They still like to get a letter - Patient preference for follow-up after radiofrequency ablation for atrial fibrillation

Eva Torsvik, Haukeland University Hospital, Haukeland University Hospital, Bergen, Norway

Patient preference for follow-up method after Radiofrequency ablation for atrial fibrillation—they still like to get a letter
Eva Torsvik 1, 3 *, Peter Schuster 1, 2, 3

1. Haukeland University Hospital, Bergen, Norway
2. University of Bergen, Department of Clinical Science, Bergen, Norway
3. ABLAnor, National Ablation registry in Norway

Background:
Several studies have shown that phone calls are an effective but resource-intensive follow up (FU) method to collect patient reported data (PROM) after discharge from hospital. No studies regarding FU methods are available in patients treated by radiofrequency ablation (RFA) for atrial fibrillation (AF).

Purpose:
We wanted to examine the recent practice and resource needs to telephone contact and further to investigate the actual preferred patient method for FU (telephone, e-mail or letter with return envelope).

Method:
In a 4 month period we called 167 patients on their mobil telephone scheduled for RFA of AF. We registered the number of attempts needed to reach the patients (maximum 3 times). In addition to medical issues, 70 of patients were asked how they would like to answer FU questions 3 and 6 months after RFA (phone, e-mail or traditional mail)

Results:
Of the 167 patients we achieved 92 responses (55%) at first time dialing, 36 responses (21.5%) at second time dialing and none could be reached at third time dialing (23,3%). Of the total 167 patients, 128 patients (76,7%) responded. Of these 167 patients, 135 were men. In regards of patient preference for FU, 50 (71,4%) favored a questionnaire in a stamped envelope. Only 8 (11,4%) preferred FU by telephone, and 12 (17,2%) by E-mail.

Conclusion:
As for other patient groups we demonstrate that telephone FU in AF patients is a resource-intensive task. For sufficient data quality a higher response rate is requested. Approximately one fourth of patients can not be reached and a third time try to contact patients resulted in zero additional response. We do not know the actual response rate in AF patients, but we clearly find a preference for FU by traditional mail.
Abstract ID: 2

Presentation type(s): Poster, clinical research

**Predictors of left ventricular function recovery during mild therapeutic hypothermia in out-of-hospital cardiac arrest patients: The evaluation by serial transthoracic echocardiography**

Haitham Ballo, Heart Center, Turku University Hospital, Turku, Finland
Antti Saraste, Heart Center, Turku University Hospital, Turku, Finland, Ruut Laitio, Department of Anesthesiology and Intensive Care, Turku University Hospital, Turku, Finland, Olli Arola, Department of Anesthesiology and Intensive Care, Turku University Hospital, Turku, Finland, Juhani Airaksinen, Heart Center, Turku University Hospital, Turku, Finland, Mikko Pietila, Heart Center, Turku University Hospital, Turku, Finland, Veli-Pekka Harjola, Department of Emergency Medicine and Services, Helsinki University Central Hospital, Helsinki, Finland, Marjut Varpula, Heart and Lung Center, Helsinki University Central Hospital, Helsinki, Finland, Tero Vahberg, Department of Biostatistics, University of Turku, Turku, Finland, Timo Laitio, Department of Anesthesiology and Intensive Care, Turku University Hospital, Turku, Finland

**Background:** Out-of-hospital cardiac arrest (OHCA) is associated with prolonged, global (LV) left ventricular dysfunction. However, time course and predictors of recovery of LV function remain unknown.

**Aim:** To evaluate LV function on admission, during mild therapeutic hypothermia (MTH) treatment and 24 hours after rewarming in OHCA patients by serial transthoracic echocardiography.

**Methods:** Thirty-eight adult OHCA survivors with ventricular fibrillation or pulseless ventricular tachycardia as initial cardiac rhythm were studied. Patients received MTH with a target temperature of 33°C for 24 hours. The transthoracic Echocardiography (GE Vivid 9 or i) was done on admission to hospital, during MTH (24+/−4 hours after reaching the target temperature), and 24 hours after rewarming (approximately 72 hours after OHCA). Data on both ischemic and non-ischemic area were acquired after the PCI procedures. The primary endpoints were the Ejection fraction (EF, Simpson’s method), and global longitudinal strain (GLS) whilst the secondary outcomes were the regional longitudinal strain in ischemic and non-ischemic area (RLS ischemic, and RLS non-ischemic). Recovery of LV function was defined as >7% increase in EF after rewarming compared to EF on admission. According to the LV recovery, Patients were divided into recovery LV group (n=15) and no recovery LV group (n=23).

**Results:** Mean age of patients included was 58 ± 11 years, 70% were male, 87% were coronary artery disease patients, and 39% with STEMI. Compared with on arrival to hospital, there were significant improvements in EF (39±10 vs. 45±4%, p<0.0001) and GLS (-8.5±3.8 vs. -12.2±4.0%, p<0.0001) at 24 hours after rewarming. During MTH, EF and GLS were already higher to that on arrival (42±12% p=0.009, and -10.6±2.6%, p=0.03). Compared with on arrival, RLS improved after rewarming both in the ischemic and non-ischemic areas (-6.8±4.8 vs. -10.4±5.7%, p=0.01, and -8.6±3.9 vs. -12.7±4.3%, p< 0.0001, respectively). On admission, EF was similar in the recovered and non-recovered groups (36±7 vs. 40±12%, p=0.16), but EF of the recovered group was higher already during MTH (47±12 vs. 39±11%, p=0.04). However, GLS between groups was comparable on admission (-7.5±3.4 vs. -9.3±3.9%, p=0.16), and during MTH (-11.4±3.4 vs. -10.1±3.9%, p=0.4).

**Conclusion:** There is a continuous improvement in LV function in OHCA survivors during the first 72 hours after the event both in the ischemic and non-ischemic regions. EF during hypothermia treatment was predictive of LV function after rewarming.
Abstract ID: 4

Presentation type(s): Poster, clinical research

**Prospective randomized comparison of minimal invasive extracorporeal circulation versus conventional extracorporeal circulation in the prevention of postoperative atrial fibrillation.**

Sten Ellam, Department of Anesthesiology and Operative Service, Kuopio University Hospital, Kuopio, Finland, Kuopio, Finland
Pekka Korvenoja, Acute Care, South Karelia Central Hospital, Lappeenranta, Finland, Lappeenranta, Finland, Juha Hartikainen, University of Eastern Finland, Kuopio, Finland, Kuopio, Finland, Antti Valtola, Heart Center, Kuopio University Hospital, Kuopio, Finland, Kuopio, Finland, Jari Halonen, University of Eastern Finland, Kuopio, Finland, Kuopio, Finland

**Aim:** Postoperative atrial fibrillation (AF) is the most common arrhythmia to occur after cardiac surgery with an incidence between 20-45%. It is associated with increased morbidity, including increased risk of stroke and need for additional treatment and costs. The pathophysiology of postoperative AF is not fully known. Cardiac surgery with extracorporeal circulation is associated with a systemic inflammatory response, which may be in part responsible for postoperative AF. Furthermore, foreign surface contact, blood-air contact, abnormal blood flow and hemodilution are problems related to extracorporeal circulation. Minimal invasive extracorporeal circulation (MiECC) has been developed to minimize the risks related to conventional extracorporeal circulation (CECC).

**Methods:** In this prospective, randomized, open labelled clinical study, 240 CABG patients were randomized to MiECC or CECC groups before the surgery. The main outcome measure was the incidence of postoperative atrial fibrillation (AF) during the hospital stay after surgery. Other end points were the use of packed red blood cells and vasoactive agents and the first CKMBm value postoperatively.

**Results:** The incidence of postoperative atrial fibrillation was 42/120 (35.0%) in the MiECC group and 43/120 (35.8%) in the CECC group (p = 0.893). The use of perioperative vasoactive agents was significantly lower in the CECC group compared with MiECC group. The first postoperative CKMBm value was significantly lower in CECC patient group than in MiECC patient group. There were no difference in the use of packed red blood cells between the groups.

**Conclusion:** There were no difference in the incidence of postoperative AF after cardiac surgery between the groups. More prospective, randomized studies are needed to establish potentially useful methods in the prevention of AF in cardiac surgery patients.
**Abstract ID: 7**

Presentation type(s): Poster, clinical research

**Wrist band photoplethysmography in detection of individual pulses and atrial fibrillation in recent-onset and late atrial fibrillation**

Eemu-Samuli Väliaho, Doctoral School, University of Eastern Finland, Kuopio, Finland
Pekka Kuoppa, Department of Applied Physics, University of Eastern Finland, Kuopio, Finland, Jukka Lipponen, Department of Applied Physics, University of Eastern Finland, Kuopio, Finland, Tero Martikainen, Department of Emergency Care, Kuopio University Hospital, P.O. Box 100, Finland, Helena Jäntti, School of Medicine, University of Eastern Finland, Kuopio, Finland, Tuomas Rissanen, Heart Center, North Karelia Central Hospital, Joensuu, Finland, Indrek Kolk, Heart Center, Kuopio University Hospital, Kuopio, Finland, Maaret Castrén, Emergency Medicine, University of Helsinki, Helsinki, Finland, Jari Halonen, School of Medicine, University of Eastern Finland, Kuopio, Finland, Mika Tarvainen, Department of Applied Physics, University of Eastern Finland, Kuopio, Finland, Juha Hartikainen, School of Medicine, University of Eastern Finland, Kuopio, Finland

**Aim:**
Atrial fibrillation (AF) is often intermittent and asymptomatic making its detection a major clinical challenge. A photoplethysmography (PPG) wrist band has been used in AF detection, however it is unknown if recent-onset (AF duration <48h) and late AF (≥48h) are detected similarly. We evaluated PPG wrist band in detection of individual pulses and tested the reliability of two commonly used AF detection algorithms in recent-onset and late AF.

**Methods:**
Five-minute PPG signals were recorded from patients with AF or sinus rhythm with a PPG wrist band and analyzed with two AF detection algorithms: AFEvidence and COSEn. A simultaneously registered 3-lead ECG served as the golden standard for rhythm analysis and was interpreted by two cardiologists.

**Results:**
The study population consisted of 213 volunteer adult patients (106 AF and 107 sinus rhythm). For the AF group the wrist band PPG achieved pulse detection sensitivity of 91.7±11.2% and a positive predictive value (PPV) of 97.5±4.6%, whereas in the sinus rhythm group the sensitivity was 99.4±1.5% (7.7%[95% CI 5.5% to 9.9%]; p<.001) and PPV 98.1±4.1% (0.6%[95% CI -0.6% to 1.7%]; p=0.350). The pulse detection sensitivity was lower 86.7±13.9% with recent-onset AF as compared to late AF 95.1±7.2% (-8.3%[95% CI -12.9% to -3.7%]; p=.001). PPG and ECG pulse detection samples are presented in the figure (HR = heart rate).

The AF detection sensitivity was 93.0% and specificity 98.1% for both AFEvidence and COSEn in recent-onset AF. In late AF, the sensitivities were 98.4% and 96.8% for AFEvidence and COSEn with a specificity of 98.1%. For the detection of AF regardless of arrhythmia duration, the sensitivities were 96.2% and 95.3% and specificity 98.1% with AFEvidence and COSEn.

**Conclusions:**
The wrist band PPG enabled accurate algorithm-based detection of AF with two common AF detection algorithms and moderate pulse detection accuracy. The AF detection sensitivity was lower in recent-onset AF compared to late AF.
Abstract ID: 8

Presentation type(s): Poster, clinical research

Wrist band photoplethysmography pulse morphology analysis enables atrial fibrillation detection without the need of pulse detection

Eemu-Samuli Väliaho, Doctoral School, University of Eastern Finland, Kuopio, Finland
Pekka Kuoppa, Department of Applied Physics, University of Eastern Finland, Kuopio, Finland, Jukka Lipponen, Department of Applied Physics, University of Eastern Finland, Kuopio, Finland, Tero Martikainen, Department of Emergency Care, Kuopio University Hospital, Kuopio, Finland, Helena Jäntti, School of Medicine, University of Eastern Finland, Kuopio, Finland, Tuomas Rissänen, Heart Center, North Karelia Central Hospital, Joensuu, Finland, Indrek Kolk, Heart Center, Kuopio University Hospital, Kuopio, Finland, Maaret Castrén, Emergency Medicine, University of Helsinki, Helsinki, Finland, Jari Halonen, School of Medicine, University of Eastern Finland, Kuopio, Finland, Mika Tarvainen, Department of Applied Physics, University of Eastern Finland, Kuopio, Finland, Juha Hartikainen, School of Medicine, University of Eastern Finland, Kuopio, Finland

Aim:
Atrial fibrillation (AF) is often asymptomatic and intermittent making its detection a major clinical challenge. A photoplethysmography (PPG) wrist band with algorithm-based detection of AF provides a promising solution for screening of AF. However, the shapes of individual pulse waveforms vary in AF decreasing pulse detection accuracy. We evaluated the utility of PPG wrist band pulse morphology in detection of AF.

Methods:
A 5-minute PPG was recorded with a PPG wrist band from patients with AF or sinus rhythm. A simultaneously registered ECG served as the golden standard for the rhythm analysis and was interpreted by two cardiologists. In addition to using the inter-beat-interval (IBI) based AFEvidence algorithm in comparison, we extracted a feature straight from the PPG signal, without the need of pulse detection. This feature was calculated as the average of absolute autocorrelation values over different lags. The feature describes the regularity of the PPG signal and is decreased if the shape and periodicity of pulse waves vary. The performance of this PPG morphology-based method in detection of AF was evaluated and compared to the AFEvidence.

Results:
The study population consisted of 213 patients (106 AF, 107 sinus rhythm). The sensitivity and specificity of PPG morphology-based autocorrelation AF detection method were 98.1% and 94.4%. For AFEvidence, the sensitivity and specificity were 96.2% and 98.1%, respectively (p=.146 between the methods, McNemar test).

Conclusions:
The PPG morphology-based autocorrelation method detects AF with good accuracy without the need of pulse detection. The method seems promising in detection of AF and should be studied further.
Abstract ID: 9

Presentation type(s): Poster, nursing

Pulmonary and cardiological nurses’ thoughts and hopes regarding Magnet Hospital

Meeri Mustonen, Nursing Science, University of Turku, Turku, Finland
Saija Inkeroinen, Nursing Science, University of Turku, Turku, Finland, Virpi Valkama, Heart and Lung Center, Helsinki University Hospital, Helsinki, Finland, Maija Hupli, University of Turku, Turku, Finland

Aim:
The journey to Magnet Hospital means change and an important element in successful change is to listen to the employees. However, there are not many studies to be found about nurses’ thoughts and hopes regarding Magnet Hospital or a journey to it. The aim of this project was to describe nurses’ thoughts and hopes regarding the Magnet Hospital.

Methods:
This was a descriptive project. Data were collected with 5 thematic group interviews in October 2018. Participants (n=26) were nurses who worked in university hospitals' pulmonary and cardiological departments in the university hospital. Data were analyzed with inductive quality content analysis.

Results:
Four main themes emerged. Nurses’ thoughts and hopes regarding the journey to Magnet Hospital and after Magnet Recognition concerned about 1) Professional development of nurses. Nurses hoped support for individual development as a nurse through education. They also requested equal access to education for all nurses. Nurses hope that nursing would become more appreciated. 2) Development of nursing. For example, developing nursing care to be more evidence-based and smoother. Nurses wanted quality indicators to be easier and more suitable for units to use. 3) Patients, as improved quality of care and equity. Nurses hope to have more time to care for patients so patients will feel that nurses do not need to rush. Also, equality in care was one of the hopes of nurses. 4) Organization; about resources, communication and leadership. For example, nurses expressed their worries about increasing workload and a lack of information.

Conclusions:
Pulmonary and cardiological nurses’ hoped Magnet Recognition will enable the development of personal skills and nursing care. However, they were worried about organizational factors. The results show a need for more information and communication about the journey to Magnet Recognition.
Abstract ID: 11

Presentation type(s): Poster, basic science

The influence of job stress on risk of cardiovascular diseases in population 25-64 years in Russia/Siberia. WHO MONICA-psychosocial program

Dmitriy Panov, Collaborative Laboratory of Cardiovascular Disease, Research Institute of Internal and Preventive Medi, Novosibirsk, Russian Federation
Valery Gafarov, Collaborative Laboratory of Cardiovascular Disease, Research Institute of Internal and Preventive Medi, Novosibirsk, Russian Federation, Elena Gromova, Collaborative Laboratory of Cardiovascular Disease, Research Institute of Internal and Preventive Medi, Novosibirsk, Russian Federation, Igor Gagulin, Collaborative Laboratory of Cardiovascular Disease, Research Institute of Internal and Preventive Medi, Novosibirsk, Russian Federation, Almira Gafarova, Collaborative Laboratory of Cardiovascular Disease, Research Institute of Internal and Preventive Medi, Novosibirsk, Russian Federation

Purpose:
To determine the impact of stress on work on the risk of cardiovascular disease over 16-years of follow-up in an open population of 25-64 years in Russia/Siberia.

Methods:
Under the third screening of the WHO MONICA-psychosocial program (MOPSY) random representative sample including both genders aged 25–64 years was surveyed in Novosibirsk in 1994 (n=1346, 48.8% males; mean age 44.9 ± 0.4 years; response rate was 77.3%). Stress at work was assessed by means Karazek scale. New-onset cases of myocardial infarction (MI), stroke were identified from 1994 to 2010.

Results:
A high level of stress at work was in 29.5% of men and in 31.6% of women. The middle level was in 48.9% of men and in 50.7% of women (χ²=2.574 u=2 p=0.276). The risk of MI over 16-years period in persons experiencing stressful situations at work was as follow: in men HR=3.592 and women HR=3.218 (95%CI 1.146-9.042); stroke risk was in men HR=2.603 (95%CI, 1.06-4.153) and in women HR was 1.956 (95%CI 1.008-3.795). In multivariate analysis risk of MI in men was HR=1.15 (95%CI 0.6-2.2) and in women HR=2.543 (95%CI 1.88-7.351); risk of stroke in men was HR=3.8 (95%CI 1.6-8.8) and in women it was HR=1.95 (95%CI 0.984-3.887). The risk of stroke was higher in those who are living alone, divorced and widowed men HR=4.2 (95% CI 1.5-13.2) and in women with high school or primary education degree HR=3 (95%CI 0.852-11.039 ).

Conclusion:
It was established that a high level of stress at work is not gender-specific. The risk of MI incidence over a 16-years period is higher in women than in men but stroke in men; the risk of myocardial infarction and stroke is affected by the social gradient in both genders.
Abstract ID: 15

Presentation type(s): Poster, clinical research

Catching Atrial Fibrillation - Sensitivity of Smartphone ECG and the Capability of the Elderly Generation

Haakon Haverkamp, Faculty of Medicine, University of Bergen, Bergen, Norway
Stig Ove Fosse, Faculty of Medicine, University of Bergen, Bergen, Norway, Peter Schuster, Cardiology, Haukeland University Hospital, Bergen, Norway

Background
Single lead, mobile ECG devices are increasingly available, and some have presented acceptable accuracy, sensitivity and specificity in detecting pathological rhythms. AF/atrial flutter is a common condition among elderly, and the consequences are potentially dire. Identifying AF/atrial flutter early is of the greatest importance.

Objective
In this study, we aim to assess the capabilities of a smartphone ECG in identifying AF/atrial flutter in particular.

Methods
A total of 55 patients admitted to the Cardiac Ward or undergoing invasive cardiac procedures at Haukeland University Hospital, Bergen, Norway, were recruited to perform a 30 second smartphone ECG while under surveillance with either 12-lead ECG or standard calculated 12-lead ECG. Recordings were subsequently anonymized and analyzed by two interpreters and categorized as AF/atrial flutter or normal/other pathology. The study was adjudicator blinded, and the classifications was later compared to ECG diagnosis. A survey of age and ownership of smartphone among cardiac patients was performed (n=162).

Results
In total, 24 included subjects had AF/atrial flutter diagnosed by 12-lead ECG. Smartphone ECG is capable of identifying AF/atrial flutter with a sensitivity of 0.92 and a specificity of 0.87, which was considered substantial. Power analysis indicated that the number of included subjects was sufficient. In the age group 50-75 years 75% owned a smartphone or tablet, but only 57% of those above 75 years of age.

Conclusion
Our study shows that smartphone ECG is applicable in identifying AF/atrial flutter. Elderly people do to a lesser degree own smartphones, which may pose a problem in practical diagnostics.
Abstract ID: 16

Presentation type(s): Poster, clinical research

Prognostic impact of angiographic results in cardiogenic shock

Tuija Javanainen, Heart and Lung center, Cardiology, Helsinki Univ.Hospital and Univ. of Helsinki, Helsinki, Finland
Marek Banaszewski, Intensive Cardiac Therapy Clinic, Institute of Cardiology, Warsaw, Poland, Johan Lassus, Heart and Lung center, Cardiology, Helsinki Univ.Hospital and Univ. of Helsinki, Helsinki, Finland, Markku Nieminen, Heart and Lung center, Cardiology, Helsinki Univ.Hospital and Univ. of Helsinki, Helsinki, Finland, Heli Tolppanen, Heart and Lung center, Cardiology, Helsinki Univ.Hospital and Univ. of Helsinki, Helsinki, Finland, Toni Jäntti, Heart and Lung center, Cardiology, Helsinki Univ.Hospital and Univ. of Helsinki, Helsinki, Finland, Anu Kataja, Department of Emergency Medicine and Services, Helsinki Univ.Hospital and Univ. of Helsinki, Helsinki, Finland, Mari Hongisto, Department of Emergency Medicine and Services, Helsinki Univ.Hospital and Univ. of Helsinki, Helsinki, Finland, Lars Køber, Department of Cardiology, Rigshospitalet, University of Copenhagen, Copenhagen, Denmark, Alessandro Sionis, Cardiology, IIB-SantPau,CIBER-CV, Universitat Autònoma de Barcelona, Barcelona, Spain, John Parissis, ER and Heart Failure Clinic, Attikon University Hospital, Athens, Greece, Tuukka Tarvasmäki, Heart and Lung center, Cardiology, Helsinki Univ.Hospital and Univ. of Helsinki, Helsinki, Finland, Veeti-Pekka Harjola, Department of Emergency Medicine and Services, Helsinki Univ.Hospital and Univ. of Helsinki, Helsinki, Finland, Raija Jurkko, Heart and Lung center, Cardiology, Helsinki Univ.Hospital and Univ. of Helsinki, Helsinki, Finland

Aim
Urgent revascularization is the mainstay of treatment in acute coronary syndrome (ACS) related cardiogenic shock (CS). Many of the previous studies regarding angiographic features in cardiogenic shock predate primary percutaneous coronary intervention era, are of retrospective nature or examine registry data. The aim was to investigate the association of angiographic results with 90-day mortality in a prospective multinational CS patient cohort.

Methods
This CardShock (NCT0137486) substudy included 158 patients with ACS related CS and data on coronary angiography. Patients were divided into survivors and non-survivors in 90-day follow up. Survival analysis was conducted with Kaplan-Meier curves and Cox regression analysis.

Results
Median age was 67 ± 11 years and 121 (77 %) were men. Mortality rate at 90-day follow-up was 42 % (n = 90). Patients with one-vessel disease (n = 49) had lower 90-day mortality than patients with two- (n = 59) or three-vessel (n = 50) disease (25 % vs. 48 % vs. 52 %, p = 0.011, Figure A). Regarding culprit arteries, mortality was numerically higher in patients with left main (LM) or left anterior descending (LAD) as the culprit artery when compared to right coronary artery (RCA) or left circumflex artery (LCX), but the difference was not statistically significant (Figure B).

Successful revascularization (post-procedural TIMI grade 3 flow) was achieved more often in survivors than non-survivors (81 % vs. 60 %, p = 0.019, Figure C). Median symptom-to-balloon time was similar between survivors and non-survivors (335 [210-641] min vs. 340 [190-660] min, p = 0.70). In multivariable mortality analysis, the CardShock risk score [1] (HR 1.76, CI 1.45-2.13, p < 0.001), multivessel coronary artery disease (HR 2.24, CI 1.13-4.44, p = 0.021) and post-procedural TIMI < 3 (HR 1.85, CI 1.08-3.16, p = 0.025) were associated with 90-day mortality.

Conclusion
Multivessel coronary artery disease is associated with worse survival in ACS-related CS. Successful revascularization of the IRA had a positive effect on outcome despite delay from symptom onset.
Abstract ID: 17

Presentation type(s): Poster, nursing

Patients’ reflections on prehospital symptom recognition and timely treatment in myocardial infarction

Nina Fålun, Department of Heart Disease, Haukeland University Hospital, Os, Norway
Trond Røed Pettersen, Department of Heart Disease, Haukeland University Hospital, Bergen, Norway, Bengt Fridlund, Centre of Interprofessional Cooperation within Em, Linnaeus University, Vaxjö, Sweden, Tone M Norekvål, Department of Heart Disease, Haukeland University Hospital, Bergen, Norway

Background: Early treatment is crucial to successful therapy in patients with acute myocardial infarction (MI). Less than two hours from symptom debut to treatment is recommended in patients with ST-segment elevation infarction. Prehospital delay is associated with increased morbidity and mortality. At the time of discharge from hospital, empirical evidence on patients’ ability to recognize symptoms and act upon them in a timely manner in collaboration with healthcare professionals is scarce.

Purpose:
To explore patient’s experience of interaction with local hospitals and general practitioners, and their reflections on pre-hospital symptoms of MI and how to act upon them.

Methods:
Twenty patients aged 18 years or older (12 men) were purposefully selected according to age and gender following a MI. All patients were recruited from medical wards and the intensive care unit at the Department of Heart Disease at a university hospital in western Norway. Face-to-face semi-structured interviews were undertaken prior to hospital discharge. The interviews were organized around a set of predetermined open-ended questions, transcribed verbatim and analyzed by qualitative content analysis.

Findings:
There were patients who acted upon severe symptoms of MI, as intimidating chest pain, by seeking medical assistance. However, patients commonly experienced that the time from onset of symptom of MI to treatment posed a transitional challenge. They did not take subtle signs of MI seriously; they misattributed and rationalized symptoms and delayed seeking medical assistance. Frequently, patients experienced healthcare professionals not to take them seriously; they were struggling to get access to health services and they experienced both negative testing according to medical examination and incorrect treatment before hospitalization.

Conclusion:
Severe chest pain is associated with MI and triggers an immediate need for care. However, both patients and healthcare professionals in primary healthcare often misattribute moderate chest pain or subtle signs and symptoms of MI. We suggest addressing existing knowledge gaps regarding misattribution of symptoms by laypersons and healthcare professionals in primary healthcare to reduce this clinical challenge.
Abstract ID: 19

Presentation type(s): Poster, basic science

[18F]AIF-NOTA-folate PET imaging detects autoimmune myocarditis in rats

Arghavan Jahandideh, Turku PET Centre, University of Turku, Turku University Hospital, Turku, Finland
Sauli Uotila, Turku PET Centre, University of Turku, Turku, Finland, Mia Ståhle, Turku PET Centre, University of Turku, Turku, Finland, Jenni Virta, Turku PET Centre, University of Turku, Turku, Finland, Ville Kytö, University of Turku, Turku, Finland, Xiang-Guo Li, Turku PET Centre, University of Turku, Åbo Akademi University, Turku, Finland, Päivi Marjamäki, Turku PET Centre, University of Turku, Turku, Finland, Pekka Taimen, Department of Pathology, University of Turku, Turku University Hospital, Turku, Finland, Chen Qingshou, Department of Chemistry, Purdue University, West Lafayette, Indiana, United States, Philip Low, Department of Chemistry, Purdue University, West Lafayette, Indiana, United States, Juhani Knuuti, Turku PET Centre, University of Turku, Turku University Hospital, Turku, Finland, Antti Saraste, Turku PET Centre, University of Turku, Turku University Hospital, Turku, Finland

AIM
Positron emission tomography (PET) imaging with 2-deoxy-2-[18F]fluorodeoxyglucose is a non-invasive tool for the detection of cardiac sarcoidosis, but it has limited specificity for myocardial inflammation due to physiological uptake in the myocardium. Therefore, new PET tracers are needed. Folate receptor β (FR-β) is expressed on activated macrophages during inflammatory response. Radiolabeled folate derivatives have been used to assess increased folate uptake in various inflammatory disorders, but not in myocarditis. In this study, we evaluated [18F]AIF-NOTA-folate PET for the detection of FR-β expression in autoimmune myocarditis in rats.

Methods
Rats (n=11) were immunized twice on day 0 and 7 with subcutaneous injection of porcine cardiac myosin in an equal volume of complete Freund’s adjuvant supplemented with mycobacterium tuberculosis and i.p. pertussis toxin injection. Control rats (n=3) were injected with complete Freund’s adjuvant alone. PET imaging at 30-40 min after i.v. [18F]AIF-NOTA-Folate (52.5 ± 1.3 MBq) injection was performed on day 21 post-immunization followed by autoradiography and histological analysis of excised heart.

Results
In 5 of immunized rats, focal, macrophage-rich myocardial inflammatory lesions were detected. PET imaging with [18F]AIF-NOTA-folate demonstrated focally increased radiotracer uptake in the myocardium of rats with inflammatory lesions, whereas there was no uptake in any of the rats without inflammation. Target-to-background ratio (maximum standardized uptake value in the myocardium divided by mean standardized uptake value in blood) was higher in rats with inflammatory lesions as compared with control rats (6.4 ± 2.5 vs. 0.8 ± 0.09, respectively; P = 0.01). Autoradiography of myocardial tissue sections showed co-localization of [18F]AIF-NOTA-folate uptake and inflammatory lesions. Incubation of myocardial tissue sections with FR-β antagonist completely blocked tracer binding confirming specificity of [18F]AIF-NOTA-folate. Immunohistochemistry showed FR-β expression in inflammatory lesions.

Conclusions
[18F]AIF-NOTA-folate revealed specific accumulation in FR-β expressing macrophages in a rat model of autoimmune myocarditis. Our result demonstrates that [18F]AIF-NOTA-folate is a potential PET tracer for detection of active myocardial inflammation.
**Abstract ID: 20**

**Presentation type(s):** Poster, basic science

**Assessment of the common carotid artery in patients with pulmonary hypertension**

Gunnar Einarsson, Department of Medical Sciences, Uppsala University, Uppsala, Sweden
Dan Henrohn, Department of Medical Sciences, Uppsala University, Uppsala, Sweden, Tord Naessen, Department of Women´s and Children´s health, Uppsala University, Uppsala University Hospital, Uppsala, Sweden, Frida Hoffman, Department of Medical Sciences, Uppsala University, Uppsala, Sweden, Marita Larsson, Department of Women´s and Children´s health, Uppsala University, Uppsala University Hospital, Uppsala, Sweden, Gerhard Wikström, Department of Medical Sciences, Uppsala University, Uppsala, Sweden

**Aim:**
Pulmonary hypertension (PH) is characterized by pressure increase in the pulmonary artery and can be a result of pathological remodeling of the vessel wall. The peripheral vasculature is less well studied in patients with pulmonary hypertension. Our aim was to assess the common carotid artery (CCA) in patients with PH and compare to healthy subjects.

**Methods:**
In 26 patients with PH (WHO groups 1, 3, 4, 5) and 30 healthy subjects, the intima and media layers of the CCA were measured with noninvasive high-frequency (25 MHz) ultrasound. The PH diagnosis was confirmed with right heart catheterization (RHC).

**Results:**
Patients with PH had a significantly thicker intima layer compared to healthy subjects (p < 0.05). The intima was also significantly thicker in all patient subgroups in comparison to healthy subjects (p < 0.05). The media thickness was significantly thinner in patients with PH in comparison to healthy subjects (p < 0.05).

**Conclusions:**
The intima layer of the CCA in patients with PH was thicker in comparison to healthy subjects. This can reflect higher degree of pathological changes in the vessel wall of the CCA in patients with PH compared to healthy subjects. Our results indicate that pathological remodeling exist also in the peripheral vasculature in patients with PH.
Abstract ID: 21

Presentation type(s): Poster, clinical research

**Elective cardioversion of atrial fibrillation during era of non-vitamin K anticoagulants.**

Saga Itäinen-Strömberg, Heart and Lung Center, Helsinki University Hospital, Helsinki, Finland  
Anna-Mari Hekkala, The Finnish Heart Association, Helsinki, Finland, Aapo L. Aro, Helsinki University Hospital, Helsinki, Finland, Tuija Vasankari, Turku University Hospital, Turku, Finland, K.E. Juhani Airaksinen, Turku University Hospital, Turku, Finland, Mika Lehto, Helsinki University Hospital, Helsinki, Finland

Aim: Novel, non-vitamin K antagonist oral anticoagulants (NOACs) are increasingly used in patients with atrial fibrillation (AF) undergoing elective cardioversion (ECV). The aim was to investigate the use of NOACs and warfarin in ECV in a real-life setting and to assess how the chosen regimen affected the delay to ECV and rate of complications.

Methods: All AF patients undergoing ECVs in the city hospitals of Helsinki between January 2015 and December 2016 were studied. Data on patient characteristics, delays to cardioversion, anticoagulation treatment, acute (< 30 days) complications and regimen changes within one year were evaluated.

Results: 900 patients (59.2% men; mean age, 68.0 ± 10.0) underwent 992 ECVs, of which 596 (60.0%) were performed using NOACs and 396 (40.0%) using warfarin. The mean CHA2DS2-VASc score was 2.5 (±1.6). In patients without earlier anticoagulation treatment, NOACs were associated with a shorter mean time to cardioversion than warfarin (51 vs. 68 days, respectively; P <0.001). Furthermore, patients receiving NOAC had fewer postponements of scheduled elective cardioversion compared with warfarin (12.6% vs. 37.4%, respectively, P<0.001). The most common reason for visit cancellation was an imbalance of warfarin therapy and labile INR values. Six thromboembolic events (0.6%) occurred: 4 (0.7%) in NOAC-treated patients and 2 (0.5%) in warfarin-treated patients. Clinically relevant bleeding events occurred in 7 patients (1.8%) receiving warfarin and 3 patients (0.5%) receiving NOACs. Anticoagulation treatment was altered for 99 patients (11.0%) during the study period, with the majority (88.2%) of changes from warfarin to NOACs.

Conclusions: The rates of thromboembolic and bleeding complications were low in AF patients undergoing ECV in this real-life study. Patients on a NOAC had a shorter time to cardioversion and fewer postponements of scheduled elective cardioversion compared with warfarin. Furthermore, patients receiving NOAC therapy had less anticoagulation treatment changes than patients on warfarin.
Silent myocardial infarction and sudden cardiac death

Juha Vähätalo, Department of Internal Medicine, University of Oulu, Oulu, Finland
Heikki Huikuri, University of Oulu, Oulu, Finland, Lauri Holmström, University of Oulu, Oulu, Finland, Tuomas Kenttä, University of Oulu, Oulu, Finland, Anette Haukilahti, University of Oulu, Oulu, Finland, Lasse Pakanen, University of Oulu, Oulu, Finland, Kari Kaikkonen, University of Oulu, Oulu, Finland, Jani Tikkanen, University of Oulu, Oulu, Finland, Juha Perkiömäki, University of Oulu, Oulu, Finland, Robert Myerburg, University of Miami School of Medicine, Miami, Florida, United States, Juhani Junttila, University of Oulu, Oulu, Finland

Aim:
Myocardial infarction (MI) may occur in the absence of symptoms, or with minor or unrecognized symptoms, and are characterized as clinically unrecognized or silent (SMI). The prevalence of SMI among sudden cardiac death (SCD) victims has not previously been described. The aim was to determine the prevalence of autopsy verified SMI in SCD victims without a prior diagnosis of coronary artery disease (CAD) and to detect ECG abnormalities related with SMI.

Methods:
The Fingesture study consists of a large series of consecutive victims of autopsy-verified SCD in Northern Finland between the years 1998-2017 (n=5,869, 78.9% males, mean age 64.9 ± 12.4 years). The autopsies routinely included histological examinations, and a toxicology investigation was carried out if needed. SMI was defined as focal scar in the distribution of a stenotic or occluded coronary artery. Pre-mortem clinical history was obtained from medical records, previously recorded ECGs, and a standardized questionnaire provided to the next of kin.

Results:
Coronary artery disease was determined to be the cause of SCD in 4,392 victims (74.8%), among whom 3,122 had no history of CAD prior to death. This represents 53.2% of all SCDs, and 71.1% of CAD-associated SCDs. CAD with silent MI was detected in 42.4% victims without a clinical history of CAD. The SMI subjects were older than subjects without MI scar (67±11 years versus 66±12 years, p<0.001) and were more often men (83% versus 76%, p<0.001). Heart weight was higher in SMI subjects (483±109 g vs. 438±106 g, p<0.001). In SMI subjects, SCD occurred more often during physical activity (19% versus 13%, p<0.001) and outdoors (21% versus 15%, p<0.001). Overall ECG abnormalities were more common in the SMI than non-SMI group (67% vs. 55%, p<0.001). Inverted T-waves were observed in 17%, pathologic Q-waves in 13%, and fragmented QRS complex in 54% in the SMI group.

Conclusions:
Many SCD victims with associated CAD had a previously undetected MI at autopsy. Previous SMI was associated with myocardial hypertrophy and SCD during physical activity. Pre-mortem ECG was abnormal in two thirds of the SCD victims with SMI.
Abstract ID: 23

Presentation type(s): Poster, basic science

Diagnostic yield and genetic characteristics in patients with a clinical suspicion of catecholaminergic polymorphic ventricular tachycardia (CPVT)

Juha Koskenvuo, Head quarters, Blueprint Genetics, Helsinki, Finland
Julie Hathaway, Blueprint Genetics, Helsinki, Finland, Inka Saarinen, Blueprint Genetics, Helsinki, Finland, Jonna Tallila, Blueprint Genetics, Helsinki, Finland, Eija Seppälä, Blueprint Genetics, Helsinki, Finland, Sari Tuupanen, Blueprint Genetics, Helsinki, Finland, Hannu Turpeinen, Blueprint Genetics, Helsinki, Finland, Tiia Kangas-Kontio, Blueprint Genetics, Helsinki, Finland, Jennifer Schleit, Blueprint Genetics, Helsinki, Finland, Johanna Tommiska, Blueprint Genetics, Helsinki, Finland, Eveliina Salminen, Blueprint Genetics, Helsinki, Finland, Pertti Salmenperä, Blueprint Genetics, Helsinki, Finland, Sari Tuupanen, Blueprint Genetics, Helsinki, Finland, Tiia Kangas-Kontio, Blueprint Genetics, Helsinki, Finland, Jennifer Schleit, Blueprint Genetics, Helsinki, Finland, Johanna Tommiska, Blueprint Genetics, Helsinki, Finland, Eveliina Salminen, Blueprint Genetics, Helsinki, Finland, Pertti Salmenperä, Blueprint Genetics, Helsinki, Finland, Johanna Tommiska, Blueprint Genetics, Helsinki, Finland, Jennifer Schleit, Blueprint Genetics, Helsinki, Finland

Aim: Catecholaminergic Polymorphic Ventricular Tachycardia (CPVT) is a rare, but potentially fatal channelopathy. Genetic testing may be used to confirm a diagnosis in unclear cases and therefore, is increasingly being performed in a heterogeneous patient population. We analyze the diagnostic yield and genetic characteristics of a cohort of patients with a clinical suspicion or diagnosis of CPVT.

Methods:
This is a retrospective review of patients referred for genetic testing at Blueprint Genetics over a 5-year period. Genetic test results and their classifications were compiled. A sub-analysis of diagnostic RYR2 variants (location, segregation) was performed.

Results:
A total of 134 patients were analyzed between 2013 and 2018. A pathogenic (P) or likely pathogenic (LP) variant was identified in 27 patients (20.1%). Twenty patients (14.9%) had a diagnostic finding in a CPVT-associated gene: 62.9% in RYR2, 7.4% in CALM1, and 3.7% in CASQ2 (biallelic). Four patients (14.8%) had a P or LP variant in KCNQ1, KCNJ2 or SCN5A and three (11.1%) had a P or LP variant in a cardiomyopathy-associated gene (DSG2, DSP or PLN). All P/LP RYR2 variants were missense, except a deletion encompassing exon 3, were missense. Parental testing was performed in 11/17 cases where P/LP RYR2 variants were found; 8 (72.7%) variants were de novo. Enrichment of P/LP RYR2 variants in the four described hotspots (OR 50, 95% CI 29-85, P<0.0001) was observed in the cohort compared to gnomAD reference population.

Conclusions:
In this cohort, 37% of patients with a diagnostic test result had a clinically significant variant in a gene other than RYR2. Interestingly, 26% of these patients had genetic test results that were diagnostic for a cardiomyopathy or a channelopathy other than CPVT. This study supports the utilization of broad next generation sequencing panels for patients with a clinical suspicion of CPVT.

<table>
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<tr>
<th>Hotspot</th>
<th>BpG total</th>
<th>BpG%</th>
<th>GnomAD</th>
<th>GnomAD%</th>
<th>OR 95% CI</th>
<th>P-value</th>
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<td>1,12 %</td>
<td>96</td>
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<td>II (aa 2246-2534)</td>
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<td>0,37 %</td>
<td>61</td>
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<td>56</td>
<td>0,025 %</td>
<td>124 (59-263)</td>
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<td>IV (aa 4497-4959)</td>
<td>3</td>
<td>1,12 %</td>
<td>57</td>
<td>0,025 %</td>
<td>45 (14-144)</td>
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<td>I-IV</td>
<td>15</td>
<td>5,60 %</td>
<td>270</td>
<td>0,119 %</td>
<td>50 (29-85)</td>
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<td>Outside of hot spot</td>
<td>2</td>
<td>0,75 %</td>
<td>730</td>
<td>0,323 %</td>
<td>2.3 (0.6-9.4)</td>
<td>P = 0.23</td>
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<tr>
<td>Whole gene</td>
<td>17</td>
<td>6,34 %</td>
<td>1000</td>
<td>0,442 %</td>
<td>15 (9.3-25)</td>
<td>P &lt; 0.0001</td>
</tr>
</tbody>
</table>
Abstract ID: 24

Presentation type(s): Poster, basic science

Diagnostic yield of genetic testing in an unselected HCM cohort

Juha Koskenvuo, Headquarters, Blueprint Genetics, Helsinki, Finland
Julie Hathaway, Blueprint Genetics, Helsinki, Finland, Inka Saarinen, Blueprint Genetics, Helsinki, Finland, Jonna Tallila, Blueprint Genetics, Helsinki, Finland, Eija Seppälä, Blueprint Genetics, Helsinki, Finland, Sari Tuupanen, Blueprint Genetics, Helsinki, Finland, Hannu Turpeinen, Blueprint Genetics, Helsinki, Finland, Tiia Kangas-Kontio, Blueprint Genetics, Helsinki, Finland, Jennifer Schleit, Blueprint Genetics, Helsinki, Finland, Johanna Tommiska, Blueprint Genetics, Helsinki, Finland, Evelina Salminen, Blueprint Genetics, Helsinki, Finland, Pertti Salmenperä, Blueprint Genetics, Helsinki, Finland, Johanna Sistonen, Blueprint Genetics, Helsinki, Finland, Mikko Muona, Blueprint Genetics, Helsinki, Finland, Massimiliano Gentile, Blueprint Genetics, Helsinki, Finland, Ville Kytölä, Blueprint Genetics, Helsinki, Finland, Samuel Myllykangas, Blueprint Genetics, Helsinki, Finland, Jussi Paananen, Blueprint Genetics, Helsinki, Finland, Tero-Pekka Alastalo, Blueprint Genetics, Helsinki, Finland

Aims:
Genetic testing in Hypertrophic Cardiomyopathy (HCM) is recommended by published guidelines. Genetic testing by NGS panels offers practical differential diagnostic solution. We evaluated diagnostic yield in a heterogeneous cohort of patients with a suspicion of HCM

Methods:
A retrospective review of patients with a suspected clinical diagnosis of HCM referred for genetic testing at Blueprint Genetics between 2013 and 2018 was undertaken. Variants classified as pathogenic (P) or likely pathogenic (LP) at the time of reporting were considered diagnostic.

Results:
Diagnostic yield was 26.2% (361/1,376). In total, 373 P/LP variants were identified including 363 variants diagnostic for HCM whereas only 10 were diagnostic for another type of cardiomyopathy based on clinical and genetic interpretation (DES, DSP, LMNA, TTN). Approximately 86% (n=320) of diagnostic variants (23.3% of all tests) involved genes encoding the sarcomere. Seventeen P or LP variants (4.6% of variants and 1.2% of all tests) were in RASopathy genes and thirteen P or LP variants (3.5% of 0.9% of all tests) were in metabolic/infiltrative disease genes. In addition, three patients with non-diagnostic findings for cardiomyopathy had P or LP variants in genes linked to a channelopathy (RYR2, SCN5A) or neurofibromatosis (NF1).

Conclusions:
The diagnostic yield of genetic testing in a heterogeneous cohort of patients with a suspected diagnosis of HCM analyzed is lower than what has been reported in well characterized patient cohorts. Importantly, 8% of all diagnostic findings were in metabolic and RASopathy genes which have significant implications on medical management.
Health-related quality of life in patients with coronary heart disease at hospital discharge

Brynja Ingadottir, Nursing, University of Iceland, Hringbraut, Iceland
Audur Ketilsdottir, Cardiology, Landspitali University Hospital, Reykjavik, Iceland, Margret Hronn Svavarsdottir, Health Sciences, University of Akureyri, Akureyri, Iceland

Aim:
To assess patient-reported health-related quality of life (HRQoL) at time of discharge after hospital treatment for coronary heart disease (CHD).

Methods:
In a cross-sectional survey (2017-2018), Icelandic patients who had received either an elective or acute treatment for their CHD answered the new HeartQoL questionnaire at time of hospital discharge. The HeartQoL has 14 items and 4 response options (very much = 0 to no = 3), with higher scores indicating better HRQL. A global score and two subscales are calculated: physical HeartQoL (10 items) and an emotional HeartQoL (4 items).

Results:
Data analysis is not completed. Preliminary results: Patients (n = 414, mean age 64 years (SD ± 9.0), 79% male) reported a mean global score of 1.9 (SD ± 0.7), a mean physical score of 1.8 (SD ± 0.8) and a mean emotional score of 2.1 (SD ± 0.6). Low HRQoL scores (≤ 2.0) were found in 48% of patients. HRQoL was lower in women than in men (M = 1.57 (SD ± 0.70) p = 0.001) and age was positively correlated with emotional HRQL (r .217, p = 0.001). Patients with previous CHD admissions had lower HRQoL than those admitted for the first time (M = 1.78 (SD ± 0.72) vs 1.98 (SD ± 0.73) p = 0.045). More detailed relationship between HRQoL and background factors and predictors of HRQoL will be presented.

Conclusion: At hospital discharge almost 50% of CHD patients reported low health-related quality of life. In order to support recovery and reduce the risk of readmissions healthcare professionals could implement assessment of HRQoL when planning hospital discharge and post-discharge follow-up. Special attention should be paid to women and patients with previous CHD-related hospital admissions.
Abstract ID: 26

Presentation type(s): Poster, clinical research

Manifestations of myocardial fibrosis in the standard 12-lead electrocardiogram

Lauri Holmström, Research Unit of Internal Medicine, University of Oulu, Oulu, Finland
Anette Haukilahti, University of Oulu, Oulu, Finland, Tuomas Kenttä, University of Oulu, Oulu, Finland, Lasse Pakanen, University of Oulu, Oulu, Finland, Heikki Huikuri, University of Oulu, Oulu, Finland, Juhani Junttila, University of Oulu, Oulu, Finland

Background:
Myocardial fibrosis has substantial role in sudden cardiac deaths (SCD). Major challenge in preventing SCDs is early recognition of vulnerable patients with fibrotic cardiomyopathy. Our aim was to find manifestations of myocardial fibrosis in 12-lead electrocardiogram (ECG).

Methods:
Study population is based on the Fingesture study, which has gathered data from 5,869 consecutive autopsied SCD victims between 1998 and 2017 in Northern Finland. The degree of fibrosis was determined based on the histological samples taken from the heart during autopsy and was categorized into four groups; 1) no fibrosis, 2) scattered mild fibrosis, 3) moderate patchy fibrosis and 4) substantial fibrosis. We were able to collect pre-mortem 12-lead ECGs from 1,100 SCD victims. Ischemic cardiomyopathy was the cause of death in 689 cases and 411 had nonischemic cardiomyopathy at autopsy in the group where ECG was available.

Results:
Mean age of the study subjects was 66±13 years and 75% were male. At least some amount of myocardial fibrosis was present in 92% of the victims. QRS duration in ECG correlated with the degree of fibrosis in autopsy as follows; 96±21ms in group 1 (n=93), 97±20ms in group 2 (n=357), 103±26ms in group 3 (n=506) and 108±27ms in group 4 (n=144; p<0.001, β=0.153). Prevalence of fragmented QRS complex was higher among victims with severe fibrosis (40% in group 1, 43% in group 2, 60% in group 3 and 65% in group 4; p<0.001). Pathologic Q waves became also more common as the amount of fibrosis increased (4.3% in group 1, 9.2% in group 2, 14.6% in group 3 and 27.8% in group 4; p<0.001). Additionally, inferolateral T-wave inversions were more common in groups with increasing amount of myocardial fibrosis (5.4% in group 1, 13.2% in group 2, 20.4% in group 3 and 31.9% in group 4; p<0.001). Associations in depolarization abnormalities were present in both subgroups. Repolarization abnormalities were visible in both ischemic and nonischemic SCDs but reached statistical significance only among ischemic SCD victims.

Conclusions:
Myocardial fibrosis was associated with QRS prolongation, deep Q waves, T-wave inversions and QRS fragmentation among SCD victims. Fibrosis did not manifest as clearly in ECG among patients with nonischemic cardiomyopathies than among ischemic SCD victims. The results may explain the increased risk for SCD in patients with abnormal QRS complex or inverted T waves providing means for recognizing patients with underlying fibrotic cardiomyopathy.
Abstract ID: 27

Presentation type(s): Poster, clinical research

**Gender differences in electrocardiographic risk markers of heart failure**

Anette Haukilahti, Research Unit of Internal Medicine, Medical Research Center Oulu, University of Oulu, Oulu, Finland
Tuomas Kenttä, Medical Research Center Oulu, University of Oulu, Oulu, Finland, Jani Tikkanen, Medical Research Center Oulu, University of Oulu, Oulu, Finland, Olli Anttonen, Department of Internal Medicine, Päijät-Häme Central Hospital, Lahti, Finland, Aapo Aro, Division of Cardiology Heart and Lung Center, Helsinki University Hospital, Helsinki, Finland, Tuomas Kerola, Päijät-Häme Central Hospital, Lahti, Finland, Harri Rissanen, National Institute for Health and Welfare, Oulu, Helsinki, Finland, Madeleine Paul, National Institute for Health and Welfare, Oulu, Helsinki, Finland, Juhani Junttila, Medical Research Center Oulu, University of Oulu, Finland, Heikki Huikuri, Medical Research Center Oulu, University of Oulu, Oulu, Finland

**Aim:**
Heart failure (HF) is one of the leading causes of hospitalization in the Western world. Women have a lower rate of HF hospitalization and mortality compared to men. Role of 12-lead electrocardiography (ECG) as a risk marker of future HF in women is not well known. We studied the association of standard 12-lead ECG and clinical risk factors to HF hospitalization in women from a large middle-aged general population sample with a long-term follow-up.

**Methods:**
Standard 12-lead ECG markers were analyzed from 10,864 subjects (48.8% women, N=5,215) of the prospective Mobile Clinic Study, and their predictive value for HF hospitalization was analyzed.

**Results:**
During the follow-up (29.6±11.2 yrs.), a total of 1,743 subjects had HF hospitalization; out of these, 861 were women (49.4%). Several baseline characteristics, such as age, body mass index, blood pressure, and history of prior cardiac disease predicted the occurrence of HF both in women and men (P<0.001 for all). After adjusting for baseline variables, ECG sign of left ventricular hypertrophy (LVH) (P<0.001), and atrial fibrillation (P<0.001) were the only baseline ECG variables that predicted the future HF in women. In men, HF was predicted by fast heart rate (P=0.008), T wave inversions (P<0.001), abnormal Q-waves (P=0.002), and atrial fibrillation (P<0.001). Statistically significant gender interactions in prediction of HF were observed in ECG sign of LVH (P<0.001), inferolateral T wave inversions (P=0.005), and heart rate (P=0.012).

**Conclusions:**
ECG sign of LVH predicts future HF in middle-aged women independently, and T wave inversions and elevated heart rate are associated with HF hospitalization in men in.
Abstract ID: 29

Presentation type(s): Poster, clinical research

**Associations of cardiorespiratory fitness and physical activity with arterial stiffness in children and adolescents with or without chronic conditions**

Eero Haapala, Faculty of Sport and Health Sciences, University of Jyväskylä, Jyväskylä, Finland
Aapo Veijalainen, School of Medicine, University of Eastern Finland, Kuopio, Finland, Jari Laukkanen, Faculty of Sport and Health Sciences, University of Jyväskylä, Jyväskylä, Finland, Urho Kujala, Faculty of Sport and Health Sciences, University of Jyväskylä, Jyväskylä, Finland, Andrew Agbaje, School of Medicine, University of Eastern Finland, Kuopio, Finland, Kristel Lankhorst, Super Lab Utrecht, Utrecht, Netherlands, Tim Takken, Wilhelmina Children's Hospital, Utrecht, Netherlands, Taija Finni, Faculty of Sport and Health Sciences, University of Jyväskylä, Jyväskylä, Finland, Timo Lakka, School of Medicine, University of Eastern Finland, Kuopio, Finland

**Aim**
Arterial stiffness is one of the first signs of arteriosclerosis in youth. Cardiorespiratory fitness (CRF) and physical activity (PA) have been inversely associated with vascular morbidity in adults but the knowledge of their role in vascular health among youth is limited. Therefore we summarised our recent findings on the associations of CRF and PA with arterial stiffness and dilatation capacity.

**Methods**
Study 1 (n=160) and 2 (n=136) were based on the baseline and study 3 (n=329) is based on the 2-year follow-up of the PANIC Study, which were conducted among apparently healthy Finnish children aged 6–8 at baseline. Study 4 was conducted among 55 healthy Finnish adolescents aged 16–19 years. Study 5 and 6 were conducted among 140 adolescents with chronic diseases or physical disabilities and 17 young Fontan patients and 26 healthy controls, respectively. Arterial stiffness was assessed by stiffness index (SI, studies 1–3) or with aortic pulse wave velocity (PWVao, studies 4–6) and arterial dilatation capacity with change in reflection index in response to a bout of exercise (RIΔ%, study 1 and 3). In studies 1–4 and 6 CRF (maximal power output or peak oxygen uptake) was measured by maximal cycle ergometer exercise test. In study 5, CRF (peak oxygen uptake) was measured by shuttle run, shuttle ride, or cycle ergometer exercise tests. In study 1, PA was assessed by questionnaire, in study 2 by combined heart rate and movement sensing, and in studies 5–6 by questionnaire on sports team participation.

**Results**
In studies 1-2, CRF was inversely associated with SI (β=-0.25 to -0.297, p≤0.009). In study 1 and 3, CRF was directly associated with RIΔ% (β=0.169 to 0.316, p≤0.03) but in study 3 this association was significant only in boys. In study 1, unstructured PA was inversely associated with SI (β=-0.162, p=0.042), but this association was explained by CRF. In study 3, moderate (β=-0.273, p=0.003) and vigorous PA (β=-0.254, p=0.005) were inversely associated with SI. CRF was inversely associated with PWVao in studies 4 (β=-0.386, p=0.01), 5 (β=-0.173, p=0.03), and 6 (β=-0.525, p<0.01). Fontan patients also had higher PWVao and lower VOpeak than healthy controls.

**Conclusions**
CRF was inversely related to arterial stiffness in 5/6 studies and to better dilatation capacity in 2/2 studies. At least moderate intensity habitual PA was inversely associated with arterial stiffness in 1/1 study. Sports participation was not related to arterial stiffness in 2/2 studies.
Abstract ID: 30

Presentation type(s): Poster, clinical research

Adverse events and outcomes in a cohort of belarusian patients with left ventricular non-compaction

Nadiia Rineiska, Cardiology, RSP centre “Cardiology”, Minsk, Belarus
Svetlana Komissarova, Cardiology, RSP centre “Cardiology”, Minsk, Belarus, Tatyana Sevruk, RSP centre “Cardiology”, Minsk, Belarus, Irina Gaidel, RSP centre “Cardiology”, Minsk, Belarus

Aim.
To evaluate adverse events and outcomes in a cohort of Belarusian patients with left ventricular non-compaction (LVNC).

Methods.
The comprehensive examination including echocardiography using Jenni criteria, CMR with late gadolinium enhancement using Peterson criteria, 24-hour ECG-monitoring was performed for 89 patients with LVNC (53 males and 36 females, median age 36.5±12.8 years) who were observed in Republican scientific and practical centre “Cardiology” from 2009 to 2018 (a median of 3.5 years).

Results.
The baseline examination revealed an isolated variant of LVNC in 33 patients (37%), dilated phenotype of LVNC in 43 patients (48.3%), hypertrophic phenotype of LVNC in 9 patients (10.2%), a combination of LVNC with Ebstein's anomaly in 2 patients (2.25%) and the biventricular form of non-compaction cardiomyopathy in 2 patients (2.25%). During the follow-up period, 4 patients with unstable ventricular tachycardia (UVT) were implanted with cardioverter-defibrillators (ICD); two of them had repeated ICD responses. Life-threatening arrhythmias were registered in two patients against the background of the manifesting WPW syndrome, and radiofrequency ablation (RFA) of an additional connection was performed. RFA of ectopic foci was performed in one patient with ventricular tachyarrhythmias, RFA of atrioventricular node and implantation of pacemaker was performed in 2 patients. Two patients with dilated phenotype and systolic dysfunction (mean LV EF - 35%) were implanted with resynchronizing device (CRT-P), 3 patients underwent orthotopic heart transplantation (OHT). Sudden cardiac death (SCD) developed in one patient with dilated phenotype on the background of ICD operation. Lethal outcome due to progression of heart failure to III-IV functional class NYHA and development of thromboembolic complications occurred in 4 patients. In 16 patients (37%) with dilated phenotype, during the observation period, adverse events and outcomes were significantly more frequently recorded compared to the rest of the patient groups with LVNC (p<0.01).

Conclusions.
Patients with LVNC have a high risk of life-threatening arrhythmias and progression of heart failure symptoms. The most unfavorable course of the disease was observed in patients with dilated phenotype, which requires timely application of an adequate treatment strategy.
Abstract ID: 31

Presentation type(s): Poster, clinical research

Relationship between Echocardiographic and Magnetic Resonance Derived Measures of aortic root and ascending aorta in Turner’s syndrome

Inesa Navickaite, Medical Academy, Lithuanian University of Health Sciences, Kaunas, Lithuania
Ruta Kriksciuniene, Department of Endocrinology, Lithuanian University of Health Sciences, Kaunas, Lithuania, Egle Ereminiene, Department of Cardiology, Lithuanian University of Health Sciences, Kaunas, Lithuania

Introduction:
Turner syndrome (TS) is assigned to rare diseases group caused by a complete or partial loss of the second X chromosome (45, X0). Dilation of the ascending aorta is the most common acquired abnormality of TS patients. It has been proven that magnetic resonance imaging (MRI) is a golden standard in the diagnosis of cardiovascular complications in TS patients. However, in most cases 2 dimensional echocardiography (2DEcho) is performed as reliable diagnostic test for a primary diagnosis of cardiovascular disorders.

The aim:
To compare dimensions of the aortic root and the ascending aorta measured by 2DEcho and MRI and to determine relation of these methods in diagnosing dilation of the aorta.

Methods:
In this cross sectional study we included all patients with genetically confirmed Turner syndrome followed up at the Hospital of Lithuanian University of Health Sciences, between 2014 and 2017. The sample consisted of 50 (n=50) TS patients. Maximal diameter of the sinuses of Valsalva (M1), diameter of the sinotubular junction (M2), and the proximal ascending aorta (M3) were measured by 2D Echo at an end-diastole. The size of the ascending aorta and the aortic root also was measured by MRI in different positions: in the aortic sinuses (D1), in the sinotubular junction (D2), in the ascending aorta at the bottom edge of the right pulmonary artery (D3), in the ascending aorta at the right proximal brachiocephalic artery (D4). In patients with TS, aortic dilatation is defined as ASI ≥ 20 mm/m².

Results:
50 TS patients were enrolled into the study, mean age 29,7±8.2, range 18 - 60 years. Basic characteristics of the participants are mean weight 57,14±11,68 (32 – 81) kg, mean height 152,14±6,49 (137 – 169) kg and mean BMI 24,57±4,84 kg/m². ASI on echocardiography strongly correlated with ASI on MRI of the ascending aorta in all positions (Table1). The dimensions of aortic sinuses did not differ comparing different imaging techniques (p=0,795).
Significantly larger medians of ASI were found on 2D Echo in all positions of the ascending aorta when compared with MRI measurements (p<0,001) (table2). The dilation of aortic sinuses dilation was more frequently observed on MRI (MRI52% vs. 2DEcho38%) (p<0,001).

Conclusion:
Dilation of the aorta was detected in more than one third of TS patients. Strong statistically reliable correlation of aortic measurements between different imaging techniques was identified. The dilatation of the sinus of aorta was more frequently found on MRI compared with echocardiography.
<table>
<thead>
<tr>
<th>Position of the measurement</th>
<th>r value</th>
<th>p value</th>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Position of the measurement</th>
<th>Median of ASI/diameter of aorta on 2DEcho</th>
<th>Median of ASI/diameter of aorta on MRI</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1/D1</td>
<td>20.04 (14-30) mm/m²</td>
<td>20.04 (12-30.5) mm/m²</td>
<td>0.795</td>
</tr>
<tr>
<td>M2/D2</td>
<td>18.36 (12.65-24.67) mm/m²</td>
<td>15.85 (10.15-22.59) mm/m²</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>M3/D3</td>
<td>18.85 (14-29.22) mm/m²</td>
<td>17.3 (10.3-28) mm/m²</td>
<td>0.001</td>
</tr>
<tr>
<td>M3/D4</td>
<td></td>
<td>16.23 (10.75-26.24) mm/m²</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Abstract ID: 32

Presentation type(s): Poster, clinical research

**Influence of clinical risk on in-hospital stay in patients with acute pulmonary embolism**

Dana Kigitovica, Internal medicine, Riga Stradins University, Riga, Latvia  
Valdis Gibietis, Riga Stradins University, Riga, Latvia, Sintija Strautmane, Riga Stradins University, Riga, Latvia,  
Verners Roberts Kalejs, Riga Stradins University, Riga, Latvia, Kitiija Meilande, Riga Stradins University, Riga, Latvia,  
Anastasija Zaicenko, Riga Stradins University, Riga, Latvia, Kristine Make, Riga Stradins University, Riga, Latvia,  
Andris Skride, Internal medicine, Riga Stradins University, Riga, Latvia

**Aim:**
Treatment of selected, haemodynamically stable patients with pulmonary embolism (PE) can be managed in outpatient care, however clinical practice shows that the management is predominantly inpatient (Aujesky et al., 2011). The aim of this study was to evaluate clinical factors that influence duration of in-hospital stay.

**Methods:**
The prospective cohort study included patients with confirmed PE in a single university hospital from 2014 till 2019. We used sPESI score (0 as low-risk (LRPE); ≥1 as high-risk (HRPE)) and Charlson Comorbidity Index (CCI) for clinical assessment. Cases of in-hospital death were excluded from the study. All data were analyzed by SPSS 20.0.

**Results:**
Of 347 patients, 58.5% were female; length of in-hospital stay was 10.9 days [±5.7; 95% CI =10.3–11.5]. LRPE was present in 28.5%; HRPE in 71.5%; patients with HRPE had higher CCI value (4.6 vs 2.9; p<0.05). Values of CCI, sPESI score had no impact on the duration of in-hospital stay (p>0.05), but sPESI in absolute numbers showed correlation with the hospitalization period (p=0.032).

Leukocyte count, haemoglobin level, creatinine value, total cholesterol, high and low density cholesterol showed impact on length of stay (p<0.05). During five-year study period, the in-hospital stay of patients after PE has not changed (p=0.074).

**Conclusions:**
Severity of PE and CCI had no impact on in-hospital stay of patients with acute PE. There was no change in in-hospital stay in last five years.
Abstract ID: 33

Presentation type(s): Poster, clinical research

**Decreased Left Ventricular Diastolic Function in Young Patients with Cryptogenic Ischemic Stroke Compared to Healthy Individuals**

Jani Pirinen, Clinical physiology and nuclear medicine, Helsinki university hospital, Helsinki, Finland
Vesa Järvinen, Clinical physiology, Hyvinkää regional hospital, Hyvinkää, Finland, Nicolas Martinez-Majander, Neurology, Helsinki university hospital, Helsinki, Finland, Juha Sinisalo, Cardiology, Helsinki university hospital, Helsinki, Finland, Jukka Putaala, Neurology, Helsinki university hospital, Helsinki, Finland

**Aim:**
More than 30% of early-onset ischemic strokes (age <50 years) remain cryptogenic after complete diagnostic work-up. We hypothesized that part of these events represent emboli originating from the heart. Here, we assessed left ventricular diastolic function using echocardiography in young patients with cryptogenic ischemic stroke and healthy controls. We aimed to clarify, whether diastolic function could play a role in cryptogenic stroke.

**Methods:**
We enrolled 26 patients aged 18-49 with cryptogenic ischemic stroke and age- and sex-matched stroke-free controls. We examined all participants with transthoracic echocardiography and analyzed filling of the left ventricle (LV) through the mitral valve, with pulsed wave Doppler. We determined the maximum velocity of the early diastolic filling (E-wave), and maximum velocity in atrial contraction (A-wave). We examined the tissue velocity counterparts E’ and A’ with tissue Doppler imaging from both the septal, and the lateral mitral annulus in the apical 4-chamber view. E/E’ and A/A’ were calculated based on these. Measurements were normally distributed and paired samples T-tests were used.

**Results:**
Mitral inflow was examined from all 26 pairs, while 25 case-control pairs had adequate visibility for E’ and A’. Stroke patients had lower E/A-ratio than healthy controls (mean 1.40 vs 1.74, P=0.013). There were no significant differences in septal E/E’ (mean 6.9 vs 6.7, P=0.665) or lateral E/E’ (6.8 vs 5.9, P=0.153), nor was there in the mean E/E’ (6.4 vs 5.9, P=0.241). There were neither significant differences in septal A/A’ (6.1 vs 5.4, P=0.066), lateral A/A’ (7.4 vs 6.6, P=0.15), nor in the mean A/A’ (7.0 vs 6.1, P=0.053) between patients and controls.

**Conclusion:**
The E/A-ratio of mitral inflow was lower in patients than in healthy control persons, which suggest that altered LV diastolic function may play a role in cryptogenic strokes.
Abstract ID: 34

Presentation type(s): Poster, clinical research

Nationwide data on the mortality associated with pulmonary embolism from 1996 to 2017

Markus Sane, Heart and Lung Center Cardiology, Helsinki University Hospital, 40100, Finland

Aim:
The aim of this study was to describe the mortality associated to the pulmonary embolism (PE) in Finland from 1996 to 2017. We wanted to evaluate the possible changes related to new diagnostic and treatment methods during the follow-up period.

Methods:
We collected the data from the death certificate registry administrated by Statistics Finland. The ICD (international classification of diseases) codes for PE (I26.0 or I26.9) was collected, PE being either as underlying, immediate or contributor cause of death.

Results:
In total 25184 patients (Females 15374, 61%) with ICD code (I26.0 or I26.9) was identified from the death registry certificate during 1996-2017. The overall mortality associated with pulmonary embolism has decreased over the years and there has been a 24% drop in the overall mortality.

Conclusions:
Pulmonary embolism carries a substantial mortality. However, the fatality has decreased over the years. Better tools for diagnostics and treatment could explain this.
Comparison of clinical profile and outcomes of acute heart failure and non-acute heart failure patients presented with acute dyspnea

Kristina Drulyte, Medical academy, Lithuanian University of Health Sciences, Kaunas, Lithuania
Andrius Montrimas, Lithuanian University of Health Sciences, Kaunas, Lithuania, Monika Kezeviciute, Faculty of Medicine, Vilnius University, Vilnius, Lithuania, Zygimantas Abramikas, Faculty of Medicine, Vilnius University, Vilnius, Lithuania, Ausra Kavoliuniene, Department of Cardiology, LUHS Kaunas Clinics, Kaunas, Lithuania, Jelena Celutkiene, Clinic of Cardiac and Vascular diseases, Vilnius University, Vilnius, Lithuania, Kamile Cerlinskaite, Clinic of Cardiac and Vascular diseases, Vilnius University, Vilnius, Lithuania, Alexandre Mebazaa, Hospital Lariboisière, Université Paris Diderot, Paris, France

Aim:
We aimed to compare the clinical profile and outcomes of patients with acute dyspnea due to acute heart failure and patients with acute dyspnea due to other diseases.

Methods:
Prospective two-centre observational cohort study enrolled consecutive patients admitted to the emergency department with acute dyspnea. All patients were categorised into acute heart failure (AHF) and non-acute heart failure (non-AHF) groups according to their adjudicated diagnosis. Major non-AHF groups were distinguished: pulmonary pathology, pulmonary embolism, acute coronary syndromes and other diseases. Quantitative variables were compared among those groups using Student’s T test and categorical variables using chi-square test.

Results:
A total of 1457 patients (mean age 69.04 years) were included in the study. Clinical profiles and outcomes of four groups are summarised in the Table.

Conclusions: The highest in-hospital mortality as well as worse short-term outcomes were observed in patients with pulmonary diseases. Unfavorable short-term prognosis was comparable in acute heart failure and acute coronary syndromes. The largest risk of readmissions due to non-cardiac reasons was typical for dyspneic patients due to pulmonary and other diseases.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Acute heart failure n= 763</th>
<th>Acute coronary syndromes n= 88</th>
<th>Pulmonary (infection, COPD, asthma ) n= 203</th>
<th>Pulmonary embolism n= 97</th>
<th>Other causes n= 306</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age*</td>
<td>70.6 (±12.1)</td>
<td>69.2 (±11.0)</td>
<td>67.4 (±14.2)</td>
<td>68.4 (±12.7)</td>
<td>66.4 (±14.5)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Gender (men)</td>
<td>440 (57.7%)</td>
<td>57 (64.8%)</td>
<td>128 (63.1%)</td>
<td>48 (49.5%)</td>
<td>152 (49.7%)</td>
<td>0.007</td>
</tr>
<tr>
<td>CHF</td>
<td>623 (81.7%)</td>
<td>55 (62.5%)</td>
<td>81 (39.9%)</td>
<td>21 (21.6%)</td>
<td>99 (32.4%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>206 (27.0%)</td>
<td>32 (36.4%)</td>
<td>38 (18.7%)</td>
<td>11 (11.3%)</td>
<td>37 (12.1%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hypertension</td>
<td>642 (84.1%)</td>
<td>75 (85.2%)</td>
<td>131 (64.5%)</td>
<td>69 (71.1%)</td>
<td>201 (66.7%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Prior MI</td>
<td>206 (27.0%)</td>
<td>29 (33.0%)</td>
<td>19 (9.4%)</td>
<td>9 (9.3%)</td>
<td>27 (8.8%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Atrial fibrillation/atrial flutter</td>
<td>442 (57.9%)</td>
<td>22 (25.0%)</td>
<td>48 (23.6%)</td>
<td>13 (13.4%)</td>
<td>93 (30.4%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>CKD</td>
<td>178 (23.3%)</td>
<td>20 (22.7%)</td>
<td>17 (8.4%)</td>
<td>6 (6.2%)</td>
<td>30 (9.8%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Anemia</td>
<td>210 (27.5%)</td>
<td>20 (22.7%)</td>
<td>29 (14.3%)</td>
<td>13 (13.4%)</td>
<td>59 (19.3%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>LVEF*</td>
<td>40.3 (±13.8)</td>
<td>43.6 (±12.5)</td>
<td>49.1 (±8.2)</td>
<td>52.5 (±5.8)</td>
<td>50.6 (±8.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>NT pro-BNP (ng/l)**</td>
<td>3548.5 [1496; 8186]</td>
<td>2077 [471; 4631]</td>
<td>914.5 [166; 2899]</td>
<td>885 [169; 2339]</td>
<td>380 [150; 2080]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hs-Troponin I (µg/ml)**</td>
<td>13.4 [0.1; 40.1]</td>
<td>10.5 [1.7; 190.7]</td>
<td>2.7 [0.1; 15.9]</td>
<td>5.6 [0.2; 72.4]</td>
<td>3.7 [0.1; 11.2]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>D-dimers (µg/l)**</td>
<td>367.5 [116; 975]</td>
<td>305 [145; 610]</td>
<td>197.5 [1; 523]</td>
<td>1305 [11; 2780]</td>
<td>215 [80; 485]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Death in hospital</td>
<td>30 (3.9%)</td>
<td>5 (5.7%)</td>
<td>23 (11.3%)</td>
<td>5 (5.2%)</td>
<td>21 (6.9%)</td>
<td>0.002</td>
</tr>
<tr>
<td>3-month all-cause rehospitalisations***</td>
<td>283 (38.6%)</td>
<td>24 (28.9%)</td>
<td>66 (36.7%)</td>
<td>23 (25.0%)</td>
<td>98 (34.4%)</td>
<td>0.057</td>
</tr>
<tr>
<td>3-month all-cause mortality***</td>
<td>64 (8.7%)</td>
<td>7 (8.4%)</td>
<td>22 (12.2%)</td>
<td>9 (9.8%)</td>
<td>31 (10.9%)</td>
<td>0.609</td>
</tr>
<tr>
<td>3-month CV rehospitalisations***</td>
<td>191 (26.1%)</td>
<td>20 (24.1%)</td>
<td>25 (13.9%)</td>
<td>9 (9.8%)</td>
<td>28 (9.8%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>3-month nonCV rehospitalisations***</td>
<td>92 (12.6%)</td>
<td>4 (4.8%)</td>
<td>41 (22.8%)</td>
<td>14 (15.2%)</td>
<td>70 (24.6%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>3-month nonCV mortality***</td>
<td>16 (2.2%)</td>
<td>1 (1.2%)</td>
<td>14 (7.8%)</td>
<td>6 (6.5%)</td>
<td>30 (10.5%)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*mean (±SD)*

**median (Q1;Q3)**

***hospital survival (n = 1373)**
Abstract ID: 36

Presentation type(s): Poster, basic science

Delay of activation in ischemic zones predicts J-wave development in the body surface ECGs in experimental coronary occlusion

Alena Tsvetkova, Laboratory of Cardiac Phisiology, Institute of Physiology Komi SC UB RAS, Syktyvkar, Russian Federation
Yan Azarov, Institute of Physiology Komi SC UB RAS, Syktyvkar, Russian Federation, Alexey Ovechkin, Institute of Physiology Komi SC UB RAS, Syktyvkar, Russian Federation, Olesya Bernikova, Institute of Physiology Komi SC UB RAS, Syktyvkar, Russian Federation, Marina Vaykshnorayte, Institute of Physiology Komi SC UB RAS, Syktyvkar, Russian Federation, Marina Demidova, Lund University, Lund, Sweden, Pyotr Platonov, Lund University, Lund, Sweden

Aim.
J-wave pattern has been recognized as an arrhythmic risk marker, particularly in myocardial infarction patients. Mechanisms underlying J-wave development in ischemia remain unknown. In myocardial infarction model, we evaluated activation time delay as a prerequisite for J-wave appearance.

Methods.
In 14 anesthetized pigs, myocardial ischemia was induced by left anterior descending (LAD) coronary artery ligation during 40 min. Body surface ECGs (12 standard precordial leads) and myocardial unipolar electrograms (64 epicardial and 48 intramural leads) were recorded at baseline and at 1, 2.5, 5 and then every 5th minute until the end of occlusion. The intramural leads were positioned in subepicardial, midmyocardial and subendocardial layers of the LV free wall, interventricular septum (IVS) and RV free wall in the apical, middle and basal ventricular regions. The epicardial electrograms were recorded from a sock-electrode array. The local activation times (LAT) were determined as instants of dV/dt minimal during QRS complex in the unipolar electrograms.

Results.
During LAD occlusion, the longest LATs in ischemic zones (anterior parts of basal and middle areas of LV free wall and IVS) reached their maximal values at 5 min and 20-30 min of ischemic exposure. In 11 animals, the end QRS-fragmentation and/or J-waves appeared in the body surface ECG leads (Figure). Maximal LATs in the basal IVS (OR 1.19, 95% CI 1.06-1.35, p=0.004), middle IVS (OR 1.12, 95% CI 1.02-1.23, p=0.021) and middle LV free wall (OR 1.05, 95% CI 1.00-1.10, p=0.043) were shown to predict J-waves in the left precordial ECG leads.

Conclusion.
LAD coronary artery occlusion produced typical temporal pattern of LAT prolongation in the ischemic zones, and this activation delay was shown to be independent predictors of J-wave appearance in the left precordial surface ECG leads.
Figure. Activation time dynamics and J-wave development. A—electrograms from left ventricular subendocardium; B—V5 lead of ECG.
Abstract ID: 37

Presentation type(s): Poster, clinical research

Comparative study of effectiveness of thrombolytic agents in pharmacoinvasive therapy for ST-elevation myocardial infarction.

Ovechkin Aleksey, Therapy department, Institute of Physiology, Komi Science Centre, Syktyvkar, Russian Federation
Tatiyna Raush, Cardiology, Komi Republic Cardiological Center, Syktyvkar, Russian Federation
Ekaterina Pershina, Pitirim Sorokin Syktyvkar State University, Syktyvkar, Russian Federation
Anna Chuprova, Pitirim Sorokin Syktyvkar State University, Syktyvkar, Russian Federation

Aim:
To compare culprit artery flow and inhospital outcomes in patients (pts) with ST Elevation Myocardial Infarction (STEMI) after thrombolytic therapy (TLT) with alteplase, tenecteplase or prourokinase within the farmacoinvasive strategy of treatment.

Methods.
We analyzed Thrombolysis in Myocardial Infarction (TIMI) flow grade and inhospital outcomes in pts with STEMI underwent Primary Percutaneous Coronary Intervention (PPCI) after thrombolytic therapy. Time intervals between onset of heart attack, TLT and coronaryangiography (CAG) were analyzed, and pts who underwent PPCI later than 24 hours were excluded from analysis. Inhospital events included: Killip class 2 or more, recurrent infarction, bleeding, hemorrhagic stroke, death.

Results.
According to the used thrombolytic drugs, pts were subdivided into: prourokinase, alteplase, and tenecteplase groups (197, 48 and 37 pts, respectively). The groups differed in age, TLT-CAG time interval, occurrence of TIMI 0 grade flow (Table 1). Logistic regression showed that the choice of TLT agent was the only independent predictor of TIMI 0 grade flow finding in CAG (Table 2). The following PPCI eliminates possible negative consequences of persistent culprit artery occlusion, since we did not observe any differences in inhospital events between the groups.

Conclusion.
Thrombolytic agents showed different efficacy with the prourokinase being less effective in TLT. Though the choice of drug did not affect inhospital events and outcomes of pharmacoinvasive treatment, it should be considered in cases with an expected delay of PCI.

Table 1. Characteristics of the groups (medians and interquartile intervals).

<table>
<thead>
<tr>
<th></th>
<th>Prourokinase group, n=197</th>
<th>Tenecteplase group, n=37</th>
<th>Alteplase group, n=48</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td>59 (51;65)</td>
<td>56 (49;62)</td>
<td>52 (45,5;61)</td>
<td>0.016</td>
</tr>
<tr>
<td>Time onset-TLT</td>
<td>130 (75;250)</td>
<td>103 (75;150)</td>
<td>150 (94,5;262,5)</td>
<td>0.065</td>
</tr>
<tr>
<td>Time TLT-CAG</td>
<td>106 (70;145)</td>
<td>90 (68;120)</td>
<td>292 (136;665)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>TIMI 0, n (%)</td>
<td>96 (48,7%)</td>
<td>14 (37,8%)</td>
<td>10 (20,8%)</td>
<td>0.002</td>
</tr>
<tr>
<td>Killip class ≥2, n (%)</td>
<td>42 (21,3%)</td>
<td>8 (21,6%)</td>
<td>11 (22,9%)</td>
<td>0.971</td>
</tr>
<tr>
<td>Deaths, n</td>
<td>8</td>
<td>2</td>
<td>0</td>
<td>0.318</td>
</tr>
</tbody>
</table>

Table 2. Logistic regression analysis of independent factors related to culprit artery occlusion.

<table>
<thead>
<tr>
<th></th>
<th>Univariate,</th>
<th>Multivariate,</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds ratio (95%CI)</td>
<td>P-value</td>
</tr>
<tr>
<td>Age, years</td>
<td>1.002(0.98; 1.022)</td>
<td>0.847</td>
</tr>
<tr>
<td>Time TLT-CAG</td>
<td>0.999 (0.997; 1.000)</td>
<td>0.026</td>
</tr>
<tr>
<td>TLT agent</td>
<td>0.66 (0.46; 0.94)</td>
<td>0.02</td>
</tr>
<tr>
<td>Time onset-TLT</td>
<td>1.00 (0.999; 1.001)</td>
<td>0.898</td>
</tr>
</tbody>
</table>
Correlations between blood parameters in acute myocardial infarction patients and changes in the local Earth magnetic field

Rima Braukyline, Department of Cardiology, Hospital of Lithuanian University of Health Scienc, Kaunas, Lithuania
Diana Žaliaduonyte-PEkšiene, Department of Cardiology, Hospital of Lithuanian University of Health Scienc, Kaunas, Lithuania
Greta Žiubryte, Faculty of Medicine, Lithuanian University of Health Sciences, Kaunas, Lithuania
Gediminas Jarušecicius, Department of Cardiology, Hospital of Lithuanian University of Health Scienc, Kaunas, Lithuania
Laura Zajancauskiene, Department of Cardiology, Hospital of Lithuanian University of Health Scienc, Kaunas, Lithuania
Martynas Jurenas, Department of Cardiology, Hospital of Lithuanian University of Health Scienc, Kaunas, Lithuania
Kamyar Hedayat, Systems Biology Research Group, Chicago, United States

Aim:
Strong significant correlation between occurrence of acute myocardial infarction (AMI) and changes in local Earth’s magnetic field (TVMF) activity have been disclosed in previous studies. The aim of this study was to evaluate correlations between significant blood parameters’ alterations and changes in TVMF activity.

Methods:
One-hundred-twenty-seven patients admitted due to AMI with no previous history of ischemic heart disease (IHD) between 25th April 2017 and 20th November 2017 have been prospectively included into our single centre study. For all patients total blood count, thyroid hormones, metabolic enzymes (lactate dehydrogenase and creatine phosphokinase), osteocalcin and blood electrolytes levels have been identified. The TVMF intensity was observed in five frequency intervals [Hz]: SDelta[0-3.5], STheta[3.5-7], SAlpha[7-15], SBeta[15-32], SGamma[32-65] (Jaruševicius G et al). Data was collected from local magnetometer situated in Lithuania, which is a part of the Global Coherence Monitoring Network. Weekly averaged TVMF intensity was compared with weekly averaged blood parameters. SPSS 20.0 was used for statistical analysis. The level of significance p < 0.05.

Results and Discussion:
Significant correlations between weekly admission due to AMI and the average weekly TVMF intensity were found in SGamma range (r=-0.43, p=0.01). Results of analyses of blood parameters are shown in table 1. The opposite changes in two TVMF ranges suggest that with increased TVMF activity in SAlpha range a serum osteocalcin level increases, while increased TVMF activity in SGamma range decrease the level of serum osteocalcin. Correlations between the phosphorus level and TVMF activity have shown that increased TVMF activity increases serum phosphorus level. In all study population significant correlations have been found in analyses of derived values. The minerals and bone protein osteocalcin from the derived blood parameters were correlated with TVMF. These parameters are known to be sensitive indicators of acute changes in global organismic metabolism. The vector of change in metabolism in response to fluctuations of TVMF may fragilize the organism’s homeostatic mechanisms possibly making a person more susceptible to a myocardial infarction.

Conclusions:
Significant correlations between blood parameters related to acute fluctuations in global organismic metabolism in patients survived acute myocardial infarction and changes in the local Earth magnetic field were found. Blood parameters were significantly correlated with changes of magnetic field intensity in SDelta, STheta, SAlpha and SBeta ranges. Even more, it was found that derived values correlate with changes in magnetic field activity in discussed ranges stronger than routine blood parameters. These parameters may contribute in prognostication.
Table 1. Correlations between blood parameters and changes in TVMF activity.
Values which are not separated into three parts are given for whole study population. Only statistically significant correlations are presented in the table.

<table>
<thead>
<tr>
<th>Blood parameter</th>
<th>Correlation in SDelta range</th>
<th>Correlation in STheta range</th>
<th>Correlation in SAlpha range</th>
<th>Correlation in SBeta range</th>
<th>Correlation in SGamma range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red blood cells count</td>
<td>r = -0.510, p = 0.003</td>
<td>r = -0.518, p = 0.003</td>
<td>r = -0.460, p = 0.009</td>
<td>r = -0.499, p = 0.004</td>
<td>r = -0.365, p = 0.044</td>
</tr>
<tr>
<td>White blood cells count</td>
<td>r = -0.390, p = 0.03</td>
<td>r = -0.405, p = 0.024</td>
<td>r = -0.394, p = 0.028</td>
<td>r = -0.407, p = 0.023</td>
<td>-</td>
</tr>
<tr>
<td>Serum osteocalcin level</td>
<td>In whole study population</td>
<td>-</td>
<td>r = 0.432, p = 0.015</td>
<td>r = -0.635, p &lt; 0.001</td>
<td>-</td>
</tr>
<tr>
<td>In female</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>r = -0.587, p = 0.001</td>
<td>-</td>
</tr>
<tr>
<td>In male</td>
<td>-</td>
<td>-</td>
<td>r = 0.424, p = 0.018</td>
<td>r = -0.597, p &lt; 0.001</td>
<td>-</td>
</tr>
<tr>
<td>Serum phosphorus level</td>
<td>In whole study population</td>
<td>-</td>
<td>-</td>
<td>r = 0.366, p = 0.043</td>
<td>-</td>
</tr>
<tr>
<td>In female</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>r = 0.402, p = 0.025</td>
<td>-</td>
</tr>
<tr>
<td>In male</td>
<td>-</td>
<td>r = 0.402, p = 0.025</td>
<td>r = 0.373, p = 0.039</td>
<td>r = 0.416, p = 0.020</td>
<td>-</td>
</tr>
<tr>
<td>Magnesium to Phosphorus ratio (Mg/P)</td>
<td>r = -0.521, p = 0.003</td>
<td>r = -0.527, p = 0.002</td>
<td>r = -0.474, p = 0.007</td>
<td>r = -0.506, p = 0.004</td>
<td>-</td>
</tr>
<tr>
<td>Chlorine to Sodium ratio (Cl/Na)</td>
<td>r = -0.534, p = 0.002</td>
<td>r = -0.537, p = 0.002</td>
<td>r = -0.488, p = 0.005</td>
<td>r = -0.517, p = 0.003</td>
<td>-</td>
</tr>
</tbody>
</table>