Good morning everyone!

I hope you have been enjoying this excellent meeting here in Glasgow.

There are many good reasons to attend today’s Josef Roesch Lecture, which will focus on prostatic artery embolisation. Professor Rösch is one of the pioneers of our specialty, and we have learned much from him and from the teachings of his “disciples”. Rösch et al. reported the first clinical transcatheter visceral embolisation procedure in 1972. Since then, embolisation procedures have become progressively more sophisticated, embolic agents have become more varied and complex, and both are being applied to new organs and in new situations. Improvements in imaging and catheter technology have also made possible significant advances.

Interventional radiological procedures have been used in all areas of medicine, and embolisation has been used to treat genitourinary diseases, including in the prostate gland, for a long time. So, we may ask ourselves: is prostatic artery embolisation (PAE) new?

The dawn of prostate embolisation

Several therapeutic methods were developed in the field of urology during the 1970s. Post-biopsy embolisation of arteriovenous fistula, and the treatment of massive haematuria caused by prostate cancer using absorbable gelatin sponge and autologus clots, were reported. Later, a large number of cases confirmed that the embolisation technique was safe and effective for controlling bladder and prostate neoplasm bleeding, and after prostate biopsies and surgeries. Therefore, it is fair to state that embolisation of the prostate is a familiar concept, that it has yielded excellent clinical results, and that its use has saved many lives.

Benign prostatic hyperplasia

One of the most prevalent urological diseases in men is benign prostatic hyperplasia (BPH), with an estimated annual cost of $1.9 billion (USD) relating to treating lower urinary tract symptoms (LUTS). LUTS commonly result from BPH. Approximately half of all men with a histologic diagnosis of BPH experience moderate to severe symptoms, including nocturia, urinary frequency, urgency, decreased urine flow rates, hesitancy and incomplete bladder emptying. Over time, urine retention may cause an increase in urinary tract infections, bladder or kidney damage, bladder stones or incontinence. Furthermore, other complications, including renal failure, renal stones and diverticulum formation, infection and bleeding, can also occur.

The first published case recognising that PAE could have a therapeutic effect on BPH symptoms was reported by DeMeert and colleagues in 2000. After that, pre-clinical studies showed that PAE could be performed safely, and result in prostate size reduction without causing erectile dysfunction.

It is great to have a wonderful new idea that has the potential of becoming reality. But, for this to happen, the idea must be extracted from the brain, taken out into the world, and turned into reality. This is what we have seen happen with PAE!

In June 2008, my colleagues and I were the first to intentionally treat, in humans, enlarged prostate due to BPH with PAE. In 2009 and 2011, CVIR reported preliminary results and the midterm follow-up on two patients who suffered from urinary retention due to BPH and prostate enlargement, and who were treated successfully with PAE. In 2011, Pisco et al. reported their initial experiences with PAE in patients with LUTS associated with BPH, showing clinical and quality-of-life improvements and prostate volume reduction during follow-up. This constituted the recognition of a new indication for a familiar technique.

A new therapy is born

Following these fruitful initial results with PAE, other groups (Bagla et al., Gao et al., Somani et al., and Kurbatov et al.) started to publish their own personal experiences and results. Nowadays, with more than one thousand procedures performed all over the world, physicians have demonstrated that PAE should be considered as a minimally invasive treatment alternative for symptomatic patients with enlarged prostates due to BPH. Immediate clinical success and quality-of-life and peak urinary flow improvements have been obtained in 90% of patients. A mean PSA value reduction of...
**Josef Roesch Lecture**

The specialists best suited for the performance of prostate artery embolisation (PAE) are the interventional radiologists, given their knowledge of arterial anatomy, expertise in other embolisation procedures, as well as clinical experience with microcatheter techniques, and understanding of the disease, and for achieving the best choice of therapy for a particular disease or clinical problem.

50% of baseline with a mean prostate volume reduction of 30% has been observed on MRI. Most reported complications were classified as minor, and occurred in less than 10% of patients, such as blood in the stool, reduction of ejaculatory volume, urinary tract infection, haematospermia, and ischaemia of the bladder, pelvic bone, seminal vesical and rectum. Symptom recurrence has been observed in 15-20% of patients in a mean follow-up time of 15 months. A multidisciplinary approach including urologists, diagnostic radiologists and interventional radiologists has been essential for understanding the disease, and for achieving better results and increasing confidence.

**The importance of evidence**

In 2001, the British gynaecologist J.W. Scott conceived what is called “Scott’s parabola”, to illustrate the cyclical “rise and fall of a surgical technique”: a procedure (or therapy) shows great promise at the outset, then becomes the standard treatment after producing encouraging results, only to fall into disuse later as a result of negative outcome reports – and perhaps the availability of better new strategies. We all have seen this, haven’t we?

The rise-and-fall-scenario describes a very common occurrence. In fact, it may well be an inevitable result of progress and innovation, a fact of life. But understanding this does not in any way diminish our collective duty and obligation to do the best we can for our patients. At any point in time, rigorous scrutiny of the evidence on hand should form the basis for determining the best choice of therapy for a particular disease or clinical problem.

I encourage you to come to the Josef Roesch Lecture to hear about what we have learned about PAE around the world. I look forward to seeing you there!
Demonstrating quality through data

Peter Reimer (EBIR) and Lothar J. Heuser

Let us start by asking a Sesame Street-style question: “Why should we demonstrate quality through data?” Well, turf battles with friends from several disciplines aside, interventional radiology has reached social media and is described as a medical sub-speciality of radiology that utilises minimally invasive, image-guided procedures to diagnose and treat diseases in nearly every organ system. The concept behind IR is to diagnose and treat patients using the least invasive techniques currently available, in order to minimise the risk to the patient and improve health outcomes [1]. Following this description, it is mentioned that, “[m]any conditions that once required surgery can now be treated non-surgically by interventional radiologists. By minimising the physical trauma to the patient, peripheral interventions can reduce infection rates and recovery time as well as shorten hospital stays” [2].

While patients may prefer such treatments, colleagues who could be replaced by such a shift in care may not be equally enthusiastic, may not be motivated to provide such treatments or may look for other options. Furthermore, the older approach has to be regarded as the gold standard until newer treatment options have proven to be superior, which brings us back to the topic of this article.

Does quality win?

Let us assume that quality will ultimately win and that structures within national medical systems will subsequently change. Specialties able to provide better services will be empowered to provide such services to patients. This would be the case if systems were to react on the basis of current knowledge supported by recent data. In the era of evidence-based medicine, guidelines are developed on the basis of consistent, reproducible, and solid data, with an emphasis on randomised controlled trials and meta-analyses.

IR is not a field known for many publicly-funded randomised controlled trials, and the CE-mark paradox is a part of that reality. In order to convince clinical colleagues, medical authorities or national institutes that decide on reimbursement of IR’s value, it is crucial to carry out discussions on the basis of sound scientific data. Sometimes it may be difficult to convince colleagues to participate in a trial that might prove the established therapy (former gold standard) inferior. Radiologists are especially reliant on the co-operation of physicians in other disciplines who are direct caretakers of patients.

How may we demonstrate quality through data?

Let us hypothesise that IR would gain more acceptance if professional societies were to stimulate, foster or organise clinical trials registries with the potential advantage of faster enrolment. The clinical results of IR procedures can be documented at a national or professional society level by providing a database on technical/clinical complications, success rates, or relevant results, such as survival or quality of life. Such databases, initiated and provided by a national or professional society, can also be used to monitor new devices that are drifting into the market on the basis of CE labelling in Europe without the availability of clinical trials. The registry of the German Society for Interventional Radiology (DeGiR) - Deutsche Gesellschaft für Interventionelle Radiologie und minimal-invasive Therapie, organised within the German Society of Radiology (DRG), represents such a potential tool. DeGiR was founded in 2008, substituting the previously existing working group for interventional radiology (AGIR) within the DRG. DeGiR represents radiologists dedicated to interventional and minimally invasive procedures, with a special focus on ensuring quality education and documentation within clinical practice.

The first AGIR president (Prof. Zeitler) initiated a strategic quality assurance programme back in 1987, in the form of an AGIR registry that documented procedures, including complications, based on a paper sheet per patient. Data were mailed to his hospital for further evaluation. The sheets were manually transferred to FoxbaseR in 1990. General results were presented at the national radiology meeting and published. In 1993, Prof. Zeitler had the data management over to Prof. Heuser, who introduced standardised software for decentralised data collection in 1994. Institutions copied their data to floppy discs once a year, and mailed these to Prof. Heuser in Bochum for further analysis on a larger scale, with more than 18,000 patients documented in 1998. Based on this system, each participating hospital received its quality data and an external benchmark comparison. In 2005, a new system, featuring server-based central data management and online documentation of pseudonymous patient data, was established. That development was accompanied by numerous suggestions and demands to improve manageability, and a software group was formed to discuss possible upgrades, including expansion. Currently, software modifications and improvements are implemented during the year and are released at the beginning of each year. Each participating institution may extract its own data as compared to the pooled data of all other participating institutions.

The current structure covers a broad spectrum of 45 procedure groups organised into 14 categories and 131 anatomic regions. Specific data are required per case to completely document a patient, including patient selection criteria, procedural details, outcome, involved interventionalists, technical success, medical success, complications or radiation exposure (Fig. 1 and 2). The names of interventionalists involved are also forwarded for the quality step 1 / step 2 programmes.

The number of participating institutions is steadily increasing, they receive an annual certificate that can be used for strategic purposes within or outside of the hospital. The pool of data is a valuable resource for systematic reviews, such as quality reports, by DeGiR, proving the broad range of vascular and non-vascular interventions [3]. The number of documented cases exceeded 100,000 in 2012 (Fig. 3).

Based on experiences with the registry, and due to the ever-increasing importance of structured training, a second strategic tool for improving quality at a national level was developed. Focusing on the training and certification of specially trained interventional radiologists and interventional training centres, this system was incrementally introduced during the past five years. The broad field of interventional radiology was initially divided into four further fields:

1. Vascular procedures – revascularisation
2. Vascular procedures – embolisation
3. Oncology treatment
4. Biopsy + drainage + pain treatment

Let us assume that the quality will incrementally increase year by year and that the registry will provide an approach to prove manageability, and a software group was formed to discuss possible upgrades, including expansion. Currently, software modifications and improvements are implemented during the year and are released at the beginning of each year. Each participating institution may extract its own data as compared to the pooled data of all other participating institutions.

The current structure covers a broad spectrum of 45 procedure groups organised into 14 categories and 131 anatomic regions. Specific data are required per case to completely document a patient, including patient selection criteria, procedural details, outcome, involved interventionalists, technical success, medical success, complications or radiation exposure (Fig. 1 and 2). The names of interventionalists involved are also forwarded for the quality step 1 / step 2 programmes.

The number of participating institutions is steadily increasing, they receive an annual certificate that can be used for strategic purposes within or outside of the hospital. The pool of data is a valuable resource for systematic reviews, such as quality reports, by DeGiR, proving the broad range of vascular and non-vascular interventions [3, 4]. The number of documented cases exceeded 100,000 in 2012 (Fig. 3).

Based on experiences with the registry, and due to the ever-increasing importance of structured training, a second strategic tool for improving quality at a national level was developed. Focusing on the training and certification of specially trained interventional radiologists and interventional training centres, this system was incrementally introduced during the past five years. The broad field of interventional radiology was initially divided into four further fields:
A two-step personal certificate is offered to colleagues who participate in a minimum number of CME activities and can prove a minimum number of annual cases per module. Level 1 is open to board-certified radiologists without an additional exam. Level 2 requires clinical practice of one year beyond board certification, and an additional oral and written test for each module. Furthermore, institutions can be certified as a centre of education for each module; this requires the presence of a colleague with a Level 2 certificate as well as several additional technical and structural requirements. The latter certificate is linked to the quality registry and a minimum number of annual cases per module.

Fig. 4 displays a list of the top ten documented interventions, including the number of interventions performed in 2013 [5].

This initiative received a lot of attention and triggered a steep increase in DeGIR’s membership, with >1,300 individuals and >250 institutions currently involved, providing a service network across the nation and strengthening the position of radiologists providing interventional services. Several new IR courses are being offered, intensifying educational opportunities. This unexpected success prompted our colleagues from the German Society of Neuroradiology (DGNR) to join forces with us. Two new modules were introduced:

Module E: neurovascular procedures – revascularisation
Module F: neurovascular procedures – embolisation

Starting in 2016, we plan to offer combined Level 2 exams. The teamwork with neuroradiology will allow us to provide a complete vascular service in developing areas like acute stroke treatment, where offering a broad service at a national level will only be possible by way of joint efforts.

The most recent development targets the issue of new devices with CE marks. These devices sometimes lack the clinical data available for approved drugs. It is true that without the rapid technical progress made in the field of medical devices, it would not have been possible for interventional radiology to develop as quickly as it did during the last decade, and that no major complications have occurred so far. Nonetheless, new devices should be monitored separately and with more care to ensure patient safety and even greater technical and clinical success. The DRG and DGNR therefore joined a software development group that tailors online documentation to respective new devices.

In summary, the DeGIR quality management software is an important tool for quality assessment and quality assurance in interventional radiology. It is adaptive to modifications of interventional procedures and the introduction of new techniques and devices. Furthermore, it forms the basis for documenting expertise for the certification of qualified departments and radiologists.

The authors would like to acknowledge and thank Prof. Arno Bücker and Prof. Ansgar Berlis for their helpful comments.

References:
2. http://www.degir.de/site/qualitaetssicherung?PHPSESSID=1o87646o0h

Fig. 4: Top Ten Interventions 2013

Branching out beyond Europe
Places now available for corresponding members!

Register for the EBIR examinations to be held in Europe in 2015:

VIENNA, March 4-5, 2015
LISBON, September 25-26, 2015

Colleagues from Australia and New Zealand will soon be able to register for the first EBIR examination held in co-operation with IRSANZCR.

MARK YOUR CALENDARS:
MELBOURNE, FEBRUARY 7, 2015

For more information, please visit www.cirse.org/ebir
Procedural complications and their management

Hannu Manninen (EBIR)

Procedural complications in endovascular interventions for chronic critical limb ischaemia (CCLI) occur in 5-10% of patients, and half of these are major [1]. The complications can be categorised as local or systemic.

Local complications and their prevention

The most common local complications consist of access site bleedings, mainly pseudo-aneurysms or haematomas. Temporary arte-terio-venous fistulas can occur, but these rarely manifest themselves clinically. Puncture below the mid-level of the femoral head, under fluoroscopic control, is usually safe. On the other hand, compression of the puncture site of the superficial femoral artery is less effective than that of the common femoral artery, and is prone to prolonged bleeding. US-guided puncture is useful for the accurate location of the femoral artery bifurcation, and for guidance of the puncture. A careful examination of previous angiographies or MR/CT angiographies is most useful for purposes of selecting an appropriate puncture site and obtaining knowledge of possible calcifications at the access site and the target lesions.

The most feared complication resulting from arterial access is retroperitoneal bleeding, the risk of which is increased by high-inguinal puncture, and which appears to be more common in elderly patients. Ilac artery perforations are potentially life-threatening. These usually result from catheter manipulations, and are associated with forceful dilatations of calcified lesions causing oversized balloons. The small calcified arteries of elderly women seem to be especially fragile. Post-dilatation of some nito-stenotic stents has anecdotally been associated with iliac artery ruptures. In infra-inguinal arteries, arterial perforations are usually clinically less important, but do sometimes cause compart-

mental syndrome if the bleeding is continued, which is more common in patients receiving anticoagulants. The use of sub-intimal recanalisation techniques, with or without re-entry catheters, does not seem to increase the complication rate [2], nor do the novel retrograde pedicle accessory puncture techniques. Distal embolisation is usually associated with the recanalisation of sub-acute total occlusions in iliac and femoral arteries.

Local thrombosis is commonly encountered during the manipulation of diffusely diseased infra-popliteal arteries with poor distal out-flow, and is often attenuated by arterial spasm. Adequate heparinisation, preferably under ACT control (target level usually about 250 seconds) during the intervention, and the liberal use of intra-arterial nitro (in boluses of 250-500 µg) in the case of spasms, are the best ways to avoid this complication. Sub-acute thrombosis at the puncture site is sometimes encountered after the use of collagen plug closure devices, these devices should be used cautiously in calcified arteries.

Systemic complications and their prevention

Systemic complications mainly result due to the nephrotoxicity of iodine contrast media, and contributing factors include underlying renal disease caused, e.g. by diabetes, and patient dehydration. Sufficient pre- and post-interven-
tional hydration with IV fluids is mandatory. Staging the diagnostic angiogram and the treatment intervention may be wise, and using CO₂ as a contrast agent is useful for guiding interventions in patients with severe renal insufficiency. Allergic reactions, although rare, always have to be remembered and, in case of anamnetic allergy, adequate prophylaxis is to be considered. Cardiac infarction is a rare complication, but may be encountered during lengthy, stressful interventions, especially if there is significant bleeding due to a vascular rupture.

Diagram and management of complications

A diagnosis of local puncture site complications is confirmed using US. In cases of pseudo-aneurysm, US-guided thrombin injection is usually very effective. In cases of diffuse active bleeding, prolonged compression, e.g. the Femostop system, can be tried, but in case of brisk bleeding with a rapidly increasing haemato-
toma size, surgical closure must be carried out urgently. Also, thrombotic occlusion of the common femoral artery caused by vascular closure plug devices is best treated with surgical thrombectomy.

Distal thromboembolisms are usually managed with aspiration and local catheter delivery of thrombolytics. The neurointerventional distal access and aspiration catheters seem to be effective, and less traumatic, than conventional aspiration catheters in infrapopliteal arteries. In case of an arterial rupture, prolonged balloon occlusion is usually very effective in infrainguinal arteries. Where ilac perforation occurs, balloon occlusion should be carried out with low pressure, and protamine should be given to remove the heparin effect. Fluid resuscitation is usually mandatory due to haemodynamic colapse in these patients. An opening of the bal-
loons and angiography are only possible after stabilisation of the haemodynamics. In case of an extensive rupture and/or continued bleed-
ing, placing a stent-graft/covered stent is the best option. It is to be noted that the damaged arterial segment is often longer than may be seen in an angiography, and a long stent is pre-

ferred to cover the whole segment. It may be necessary to place an aortic occlusion balloon from the contralateral iliac to secure this.

Post-interventional retroperitoneal bleeding usually causes lower abdominal pain, but this condition may also manifest itself only as hypo-
tension or even angina pectoris in patients with cardiac disease. The diagnosis is most reliably made with CT, given that US is not accurate, especially in obese patients. If active bleeding is not seen at CT angiography, fluid resuscitation may be sufficient therapy. Active bleeding, however, usually requires urgent surgical or endovascular repair.

References:

1. Matsi PJ, Manninen HI. Complications of lower-limb percuta-

Hannu I. Manninen

Kuopio University Hospital Kuopio, Finland

Prof. Manninen is a professor of radiology at the University of Eastern Finland and Chairman of the Interventional Radiology Study Group at Kuopio University Hospital, where he works in the Department of Clinical Radiology. He has contrib-
ted to several CIRSE events, including as moder-
ar on a special session on upper extremity PVD at CIRSE 2013 and instructor for a workshop on upper extremity arterial intervention at CIRSE 2012. Prof. Manninen also served as local organ-
iser of a 2006 CIRSE course on advanced vascular interventions held in Finland. Prof. Manninen has authored and co-authored multiple articles, including on stent-assisted embolisation of recur-
rent or residual intracranial aneurysms and the association between MRI findings of uterine leio-
ymyomas and symptoms demanding treatment.
The necrosis-inducing properties of focused ultrasound (FUS) have been understood for decades, and for the past 16 years, it has been paired with MR image-guidance modalities that are able to provide real-time thermal feedback. New-generation MR and ultrasound devices have significantly increased application possibilities, and researchers have eagerly been investigating these.

The mechanisms

HIFU is unique in its non-invasiveness. As acoustic waves pass through tissue, some of the energy is absorbed and converted to heat. By focusing multiple beams on a tiny area, it is possible to achieve temperatures that induce tissue necrosis, allowing ablation of benign and malignant growths without puncturing a patient’s skin.

At the focal spot, a number of phenomena occur: heating, cavitation and coagulation necrosis. Investigating and understanding these mechanisms has expanded the possible applications of HIFU/FUS. Interventional radiologists initially avoided cavitation-induced tissue damage due to its unpredictable nature, but now believe that this can be harnessed to enhance ablation efficacy. Other research is exploring the use of sub-thermal ultrasound energy for targeted drug delivery, specifically, via heat-sensitive liposomes and other nano-carryers in the vicinity of tumours. Sensitisation of cancer cells to radiation therapy is another more recent discovery.

If proven to be safe and effective, HIFU/FUS could revolutionise treatment. Not only would it provide adjuvant options for, or even an alternative to, percutaneous procedures and chemo- and radiation therapy, but it could also offer a treatment option to patients precluded from these approaches.

Novel investigations

MR-guided focused ultrasound is currently approved for the treatment of uterine fibroids and bone metastasis in Europe; the USA, Canada, Asia and Australia, and (excluding the USA) for treating functional brain diseases. Research is being conducted on other potential applications, including cancers of the liver, breast, brain, pancreas, bone and prostate. These investigations are at an early stage. However, available evidence does show that, for a number of clinical applications, HIFU appears to be a safe therapy that does not rule out other treatment options, and achieves best results in small tumours (in terms of both clinical benefits and costs).

Specifically, early studies have shown a survival benefit in patients suffering from pancreatic cancer; a group that has the highest case-fatality rate of all cancer patients due to the predominance of late diagnoses and limited eligibility for surgical resection. Early results on breast interventions have also been promising, showing a reduced recurrence rate. Other research efforts are looking to improve FUS efficacy in the liver by devising a model for respiratory motion compensation, which would make it possible to deploy the maximum thermal dose to a tumour while preserving adjacent healthy tissue. Research teams are also exploring ways to overcome HIFU’s two main limitations – long treatment times and beam distortion caused by patient habitus.

Today’s Hot Topic Symposium

Many of the current investigations focus on the use of ultrasound-guided HIFU, particularly contrast-enhanced ultrasound. This Hot Topic Symposium will be devoted to MR-guided HIFU. Four invited experts will examine the modality from a variety of perspectives, offering insights into the current status of various investigations, including as to whether MR-guided HIFU may offer benefits beyond those provided by more established treatment options.

Principles of MR-guided HIFU

Andreas Melzer (Dundee/UK) will open the session, presenting Principles of MR-HIFU: what an IR should know.

He notes: “MRgFUS is not just an alternative to LR procedures, it offers novel applications and provides a variety of adjuvant options for conventional procedures. Patient selection, as well as planning and carrying out MRgFUS procedures, is significantly different from conventional LR. MR contraindications, appropriate patient positioning and adequate US ‘access’ to the region of interest have to be considered. A new approach has to be implemented, which involves looking at MR images with a focus on how ultrasound can pass through the surrounding tissue, and how obstacles – including bone, air-filled intestine, nerves, major vessels – can be avoided. Skin acoustic coupling, sonication spot size and cooling requirements are of importance. Fortunately, current MRgFUS and MR HIFU systems provide sophisticated planning, simulation and temperature control of each sonication. This has led to an extraordinarily high safety profile of the procedures, with mostly negligible, minor complications. One of the major current clinical constrains is the time required for sonicating large tumours, which is currently being tackled by novel sonication algorithms and advanced multiple element transducers.”

MR-guided HIFU and uterine fibroids

Matthews Matzko (Dachau/DE) will discuss a particular application of MR-guided HIFU addressing its use in treating uterine fibroids, and how suitable patients are best identified.

MR-guided HIFU and bone lesions

Alessandro Napoli (Rome/IT) will examine MR-guided HIFU for painful bone lesions, including whether its role is merely palliative or potentially curative.

According to Dr. Napoli: “What was initially considered a limitation – that bone blocks ultrasound energy diffusion – actually constitutes an advantage. In fact, after a few years of its use, HIFU appears to be perfectly suited for application to the bone, especially for pain-palliation purposes, thanks to the absorption features of cortical bone, which heats up during HIFU delivery, thus destroying neural layer.”

“A recent Phase III trial demonstrated the clinical efficacy of MR-guided HIFU as a non-invasive treatment for alleviating pain that results from bone metastases in patients for whom standard treatments have failed [1]. In addition, the modality is not merely a palliative tool for bone lesions. During the past year, our group was able to demonstrate its potential application for local tumour control in patients with bone metastases and in patients with osteoid osteoma [2, 3].

“We are convinced that, thanks to a lower complication rate, the needle-less design and positive bone rearrangement, MR-guided HIFU may in the near future be considered the treatment of choice in select patients. Data collection is growing. Along with clinical evidence and a more proactive IR community – already demonstrated by increased interest at CIRSE 2014 – this will fuel the expansion and adoption of this non-invasive modality, especially in the oncology setting.”

MR-guided HIFU and Prostate Cancer

Rajiv Chopra (Dallas, TX/US) will discuss the possibility of using HIFU to treat prostate cancer, specifically addressing whether the transurethral approach represents a safe and viable option.

References:
1.  JBJS 2014, JBJS 2014
2.  Investigative Radiology 2014
The major challenges for image-guided ablation are:
1. defining the lesion with millimetre-precision, 2. being able to precisely target the lesion, and 3. to monitor the treatment effect.

In many organs and many tumour types these are serious challenges, but in the lung, we have the ability to overcome these. We have the technology to accurately define each and every lesion, we have precise CT fluoroscopic-guided targeting and we have a clearly defined treatment endpoint, in that CT will show the treatment effect as a penumbra of ground-glass shadowing. Therefore, lung tumours represent the ideal opportunity for ablation. Further, there is a clinical need for a new treatment modality that can effectively and repeatedly treat multiple (often bilateral) small metastases. All the other therapeutic modalities – surgery, cyberknife and chemotherapy – have limitations such as major morbidity, the number of lesions that can be treated, or long-term efficacy, which lends to the rapid clinical adoption of ablation for this application.

Several studies have shown consistently complete ablation in smaller tumours, up to 3 or 3.5 cm in diameter. The causes of reduced ablation such as contiguity with larger (>3 mm diameter) vessels or bronchi are well known. Similarly, the complication and adverse effect profiles are well described. Pneumothorax is the most common expected side-effect. The chance of pneumothorax increases with the amount of aereated lung that is traversed by the needles/probes or antenna. Furthermore, the complication and adverse effects are likely to be correlated to the manoeuvres and the skill of the operator. The ready management of pneumothorax should be a standard part of any lung ablation’s repertoire.

The current clinical indications include patients with small volume but inoperable primary or secondary lung tumours. The most common metastatic lesions are from colorectal and sarcoma.

Colorectal Metastases

Colorectal metastases form the largest single cohort of patients. Results from metastasectomy suggest a survival advantage. Number, distribution and the speed of development of metastases; i.e., disease-free interval between primary resection and the development of lung metastases, are considered when deciding whether a patient is operable. Surgical preference is given to fit patients with fewer than 3 metastasectomous metastases, preferably unilateral, a longer disease-free interval and no extra-pulmonic disease. Ablation is currently considered in inoperable patients, but this is likely to expand beyond patients who are technically inoperable to include those whose tumour biology or co-morbidity favour use of the least invasive effective technique.

Three centres have reported 3-year survival rates for inoperable patients of 46, 47 and 57% respectively. Tumour size is important, as for all ablation techniques. Our analysis of 122 patients showed survival was better in patients with smaller tumours; median 51 months, 3-year 64% for ≤2 cm tumours versus 31 months and 44% for 2.1–4 cm tumours (p = 0.08). Importantly, a history of ablatted/resected liver metastases, systemic chemotherapy or prior lung resection, the total number of lung metastases ablated, uni- or bilaterality did not impact survival.

Sarcoma

These tumours are much less common than colorectal cancer, but pulmonary metastatic disease is a dominant feature. There is good evidence that repeated sequential metastasectomy is beneficial. The reported 3-year survival following surgery is between 30 and 54%, and the 5-year survival is 15–40%, with a median survival of 12–18 months. Treatment of all sites of disease results in better survival than partial treatment. Our results of RF or MW ablation of 87 sarcoma metastases in 36 patients reflected the therapeutic intent. We preferentially used MW in larger tumours. Particularly good results were achieved in 55 sub-2 cm metastases treated with radiofrequency, yielding a 95% primary control rate and mean (median not reached) 2- and 3-year overall survival of 51 months, 94% and 85%.

Other Tumour Types

Ablation can be applied to any lung metastasis, but will benefit those who have lung-only disease in whom all sites can be effectively treated. We have treated appropriately selected patients with metastases from renal cell, melanoma, head and neck, breast, oesophagus, primary lung, HCC, thyroid, parathyroid, duodenal, small bowel and anal carcinomas.

Conclusion

This is a growth area with a large number of potential patients. The IR community needs to push hard for the necessary anaesthetic, CT and CT fluoroscopic resources to be made available and to ensure that we have the necessary skilled workforce to carry out multi-tumour lung ablation as part of their routine clinical practice.
Your Peripheral CTO Toolkit

**Vi ance™**
Crossing Catheter

- **ATK** Standard
- **BTK** Flexible

**Enteer™**
Re-entry System

- **ATK** 3.75 mm
- **BTK** 2.75 mm

**Enteer™**
Guidewire

- Flexible | Standard | Stiff

Solutions engineered for ATK and BTK crossing.

Visit Covidien at CIRSE.

[Visit Covidien's website for more information](www.covidien.com/cto)
The most effective treatment for malignant obstructive jaundice is tumour surgical resection and biliary-enteric anastomosis. However, because this disease is occult, diagnosis is often made when surgical resection is no longer feasible. In addition, the operative mortality is high ($>20\%$). Percutaneous transhepatic biliary drainage and self-expandable metal stent placement is a commonly used method for palliation of malignant obstructive jaundice, which can significantly improve quality of life and extend the survival time.

It is essential to choose an appropriate approach, as it can improve the success rate, reduce the trauma to the patient, and decrease the incidence of complications. The percutaneous access route should avoid liver tumours (especially malignant ones). A right-sided approach is generally chosen because of the thick bile duct and the large volume of the right lobe. When the structure is located more cephalad in the confluence, resulting in the isolation of the right anterior or right posterior branch, or in right lobe atrophy, or when the portal vein has been invaded, a left approach should be chosen to drain more liver parenchyma. In patients with ascites, a left-sided drainage may be preferable, because it might avoid ascites leaking around the catheter and causing skin irritation.

Hilar biliary obstruction is not only difficult to deal with surgically, but also a technical challenge for percutaneous interventional drainage. It is most often caused by hilar cholangiocarcinoma (Klatskin’s tumour), gallbladder cancer invading the liver and/or hepatoduodenal ligament, advanced hilar adenocarcinoma in the hepatoduodenal ligament or liver metastases compressing hilar structures. For obstructions at the level of the bifurcation, with the left and right hepatic duct still connected, draining only one lobe with a metal stent may be better tolerated, and placed with its distal end in the common hepatic duct and the proximal end in the drained bile duct. Although trial et al. reported no significant difference between biliary drainage with or without stent patency rate with unilobar versus bilobar drainage, even in Bismuth type II and III hilar obstructions, most authors suggest that survival is better with drainage of both sides of the liver.

This bilobar drainage with metal stents has been preferred in patients with obstruction at the level of the bifurcation, with the left and right hepatic duct isolated. In most cases, the contralateral duct is isolated. In patients with ascites, a left-sided drainage may be preferable, because it might avoid ascites leaking around the catheter and causing skin irritation.

Percutaneous transhepatic biliary drainage and self-expandable metal stent placement is a commonly used method for palliation of malignant obstructive jaundice, which can significantly improve quality of life and extend the survival time.

Stenting and drainage of the biliary tract is a safe procedure, but does have related complications (ranging from 8-30%), which can be divided into immediate and late complications.

Immediate complications include pain at the site of puncture; bile leakage; intraperitoneal and extrahepatic bleeding, including haemobilia; pneumothorax; haemothorax; sepsis; and catheter-related problems such as kinking or dislocation, which can often be prevented by using normal or internal-external drainage catheters and locking pig-tails.

Late complications include cholangitis, pancreatitis, hepatic abscess, septicemia, and catheter stent blockage or arterial or venous biliary fistulae.

Stent occlusion may result from tumour ingrowth or overgrowth or may be due to biliary sludge and impacted stones or mucosal hyperplasia in the stent, as a result of chronic inflammatory reaction to the stent mesh. A careful imaging review is mandatory for planning biliary drainage and stenting of hilar obstructions.

Technical success of percutaneous biliary drainage has been reported as being greater than 90%, and distal success as more than 75% in all major series in a review study. Stents can occasionally become blocked due to either biliary sludge or tumour recurrence, resulting in the reappearance of jaundice, which may occur in 10-40% of patients at some point after the procedure. Tumour recurrence can grow either through the stent struts or overgrowth of the proximal or distal end. Endoscopic intervention is not possible, a percutaneous approach will be needed where a similar size or smaller metal stent is coaxially inserted into the blocked one with or without balloon dilatation.

Most complications can be managed conservatively, although the more serious ones may need further radiological or surgical intervention. Procedure-related mortality is very low (0.2-3%), although 30-day mortality is significant (2-20%), usually due to the underlying disease process, from deranged liver function, malnutrition and cancer cachexia.

Metal stents have higher patency rates, shorter hospital stay for patients and lower overall cost than plastic stents. Covered metal stents are now available, but stent migration and occlusion of side branches (including cystic or pancreatic ducts causing cholecystitis and pancreatitis respectively) are potential complications that may limit their use. The use of self-expanding metal stents has increased due to fewer long-term complications than are seen with the smaller diameter plastic stents, particularly early stent occlusion. It is well known that advances in adjunctive chemotherapy and radiotherapy also form part of palliative treatment, which prolongs life expectancy in patients who have had stents inserted and thereby possibly outline the stent-patency period.

Evidence indicates that those patients with cholangiocarcinoma who are not candidates for surgery should be offered brachytherapy or photodynamic therapy in addition to biliary stenting, as median survival and stent patency is prolonged compared to stenting alone.

References:
LEADERS IN ONCOLOGIC INTERVENTIONS

ECIO 2015
Sixth European Conference on Interventional Oncology

Join us for ...
Multidisciplinary tumour boards,
new horizons sessions and
lots of tips and tricks for
local tumour management

www.ecio.org

April 22-25, 2015
Nice, France
IR-relevant sedation and analgesia techniques

Alessandra Vari

The scope and capability of interventional radiological expansion are expanding faster than those of any other sub-specialty of medicine today. Prompted by parallel advances in biomedical and computer technology, interventional radiology and anaesthesiology are moving from merely providing replacements for traditional, invasive treatments (such as open surgery) to innovatively creating novel treatment strategies.

The growth in the number and complexity of interventional radiological procedures has highlighted the need for safe and effective sedation and analgesia (SA) in the IR suite. The literature reports large inter-hospital variability in practice patterns among countries and institutions, with different levels and methods of sedation being used for similar procedures all over Europe and worldwide [1]. Therefore, the need to standardize SA protocols for non-anaesthesiologists, in accordance with existing evidence and universally acknowledged. In addition, trends towards making interventional radiology a clinical specialty are not uniform, and anaesthesiologists or nurse anaesthetists are usually not available to attend all interventional radiology procedures. As a consequence more and more interventional radiologists are involved in the provision of pharmacological sedation.

The desire to develop minimally invasive thera-pies that gave an impetus to the present up- surge in interventional radiology also propelled the development of IV sedation protocols. Increasing pressure to contain healthcare costs and the need to reduce hospital overcrowding have led to the widespread use of same-day care as an effective approach, including with respect to IR procedures.

In addition, in light of growing evidence on the long-term effects of general anaesthetics on cognitive function and mortality in elderly pa- tients, who make up a great part of the popula- tion treated by interventional radiologists [2], there is a push to use sedation whenever possible.

IR patients need to be kept stress- and pain-free, and immobile, during procedures; communica- tion with patients may be necessary for the purposes of asking them to perform voluntary actions (such as holding their breath). In light of this, sedation techniques have greatly gained popularity in comparison to general anaesthesia, given that they allow a quick and safe discharge with few or no side-effects, such as PONV and TE disease risk.

According to current recommendations [3,4], radiologists are entrusted with (and eventually granted privileges regarding) the administra- tion of moderate sedation (previously termed “conscious sedation”), which, according to the American Society of Anesthesiology-ACR definition, is “a drug-induced depression of consciousness during which patients respond purposefully to verbal commands alone or accompanied by light or tactile stimulation. No interventions are required to maintain a patent airway and spontaneous ventilations is adequate. Cardiovascular function is usually maintained managed” [3,6]. This definition sets a clear safety window in which the patient under moderate sedation is in a controlled state that does not require any respiratory or cardiovascular support (and therefore can also be managed by a non-anaesthesiologist).

Current intravenous SA techniques for IR procedures typically involve a combination of opioids and hypnotics. A patient-oriented choice of drugs should be made for each indi- vidual case, balancing interventional require- ments (type, length, position of the patient, anticipated pain and level of co-operation needed) with an adequate level of SA and effective control of post-procedural pain.

Patient status also represents a key factor in both reduction of morbidity and anaesthetic planning. A further element of choice is repre- sented by the availability of technical resources, such as monitoring, appropriate medication and infusion devices, as well as the radiologists’ capability to safely operate them.

Given all these requirements, it is paramount for non-anaesthesiologists administering seda- tion to have a working knowledge of the clini- cal pharmacology of drugs and antagonists, as well as the capacity to manage the most common complications of sedation, i.e. respira- tory depression, cardiac and haemodynamic complications, and anaphylaxis.

Peri-operative pain management also repre- sents a growing area of interest for the inter- ventional radiologist. A great number of cases treated in IR involve the oncology patient popu- lation, which presents considerable additional challenges for the analgesia to be provided along with sedation: poor nutritional status, neoplastic hypermetabolism, a higher incidence of nausea and vomiting, and the chronic use of high doses of narcotics for pain. These all call for a systematic use of multimodal pain management strategies.

Today’s presentation aims to provide non- anaesthesiologists with clinically-oriented insights into moderate sedation, outlining key practice points for its administration and the management of the most common complica- tions, in the hope of soon seeing basic training programs for non-anaesthesiologists implementing SA protocols for non-IR therapies.

The growth in the number and complexity of interventional radiological procedures has highlighted the need for safe and effective sedation and analgesia (SA) in the IR suite. The literature reports large inter-hospital variability in practice patterns among countries and institutions, with different levels and methods of sedation being used for similar procedures all over Europe and worldwide [1]. Therefore, the need to standardize SA protocols for non-anaesthesiologists, in accordance with existing evidence and universally acknowledged. In addition, trends towards making interventional radiology a clinical specialty are not uniform, and anaesthesiologists or nurse anaesthetists are usually not available to attend all interventional radiology procedures. As a consequence more and more interventional radiologists are involved in the provision of pharmacological sedation.

The desire to develop minimally invasive thera-pies that gave an impetus to the present up- surge in interventional radiology also propelled the development of IV sedation protocols. Increasing pressure to contain healthcare costs and the need to reduce hospital overcrowding have led to the widespread use of same-day care as an effective approach, including with respect to IR procedures.

In addition, in light of growing evidence on the long-term effects of general anaesthetics on cognitive function and mortality in elderly pa- tients, who make up a great part of the popula- tion treated by interventional radiologists [2], there is a push to use sedation whenever possible.

IR patients need to be kept stress- and pain-free, and immobile, during procedures; communica- tion with patients may be necessary for the purposes of asking them to perform voluntary actions (such as holding their breath). In light of this, sedation techniques have greatly gained popularity in comparison to general anaesthesia, given that they allow a quick and safe discharge with few or no side-effects, such as PONV and TE disease risk.

According to current recommendations [3,4], radiologists are entrusted with (and eventually granted privileges regarding) the administra- tion of moderate sedation (previously termed “conscious sedation”), which, according to the American Society of Anesthesiology-ACR definition, is “a drug-induced depression of consciousness during which patients respond purposefully to verbal commands alone or accompanied by light or tactile stimulation. No interventions are required to maintain a patent airway and spontaneous ventilations is adequate. Cardiovascular function is usually maintained managed” [3,6]. This definition sets a clear safety window in which the patient under moderate sedation is in a controlled state that does not require any respiratory or cardiovascular support (and therefore can also be managed by a non-anaesthesiologist).

Current intravenous SA techniques for IR procedures typically involve a combination of opioids and hypnotics. A patient-oriented choice of drugs should be made for each indi- vidual case, balancing interventional require- ments (type, length, position of the patient, anticipated pain and level of co-operation needed) with an adequate level of SA and effective control of post-procedural pain.

Patient status also represents a key factor in both reduction of morbidity and anaesthetic planning. A further element of choice is repre- sented by the availability of technical resources, such as monitoring, appropriate medication and infusion devices, as well as the radiologists’ capability to safely operate them.

Given all these requirements, it is paramount for non-anaesthesiologists administering seda- tion to have a working knowledge of the clini- cal pharmacology of drugs and antagonists, as well as the capacity to manage the most common complications of sedation, i.e. respira- tory depression, cardiac and haemodynamic complications, and anaphylaxis.

Peri-operative pain management also repre- sents a growing area of interest for the inter- ventional radiologist. A great number of cases treated in IR involve the oncology patient popu- lation, which presents considerable additional challenges for the analgesia to be provided along with sedation: poor nutritional status, neoplastic hypermetabolism, a higher incidence of nausea and vomiting, and the chronic use of high doses of narcotics for pain. These all call for a systematic use of multimodal pain management strategies.

Today’s presentation aims to provide non- anaesthesiologists with clinically-oriented insights into moderate sedation, outlining key practice points for its administration and the management of the most common complica- tions, in the hope of soon seeing basic training programs for non-anaesthesiologists implementing SA protocols for non-IR therapies.
Don’t miss the Morbidity & Mortality Conference
Tomorrow at 11:30 in Auditorium 3

The Morbidity & Mortality Conference is an important part of each CIRSE Congress, analysing interventional radiology cases which have led to complications or deaths that could have been avoided. This provides a valuable learning experience for attendees, who can benefit from the experience of their colleagues, allowing them to avoid the same pitfalls.

The cases discussed will cover a range of topics, both vascular and non-vascular, and will be presented by experienced IIRs. Once presented with a case, audience members will be asked to vote on their preferred course of action – allowing you to see how you might have fared when faced with that difficult decision.

Don’t miss this golden opportunity to learn from someone else’s mistakes.

Global Embolization Symposium and Technologies
GEST 2015
Seville | Spain
June 3-6

www.gest2015.eu
Zero contrast intervention: a realistic ambition?

Marco Das

Since Portugal’s Egas Moniz first introduced contrast-enhanced imaging of the intracranial vessels in 1927, angiography, and especially digital subtraction angiography (DSA), has become one of the most important diagnostic and interventional imaging procedures in modern medicine. The use of contrast media (CM) to visualise the human vasculature has led to unique diagnostic capabilities and treatment options as well as reduction of invasive procedures. The use of CM is crucial, but also associated with certain risks and cost.

Contrast-induced nephropathy

Contrast-induced nephropathy (CIN) is defined by the European Society of Urogenital Radiology (ESUR) as a decrease in renal function within three days of receiving iodinated CM injection. It is assumed that 10% of all hospital-acquired renal failures are due to iodinated CM, but in patients with increased risk such as diabetes, chronic renal failure, hypertension, known urological history, advanced age (>60) or use of NSAIDs, the incidence may be as high as 30%. Even though the mechanism of renal toxicity is still not fully understood, CM has toxic effects on renal tubular cells. Unfortunately patients diagnosed with CIN have an increased mortality, which prolongs their stay in the hospital and thus causes additional cost to the health care system. To reduce the risk of CIN, pre- and post-hydration is recommended by the ESUR in patients with impaired renal function. Typically 1.1-1.5 ml/kg/h saline are given intravenously at least 6 hours before and 6 hours after CM application or in patients with chronic heart failure in a prolonged application. Still, there is controversy about the effectiveness of pre- and post-hydration, as well as about increased cost and increased length of stay.

Allergic adverse events

In general, adverse reactions such as allergic reactions are low, since ionic CM have become obsolete in intravascular procedures. In total, adverse reactions occur in around 3% of cases, while really severe adverse reactions are as low as 0.04%. Anyhow, adverse reactions do occur, and patients with a known allergy to CM should either receive prophylaxis before CM administration, or CM should be avoided.

Alternatives to iodinated CM

Many patients who are referred for interventional procedures are at increased risk for CIN. Strategies have to be developed how to deal with these kind of patients, and thus to reduce or to avoid iodinated CM.

Carbon dioxide

For many years, carbon dioxide (CO₂) has been used as alternative contrast agent in interventional procedures. It is an invisible gas, which briefly displaces the blood within the vessels. The big advantage of CO₂ is that it is not nephrotoxic, and is non-allergic and easily inhaled after application. The major drawback of CO₂ is that it can only be used below the diaphragm, due to neurotoxicity. Furthermore, image quality may not reach the diagnostic quality of regular CM, and patients often suffer from injection discomfort.

Gadolinium

Gadolinium was used for some time in patients with chronic kidney disease (CKD) or allergy to iodinated CM. Since gadolinium was associated with nephrogenic systemic fibrosis (NSF) in 2006, this has not been able to be a safe alternative anymore, thus its use has declined. The use of gadolinium is also limited in terms of visibility on fluoroscopy and the maximal volume, which is determined by 0.3 mmol/kg. Furthermore, gadolinium is relatively expensive compared to iodinated CM. Nowadays it cannot be recommended as an alternative CM in patients with CKD, but might be an alternative in patients with a normal kidney function who have been suffering from severe allergic reactions.

Image Fusion

Recently, image fusion has become available making use of peri-interventional non-invasive imaging techniques such as MR and CT imaging to guide interventional procedures. The overall goal would be to use this guidance to completely avoid CM during intervention. For optional image fusion, several steps are necessary.

First, an optimal quality MR or CT is necessary. Especially if CM should be avoided completely e.g. the assessment of the degree of stenosis should be optimal. It is well known that stenosis evaluation on MR or CT can be over- or underestimated. This should be kept in mind if the degree of stenosis cannot be verified with CM during interventional procedure. Also the diameter of the treated vessels should be evaluated carefully and dedicated post-processing should be used if available. Second, in order to match the pre-interventional imaging to the patient a non-contrast-enhanced cone-beam CT of the region of interest is needed, which is then fused to the pre-interventional imaging by registration techniques which can be either automated or manually operated. It should be taken into account that positioning of the patient for pre-interventional imaging, as well as during the intervention might be different, making optimal matching results difficult. Furthermore, patient movement due to breathing or patient discomfort needs to be considered as well. Third, validation of the fusion result is desirable, but in zero-contrast intervention not possible. And finally the result of the procedure has to be validated and complications have to be excluded. Of course, this, will not be possible without application of CM, unless ultrasound may be an alternative option e.g. in peripheral artery interventions.

Dr. Das is assistant medical director and head of the CT division at the Department of Radiology of the Maasstricht University Medical Center. An expert in Interventional radiology and cardiovascular imaging, he has lectured on non-invasive imaging at Maasstricht University. Dr. Das has contributed to various publications, including with articles on the impact of CT radiation dose reduction and iterative reconstruction algorithms on coronary calcium scoring, RFA of liver metastases and software-assisted evaluation of the ablation zone in MDT; the efficacy of radiation safety glasses; and on computer-aided detection systems and radiologist performance with respect to small pulmonary nodules. Dr. Das is a member of the German Society of Interventional Radiology (DGIR) and of the Dutch Society of Interventional Radiology (NGIR).

So far, image fusion has been successfully applied in numerous different interventions, e.g. placement of endovascular aortic prosthesis or peripheral artery interventions. These initial trials have shown the potential of the technique to substantially reduce the amount of CM. To date, feasibility in larger vessels has been shown, but its value in smaller vessels, e.g. guidance for hepatic embolisation or intracranial guidance still has to be shown.

Zero-contrast intervention is an ambitious task for the future. Alternative contrast agents to standard iodinated CM have their drawbacks and can only offer bailout strategies in patients with CKD or allergy to CM. Image fusion with pre-interventional non-invasive imaging has a high potential, but has drawbacks in terms of verifying a lesion, as well as assessment of therapy success.

References:
New Product Launches

APRIOMED
Morrison Steerable FNA Needle

ApriMed’s Morrison Steerable FNA Needle™ is the first steerable fine-needle aspiration (FNA) needle enabling active guidance around objects inside the body. During image guidance, the needle can be steered with live feedback allowing precise needle placement. The 21-gauge FNA needle enables soft tissue biopsy as well as aspiration and injection. With the needle’s enhanced control it is possible to:

· Make major adjustments around bones, organs or other structures
· Make minor adjustments near target
· Make multiple adjustments as the needle is advanced

www.apriomed.com

BOSTON SCIENTIFIC
Boston Scientific releases new data and launches next-generation Vessix™ Renal Denervation System at CIRSE 2014

Boston Scientific announces release of latest data of REDUCE-HTN study* demonstrating a significant reduction in ambulatory and office-based blood pressure at 18 months in patients treated with the Vessix™ Renal Denervation System. This is one of the largest Renal Denervation data sets collected to date using ambulatory blood pressure monitoring. The data release coincides with the launch of the next generation 7F (2.67 mm) Vessix™ Radial Renal Denervation System. “This is not the only technology designed to combine bipolar energy and a balloon-based platform, enabling consistent and complete renal denervation treatment across a variety of anatomies,” said Derek Scheinert, MD, Director, Center of Vascular Medicine, Angiology & Vascular Surgery at Park Kranenhaus in Leipzig, Germany. “The new Vessix Reduce Catheter, Generator and Guide Sheath offer an outstanding operator experience and take what was already an exceptional system and make it even better.”

· Schinco, M. J. REDUCE-HTN Clinical Study Results. and Clinical Data. Presented at ESC 2014, May 2014

* All abbreviations are the property of their respective owners. CAUTION: The user is restricted to use this device only in the order of a physician. Indications, contraindications, warnings and instructions for use can be found in the product labeling supplied with each device. The forerunner is a high-technology, multi-vessel, robotic catheter system designed with dual articulated arms for automated, independent radial maneuvering. The system provides a way for physicians to treat diffuse, complex atherosclerotic disease. The Magellan™ Robotic Catheter 6Fr – 300 mm is approved for the treatment of obstructive lesions of native and bypass grafts up to 250 mm. The treatment of diffuse, complex atherosclerotic disease.

CODIS
Cordis introduces SABER™ PTA Dilatation Catheter

Cordis is proud to introduce the new SABER™ PTA Balloon Dilatation Catheter. Developed to complement the Cordis Leg Solutions Portfolio as a next-generation, high-performance workhorse. 0.18” PTA balloon, the SABER™ Balloon Catheter is approved to dilate stenoses in iliac, femoral, ilio-femoral, popliteal, infrapopliteal, and renal arteries as well as for the treatment of obstructive lesions of native or synthetic arteriovenous fistulae. The Catheter is also indicated for post-dilation of balloon-expandable and self-expanding stents in the peripheral vasculature. The SABER™ Catheter is available in diameters of 2 to 10 mm and lengths of 20-300 mm. It combines a durable dual-layer hydrophilic coating with a low-profile body and new molded tip design to enhance crossability. In addition, this new Catheter has exceptional rated burst pressures – up to 18atm – and low compliance due to its construction with Cordis’ proprietary DURALUX™ Balloon Material.

COVIDIEN
Emprint™ Ablation System and Emprint™ Procedure Planning: The future of ablation from Covidien

The Emprint™ ablation system with Thermosphere™ technology and planning for powerful predictability at booth number 3, at the symposium on Monday, September 15th at 11.30, Auditorium 3, at the symposium on Monday, September 15th at 11.30, Auditorium 3, and in the Covidien learning centre.

CODIVIEN
Next generation of Onyx™ 34 liquid embolic system has received CE mark

In 2013 Covidien funded the project ORCA as an answer to a request from the market, that preferred a new formulation of PV Onyx™ liquid embolic systems, a formulation that gives less CT artifact Validation in vitro using a water phantom tank to simulate body tissue and synthetic vessel 1 Kahn, S. et al. Determinants and Time Course of Postthrombotic Syndrome After Acute Deep Vein Thrombosis, Annals of Internal Medicine, 2009

The Magellan™ Robotic Catheter 6Fr extends the benefits of robotic precision, stability and control to peripheral vascular procedures in smaller vessels. Designed to deliver:

· Independent control of dual bending sections
· Lower profile and smaller diameter access site
· Streamlined procedural workflow
· Remote navigation, away from radiation


HANSEN MEDICAL
Magellan™ Robotic Catheter 6Fr – Robotic Control in Smaller Vessels

The Magellan™ Robotic Catheter 6Fr extends the benefits of robotic precision, stability and control to peripheral vascular procedures in smaller vessels. Designed to deliver:

· Independent control of dual bending sections
· Lower profile and smaller diameter access site
· Streamlined procedural workflow
· Remote navigation, away from radiation

To find out more about the products being officially launched during CIRSE 2014, please visit the company booths in the Exhibition Hall. A full list of exhibitors and a floor-plan can be found in your pocket guide.

Information can also be found on our website: www.cirse.org/cirse2014


Indications, contraindications, warnings and instructions for use can be found in the product labeling supplied with each device. All claims and descriptions are for CE regulated countries. Availability of these products may vary in countries outside EU. Coviden, Cordis and logo and Cordis logo are US and internationally registered trademarks of Covidien AG. ™ Trademark of a Covidien company. EU-14-0595-10

1 CT artifact Validation in vivo using a water phantom tank to simulate body tissue and synthetic vessel donors.

Document TR_NV 11300 RevA 2013-08-20

2014/35/EC 2011/61/EU

1 CT artifact Validation in vitro using a water phantom tank to simulate body tissue and synthetic vessel donors.

Document TR_NV 11300 RevA 2013-08-20

2014/35/EC 2011/61/EU
New Product Launches

TERUMO

iNteract+

iNteract+ is TeraRecon’s new ‘ingeniously informed’ image viewer that works in combination with any of TeraRecon’s medical image viewers and image sharing and storage solutions to provide unmatched intelligence, powerful interoperability and simplified integration capabilities.

iNteract+ solutions enhance the clinical end-user experience provided by PACS, VNA, EMR and other mission-critical image processing and image acquisition systems. Often, it can eliminate the need for many disparate image transport, viewing and storage systems while facilitating a smooth transition toward centralized administration of imaging resources. From the sharing time-sensitive imaging data, to expanding the clinical tools available when and where physicians are working. iNteract+ stands alone as the only solution capable of also achieving collaborative remote access with image sharing, DICOM and non-DICOM viewing and incorporation of relevant clinical information all within one viewer.

TERUMO

AZUR® CK

AZUR® CK Peripheral Detachable Coil system

New! TERUMO is pleased to announce the launch of AZUR CK. This soft (0.016") detachable coil has been optimized to deliver Best-in-Class, cross-sectional coverage. It is a complex-shaped, bare platinum coil with an inner core of hydrogel that expands from the inside out. The unique design creates a solid coil without any open spaces in the center. The three-dimensional shape with variable diameter loops creates a stable anchor and promotes conformity to different morphologies. AZUR CK is excellent as a first coil – it provides a stable stopper for control in high flow areas and subsequent coil placement. The detachment system delivers precise positioning and placement. By matching PROGREAt double marker with AZUR detachable coils, TERUMO Peripheral Coiling Solution offers you the precision of neuroradiology procedures in the peripheral vessels.

TERUMO

PROGREAt® Double Marker

PROGREAt® Double Marker Micro Catheter system

New! TERUMO is pleased to announce the launch of PROGREAt double marker, available in 2.4Fr and 2.8Fr version. PROGREAt double marker has the unique navigability and torqueability of the usual PROGREAt, plus two markers that provide excellent visibility. PROGREAt is now available in an extensive range, to allow a perfect match to your needs: PROGREAt 2.0Fr simple marker, PROGREAt 2.4Fr with double marker, PROGREAt 2.7Fr coaxial, PROGREAt 2.8Fr coaxial simple marker, PROGREAt 2.8Fr double marker. PROGREAt are available in 130 cm or 150 cm. By matching PROGREAt double marker with AZUR detachable coils, TERUMO Peripheral Coiling Solution offers you the precision of neuroradiology procedures in the peripheral vessels.

TERUMO

MISAGO® 5mm

TERUMO extended the size mix of the MISAGO® SX stent system with a 5mm version for the treatment of fem-pop vessels.

The clinically distinguished MISAGO Ntinnol Stent Portfolio (6F; 0.035") has been expanded to include a 5mm diameter stent. Like the other sizes of the MISAGO stent, they offer optimal flexibility, long-term patency and excellent durability for femoral-popliteal lesions due to “spineless” stent architecture. The versatile Rapid Exchange delivery system with an ergonomic one-hand delivery handle can be used with short and with long wires to facilitate accurate and successful stent implantation.

Features:
- MISAGO is available in stent diameters of 5.0-10.0 mm and lengths of 40-150 mm. Clinically proven patency rates, exceptional balance between flexibility and radial force, and the industry’s lowest fracture rates provide reliable clinical results. These radiopaque gold markers at each stent edge provide full deployment control and post-procedural visibility.

TERUMO

TERCROSS™

TERCROSS is the name of TERUMO’s recently launched 0.014” OTW PTA-Balloon catheter that offers enhanced pushability, kink resistance and fast deflation time for BTK lesions due to extreme support of the OTW seamless polymer shaft. Available in a variety of bread sizes with long shaft design, TERCROSS enables the treatment of a wide range of BTK lesions. Additionally, TERCROSS has two crossing sizes of 1.25 and 1.5 mm balloon diameters, designed specifically to facilitate the passage of extremely tight subocclusive lesions.

Features:
- TERCROSS is available in balloon diameters of 1.25-4.0mm and lengths of 20-200mm. The lowest balloon cross over profile and the hydrophilic coating provide reliable crossability. With an exceptionally high rFB of 20 atm and fast deflation time it matches all requirements for an efficient and successful recalibration. Two different shaft lengths of 100 and 148cm enable antegrade and contralateral approaches.

TERUMO

ROADSAVER®

The ROADSAVER® Carotid Artery Stent System for Sustained Embolic Protection

The ROADSAVER Carotid Artery Stent, a double layer micromesh stent is indicated for use in patients with carotid arterial atherosclerotic disease, by combining these unique features:
- It is made of a dual-layer micromesh scaffold with the smallest cell size. The ROADSAVER is designed to sustain embolic protection, much like a metallic covered stent, allowing for side branch patency.
- The braided Nitinol design allows the stent to adapt to most carotid anatomies.
- The very flexible stent delivery system can recapture up to 50% deployment length and can be repositioned for accurate placement. Due to its flexibility the stent delivery system perfectly tracks through tortuous anatomies towards the lesions, minimizing the risk of access sheath/guide catheter dislodgement.

These features set ROADSAVER apart as the latest technology and establish ROADSAVER as the next generation in carotid artery stents.
The international CVIR community is growing quicker than ever, so we've expanded our online media tools to reach our stakeholders around the world.

**CVIR NEWS**
Read a selection of CVIR's top articles, hand-picked for you by our Editors.

**FACEBOOK**
Connect with the people behind the journal and with your colleagues from around the world.

**TWITTER**
Get breaking news from CVIR and the world of interventional radiology.

**LINKED IN**
Gain insights into trends and hot topics from the field, compiled for the IR professional.

**CVIR ONLINE**
Get helpful information on how to submit, review and read articles or place advertisements in CVIR.

**MOBILE APP**
Have the world of IR at your fingertips, anytime, anywhere.