cancer treatment with irreversible electroporation (IRE): efficacy and safety in 300 patients over 5 years
M. Stehling¹, N. Klein¹, E. Guenther¹, S. Zapf¹, R. El Idrissi¹, B. Rubinsky²; ¹Offenbach/DE, ²Berkeley, CA/US

FP 708 Imaging

Room 134
A 3-dimensional (3D) printed endovascular simulation model: technique and initial data
S. Mafeld¹, C. Nesbitt¹, J. McCaslin¹, A. Bagnall¹, P. Davey², P. Bose³, R. Williams¹; ¹Newcastle-upon-Tyne/GB, ²Durham/GB, ³Essex/GB

Don't miss it!**Arterial thrombectomy
Expert Case Discussion**

Saturday, September 10, 11:30-12:30
Auditorium 1

 e-voting



Thomas Rand
(EBIR)

General Hospital Hietzing
Vienna, Austria

Prof. Thomas Rand is an interventional radiologist and Head of Radiology at Hietzing General Hospital, Vienna. He graduated from the University of Vienna, specialising first in osteoradiology, and later in interventional radiology. Prof. Rand completed fellowships at New York University and the University of California, San Diego. He has been author or co-author on over 100 peer-reviewed articles and 10 books. He is a member of numerous scientific societies, and is much involved with research and education, as well as being an active faculty member at CIRSE meetings.

Case Presenters

Dimitrios Karnabatidis

University Hospital
of Patras
Patras, Greece

Dimitrios Karnabatidis Ph.D., EBIR, is Associate Professor of Interventional Radiology at the University of Patras, Greece. He has conducted or been involved as a Primary Investigator in numerous clinical trials, as well as experimental and research studies. His research work includes more than 140 peer-reviewed publications and has received more than 2,000 citations. He is Editorial Board Member of the Journal of Endovascular Therapy and of the World Journal of Radiology. He is a CIRSE Fellow, and was a member of the CIRSE Standards of Practice Committee.



Lukas Hechelhammer

Kantonsspital St. Gallen
St. Gallen, Switzerland

Dr. Lukas Hechelhammer is a senior interventional radiologist at the Kantonsspital St. Gallen, one of the largest non-university hospitals in Switzerland. He completed his interventional training at the University Hospital Zurich and the Institut Gustave Roussy in Villejuif, France. He has served as a member of the ESIR Editorial Board. His current scientific focus is on the clinical and imaging follow-up of patients after prostatic arterial embolisation.

The new Expert Case Discussions: Arterial thrombectomy

Thomas Rand, Dimitris Karnabatidis, Lukas Hechelhammer

Within the last two decades, a variety of techniques have been established and have become standardised tools in the workbox of interventional radiologists. These methods comprise catheter-mediated infusion of fibrinolytic agents, catheter-mediated thrombus aspiration, mechanical thrombectomy and combinations of the above.

But let's go back to where it all started with the plain old Fogarty balloon: percutaneous mechanical thrombectomy was once synonymous with the use of Fogarty balloons, and it might still be one the cheapest and simplest methods. However surgical access, whether inguinal or popliteal, has to be done, and although Fogarty balloons may work very effectively in infrainguinal soft lesions, they are missing a guidewire component and have poor pushability and very limited guidance. Therefore, this method might get very difficult and inefficient in patients with underlying chronic stenosis and well defined thrombus.

In contrast, minimally invasive catheter-related methods avoid surgical access and enable excellent guidance of catheters as well as potential application of medication.

Firmly rooted in minimally invasive endovascular techniques, percutaneous catheter-directed thrombolytic therapy is a basic concept for the treatment of acute limb ischaemia (ALI) caused by acute embolic and thrombotic events, with its main indication in recent occlusive events, such as during the first 2 weeks.

Thrombolytic agents are powerful tools, but must be strictly controlled and have major limitations: absolute contraindications are ongoing bleeding, intracranial haemorrhage and compartment syndrome. Relative contraindications are major non-vascular surgery or trauma, intracranial tumours, recent eye surgery or neurosurgery and gastrointestinal bleeding.

Pre-procedural imaging is mandatory and a variety of factors has to be evaluated: location, morphology, haemodynamic status, collateral flow, inflow, outflow, run-off vessels and occluded length must be defined. Laboratory examinations generally include the baseline clotting profile; however, in suspected hypercoagulate disorders, antibodies such as factor IV, anticardiolipin aBs and protein S or C, and antithrombin III deficiency tests should be requested as well.

Regarding vascular access, all efforts should be made to perform a single wall puncture

Literature

Karnabatidis D, et al. Quality Improvement Guidelines for Percutaneous Catheter-Directed Intra-Arterial Thrombolysis and Mechanical Thrombectomy for Acute Lower-Limb Ischemia. Cardiovasc Intervent Radiol 2011; 34: 1123-1136

Dormandy JA, Rutherford RB. Management of peripheral arterial disease (PAD). TASC Working Group. TransAtlantic Inter-Society Consensus (TASC). J Vasc Surg (2000); 31:51-5296

Ouriel K. Endovascular techniques in the treatment of acute limb ischemia: thrombolytic agents, trials and percutaneous mechanical thrombectomy techniques. Sem Vasc Surg (2003); 16(4): 220-279

to minimise puncture-related bleeding in the course of thrombolysis. The "guidewire traversal test" gives a very basic but good impression of the thrombus morphology. If it is easy to pass, it reflects a fresh thrombus with good chances for lytic therapy. There are several techniques for the thrombolysis itself, but, in summary, local lysis is approached by using side-hole catheters and infusion wires as selectively as possible into the thrombus. Usually a bolus is given, followed by a continuous infusion. Lysis must be monitored with periodic angiograms.

Thrombolytic agents and their infusion

Classic thrombolytic agents such as urokinase and streptokinase are still widely used, however some newer agents have been developed. The complexity of clotting and de clotting mechanisms on the one hand and the variety of thrombolytic agents on the other hand is demanding. Therefore, it is essential to create a simple and clear concept one can firmly adhere to in emergency situations. Such a basis will vary from centre to centre and depends on the individual routine work and experience. In our session, we will particularly try to provide some simple and clear concepts.

Percutaneous mechanical thrombectomy

Embolic events in the course of lower limb interventions were mostly observed as depositions in the trifurcation. To remove clots from this position, aspiration techniques were developed and proved very effective. Based on an inguinal puncture and guidewire techniques, aspiration catheters (in the form of end-hole catheters) are placed directly into the proximal end of the thrombus. Using external aspiration by a large syringe, as much thrombus clot as possible is aspirated and removed under continuous suction. In this set-up, it is essential to use rather large devices around 7 and 8 Fr., with the capability to remove thrombus loads efficiently.

New generations of dedicated percutaneous thrombectomy devices (PTDs) have been developed recently and may be categorised according to their mechanism, such as mechanical clot dissolution catheters, hydrodynamic and rheolytic catheters, ultrasonic catheters and mixed types.

These mechanical PTDs generally work on the basis of fragmentation, aspiration and deletion of thrombotic material. When using the term "fragmentation" one always should be aware

that subsequent microembolisation without adequate removal might create damage by small distal embolisation that can hardly be controlled.

As a matter of fact, PTDs for revascularisation should not only provide sufficient, immediate success, but must also enable a safe embolic-free procedure. Therefore, devices with fragment aspiration are the preferred method of choice. Studies with the use of PTDs as stand-alone methods in cases of contraindicated thrombolysis have shown salvage rates up to 95% at 1 month.

So-called rheolytic systems work on the basis of pulsatile jets, and various specifically tailored rheolytic thrombectomy (RT) catheters. The device uses a complex mixture of rapid fluid streaming and hydrodynamic forces (1,000 psi to 2,000 psi) to fracture thrombus, allowing extraction at the distal catheter tip using negative pressure, which has its basis on the so called Bernoulli/Venturi effect.

Novel techniques were further conceptualised, to simultaneously maximise the advantages of both rheolytic systems and chemical thrombolysis and to minimise their disadvantages and limitations. The Power-Pulse Spray (P-PS) technique combines both rheolytic mechanical and chemical thrombolysis.

Acute lower extremity arterial thrombotic occlusive disease can lead to critical limb ischaemia with impending limb loss if rapid revascularisation is not provided. Open surgical thrombectomy, percutaneous chemical thrombolysis (CT), and percutaneous rheolytic thrombectomy (RT) offer a variety of treatments; however, they must be performed under controlled standards and demand high experience.

The greatest challenge, however, is to bring the variety of mechanical options, together with the knowledge about dosage and mechanisms of chemical thrombolysis and the complex mechanisms of clotting and de clotting in a simple structure, that allows the interventional radiologist to act quickly, safely and successfully in their daily work.

Today, top experts will show us how to easily and successfully deal with complex cases. They will present their experience and their cases in this field, and our goal is to provide clear structures for complex situations.

The following cases will give you a taste of what will be discussed:

Kasirajan K, Haskal ZJ, Ouriel K. The use of mechanical thrombectomy devices in the management of acute peripheral arterial occlusive disease. J Vasc Interv Radiol 2003; 12:405-411

Leung DA, et al. Rheolytic Pharmacomechanical Thrombectomy for the Management of Acute Limb Ischemia: Results From the PEARL Registry. J Endovasc Ther 2015 Aug; 22(4):546-57.

Sedghi Y, et al. Endovascular management of acute limb ischemia. Vasc Med 2013; 18(5):307

Spiliopoulos S, et al. Treatment of infrainguinal thromboembolic complications during peripheral endovascular procedures with AngioJet rheolytic thrombectomy, intraoperative thrombolysis, and selective stenting. J Vasc Surg 2012; 56:1308

Case 1 (Lukas Hechelhammer):

A 68-year-old female patient with femoro-popliteal stent presented with new onset of lower leg pain, numbness and coolness of the right foot (see Figures 1a-c, right).

CTA confirming suspected stent-occlusion and intraarterial lysis with urokinase was started.

During intra-arterial lysis, massive foot pain (uncontrollable with morphin) occurred and re-angiography showed acute embolic occlusion of pedal arteries.

Due to small calibre and spasm, recanalisation suction thrombectomy was successful performed by aspiration with 3Max Penumbra Catheter.

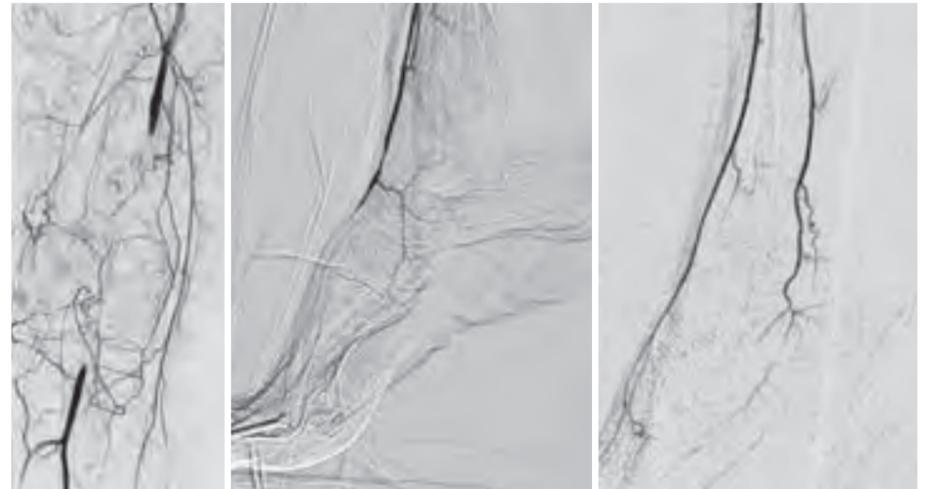


Fig. 1a: Acute stent occlusion.

Fig. 1b: Distal embolisation under intra-arterial lysis.

Fig. 1c: Final image after 3 Max penumbra.

Case 2:

An 83-year-old female with known atrial fibrillation was admitted due to abdominal pain, nausea and emesis over 48 hours. Lab testing revealed elevated alkaline phosphatase, LDH and y-GT and CTA showing thrombo-embolic occlusion of SMA.

Aspiration thrombectomy with ACE 64 was performed and complete recanalisation established.



Fig. 2a: CTA before treatment.



Fig. 2b: Before aspiration.



Fig. 2c: After aspiration with ACE 64.

Case 4 (Dimitris Karnabatidis):

This case shows the combination of techniques, such as lysis and mechanical thrombectomy in the subacute occlusion of an axillary-femoral

bifurcated bypass graft as well how to act in distal embolisation.

Subacute occlusion of axillary-femoral bifurcated by-pass graft

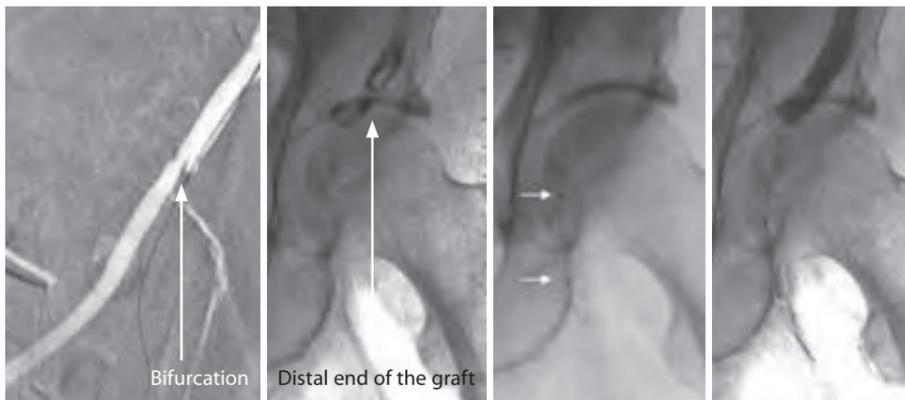


Fig. 4a,b: The guidewire wire has passed through the occlusion.

Fig 4c: Filter in the main branch of the deep femoral artery.

Fig. 4d: Local thrombolysis and mechanical thrombectomy

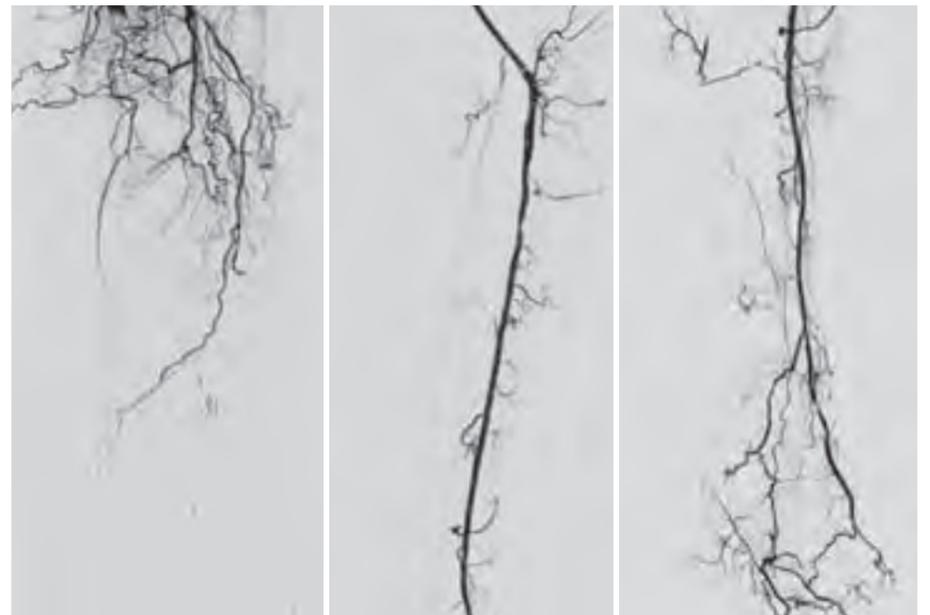


Fig. 3a: acute SG occlusion 6 months later.

Fig. 3b: Lower leg after PTEE.

Fig. 3c: Foot after PTEE.

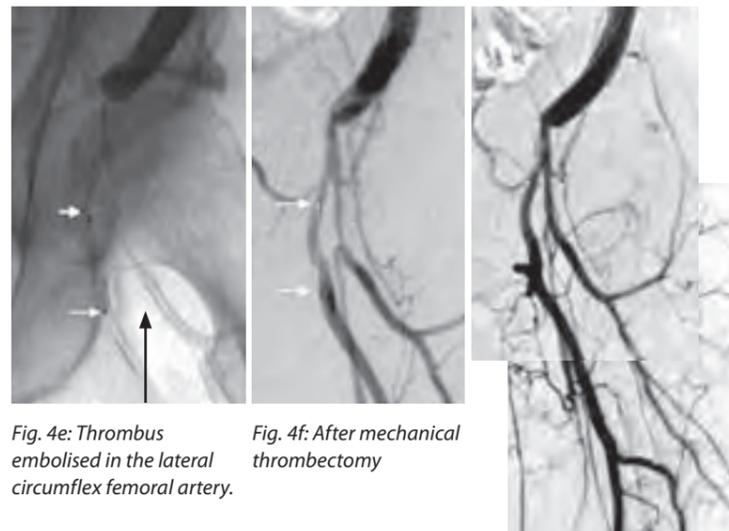


Fig. 4e: Thrombus embolised in the lateral circumflex femoral artery.

Fig. 4f: After mechanical thrombectomy

Fig. 4g,h: Final result

Calling all CVIR Reviewers, Authors and Editorial Board Members!

In recognition of your valuable contribution to the journal, CVIR's Editor-in-Chief, Dierk Vorwerk would like to invite you to attend this year's

CVIR Reception and Award Ceremony

Saturday, 10th September

12:30 – 13:45, Room 134

CCIB – Convencions Internacional de Barcelona,
Plaça de Willy Brandt 11-14 | 08019 Barcelona

Poster Awards 2016

SCIENTIFIC POSTERS

Magna Cum Laude

Embolotherapy for neuroendocrine tumor liver metastases: prognostic factors for hepatic progression-free survival and overall survival

J.X. Chen¹, S.C. Rose², S.B. White³, G. El-Haddad⁴, N. Fidelman⁵, H. Yarmohammad⁶, D.Y. Sze⁷, N. Kothary⁷, K. Stashek⁸, E.P. Wileyto⁹, R. Salem¹⁰, D.C. Metz¹¹, M.C. Soulen¹

¹Hospital of the University of Pennsylvania, Radiology, Philadelphia, PA/US, ²UCSD Health Sciences, Radiology, San Diego, CA/US, ³Medical College of Wisconsin, Radiology, Milwaukee, WI/US, ⁴Moffitt Cancer Center, Interventional Radiology, Tampa, FL/US, ⁵University of California, San Francisco, Radiology, San Francisco, CA/US, ⁶Memorial Sloan Kettering Cancer Center, Interventional Radiology, New York, NY/US, ⁷Stanford Medical Center, Radiology, Palo Alto, CA/US, ⁸Hospital of the University of Pennsylvania, Pathology, Philadelphia, PA/US, ⁹University of Pennsylvania, Biostatistics, Philadelphia, PA/US, ¹⁰Northwestern University, Interventional Radiology, Chicago, IL/US, ¹¹Hospital of the University of Pennsylvania, Gastroenterology, Philadelphia, PA/US

Cum Laude

Irreversible electroporation of the liver: is there a threshold for the volume of tissue to be ablated?

F. Burdío¹, A. Ivorra², P. Sanchez¹, A. Radosevic³, Q. Castellví²

¹Hospital del Mar, Surgery, Barcelona/ES, ²Universidad Pompeu Fabra, TIC, Barcelona/ES, ³Hospital del Mar, Radiology, Barcelona/ES

Is CT angiogram an essential investigation prior to prostate artery embolisation?

D.F.W. Maclean¹, B. Maher¹, A. Cannavale¹, M.R. Harris², J. Dyer², S. Modi¹, N. Hacking¹, T.J. Bryant¹

¹University Hospital Southampton, Department of Interventional Radiology, Southampton/GB, ²University Hospital Southampton, Urology, Southampton/GB

Certificate of Merit

HIFU for prostate cancer: a 9-year experience of 1150 patients

V.A. Solovov, M.O. Vozdvizhenskiy, A.E. Orlov

Samara Oncology Centre, Interventional Radiology, Samara/RU

Endovascular management of renovascular hypertension in a paediatric population:

a 12-year single-centre experience

N. Thulasidasan, N. Karunanithy

Guy's and St.Thomas' NHS Foundation Trust, Department of Interventional Radiology, London/GB

Endovenous radiofrequency-powered thermal ablation of the marginal venous system

W. Ullmer, W.A. Wohlgemuth

University Medical Center Regensburg, Department of Radiology, Regensburg/DE

Following a zero tolerance approach to inadequate patient preparation for interventional radiology procedures: implementation and early experience

R.D. White; University Hospital of Wales, Department of Clinical Radiology, Cardiff/GB

Impact of different embolic agents for TACE procedures on VEGF levels post-treatment

P. Wiggermann¹, K. Krüger², C. Niessen¹, L.P. Beyer¹, E. Hohenstein², C. Stroszczynski¹, P.L. Pereira³

¹University Hospital Regensburg, Department of Radiology, Regensburg/DE, ²SLK Kliniken Heilbronn GmbH, Clinic for Radiology, Minimally-invasive Therapies and Nuclear Medicine, Heilbronn/DE, ³SLK-Clinics GmbH, Ruprecht-Karls-University Heidelberg, Dept of Radiology, Minimally Invasive Therapies and Nuclearmedicine, Heilbronn/DE

EDUCATIONAL POSTERS

Magna Cum Laude

How to use your smartphone to assist CT-guided puncture

M. Hirata¹, R. Watanabe²

¹Matsuyama Shimin Hospital, Radiology, Matsuyama Ehime/JP, ²Matsuyama Shimin Hospital, Surgery, Matsuyama Ehime/JP

Cum Laude

Drainage outflow from hypervascular hepatocellular carcinoma: what you need to know and why it is important in transcatheter arterial chemoembolization (TACE)

T. Minami¹, O. Matsui¹, S. Miyayama², A. Kitao¹, N. Terayama³, S. Kobayashi⁴, W. Koda¹, K. Kozaka⁴, D. Inoue¹, K. Yoshida¹, N. Yoneda¹, T. Matsubara¹, T. Gabata¹

¹Kanazawa University Hospital, Radiology, Kanazawa/JP, ²Fukuiken Saiseikai Hospital, Radiology, Fukui/JP, ³Takaoka City Hospital, Radiology, Takaoka/JP, ⁴Kanazawa University School of Medicine, Radiology, Kanazawa/JP

Certificate of Merit

The environmental impact of interventional radiology

M.P. Bolger, M.K. O'Reilly, G. Sugrue, L.P. Lawler

Mater Misericordiae University Hospital, Department of Radiology, Dublin/IE

Percutaneous dialysis arteriovenous fistula banding: technical review

H.K. Kok, E. Ryan, M.J. Lee

Beaumont Hospital Dublin, Department of Academic Radiology, Dublin/IE

Techniques to avoid complications during percutaneous cryoablation for renal cell carcinomas: all that we should know

K. Michimoto¹, K. Shimizu¹, Y. Kameoka¹, J. Miki², K. Kishimoto³, S. Sadaoka¹

¹The Jikei University School of Medicine, Kashiwa Hospital, Department of Radiology, Chiba/JP,

²The Jikei University School of Medicine, Kashiwa Hospital, Urology, Chiba/JP

ECIO 2016 – Bridging the gap between research and practice

Ciara Madden, CIRSE Office

Interventional oncology continues to move forward in leaps and bounds, and the Seventh European Conference on Interventional Oncology provided an ideal platform for learning about the latest developments and devices, and exchanging information with peers.

Held in Dublin, Ireland, from April 17-20, ECIO 2016 attracted more than 1,300 participants from 68 countries. Notably, over 30% of those taking part came from non-radiological specialties, which contributed to the strong multidisciplinary ethos of the meeting, and allowed for animated and fruitful cross-specialty discussions.

Colorectal liver metastases

A core theme at this year's congress was metastatic colorectal liver cancer. More than one million new colorectal patients are seen each year worldwide: approximately 15% of these have liver metastases at diagnosis and around 60% develop these during follow-up. Recent interventional oncology data demonstrate some promising adjuvant therapies, as well as increased survival time and improved quality of life in unresectable patients.

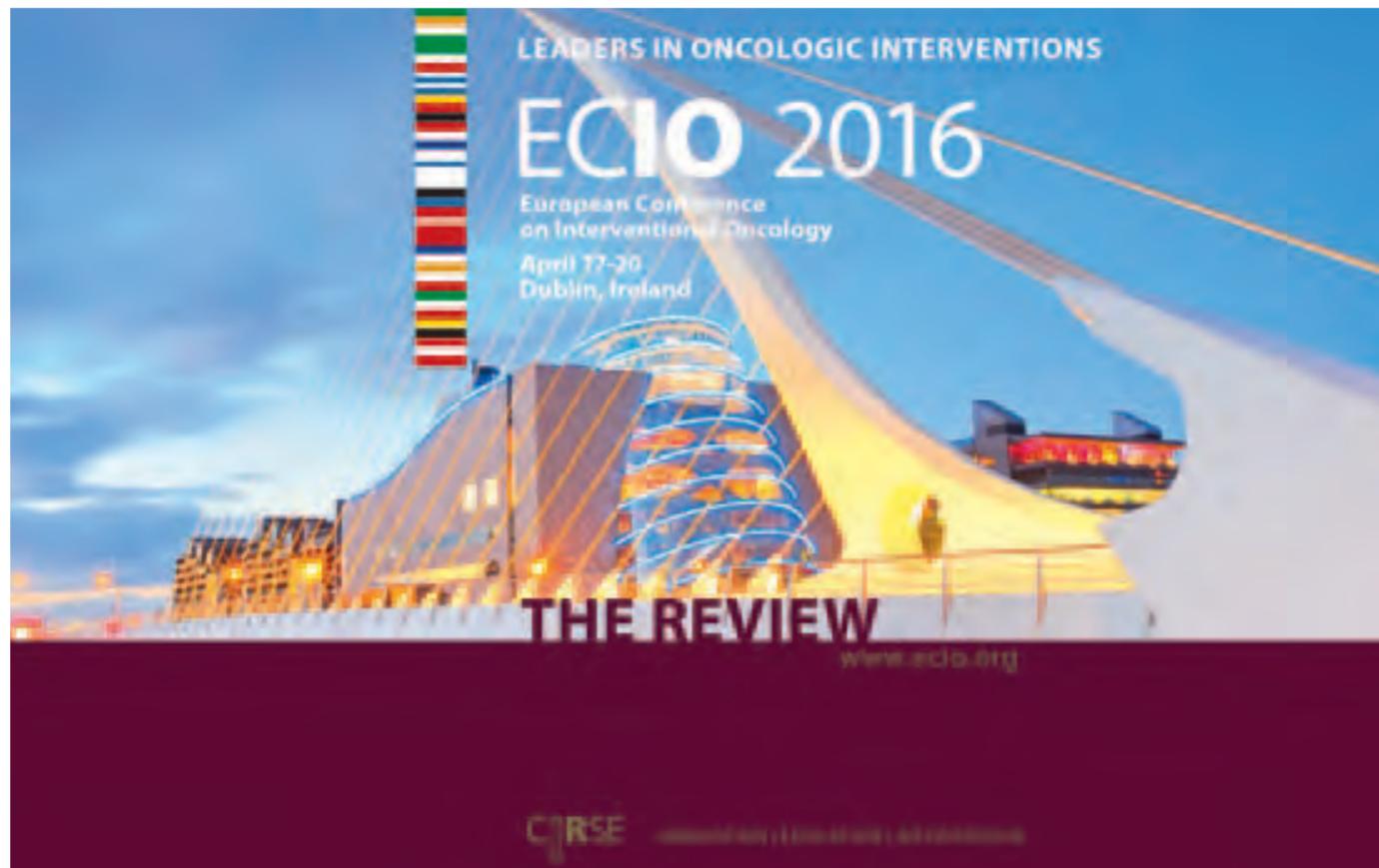
These treatments and their clinical application were thoroughly examined in a number of Clinical Focus Sessions and a Multidisciplinary Tumour Board, and were also touched upon at a unique session on immunotherapy, which was one of the most popular sessions of the meeting.

A diverse programme

Other topics of discussion included staples such as imaging, HCC, lung cancers, new developments and the clinical management of patients. The conference also addressed newer clinical territories such as neuroendocrine tumours and cholangiocarcinoma, as well as hosting a discussion on quality assurance in the IO field.

Interdisciplinary cooperation

As mentioned, a large proportion of the congress delegates came from non-radiological specialties. This is a welcome development, as the congress organisers, and indeed, all faculty members, have repeatedly stressed the importance of genuine collaboration and multidisciplinary discussions. In this spirit, the congress has consistently invited hepatolo-



gists, medical oncologists, gastroenterologists and more as part of the faculty, and we were proud to once again welcome these colleagues to the conference – many at the kind recommendation of the European Society of Medical Oncology (ESMO) and the European Society of Surgical Oncology (ESSO).

This interdisciplinary communication was supported and increased even further through CIRSE's popular Collaborating Against Cancer Initiative: a grant option that allows interventionalists to bring a non-radiologist colleague along at no extra cost.

Honorary Lecture

We were also proud to welcome a true advocate of interdisciplinary cooperation: renowned liver specialist Dr. Bruno Sangro. His Honorary Lecture, "Intra-arterial treatment of hepatocellular carcinoma at the dawn of systemic therapy" was a major highlight, and also touched upon a much-visited theme of the meeting: immunotherapy.

Other scientific highlights in 2016

With over 45 hours of educational content, selecting the highlights is no easy matter. Four of this year's five hands-on workshops were dedicated to localised tumour ablation: liver, lung, kidney, and a special session which went "beyond the mainstream" to cover thyroid, prostate and lymph nodes. A new hands-on workshop on supportive procedures included gastric and duodenal tube placement, central venous access and port PICC lines.

The always-popular video learning sessions featured step-by-step demonstrations on how to perform treatments in the lung, kidney and bone as well as the liver.

After the success of last year's new session Best IO Papers, this year introduced another feature called Invited Scientific Papers. Rather than operating as its own separate session, this new addition brought some of the top research papers into corresponding clinical focus sessions for presentation.

Clinical review

The ECIO 2016 Review brochure, which you will find in your congress bag, details the latest advances in a number of exciting fields, including metastatic colorectal liver cancer, immunotherapy, cholangiocarcinoma, neuroendocrine tumours, lung metastases, and kidney cancer.

Presentations from the conference can be viewed on ESIRonline – and all CIRSE delegates benefit from one year's access! CIRSE Members enjoy unlimited access. Log in with your congress or member ID and access over 9,000 presentations spanning a range of clinical areas!

www.esir.org

To get a taste of what clinical advances were discussed at ECIO 2016, please consult your complimentary copy of the ECIO 2016 Review!

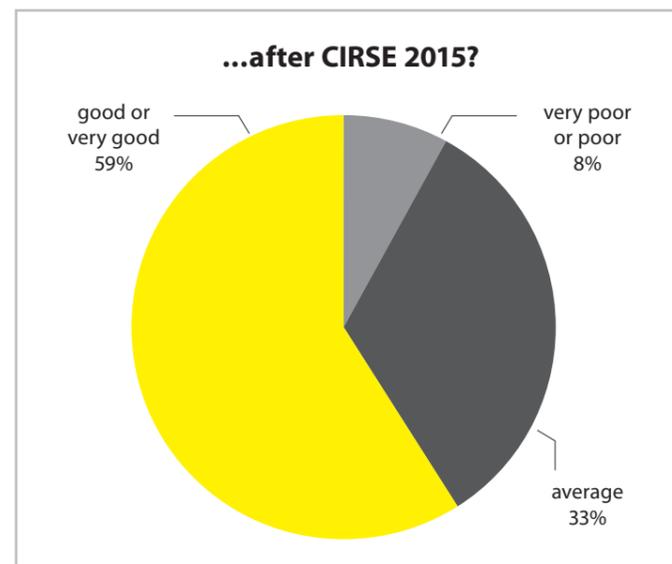
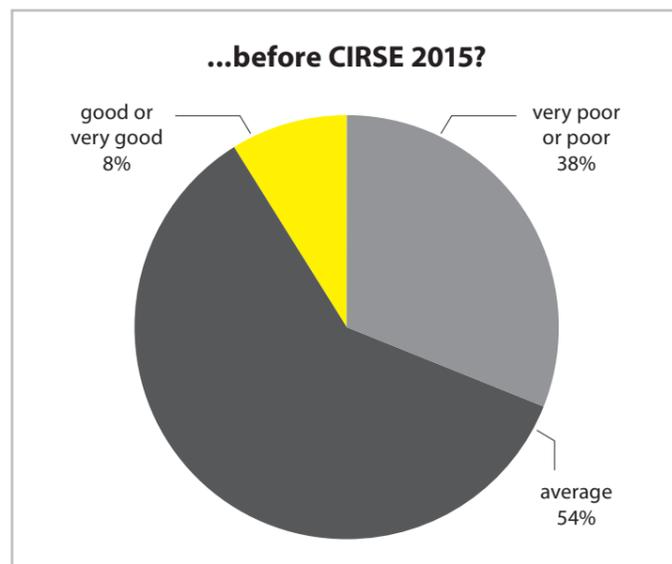


be inspIReD...

Helen Hemblade, CIRSE Office

We finished last year's Student Programme in Lisbon on a big high, partly because we welcomed 159 fantastic medical students from 23 countries, but also because in our evaluation survey, feedback was overwhelmingly positive! 92.9% of respondents indicated that interventional radiology had become more attractive as a career choice for them, demonstrating CIRSE's strong commitment to encourage the new generation of interventional radiologists.

How would you judge your knowledge of interventional radiology...



7 things for students to look forward to at CIRSE 2016

1. Student Programme Session

Exclusively for students, this session gives a thorough overview of interventional radiology with short talks from leading interventional radiologists and ample time to ask questions and interact. Saturday, September 10, 08:30-09:30, Room 115. The same lecture is also offered in Spanish at 16:15. Attendance is compulsory for all grant recipients!

2. The Students' Lounge

Whether you want to meet other students, write up your notes or simply sit back and relax, this is the place to be. Complimentary lunchboxes will also be available in the Students' Lounge from 12:00-14:00 (Saturday-Tuesday).

3. The Mentoring Breakfast

Get to know young interventional radiologists as well as experienced IR experts in a relaxed atmosphere and ask them anything you want to know about the life of an interventional radiologist while getting breakfast. See you there: Sunday, September 11 at 09:00-10:30 in the Students' Lounge.

4. The Students' Evening

The Students' Evening will be a great opportunity to socialise with your new-found friends and enjoy the legendary Barcelona night life. Every student gets a free drink on Sunday, September 11 at 20:00 in Bar Miramelindo.

5. The Students' Quiz – new!

An exciting feature has been added to the CIRSE Student Programme: The Students' Quiz will be your chance to form teams and win prizes in this pub-style IR quiz. The quiz will take place in the Students' Lounge Tuesday, September 13 from 14:30.

6. Hands-on Workshops

Once again, a number of Hands-on Workshop will be offered, free of charge!

Sunday, September 11, 14:30-15:30

Simulator Gallery
Principles to practice: education and simulation skills training – The role of embolisation in trauma

Sunday, September 11, 16:15-17:15

Room 130
Embolisation: materials and tools

Monday, September 12, 16:15-17:15

Room 111
Tumour ablation: tips and tricks

Tuesday, September 13, 14:30-15:30

Simulator Gallery
Principles to practice: education and simulation skills training – The role of IR in limb salvage

7. Company Learning Centres

Cook Medical

Saturday 09:45-10:45

Cook Medical will be offering four stations that demonstrate basic skills.

- Drainage/GI
- Stents
- Access
- Endovascular Grafts

Merit Medical

Tuesday, September 13, 11:00-12:15

Why did I choose the radial approach? Insights from my practice

Moderator: A. Moelker (Rotterdam/NL)

From stick to haemostasis, we will show the benefits of radial access step by step at 4 different stations.



The European Trainee Forum: talkin' 'bout my generation

Helen Hemblade, CIRSE Office

A decade ago, during the 2006 European Congress of Radiology, Dr. Frederick Keller from the Dotter Institute in Portland, Oregon, anticipated four threats to the survival of interventional radiology. Among these were "stagnation of training" and "lack of recognition and identity". At the time, IR was not yet considered a primary specialty of medicine in the U.S. and as such, neither training nor "identity" of the specialty had been defined.

In 2012, interventional radiology became a primary specialty in the U.S. and, while still undergoing some discussion, a new training pathway for IRs is being put in place from now until 2022. In Europe, conversely, the task of streamlining education and training for an emerging medical specialty across a large continent containing many healthcare systems is not quite as straightforward. It is, however, important to ensure the future of IR is not hindered by lack of opportunities and that support for the next generation of interventionalists remains strong in Europe. It is therefore a subject that must be addressed on a collective level.

CIRSE's educational and trainee initiatives

In 2010, the CIRSE Student Programme was created to give undergraduate European medical students the opportunity to attend CIRSE annual meetings free of charge, and a published curriculum on IR practices is given to students in order to provide them with a clear overview of the subspecialty. In terms of setting standards within the subspecialty in Europe, since 2010, the European Board of

Interventional Radiology exams have been equipping interventional radiologists with demonstrable proficiency in IR's toolkit of key skills and important safety measures. CIRSE also provides continued training for expert IRs in the form of its European School of Interventional Radiology (ESIR) two-day courses, covering a number of pertinent topics in IR.

Introducing the ETF

Formed earlier this year, European Trainee Forum (ETF) was established in order to create a community within CIRSE dedicated to the training, educational and networking needs of IR trainees across the EU, as well as to promote IR among peers and students. The Subcommittee functions on a highly inclusive level, encouraging input from all those interested in interventional radiology training. Current members come from across Europe, representing IR societies from the UK, Croatia, Turkey, the Czech Republic, Switzerland, Denmark, Russia, Poland, Italy, Spain and Portugal. The Subcommittee had its first official meeting in Dublin during ECIO 2016 and plans to regularly meet at CIRSE congresses.

Plans for CIRSE 2016

Mentoring Breakfast

Sunday, September 11, 09:00-10:30

Students' Lounge

The mentoring breakfast is an ideal opportunity for willing IRs to impart their knowledge and experience to medical students over coffee and croissants!

IR Trainee Session

Tuesday, September 13, 11:30-12:30

Room 133

Aimed at students and interventionalists-in-training, the IR trainee session will open with an introduction from ETF Subcommittee Chairperson Dr. Gregory Makris, followed by:

A. Adam: *Developing your academic career as an IR*

D. Vorwerk: *Publishing and CVIR*

O. van Delden: *The EBIR Exam*

C. Binkert: *Establishing private clinics and clinical entrepreneurship*

Don't miss it!

Building an IR career
IR Trainee Session

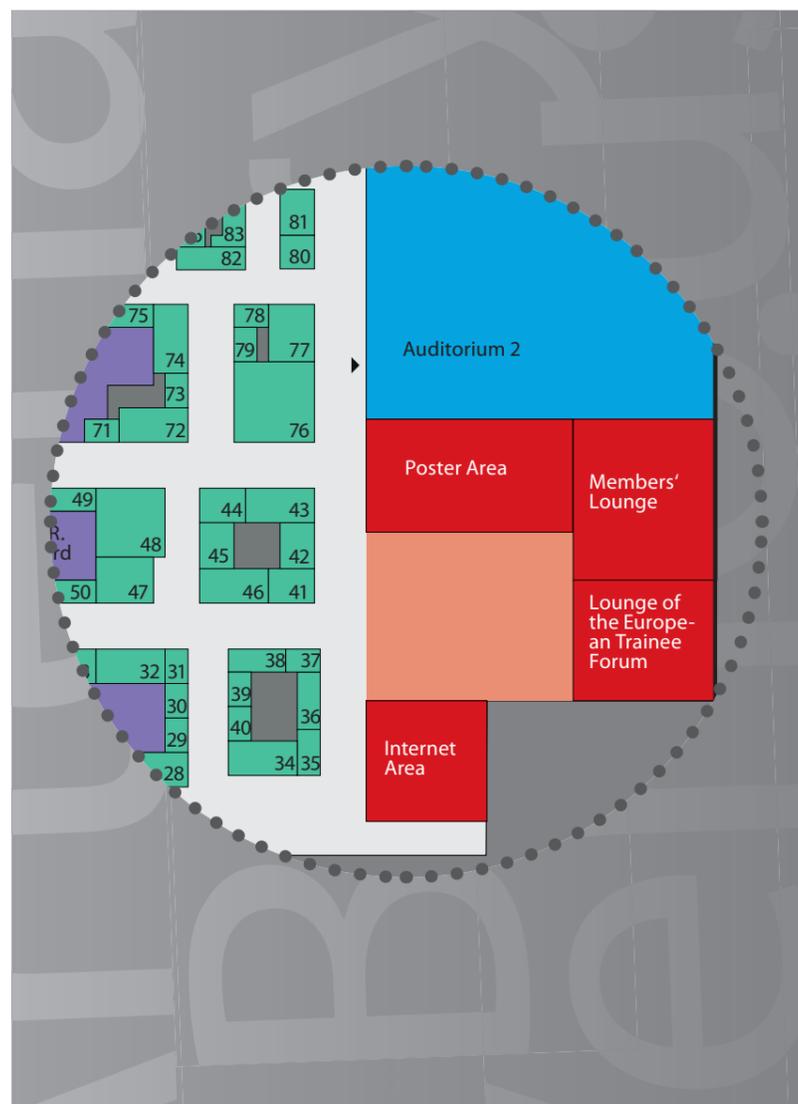
Tuesday, September 13, 11:30-12:30

Room 133

CIRSE 2016 is offering another exciting new feature along with the launch of the ETF!

The **European Trainee Forum Lounge** is a designated area for young interventional radiologists to relax, meet peers, establish contacts with leading European IRs and help build their professional network.

Should you like to get involved with the ETF or have any ideas to share, please get in contact with raho@cirse.org



Members' Lounge

As a special service to members, CIRSE is offering a Members' Lounge at Barcelona 2016.

All CIRSE members are invited to take a rest, have some complimentary coffee and make use of our wireless internet connection. Lunch will also be provided in this space.

The Members' Lounge is located on the entrance level, next to Auditorium 2.

ETF Lounge

There will also be a new European Trainee Forum Lounge next door to the Members' Lounge for IR residents to mingle and relax as well.

Residents and IRs-in-training will be able to network and enjoy complimentary coffee and wireless internet in this space, and lunch will be provided to enjoy here too!

Stop by throughout the congress and meet your colleagues!

IR Congress News is published as an additional source of information for all CIRSE 2016 participants. The articles and advertorials in this newspaper reflect the authors' opinion. CIRSE does not accept any responsibility regarding their content. If you have any questions about this publication, please contact us at madden@cirse.org.

Editors-in-Chief: C. Binkert, F. Fanelli
Managing Editor: Ciara Madden, CIRSE Office
Editorial Team: Michelle Weiss, Helen Hemblade
Graphics/Artwork: LOOP. ENTERPRISES media / www.loop-enterprises.com



At Terumo Interventional Systems, we constantly work to refine and perfect our products so that interventionalists can do more. That is why we support great thinking that pushes back the boundaries of our field.

PUSHING BOUNDARIES

We are committed to innovation that embraces intricacies and complexities. Our exceptional tools and education programs empower physicians with the confidence they need to perform ever-more challenging procedures and spark progress.

