SSRCTS

SCANDINAVIAN SOCIETY FOR RESEARCH IN CARDIOTHORACIC SURGERY

Program and abstracts

23rd Annual Meeting

7 - 9 February 2013
Geilo, Norway

www.ssrcts.org

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Welcome!

Dear Colleagues,

Welcome to the 23rd Annual Scientific meeting of the Scandinavian Society for Research in Cardiothoracic Surgery (SSRCTS) being held in Geilo, Norway on 7-9 February. Over 30 abstracts will be presented at this year's conference, the majority as oral presentations. It has been a pleasure to observe that the quality of abstracts and presentations has kept a high level over the years, giving a reliable overview of ongoing research in the field by young researchers in Scandinavia. From the beginning, the idea of the meeting was to combine basic and clinical research within the field of cardiothoracic surgery and to give our young scientists the opportunity to present their academic work. At the same time, this gives them opportunities to build their networks and meet with colleagues from other countries.

At this year's meeting we have participants from all the Scandinavian countries as well as contributors from the UK, Italy and the Netherlands. Our Clinical Main Topic this year will focus on coronary revascularization with a lecture by Professor Pieter Kappetein, Rotterdam. There will also be a cardiologist point of view on the same topic by Professor Rune Wiseth from Trondheim. The Main Basic Science Topic will focus on the mitochondrion with lectures by Professor Fabio di Lisa from Padova and Marte Bliksøen from Oslo. The Postgraduate course will focus on how to write a good paper and get it published in a major scientific journal, explained by Professor Jarle Vaage. Finally there will be two invited lectures, one by Professor Anders Jeppsson from Gothenburg titled *Bleeding Problems in Cardiac Surgery – an Update*; and a lecture from Dr. Morten Smerup named *Aarhus on Congenital Heart Disease in Adults (GUCH).*

For this year's meeting, we will for the first time charge a modest registration fee but no companies are sponsoring the meeting this year. Still, Mari-Liis and I are proud of offering a broad scientific program with internationally recognized speakers. This would not have been possible without a generous support from our mother organization, the Scandinavian Association of Thoracic Surgery (SATS).

I sincerely hope you will attend and profit from the meeting. I am sure your days in Geilo will be memorable ones.

Tómas Guðbjartsson
President of SSRCTS

Committee

President SSRCTS

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SSRCTS
SCANDINAVIAN SOCIETY FOR RESEARCH IN CARDIOTHORACIC SURGERY

Conference venue

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Program at a glance

Thursday 7 February		Friday 8 February		Saturday 9 February	
14:00-14:50	Arrival and registration	14:00-15:00	**Oral Session III** *Abstracts A11-A15*	14:00-15:40	**Oral Session V** *Abstracts A21-28*
14:50-15:00	Welcome	15:00-15:15	*Coffee break*		
15:00-16:00	**Oral Session I** *Abstracts A01-A05*	15:15-16:15	**Oral Session IV** *Abstracts A16-A20*	15:40-16:00	*Coffee break*
16:00-16:15	*Coffee break*	16:15-17:00	*Main topic, clinical* **Coronary revascularization is the optimal treatment for three vessel and LMS coronary artery disease**	16:00-17:30	*Main topic, basic science* **The mito-chondrion: When your best friend becomes your worst enemy**
16:15-17:15	**Oral Session II** *Abstracts A06-A10*				
17:15-17:25	**Poster Session** *Abstracts P01-P02*				
17:25-18:00	*Coffee break*	17:00-17:30	*Coffee break*	17:30-18:00	*Coffee break*
18:00-18:45	*Invited lecture:* **GUCH - epidemic or midnight promises?**	17:30-18:15	*Main topic, clinical* **PCI - still a viable option?**	18:00-19:15	**Oral Session VI** *Abstracts A29-A34*
		18:15-18:30	*Coffee break*	19:15-19:45	**Beer and Business**
18:45-19:30	*Postgraduate course:* **How to write and publish a scientific paper**	18:30-19:30	*Invited lecture:* **Bleeding problems in cardiac surgery – an update**	19:45	**Awards**
20:00	*Dinner (buffet)*	20:00	*Dinner (buffet)*	20:30	*Presidential dinner with pompous speeches*

Scientific program

Thursday, 7 February

14:00-14:50 Arrival and registration

14:50-15:00 Welcome
Mari-Liis Kaljusto, Oslo, Norway
Tómas Guðbjartsson, Reykjavík, Iceland

15:00-16:00 Oral session I
Chairman: Morten Holdgaard Smerup, Århus, Denmark

9+3 minutes for each presentation

15:00 A01 **Magnetic resonance imaging of the brain after preconditioned hypothermic circulatory arrest**
H Haapanen, O Arvola, FS Yannopoulos, J Herajärvi, R Blanco, K Kiviluoma, T Juvonen

15:12 A02 **Self-management of oral anticoagulant therapy in two centers: 11.000 patient-years of follow-up**
H Nilsson, EL Grove, TB Larsen, M Maegaard, TD Christensen

15:24 A03 **Surgical outcomes in diabetic patients following coronary artery bypass grafting in Iceland**
TA Axelsson, D Helgason, H Johannesdottir, K Andersen, A Geirsson, T Gudbjartsson

15:36 A04 **Myocardial infarction induces increased C4d deposition after rat cardiac arrest**
V Vuohelainen, T Paavonen, M Hamalainen, E Moilanen, M Tarkka, A Mennander

15:48 A05 **Retransfusion of unwashed cardiotomy suction blood impairs hemostasis in cardiac surgery patients**
J Gabel, C Shams Hakimi, M Westerberg, V Radulovic, A Jeppsson

16:00-16:15 Coffee break

16:15-17:15 Oral session II

Chairman: Fabio di Lisa, Padova, Italy

9+3 minutes for each presentation

16:15 A06 **Confined ischemia has a remote myocardial salvation impact after rat cardiac arrest**
Z Wang, H Li, J Tenhunen, M Hamalainen, E Moilanen, T Paavonen, M Tarkka, A Mennander

16:27 A07 **The impact of non-circular TAVI deployment on valve performance**
S Heide-Jørgensen, MH Nielsen, SK Krishna, JL Pirk, J Taborsky, JL Hønge, R. Zegdi, P Johansen

16:39 A08 **Polytetrafluoroethylene neochordae versus resection in repair of isolated posterior mitral leaflet prolapse: a multi-center study**
S Ragnarsson, S Nozohoor, R Sanchez, J Sjögren, P Wierup

16:51 A09 **Levosimendan improves contractility in heart failure**
S Moss Kolseth, N Pinheiro Lage Rolim, Ø Salvesen, DO Nordhaug, MA Høydal, A Wahba

17:03 A10 **Towards systematic evaluation of Immunoglobulin G4 positive extended thoracic aortitis**
E Niinimaki, H Kajander, T Paavonen, T Sioris, A Mennander

17:15-17:25 Poster session

Chairman: Tómas Guðbjartsson, Reykjavík, Iceland

2+3 minutes for each poster

P01 **Intensive care unit admissions following lobectomy or sublobar resections for non-small cell lung cancer**
TA Axelsson, MI Sigurdsson, A Alexandersson, H Thorsteinsson, G Klemenzson, S Jonsson, T Gudbjartsson

P02 **Functional and biomechanical effects of an MC3 annuloplasty ring on a novel tissue engineered tricuspid valve prosthesis**
CH Ilkjær, DM Røpcke, TI Hejslet, JL Hønge, HE Jensen, SL Nielsen, VE Hjortdal

17:25-18:00 Coffee break

Invited lecture

Chairman: Tómas Guðbjartsson, Reykjavík, Iceland

18:00-18:45 **GUCH - epidemic or midnight promises?**
Dr Morten Holdgaard Smerup, Århus, Denmark

Postgraduate course

Chairwoman: Mari-Liis Kaljusto, Oslo, Norway

18:45-19:30 **How to write and publish a scientific paper**
Professor Jarle Vaage, Oslo University Hospital, Norway

20:00 **Dinner (buffet)**

Friday, 8 February

14:00-15:00 Oral session III

Chairman: Anders Jeppsson, Gothenburg, Sweden

9+3 minutes for each presentation

14:00 A11 **Remote ischemic preconditioning reduces thrombus formation in the rat**
DM Røpcke, VE Hjortdal, GE Toft, MO Jensen, SD Kristensen

14:12 A12 **Cell salvage of cardiotomy suction blood improves the balance between pro- and anti-inflammatory cytokines after cardiac surgery**
J Gabel, M Westerberg, A Bengtsson, A Jeppsson

14:24 A13 **The effect of bulging sinuses of valsalva on valve dynamics – an in vitro study of TAVI valves**
JL Pirk, SK Krishna, J Taborsky, MH Nielsen, S Heide-Jørgensen, JL Hønge, R Zegdi, P Johansen

14:36 A14 **Transapical neochord implantation: Is tension of artificial chordae tendineae dependent on insertion site?**
HE Jensen, MO Jensen, F Waziri, JL Hønge, E Sloth , M Fenger-Gron, SL Nielsen

14:48 A15 **Therapy for myocardial edema? The water channel Aqua-porin-1 is regulated by micro-RNAs in human endothelial cells**
A Rutkovskiy, M Olovyannikova, G Valen, J Vaage

15:00-15:15 Coffee break

15:15-16:15 Oral session IV

Chairman: Pieter Kappetein, Rotterdam, the Netherlands

9+3 minutes for each presentation

15:15 A16 **Lumican is increased in experimental and clinical heart failure, and its production by cardiac fibroblasts is induced by mechanical and pro-inflammatory stimuli**
K VT Engebretsen, IG Lunde, ME Strand, A Waehre, I Sjaastad, H Marstein, B Skrbic, CP Dahl, ET Askevold, G Christensen, JL Bjørnstad, T Tønnessen

15:27 A17 **Preoperative plasma concentration of fibrinogen is an independent predictor of excessive bleeding after cardiac surgery**
K Waldén, A Jeppsson, S Nasic, M Karlsson

15:39 A18 **Valve sparing surgery of the aortic root: a 12-year experience**
N Gasiavelis, R Lundblad, J Offstad, K Andersen, O Geiran

15:51 A19 **Assessing myocardial fibrosis with 2D Cardiac Performance Analysis MR©**
S Laugesen, S Udholm, WY Kim, J Nielsen, M Hassenkam, S Ringgaard, M Smerup, VE Hjortdal

16:03 A20 **Reduced visfatin levels in aortic stenosis increase after aortic valve replacement and may contribute to reverse left ventricular remodelling**
P Majak, IG Lunde, AK Hasic, T Husebye, G Christensen, T Tønnessen, JL Bjørnstad

Main topic, clinical

Coronary revascularization vs. PCI

Chairmen: Tómas Guðbjartsson, Reykjavík, Iceland
and Anders Jeppsson, Gothenburg, Sweden

16:15-17:00 **Coronary revascularization is the optimal treatment for three vessel and LMS coronary artery disease**
Professor Pieter Kappetein, Rotterdam, the Netherlands

17:00-17:30 **Coffee break**

17:30-18:15 **PCI - still a viable option?**
Professor Rune Wiseth, Trondheim, Norway

18:15-18:30 **Coffee break**

Invited lecture

Chairwoman/-man: Mari-Liis Kaljusto, Oslo, Norway
and Pieter Kappetein, Rotterdam, the Netherlands

18:30-19:30 **Bleeding problems in cardiac surgery – an update**
Professor Anders Jeppsson, Gothenburg, Sweden

20:00 **Dinner buffet**

Saturday, 9 February

14:00-15:40 Oral session V

Chairman: Jarle Vaage, Oslo, Norway

9+3 minutes for each presentation

14:00	A21	**Penetrating cardiac injuries - a 10-year Oslo experience** ML Kaljusto, NO Skaga, J Pillgram-Larsen, T Tønnessen
14:12	A22	**Short-term surgical outcomes of isolated coronary artery bypass grafting has improved in Iceland** H Johannesdóttir, D Helgason, TA Axelsson, A Geirsson, T Gudbjartsson
14:24	A23	**MitraClip, one year experience at Rikshospitalet** G Dahle, KA Rein
14:36	A24	**Transcatheter treatment of failed surgical bioprostetic valves and failed valve repair. A single center experience** G Dahle, KA Rein
14:48	A25	**Resection rate and operability of elderly patients with non-small cell lung cancer in Iceland** K Baldvinsson, A Wilberg Orrason, H Thorsteinsson, MI Sigurdsson, S Jonsson, T Gudbjartsson
15:00	A26	**Impact of aortic valve repair on the stress distribution of the aortic root** T Bechsgaard, JL Hønge, H Nygaard, SL Nielsen, P Johansen
15:12	A27	**Effect of ring annuloplasty on tricuspid valvular complex dynamics and geometry** CH Ilkjær, JL Hønge , MO Jensen, SL Nielsen
15:24	A28	**Autologous bone marrow mononuclear cell transplantation in ischemic heart failure - A prospective, controlled, randomized, double-blinded study of cell transplantation combined with coronary bypass surgery** T Pätilä, M Lehtinen, A Vento, J Schildt, E Kankuri, J Sinisalo, M Laine, P Hämmäinen, A Nihtinen, R Alitalo, A Ahonen, K Lauerma, R Pöyhiä, M Kupari, A Harjula

15:40-16:00 Coffee break

Main topic, basic science

The mitochondrion: When your best friend becomes your worst enemy

Chairwoman: Guro Valen, Oslo, Norway

16:00-16:45 **The mitochondrion in ischemic injury and heart failure**
Professor Fabio di Lisa, Padova, Italy

16:45-17:30 **Mitochondrial DNA –biomarker or mediator of injury**
Dr Marte Bliksøen, Oslo, Norway

17:30-18:00 **Coffee break**

18:00-19:15 **Oral session VI**

Chairman: Ari Mennander, Tampere, Finland

9+3 minutes for each presentation

18:00 A29 **Effects of ex vivo platelet transfusion on platelet aggregability in blood samples from coronary artery disease patients treated with acetylsalicylic acid, clopidogrel or ticagrelor**
EC Hansson, C Shams Hakimi, K Åström-Olsson, C Hesse, H Wallén, M Dellborg, P Albertsson, A Jeppsson

18:12 A30 **A comparison of recruitment and training of doctors in the UK National Health Service and pilots in the Royal Air Force**
AE Mitchell, TA Eastwood, IM Mitchell

18:24 A31 **Major vascular trauma in Iceland**
BK Johannesdottir, B Mogensen, HM Thorisson, K Logason, T Gudbjartsson

18:36 A32 **Leg ischemia before circulatory arrest alters brain leukocyte count and respiratory chain redox state**
FS Yannopoulos, O Arvola, H Haapanen, J Herajärvi, I Miinalainen, H Jensen, K Kiviluoma, T Juvonen

18:48 A33 **Effects of remote ischemic preconditioning on cardiac mitochondrial respiration and incidence of atrial fibrillation in coronary surgery**
K Hordnes, MA Høydal, Ø Rognmo, U Wisløff, A Wahba

19:00 A34 **Wound closure with triclosan-coated sutures do not lower the rate of surgical site infections after sternotomy – results from a randomized controlled trial**
S Steingrimsson, L Thimour-Bergström, Ö Friberg, H Scherstén, T Gudbjartsson, A Jeppsson

19:15-19:45 Beer and business

19:45 **Awards**
20:30 **Presidential dinner with pompous speeches**

Abstracts - Oral presentations

A01

Magnetic resonance imaging of the brain after preconditioned hypothermic circulatory arrest

H Haapanen[1], O Arvola[1], FS Yannopoulos[1], J Herajärvi[1], R Blanco[2], K Kiviluoma[3], T Juvonen[1]

[1]Oulu University Hospital, Department of Surgery, [2]Oulu University Hospital, Department of Radiology, [3]Oulu University Hospital, Department of Anesthesiology, Oulu, Finland

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Objectives: Elective hypothermic circulation arrest (HCA) is an efficient and safe method in protecting the central nervous system (CNS) and giving surgeons the time to operate on the most difficult of cardiac and aortic diseases. Remote ischemic preconditioning (RIPC) has risen as a promising method in protecting the CNS in ischemic conditions, including prolonged HCA. Magnetic resonance imaging (MRI) has proven to be accurate and specific tool in monitoring cerebral ischemia under clinical conditions in the past two decades. Our goal was to investigate whether the possible positive effects of RIPC could be seen in repeated MRIs and whether there was any correlation with the histopathological analysis. We also studied whether MRI could be used to predict the neurological and histopathological outcome in the porcine model.

Materials and methods: Twelve pigs were randomized into a RIPC group (n=6) and a control group (n=6). The RIPC group was treated with four cycles of transient hind-leg ischemia before 60 minutes of HCA, whereas the control group received a sham-treatment. The MRI of the brain was performed after 8 hours of follow-up and the second MRI scan after 7 days of follow-up. A 1.5 T magnet (GE twin speed) was used. The MRI included T2 weighted, 3D T1, perfusion and diffusion weighted MRI (DWI). Histopathological analysis of the CNS was performed after the second MRI.

Results and Discussion: This study is currently unfinished and preliminary data will be presented at the meeting.

A02

Self-management of oral anticoagulant therapy in two centers: 11.000 patient-years of follow-up

H Nilsson[1,2,3], EL Grove[2], TB Larsen[3], M Maegaard[1], TD Christensen[1]

[1]*Department of Cardiothoracic and Vascular Surgery & Institute of Clinical Medicine, Aarhus University Hospital, Aarhus;* [2]*Department of Cardiology, Aarhus University Hospital, Aarhus;* [3]*Department of Cardiology, Aalborg Hospital & Department of Health Science and Technology, Aalborg University, Aalborg, Denmark*

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Objectives: Patient-self-management (PSM) of oral anticoagulant therapy with vitamin K antagonists have demonstrated efficacy in randomized clinical trials. An important question remains about its clinical effectiveness. We hypothesized that implementation of PSM in everyday clinical practice could improve the quality of treatment. The aim of this study was to evaluate the effectiveness of PSM in everyday clinical practice.

Materials and methods: A case-series study including all patients who had passed an exam in PSM in the period 1995-2012 at Aarhus University Hospital or Aalborg University Hospital, including 2200 patients and 11000 patient-years in total. The effectiveness was measured using the endpoints: all-cause mortality, major thromboembolism and bleeding events, percentage of time within therapeutic International Normalized Ratio (INR) target range (TTR) and variance of the INR value. Patient data was obtained from two databases in the two centers, where all data had been prospectively registered.

Results: Results are pending but baseline characteristics (age, gender, indication for anticoagulant therapy) and data on all-cause mortality, major thromboembolism and bleeding events, TTR, INR-variance will be presented at the meeting.

Conclusions: We hope to find a good quality of treatment. Further analysis will be commenced by applying a control group and using data from national databases.

A03

Surgical outcomes in diabetic patients following coronary artery bypass grafting in Iceland

TA Axelsson[1], D Helgason[1], H Johannesdottir[1], K Andersen[3], A Geirsson[2], T Gudbjartsson[1,2]

[1]*Faculty of Medicine, University of Iceland, Departments of* [2]*Cardiothoracic Surgery and* [3]*Cardiology, Landspitali University Hospital, Reykjavik, Iceland*

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Objective: To investigate surgical outcomes in diabetic patients and compare them to non-diabetic patients following isolated coronary artery pass grafting (CABG) in Iceland.

Materials and methods: A retrospective analysis of all isolated primary CABG patients in Iceland operated between 2002 and 2011. A total of 1397 patients were included and 233 patients with diabetes mellitus (type 1 or 2) were compared to non-diabetics (n=1164) in terms of patient demographics, operative data, and postoperative outcomes.

Results: There was no significant difference between diabetic patients and non-diabetic patients in terms of age (mean 66±9 yrs), gender, EuroSCOREst (mean 4.7), preoperative creatine values, off-pump procedures (25%) or incidence of either left main stem or three-vessel disease. The diabetic patients had a significantly higher BMI (29.5 vs. 27.9), were more likely to have a history of hypertension (84% vs. 60%) and had a 15 min longer mean operative time. Diabetic patients also received more units of packed red blood cells (mean 3.4 vs. 2.6, p=0.049) but postoperative bleeding was comparable between the groups. Diabetics more often had major postoperative complications (18% vs 12%, p<0.01), but acute renal failure (RIFLE criteria) was the only single major complication that showed a statistical significance (5% vs. 1%, p<0.01). Minor postoperative complication rates (i.e. atrial fibrillation, pneumonia, UTI and superficial wound infections) were similar in both groups. The 30-day mortality was 4.3% vs. 2.0% for diabetics and non-diabetics patients, respectively (p=0.06).

Conclusions: Diabetic patients were more likely to have acute renal failure but had similar minor complication rates as non-diabetics. There was a trend towards higher 30-day mortality in diabetic patients but the difference was not significant. Information on long-term survival is pending.

A04

Myocardial infarction induces increased C4d deposition after rat cardiac arrest

V Vuohelainen[1], T Paavonen[2], M Hamalainen[3], E Moilanen[3], M Tarkka[1], A Mennander[1]

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Objectives: Complement activation as evidenced by C4d deposition indicates immunological tissue reactivity. We evaluated in a rat cardiac transplantation model whether ischemia-reperfusion injury alone (IRI) or with early regional myocardial infarction (MI) would induce myocardial reactivity by characterizing C4d deposits.

Materials and methods: Isogenic heterotopic cardiac transplantation after cardiac arrest with tepid physiological saline was performed to 16 Fischer344 rats to induce ischemia-reperfusion injury (IRI), of which 9 rats also underwent ligation of the left anterior coronary artery (LAD) of the heart to yield MI. Histology and qRT-PCR for eNOS, iNOS and TGFβ were performed after cessation of heart beat. C4d was evaluated by immunohistochemistry.

Results: Fourteen grafts ceased to beat 2 days after transplantation, encompassing 8 grafts with IRI+MI. Myocardial inflammation and C4d deposition were increased in grafts with IRI+MI as compared with IRI (0.71 vs 0.14, PSU, respectively, $p<0.04$ and 80.13 vs 20.29, PSU, respectively, $p<0.02$). The expression of eNOS tended to decrease in grafts with IRI+MI as compared with IRI, though significance was not reached ($p=0.05$). Receiver operating characteristic curve (ROC) analysis showed that myocardial infarction was associated with C4d deposition (AUC 0.837; S.E. 0.116; $p=0.035$; 95% C.I. 0.610-1.000), but not with presence of inflammation per se (AUC 0.786; SE 0.131; $p=0.074$; 95 % CI 0.529-1.000).

Conclusions: Increased C4d deposition may reveal immunological reactivity after myocardial infarction. Immunologic complement factors may be amenable to diagnosis of myocardial infarction after cardiac arrest.

A05

Retransfusion of unwashed cardiotomy suction blood impairs hemostasis in cardiac surgery patients

J Gabel[1,2], C Shams Hakimi[1], M Westerberg[1], V Radulovic[3], A Jeppsson[1,2]

[1]Department of Cardiothoracic Surgery, Sahlgrenska University Hospital, [2]Department of Molecular and Clinical Medicine, Institute of Medicine, Sahlgrenska Academy, University of Gothenburg, [3]Department of Medicine/Haematology and Coagulation Disorders, Sahlgrenska University Hospital, Gothenburg, Sweden

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Objectives: Cardiac surgery with cardiopulmonary bypass (CPB) induces a coagulopathy which may contribute to perioperative bleeding complications. We hypothesized that retransfusion of unwashed cardiotomy suction blood contribute to impaired coagulation and platelet function.

Materials and methods: Systemic blood samples from ten cardiac surgery patients collected during CPB were supplemented ex vivo with increasing doses of autologous cardiotomy suction blood (5, 10 and 20%, respectively). Clot formation and platelet function were assessed with thromboelastometry and multi-electrode aggregometry. In an in vivo pilot study thirty CABG patients were included. The patients were randomized to retransfusion or not of cardiotomy suction blood. Clot formation, platelet aggregability and thrombin generation capacity were compared between cardiotomy blood and systemic blood, and between the groups at three time points after CPB. In addition, postoperative bleeding, transfusions and hemoglobin levels were compared.

Results: Cardiotomy suction blood had markedly impaired clot stability compared to the systemic circulation. Ex vivo supplementation of systemic blood with cardiotomy blood accelerated clotting time dose-dependently but impaired platelet aggregability and clot stability. In vivo retransfusion (mean volume 280 ml) did not significantly influence biomarkers of systemic hemostasis. In contrast, postoperative bleeding volume was reduced with 25% in the no-retransfusion group (median 390 (range 250-660) vs. 520 ml/12h (300-1570), p=0.038).

Conclusions: The results indicate that retransfusion of unwashed cardiotomy suction blood in cardiac surgery patients impair systemic hemostasis.

A06

Confined ischemia has a remote myocardial salvation impact after rat cardiac arrest

Z Wang[1], H Li[1], J Tenhunen[2], M Hamalainen[3], E Moilanen[3], T Paavonen[4], M Tarkka[1], A Mennander[1]

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Objectives: It is not clear whether controlled reperfusion after acute cardiac arrest enhances salvation of ischemic myocardium after ischemia-reperfusion injury (IRI). We evaluated in a rat cardiac transplantation model whether confined ischemia induced by a distal myocardial infarction (MI) and remote postconditioning (RPostC) may protect from IRI after global cardiac ischemia.

Materials and methods: Syngeneic heterotopic cardiac transplantation after cardiac arrest was performed to 18 Fischer344 rats to induce ischemia-reperfusion injury (IRI), of which 12 rats also underwent distal ligation of the left anterior coronary artery (LAD) of the heart to yield distal MI (IRI+MI). For additional RPostC, the left renal artery was occluded 5 minutes immediately after reperfusion (IRI+MI+RPostC) in 6 rats. Microdialysis of the graft was performed for evaluation of glutamate, lactate, pyruvate, and glycerol. Histology and qRT-PCR for iNOS, eNOS and TGFβ were performed after graft harvesting.

Results: After a 10 min pyruvate decrease, glutamate decreased in IRI+MI and IRI+MI+RPostC as compared with IRI (11.1±1.8 and 12.7±3.4 vs 38.2±10.6, µmol respectively, $p<0.05$; 19.0±3.7 and 27.9±3.7 vs 74.2±31.7, µmol respectively, $p<0.05$). Major differences in neither lactate nor glycerol were observed. Representing remote myocardial ischemia, the relative number of vacuolated intramyocardial artery nuclei decreased in IRI+MI and IRI+MI+RPostC as compared with IRI (3% and 3% vs 19%, $p<0.05$, respectively), and was correlated with decrease of eNOS expression ($p<0.05$, Pearson correlation) but not iNOS. Meanwhile, TGFβ expression decreased in both IRI+MI and IRI+MI+RPostC ($p<0.04$) as compared with IRI.

Conclusions: Confined ischemia by means of MI and RpostC protects remote myocardium after IRI, suggesting that controlled revascularization after acute cardiac arrest enhances salvation of ischemic myocardium.

A07

The impact of non-circular TAVI deployment on valve performance

S Heide-Jørgensen[1], MH Nielsen[1], SK Krishna[1], JL Pirk[1], J Taborsky[1], JL Hønge[2], R. Zegdi[3], P Johansen[1,2]

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Objectives: Previous studies have shown that the valve deployment during transcatheter aortic valve implantation (TAVI) causes the stent to deform for both transfemoral and transapical insertion. Deformation implies that the stent present itself as non-circular and may vary in shape from triangular to elliptically (Fig. 1). However, none of the studies describing these observed deformations have investigate the effect on the valve functionality. The aim of this study was to investigate the difference in hemodynamics and valve dynamics between non-circular and circular TAVIs to find the impact on valve performance due to the deformation.

Materials and methods: A complete in vitro system of the left side of the heart has been built based on a pulsatile piston pump (ViVitro SuperDup'r), which is controlled by a wave form generator enabling adjustment of stroke volume and heart rate. The system makes it possible to measure the left ventricular pressure and the aortic pressure with microtip pressure catheters. Furthermore, the arterial flow is measured using a transit time flowmeter. Along with the hemodynamic assessment the orifice area of the valve and the dynamic motion of the leaflets is obtained through high-speed imaging and ultrasonography. The experiments consist of three groups: 1) circular deployed (control), 2) elliptical deployed, and 3) triangular deployed. Each group will consist of 6 valves. For each valve 15 heart cycles of data will be acquired under three different hemodynamic conditions: 1) low cardiac output (1-2 l/min), 2) normal cardiac output (4-5 l/min), and 3) high cardiac output (7-8 l/min).

Results and Discussion: Results are pending, but preliminary data will be presented at the meeting. If this study finds an effect of non-circular deployment on hemo- and leaflet dynamics, it should be further investigated whether this is likely to affect the longevity of the TAV prostheses.

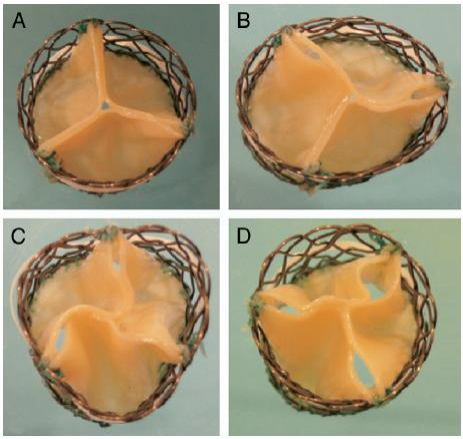

Figure 1. *A: circular, B: elliptical, C: triangular, D: oversized diameter in TAVI*

A08

Polytetrafluoroethylene neochordae versus resection in repair of isolated posterior mitral leaflet prolapse: a multi-center study

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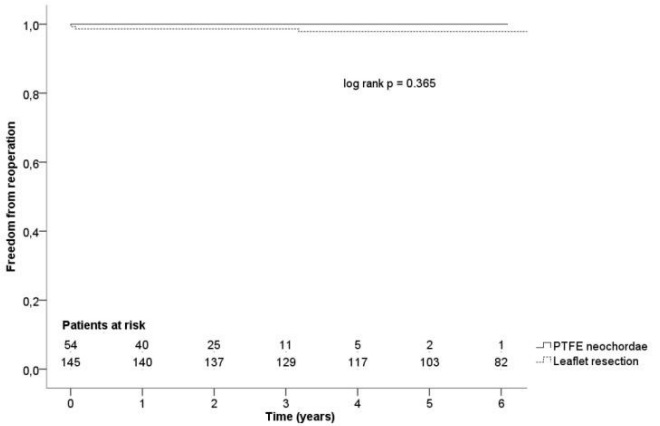
Objectives: Resectional techniques are the established method of posterior mitral valve leaflet repair for degenerative disease. However, implantation of polytetrafluoroethylene (PTFE) neochordae is gaining acceptance. The aim of this study was to compare the effectiveness, durability, and clinical outcome for patients undergoing mitral repair using of PTFE neochordae in comparison with the widely adopted technique of leaflet resection.

Materials and methods: A retrospective study of 210 patients that underwent isolated mitral valve repair for degenerative posterior mitral leaflet prolapse at two cardiothoracic centers in Sweden and Denmark was conducted. Follow-up was performed in December 2012 and was 100% complete for survival and freedom from reoperation (mean 5.8±3.9 years; 5.8±3.9 years), 72.6% complete

for freedom from moderate mitral regurgitation by echocardiography (mean 3.1±3.3 years), and 65.7% complete for freedom from endocarditis (mean 6.1±3.4 years).

Results: Repair was successful in 201 patients (95.7%), of which 146 (72.6%) underwent leaflet resection and 55 (27.4%) PTFE neochordal repair. Mean age was 61±12 years and 28.9% were females. All patients received an annuloplasty ring with a mean ring size 33±4 mm in the PTFE group and 31±3 mm in the resection group (p=0.001). Survival at five years was 98.2% in the PTFE group and 93.9% in the resection group (log rank, p=0.679). Freedom from all cause reoperation was 100% in the PTFE group and 98.9% in resection group (log rank, p=0.485). Freedom from moderate or greater mitral regurgitation was 89.0% in the PTFE group and 96.1% in the resection group (log rank, p=0.074). Freedom from endocarditis was 100% in PTFE group and 98.3% in resection group (log rank, p=0.653).

Conclusions: Both repair techniques for posterior mitral leaflet prolapse are associated with excellent results and appear comparable in the early and midterm postoperative course with low mortality, incidence of reoperation and moderate or greater mitral regurgitation. PTFE neochordal repair allows larger mitral annuloplasty rings and may be associated with better hemodynamic performance.



Kaplan-Meier estimate of freedom from reoperation of 201 patients that underwent mitral valve repair for isolated posterior leaflet prolapse with polytetrafluoroethylene neochordae, PTFE (continuous line) and leaflet resection (dotted line).

A09

Levosimendan improves contractility in heart failure

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Objectives: Since few studies have presented a thorough analysis of the effect of levosimendan on contractility, our aim was to investigate this closer in vivo and in vitro.

Materials and methods: Rats with post-MI heart failure (HF) after LAD-ligation and sham-operated animals (sham) were randomized to infusion of levosimendan (LEV) (2.4 μg/kg/min) or vehicle. Echocardiographic examination was coupled to pressure-conductance sampling in the left ventricle (LV) before (B) and after (40 min). Contractility, relaxation and Ca^{2+}handling in isolated LV cardiomyocytes were studied in an epi-fluorescence microscope.

Results: HF LEV (n=6), HF vehicle (n=7), sham LEV (n=5), sham vehicle (n=7) animals were included in the analysis. End-diastolic pressure (EDP) was higher while the slope of the preload-recruitable stroke work, M_w was lower in HF vs. sham. In HF animals levosimendan infusion reduced EDP ($p<0.001$) and middle artery pressure (MAP) ($p<0.001$) and improved M_w, (HF LEV: B: 50±13, 40 min: 75±25 vs. HF vehicle: B: 52±17, 40 min: 56±14 mmHg, $p<0.05$) compared to vehicle infusion. In vivo LEV-infusion did not affect isolated cardiomyocytes. Introducing levosimendan to HF cardiomyocytes in vitro improved fractional shortening ($p<0.001$) and Ca^{2+}-sensitivity index ratio ($p<0.0001$) in addition to increase the diastolic Ca^{2+}level ($p<0.05$).

Conclusions: Levosimendan improves contractility in HF animals by increasing the Ca^{2+}-sensitization and lowers MAP and EDP and thereby possibly changes the conditions for organ perfusion.

A10

Towards systematic evaluation of Immunoglobulin G4 positive extended thoracic aortitis

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Objectives: Immunoglobulin G4 (IgG4) positive aortitis has recently been associated with increased susceptibility for immunologic disturbances after surgery for the ascending aorta. We report our early experience on evaluating IgG4 positivity in patients undergoing surgery for extended aortic pathology.

Materials and methods: Five patients underwent one-stage corrective surgery using the hybrid open arch repair by the frozen elephant trunk together with endovascular aortic grafting. After deployment of the hybrid graft, a bare-metal nitinol stent was inserted antegrade via the frozen elephant trunk for distal aortic remodeling of the true lumen in four patients with complicated type B dissection, of which two patients had been previously operated for acute type A dissection. Instead, one patient had a thoracic endograft for complete exclusion of an atherosclerotic aneurysm. A representative sample of the resected arch aneurysm was procured for histology, and Hematoxylin-Eosin, Elastase-Van-Gieson and Perjodic-Acid-Schiff stainings were performed. T- and B-lymphocytes, plasma cells, macrophages and IgG4 positivity were evaluated by immunohistochemistry.

Results: The mean preoperative maximum aortic diameter was 54 mm (range 41-79 mm). The mean follow-up was 18 months (range 1-24 months). Complete thrombosis of the false lumen at the level of the frozen elephant trunk was achieved in all four patients with dissection, and successful exclusion of the arteriosclerotic aneurysm in one. This 75-year-old male was diagnosed with IgG4-positive aortitis including numerous plasma cells, and experienced unexpected blindness after surgery without evidence of emboli or long-term neurological impairment upon repeated brain CT.

Conclusions: The hybrid open arch repair by the frozen elephant trunk and simultaneous endovascular grafting is a feasible choice for one-stage surgery through sternotomy aiming at definitive treatment of extended thoracic aortic pathology. IgG4 positive aortitis was found after histopathological evaluation and may be associated with systematic inflammation, including postoperative blindness.

A11

Remote ischemic preconditioning reduces thrombus formation in the rat

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Objectives: Remote ischemic preconditioning (RIPC) has been reported to reduce infarct size in patients with ST-elevation myocardial infarction. The mechanism is unknown but has been suggested to be protection against myocardial damage induced by reperfusion injury. It was our hypothesis that RIPC has a direct effect on arterial thrombus formation and embolization in a dynamic in vivo rat model of experimental arterial thrombosis.

Materials and methods: A thrombogenic arterial anastomosis was created in the femoral artery of 41 male Wistar rats. The rats were randomized to surgery with or without RIPC, which consisted of 10 minutes of arterial occlusion on the contralateral limb. The thrombus formation at the arteriotomy site was monitored with a HD video camera through the microscope during trans-illumination of the vessel after clamp release. The number of emboli was counted and thrombus area was measured every minute for 30 minutes. Data was Gaussian distributed and is reported as means +/- SEM. Student´s t-test was used for statistical comparison.

Results: No significant differences in baseline characteristics between the two groups were found. The thrombus area (Fig. 1) was significantly reduced in the group receiving RIPC (722 +/- 41 vs. 910 +/- 46, p = 0.0041) and number of emboli was significantly lower in RIPC rats compared to non-RIPC rats (0.88 +/- 0.06 vs. 1.08 +/- 0,06, p = 0.025).

Conclusions: RIPC leads to significantly reduced thrombus formation and reduces the number of emboli in this rat model. The mechanism of RIPC on thrombogenesis should be further explored. Our results might be clinically important in coronary thrombosis and cerebral thromboembolism, as reduction of thrombus formation and embolization will lead to attenuated ischemic damage.

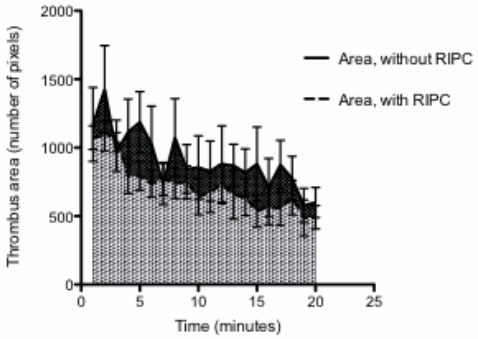

***Figure 1**: Thrombus area (number of pixels) displayed in relation to time after clamp removal in rats with and without remote preconditioning (RIPC). Mean and SEM values are shown.*

A12

Cell salvage of cardiotomy suction blood improves the balance between pro- and anti-inflammatory cytokines after cardiac surgery

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Objectives: The inflammatory response after cardiac surgery is characterized by a profound release of pro- and anti-inflammatory cytokines. Recent data suggests that the balance between pro- and anti-inflammatory cytokines is of greater importance than the absolute levels. Retransfusion of unwashed cardiotomy suction blood contributes to the inflammatory response but the balance between pro- and anti-inflammatory cytokines in cardiotomy suction blood and if cell salvage before retransfusion influences the systemic balance has not previously been investigated.

Materials and methods: Twenty-five coronary artery bypass grafting patients were randomized to cell salvage of cardiotomy suction blood or not before retransfusion. Plasma levels of three anti-inflammatory cytokines (IL-1 receptor antagonist (IL-1Ra), IL-4 and IL-10) and two pro-inflammatory cytokines (TNF-alpha and IL-6) and the IL-6-to-IL-10 ratio were analyzed in cardiotomy suction blood before and after cell salvage, and in the systemic circulation before, during, and after surgery.

Results: Plasma levels of all cytokines except IL-4 and IL-10 were significantly higher in cardiotomy suction blood than in the systemic circulation. The IL6-to-IL10 ratio was six-fold higher in cardiotomy suction blood than in the systemic circulation, median 10.2 (range 1.1-75) vs. 1.7 (0.2-24), $p<0.001$. Cell salvage reduced plasma levels of cytokines in cardiotomy suction blood. Cell salvage before retransfusion of cardiotomy suction blood improved the systemic IL-6-to-IL-10 ratio 24h after surgery, 5.2 (3.6-17) vs. 12.4 (4.9-31), $p=0.032$.

Conclusions: The balance of pro- and anti-inflammatory cytokines in cardiotomy suction blood is unfavourable. Cell salvage reduces the absolute levels of both pro- and anti-inflammatory cytokines and improves the balance in the systemic circulation after surgery.

A13

The effect of bulging sinuses of valsalva on valve dynamics – an in vitro study of TAVI valves

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Objectives: Patients suffering of severe aortic valve stenosis that are not eligible for aortic valve replacement may benefit from transcatheter aortic valve implantation (TAVI). This is a minimal traumatic treatment that doesn't require open heart surgery and extra corporeal circulation. The TAV is typically advanced through the femoral artery. Upon deployment of the TAV, the native leaflets are pushed into the sinuses of valsalva hindering the natural vortices created in the sinuses, which potentially may impair the TAV leaflet dynamics. It is our aim to investigate if blockage of these sinuses will affect the hemo- and leaflet dynamics of TAVI valves.

Materials and methods: The TAVI valves used in the experiments are made with homemade stents and pericardia tissue to create the leaflets. A left heart in vitro model based on a pulsatile pump (ViVitro SuperDup'r) will ensure physiological conditions for testing of the valves. The valves will be mounted in either a straight tube (aortic root with no sinuses (= blocked sinuses)) or a tube with sinuses of valsalva. The experiments consist of two groups: 1) Acrylic tube without sinuses of valsalva and 2) acrylic tube with sinuses of valsalva. Each group will consist of 6 valves. For each valve 15 heart cycles of data will be acquired under three different hemodynamic conditions: 1) cardiac output: 1–2 l/min; 2) cardiac output: 4–5 l/min; 3) cardiac output: 7–8 l/min. Leaflet dynamics will be assessed based on high speed imaging (Photron Fastcam SA3) of the valve seen from the aortic perspective. Furthermore, echocardiography (Vingmed GE Vivie FiVe) will be applied to obtain B-mode and M-mode recordings of the valves. The hemodynamic characterization will be based on transvalvular pressure recordings and transit time flow acquisition.

Results and discussion: Results are pending but preliminary data will be presented at the meeting. The effect of the sinuses of valsalva has not yet been investigated on TAVI valves. Possible effects associated with the absence of the sinuses may have impact on the durability of the TAVI valves.

A14

Transapical neochord implantation: Is tension of artificial chordae tendineae dependent on insertion site?

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Objectives: Transapical chorda tendineae replacement is a promising new approach to mitral leaflet prolapse. However, animal studies have raised concern that tension of transapically fixated artificial neo-chordae may be higher than tension in neo-chordae attached to papillary muscle tips, thereby reducing repair durability.

Materials and methods: In eight 80 kg pigs, primary anterior leaflet chordae were replaced by a 5-0 polytetrafluoroethylene neo-chord with a miniature in-line force transducer. The neo-chord was attached first to the anterior papillary muscle and, on a second cardiac bypass, transapically on the left ventricle apex. Occlusion of the inferior vena cava was performed to examine the effect of left ventricle pressure change on neo-chord tension to adjust the crude data to 95 mmHg. The maximum slope (dF/dt_{max}) of the chordal tension curve was calculated to compare curve patterns. Data are mean ± standard deviation.

Results: The following tension was measured in the neo-chordae during papillary muscle and transapical fixation, respectively; peak tension (crude; 0.39 ±0.32 vs. 0.50 ± 0.25 N, p=0.17, adjusted; 0.41 ±0.30 vs. 0.46 ±0.27 N, p=0.22), mid-systolic tension (crude; 0.19 ±0.12 vs. 0.19 ±0.15 N, p=0.96, adjusted; 0.28 ±0.16 vs. 0.19 ±0.11, p=0.12). There was a significantly lower dF/dt_{max} of the neo-chord tension curves after papillary muscle fixation compared with transapical fixation; or 7.4 ±6.9 vs. 10.3 ±7.7 N/s (p=0.028).

Conclusions: Overall, chordal insertion site had little influence on tension in the artificial neo-chordae, compared to the inter-individual variation. However, abnormal tension fluctuations in the transapically fixated neo-chordae may predispose to leaflet tears and early repair failure.

A15

Therapy for myocardial edema? The water channel Aquaporin-1 is regulated by micro-RNAs in human endothelial cells

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Objectives: Myocardial edema is an important part of injury caused by ischemia-reperfusion and it also occurs after cardioplegic arrest. Mycardial edema per se reduces cardiac function and exercabates ischemia-reperfusion injury. Aquaporin-1 (AQP1) is a primary water channel in endothelial cells of the human and mouse heart, and is important for transvascular water balance. We have previously shown that cardiac AQP1 is downregulated by ischemia, hypoxia and cardioplegia. To elucidate the intrinsic regulatory mechanism of AQP1 downregulation may enable us to develop a strategy to reduce myocardial edema. We hypothesize that AQP1 in endothelial cells is regulated by microRNAs (MiRs) - small non-coding nucleic acids that enable sequence-specific inhibition of translation.

Materials and methods: AQP1 expression was studied using human umbilical vein endothelial cells (HUVECs). Bioinformatics was used to predict putative regulation of AQP1 and yielded MiR-133a, MiR-133b, MiR-320 and MiR-214 as potential candidates of AQP1 regulation. HUVECs were subjected to 4 hours of hypoxia and 4 hours of reoxygenation, after which expression of AQP1 and the four selected MiRs were measured by quantitative PCR. Furthermore, HUVECs were transfected with precursors and inhibitors of MiR-320 and MiR-214. Expression of AQP1 was analyzed by Western blot.

Results: AQP1 was expressed in HUVECs. MiRs-29 and -133 were not detected in HUVECs, however, MiR-320 and -214 were found. MiR-214 was significantly upregulated in hypoxia compared to time-matched normoxic controls, while AQP1 was downregulated. HUVECs transfected with precursors of MiRs -320 and -214 had no change of AQP1 expression, but anti-MiR-214 transfection increased AQP1 protein.

Conclusions: AQP1 expression in HUVEC cells is downregulated by hypoxia, concomitantly with increased MiR-214. Anti-MiR-214 transfection increased AQP1 protein. Our preliminary study suggests that MiR-214 may be a potential therapeutic substance to reduce myocardial edema.

A16

Lumican is increased in experimental and clinical heart failure, and its production by cardiac fibroblasts is induced by mechanical and pro-inflammatory stimuli

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Objectives: During progression to heart failure (HF), myocardial extracellular matrix (ECM) alterations and tissue inflammation are central. Lumican is an ECM-localized proteoglycan associated with inflammatory conditions and known to bind collagens. We hypothesized that lumican plays a role in the dynamic alterations in cardiac ECM during development of HF. Thus, we examined cardiac lumican in a mouse model of pressure overload and in HF patients, and investigated expression, regulation and effects of increased lumican on cardiac fibroblasts.

Materials and methods: After 4 weeks of aortic banding, mice were divided into HF and non-HF groups based on lung weight and left atrial diameter.

Results: Interestingly, cardiac lumican mRNA and protein levels were increased in mice with HF. Similarly, cardiac biopsies from patients with end stage heart failure revealed increased lumican mRNA and protein levels compared to non-failing hearts. *In vitro,* mechanical stretch and the pro-inflammatory cytokine interleukin-1-beta increased lumican mRNA as well as secreted lumican protein from cardiac fibroblasts. Stimulation with lumican increased collagen 1α, lysyl oxidase and TGFβ1 mRNA, that was attenuated by co-stimulation with an inhibitor of the pro-inflammatory transcription factor NFκB. Furthermore, increased lumican induced increased levels of the dimeric form of collagen 1, decreased activity of the collagen degrading enzyme metalloproteinase 9 and increased phosphorylation of the fibrosis inducing SMAD3.

Conclusions: Cardiac lumican is increased in experimental and clinical HF. Lumican production by cardiac fibroblasts was induced by inflammatory and mechanical stimuli, and increased lumican altered molecules important for cardiac remodeling and fibrosis suggesting a role in HF development.

A17

Preoperative plasma concentration of fibrinogen is an independent predictor of excessive bleeding after cardiac surgery

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Objectives: Fibrinogen is a key protein in the coagulation cascade. Conflicting data exists whether preoperative endogenous plasma concentration of fibrinogen influences postoperative bleeding after cardiac surgery. Previous studies have mainly been performed in small selected patient populations. We assessed the importance of fibrinogen concentration for excessive bleeding in a large cohort of patients undergoing miscellaneous cardiac surgery procedures.

Materials and methods: Patients (n=1954) scheduled for heart surgery from February 2009 to January 2011 at Sahlgrenska University Hospital were included in a prospective observational study. Fibrinogen was measured preoperatively with the Clauss method. The patients were divided into five subgroups after preoperative fibrinogen concentration (≤2.5, 2.6-3.0, 3.1-3.8, 3.9-4.5 and ≥4.6 g/L). Excessive bleeding was defined as mediastinal drain volume >1000 ml/12h. The association between fibrinogen concentration and excessive bleeding as outcome was assessed with a logistic regression model.

Results: The prevalence of excessive bleeding was inversely proportional to the preoperative fibrinogen concentration. The prevalence ranged from 18.1% in the group including patients with fibrinogen ≤2.5 g/L to 7.0% in the ≥4.6 g/L group. The odds ratio for the <2.5 g/L group was in univariate testing 2.92 (95% CI 1.55-5.53, p=0.001) compared to the ≥4.6 g/L group. The difference remained statistically significant after adjustment for age, gender, weight, renal function, acuteness and type of surgery with OR 2.63 (95% CI 1.35- 5.12, p=0.005). In the CABG subgroup (n=1075) the difference was even more pronounced with OR 5.16 (95% CI 1.60-16.66, p=0.006) in univariate testing and OR=3.87 (95% CI 1.16-12.89, p=0.027), after adjustment.

Conclusions: Preoperative plasma concentration of fibrinogen predicts excessive bleeding after cardiac surgery.

A18

Valve sparing surgery of the aortic root: a 12-year experience

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Objectives: In this study we report our experience with aortic valve-sparing procedures.

Materials and methods: From 1999 to 2011, 96 patients (60 men and 36 women, mean age 47,8 years) were operated for aortic root aneurysm or aortic dissection (n=3) with valve sparing surgery. Preoperatively 17 patients had no aortic regurgitation (AR), 26 had small, 31 had moderate and 22 had severe AR. Four patients had history of previous aortic surgery. Thirty patients had Marfans, 9 had Loyes-Dietz syndrome and 4 had aortitis. Sixteen patients were operated ad modum Yacoub and 80 patients with the David-technique. Fifteen patients had additional surgery of the aortic arch. Thirtyseven patients had other concomitant surgery. All patients were studied postoperatively with echo-cardiography.

Results: Overall mean CPB-time was 155 minutes and cross-clamp time 124 minutes. The 30-day mortality was 2.1% (n=2). Twenty-seven patients had early postoperative complications. Late mortality was 9.3% (n=9). Intraoperatively 64 patients had no AR, 27 had small and 5 had moderate AR. At the long-term follow-up (mean 38 months, 71 patients), 28 patients had no AR, 33 had small and 2 had moderate AR. Twelve patients (12.5%) have been reoperated due to residual AR, 5 (31%) after the Yacoub and 7 (8.8%) after the David procedure.

Conclusions: Reconstruction of the aortic root with valve sparing surgery can be performed with good results. In our experience the David technique seem to yield better long-term results. These methods may allow treatment of patients without the need for aortic valve prosthesis.

A19

Assessing myocardial fibrosis with 2D Cardiac Performance Analysis MR©

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Objectives: Quantitative analysis of myocardial deformation has become one of the most interesting challenges in cardiology. However, from a clinicians' point of view the conventional methods of analysing myocardial velocity, displacement and strain are both complicated and time-consuming. 2D Cardiac Performance Analysis Magnetic Resonance Imaging (Tomtec©) is a new tool to quantify myocardial deformation based on regular cardiac MRI cine imaging. The manufacturers claim that this new program has a fast, easy and intuitive workflow. It can measure and display wall motion abnormalities, distinguish active contraction from passive motion, analyse dyssynchrony amount and location and measure myocardial mechanics, and this can all be done without additional acquisitions of specific MRI modes like tagged images.

Materials and methods: The study group contains 8 patients with ischemic heart disease and previous myocardial infarction and a control group of 8 healthy individuals. Global and regional myocardial mechanics were compared using 2D Cardiac Performance Analysis MR©.

Results and Discussion: Results are pending but preliminary data showed impaired global and regional myocardial function in ischemic patients compared to controls. Significant wall motion abnormalities was detected by the 2D Cardiac Performance Analysis MR©. The ability to accurately depict the regional extent of myocardial fibrosis and the overall myocardial deformation shows promise for the role of 2D Cardiac Performance Analysis MR© as a potential prognostic tool in patients with ischemic left ventricular (LV) dysfunction.

A20

Reduced visfatin levels in aortic stenosis increase after aortic valve replacement and may contribute to reverse left ventricular remodelling

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Objectives: The adipocytokine visfatin may be advantageous for the myocardium during reverse remodelling due to its effect on myocardial repair. Using a mouse model of reversible left ventricle pressure overload, we aimed to examine if visfatin was altered in the myocardium. Furthermore, we wanted to address this issue in patients with aortic stenosis (AS) and elucidate whether visfatin levels are related to reverse remodelling following aortic valve replacement (AVR).

Materials and methods: Myocardial visfatin was analysed four weeks after aortic banding (AB) and 3 days after debanding (DB) in mice and compared to sham operated animals. Furthermore, myocardial visfatin was measured in biopsies from patients undergoing AVR and compared to myocardium from controls. Finally, serum visfatin was measured before, 2 days, 6 and 12 months after AVR in patients with AS and correlated with echocardiographic measurments of cardiac morphology and function.

Results: Four weeks after AB, myocardial visfatin protein was reduced by 50% compared to sham. Three days after DB, myocardial protein levels increased to sham levels. Myocardial visfatin and serum visfatin levels were reduced by 23% and 64%, respectively, in patients with AS compared to controls. Twelve months after AVR, serum visfatin levels were increased compared to preoperative values and correlated positively to echocardiographic parameters of left ventricular reverse remodelling.

Conclusions: Myocardial protein and serum levels of visfatin are reduced by cardiac pressure overload. Correction of pressure overload leads to an increase in visfatin levels, which may have a beneficial impact on postoperative reverse remodelling.

A21

Penetrating cardiac injuries - a 10-year Oslo experience

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Objective: Penetrating heart injuries are often fatal and mortality may be related to the type of weapon favoured in different parts of the world. The incidence and outcome from penetrating heart injuries in Europe (and especially Scandinavia), has been poorly studied. We present a 10-year experience of outcomes for patients with penetrating heart injuries at Oslo University Hospital (OUH), Ullevål.

Material and method: This retrospective study includes data from 1 Jan 2001 to 31 Dec 2010, collected from the Trauma registry at OUH, Ullevål and from the patient records. Penetrating heart injury is defined as an injury of any structure inside and including the pericardium. Demographic data, the mechanism of injury, anatomical site of the injury, physiological status at admission, interventions, time aspects and 30-day outcome, was recorded.

Result: Thirty one patients had a penetrating heart injury, (5 female, 26 male), age range 17 to 64 years. Fourteen patients survived (45%). Twenty two injuries were caused by others (71%), 6 were self-inflicted (19%) and in 3 patients the mechanism of injury was unknown (10%). Four out of 8 patients (50%) with gunshot wounds (GSW) survived compared to10 out of 23 (44%) with stab wounds. Median (quartiles) for all patients for the following values were: ISS 25 (21-35), RTS 0 (0-6,9), GCS 3 (3-13). The left ventricle was injured most often, followed by the right ventricle and the right atrium. The exact anatomical site of the injury was unknown for 7 patients who received conservative treatment. Thirteen patients had signs of life (SOL) at admission and survived. Eighteen patients were admitted without signs of circulation and received emergency room thoracotomy (ERT). Eight of these had no SOL at the scene of injury and did not survive. The remaining ten patients did have SOL at the scene of injury and one survived. The time of transport for this latter patient was short. Two out of 31 patients were operated later on the same day and one patient had tamponade relieved at a subsequent admission one week later. Cardio-pulmonary bypass was required in one patient with a favorable outcome.

Conclusions & discussion: Three patients were injured by a shotgun, pistol or rifle at long range and received conservative treatment. Exclusion of these

patients reduces the survival in the GSW group to 20%. In a previous study of ERT at OUH Ullevål, Pahle et al. found that the time elapsed and SOL were difficult to evaluate in the acute situation in the field. We agree that the patients should be given the benefit of the doubt and start aggressive initial treatment. However, we observed 100% mortality in patients without SOL at the scene of injury (median time of transport 25 min, range 10-42 min). We recommend a policy of "Load and go" to OUH Ullevål, regardless of which emergency service can provide transport, in cases of penetrating thoracic injury in Oslo and the surrounding areas. Rapid transport from the injury site to emergency surgery saves lives.

A22

Short-term surgical outcomes of isolated coronary artery bypass grafting has improved in Iceland

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Objectives: We evaluated patient characteristics and short-term surgical outcomes of all isolated coronary artery bypass grafting (CABG) patients in a whole nation over the past decade.

Methods: A retrospective analysis of 1397 CABG patients operated in Iceland in the period 2002-2011; 697 patients operated 2002-2006 and 700 patients operated 2007-2011. Patient demographics, operative data, and postoperative outcomes were compared between the two 5-year periods.

Results: Patient demographics (age, gender, diabetes, hypertension, dyslipidemia, BMI), EuroSCORE and incidence of either three vessel or left main-stem disease did not change between the two periods. There was an increase in the preoperative use of aspirin (73% vs. 87%, $p<0.01$) and statins between the two periods (74% vs. 82%, $p<0.01$). The use of LIMA and number of distal anastomoses was unchanged but operative and X-clamp times were slightly increased and the use of off-pump CABG decreased (29% vs. 21%, $p<0.01$). Atrial fibrillation (41%) and pleural effusion requiring drainage (12%) were the most common minor complications and stayed the same between periods, however, there was a significant reduction in perioperative myocardial infarction (10% vs. 4%, $p<0.01$) and sternum dehiscence (3% vs. 1%, $p=0.014$). There was a trend for decreased 30-day mortality between the two periods (3% vs. 2%,) but the

difference was not significant.

Conclusions: Surgical outcomes of CABG patients in Iceland is good and has improved over the past decade with lower rates of major complications, especially perioperative myocardial infarction and sternum dehiscence. This can be at least partially explained by better medical therapy with increased use of aspirin and statins demonstrated in the study. Other factors such as improvements in techniques and perioperative care could also play a role.

A23

MitraClip, one year experience at Rikshospitalet

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Objectives: The MitraClip system has recently been introduced in clinical practice for percutaneous mitral valve repair in selected patients. This is an extended development of professor Alfieri's surgical "edge-to-edge" technique to create the double orifice. We present our single center one year experience with the MitraClip system.

Materials and methods: From Nov 2011 18 patients (12 males) underwent MitraClip procedure in our institution. The procedure was done at the Interventional Center with the guidance of 2D and 3D echocardiography and fluoroscopy. The patients were followed both clinically and by echocardiography at 3, 6 and 12 months. The mean age was 67 years, mean LogEuroscore was 21% and mean ejection fraction 30% (range; 15-50). Ten patients had previously undergone myocardial revascularisation, six were in AF and six had CRT-D or pacemaker. All patients had congestive heart failure with mitral regurgitation (MR), grade 4. Fifteen patients had functional mitral valve regurgitation. Three patients had the MitraClip procedure with the intention to postpone heart transplantaion. Four patients were on hemodialysis.

Results: Initially two patients could not be clipped. One of these got a MitraClip successfully placed later on. Sixteen patients had initial procedural success. One patient had a partial detachment of one clip and underwent surgical mitral valve implantation. Three patients with initially satsifactory result, showed a residual MR with symptoms at follow and had a redo clip procedure with good result. The number of MitraClips used per procedure was 1,3. Mean procedural time was 120 minutes (range; 45-258). The MR was reduced from 3,5 to 1,5. All

patients had mean gradient <5 mmHg. All patients were extubated in the operation room and stayed one night in the ICU. Twelve patients were discharged directly to home. The mean total stay was 4,8 (3-7) days. One patient underwent a percutaneous ablation due to AF and one patient received an ICD. So far there is no mortality.

Conclusions: MitraClip implantation is a safe and effective treatment for selected patients. In addition to the MitraClip application some patients will be in need of heart failure- and electrophysiological treatment. Some patients may present with symptomatic residual MR following the MitraClip implantation. Redo MitraClip procedure or conventional open heart surgery may be an option.

A24

Transcatheter treatment of failed surgical bioprostetic valves and failed valve repair. A single center experience

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Objectives: Redo surgery in patients after failed valve repair as well as following structural deterioration of bioprosthesis are at high risk. This is more pronounced in patients with additional comorbidities. Interventional approach like transcatheter valve implantation might be a benefit. We report the experience from Dept of Cardiothoracic Surgery, Rikshospitalet, Oslo University Hospital.

Materials and methods: The transcatheter valve program was established in Sept 2009. Six patients, four women, mean age 71 years (44-87) were treated for failed valve repair or degenerated bioprostesis in the mitral and aortic position. The access was either transapical or transfemoral. The Edwards Sapien XT valve was implanted in five patients and CoreValve in one patient. Two procedures were performed on partial bypass. Mean BMI was 27,6 (16,4-31,1) kg/m², the mean LogEuroscore was 31,8 (9,7-48,0) % and mean ejection fraction was 33 (15-40) %. Three patients had previously undergone coronary surgery and three patients had pacemaker/ICD implanted. One patient had surgical replacement of a catheter valve due to paravalvular leak.

The heterogenicity of the procedures in the patient group is shown in table I.

Results: The procedural success was 100%. No significant gradient was observed among patients, neither in the mitral- nor in the aortic group. One patient had

moderate paravalvular leak, like preoperatively. Two patients were re-operated in the groin due to vascular complications. One patient died within 30 days.

Conclusions: There is an increasing number of bioprosthesis implanted and valve repairs performed, and the patients survive longer. Our results demonstrate the feasibility of transcatheter treatment for failed repair and degenerated bioprosthesis, both in the mitral- and aortic position. This may in the future probably play a significant role for the redo-mortality in valve surgery.

Table I. *List of procedures*

PAT NO	AVR/ MVR MVP	OTHER IMPLANTS HEART SURGERY	IMPLANT	SIZE	FAILURE	APPROACH	CPB	PROSTHESIS	SIZE
1	MVP	TVP (MC3 ring #30)	CE physioring	34	MR	TA	Y	Edwards Sapien XT	29
2	MVP	TAVI (CV), PM TVR CABG	CE physioring	28	MS	TA	Y	Edwards Sapien XT Two valves	26
3	MVR	TVP (MC3 # 28)	Perimount	27	MS	TA	N	Edwards Sapien XT	29
4	AVR	CABG	Perimont	25	AS/AR	TA	N	Edwards Sapien XT	26
5	AVR	0	Freestyle	23	AS/AR	TF	N	CoreValve	26
6	AVR	CABG	CoreValve	31	PVR	TA	N	Edwards Sapien XT	29
7	AVR	CABG	CoreValve	31	PVR	OPEN	Y	Perimount	25

MVP: mitral valve plasty, MVR: mitral valve replacement, AVR: aortic valve replacement, TVR: tricuspid valve replacement, TVP: tricuspid valve plasty, TAVI (CV): transcatheter aortic valve implantation with CoreValve, MR: mitral valve regurgitation, MS: mitral valve stenosis, CABG: coronary artery bypass, TA: transapical, TF: transfemoral, PVR: paravalvular regurgitation.

A25

Resection rate and operability of elderly patients with non-small cell lung cancer in Iceland

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Objective: An increasing number of elderly patients are diagnosed with non-small cell lung carcinoma (NSCLC) and evaluated for surgical resection. We compared resection rate (RR), operability and survival in this group (≥75 years) to younger patients using centralized databases in Iceland.

Materials and methods: The study population comprised all patients diagnosed with NSCLC in Iceland from 1991 to 2010. Information was retrieved from medical records and the Icelandic Cancer Registry. All tumors were staged clinically (TNMc) and the reasons for exclusion from surgical resection were registered for patients diagnosed with localized or regional disease (cTNM stages IA – IIIA).

Results: Of 2263 confirmed cases of NSCLC, 735 (32.5%) patients were classified as elderly. Surgical RR for the elderly group was 14.7% compared to 26.3% for younger patients ($p<0.001$). The rate of major complications was 12% in the elderly group, not significantly different than for younger patients (15%, $p=0.45$). The same was true for 30 day mortality (0.9 vs 0.7%). Five year overall survival (39% vs 42%, $p=0.28$), and cancer specific survival (55% vs. 47%, $p=0.64$), were similar. Preliminary results showed that 56.7% of the elderly patients with localized/regional disease were excluded from surgery. The most common reasons were insufficient pulmonary function (37.4%), multiple co-morbidities (21.6%), central tumor location (16.5%), poor ECOG performance status (12.1%), heart disease and dementia. Elderly patients with incidentally detected tumors were more often operated on than those presenting with symptoms (38% vs. 22%, $p=0.02$).

Conclusions Elderly patients diagnosed with a potentially resectable NSCLC are frequently excluded from surgery due to co-morbid conditions. The favourable 30 day and long term survival for this age group compared to younger patients may reflect a selection bias.

A26

Impact of aortic valve repair on the stress distribution of the aortic root

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Objectives: Prosthetic valve replacement has been the treatment of choice for patients with aortic valve insufficiency but in later years the use of valve sparing treatments has gained momentum. However, the use of valve sparing repair techniques is based on empirical data and only very limited experimental research has been performed to support the effect of these techniques. This is

imperative to understand the essential effect induced by the procedures. Furthermore, such knowledge will provide the fundaments for improving the existing techniques. Hence, this study aims at characterizing the different types of repair techniques in a biomechanical and hemodynamic manner leading to better repair procedures and eventually improve quality of life for the heart valve patients.

Materials and methods: Force transducers will be developed to acquire the stress distribution in the aortic root where the ring geometry of these rings will be based on averaging of existing CT/MR data of patients with a body weight of 80kg. A Polypower™ transducer strip will be developed and used to measure the dilation of the aortic root.

The experiments will be performed in two settings, namely in vitro and in vivo. The in vitro setup will make use of aortic roots from pigs that will be collected from a local slaughterhouse. The roots will be installed in a left heart simulator, where the developed force transducer rings will be mounted in the aortic root afterwards. High speed cameras will be used to assess the distensibility of the root thoughout a heart cycle, along with acquisition of hemodynamic data (bloodflow, pressure and heart rate). Peripheral units mimicking compliance and resistance will ensure physiological conditions. In the in vivo trials the force transducer along with the Polypower™ transducer will be implemented in a porcine model. Sonomicrometry crystals will be sewn onto the aortic root to measure the distensibility of the root. Hemodynamic data will be acquired and echocardiography will be deployed bedside for monitoring and assessment of cardiac function.

Results and discussion: Results are pending but preliminary data will be presented at the meeting. With this project we aim to describe the biomechanics and hemodynamics of the aortic root, and expect this characterization will supply knowledge for improving the treatment of patients with aortic root / valve pathologies.

A27

Effect of ring annuloplasty on tricuspid valvular complex dynamics and geometry

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Objectives: The importance of tricuspid valve insufficiency in the development of right sided heart failure has been increasingly acknowledged in recent years, which untreated can be just as dangerous as left sided heart valve disease. Tricuspid valve insufficiency is commonly treated with a ring annuloplasty. The objective of this study was to investigate the influence of ring annuloplasty on the function and dynamic of the tricuspid valvular complex.

Material and methods: In an acute setting seven 60 kg Danish Landrace pigs underwent sternotomy and cardiopulmonary bypass. Fifteen sonomicromety crystals were implanted: eight around the annulus, tree at the edge of the leaflets, one at each papillary muscle tip, and one at the right ventricular apex. Baseline hemodynamics and sonomicrometry data were recorded after a period of stabilization. Dedicated software (Anulus Analyser) will be used to determine the effect of rigid ring implantation on annular dynamics and planarity of the tricuspid valve.

Results and discussion: The initial results will be presented at the meeting. This study will provide additional information on the effect of ring annuloplasty on tricuspid valve complex dynamics and geometry.

A28

Autologous bone marrow mononuclear cell transplantation in ischemic heart failure - A prospective, controlled, randomized, double-blinded study of cell transplantation combined with coronary bypass surgery

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Objectives: Every year, millions of people are killed by ischemic heart failure, a condition without a cure. Bone marrow mononuclear cell (BMMC) transplantation is a promising new treatment for heart failure but clinical trials have shown mixed results. Here we present results from our clinical trial combining BMMC therapy with coronary bypass surgery (CABG).

Materials and methods: First, we enrolled 107 ischemic heart failure patients scheduled for CABG. After an 8- to 12- week period with optimized drug therapy, 39 patients still had left ventricular ejection fraction (LVEF) ≤45% and were eligible for the actual study. In a randomized and double-blind manner, the eligible patients received intramyocardial injections of BMMCs or vehicle intraoperatively into the infarction border area.

Results: The median number of cells injected was 8.4 x 10^8 (interquartile range [IQR] 5.2 x 10^8 to 13.5 x 10^8). We measured global and segmental LV function and scar size by magnetic resonance imaging (MRI), and viability by positron emission tomography (PET) and single-photon emission tomography (SPECT), preoperatively and after one-year follow-up. LVEF, the predefined primary end point measure, rose by a median of 5.6% among controls (IQR 0.2 to 10.1) and by 4.8% in the BMMC group (IQR -0.5 to 8.2) (p=0.59). Wall thickening in injected segments improved by a median of 4.5% in the control group (IQR -18.1 to 23.9) and by 5.5% in the BMMC (IQR -6.6 to 26.5) (p=0.81). Changes in viability by PET and SPECT did not differ between the groups. The myocardial scar volume by MRI in injected segments rose by a median of 5.1% in the control group (IQR -3.3 to 10.8) but fell by 13.1% in the BMMC group (IQR -21.4 to -6.5) (p=0.0002).

Conclusions: When combined to CABG, BMMC therapy failed to improve global or local LV systolic function or viability by PET and SPECT during the 1-year follow-up. Intriguingly, however, it affected one important prognostic marker: BMMC therapy significantly reduced myocardial scar volume. Long-term studies are essential to investigate this finding's permanence.

A29

Effects of ex vivo platelet transfusion on platelet aggregability in blood samples from coronary artery disease patients treated with acetylsalicylic acid, clopidogrel or ticagrelor

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Objectives: The new $P2Y_{12}$ blocking agents inhibit platelet aggregability more effectively than clopidogrel but also increase the risk for bleeding complications. Upon bleeding, transfusion of platelet concentrate is often used to restore platelet function but there is scarce knowledge about its efficacy and if the efficacy differs between different platelet inhibitors. We assessed the effect of platelet supplementation on platelet aggregability in blood samples from patients treated with acetylsalicylic acid (ASA), clopidogrel or ticagrelor.

Materials and methods: A prospective non-randomized observational study was performed. Platelet aggregability was investigated with multiple electrode aggregometry with adenosine diphosphate (ADP), arachidonic acid (assesses ASA-dependent aggregability) and thrombin receptor activating peptide-6 (TRAP) as activators in whole blood samples from coronary artery disease patients treated with ASA (n=10), ASA+clopidogrel (n=15) or ASA+ticagrelor (n=15), and from healthy controls (n=10). Aggregability was measured before and after three increasing doses of AB0-compatible fresh apheresis platelet concentrate (+46, +92 and $+138\times10^9$/L).

Results: Both ASA-dependent and ADP-dependent aggregability improved dose-dependently after platelet supplementation. ASA-dependent aggregability was completely restored in all patient groups while there was only a small improvement in ADP-dependent aggregability in patients on dual antiplatelet therapy. The effect of platelet supplementation on ASA- and ADP-dependent aggregability was inferior in ticagrelor-treated compared to clopidogrel-treated patients.

Conclusions: The results suggest that platelet transfusion improves ADP-dependent platelet inhibition in patients on dual antiplatelet therapy but the effect is limited also with high platelet doses. Less effect of platelet transfusion can be expected in patients treated with ASA+ticagrelor than in patients treated with ASA+clopidogrel.

A30

A comparison of recruitment and training of doctors in the UK National Health Service and pilots in the Royal Air Force

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Objectives: The United Kingdom Royal Air Force (RAF) is an elite organisation, depending on highly trained and specialist staff. It is also a large, financially stretched, public sector employer that faces many similar issues to the National Health Service (NHS). Doctors have learnt lessons from pilots regarding safety checklists. The aim of this study was to examine what we could learn from the RAF, regarding recruitment, training and career development.

Materials and methods: Information was gathered from direct questioning of medical students, NHS doctors and RAF pilots, from Parliamentary reports and publically accessible data provided by Medical schools and RAF recruitment centres.

Results: Entry to medical school, in contrast to the RAF, depends much more on extremes of academic excellence, social status and bias. The RAF seeks to actively recruit talented candidates through Air Cadets and scholarships for example, motivating and preparing applications from disadvantaged candidates. Active recruitment to medicine is non-existent. Hierarchy is very important throughout the RAF and career progression is based on genuine experience and merit. Mentoring is a lifelong process and appraisal is by more senior officers. In medicine, at consultant level, none of these are true. Specialisation within the RAF is dictated by a rigorous process involving aptitude tests, interviews and recognition that different skills and personalities are required for different careers paths. Cardiothoracic surgery has attempted to copy this model but most careers are still largely self-determined. In medicine skills labs and courses teaching basic surgical techniques do exist, but surgeons largely train on patients. In contrast, the RAF has an intense program of simulation, both in manual skills and importantly in disaster management, for when the unthinkable happens.

Conclusions: The NHS and RAF both depend upon different personalities with different skills, functioning as a team. We should embrace the lessons they have learnt.

A31

Major vascular trauma in Iceland

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Objectives: Trauma involving major arteries is an important cause of death and morbidity in most countries. This retrospective study focused on mechanism of injury, incidence and outcome of patients with major vascular trauma in a whole nation.

Material and methods: All patients that sustained major vascular injury (MVI) (requiring intensive care) in Iceland between 2000 and 2011 were included. Patient demographics, mechanism, and site of injury were registered, also concomitant injuries, signs of life at admission, number of transfusions administrated and lengths of hospital stay. Based on physiological status on admission, injury severity score (ISS), revised trauma score (RTS) and ability of survival (Ps) were calculated.

Results: Altogether 23 patients sustained 35 vascular injuries that included 18 accidents, 3 murder attempts and 2 self inflicted injuries. Median age was 45 years (range 19-76) and 83% were males. Fifteen of the cases were blunt injuries, usually following motor vehicle accidents in the metropolitean area, and 8 penetrating injuries. Chest (n=7) followed by upper limb (n=5) trauma was most common. In 86% of cases open surgery was needed to stop the bleeding, but in 3 cases endovascular angiography could be used successfully. The most common injuries involved the aorta (n=6) and brachial artery (n=4). Median blood loss was 3L (range; 0,5-55) and median of 9 units of packed red blood cells were transfused (range;3-156). CPR was required on the scene for 2 patients and for 1 patient intraoperatively. Median hospital stay was 13 days (range; 0-112). Four patients died within 30 days (17%), 3 intraoperatively and one 11 days postoperatively. There were 18 long-term survivors out of whom 10 made a good recovery with no neurological sequelae.

Conclusions: Major vascular injury is rare in Iceland compared to the US and South-Africa. Although the number of patients in this series is small, our results are encouraging with majority of patients surviving the injury.

A32

Leg ischemia before circulatory arrest alters brain leukocyte count and respiratory chain redox state

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Objectives: Remote ischemic preconditioning and its neuroprotective abilities are currently under investigation and the method has shown significant effects in animal studies. Although several mechanisms and mediators have been revealed, this study aimed to obtain and assess direct visual data of leukocyte behaviour in cerebral vessels after hypothermic circulatory arrest (HCA) after remote ischemic preconditioning.

Materials and methods: Twelve native stock piglets were randomized into a remote ischemic preconditioning group (RIPC) (n=6) and a control group (n=6). The intervention group underwent hind-leg ischemia whereas the control group received a sham-treatment before a 60 minute period of HCA. Three filters were used to evaluate vascular caliber changes, leukocytes, and nicotinamide adenine dinucleotide redox state data. Cerebral and cerebellar biopsies were collected and analyzed with transmission electron microscope.

Results: RIPC group had normal RER's in their cerebellar tissue whereas the control group had a mean score of 1.06 (SD 0.41) (p= 0.026). Intravital microscopy revealed no differences in vessel diameter between groups. The measured amount of adherent leukocytes was lower in the RIPC group. The difference was statistically significant at several time points after hypothermic circulatory arrest. Additionally nicotinamide adenine dinucleotide auto-fluorescence had several statistically significant differences.

Conclusions: Remote ischemic preconditioning seems to provide better mitochondrial respiratory chain function as indicated by the higher NADH content. Simultaneously it provides a reduction of adherent leukocytes in cerebral vessels after hypothermic circulatory arrest. Additionally it might provide some degree of cellular organ preservation as implied by the electron microscopy results.

A33

Effects of remote ischemic preconditioning on cardiac mitochondrial respiration and incidence of atrial fibrillation in coronary surgery

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Objectives: Remote ischemic preconditioning preceding coronary surgery is an inexpensive and easy to perform method of myocardial preservation. However the mechanisms of action on a cellular level are largely unknown and the clinical effects are debated.

Materials and methods: In a single centre, prospective randomized double-blinded clinical trial, 60 patients scheduled for first time coronary surgery were included. Patients with significant comorbidity were excluded. Remote ischemic preconditioning was performed in a standardized fashion. Right arm ischemia was induced by suprasystolic inflation of a blood pressure cuff for 3 x 5 minutes. Coronary surgery was performed on-pump at 34ºC under cold cardioplegic arrest. Myocardial biopsies were harvested from the right atrium at the time of cannulation and decannulation. Multiple left ventricular myocardial biopsies were obtained from the anterior wall prior to cross-clamp and before weaning from bypass. Mitochondrial respiration was measured using the permeabilized skinned muscle fiber technique. Postoperative heart rate was evaluated by cardiac telemetry.

Results: Patient characteristics including cross clamp time and number of grafts, were similar in both groups, there was no 30-day mortality. Maximal mitochondrial respiration in left ventricular samples was significantly reduced after aortic cross-clamping in the control group (10.2±3.9 vs 8.7±2.5 µmol O_2/min/g, p=0.015), whereas it was preserved in the remote ischemic preconditioning group (9.8±3.9 vs 10.0±3.0 µmol O_2/min/g, p=0.685). Similar results were obtained in right atrial biopsies. The incidence of de novo postoperative atrial fibrillation was significantly reduced in remote ischemic preconditioning patients compared to controls (14% vs 46%, p=0.007).

Conclusions: This is the first clinical trial that demonstrates preserved mitochondrial respiration and a reduced incidence of postoperative atrial fibrillation in remote ischemic preconditioning.

A34

Wound closure with triclosan-coated sutures do not lower the rate of surgical site infections after sternotomy – results from a randomized controlled trial

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Background: Surgical site infection (SSI) is a serious complication following open heart surgery. Triclosan-coated sutures have been shown to reduce the rate of SSI in various surgical wounds, including wounds after vein harvesting in CABG patients. We evaluated the rate of SSI in sternotomy wounds comparing wound closure with triclosan-coated and conventional sutures.

Materials and methods: This is a prospective randomized double-blind single center study. A total of 358 patients that underwent open heart surgery (CABG+/- valvular surgery) were randomized to closure of the sternal wound with either triclosan-coated sutures (Vicryl Plus and Monocryl Plus, Ethicon, Somerville, NJ, USA) (n=179) or identical sutures without triclosan (n=179). A total of six patients were excluded from analysis, two sutured with triclosan-coated sutures and four in the control group. Patients were followed up after 30 days (clinical visit) and 60 days (telephone interview). The groups were compared with main focus on SSI meeting the Center for Disease Control criteria.

Results: The demographics in both groups were comparable, including age, gender, rate of diabetes and smoking. SSI of the sternotomy wound was diagnosed in 41 patients; 22 (12.6%) sutured with triclosan-coated sutures compared to 19 (10.7%) sutured without triclosan (p=0.59). Most infections were superficial (n=33, 9%) while eight (2.3%) were deep sternal wound infections. The most commonly identified main pathogens were *Staphylococcus aureus* (32%) and coagulase-negative staphylococci (27%), with positive cultures obtained in 30 out of 41 patients with SSI.

Discussion: Skin closure with triclosan-coated sutures did not reduce the rate of sternal SSIs following open heart surgery.

Abstracts - Poster presentations

P01

Intensive care unit admissions following lobectomy or sublobar resections for non-small cell lung cancer

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Objectives: Following resection for non-small cell lung cancer (NSCLC), patients are usually admitted to the post-anesthesia care unit (PACU)for a few hours before admission to a general ward (GW). However, some patients need ICU-admission, either immediately post-surgery or from the PACU or GW. The aim of this study was to investigate the indications and risk factors for ICU-admission.

Materials and methods: A retrospective study of 252 patients who underwent lobectomy, wedge resection or segmentectomy for NSCLC in Iceland during 2001-2010. Data was retrieved from medical records and patients admitted to the ICU compared to patients not admitted.

Results: Altogether 21 patients (8%) were admitted to the ICU, median length-of-stay being one day (range 1-68). In 11 cases (52%) the reasons for admission were intraoperative problems, usually hypotension or excessive bleeding. Ten patients were admitted from the GW (n=4) or PACU (n=6), due to hypotension (n=4), heart and/or respiratory failure (n=4) and reoperation for bleeding (n=2). There were three ICU-readmissions. Patients admitted to the ICU were six years older (p=0.004) and more often had chronic obstructive pulmonary disease and/or coronary artery disease. Tumor size, pTNM-stage, length of operation and the ratio of patients receiving TEA (thoracic epidural anaesthesia) were similar between groups. Over two-thirds of the ICU-patients had minor complications and around half had major complications, compared to 30% and 4%, respectively, for controls.

Conclusions: ICU-admissions are infrequent following non-pneumonectomy lung resections for NSCLC, these patients being older with cardiopulmonary comorbidities. In half of the cases, admission to the ICU directly follows surgery and ICU-readmissions are few.

P02

Functional and biomechanical effects of an MC3 annuloplasty ring on a novel tissue engineered tricuspid valve prosthesis

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Background: A novel extracellular matrix material (SIS-ECM) for cardiovascular use has recently been developed. SIS-ECM acts as a degradable scaffold allowing ingrowth and differentiation of the recipients' own cells over time and a functioning SIS-ECM tricuspid valve prosthesis has been developed in our laboratory. Implantation of an adjuvant annuloplasty ring is a common tricuspid valve repair technique but it is uncertain how implantation of an annuloplasty ring will affect the functioning and stress distribution in an implanted SIS-ECM valve.

Objectives: Our objective in this study is to investigate biomechanical and functional aspects of the SIS-ECM tricuspid valve prosthesis before and after implantation of an adjuvant tricuspid annuloplasty ring.

Materials and methods: In an acute setting, eight 60 kg Danish Landrace pigs will be put on cardiopulmonary bypass. First, 13 piezoelectric sonomicrometric crystals will be implanted at the top of each papillary muscle. The native valve will be excised and a SIS-ECM valve will be inserted. Baseline sonomicrometry, force measurements and hemodynamics will then be recorded off bypass. Next, a tricuspid ring (Edwards MC3) will be implanted during cardiac arrest and the same measurements will be performed again. 2D echocardiography will be obtained before and after ring implantation to measure coaptation length.

Results and discussion: This is an on-going project and preliminary data will be presented at the meeting. We expect to find a stabilizing effect of the annuloplastic ring on the new valve with respects to biomechanical and functional parameters.

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