# XXV Nordic-Baltic Congress of Cardiology 2015, Tallinn, Estonia

## Program

**Thursday, June 04, 2015**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>8:00</td>
<td>Registration Open / Arrival Tea and Coffee</td>
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</tr>
<tr>
<td>10:00–10:40</td>
<td>Welcome and Opening</td>
<td>Ballroom</td>
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<tr>
<td></td>
<td>Margus Viigimaa, President of the Estonian Society of Cardiology, Chairman of the NBCC 2015</td>
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<td></td>
<td>Jeroen Bax, President Elect of the European Society of Cardiology (ESC)</td>
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<td>Jüri Ratas, Vice-Chairman of the Estonian Parliament</td>
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<tr>
<td>10:40–12:00</td>
<td>Plenary Session 1 Nordic-Baltic Cardiology Societies in the ESC</td>
<td>Ballroom</td>
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<td></td>
<td>Chair: Jeroen Bax (NL), Francesco Cosentino (SE), Panos Vardas (GR)</td>
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<tr>
<td>10:40</td>
<td>Development of Nordic-Baltic Cardiology Societies: Presidents of the societies</td>
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<tr>
<td>11:20</td>
<td>ESC Guidelines: Where Are We Going</td>
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<td>11:40</td>
<td>Importance of the European Heart Agency for the ESC and Nordic-Baltic cardiology</td>
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<tr>
<td>12:00–13:00</td>
<td>Lunch and Poster Viewing / Poster Tours</td>
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<tr>
<td>12:00–12:45</td>
<td>Press Conference</td>
<td>Tartu room</td>
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<tr>
<td>13:00–15:00</td>
<td>Plenary Session 2 The Year In Cardiology – The EHJ Perspective</td>
<td>Ballroom</td>
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<td></td>
<td>Chair: Dan Atar (NO), Thomas F. Lüscher (CH), Margus Viigimaa (EE)</td>
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<tr>
<td>13:00</td>
<td>Prevention</td>
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<td>13:30</td>
<td>Imaging + TAVI</td>
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<tr>
<td>14:00</td>
<td>Atrial Fibrillation</td>
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<td>14:30</td>
<td>Heart Failure</td>
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<tr>
<td>13:00–15:00</td>
<td>Nordic-Baltic Electrophysiology Club Meeting</td>
<td>Tartu room</td>
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<tr>
<td></td>
<td>Chair: Pekka Raatikainen (FI) &amp; Jüri Voitk (EE)</td>
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<tr>
<td>13:00</td>
<td>Opening Remarks</td>
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<td>13:05</td>
<td>Prediction of Sudden Cardiac Death – From Basic Science to Clinical Practice</td>
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<tr>
<td>13:45</td>
<td>Device Therapy for Bradyarrhythmias and Heart Failure in the Nordic-Baltic Countries According to the EHRA White Book Data</td>
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<tr>
<td>14:05</td>
<td>Invited Comments from all Nordic-Baltic Countries and Panel Discussion on Potential Needs for Improvement</td>
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<tr>
<td>15:00–15:30</td>
<td>Afternoon Coffee 1 and Poster Viewing</td>
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<tr>
<td>15:30–17:00</td>
<td>Plenary Session 3 Heart Failure</td>
<td>Ballroom</td>
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<tr>
<td>15:30</td>
<td>Hypertrophic Cardiomyopathy, Effects of a Founder Mutation</td>
<td>Gunnar Thor Gunnarsson (IS)</td>
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<tr>
<td>15:50</td>
<td>Myocarditis – Challenges in Diagnostics and Treatment</td>
<td>Jyri Lommi (FI)</td>
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<tr>
<td>16:15</td>
<td>Genetics of Hypertrophic Cardiomyopathy</td>
<td>Pertti Jääskeläinen (FI)</td>
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<tr>
<td>16:35</td>
<td>devices in Heart Failure: Adoption of Current Guidelines in the Nordic Baltic Region</td>
<td>Frieder Braunschweig (SE)</td>
</tr>
<tr>
<td>15:30–17:00</td>
<td>Nordic-Baltic Electrophysiology Club Meeting</td>
<td>Tartu room</td>
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<tr>
<td>15:30</td>
<td>Device Therapy and Catheter Ablation in Treatment of Tachyarrhythmias in the Nordic-Baltic Countries According to the ERHA White Book Data</td>
<td>Pekka Raatikainen (FI)</td>
</tr>
<tr>
<td>15:50</td>
<td>Invited Comments from all Nordic-Baltic Countries and Panel Discussion on Potential Needs for Improvement</td>
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<tr>
<td>16:30</td>
<td>Future NBEC Meetings and Other Activities</td>
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<tr>
<td>15:30–17:00</td>
<td>Nordic-Baltic National Cardiology Societies Leadership Meeting with ESC</td>
<td>Boardroom</td>
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<tr>
<td>17:00–17:20</td>
<td>Afternoon Coffee 2 and Poster Viewing</td>
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<tr>
<td>17:20–19:30</td>
<td>Satellite Sessions</td>
<td>Ballroom</td>
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<td>17:20</td>
<td>Satellite Session Berlin-Chemie</td>
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<td>18:20</td>
<td>Break – Exercise and Heart</td>
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<td>18:30</td>
<td>Satellite Session Mylan (Abbott)</td>
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<td>19:30</td>
<td>Close of Day 1</td>
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<tr>
<td>19:30</td>
<td>Welcome Reception</td>
<td>Swissotel 6th floor</td>
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**Friday, June 05, 2015**

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<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>08:00</td>
<td>Registration Open</td>
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<tr>
<td>09:00–10:20</td>
<td>Session 1 Arrhythmia</td>
<td>Ballroom 2+3</td>
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<tr>
<td>09:00</td>
<td>Atrial Fibrosis as a Main Component of Atrial Fibrillation</td>
<td>Panos Vardas (GR)</td>
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<tr>
<td>09:20</td>
<td>Paroxysmal Atrial Fibrillation Treatment with Vimecon Laser Wire Ablation Catheter</td>
<td>Tomas Kazakevicius (LT)</td>
</tr>
<tr>
<td>09:40</td>
<td>Why Catheter Ablation of Atrial Fibrillation Does Not Cure All the Patients with Atrial Fibrillation?</td>
<td>Antti Hedman (FI)</td>
</tr>
<tr>
<td>10:00</td>
<td>Real World Patients with New-Onset Atrial Fibrillation: Lessons from Estonia</td>
<td>Tiina Uuetoa (EE)</td>
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<tr>
<td>09:00–10:20</td>
<td>Nursing Program 1 Teamwork in Hypertension Patient Management</td>
<td>Ballroom 1</td>
</tr>
<tr>
<td>09:00</td>
<td>Introduction</td>
<td>Teele Vaga (EE)</td>
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<tr>
<td>09:10</td>
<td>Hypertension Patient Approach in Primary Care</td>
<td>Lilli Gross (EE)</td>
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<tr>
<td>09:40</td>
<td>Treatment of Resistant Hypertension</td>
<td>Anu Hedman (EE)</td>
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<tr>
<td>10:00</td>
<td>Echocardiographic Diagnostics of Hypertension</td>
<td>Mira Trostnikova (EE)</td>
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<tr>
<td>09:00–10:20</td>
<td>Nordic-Baltic PCI Club</td>
<td>Tartu room</td>
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<tr>
<td>09:00</td>
<td>Bioabsorbable Vascular Scaffolds in Left Main. Where Are We, Where Are We Going?</td>
<td>Andrejs Erglis (LV)</td>
</tr>
<tr>
<td>09:20</td>
<td>Bioabsorbable Vascular Scaffolds in Bifurcations – The EBC Perspective</td>
<td>Jens Flensted Lassen (DK)</td>
</tr>
<tr>
<td>09:40</td>
<td>Angiographic Predictors of Two-Stent Strategy. Insight from Latvian Cardiology Center Bifurcation Registry</td>
<td>Indulis Kumsars (LV)</td>
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<tr>
<td>10:00</td>
<td>Cardiac Surgery and Interventional Cardiology – Common Potentials Now and in Future</td>
<td>Rimantas Benetis (LT)</td>
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<tr>
<td>10:20–10:40</td>
<td>Morning Coffee and Poster Viewing</td>
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<td>10:40–12:00</td>
<td>Session 2 Arrhythm</td>
<td>Ballroom 2+3</td>
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<tr>
<td>10:40</td>
<td>Atrial Fibrillation and the Brain</td>
<td>David O. Arnar (IS)</td>
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<tr>
<td>11:00</td>
<td>How Long We Should Use Oral Anticoagulants after Electrical Cardioversion?</td>
<td>Oskars Kalejs (LV)</td>
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<tr>
<td>11:15</td>
<td>Ablation of Ventricular Tachycardia</td>
<td>Christian Gerdes (DK)</td>
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<tr>
<td>11:30</td>
<td>Home Monitoring of ICD Patients in Estonia</td>
<td>Prit Kampus (EE)</td>
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<tr>
<td>11:45</td>
<td>Arrhythmias in Patients with Congenital Heart Defect</td>
<td>Anita Hlippala (FI)</td>
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<tr>
<td>10:40–12:00</td>
<td>Nursing Program 2 Myocardial Infarction and Heart Failure</td>
<td>Ballroom 1</td>
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<tr>
<td>10:40</td>
<td>Myocardial Infarction Patient Needs</td>
<td>Tatjana Jushinski (EE)</td>
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<tr>
<td>11:00</td>
<td>Inpatient Unit Rehabilitation after Myocardial Infarction</td>
<td>Anete Ojaste (EE)</td>
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<tr>
<td>11:20</td>
<td>Outpatient Clinic Rehabilitation Program in Tartu University Hospital for Patients with Ischaemic Heart Disease After Revascularization of the Myocardium</td>
<td>Livian Laaneots (EE)</td>
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<tr>
<td>11:40</td>
<td>Heart Failure Patient Monitoring Options in Outpatient Clinic</td>
<td>Anne Speek (EE)</td>
</tr>
<tr>
<td>10:40–12:00</td>
<td>Nordic-Baltic PCI Club</td>
<td>Tartu room</td>
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<tr>
<td>10:40</td>
<td>Troponins and PCI-Related Myocardial Damage</td>
<td>Gustavs Latkovskis (LV)</td>
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<tr>
<td>11:00</td>
<td>Culprit Lesion vs. Staged Myocardial Revascularization: Data of OMAPIMIM Study</td>
<td>Ramunas Navickas (LT)</td>
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<tr>
<td>11:20</td>
<td>Rationale and Lessons from Thrombus Aspiration Trials</td>
<td>Kari Niemelä (FI)</td>
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<tr>
<td>11:40</td>
<td>OCT Findings and Thrombus Aspiration in STEMI</td>
<td>Olli Kajander (FI)</td>
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<tr>
<td>12:00–13:00</td>
<td>Lunch and Poster Viewing / Poster Tours</td>
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<tr>
<td>13:00–14:40</td>
<td>Session 3 Invasive Cardiology and Cardiosurgery</td>
<td>Ballroom 2+3</td>
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<tr>
<td>13:00</td>
<td>PCI as a Primary Choice in the Treatment of Left Main Stenosis</td>
<td>Kari Kervinen (FI)</td>
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<tr>
<td>13:20</td>
<td>Multivessel Disease and STEMI: Complete or Partial Revascularization</td>
<td>Lene Holmvang (DK)</td>
</tr>
<tr>
<td>13:40</td>
<td>PCI in Stable Coronary Artery Disease</td>
<td>Jaan Eha (EE)</td>
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<td>14:00</td>
<td>Health-Related Quality of life 12 Years After the CABG</td>
<td>Otso Järvinen (FI)</td>
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<tr>
<td>14:20</td>
<td>Cardiologist and Surgeon Working Together: New Hybrid Approaches to Mitral Valve Repair</td>
<td>Audrius Aidietis (LT)</td>
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<tr>
<td>13:00–14:40</td>
<td>Nursing Program 3 Prevention of Thrombosis</td>
<td>Ballroom 1</td>
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<tr>
<td>13:00</td>
<td>Nurse’s Role in Patient Management of Anticoagulant Therapy</td>
<td>Aire Pöder (EE)</td>
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<td>13:20</td>
<td>Patient Counseling in Prevention of Stent Thrombosis</td>
<td>Merle Tamm (EE)</td>
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<tr>
<td>13:40</td>
<td>Nursing Problems of Cardiac Surgery Patients in Pre- and Postoperative Period</td>
<td>Ulvi Tasane (EE)</td>
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<tr>
<td>14:00</td>
<td>Primary Postoperative Cardiac Rehabilitation</td>
<td>Inga Koger (EE)</td>
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<tr>
<td>14:20</td>
<td>Conclusion</td>
<td>Teele Vaga (EE)</td>
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<td>After This Session, from 15:00 Nursing Program Continues with Post-Workshop in North Estonia Medical Centre</td>
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<tr>
<td>Time</td>
<td>Session Title</td>
<td>Chair</td>
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<tr>
<td>13:00</td>
<td>Session 4 Hypertension and Arterial Ageing</td>
<td>Francesco Cosentino (SE) &amp; Peter Nilsson (SE)</td>
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<tr>
<td>13:00</td>
<td>Epigenetic Changes, Oxidative Stress and Vascular Disease in Diabetes</td>
<td>Francesco Cosentino (SE)</td>
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<td>13:20</td>
<td>Gut Microbiota and Heart Disease</td>
<td>Peter Nilsson (SE)</td>
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<td>13:40</td>
<td>Arterial Stiffness Estimation Methods, Devices and Results</td>
<td>Kristjan Pilt (EE)</td>
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<tr>
<td>14:00</td>
<td>Arterial Hypertension: Past, Present and Future</td>
<td>Irina Chazova (RU)</td>
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<td>14:20</td>
<td>Treatment of Resistant Hypertension</td>
<td>Ilkka Kantola (FI)</td>
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**4:40–15:10 Afternoon Coffee 1 and Poster Viewing**

**15:10–16:50 Session 5 Innovative Cardiology in Nordic-Baltic Region**

*Chair: Andrejs Erglis (LV) & Thorarinn Gudnason (IS)*

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<th>Time</th>
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<tbody>
<tr>
<td>15:10</td>
<td>Registry-Based Randomised Clinical Trials, a Nordic Novelty in CV Research</td>
<td>Thorarinn Gudnason (IS)</td>
<td>Ballroom 2+3</td>
</tr>
<tr>
<td>15:30</td>
<td>The Paradigm Shift: Device Based Approaches to Modulate the Sympatic Nervous System in Cardiovascular Disease</td>
<td>Andrejs Erglis (LV)</td>
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<tr>
<td>15:50</td>
<td>E-Health Innovations in Estonia</td>
<td>Peeter Ross (EE)</td>
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<tr>
<td>16:10</td>
<td>Percutaneous Aortic Valve Replacement – State of the Art</td>
<td>Andreas Röck (SE)</td>
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<tr>
<td>16:30</td>
<td>Update on European Diploma in General Cardiology from UEMS-Cardiac Section</td>
<td>Jim Hall (UK)</td>
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**15:10–16:50 Session 6 Cardiac Imaging**

*Chair: Antti Saraste (FI) & Ole Christian Mjølstad (NO)*

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<th>Time</th>
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<tbody>
<tr>
<td>15:10</td>
<td>Non-Invasive Imaging in the Detection of Coronary Artery Disease: When and Which Modality?</td>
<td>Antti Saraste (FI)</td>
<td>Ballroom 1</td>
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<tr>
<td>15:30</td>
<td>Pocket-Size Ultrasound, a New Diagnostic Tool in Clinical Practice</td>
<td>Ole Christian Mjølstad (NO)</td>
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<tr>
<td>15:50</td>
<td>Echocardiography in Acute Coronary Syndrome</td>
<td>Piibe Muda (EE)</td>
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<tr>
<td>16:10</td>
<td>Clinical Use of Optical Coherence Tomography to Identify Angiographic Silent Stent Thrombosis</td>
<td>Terje Steigen (NO)</td>
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<tr>
<td>16:30</td>
<td>Diagnostic Value of Myocardial Deformation in Evaluation of the Severity of Coronary Artery Stenosis</td>
<td>Jolanta Vaskelyte (LT)</td>
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**15:10–16:30 Session 7 Oral Posters**

*Chair: Germanas Marinskis (LT) & Mikko Pietilä (FI)*

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<th>Time</th>
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<th>Authors</th>
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<tbody>
<tr>
<td>15:10</td>
<td>Mortality in Takotsubo Syndrome Is Similar to Mortality in Myocardial Infarction – A Report from the SWEDEHEART Registry</td>
<td>Björn Redfors, Ramtin Vedad, Oskar Angeräsv, Truls Råmunddal, Petur Petursson, Inger Haraldsson, Anwar Ali, Christian Dworeck, Jacob Odenstedt, Dan Ioaness, Berglin Libungan, Yangzhen Shao, Per Albertsson, Grgg W. Stone, Elmir Omerovic</td>
</tr>
<tr>
<td>15:20</td>
<td>Estonian Myocardial Infarction Registry – First Results from a High Risk Country</td>
<td>Toomas Marandi, Gudrun Veldre, Mai Blöndal, Aet Saar, Tiia Ainla, Jaan Eha</td>
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<tr>
<td>15:30</td>
<td>Radiofrequency Ablation of Idiopathic Right Ventricular Outflow Tract Tachycardia/Premature Ventricular Contractions: 10 Years Follow-Up</td>
<td>Synne D. Roervik, Per Ivar Hoff, Jian Chen, Eivind Solheim, Peter Schuster</td>
</tr>
<tr>
<td>15:40</td>
<td>Outcomes of Pulmonary Endarterectomy for Chronic Thromboembolic Pulmonary Hypertension Patients in Latvia</td>
<td>Andris Skride, Ainars Rudžitis, Martins Kalejs, Krista Lesina</td>
</tr>
<tr>
<td>15:50</td>
<td>Equipotent Effects of Rosuvastatin, Atovasatin and Simvastatin on LDL-C Reduction: Results from the VOYAGER Meta-Analysis</td>
<td>Björn W. Karlsom, Michael K Palmer, Stephen J. Nicholls, Pia Lundman, Philip J. Barter</td>
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<tr>
<td>16:00</td>
<td>Increased Carotid Plaque Burden in Patients With Acute Coronary Syndrome and Impaired Glucose Metabolism</td>
<td>Thorarinn Arni Bjarnason, Erna Sif Oskarsdottir, Steinar Orri Hafthorsson, Linda Bjork Kristinsdottir, Isliefur Olafsson, Sigurdur Sigurdsson, Vilmundur Gudnason, Karl Andersen</td>
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<tr>
<td>16:10</td>
<td>The Advantages of Aortic Valve Replacement with Cryopreserved Allografts in Patients with Infective or Prosthetic Aortic Valve Endocarditis</td>
<td>Sjarhej Spirydonau, V. Adzinzou, M. Schatskina, V. Podpalov, S. Kurganovich, A. Shtet, Y. Ostrovsky</td>
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<tr>
<td>16:20</td>
<td>Elevated Highly Sensitive Troponin T – Utility and Differential Diagnosis</td>
<td>Stefan Thorsson, David O. Arnar, Karl Andersen</td>
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<tr>
<td>15:10–16:50</td>
<td>Expert Round Table: Nordic-Baltic Countries Networking on Familial Hypercholesterolemia and FH Registries</td>
<td>Swissotel 30th floor</td>
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<tr>
<td>16:50–17:20</td>
<td>Afternoon Coffee 2 and Poster Viewing</td>
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<tr>
<td>17:20–18:20</td>
<td>Satellite Sessions</td>
<td>Ballroom</td>
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<td>17:20</td>
<td>Satellite Session St Jude Medical</td>
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<td>18:20</td>
<td>Close of Day 2</td>
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<tr>
<td>20:00</td>
<td>Gala Dinner</td>
<td>Seaplane Harbour</td>
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Saturday, June 06, 2015

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<tr>
<td>08:00</td>
<td>Registration Open</td>
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<tr>
<td>08:40–10:20</td>
<td>Plenary Session 4 Prevention</td>
<td>Ballroom</td>
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<td>08:40</td>
<td>Cardiovascular Prevention – Problems and Possibilities</td>
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<td>09:00</td>
<td>CVD Mortality in Latvia: Numbers and Reality</td>
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<td>09:20</td>
<td>Hypertension Burden and Prevention Strategies in Russia</td>
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<td>09:40</td>
<td>Exercise – The Healer or the Killer</td>
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<tr>
<td>10:00</td>
<td>Late INa+ in Secondary Prevention of Coronary Artery Disease</td>
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<td>10:20–10:40</td>
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<td>10:40–12:00</td>
<td>Plenary Session 5 Prevention</td>
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<td>Obesity, Diabetes and CV Risk Factors of the 21st Century</td>
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<td>Familial Hypercholesterolemia – Underdiagnosed and Undertreated</td>
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<td>Lipid Lowering Therapies – Past, Present and Future</td>
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<td>Are Lipid Targets Still Valid in Cardiovascular Prevention?</td>
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<td>10:40–12:00</td>
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<td>Introduction to Some New Methods in Cardiovascular Disease</td>
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<td>Genetics and Genomics of Ageing: Implications on CVD</td>
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<td>Dietary Polyphenols in the Management of Hypertension. A Metabolomic Approach</td>
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<td>12:00–12:15</td>
<td>Closure and Poster Awards</td>
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Welcome and Opening

On behalf of the Organizing Committee it is a great pleasure to welcome you to the jubilee XXV Nordic Baltic Congress of Cardiology in Tallinn, Estonia, June 4-6, 2015.

This meeting will bring together cardiologists, clinical and basic researchers, nurses in the field of cardiovascular medicine. This is a unique opportunity to make friends and establish collaboration with colleagues from Nordic-Baltic region and other European countries. This will give the opportunity to bring together state-of-art research in the field of cardiovascular medicine and create strong forum for exchanging ideas and seeking solutions for the future.

On behalf of the Estonian Society of Cardiology, it is our great pleasure to host XXV Nordic Baltic Congress of Cardiology. We welcome you to enjoy the scientific program, beauty of Estonia and the charming atmosphere of the gothic city of Tallinn.

Margus Viigimaa,
President of the XXV Nordic-Baltic Cardiology Congress
O-01
Atrial Fibrosis as a Main Component of Atrial Fibrillation
Panos Vardas
Head of the Cardiology Department, Heraklion University Hospital, Crete, Greece

Cardiac fibrosis is a pathological response that causes abnormalities in cardiac conduction and mechanical function, thereby contributing to the pathophysiology of a variety of cardiac conditions, including hypertrophy, failure, and arrhythmias.

Although the fundamental mechanisms underlying Atrial Fibrillation (AF) have long been debated, electrical, contractile, and structural remodeling are each important synergistic contributors to the AF substrate [1].

Sustained AF increases formation of interstitial fibrosis which creates areas of conduction delay further facilitating micro-reentry. Common triggers for atrial fibrosis include the activation of the renin-angiotensin-aldosterone-system, inflammation, and oxidative stress [2].

Fibrosis impairs conduction by acting as a barrier to continuous longitudinal conduction in cardiomyocyte bundles. Augmented interstitial fibrosis modifies the pattern of myocyte apposition, rearranges atrial myocyte connections and alters cell-to-cell interaction and communication. The combination of normal and diseased atrial fibres in conjunction with local fibrosis results in spatial dispersion of atrial refractoriness and causes inhomogeneous localized conduction abnormalities, including intra-atrial conduction block and slow conduction [3].

Atrial fibrosis is a common feature of clinical AF. Atrial extracellular matrix remodeling manifested in the atrium is associated with the development of sustained AF in patients with cardiomyopathy and heart failure [3, 4]. The amount of collagen increases as the AF burden increases. In patients with AF with preserved LV Function the degree of fibrosis is augmented and tends to separate myocytes from each other. Such types of fibrosis may alter the biophysical properties of the tissue allowing the initiation and perpetuation of AF. Apart from its important role in AF pathophysiology atrial fibrosis seems to have significant implications in AF management since it is an important risk factor for AF recurrence in patients who have undergone AF catheter ablation [3, 4, 5].

A deeper understanding of the relationships between fibrosis and AF may lead to more rational therapeutic strategies and ultimately to improved outcomes for patients.

References

O-02
Atrial Fibrillation
Panos Vardas
Head of the Cardiology Department, Heraklion University Hospital, Crete, Greece

Atrial fibrillation is defined as complete and chaotic disruption of atrial electrical and mechanical function and synchronization of atrial myofibrils for at least 30 sec. Systematic studies revealed that pulmonary veins are an important source of ectopic beats and they are capable of initiating frequent paroxysms of atrial fibrillation, that could be eliminated by treatment with radiofrequency ablation. However, one of the main causes responsible for the development of atrial fibrillations is atrial fibrosis. Moreover atrial fibrillation leads to changes in atrial electrophysiology that promote atrial fibrillation maintenance (AF begets AF).

The prevalence of AF increases with age and is 1–1.5% in the general population (ranging from 0.1% among young to 9% of 80 yrs old) and it is expected that the number of patients with AF will
double or triple in the next few decades. The number of people with diagnosed AF in industrialized countries (US, Japan, Germany, Italy, France, UK and Spain) is expected to rise from 6.3 million in 2007 to 7.5 million in 2017. The overall prevalence of AF is increasing, driven by: a) Ageing of populations worldwide, b) Rising prevalence of chronic heart disease, c) Rising prevalence of AF risk factors, e.g. diabetes mellitus.

Stroke is the leading complication of AF and AF is associated with a 5-fold higher stroke risk overall. AF doubles the risk of stroke when adjusted for other risk factors and without preventive treatment, each year approximately 1 in 20 patients (5%) with AF will have a stroke. AF is responsible for nearly one-third of all strokes, and AF is the leading cause of embolic stroke. Stroke in AF is associated with a heavy burden of morbidity and mortality and is usually more severe than stroke due to other causes. Finally, the mortality rate for patients with AF is double that in people with normal heart rhythm.

The European Society of Cardiology recognizing the importance of the correct treatment of AF have published and updated detailed guidelines for the management of patients with atrial fibrillation.

O-03
Dietary Polyphenols in the Management of Hypertension. A Metabolomic Approach
Jordi Camps
Unitat de Recerca Biomèdica Hospital Universitari de Sant Joan Universitat Rovira i Virgili Reus, Catalonia, Spain

Hypertension is the most important risk factor in the development of cardiovascular diseases but its pathophysiology remains incompletely understood. Polyphenols, obtained from several plants, induce a favourable endothelial response in hypertension and beneficial effects in the management of other metabolic cardiovascular risk factors. Studies from our laboratory using the calyces of Hibiscus Sabdariffa L., as a source of polyphenols, demonstrated an amelioration of hypertension in humans. To know the phytochemical composition of the HS extracts is important to identify and characterise the bioactive components, and to investigate which are the required amounts producing a significant therapeutic effect.

Extracts of H. sabdariffa calyces were injected into a rapid resolution liquid chromatograph (RRLC). The diodearray detector (DAD) coupled to the RRLC system was set in a spectrum range from 200 to 600 nm, and the system was coupled to a time-of-flight (TOF) mass spectrometer, equipped with an electrospray ionization source (ESI). We identified 20 main phenolic and other polar compounds in the extracts, including quercetin, kaempferol, myricetin, delphinidin, cyanidin, epigallocatechin, and several derivatives from them. There were significant amounts of saccharides in the extracts, including arabinose, galactose and glucose. The mucilage content was approximately 20% and predominantly composed by anhydro uronic acid.

Because dose is important to obtain a significant clinical effect, herbal teas cannot provide the necessary amounts of polyphenols unless the consumption is very high. Therefore, we recommend preparation and release of concentrated extracts. Additionally, polyphenols exist as complex mixtures of related compounds in foods, and synergism among different polyphenols is likely, as well as the possibility that polyphenol extracts modulate simultaneously many proteins and receptors. Indeed, we have already documented this phenomenon with simple drugs such as glitazones or fibrates using the combination of metabolomics and transcriptomics focused to obtain changes in metabolic status. Additionally, and despite the low bioavailability of polyphenols, intervention studies provide evidence for the protective effects of secondary plant metabolites.

It is of great significance, in our opinion, to elucidate the therapeutic mechanisms of polyphenols. This is a challenge because polyphenols hit multiple targets with relatively weak affinity and multiple polyphenols may represent an increase in the number of effects. To clarify these mechanisms, the metabolism of polyphenols should be incorporated into future research. Ongoing studies will probably refine and confirm the Omic technologies as promising tools for capturing metabolic complexity caused by plant-derived extracts. We expect that the interpretation of the induced metabolic changes using this approach and potent bioinformatics analysis systems will result in knowledge of effects on hypertension caused by specific polyphenol metabolites.

Acknowledgements: This study was supported by grants from the Carlos III Health Institute, Madrid, Spain (PI108/1381, PI11/00130), the European Fund for Regional Development, and the Bioactive Food Platform (Spain).

O-04
Gut Microbiota and Heart Disease
Peter M. Nilsson
Lund University, Sweden

The growing interest in the role of infectious agents, mostly bacteria, for development of cardiovascular risk has an old background. It has been known for long that some bacterial strains can cause aortic aneurysm (Treponema pallidum) or heart valve insufficiency (Streptococci, Staphylococci). In more recent years the finding of seropositivity for Chlamydia pneumoniae and other infectious agents led to intervention studies based on antibiotic treatment, however not successful after longer follow-up [1]. This has now changed as new research has focused on bacteria in the gastrointestinal tract in relation to health and disease, also cardiovascular changes.

Of particular interest is to determine the role of microbiome, measured as microbiota (the gut bacteria composition and variety), and its association with dietary intake together with the genetic profile of the host, in relation to alterations in metabolism and immunological function [2]. This will be linked to other research areas in microbiology, nutritional sciences, technology and innovation for prevention. For example, functional food products can be developed and tailored to the match the profile and needs of the individual. Of special interest in a family perspective is that the microbiome of individuals is influenced in early life, first by the microbiota of the mother from exposure to the offspring during delivery and neonatal period. Later on this is influenced by more
or less shared microbiota patterns in the household during childhood and adolescence due to cohabitation. It is hypothesised that microbiota profile as well as dietary intake patterns may cluster within families. Recently it was discovered that there is also a specific serum biomarker, the pro-atherosclerotic metabolite, trimethylamine-N-oxide (TMAO) that is able to reflect the gut microbiome [3]. It could be possible to measure this biomarker using plasma samples from new or existing biobanks within for evaluation of the TMAO marker status of individual microbiota [4]. Interventions to change the microbiota have provided some promising results and been described as a potential treatment target for cardio-metabolic disease [5]. Such interventions should be based on the wider use of designed and tested functional food products as part of a healthy lifestyle in general.

References

O-05
OCT Can Detect Angiographically Silent Stent Thrombosis
Terje Kristian Steigen
FESC, Norway

We present some cases with acute coronary syndromes (ACS) from very late stent thrombosis that have been previously treated with first-generation drug-eluting stents (DES). The important point is that patients previously treated with coronary stents may suffer an ACS without any clear evidence of thrombus formation on coronary angiography (CAG). This may be due to partial, non-occlusive stent thrombosis causing microembolization. In this presentation we discuss possible mechanisms behind this and the diagnostic findings from optical coherence tomography (OCT) and histology. One patient had ACS 15 months after DES implantation. The angiogram was near normal with slight peri-stent contrast staining. OCT revealed abnormalities including thrombus not visible on CAG. These are findings that may explain the ACS. Patients have reported episodes with chest pain after DES implantation, some with positive troponins, but no significant findings on CAG. Postmortem histological examination of the coronary arter-

Abstracts

Cardiology
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O-06
Exercise – The Healer or the Killer
Iveta Mintale
Pauls Stradins Clinical University Hospital, Latvia

Objectives: The cornerstone of CAD prevention is regular physical activity and/or aerobic exercise training, that helps decrease cardiovascular mortality by at least 30%. We have many patients who should improve their exercise plan. But there are also some patients who want to be ready for a marathon only 6 months after an acute MI and primary PCI.

What is the truth? Which is the optimal work load, optimal heart rate while exercising, and optimal frequency of physical exercise, if we want to prevent CV events?

Background: Physical exercise has many positive effects on the cardiovascular system: anti-atherosclerotic – improved lipid profile, reduced weight, decreased blood pressure; anti – ischemic – improved myocardial perfusion; anti – thrombotic – activated thrombolysis and decreased coagulation, and anti – arrhythmic effect, which leads to a decreased process of atherosclerosis.

Methods: Viewed ESC guidelines on CVD prevention, Secondary Prevention Through Cardiac Rehabilitation: Physical Activity Counselling and Exercise Training: Key Components of the Position Paper from the Cardiac Rehabilitation Section of the European Association of Cardiovascular Prevention and Rehabilitation, Cardiovascular Health study and Copenhagen Heart study.

Results: There is a strong evidence that physical exercise effects on patients body have an U shape curve, which means that light and moderate physical exercise can decrease mortality whereas strenuous physical exercise has the same level of mortality risk as sedentary lifestyle does.

Conclusions: Physical activity is very important to decrease CVD mortality risk. It is one of the crucial actions to change the profile of the CVD risk factors together with smoking cessation, Med diet and normal weight. However there are the lower and upper limits of exercise intensity.
Before the introduction of statins several lipid-lowering therapies had been introduced and even surgical procedures were evaluated. A partial list of compounds which have been utilized or indicated as hypolipidaemic agents will include non-absorbable agents, bile acid sequestering resins, neomycin and beta-sitosterol; and absorbable agents, nicotinic acid (niacin), clofibrate, probucol, d-thyroxine. Of these compounds, nicotinic acid, resins and clofibrate derivatives have been commonly used in the past and even tested in clinical trials. Resins were tested in the LRC-CPPT (Lipid Research Clinic’s Coronary Primary Prevention Trial) and this was the first major clinical trial which documented that decreasing total cholesterol and LDL-C was associated with a reduction in the incidence of fatal and non-fatal myocardial infarction.

Statins were introduced in the late 1980’s and the results from the first major trials with simvastatin (4S) and pravastatin (CARE) documented the efficacy of these new agents and the concept of the LDL-hypothesis. During the following twenty years a large number of statin trials have been published showing that patients with cardiovascular disease, diabetes or risk factors will benefit from statin therapy. At present we are discussing the paradigms of further benefits using the available drugs focusing on residual risk through lipid regulation. Recently it has been shown that a combination of a statin and a cholesterol absorption inhibitor, ezetimibe, can not only lower LDL-C but is also associated with a reduction in the incidence of fatal and non-fatal myocardial infarction.

Future (non-statin) LDL-C lowering strategies are now being tested in clinical trials and the most promising compounds are ApoB mRNA antisense drugs, PCSK9 antibodies, Microsomal Tri-glyceride Transfer Protein inhibitors (MTB-inhibition), and Cholesterol-ester transfer protein inhibitors (CETP inhibitors). ApoB antisense and MTP-inhibition will most likely be restricted to very severe hypercholesterolemia and homozygous FH; whereas PCSK9 and CETP inhibition might have a future in clinical practice dependent of the results of ongoing trials.

Methods: In 91 patients (mean age 64 ± 8.6 years) with stable CAD, inducible myocardial ischemia was evaluated by dobutamine stress echocardiography (DSE) and adenosine magnetic resonance imaging (AMRI). After DSE and AMRI all patients underwent invasive coronary artery angiography. Significant coronary artery stenosis was defined as 75% or greater luminal narrowing of epicardial coronary vessel. DSE and AMRI investigators were blinded to coronary artery angiography results. Based on AMRI patients were divided into two groups – non-pathologic (n = 51) and pathologic (n = 40). Longitudinal, circumferential, radial strain, systolic and diastolic longitudinal, circumferential, radial strain rate (SR) parameters and their changes from rest (BASE) to low stress (MIN), peak stress (MAX) and recovery (REC) were estimated.

Results: There were no significant differences in the clinical characteristics, results of conventional echocardiography and strain, strain rate parameters between the two groups at rest.

In the non-pathologic group systolic longitudinal (19.4 ± 3.0 to –21.9 ± 4.0%, p = 0.00) and circumferential strain (17.4 ± 5.9 to –21.2 ± 6.3%, p = 0.01) increased significantly from BASE to MIN, as well as systolic longitudinal SR (–2.4 ± 3.7 and –2.6 ± 0.4 l/s, p = 0.00) from BASE to MIN and from MIN to MAX (–2.6 ± 0.4 and –2.8 ± 0.5 l/s p = 0.00). In contrast, in the pathologic group, insignificant increase of systolic longitudinal (–2.1 ± 2.6 and –1.8 ± 0.4 l/s, p = 0.1) and radial (4.6 ± 2.8 and 3.5 ± 0.8, p = 0.15) SR and insignificant increase of systolic circumferential SR (–2.7 ± 0.9 and –2.8 ± 3.5, p = 0.9) from MIN to MAX was observed. Discriminant function analysis revealed that selected STI derived parameters best classify patients into predefined AMRI groups (pathologic and non-pathologic) with the accuracy, respectively 90.9% and 83.3%.

From BASE to MIN late radial diastolic SR significantly increased in the pathologic group (~1.86 l/s to ~2.88 l/s, p = 0.01) though not in the non-pathologic group (–1.95 l/s to –2.28 l/s, p = 0.75). Same tendency was observed in late longitudinal diastolic SR (non-pathologic group: 1.27 l/s to 1.53 l/s, p = 0.001; pathologic group 1.27 l/s to 1.41 l/s, p = 0.07). Discriminant function analysis revealed that diastolic SR can be used to classify patients into both groups by 100% accuracy. Diastolic SR parameters used were: early longitudinal at BASE, early longitudinal at MIN, late longitudinal at MIN, late radial at MIN, late longitudinal ΔBASE to MIN, early circumferential ΔBASE to MIN, late circumferential ΔBASE to MIN, early circumferential ΔMIN to MAX, late radial ΔMIN to MAX.

Conclusion: Left ventricular strain and strain rate analyses during DSE can be used in the assessment of hemodynamic signifi-
cance of coronary artery stenosis in patients with stable CAD. Early and late longitudinal, circumferential and radial diastolic SR are important and more sensitive than systolic markers of validated by perfusion defects hemodynamically significant CAD.

O-09
Pocket-Size Ultrasound, a New Diagnostic Tool in Clinical Practice
Ole Christian Mjolstad
Department of Cardiology, St. Olav, Trondheim University Hospital PB 3250 Sluppen 7006 Trondheim, Norway

Despite the heavy arsenal of diagnostic modalities available for physicians, autopsies have revealed major diagnostic errors in 30% of cases. Thus there is a need for improvement in diagnostic accuracy.

During the recent two decades, the development of new digital technology and miniaturization of ultrasound scanners have moved these scanners from the echo-lab into the white coat pocket. These scanners are small, cheap and easy to handle. In a series of publications our research group has shown that non-experts, as well as expert users in different clinical scenarios are able to use these devices correctly and increase their diagnostic precision.

Medical residents were after a targeted education in ultrasound able to obtain reliable information of important cardiac structures and great vessels in patients admitted to a medical department. When experts added a pocket-size ultrasound examination to the usual care diagnostic in the emergency room, they made important diagnostic changes in 1 of 5 patients admitted to a medical department, resulting in a completely different treatment strategy without time delay.

In primary care, general practitioners were able to evaluate left ventricular systolic function with pocket-size ultrasound using mitral annular excursion as a surrogate marker. In order to aid inexperienced users, we have presented a fully automatic algorithm for measuring mitral annular excursion. The algorithm is able to be run real-time on a pocket-size scanner. The accuracy of the algorithm makes it suitable for separating poor ventricles from normal ones.

In spite of this, we suggest that implementing strategies and systems for routinely adding a pocket-size ultrasound examination to patients both in medical departments and general practice are appropriate. Further studies must demonstrate the degree of education and training needed for the medical professionals performing these examinations.

O-10
PCI as a Primary Choice in the Treatment of Left Main Stenosis
Kari Kervinen
Consulting Cardiologist, Oulu University Hospital, Finland

In the first decade of the present millennium, CABG was still regarded as the standard treatment for left main (LM) stenosis. The ESC year 2008 guidelines on PCI stated that ‘Stenting for unprotected LM disease should only be considered in the absence of other revascularization options’. This recommendation was largely based on data using the treatment methods of the 1970’s and 1980’s comparing CABG and medical therapy.

The recent data, based on the present treatment standards, such as drug eluting stents and usage of statins suggest that PCI provides at least equivalent or even superior results to CABG in most LM lesions. This is based on several randomised studies and meta-analyses. In the SYNTAX trial, the 5-year results for 705 patients showed no overall difference between PCI and CABG in death (7.3% PCI vs. 8.4% CABG) or MI (6.9% vs. 4.1%) but a higher incidence of stroke with CABG (1.2% vs. 4%). The need for repeat revascularization (mainly PCI) was 20% for the PCI group vs. 12% for CABG. In patients with SYNTAX score 32 or less, the incidence of death and MI tended to be less after PCI. In the patients with SYNTAX score over 32, these endpoints tended to be met less often after CABG. The meta-analysis by Capodanno et al. (2011) consisted of 1611 patients from four randomised studies with one year follow-up. The analysis showed that there was no significant difference in death or MI between PCI and CABG, but there were less strokes (OR 0.15 in favour of PCI) and more need for repeat revascularization (OR 2.25) in the PCI patients.

Based on the present data, PCI is the treatment of choice in most patients with LM stenosis: isolated LM, LM + 1-2 vessels and LM + 2-3 vessels when the SYNTAX score remains 32 or less.

O-11
CVD Mortality in Latvia: Numbers and Reality
Vilnis Dzerve
University of Latvia, Latvia

Mortality from cardiovascular diseases is the leading cause of death in Latvia. Standardised mortality from circulatory diseases is approximately twice higher in Latvia, as compared with the average in European Union.

The dynamics of cardiovascular mortality during last 25 years will be presented.

The analysis of the information included in the medical certificate of cause of death (hereinafter referred to as the certificate) shows that the main cause of death may vary between various groups of diseases in case inaccurate data were submitted. It is necessary to study the scope of the issue and to make proposals how to improve data credibility.

The aim of our study was to get information about the actual mortality from circulatory diseases in Latvia by making a compara-
Hypertrophic cardiomyopathy (HCM) is a myocardial disease that is traditionally characterized by asymmetric (usually septal) hypertrophy of the left ventricular wall. In about two thirds of patients HCM is inherited by an autosomal dominant pattern and caused by mutations in the genes encoding sarcomeric proteins. The two major HCM genes are beta-myosin heavy chain (MYH7) and cardiac myosin-binding protein C (MYBPC3), mutations in which account for >50% of genetically verified HCM cases. More than 10 other sarcomeric HCM-associated genes, in which causative mutations are relatively uncommon, have also been reported. In addition, HCM (or a phenotype resembling sarcomeric HCM) may infrequently be caused by non-genetic disorders, or by mutations in a variety of non-sarcomeric genes associated with other genetic diseases. To date, more than 1400 mutations, most of which are found in single or in a few patients or families, have been reported. On the other hand, highly prevalent founder mutations, which account for a significant proportion of HCM cases, have been identified especially in genetically isolated populations. In a minority of patients multiple causal mutations, which together may cause a more severe phenotype, are found. However, as the phenotype associated with different HCM genes and mutations is very heterogeneous, the genotype usually is not helpful in predicting the clinical course of HCM. The current ESC Guidelines on HCM recommend genetic testing in patients with an established diagnosis of HCM to enable cascade genetic screening of the relatives at risk of HCM. The use of modern screening techniques, e.g. next-generation sequencing, allow simultaneous screening of all known disease-related genes but the frequent occurrence of multiple gene defects in a same patient makes it challenging to determine the clinical significance of each variant.
Abstracts

Cardiology

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The objective of this presentation is to 1) give an overview of the design and implementation of Estonian nation-wide Health Information System (EHIS) functional since 2009, 2) describe the functionalities of the system from the cardiologists point of view, 3) provide statistics of use and 4) perspectives for the further development.

EHIS integrates different healthcare databases and services. It makes possible to access medical data, prescriptions and images in a secure way. The list of medical files and images exchanged is defined by the law, all healthcare providers are obliged to connect with the repository and the data is equally accessible for healthcare providers and citizen. The most common documents shared in EHIS are ambulatory and stationary case summaries, reports of exams (incl. radiology and cardiology images, ECG, etc.) and e-prescriptions. The use of international medical data exchange standards and standard profiles makes it possible to seamlessly exchange documents and images generated by different healthcare providers. Healthcare professionals can access EHIS through their own information systems and retrieve documents and medical images from different healthcare providers to own desktop. Citizen have access to their data through the web based patient portal provided by the state. Patient portal gives the person access to audit trail and allows to declare intentions, trustees and preferences.

The use of EHIS by healthcare professionals has increased constantly during the first 6 years reaching more than 500 000 queries monthly. EHIS has data about 1.35 million out-patient and 1.2 million in-patient summaries and 3.9 diagnostic examination reports. Patient portal has been used by 4.1% of all population.

EHIS with its services has proved to be widely used by healthcare professionals. The use of EHIS by patients is relatively low. Next developments of EHIS are integration of current databases with Estonian Genome Center biobank to include genome information. Also implementation of new services and improvement of user interfaces is planned.
Abstracts

O-20
Treatment of Resistant Hypertension
Ilkka Kantola
Division of Medicine Turku University Hospital, Finland

Resistant hypertension (RH) is defined as office blood pressure (BP) that remains above target even after using a minimum of three antihypertensive drugs at maximal tolerated doses, from different classes, one of which is a diuretic. Also, patients with controlled BP using four or more antihypertensive drugs are considered resistant to treatment.

The true prevalence of RH is unknown, but clinical trials suggest a share between 10 and 30% of the hypertensive patients in the general population. RH has been associated with male gender, a longer duration of hypertension, obesity (especially abdominal obesity), left ventricular hypertrophy, reduced estimated glomerular filtration rate, and microalbuminuria. In some studies those with RH had been older, black and had albuminuria, diabetes, heart failure, and stroke.

The first step considering the treatment is to confirm the presence of uncontrolled hypertension or RH by using the correct BP measurement technique, excluding the white coat effect, and assessing the patient’s adherence to their treatment. Second, successful treatment requires the identification and reversal of harmful lifestyle factors, discontinuation or minimization of interfering substances, and screening for secondary causes of hypertension. More attention should be paid to lifestyle modifications, such as weight loss, exercise, dietary changes (salt), and reduction of alcohol use. Assessment of mood disturbances, like depression, should also be included. An efficient pharmacotherapy regimen should be tailored on an individual basis for each patient. In general practice referral to an appropriate specialist should be considered. In some special cases renal denervation or baroreceptor stimulation may be considered although the last study results were not promising.

O-21
Remote Home Monitoring of ICD Patients in Estonia
Priit Kampus
Cardiologist, Estonia

The rate of implantable cardioverter-defibrillator (ICD) implantation has increased, as it has become a part of standard therapy in patients who are at risk for life-threatening ventricular arrhythmias. Routine follow-up visits are usually scheduled at six or twelve month intervals and with the growing number of implantations, the demand for ICD follow-up is pushing clinics to their maximum capacity. Over the last years remote home monitoring (RHM) of implanted cardiac devices like ICDs has been introduced. RHM is an automatic remote monitoring system that uses the cellular phone network, and enables physicians to remotely monitor clinical and device status of ICD patients. The technology provides a more continuous follow-up and saves physician and patient time for ambulatory visits that often do not result in specific actions.

Many studies have shown that remote technology results in patient care are comparable with classical ambulatory follow-up visits. RHM results in earlier detection of device and patient-related problems which translate into earlier clinical decision-making, less inappropriate shocks and improved device longevity. Moreover, recent studies have also shown a significant reduction in the length of cardiovascular hospitalizations and even a mortality benefit in ICD patients with heart failure.

In Estonia the RHM system (Merlin.net™, St. Jude Medical) has been introduced in 2009 and thereafter all ICD implanted patients in North Estonia Medical Centre are on regular remote monitoring. Annually our hospital implants approximately 70 high voltage devices and from 2009 we have more than 300 patients on the RHM system list. We have about 8–10 alerts daily from the RHM system. In our clinic, the primary filtered alerts are processed by trained nurse-technicians, consulting with the cardiologist in special cases (e.g., frequent antitachycardia pacing therapy, high voltage therapy, atrial fibrillation, malfunction of the device). All clinically significant alerts and description of the action what has been taken, are stored in patient electronic medical records. Although the RHM system has been well established, there is still no reimbursement in Estonia for the visits performed with the RHM.

In conclusion, the RHM clinic in our hospital has become the standard of care for patients with ICDs, as RHM have the potential to improve patient safety and satisfaction, and has the potential of reducing costs.

O-22
Methods, Devices and Results of Arterial Stiffness Estimation
Kristjan Pilt
Department of Biomedical Engineering, Technomedicum, Tallinn University of Technology, Estonia

Increased arterial stiffness is a strong predictor of future cardiovascular (CV) events, which may increase morbidity and mortality. Early detection of increased arterial stiffness enables us to apply treatments and lifestyle change to decelerate the probability of CV events. Simple screening methods allow sifting out potential patients with early changes in the walls of arteries. A screening method has to be noninvasive, operator independent, repeatable, rapidly performable, reliable, and inexpensive. Different methods are available for the estimation of arterial stiffness. Non-invasive methodologies are based on direct and more or less intrinsically associated parameters, which can be related to the stiffness and ageing of arteries. Direct methods for non-invasive arterial stiffness estimation include synchronous measurements of blood pressure and pulsatile blood flow, diameter changes, and wall thickness by ultrasonography. The Young’s elastic modulus, which is the physical measure of stiffness, can be calculated based on these parameters. However, the ultrasonography is operator dependent and expensive examination and therefore unsuitable for the screening method.

Pulse wave velocity (PWV) is a parameter, which can be intrinsically associated through the Moens-Korteweg equation to the arterial stiffness of a vessel segment. It should be mentioned that...
the SphygmoCor device and comparable results were obtained, to estimate the aortic AIx using the PPG technology for pulse wave studies a method and signal processing algorithms are developed. In addition, to estimate the aortic PWV, an Arteriograph or similar devices can be used with a blood pressure measurement cuff. According to the Moens-Korteweg equation, the PWV and stiffness of artery are also non-linearly related to the blood pressure and have to be taken into account in the results analysis. In addition, the PWV is dependent on the lumen diameter, wall thickness of artery and density of blood, which is assumed to vary minimally for subjects. However, in case the patient is under medication and the density of blood is lowered, the PWV may increase noticeably.

The pulse waveform registered from the artery and smaller vessels depends on the stiffness and related ageing of the arterial system. Different methods have been used for the waveform analysis. Augmentation index (AIx) is a clinically used parameter, which describes the enhancement of central aortic pressure in the systolic part of the cardiac cycle. Different studies have found that the aortic AIx increases with age. Furthermore, as compared to the healthy patients, the results indicate that in case of diabetes patients the aortic AIx is increased by 10% on average. The premature increase in AIx and the related rise in arterial stiffness are often explained through the accelerated ageing of arteries. The devices such as SphygmoCor and Arteriograph enable pulse waveform registration and analysis from peripheral arteries and to calculation of the aortic AIx. The pulse wave can also be registered using optical methods such as photoplethysmography (PPG). In our studies a method and signal processing algorithms are developed to estimate the aortic AIx using the PPG technology for pulse wave registration from a finger. The methodology was compared with the SphygmoCor device and comparable results were obtained, which suggest that the analysis system is suitable for screening. However, further clinical studies are needed.

**O-23**

**Registry Based Randomised Clinical Trials, a Nordic Novelty in CV Research**

Thorarinn Guðnason  
Department of Cardiology, Landspitali University Hospital, Reykjavik, Iceland

The randomised clinical trial (RCT) has through the last decades been a gold standard method to evaluate new therapeutic techniques, such as new medical therapies or devices. However, RCTs have limitations by including highly selected populations at selected centres and may not always reflect real world settings i.e. regarding age or comorbidities of patients. Furthermore, RCTs usually don’t enable follow up of the non-included but screened cohort, and are very expensive to conduct. As a result many therapies and patient groups remain poorly studied, i.e. women in the cardiovascular literature. To overcome some of these limitations a novel type of RCT was recently introduced, the prospective Registry based Randomized Clinical Trial (RRCT) with follow-up on mortality and other end-points through registries only. Nationwide, online registries are used for both randomisation, registration, handling of study data and for follow up of endpoints. This has enabled rapid inclusion of a large number of patients in all centres in whole countries. The RRCT is limited however to answering a few questions on hard endpoints. Complete follow up of both the study population and the non-included cohort has been achieved in a RRCT.

The first RRCT with complete follow-up on mortality through registries only was The Thrombus Aspiration in ST-Elevation myocardial infarction in Scandinavia (TASTE) trial. In all 7244 STEMI patients in 3 countries were included, during 2.5 years using the SCAAR/SWEDEHEART registry platform. The study by its own was larger than all prior studies on thrombus aspiration in STEMI put together and the primary endpoint was all cause mortality. The included patients represented 80% of the eligible STEMI patients and 60% of all STEMIs in the participating centres during the study (all centres in Sweden and Iceland and one centre in Denmark). TASTE revealed that routine thrombus aspiration during STEMI PCI is safe, but did not improve survival or a number of other secondary endpoints at 30 days and one year. Its results changed the ESC guidelines the year after its publication.

RRCT may combine the strengths of a prospective randomised trial with the benefits of following patients in clinical registries or in observational studies. It allows rapid inclusion of large groups of patients that are highly representative of the real world situation and obtaining prompt answers on important hard endpoints at only a fraction of the cost of a RCT.

Several RRCTs in cardiology are in progress in the Nordic countries using the SCAAR/SWEDEHEART platform. They will be introduced shortly in the talk.

The RRCT may become a valuable future research tool that can enable scientific evaluation of novel therapies but also of older therapies not investigated before due to cost or other reasons.

**O-24**

**ESC Guidelines – Where Are We Going?**

Dan Atar  
Oslo University Hospital, Ullevål, Norway

The European Society of Cardiology (ESC) has dedicated itself to the publication and dissemination of clinical practice guidelines. This is regarded one of the core products generated within the ESC, and is intended to reflect updated evidence at all times, high quality, and ease of access. The publication scheme for 2015 is the following 1) Pulmonary Hypertension, 2) ACS-NSTE, 3) Pericardial Diseases, 4) Infective Endocarditis, and 5) VA and Sudden Cardiac Death. For the 2016 schedule, the following guidelines are planned to appear: 1) Dyslipidemia, 2) CVD Prevention, 3) Atrial Fibrillation, and 4) Heart Failure. As a tradition, these guidelines are being launched during the Annual Congress of the ESC in their respective year of publication.

The ESC is aware of the popularity of the guidelines. They are accessible and can be downloaded at no charge by anybody worldwide. This is in harmony with the purpose of the ESC: to reduce the burden of cardiovascular disease. The guidelines can contribute to
decision making in patients, however, there will always be clinical situations that are not fully covered by guidelines. Also, while the strongest guideline recommendations are based on comprehensive scientific evidence, fact the need for expert consensus in the absence of robust scientific evidence must often be deployed. Since the knowledge of disease mechanisms, diagnostic technology and algorithms, and treatment modalities is in constant progression, guidelines need inevitably to be updated regularly. In most instances, a 4-year turnaround for rewriting guidelines is adequate, but in some cases, earlier guideline-updates are required.

The presentation will discuss aspects of guideline quality assessment and negotiate the importance of independence of guideline writing committees. Future developments in guideline generation, such as grading systems, will be highlighted.

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**0-25**  
**Obesity, Diabetes and CV Risk Factors of the 21st Century**  
**Karl Andersen**  
Landspitali University Hospital, Iceland

The incidence of CAD has been falling considerably in Europe during the last 2–3 decades. This has lead to a significant reduction in age standardized death rates in most countries. Although major advantages have been seen in the treatment of CAD, most of this progress is attributed to positive trends in several well known risk factors. In spite of positive trends in smoking rates, blood cholesterol and systolic blood pressure, there are negative trends in the rate of obesity and diabetes in many European countries. Furthermore, type 2 diabetes, a major risk factor for the development of atherosclerotic disease is largely ignored by most clinicians in the treatment of CAD. Several studies have shown that the prevalence of pre-diabetes or type 2 diabetes among patients admitted to the CCU for Acute Coronary Syndromes is close to 65%, half of which is unknown to the patient at the time of admission. Although lifestyle modification and weight reduction may attenuate the progress from pre-diabetes to diabetes, there is scarce data supporting the preventive effect of pharmaceutical treatment to avoid major adverse clinical events in these patients. Therefore, there is need to shift the focus to upstream prevention of atherosclerotic disease by reducing the rising epidemic of obesity and diabetes. In the presentation, recent advantages in the area of CV prevention in this area will be reviewed.

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**0-26**  
**Hypertrophic Cardiomyopathy, Effects of a Founder Mutation**  
**Gunnar Thor Gunnarsson**  
Akureyri Hospital, Akureyri, Iceland

The geographic isolation and homogeneous population of Iceland is ideally suited to ascertain clinical and genetic characteristics of hypertrophic cardiomyopathy (HCM) at the population level. The Icelandic Hypertrophic Cardiomyopathy project aims to: Identify all patients in Iceland with a clinical diagnosis of HCM, describe their clinical profiles and identify disease-causing mutations/the genetic causes of left ventricular hypertrophy (LVH). Explore the genotype – phenotype relationship of HCM mutations in patients and 1st degree relatives. Assess biochemical markers and diastolic function as predictors of disease development in HCM. Assess of phenocopies of HCM. First results have been published (Adalsteinsdottir et al. Circulation 2014;130:1158–1167).

Findings from the Icelandic Hypertrophic Cardiomyopathy Project will be discussed. Of all identified HCM patients, 67% had pathogenic sarcomere mutations. Nearly 90% of mutation positive patients had the same MYBPC3c.927-2A>G mutation. Haplotype and genetic genealogical data defined MYBPC3c.927-2A>G as a founder mutation, introduced into the Icelandic population in the 15th century, with a current population prevalence of 0.36%. Two GLA mutations causing Fabry disease were found in 5% of the HCM cohort.

First degree relatives of MYBPC3c.927-2A>G positive underwent genetic testing and clinical evaluation, including echocardiography. This revealed the MYBPC3c.927-2A>G to cause late and gender specific penetration with more that 60% developing LVH first after 40 years of age and greater disease penetration in males than females.

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**0-27**  
**Epigenetic Changes, Oxidative Stress and Vascular Disease in Diabetes**  
**Francesco Cosentino**  
Karolinska University Hospital, Solna, Sweden

Type 2 diabetes mellitus (T2DM) is associated with increased risk of micro- and macrovascular complications and approximate two-fold greater risk of mortality as compared with the general population. Advances in therapy have reduced morbidity and mortality in patients with T2DM. However, cardiovascular risk is far to be eradicated and mechanism-based therapeutic approaches are needed. In patients with diabetes high glucose levels trigger endothelial inflammation, mitochondrial oxidative stress and reduced availability of nitric oxide, a key effector of vascular health. This chain of events favours the development of coronary atherosclerotic lesions as well as microvascular disease. Although the link between diabetes and atherosclerosis is well established, a better comprehension of the underlying mechanisms is of utmost importance to identify novel molecular targets. Adverse chromatin remodeling is emerging as a key driver of vascular damage and may play a role in this setting.
2014 has been a year during which great efforts were made to reduce the gap between evidence-based recommendations on the prevention of cardiovascular disease (CVD) and daily practice. Recently new guidelines related to the prevention of CVD have been presented in Europe and in the US. The differences between these guidelines are mainly related to implementation strategies rather than scientific evidence. In the EUROASPIRE IV survey, conducted in 24 European countries, it was found that a large majority of coronary patients do not achieve the guideline standards for secondary prevention with high prevalences of persistent smoking, unhealthy diets, physical inactivity. Risk factor control is inadequate despite high reported use of medications and there are increasing inequalities in secondary prevention practice across Europe. All CVD patients require a modern prevention program, in accordance with national, cultural and socio-economic aspects of their societies, to achieve healthier lifestyles, better risk factor control and adherence with cardioprotective medications. New developments in the field of CVD epidemiology and prevention will be reported focusing on estimation of total CV risk and the results of recent intervention studies.

**O-29**

**Mortality in Takotsubo Syndrome Is Similar to Mortality in Myocardial Infarction – A Report from the SWEDHEART Registry**

Björn Redfors1, Ramtin Vedad1, Oskar Angerås1, Truls Råmunddal1, Petur Petursson1, Inger Haraldsson1, Anwar Ali1, Christian Dvoreck1, Jacob Odemstedt1, Dan Ioaness1, Berglin Libungan1, Yangzhen Shao1, Per Albertsson1, Gregg W. Stone2, Elmir Omerovic3

1Department of Cardiology, Sahlgrenska University Hospital Gothenburg, Sweden; 2Columbia University Medical Center and The Cardiovascular Research Foundation New York, NY, USA

**Background:** Takotsubo syndrome is an acute cardiovascular condition that predominantly affects women. In this study, we compared patients with takotsubo syndrome and those with acute myocardial infarction with respect to patient characteristics, angiographic findings, and short- and long-term mortality.

**Methods:** From the Swedish Coronary Angiography and Angioplasty Registry (SCAAR) and the Register of Information and Knowledge about Swedish Heart Intensive Care Admissions (RIKS-HIA), we obtained and merged data on patients undergoing coronary angiography in Västra Götaland County in western Sweden between January 2005 and May 2013. Short- and long-term mortality in patients with takotsubo ($n = 302$) and patients with ST-elevation myocardial infarction (STEMI, $n = 6595$) were compared by modeling unadjusted and propensity score–adjusted logistic and Cox proportional-hazards regression.

**Results:** The proportion of the patients diagnosed with takotsubo increased from 0.16% in 2005 to 2.2% in 2012 ($P < 0.05$); 14% of these patients also had significant coronary artery disease. Cardiogenic shock developed more frequently in patients with takotsubo than NSTEMI (adjusted OR 3.08, 95%CI 1.80–5.28, $P < 0.001$). Thirty-day mortality was 4.1% and was comparable to STEMI and NSTEMI. The long-term risk of dying in takotsubo (median follow-up 25 months) was also comparable to NSTEMI (adjusted HR 1.01, 95%CI 0.70–1.46, $P = 0.955$) STEMI (adjusted HR 0.83, 95%CI 0.57–1.20, $P = 0.328$).

**Conclusions:** The proportion of acute coronary syndromes attributed to takotsubo syndrome in Western Sweden has increased over the last decade. The prognosis of takotsubo syndrome is poor, with similar early and late mortality as STEMI and NSTEMI.

SWEDHEART – Swedish Web System for Enhancement of Evidence-Based Care in Heart Disease Evaluated According to Recommended Therapies.
Radiofrequency Ablation of Idiopathic Right Ventricular Outflow Tract Tachycardia/Premature Ventricular Contractions: 10 Years Follow-Up

Synne D. Roervik1, Per Ivar Hoff2, Jian Chen3, Eivind Solheim4, Peter Schuster3

1University of Bergen, Norway; 2Haukeland University Hospital, Heart Department, Norway; 3Haukeland University Hospital, Heart Department, University of Bergen, Department of Clinical Science, Norway

Background: Idiopathic ventricular tachycardia (IVT) or frequent premature ventricular contractions (PVC) from the right ventricular outflow tract (RVOT) can safely treated by radiofrequency ablation (RFA). Short-term and intermediate follow-up (FU) has shown good results, but knowledge about long-term effect of RFA is limited.

Methods and Materials: We conducted a follow-up analysis consisting of an in-house questionnaire and qualitative assessment of the patients medical records. Our original sample was 38 patients, but three patients who had structural heart disease or any identifiable predisposing causes for arrhythmia were excluded. The remaining 35 patients consisted of 18 females and 17 males with a mean (range) age of 56 (32–81) years. All of the patients were originally diagnosed with recurrent episodes of symptomatic idiopathic VT (n = 16) or frequent PVC from the RVOT (n = 19), and treated by RFA in the time period from 2002 to 2005. The time from the RFA procedure to the follow-up had a mean (range) of 10.9 (9–12) years.

Results: The main symptoms experienced before the RFA procedure among the patients were palpitations (82.9%) and dizziness (77.1%). These symptoms were significantly reduced in 91.4% of the patients (p < 0.001). The general health perception, classified from 1 (bad) to 4 (excellent), increased significantly from 1 to 3 (p < 0.001) at both short-term and long-term follow up. The patients working capacity, classified from 1 (incapacitated) to 5 (fully employed), had a significant increase from 3 to 5. The share of fully employed patients increased from 25.7% to 57.1%.

Conclusions: RFA is an effective treatment option demonstrated by real long-term follow-up of IVT and PVC. Patients experience a significant reduction in symptoms, and demonstrate a significant improvement in general health perception and working capacity even 10 years after treatment.
**O-33**

**Equipotent Effects of Rosuvastatin, Atorvastatin and Simvastatin on LDL-C Reduction: Results from the Voyager Meta-Analysis**

Björn W. Karlson¹, Michael K. Palmer², Stephen J. Nichols³, Pia Lundman⁴, Philip J. Barter⁵

¹AstraZeneca, Mölndal, and Department of Molecular and Clinical Medicine, Institute of Medicine, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden; ²Manchester Metropolitan University, School of Healthcare Science, Manchester, United Kingdom; ³South Australian Health and Medical Research Institute, University of Adelaide, Adelaide, Australia; ⁴Danderyd Hospital, Karolinska Institute, Stockholm, Sweden; ⁵University of New South Wales, Sydney, Australia

**Objective:** To establish the doses of atorvastatin (ATV), rosuvastatin (RSV) and simvastatin (SIM) which produce a similar LDL-C reduction in patients with hypercholesterolaemia.

**Methods:** The VOYAGER meta-analysis database includes individual patient data on 32,258 patients receiving ATV, RSV and SIM therapy across 37 clinical studies. For this analysis, the least-squares mean percentage change in LDL-C was calculated using 38,052 patient exposures to daily treatment with ATV 10–80 mg, RSV 5–40 mg and SIM 10–80 mg in hypercholesterolaemic patients included in randomised, comparative trials in the VOYAGER database. Linear interpolation between actual adjacent doses was then used to estimate equipotent doses of the three statins.

**Results:** With each doubling of statin dose there was a supplemental 5–6% reduction in LDL-C (figure). RSV 5 mg was found to reduce LDL-C by 39% on average. To achieve similar results with ATV an approximate dose of 15 mg would be required and with SIM an approximate dose of 39 mg would be required. RSV 10 mg reduced LDL-C by 44%; similar reductions could be achieved with approximately ATV 29 mg and SIM 72 mg. RSV 20 mg reduced LDL-C by 49%; similar reductions were observed with approximately ATV 70 mg but were not achievable with the maximum licensed dose of SIM (80 mg). Rosuvastatin 40 mg reduced LDL-C by 55%. Comparable reductions were not achieved with the maximum 80 mg doses of atorvastatin or simvastatin.

**Conclusions:** With regards to reductions in LDL-C, a RSV dose is equivalent to a 3–3.5 times higher mg dose of ATV and to a seven times higher mg dose of SIM. These results show that reductions in LDL-C depend on the statin and its dose.

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**O-34**

**Increased Carotid Plaque Burden in Patients with Acute Coronary Syndrome and Impaired Glucose Metabolism**

Thorarinn Arni Bjarnason¹, Erna Sif Oskarsdottir¹, Steinar Orri Hafthorsson¹, Linda Bjork Kristinsdottir¹, Isleifur Olafsson¹, Sigurdur Sigurdsson², Vilhundur Gudnason², Karl Andersen¹

¹Landspitali – The National University Hospital of Iceland, Iceland; ²Icelandic Heart Association, Iceland

**Background:** Type 2 diabetes (DM2) and prediabetes are established risk factors for atherosclerosis. The aim of this study was to evaluate the atherosclerotic plaque burden in the carotid arteries of patients with acute coronary syndrome and relate it to the presence of newly diagnosed DM2, prediabetes, or normal glucose metabolism (NGM).

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![Fig. 1. (for Abstract O-33).](image-url)
**Methods:** The Study population were patients with Acute Coronary Syndrome (ACS) admitted to a single center coronary care unit with no previous diagnosis of DM2. Glucose metabolism was evaluated with fasting glucose in plasma (FGP), HbA1c and a standard two-hour oral glucose tolerance test (OGTT) with 75 g glucose. Measurements of glucose metabolism were made before hospital discharge and repeated three months later. The highest value from these measurements determined whether patients were classified as having NGM, prediabetes or DM2. Atherosclerotic plaques in bilateral bifurcations of the common carotid and internal carotid arteries were evaluated with a standard ultrasound examination and patients were classified as having normal, minimal, moderate or severe atherosclerotic plaque formation.

**Results:** One hundred and forty one ACS patients (male 79%, mean age 63 years) with no previous diagnosis of DM2 were consecutively included in the study. Patients classified with NGM were 46.8% of the study population, 42.6% with prediabetes and 10.6% with DM2. Atherosclerotic plaques were found in 95%, 98% and 100% of patients with NGM, prediabetes and DM, respectively. The prevalence of moderate or severe carotid plaque was 41%, 59% and 83% in patients with NGM, prediabetes and DM2, respectively. Carotid artery plaque burden was significantly related to impaired glucose metabolism between patients diagnosed with NGM, prediabetes or DM2 (Kruskall–Wallis test, p < 0.01). In multivariate analysis (logistic regression) the odds ratio for patients with newly diagnosed IGT or DM2 having either moderate or severe atherosclerotic plaque in the carotid arteries was 2.56 (95% CI 1.07–6.37) and 5.56 (95% CI 1.50–24.89) respectively.

**Conclusion:** Carotid atherosclerotic plaque is found in nearly all patients with ACS. The severity of plaque burden is directly related to impaired glucose metabolism. Newly diagnosed IGT and DM2 are independent predictors for moderate to severe atherosclerotic plaque in the carotid arteries of patients with ACS.

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**O-36**

**Elevated Highly Sensitive Troponin T – Utility and Differential Diagnosis**

Stefan Thorsson¹,², David O. Arnar¹,², Karl Andersen¹,²

¹University of Iceland, School of Health Sciences, Reykjavik, Iceland; ²Landspitali University Hospital, Reykjavik, Iceland

**Introduction:** Measurements of serum cardiac enzymes are a fundamental part of evaluation of patients with acute chest pain. With the advent of highly sensitive assays, smaller changes in troponin levels are detected than before. However, increased sensitivity comes at the expense of specificity. The aim of this study was to assess the diagnostic accuracy of troponin T (TnT) elevation using a highly sensitive assay (hsTnT).

**Methods:** All hsTnT measurements at our hospital over a 12 month period were gathered along with the final ICD-10 discharge diagnoses. TnT value was defined as abnormal if >15 ng/mL. Sensitivity, specificity as well as positive (PPV) and negative predictive (NPV) values of hsTnT in the diagnosis of MI were calculated. Diagnoses other than MI associated with elevated TnT were also analyzed.

**Results:** hsTnT assays for 7259 patients were included. Of those, 3164 (43.6%) had elevated hsTnT and 495 (15.6%) were diagnosed with myocardial infarction (MI). For the diagnosis of MI, the hsTnT assay had a sensitivity of 0.985 and specificity of 0.603. Respectively, PPV and NPV were 0.156 and 0.998. Using ROC analysis, sensitivity and specificity were highest when elevation of TnT was defined as >78 ng/mL. Chronic ischemic heart disease was the final diagnosis in 21% and a cardiac arrhythmia a likely cause in 19% of patients with elevated TnT. Congestive heart failure, aneurysm, renal failure, pneumonia and tumor growth were also commonly associated with elevated TnT levels.

**Conclusion:** hsTnT assays have excellent sensitivity and negative predictive value in the diagnosis of MI. Specificity is fairly low and positive predictive value is poor. Therefore, MI can accurately be ruled out when troponin levels are normal. However, mildly elevated troponin levels can present a diagnostic challenge. A higher cut-off value might raise specificity without jeopardizing sensitivity.
**P-01**

**The Predictive Role of Circulating Microparticles in Patients with Chronic Heart Failure**

*Alexander E. Berezin*

Internal Medicine Department, State Medical University, Zaporozhye, Ukraine

**Objective:** The aim of the study was to evaluate whether circulating microparticles with apoptotic or non-apoptotic phenotypes are useful for risk assessment of three-year cumulative fatal and non-fatal cardiovascular events in chronic heart failure (CHF) patients.

**Methods:** The incidence of fatal and non-fatal cardiovascular events, as well as the frequency of occurrence of death from any cause in a cohort of 388 patients with CHF was studied prospectively during 3 years of observation. Circulating levels of NT-pro brain natriuretic peptide (NT-pro-BNP), high-sensitivity C-reactive protein (hs-CRP), endothelial apoptotic microparticles (EMPs) were measured at baseline.

**Results:** Median follow-up was of 2.32 years (IQR = 1.8–3.1). During follow-up, 110 cardiovascular events (including 43 fatal cases) were determined. Additionally, 74 subjects were hospitalized repetitively due to worsening CHF and also 16 subjects were readmitted in the hospital due to other cardiovascular reasons. In the univariate logistic regression analysis, the main factors independently related with cumulative end-points were creatinine, fasting glucose, HbA1c, total cholesterol, uric acid various types of EMPs, NT-pro-BNP, hs-CRP, NYHA class, decreased left ventricular ejection fraction (LVEF) less 45%, and type 2 diabetes mellitus. In multivariate model NYHA class, decreased LVEF (less 45%), NT-pro-BNP, hs-CRP, NYHA class, decreased left ventricular ejection fraction (LVEF) less 45%, and type 2 diabetes mellitus remained statistically significant for cumulative end-point. Adding of CD144+/CD31+/annexin V+ EMPs and CD31+/annexin V+ EMPs to the standard ABC model may improve the relative IDI for cumulative end-point by 11.4% and 10.5% respectively.

**Conclusion:** Apoptotic phenotype of circulating microparticles may relate three-year combined clinical outcomes in CHF patients.

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**P-02**

**Heart Rate Variability in Patients with Restless Leg Syndrome**

*Durdane Bekar Aksoy¹, Atac Celik², Kayihan Karaman², Betul Cevik¹, Fatih Altunkas², Arif Arisoy², Ilker Akar³, Ilker Ince³, Koksal Ceyhan²*

¹Gaziosmanpasa University, Faculty of Medicine, Department of Neurology, Tokat, Turkey; ²Gaziosmanpasa University, Faculty of Medicine, Department of Cardiology, Tokat, Turkey; ³Gaziosmanpasa University, Faculty of Medicine, Department of Cardiovascular Surgery, Tokat, Turkey

**Objective:** Restless legs syndrome (RLS) is a movement disorder characterized by an urge to move the legs unpleasantly. Although the underlying mechanism of this disease is still unknown, dysfunction of dopaminergic system is blamed to be one of the possible cause for the syndrome. Heart rate variability (HRV) is used for evaluating changes in cardiac autonomic functions and also used to provide risk stratification in cardiac and non-cardiac diseases. The aim of this study is to evaluate cardiac autonomic functions in patients with RLS.

**Methods:** Thirty-three (mean age 53 ± 8 years) RLS patients and 30 (mean age 57 ± 8 years) control subjects were included to the study. Twenty-four hour ambulatory electrocardiogram recordings were taken using Pathfinder Software Version V8.255 (Reynolds Medical). The time domain parameters of HRV analysis

| Study parameters between the patient and the control groups (for Abstract P-02) |
|---------------------------------|-----------------|-------------------|--------|
|                                | Control group (n = 30) | Patient group (n = 33) | p value |
| Age (years)                     | 57±8             | 54±8              | 0.106  |
| Sex (male)                      | 14 (47)          | 15 (46)           | 0.923  |
| Glucose (mg/dl)                 | 94±14            | 98±11             | 0.302  |
| Creatinine (mg/dl)              | 0.80±0.14        | 0.83±0.16         | 0.395  |
| TSH (μIU/ml)                    | 1.67±0.98        | 1.80±0.95         | 0.591  |
| WBC (×10³/μl)                   | 6.78±1.51        | 7.62±2.42         | 0.109  |
| Hemoglobin (g/dl)               | 12.5±1.3         | 12.9±1.7          | 0.287  |
| Heart rate (beat/min)           | 69±8             | 81±8              | <0.001 |
| pNN50 (%)                       | 10.7 [2.6–17.8]  | 5.9 [1.6–9.7]     | 0.081  |
| RMSSD (ms)                      | 34.2 [21.2–47.4] | 26.9 [17.8–33.7]  | 0.096  |
| SDNN (ms)                       | 100.8±22.9       | 50.6±18.4         | <0.001 |
| SDANN (ms)                      | 113.3±45.6       | 109.1±35.1        | 0.683  |

TSH = Thyroid stimulating hormone; WBC = white blood cell; pNN50 = percentage of differences between adjacent NN intervals that are >50 ms; RMSSD = root mean squared differences of successive RR intervals; SDNN = standard deviation of all normal RR intervals; SDANN = standard deviation of mean of normal RR intervals at each 5 minute segment.

Data are shown as n (%), mean ± SD, and median [interquartile range].
were performed using the Heart Rate Variability Software (version 4.2.0, Norav Medical Ltd, Israel).

**Results:** There were no differences in age, sex, serum glucose, creatinine, thyroid stimulating hormone, white blood cell and hemoglobin levels. Heart rate was significantly higher, SDNN was significantly lower and SDANN and RMSSD were remained unchanged in RLS group (table).

**Conclusions:** Cardiac autonomic functions seemed to be changed in RLS. Further studies are needed in order to explain the underlying mechanism of this disease.

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**P-04**

**Effects of Three Month Nasal Continuous Positive Airway Pressure Treatment on Electrocardiographic, Echocardiographic and Overnight Polysomnographic Parameters in Newly Diagnosed Moderate/Severe Obstructive Sleep Apnea Patients**

Davran Cicek, Serhat Balcaoğlu, Huseyin Lakadamyali, Haldun Muderrisoglu

Baskent University School of Medicine, Turkey

The objective of the study was to determine the effects of nasal continuous positive airway pressure (nCPAP) therapy on left ventricular (LV) function and electrocardiographic parameters in newly diagnosed moderate/severe obstructive sleep apnea (OSA) patients without cardiovascular comorbidities and medical treatments.

We examined 44 patients who underwent overnight polysomnography together with 24-hour Holter electrocardiography, cardiopulmonary exercise testing including heart rate recovery at 1 minute (HRR-1), echocardiography, surface electrocardiography, and those who were diagnosed with moderate/severe OSA apnea – hypopnea index ≥15. After 3 months of nCPAP treatment, the above-mentioned examinations were repeated.

Forty-four patients completed the treatment period. Twelve weeks on effective nCPAP induced a significant increase in the mitral E/A ratio (P = 0.001), as well as reductions in isovolumic relaxation time (P = 0.001) and mitral deceleration time (DT) (P = 0.002). There were no significant differences in LV ejection fraction, LV mass index, and pulsed wave Doppler parameters. Mean heart rate was 79.2 ± 12.5 pulses/minute, maximum P-wave duration 117.5 ± 8.6 ms, P-wave dispersion (PWd) 54.6 ± 40.5 ms, and QT dispersion (QTD) 46.3 ± 7.1 ms, which significantly decreased to 70.4 ± 9.6 pulses/minute (P < 0.001), 111.5 ± 8.7 ms (P < 0.001), 51.6 ± 8.9 ms (P < 0.001), 418.4 ± 31.2 ms (P < 0.001), and 33.8 ± 3.4 ms (P < 0.001), respectively. Exercise capacity at baseline determined as 10.5 ± 2.2 metabolic equivalents (METS) and HRR-1 (20.6 ± 11.7 bpm) significantly increased (12.1 ± 5.6 METS and 27.4 ± 8.6 bpm).

There was no significant difference in aortic root parameters.

Three-month nCPAP therapy significantly increased LV shortening fraction, with no effect on systolic function or aortic root diameters and a positive effect on heart rate, PWd, HRR-1, QTc and QTD time following nCPAP therapy.

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**P-05**

**Metabolomic Characteristics of Arterial Stiffness in Patients with Peripheral Arterial Disease**

Maksim Zagura

Department of Cardiology, University of Tartu, Estonia

**Background:** Arterial stiffness is increasingly recognized as an important determinant of cardiovascular outcome. Metabolomics may facilitate identification of novel low-molecular cardiovascular...
Table 1. Haemodynamic and biochemical characteristics of the study participants (for Abstract P-05)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>PAD patients (n = 42)</th>
<th>Controls (n = 46)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>66±7</td>
<td>66±8</td>
<td>0.78</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>25.9±3.7</td>
<td>25.7±4.7</td>
<td>0.84</td>
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<td>MAP (mm Hg)</td>
<td>103.7±13.1</td>
<td>92.6±6.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>PSBP (mm Hg)</td>
<td>148.8±18.9</td>
<td>126.4±7.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>PDBP (mm Hg)</td>
<td>79.7±9.4</td>
<td>75.2±6.1</td>
<td>0.01</td>
</tr>
<tr>
<td>CSBP (mm Hg)</td>
<td>134.6±17.4</td>
<td>117±9.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>CDBP (mm Hg)</td>
<td>80.6±10</td>
<td>76±6.2</td>
<td>0.01</td>
</tr>
<tr>
<td>Heart rate (beats/min)</td>
<td>63±11</td>
<td>60.7±8.8</td>
<td>0.13</td>
</tr>
<tr>
<td>AIx@75 (%)</td>
<td>26.5±7.1</td>
<td>18.6±6.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>aPWV (m/s)</td>
<td>9.9±1.6</td>
<td>8.5±0.7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>bPWV (m/s)</td>
<td>8.9±0.6</td>
<td>8±6.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Angiographic score</td>
<td>26.5±8.3</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>ABPI</td>
<td>0.4±0.3</td>
<td>1.2±0.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Glucose (mmol/l)</td>
<td>5.7±0.7</td>
<td>5.3±0.4</td>
<td>0.004</td>
</tr>
<tr>
<td>Total cholesterol (mmol/l)</td>
<td>6±1.1</td>
<td>5.5±1.2</td>
<td>0.08</td>
</tr>
<tr>
<td>LDL-cholesterol (mmol/l)</td>
<td>4.2±1.1</td>
<td>3.9±1.2</td>
<td>0.27</td>
</tr>
<tr>
<td>HDL-cholesterol (mmol/l)</td>
<td>1.2±0.3</td>
<td>1.3±0.3</td>
<td>0.36</td>
</tr>
<tr>
<td>Triglycerides (mmol/l)</td>
<td>1.7±0.6</td>
<td>1.2±0.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>hsCRP (mg/l)</td>
<td>2.6 (1.4–5.6)</td>
<td>1 (0.5–1.7)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>eGFR (ml/min/1.73 m²)</td>
<td>97.8±25.9</td>
<td>95.1±18.6</td>
<td>0.68</td>
</tr>
<tr>
<td>oxLDL (μmol/l)</td>
<td>69 (55–98)</td>
<td>41.9 (36–54.4)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

* Indicates medians and interquartile ranges. aPWV and bPWV have been adjusted for MAP.

Table 2. Serum amino acid levels of the study participants (for Abstract P-05)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>PAD patients (n = 42)</th>
<th>Controls (n = 46)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alanine (μmol/l)</td>
<td>156.3±57.2</td>
<td>138±44.4</td>
<td>0.11</td>
</tr>
<tr>
<td>Arginine (μmol/l)</td>
<td>164.4±75</td>
<td>157.3±41.3</td>
<td>0.57</td>
</tr>
<tr>
<td>Asparagine (μmol/l)</td>
<td>100.9±48.4</td>
<td>96.4±24.7</td>
<td>0.58</td>
</tr>
<tr>
<td>Aspartate (μmol/l)</td>
<td>319.9±353.3</td>
<td>21.1±21.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Citrulline (μmol/l)</td>
<td>183.75</td>
<td>193±64</td>
<td>0.29</td>
</tr>
<tr>
<td>Cysteine (μmol/l)</td>
<td>8.8±9.2</td>
<td>15.3±6.8</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Glutamine (μmol/l)</td>
<td>670.4±253.6</td>
<td>643±187.2</td>
<td>0.56</td>
</tr>
<tr>
<td>Glutamate (μmol/l)</td>
<td>613.5±631.7</td>
<td>141±127.2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Glycine (μmol/l)</td>
<td>404.6±149.2</td>
<td>320±109.3</td>
<td>0.003</td>
</tr>
<tr>
<td>Histidine (μmol/l)</td>
<td>180.5±48.9</td>
<td>156±36.1</td>
<td>0.01</td>
</tr>
<tr>
<td>Hydroxyproline (μmol/l)</td>
<td>76±25.1</td>
<td>69.7±19.5</td>
<td>0.19</td>
</tr>
<tr>
<td>Leucine (μmol/l)</td>
<td>154.4±38.3</td>
<td>131.4±33.7</td>
<td>0.004</td>
</tr>
<tr>
<td>Lysine (μmol/l)</td>
<td>409.2±122.1</td>
<td>371.9±95.8</td>
<td>0.11</td>
</tr>
<tr>
<td>Methionine (μmol/l)</td>
<td>51.9±13</td>
<td>42.6±11.8</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Ornithine (μmol/l)</td>
<td>297.9±103.7</td>
<td>208±57</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Phenylalanine (μmol/l)</td>
<td>141.1 (98.8–181)</td>
<td>108 (95.4–121)</td>
<td>0.004</td>
</tr>
<tr>
<td>Proline (μmol/l)</td>
<td>1,268.5±399.4</td>
<td>1,123±381</td>
<td>0.08</td>
</tr>
<tr>
<td>Serine (μmol/l)</td>
<td>249 (183–291)</td>
<td>175.5 (152–223)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Threonine (μmol/l)</td>
<td>22.1±33.7</td>
<td>10.8±16.7</td>
<td>0.047</td>
</tr>
<tr>
<td>Tryptophan (μmol/l)</td>
<td>26.3±10.9</td>
<td>26.1±8.6</td>
<td>0.91</td>
</tr>
<tr>
<td>Tyrosine (μmol/l)</td>
<td>33.1 (23–37)</td>
<td>24.7 (20–31)</td>
<td>0.01</td>
</tr>
<tr>
<td>Valine (μmol/l)</td>
<td>102.5 (87.8–135)</td>
<td>96 (84.4–109)</td>
<td>0.12</td>
</tr>
</tbody>
</table>

* Indicates medians and interquartile ranges.
risk factors. The aim of the current study was to compare metabolic signatures and functional-biochemical characteristics of patients with peripheral arterial disease (PAD) and clinically healthy subjects.

**Methods:** We studied 42 men with symptomatic PAD (aged 66 ± 7 years) and 46 healthy men (aged 66 ± 8 years). Aortic pulse wave velocity (aPWV) was assessed by applanation tonometry using the Sphygmocor device. Metabolic profiling was performed with high-performance liquid chromatography and mass-spectrometry. Serum oxidized low-density lipoprotein (oxLDL) level was measured by ELISA.

**Results:** The aPWV as well as serum levels of lactate, free carnitine and 11 amino acids including tyrosine were higher among the patients with PAD. In contrast, serum levels of pyruvate, citrate, alpha-ketoglutarate, aconitate and cysteine were higher in the control group. In multiple regression models, aortic PWV was independently determined by log-tyrosine and log-oxLDL in the patients ($R^2=0.61; p < 0.001$) and by age, log-pyruvate and log-oxLDL in the controls ($R^2=0.52; p < 0.001$).

**Conclusion:** Our study describes for the first time significant differences in metabolomic signature of patients with advanced atherosclerosis compared to clinically healthy controls. The aPWV is independently associated with serum levels of tyrosine and oxLDL in the patients ($R^2=0.61; p < 0.001$) and by age, log-pyruvate and log-oxLDL in the controls ($R^2=0.52; p < 0.001$).

**Fig. 1.** Relationship between tyrosine and the tertiles of aPWV and angiographic score (a) as well as relationship between phenylalanine and angiographic score (b). The aPWV has been adjusted for MAP. aPWV = Aortic pulse wave velocity; AU = arbitrary units; MAP = mean arterial pressure (for Abstract P-05).
The distribution of LDL-C reduction with Atorvastatin, Rosuvastatin and Simvastatin: A VOYAGER Meta-Analysis

Björn W. Karlson, Michael K. Palmer, Stephen J. Nicholls, Pia Lundman, Philip J. Barter

AstraZeneca, Mölndal, and Department of Molecular and Clinical Medicine, Institute of Medicine, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden; Manchester Metropolitan University, School of Healthcare Science, Manchester, United Kingdom; South Australian Health and Medical Research Institute, University of Adelaide, Adelaide, Australia; Danderyd Hospital, Karolinska Institute, Stockholm, Sweden; University of New South Wales, Sydney, Australia

Objective: Unlike other dyslipidaemia treatment guidelines, the 2013 ACC/AHA guideline recommends low-, medium- or high-intensity statins according to an individual patient’s cardiovascular risk. Although this approach simplifies treatment decisions for clinicians, it may not always be clear if individual patients are achieving adequate LDL-C reductions and therefore if they require treatment modification. The aim of this study was to use data from the VOYAGER meta-analysis database to investigate the distribution of LDL-C response with three commonly used statins.

Table 3. Acylcarnitines, hydroxy acids and other metabolic parameters of the study participants (for Abstract P-05)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>PAD patients (n = 42)</th>
<th>Controls (n = 46)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aconitate (μmol/l)</td>
<td>4.5 (3.3–6.9)</td>
<td>6.8 (5.4–8.8)</td>
<td>0.003</td>
</tr>
<tr>
<td>Alpha-ketoglutarate (μmol/l)</td>
<td>6.2 (2.1–8.6)</td>
<td>8.8 (6.8–10)</td>
<td>0.002</td>
</tr>
<tr>
<td>Beta-hydroxybutyrate (μmol/l)</td>
<td>1.2 (0.6–6.4)</td>
<td>2.1 (1.3–6.8)</td>
<td>0.26</td>
</tr>
<tr>
<td>Citrate (μmol/l)</td>
<td>286.1 (233.3–426)</td>
<td>442.1 (393–542)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Citrulline (μmol/l)</td>
<td>183.8±75.4</td>
<td>192.9±64.2</td>
<td>0.54</td>
</tr>
<tr>
<td>7-Ketocholesterol (μmol/l)</td>
<td>2.3 (1.8–24.2)</td>
<td>2.1 (1.8–2.6)</td>
<td>0.046</td>
</tr>
<tr>
<td>Lactate (μmol/l)</td>
<td>823 (700.5–963.5)</td>
<td>571.3 (459–769)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Malonate (μmol/l)</td>
<td>32.8 (24.8–49.3)</td>
<td>1.7 (0.9–5.1)</td>
<td>0.15</td>
</tr>
<tr>
<td>Oxaloacetate (μmol/l)</td>
<td>35.6±23.3</td>
<td>33.3±27.2</td>
<td>0.67</td>
</tr>
<tr>
<td>Pyruvate (μmol/l)</td>
<td>40.6 (25.1–52.6)</td>
<td>45.8 (35.9–65.3)</td>
<td>0.02</td>
</tr>
<tr>
<td>Succinate (μmol/l)</td>
<td>14.7 (11.1–17.9)</td>
<td>14.5 (10.8–16.6)</td>
<td>0.43</td>
</tr>
<tr>
<td>Free carnitine (C0) (μmol/l)</td>
<td>40.1 (31.5–50.1)</td>
<td>28.9 (21.5–38.1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Acetylcarnitine (C2) (μmol/l)</td>
<td>14.5 (12.5–19.3)</td>
<td>17.2 (11.3–22.6)</td>
<td>0.47</td>
</tr>
<tr>
<td>Propionylcarnitine (C3) (μmol/l)</td>
<td>0 (0–3.3)</td>
<td>0 (0–1.8)</td>
<td>0.68</td>
</tr>
<tr>
<td>Butyrylcarnitine (C4) (μmol/l)</td>
<td>2.5 (0.1–7.1)</td>
<td>1.7 (0.1–5.9)</td>
<td>0.13</td>
</tr>
<tr>
<td>Pentanoylcarnitine (C5) (μmol/l)</td>
<td>0.7 (0–3.3)</td>
<td>0.1 (0–3)</td>
<td>0.79</td>
</tr>
<tr>
<td>Hexanoylcarnitine (C6) (μmol/l)</td>
<td>0.4 (0–3.1)</td>
<td>0.2 (0–3.3)</td>
<td>0.77</td>
</tr>
<tr>
<td>Octanoylcarnitine (C8) (μmol/l)</td>
<td>2.0 (0–3.5)</td>
<td>2.5 (0–5.6)</td>
<td>0.46</td>
</tr>
<tr>
<td>Decanoylcarnitine (C10) (μmol/l)</td>
<td>2.9 (0.9–4.9)</td>
<td>3.4 (0–6.5)</td>
<td>0.55</td>
</tr>
<tr>
<td>Tetradecanoylcarnitine (C14) (μmol/l)</td>
<td>0.5 (0.2–1)</td>
<td>0.5 (0.1–0.9)</td>
<td>0.46</td>
</tr>
<tr>
<td>Octadecanoylcarnitine (C18) (μmol/l)</td>
<td>0.1 (0–0.3)</td>
<td>0 (0–0.2)</td>
<td>0.16</td>
</tr>
</tbody>
</table>

a Indicates medians and interquartile ranges.

Table 4. Multiple regression analysis for PAD patients and the control subjects with aPWV adjusted for MAP as the dependent variable (for Abstract P-05)

<table>
<thead>
<tr>
<th>Regression coefficient</th>
<th>Standard error</th>
<th>p value</th>
</tr>
</thead>
</table>
PATIENTS: Log-tyrosine | 3.61 | 0.8 | <0.001 |
| Log-oxLDL             | 3.68 | 1.13 | 0.002 |
| Age (years)           | 0.05 | 0.03 | 0.09 |

CONTROL: Age (years) | 0.04 | 0.01 | <0.001 |
| Log-pyruvate         | 1.48 | 0.47 | 0.003 |
| Log-oxLDL            | 1.52 | 0.56 | 0.01 |

a R² value = 0.61; p < 0.001; | n = 42; b R² value = 0.52; p < 0.001; n = 46.

Aortic pulse wave velocity; MAP = mean arterial pressure; oxLDL = oxidized low-density lipoprotein; PAD = peripheral arterial disease.
Methods: The VOYAGER meta-analysis database includes 38,052 patient exposures to individual doses of atorvastatin 10–80 mg, rosuvastatin 5–40 mg and simvastatin 10–80 mg treated in 37 randomised trials. Individual patient data was used to calculate the LDL-C reduction in response to a particular statin and dose. The percentage change in LDL-C was plotted in 10% increments. The percentage of patients experiencing a suboptimal response was also determined. An LDL-C reduction of <15% was determined as suboptimal, in the absence of a standard definition.

Results: Atorvastatin 10–80 mg reduced LDL-C by a mean (SD) of 36% (16%) to 49% (17%); rosuvastatin 5–40 mg by 41% (13%) to 56% (15%); and simvastatin 10–80 mg by 28% (14%) to 46% (13%). The distribution of LDL-C reduction is shown in the figure; SDs for LDL-C reduction for all statins and doses ranged from 12.8–17.9%. The percentage of patients achieving a suboptimal response (<15% LDL-C reduction) to individual statin doses is also shown in the figure. The percentage of patients experiencing a suboptimal response ranged from 2.8–12.7%.

Conclusion: The distribution of LDL-C response observed with different doses of the different statins highlights the need for clinicians to be aware of possible poor responses to statin treatment in individual patients.

Fig. 1. (for Abstract P-06).
Effect of Normobaric Intermittent Hypoxic Therapy on the Impaired Heart Rate Variability in Patients with High Cardiovascular Risk

Svetlana Pavlovna Solovey1, Irena Karpova1, Igor Krivorot2
1Cardiologist, Belarus; 2Science-Practical Center Cardiology, Minsk, Belarus

Objective: The objective of this study was to evaluate the influence of normobaric intermittent hypoxic adaptation on the impaired heart rate variability (HRV) in patients (pts) with chronic coronary artery disease and high cardiovascular risk.

Methods: 25 pts. (23 males and 2 females) aged 57.9 ± 1.4 years (yrs) with stable angina FC II-III in 6 months after myocardial infarction (MI) (Group I) and 40 pts (21 males and 19 females) aged 60.6 ± 0.8 yrs with angina FC II-III and diabetes mellitus type 2 (DM2) (Group II) were included into this study. Continuous 24-hour ECG recordings were made using Philips Zymed Holter ECG recorder and 5-minute ECG recordings were performed after treatment and after 6 months.

Results: The hypoxic therapy contributed to the improvement of total HRV. In pts with Igr and Igr the increase of SDNN, CV and TI was observed (p < 0.05). Cardiac vagal-sympathetic activity also increased in pts with coronary heart disease and high cardiovascular risk.

Conclusion: Normobaric intermittent hypoxic therapy contributes to the improvement of HRV, brings mild antiarrhythmic influence in pts with coronary heart disease and high cardiovascular risk.
sis Society Consensus Panel as a TG level of 2.0–10.0 mmol/l, the primary treatment goal is low-density lipoprotein cholesterol (LDL-C) however, a TG level <1.7 mmol/l is recommended as desirable. The objective of this study was to analyse individual patient data from the VOYAGER meta-analysis database of 32,258 patients from 37 studies to determine LDL-C and TG reduction in patients with baseline TG ≥2.0 mmol/l.

Methods: The least-squares mean (LSM) % change from baseline in LDL-C and TG was evaluated for 15,800 patient exposures to atorvastatin 10–80 mg, rosuvastatin 5–40 mg and simvastatin 10–80 mg. Comparisons were made using mixed-effect models with data only from studies directly comparing treatments by randomised design.

Results: LSM % LDL-C reductions ranged from −26.9% to −55.9%. Rosuvastatin 10–40 mg resulted in significantly greater LDL-C reductions than equal or double dose of atorvastatin and simvastatin (all p < 0.05). LSM % TG reductions ranged from −15.1% to −31.3%. Compared with atorvastatin, rosuvastatin 10 mg produced a significantly greater (p < 0.05) reduction in TG than atorvastatin 10 mg and reductions with rosuvastatin 20 and 40 mg were similar to equal doses of atorvastatin. Compared with simvastatin, doses of rosuvastatin 10–40 mg resulted in significantly greater (p < 0.05) reductions in TG than equal or double doses of simvastatin. LSM % reductions in LDL-C (a) and TG (b) are shown in the figure.

Conclusions: In patients with hypertriglyceridaemia, reductions in LDL-C were substantial and dependent on the choice and dose of statin. Reductions in TG were numerically less than for LDL-C, and therefore additional TG-lowering therapy may be required to further reduce residual cardiovascular risk.

P-09
Markers of Renal Dysfunction in Subjects with Chronic Heart Failure

Sviatiana Matskevich, Olga Barbuk, Margarita Belskaya, Tatyana Serchenya
Science-Practical Center Cardiology, Minsk, Belarus

Objective: Define and assess the significance of markers of renal insufficiency in chronic heart failure (CHF).

Materials and Methods: 50 patients (mean-age 61.7 ± 7.54 y.o.) with post-infarction cardiocirculatory complication of FC NYHA III CHF were examined. Patients with renal dysfunctions and/or endocrine disorders were not included in the study. All subjects underwent a common examination. Heart US study was performed using Vivid–7 device (GE, USA-Belgium). Biochemistry tests were performed using Olympus device; cystatin C levels were measured by Randox test kits (normal 0.57–1.05 mg/l), creatinine concentration was measured using Beckman kits (normal 44.0–110.0 mmol/l), and NT-proBNP was measured using mini Vidas device (normal within 125 pg/ml). Glomerular filtration rate (GFR) utilizing creatinine level (ml/min/1.73 m2) was estimated by Cockcroft-Gault method, and GFR was measured utilizing cystatin C as follows: GFR (ml/min/1.73 m2) = −4.32+80.35/ cystatin C. Olympus device was used to assess microalbuminuria (MAU), and ELISA test utilizing IFA-A1M monoclonal antibody was used to assess urinal alpha-1 microglobulin (A1M). The value of A1M above 12 mg/l was considered abnormal.

Results: Values of NT-proBNP averaged to 375.8 ± 28.4 pg/ml, and LVEF – 47.21 ± 7.12%. Mean values of creatinine and cystatin C did not exceed abnormal values which were 98.8 ± 12.21 mmol/l and 0.96 ± 0.14 mg/l, respectively. However, high level of cystatin C was seen 1.5 times more (p < 0.01) compared to high creatinine. Mean GFR utilizing creatinine and cystatin C were above normal and made 80.4 ± 11.4 and 81.7 ± 10.8 ml/min/1.73 m2, respectively. Moderate reduction in GFR utilizing cystatine C (GFR 30–59 ml/min/1.73 m2) was seen in 10%, and mild reduction (GFR 60–89 ml/min/1.73 m2) was shown in 56% of patients. Thus, most of the patients with FC III CHF (66%) had mild-to-moderate glomerular filtration rate changes. Higher urinal A1M was defined to be in 14% of patients, MAU was seen in 16% of cases. A direct correlation between MAU and A1M (r = 0.50, p < 0.01), LVEF and GFR utilizing cystatin C (r = 0.51, p < 0.01), and negative correlation between LVEF and cystatin C (r = −0.51, p < 0.01) were obvious.

Conclusion: Thus, most of patients with FC III CHF showed signs of renal impairment in absence of primary renal disorder. These changes suggest the association between renal impairment and decreased cardiac pump function, and CHF severity. It becomes evident that cystatin C, microalbuminuria and alpha-1 microglobulin can be considered as early markers of renal disorder in the setting of CHF, and renal disorder itself can be a factor predisposing to CHF progression.

P-10
Modeling of the Operational Risk in Patients with Congenital Heart Diseases

Inkar Sagatov
Kazakh Medical University of Continuous Education, Kazakhstan

Objectives: to use the Aristotle score in patients with congenital heart diseases (CHD) and estimate the received results.

Methods: Before surgery, 126 patients with CHD were examined during inpatient treatment in the National Scientific Center of Surgery named after A.N. Syzganov (the clinical base of KazMUCE) in 2011–2014.

The average age of patients with CHD at the time of surgery was 15.0 ± 11.7 (0–54) years. There were more female patients (51.6%). Generally these were patients with diverse variants of septal defects, rare – with Tetralogy of Fallot, partial anomalous venous return, complete and incomplete balanced forms of AVSD, congenital mitral valve insufficiency, obstructive defects at the level of valves and outflow tracts of the ventricles.

Results: The average surgical risk in patients with CHD according to the Aristotle score was 6.3 ± 3.3 (Basic score). This corresponded to the second complexity level. The minimum value was 3.0 and the maximum value – 21.5.

Complicated postoperative period was noted in 26 patients: brain edema in 2 patients, bleeding in early postoperative period in 9 patients, complete AV block in 6 patients, respiratory insufficiency in 4 patients, acute heart failure in 4 patients, mediastinitis in 1 patient. The surgical risk according to the Aristotle score in patients with CHD and complicated postoperative course was
Conclusions: The Aristotle score is informative enough for predicting the postoperative complications in patients with CHD.

P-11
Case Presentation of the First Lung Transplantation on a Latvian Patient with Idiopathic Pulmonary Arterial Hypertension
Andris Skride1, Ainars Rudzitis2, Krista Lesina3, Kristaps Sablinskis4, Alberts Belovs4
1Pauls Stradins Clinical University Hospital, Latvian Cardiology Center, Riga Stradins University, Latvia; 2Pauls Stradins Clinical University Hospital, Latvian Cardiology Center, Latvia; 3Riga East University Hospital, Riga Stradins University, Latvia; 4Riga Stradins University, Latvia

Background: Nowadays, lung transplantation is a generally accepted therapy for patients with a wide range of severe lung disorders who are failing maximal medical therapy, or for whom no effective medical therapy exists.

Objective: The aim of the study is to demonstrate the first successful double-lung transplant (DLT) on a Latvian patient and to examine the management of postoperative complications and care.

Methods: Retrospective analysis of perioperative procedures, complications and care of lung transplant patient with idiopathic pulmonary arterial hypertension (IPAH).

Results: A 32-year old female with diagnosis of IPAH and Swyer syndrome underwent DLT surgery under extracorporeal membrane oxygenation (ECMO) support on April 15th 2014 in Vienna General Hospital, Austria. The diagnosis of IPAH was confirmed in January 2011. The patient was put on the active waiting list of Eurotransplant on February 24th 2014. Before the transplantation, patient’s functional status rapidly deteriorated despite maximal symptomatic and pathogenetic therapy: 6-minute walk test (6MWT) result in January 2011 was 380 m, in December 2013 it was only 26 m. ECMO support was received for 3 days postoperatively. Patient developed postoperative psychosis, which resolved in approximately six days. Shortly after surgery an intermittent hemofiltration was necessary due to an acute kidney failure. The patient was discharged on May 21st in good general condition. In October 2014 6MWT result was more than 600 m.

Conclusions: There is strong evidence supporting quality of life and survival benefit for lung transplant recipients. Currently in Latvia there is no possibility to perform DLT, therefore current case sets a good example in physician collaboration between Latvia and Austria. There should be a discussion in Latvian medical community, whether to create a lung transplant center in Latvia or to cooperate with Estonia and Lithuania. Meanwhile it would be necessary to create a national lung transplant patients registry.

P-12
Gender-Specific Differences in Genotype Distribution of ADRB1, ADRB2, ACE, AGT, AGTR1, CYP11B2 & CMA1 Genes in Patients with Hypertrophic Cardiomyopathy
Svetlana Komissarova
RSPC Cardiology, Belarus

Objectives: The most common reason for the development of hypertrophic cardiomyopathy (HCM) is a mutation occurring in genes encoding the synthesis of myocardial proteins. Phenotypic realization of these mutations depends considerably on the functioning of sympathoadrenal and renin-angioten-sin-aldosterone systems. Protein activity of these systems is determined primarily by the genes that encode them. Results obtained from population-based studies suggest that the incidence of HCM represents 0.2%, and, moreover, males show the disease evidently more often compared to women. Due to this, the objective of the present study was to assess the impact of polymorphisms of genes coding proteins of sympathoadrenal (SAS) (ADRB1 & ADRB2) and renin-angiotensin-aldosterone systems (RAAS) (ACE, AGTR1, CYP11B2, AGT, CMA1) on the realization of phenotypic HCM manifestations considering the gender of patients.

Materials and Methods: The study included 285 patients with diagnosed HCM (98 females and 187 males, mean-age 46.0 ± 12.9) and 276 subjects with no phenotypic signs of the disease (103 females and 173 males). The PCR and RFLP methods studied polymorphisms of renin-angiotensin-aldosterone system genes: AGT (T174M), AGTR1 (1166A>C), CMA1 (–1903A>G), ACE (I/D polymorphism) CYP11B2 (–344C>T), as well as genes belonging to sympathoadrenal system: ADRB1 (Ser49Gly, Arg389Gly), and ADRB2 (Arg16Gly, Gln27Glu).

Results: Gender-specific discrepancies were found in distribution of polymorphic variants of ACE, CYP11B2, CMA1 gene, coding RAAS proteins. The HCM males showed D allele of ACE gene evidently more often, and 1 allele was observed less compared to controls (OR = 1.41 and OR = 0.71, χ2=5.16, p = 0.023). The number of female patients with TT genotype of CYP11B2 gene and with AA genotype of CMA1 was statistically larger than in controls (OR = 0.47, p = 0.023 and OR = 0.50, p = 0.031). The effect of polymorphisms of genes coding SAS proteins on the realization of HCM phenotypic manifestations was found not to depend on a patient’s sex.

Conclusions: Results of this study support the fact that the realization of HCM phenotypic signs together with the mutations of sarcomeric proteins involves modifier genes, but their significance is determined by the patient’s sex.
Prehypertension and Hypertension in Belarusian Urban Population

Vladislav Podpalov1, A. Deen2, O. Zhurova1, N. Balashenko1, N. Prokoshina1, O. Podpalova1

1Vitebsk State Medical University, Vitebsk, Belarus; 2National Research Center for Preventive Medicine, Moscow, Russia

Objectives: To analyze the prevalence of preHypertension (preHT), Hypertension (HT) and associated risk factors in Belarusian urban population in epidemiologic study.

Methods: A cross-sectional analysis of 3399 individuals (1884 men and 1545 women) living in several Vitebsk areas was conducted in 2007–2008. PreHT is defined according to the JNC-7 (2003) and HT is defined according to the WHO/ISH (1999). The survey included: standard cardiologic questionnaires, anthropometric and blood pressure measurements, electrocardiography, biochemical analyses of blood and urine.

Results: Men and women were of similar age. The following data were received: preHT frequency was 34.3% (39.9% in men vs. 29.8% in women, p < 0.001), HT was 40.3% (42.2% in men vs. 38.7% in women, p > 0.05). 75% of persons were aware of their HT. 53.3% of hypertensives were taking antihypertensive drugs (35.9% patients did it regularly) and only 9.3% of all hypertensives had blood pressure <140/90 mm HG. It was found out that in men after adjustment for age preHT prevalence was associated with body mass index (p < 0.001) and alcohol abuse (p < 0.1). And in women it was associated with body mass index (p < 0.001), family history of premature cardiovascular disease (p < 0.001) and heart rate (p < 0.001). HT prevalence in men adjusted for age was associated with body mass index (p < 0.001), family history of premature cardiovascular disease (p < 0.001) and heart rate (p < 0.001), alcohol abuse (p < 0.001), C-reactive protein (p < 0.01), low physical activity (p < 0.05). And in women it was associated with body mass index (p < 0.001), family history of premature cardiovascular disease (p < 0.001), heart rate (p < 0.001), alcohol abuse (p < 0.001), C-reactive protein (p < 0.01), low physical activity (p < 0.05), total cholesterol (p < 0.05), smoking in the past and present (p < 0.05), university education (p < 0.1).

Conclusions: Epidemiology research showed the prevalence of preHT, HT and cardiovascular risk factors in urban unorganized population of the Republic of Belarus. That probably explains the high death rate from cardiovascular diseases.

Improved Treatment and Prognosis after Myocardial Infarction in Estonia between 2001 and 2011

Aet Saar1, Toomas Marandi2, Mai Blöndal3, Tiia Ainla4, Krista Fischer5, Jaan Eha5

1Department of Cardiology, University of Tartu, Tartu, Estonia; 2Centre of Cardiology, North Estonia Medical Centre, Tallinn, Estonia, Department of Cardiology, University of Tartu, Tartu, Estonia, Quality Department, North Estonia Medical Centre, Tallinn, Estonia; 3Centre of Cardiology, North Estonia Medical Centre, Tallinn, Estonia, Department of Cardiology, University of Tartu, Tartu, Estonia; 4Estonian Genome Centre, University of Tartu, Tartu, Estonia; 5Heart Clinic, Tartu University Hospital, Tartu, Estonia, Department of Cardiology, University of Tartu, Tartu, Estonia

Background: In Estonia death rates due to coronary heart disease remain among the highest in Europe. During the last decade much effort has been made to improve the management of acute myocardial infarction (AMI) by emphasizing the importance of timely access to reperfusion and revascularization. Three consecutive retrospective studies in years 2001, 2007 and 2011 were conducted to monitor the progress and highlight shortcomings. Report comparing data from 2001 and 2007 described more frequent invasive diagnostics and treatment but failed to show better survival.

Purpose: The aim of the paper is to describe differences in management of AMI patients during the period 2001–2011 and investigate if improved invasive treatment has resulted in better prognosis.

Methods: The study included a random sample of all AMI patients treated in Estonian hospitals (a third of annual cases) in 2001, 2007 and 2011. The list of cases was obtained from the database of Estonian Health Insurance Fund. Data was collected retro-

| Table 1. Treatment and mortality of Estonian AMI patients in years 2001, 2007 and 2011 (for Abstract P-14) |
|-------------------------------------------------|---------------------------------|---------------------------------|---------------------------------|------------------|
| Treatment and mortality of Estonian AMI patients | 2001 (n = 423) | 2007 (n = 687) | 2011 (n = 665) | p value |
| Cardiac catheterization, % | 17.7 | 40.9 | 46.8 | <0.001 |
| PCI, % | 11.1 | 31.4 | 38.6 | <0.001 |
| CABG, % | 2.6 | 1.7 | 2.7 | 0.90 |
| Thrombolysis for STEMI, % | 39.7 | 21.6 | 15.0 | <0.001 |
| Primary PCI for STEMI, % | 3.5 | 26.5 | 35.5 | <0.001 |
| Death in 1-year, % | 31.0 | 30.0 | 21.8 | 0.014* |
| Death in 30-days, % | 18.9 | 18.0 | 12.8 | 0.047* |

* Adjusted for age, sex, diabetes, hypertension, dyslipidemia, previous AMI, chronic heart failure.

PCI = Percutaneous coronary intervention; STEMI = ST segment elevation myocardial infarction; CABG = coronary artery bypass grafting.
spectives from patient records by experts according to the study form. Statistical analysis was performed using the ‘R’ software.

Results: The total of 423, 687 and 665 patients in years 2001, 2007 and 2011, respectively, were included in the study. The proportion of patients who underwent coronary angiography and revascularization increased significantly. 30-day mortality decreased by 6.1% and 1-year mortality by 9.2% (table 1). The reduction in mortality remained significant after adjusting for the baseline characteristics.

Conclusion: Efforts to improve AMI management have resulted in more extensive use of revascularization. Short- and long-term mortality rates are declining which is at least partly related to the successful implementation of evidence-based treatment regimes. Next steps should focus on raising public awareness of early recognition of AMI symptoms to provide timely revascularization for more patients.

P-15
Beneficial Effects of Angiotensin II Receptor Blocker Telmisartan on Aortic Stiffening and Remodelling in STZ-Diabetic Rats

Erik Salum, Mark Butlin, Jaak Kals, Mihkel Zilmer, Jaan Eha, Alberto Avolio, Andres Arend, Marina Aunapuu, Pritt Kampus
Department of Cardiology, University of Tartu, Estonia

Background: Prevention or attenuation of diabetic vascular complications includes anti-hypertensive treatment with renin-angiotensin system inhibitors on account of their protective effects beyond blood pressure reduction. The present study aimed to investigate the effects of telmisartan, an angiotensin II type 1 receptor blocker (ARB), on blood pressure, aortic stiffening, and aortic remodelling in experimental type 1 diabetes in rats.

Methods: Diabetes was induced by streptozotocin (STZ) (65 mg/kg) in male Wistar rats. One diabetic group was treated for 10 weeks with telmisartan (10 mg/kg/day p.o). Pressure-independent aortic pulse wave velocity (PWV) was measured under anaesthesia after intravenous infusion of phenylephrine and nitroglycerine. Aortic wall samples were collected for histomorphometrical analysis.

Results: Untreated diabetes imposed differential effects on aortic stiffening, as demonstrated by increased isobaric PWV over a range of high blood pressures, but not at lower blood pressures (figure). This was associated with loss and disruption of elastin fibres and an increase in collagen fibres in the aortic media. Treatment with telmisartan decreased resting blood pressure, reduced aortic stiffness, and partially prevented the degradation of elastin network within the aortic wall.

Conclusions: Telmisartan improved the structural and functional indices of aortic stiffening induced by untreated STZ-diabetic rats, demonstrating the importance of ARBs in the therapeutic approach to diabetic vascular complications.

P-16
Arterial Stiffness Assessment for Early Diagnosis of Atherosclerosis

Marika Pikka1,2, Margus Viigimaa2,3, Kristjan Pilt4, Kristina Kööts4, Kalju Meigas4

1North Estonia Medical Centre, Laboratory; 2Tallinn University of Technology, Technomedicum of TUT, Institute of Cardiovascular Medicine, Estonia; 3North Estonia Medical Centre, Centre of Cardiology, Estonia; 4Tallinn University of Technology, Technomedicum of TUT, Institute of Biomedical Engineering, Estonia

Introduction: In recent years there has been increased interest in the study of the stiffness of large arteries in the development of cardiovascular diseases. Many well-known risk factors for cardiovascular complications are brought into effect through changes of the properties of the arterial wall. The main parameters to assess the elastic properties of the peripheral arteries and aorta are aortic pulse wave velocity (PWV) and augmentation index (Alxao).

The aim of our study was to evaluate arterial stiffness in study subjects and its correlation with the conventional risk factors for cardiovascular diseases according to the SCORE scale.

Methods: In this study 75 subjects were investigated: 42 apparently healthy subjects, 18 patients with metabolic syndrome and 15 diabetic patients. Information on medical history, present condition, demographic characteristics, risk factors, smoking, and medication, were investigated using a structured questionnaire. Applying the SCORE scale, all subjects were classified into risk levels. Arterial stiffness parameters were measured with Arteriograph (TensioMed, Hungary).

Results: Age showed positive correlation with both Alxao (r = 0.52; p < 0.001) and PWV (r = 0.41; p < 0.001). Arterial hypertension is an independent factor in increasing arterial stiffness. A correlation was shown between the increase SBP with Alxao (r = 0.54; p < 0.001) and PWV (r = 0.55; p < 0.001). The positive correlations between SCORE with Alxao (r = 0.43; p < 0.001) and SCORE with PWV (r = 0.39; p < 0.005).

Conclusions: Our results suggest that among the CVD risk factors the most important determinants of arterial stiffness are hypertension and age. Positive correlations of arterial stiffness and SCORE may indicate the increased risk of cardiovascular events with an increase in arterial stiffness. Studying the charac-
Abstracts

P-17
Chromogranin A Expression in Right Atrial Tissue in Patients with Severe Aortic Valve Stenosis
Edite Kulmane, Mara Pilmane, Romans Lacis
Pauls Stradins Clinical University Hospital, Latvia

Objective: Chromogranin A is a neuroendocrine system marker and might represent overall sympathetic activity. Elevated serum chromogranin A levels are associated with risk of clinical deterioration and death with acute coronary syndromes or chronic heart failure.

In this study we examined whether chromogranin A is produced in right atrial tissue in patients with severe aortic valve stenosis and angiographically confirmed absence of coronary heart disease.

Methods: In our hospital, right atrial tissue fragments were taken from 5 patients with severe aortic valve stenosis during elective aortic valve replacement surgery. The mean age was (mean ± SD) 73.8 ± 5.0 years (range 69–83 years) and there were 4 female patients. Tissues were processed for chromogranin A by means of biotin-streptavidin immunohistochemistry.

Results: Echocardiographically measured mean aortic valve area was 0.7 cm² and mean pressure gradient through aortic valve was 53 ± 7 mm HG. In all patients left ventricular ejection fraction was more than 55% and right atrial area less than 18 cm².

In one case we didn’t find any signs of chromogranin A in right atrial tissues. There were some blood vessels which few endothelial cells contained chromogranin in the other four specimens. In three cases factor positive cells particularly were pronounced in epicardium and endocardium, especially in regions with cube shaped epithelial cells.

Conclusions: Chromogranin A is characteristic factor in right atrial tissue (endothelium, endocardium, epicardium) of patients with severe aortic valve stenosis. Presence of factor proves idea about possibility of human heart cells to change a phenotype and produce neuroendocrine hormones for tissue remodeling.

P-18
Cardiotropic Action of a Stable Nitric Oxide Donor in Heart Failure
Valery Kapelko, Vladimir Lakomkin, Elena Lukashkova, Alexander Abramov, Vladimir Ermiushkin, Vladimir Gramovich, Oleg Vyborov, Nidas Undrovinas, Vladimir Shirinsky
Russian Cardiological Research and Productive Complex, Russia

Background: Nitric oxide is involved in a number of cellular metabolic processes. The activity of tissue NO synthases are depressed in heart failure, thus the supplementation of NO to the diseased myocardium may be beneficial.

Objective: We used dinitrosyl iron complexes (DNIC) with ligand glutathione (commercial name 'Oxacom') to study their cardiotropic action in heart failure. Oxacom is known to induce a prolonged hypotensive effect both in animals and healthy volunteers.

Materials And Methods: Rats were injected twice with isoproterenol in varied doses, 85–180 mg/kg. The blood pressure (BP), left ventricular (LV) pressure and ECG were recorded after 2–8 weeks in acute experiments preceded by echocardiographic study.

Results: Echocardiographic study revealed obvious signs of heart failure, namely LV dilatation, lower ejection fraction, especially in rats that received higher cumulative isoproterenol doses (300–360 mg/kg). Cardiomyocytes isolated from failing hearts responded to electrostimulation by arrhythmic contractions and by significantly slowed and incomplete removal of Ca++ from the myoplasm. The decreased maximal rates of LV pressure development and fall as well as lowered indices of myocardial contractility and relaxability were detected. Intravenous bolus injection of oxacom caused an immediate BP decrease by 20–30 mm HG followed by a slow recovery. The LV systolic pressure did not change but the maximal rate of LV pressure development and contractility index increased by 20–26% while the isovolumic relaxation constant rose 1.5-fold associated with decreased LV diastolic pressure. These changes gradually normalized within 10–15 minutes.

Conclusion: Results suggest that prolonged NO donation exerts positive inotropic action in heart failure mainly by relaxability improvement.

P-19
Prediabetes and Diabetes Are Not Related to Endothelial Dysfunction among Patients with Unstable Coronary Syndromes
Linda Björk Kristinsdottir, Steinar Orri Hafþórrsson, Erna Síl Oskarssdottir, Guðmundur Thorgeirsson, Vílmundur Guðnason, Sigurður Sigurðsson, Ilsufur Olafsson, Thorarinn Arni Bjarnason, Karl Andersen, Erna Síl Arnardóttir
Landspitali – The National University Hospital of Iceland, Reykjavik, Iceland

Introduction: Approximately two thirds of patients with Acute Coronary Syndromes (ACS) have undiagnosed diabetes or prediabetes. The aim of this study was to determine whether disturbances in glucose metabolism are related to endothelial dysfunction in patients with ACS.

Methods: Patients with ACS but no known disturbance of glucose metabolism were consecutively included in a single center university hospital setting. A standard oral glucose tolerance test and measurements of fasting plasma glucose and HbA1c were performed 3–5 days after hospitalization, and repeated 8–12 weeks later. Carotid ultrasound was also performed to determine the extent of plaque formation in each patient. Assessment of endothelial dysfunction was done with EndoPAT and presented as the Reactive Hyperemia Index (RHI).

Results: Ninety-two patients were consecutively included (mean age 63.5 years, 79% male). Medians of RHI were 1.85 (IQR: 1.59–2.25), 1.78 (IQR: 1.60–2.27) and 1.85 (IQR: 1.40–3.43) in pa-
Patients with normal glucose metabolism (32%), prediabetes (51%) and diabetes (17%), respectively (p = 0.83). RHI medians were 2.97 (IQR: 2.97–2.97), 1.82 (IQR: 1.59–2.15), 1.78 (IQR: 1.54–2.22) and 2.09 (IQR: 1.63–2.29) in patients with no, minimal, moderate or severe stenosis in carotid arteries, respectively (p = 0.41). A negative correlation was seen between RHI and the extent of coronary artery disease (r = −0.22, p = 0.03).

Conclusion: Endothelial dysfunction is not related to metabolic derangement among ACS patients. This might indicate that atherosclerosis in ACS patients is progressed to the extent that the upstream effect of metabolic derangement and subsequent endothelial dysfunction, can no longer be detected.

P-20
Carotid Atherosclerotic Plaque Burden Is Increased in Patients with Acute Coronary Syndrome Compared with Normal Population
Thorarinn Arni Bjarnason, Linda Bjork Kristinsdottir, Erna Sif Oskarsdottir, Thor Aspelund, Sigurdur Sigurdsson, Vilmundur Gudnason, Karl Andersen
Landspitali – The National University Hospital of Iceland, Reykjavik, Iceland

Background: Atherosclerotic plaques in carotid and coronary arteries share common risk factors. The co-existence of severe atherosclerotic plaques in the carotid and coronary arteries is a sign of widespread atherosclerosis. The aim of this study was to compare atherosclerotic plaque burden in the carotid arteries of patients with recent acute coronary syndromes (ACS) with an age and sex matched normal population.

Methods: Sixty-four patients (73% male, age 61 years) admitted to the coronary care unit with ACS where consecutively included in the study. Atherosclerotic plaques in bilateral bifurcation of the common carotid and internal carotid arteries were evaluated with ultrasound examination. Patients were classified as having none, minimal, moderate or severe atherosclerotic plaques. The results were compared with a sex and aged matched normal population (n = 251) from the REFINE Reykjavik study.

Result: The carotid plaque burden for cases and controls is shown in table 1.

Conclusion: The atherosclerotic carotid plaque burden was significantly higher (p < 0.001) in patients with recent ACS compared with normal population.

Table 1. (for Abstract P-20)

<table>
<thead>
<tr>
<th>Normal Population (n = 251)</th>
<th>ACS patients (n = 64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>28%</td>
</tr>
<tr>
<td>Minimal</td>
<td>50%</td>
</tr>
<tr>
<td>Moderate</td>
<td>19%</td>
</tr>
<tr>
<td>Severe</td>
<td>4%</td>
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</tbody>
</table>

P-21
Diagnosis of Diabetes Mellitus and Prediabetes Is Improved by Repeated Measurements in Patients with Acute Coronary Syndrome
Thorarinn Arni Bjarnason, Steinar Orri Hafthorsson, Linda Bjork Kristinsdottir, Erna Sif Oskarsdottir, Isleifur Olafsson, Karl Andersen
Landspitali – The National University Hospital of Iceland, Iceland

Background: Type 2 diabetes (DM2) and prediabetes are established risk factors for coronary artery disease that often go undetected among patients with acute coronary syndromes (ACS). Recent guidelines have recommended oral glucose tolerance test (OGTT) as the most reliable screening tool for prediabetes and DM2 in this patient population. The aim of this study was to determine whether the diagnosis of impaired glucose metabolism could be improved by repeated measurements of glucose metabolism before hospital discharge and 3 months later.

Methods: The Study populations were patients with ACS admitted to a single center coronary care unit with no previous diagnosis of DM2. Glucose metabolism was evaluated with fasting glucose in plasma (FGP), HbA1c and a standard two hour OGTT with 75 g glucose. Measurements of glucose metabolism were made before hospital discharge (day 2–4 of hospital stay) and repeated three months later. The highest value determined whether patients were classified as having normal glucose metabolism (NGM), prediabetes or DM2.

Results: One hundred and fifty four patients (male 80.5%, mean age 63 years) with no previous diagnosis of DM2 were consecutively included in the study. During hospital stay, 46.8, 40.2, and 13.0% were classified as having NGM, prediabetes or DM2, respectively. Three months later, 40.3, 50.0, and 9.7% were classified as having NGM, prediabetes or DM2, respectively. When combining the results from hospital stay and 3 months later, 28.6, 53.9 and 17.5% were classified as having NGM, prediabetes or DM2, respectively. The classification for glucose metabolism remained the same in 59.7% of patients, 18.2% got better and 22.1% got worse between measurements.

Conclusion: The prevalence of impaired glucose tolerance in patients with ACS and previously undiagnosed diabetes was higher 3 months after hospital stay than during hospitalization. The diagnostic yield was considerably improved by combining results from hospital stay and 3 months later.
**P-22**

**Newly Diagnosed Diabetes by Screening Is Related to More Extensive Coronary Artery Disease in Patients with Acute Coronary Syndromes**

Steinar Orri Hafthorsson¹, Erna Sif Oskarsdottir¹, Linda Bjork Kristinsdottir², Gudmundur Thorgeirsson², Isleifur Olfassson³, Thorarinn Gudnason¹, Thorarinn Ami Bjarnason¹, Karl Andersen²

¹University of Iceland, Iceland; ²University of Iceland, Landspitali University Hospital, Iceland; ³Landspitali University Hospital, Iceland

**Introduction:** Patients with Acute Coronary Syndrome (ACS) often have undiagnosed glucose metabolism disorders which negatively affects their prognosis. The aim of this study was to evaluate whether derangement of glucose metabolism was related to the extent of Coronary Artery Disease (CAD).

**Methods:** ACS patients with no previous diagnosis of type 2 diabetes mellitus (DM2) were consecutively studied in a single center university hospital setting. Prediabetes and DM2 were diagnosed by fasting plasma glucose (FPG), HbA1c and standard oral glucose tolerance test performed 2–4 days after hospital admission and repeated 3 months after discharge. The extent of CAD was evaluated by Gensini score which grades severity and location of lesions as well as the cumulative effect of multiple lesions.

**Results:** Among 171 patients (77% male, average age = 63.3), 47% had normal glucose metabolism (NGM), 41% were diagnosed with prediabetes and 12% with DM2. The median Gensini score was 30.0 (16.0–48.8). The median Gensini score was 26.0, 28.5 and 37.0 for patients with NGM, prediabetes and DM2, respectively (p = 0.07).

**Discussion:** ACS patients with no previously known metabolic derangement that are found to have DM2 by screening have more extensive CAD than patients with NGM. This underscores the importance of screening for metabolic derangements among patients hospitalized for ACS.

**P-23**

**Central and Brachial Blood Pressure But Not Arterial Stiffness Decreases with Intensive Resistance Training in Powerlifting Athletes**

Martin Serg¹, Janno Jurgenson¹, Priit Kampus¹, Jaak Kals³, Maksim Zagura², Mikhail Zilmer³, Jaan Eha³, Eve Unt²

¹Department of Cardiology, University of Tartu, Estonia; ²Department of Sports Medicine and Rehabilitation, University of Tartu, Estonia; ³Institute of Biomedicine and Translational Medicine, University of Tartu, Estonia

**Objective:** Regular physical activity is recommended as an important component of cardiovascular disease prevention. However, there is some evidence that resistance training may have detrimental cardiovascular effects. The aim of the current study was to evaluate the effect of a 12-week supervised resistance training program on arterial stiffness, brachial/central aortic blood pressure, and systolic/diastolic function of the heart in powerlifting athletes.

**Methods:** 19 young male powerlifting athletes (mean age 28±6 years) participated in the study. The study subjects exercised four days per week with an intensity of 60 to 100% assessed from one repetition maximum, 90–120 minutes per session for 12 weeks. Carotid-femoral pulse wave velocity, augmentation index, and central aortic blood pressure were measured using application tonometry. Echocardiographic examination was performed at baseline and at the end of the study.

**Results:** After a 12-week supervised resistance training period the physical performance of the study subjects increased significantly (p < 0.05). Brachial and central aortic systolic blood pressure decreased significantly (132 ± 9 vs 124 ± 9 mm HG; p < 0.01 and 110 ± 8 vs 105 ± 9 mm HG; p < 0.01, respectively). Carotid-femoral pulse wave velocity and augmentation index did not change. In echocardiography, tricuspid annular velocity measured using tissue Doppler imaging, increased (p < 0.05).

**Conclusion:** Our study suggests that resistance training in powerlifting athletes has no acute adverse effects on arterial stiffness. Furthermore, resistance training decreases brachial and central blood pressure, and increases right ventricular function in acute setting.
Blood lipid levels.

CoQ10 in patients on statin treatment and to compare it with the synthesis of CoQ10.

Statins reduce the synthesis of CoQ10 by blocking the production of farnesyl pyrophosphate, an intermediate molecule in the synthesis of HMG-CoA reductase inhibitors which decrease mevalonate synthesis and are widely used in the treatment of hypercholesterolemia. Coenzyme Q10 (CoQ10) is a fat-soluble quinone, participates in oxidative phosphorylation in mitochondria and is an important antioxidant, thus protects the cell from radical oxidation. Some CoQ10 in human body is obtained with food ingestion, however most of the CoQ10 results from the synthesis in the body. Statins reduce the synthesis of CoQ10 by blocking the production of farnesyl pyrophosphate, an intermediate molecule in the synthesis of CoQ10.

The aim of this investigation was to determine the level of plasma CoQ10 in patients on statin treatment and to compare it with blood lipid levels.

Methods: Blood was obtained from out-patient clinic cardiovascular patients after at least 6-month statin treatment with rosuvastatin or atorvastatin. LDL-cholesterol (LDL-C), HDL-cholesterol (HDL-C), total cholesterol (TC), triglycerides (TG) and lipoprotein(a) (Lp(a)) were measured by Roche reagents on Cobas 6000 analyzer and plasma total CoQ10 levels by HPLC method.

Results: A total 60 patients were investigated, 37 men (age 60.8 ± 11 y) and 23 women (age 66.2 ± 11 y). The subjects were divided into two groups on the basis of coenzyme Q10 levels: group-1 (n = 41) with Q10 deficiency (0.58 ± 0.12 mg/l) and group-2 (n = 19) with normal levels (1.1 ± 0.24 mg/l). Group-1 had lower blood lipid levels compared to group-2: total cholesterol 4.5 ± 0.97 vs 5.3 ± 1.3 (p = 0.02), LDL-cholesterol 2.5 ± 0.8 vs 3.4 ± 1.04 (p = 0.001), triglycerides 1.6 ± 0.9 vs 2.3 ± 1.7 (p = 0.115), lipoprotein(a) 0.3 ± 0.3 vs 0.6 ± 0.7 (p = 0.144). HDL-cholesterol was higher in group-1 (1.5 ± 0.5) as compared to group-2 (1.2 ± 0.3) and the difference between the groups was statistically significant (p < 0.05).

Conclusion: In our study the better response to statin treatment was associated with CoQ10 deficiency.

### Table 1. Baseline characteristics of the participants (for Abstract P-26)

<table>
<thead>
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<th>Variable</th>
<th>Initial (n = 33)</th>
<th>6th month (n = 33)</th>
<th>P value</th>
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<tbody>
<tr>
<td>Age (year)</td>
<td>20.4±3.2</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Sex (F/M)</td>
<td>10/23</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Lenght (cm)</td>
<td>173.2±8.5</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>68.3±13.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>22.7±3.1</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Systolic blood pressure (mm Hg)</td>
<td>111±15.9</td>
<td>113.2±14.4</td>
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</tr>
<tr>
<td>Diastolic blood pressure (mm Hg)</td>
<td>69.0±8.7</td>
<td>72.5±9.2</td>
<td>0.705</td>
</tr>
<tr>
<td>Heart rate (bpm)</td>
<td>77.2±12.7</td>
<td>74.7±11.6</td>
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<tr>
<td>Oxygen saturation (%)</td>
<td>95.5±1.5</td>
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</table>

### P-25

**Level of Plasma Coenzyme Q10 in Patients on Statin Treatment.**

Marika Pikta1,2, Galina Zemtsovskaja1,3, Mihhail Zemtsovski2,3, Davit Duishvili2,3, Alla Tikhaze3, Vadim Lankin3, Margus Vigilmaa2,3

1North Estonia Medical Centre, Laboratory; 2North Estonia Medical Centre, Cardiology Department; 3Tallinn University of Technology, Technomedicum of TUT, Institute of Cardiovascular Medicine, Estonia

**Introduction:** Statins are 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase inhibitors which decrease mevalonate synthesis and are widely used in the treatment of hypercholesterolemia. Coenzyme Q10 (CoQ10) is a fat-soluble quinone, participates in oxidative phosphorylation in mitochondria and is an important antioxidant, thus protects the cell from radical oxidation. Some CoQ10 in human body is obtained with food ingestion, however most of the CoQ10 results from the synthesis in the body. Statins reduce the synthesis of CoQ10 by blocking the production of farnesyl pyrophosphate, an intermediate molecule in the synthesis of CoQ10.

The aim of this investigation was to determine the level of plasma CoQ10 in patients on statin treatment and to compare it with blood lipid levels.

**Methods:** Blood was obtained from out-patient clinic cardiovascular patients after at least 6-month statin treatment with rosuvastatin or atorvastatin. LDL-cholesterol (LDL-C), HDL-cholesterol (HDL-C), total cholesterol (TC), triglycerides (TG) and lipoprotein(a) (Lp(a)) were measured by Roche reagents on Cobas 6000 analyzer and plasma total CoQ10 levels by HPLC method.

**Results:** A total 60 patients were investigated, 37 men (age 60.8 ± 11 y) and 23 women (age 66.2 ± 11 y). The subjects were divided into two groups on the basis of coenzyme Q10 levels: group-1 (n = 41) with Q10 deficiency (0.58 ± 0.12 mg/l) and group-2 (n = 19) with normal levels (1.1 ± 0.24 mg/l). Group-1 had lower blood lipid levels compared to group-2: total cholesterol 4.5 ± 0.97 vs 5.3 ± 1.3 (p = 0.02), LDL-cholesterol 2.5 ± 0.8 vs 3.4 ± 1.04 (p = 0.001), triglycerides 1.6 ± 0.9 vs 2.3 ± 1.7 (p = 0.115), lipoprotein(a) 0.3 ± 0.3 vs 0.6 ± 0.7 (p = 0.144). HDL-cholesterol was higher in group-1 (1.5 ± 0.5) as compared to group-2 (1.2 ± 0.3) and the difference between the groups was statistically significant (p < 0.05).

**Conclusion:** In our study the better response to statin treatment was associated with CoQ10 deficiency.
Conclusion: Our study revealed right ventricular diastolic function impaired while the systolic function preserved in healthy subjects that migrated from the sea level to the moderate altitude. These differences may be explained by increased RV afterload due to hypoxic pulmonary vasoconstriction. This result is compatible with the previous studies. Conventional and tissue Doppler echocardiography may be used in detection of effect of moderate altitude on right ventricle functions.

Methods: Ultrasound examination of the CCA was carried out by a certified ultrasound specialist. We studied 13 healthy subjects between the age of 23 and 73 (4 females and 9 males with a mean age of 41) and 9 patients between the age of 32 and 73 (6 females and 3 males with a mean age of 50) with clinical diagnosis of CKD. We used the Siemens Sequoia 256 Ultrasound System equipped with linear transducer 6–8 MHz. Measurements of the CCA IMT were taken from far wall of the artery in diastolic phase of the heart in 3 projections. IMT measurements were taken at 10 mm distance from the bifurcation of the CCA.

Table 2. Echocardiographic Variables for Right Ventricular Morphology and Function of study group (for Abstract P-26)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Initial</th>
<th>6th month</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RV end diastolic diameter (mm)</td>
<td>36.8±4.30</td>
<td>37.1±4.7</td>
<td>0.728</td>
</tr>
<tr>
<td>RV end diastolic area (cm²)</td>
<td>15.3±3.85</td>
<td>16.4±3.9</td>
<td>0.123</td>
</tr>
<tr>
<td>RV end systolic area (cm²)</td>
<td>9.7±2.95</td>
<td>10.5±2.9</td>
<td>0.014</td>
</tr>
<tr>
<td>RV fractional area change (%)</td>
<td>36.6±10.6</td>
<td>35.4±9.3</td>
<td>0.519</td>
</tr>
<tr>
<td>Right atrial end diastolic area (cm²)</td>
<td>11.5±2.30</td>
<td>12.9±3.2</td>
<td>0.021</td>
</tr>
<tr>
<td>Tricuspid annular plane systolic excursion (mm)</td>
<td>23.5±2.95</td>
<td>23.5±3.6</td>
<td>0.664</td>
</tr>
<tr>
<td>RV myocardial performance index</td>
<td>0.34±0.18</td>
<td>0.28±0.07</td>
<td>0.135</td>
</tr>
<tr>
<td>Tricuspid E wave (cm/s)</td>
<td>65.4±12.4</td>
<td>69.5±16.02</td>
<td>0.101</td>
</tr>
<tr>
<td>Tricuspid A wave (cm/s)</td>
<td>42.3±11.2</td>
<td>48.8±12.5</td>
<td>0.013</td>
</tr>
<tr>
<td>Tricuspid E/A</td>
<td>1.61±0.3</td>
<td>1.45±0.2</td>
<td>0.038</td>
</tr>
<tr>
<td>Tricuspid deceleration time (ms)</td>
<td>204.6±52.2</td>
<td>206.1±55.8</td>
<td>0.860</td>
</tr>
<tr>
<td>Mean pulmonary artery pressure (mm Hg)</td>
<td>14.2±6.3</td>
<td>17.6±4.4</td>
<td>0.006</td>
</tr>
<tr>
<td>Tricuspid annular S (cm/s)</td>
<td>14.1±2.9</td>
<td>15.4±2.3</td>
<td>0.031</td>
</tr>
<tr>
<td>Tricuspid annular E' (cm/s)</td>
<td>14.0±3.5</td>
<td>14.2±2.2</td>
<td>0.379</td>
</tr>
<tr>
<td>Tricuspid annular A' (cm/s)</td>
<td>10.0±3.8</td>
<td>12.1±3.0</td>
<td>0.006</td>
</tr>
<tr>
<td>RV free wall S (cm/s)</td>
<td>10.5±3.2</td>
<td>12.7±2.2</td>
<td>0.007</td>
</tr>
<tr>
<td>RV free wall E' (cm/s)</td>
<td>11.9±3.8</td>
<td>14.5±3.2</td>
<td>0.000</td>
</tr>
<tr>
<td>RV free wall A' (cm/s)</td>
<td>6.7±1.9</td>
<td>10.3±3.3</td>
<td>0.007</td>
</tr>
<tr>
<td>Tricuspid E /Tricuspid annular E'</td>
<td>4.8±1.2</td>
<td>5.0±1.3</td>
<td>0.600</td>
</tr>
<tr>
<td>Tricuspid annular E'/A'</td>
<td>1.52±0.5</td>
<td>1.23±0.34</td>
<td>0.002</td>
</tr>
</tbody>
</table>

RV = Right ventricle.

Intima-Media Thickness of the Common Carotid Artery of Patients with Chronic Kidney Disease

S. Silluta1, K. Pilt1, K. Kööts1, M. Viigimaa2, K. Meigas1

1Institute of Biomedical Engineering, Tallinn University of Technology, Estonia; 2Institute of Cardiovascular Medicine, Tallinn University of Technology, Estonia

Background: In previous studies it has been noticed that patients with chronic kidney disease (CKD) have a higher risk for developing cardiovascular diseases. In case of patients with CKD, detecting early signs of the atherosclerosis is of high importance. One of the methods to describe the condition of arteries and predict the risk of cardiovascular diseases is the measurement of intima-media thickness (IMT) of the common carotid artery. The aim of this research was to compare the IMT of the right common carotid artery (CCA) between healthy controls and patients with CKD.

P-27

Intima-Media Thickness of the Common Carotid Artery of Patients with Chronic Kidney Disease

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1Institute of Biomedical Engineering, Tallinn University of Technology, Estonia; 2Institute of Cardiovascular Medicine, Tallinn University of Technology, Estonia

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Methods: Ultrasound examination of the CCA was carried out by a certified ultrasound specialist. We studied 13 healthy subjects between the age of 23 and 73 (4 females and 9 males with a mean age of 41) and 9 patients between the age of 32 and 73 (6 females and 3 males with a mean age of 50) with clinical diagnosis of CKD. We used the Siemens Sequoia 256 Ultrasound System equipped with linear transducer 6–8 MHz. Measurements of the CCA IMT were taken from far wall of the artery in diastolic phase of the heart in 3 projections. IMT measurements were taken at 10 mm distance from the bifurcation of the CCA.

Fig. 1. Correlation between subject’s age and IMT of the right CCA with the regression line and correlation coefficient (for Abstract P-27).
Results: Measurements of the right CCA IMT of both groups were analysed by using MS Excel. In case of healthy subjects the Pearson’s correlation coefficient between right CCA IMT and age was found at 0.74. As the IMT of the CCA is associated with the subjects’ age, the relationship between IMT of the right CCA and age is given in figure 1. Also the linear model was constructed for the controls. An unpaired t-test was performed with α = 0.05. As a result, the difference between two groups was found statistically significant (p < 0.005). The mean difference was 0.15 [mm]. To eliminate the factor of age and to illustrate the differences of two groups, the Bland-Altman plot was constructed (figure 2).

Conclusion: IMT of the right CCA depends on the subjects’ age and health condition. The IMT of the right CCA is wider for patients with CKD compared to healthy subjects.

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P-29
Vitamin D and Glucose Regulation in Icelandic Patients with Acute Coronary Syndrome
Enna Sif Oskarsdottir1, Thorarin Arnir Bjarnason1, Linda Bjork Kristinsdottir1, Steinar Orri Hafthorson1, Sigrun Helga Lund2, Frida Bjork Skuladottir1, Bylgja Kaernested1, Isleifur Olafsson1, Gudmundur Thorgeirsson1, Karl Andersen1
1The National University Hospital of Iceland, Iceland; 2University of Iceland, Iceland

Background/Objective: The role of vitamin D in the pathogenesis of diabetes has been debated but few studies have investigated this association in patients with Acute Coronary Syndrome (ACS). The objectives of this study was to explore a possible relationship between vitamin D levels (measured as s-25(OH)D) and blood glucose metabolism in ACS patients.

Methods: ACS patients (n = 108, mean age = 63.5 ± 9.7 years, males = 82%) with no previous diagnosis of diabetes or impaired glucose tolerance were consecutively included. Eight to 12 weeks after hospital discharge a standard oral glucose tolerance test (OGTT) was performed, as well as measurements of fasting plasma glucose (FPG), HbA1C and s-25(OH)D. Patients were then categorized into the groups normal glucose metabolism (NGM), impaired glucose tolerance (IGT) and type 2 diabetes (DM2), based on ADA guidelines.

Results: A septal pouch that opened into the left atrial cavity was found in 51% of cases. The apex of the left sided SP was always directed downward, which potentially creates good conditions for blood stasis and clotting. The mean depth of the left sided SP was 9.3 ± 5.7 mm (min = 1.1 mm; max = 36.4 mm) and was correlated with the LAA external circuit (r = 0.29; p = 0.015). The left sided SP volume varied from 0.05 ml to 2.0 ml while the LAA volume from 0.8 ml to 8.3 ml. The mean volume ratio (SP/LAA volume) was 9.4 ± 7.9% (min = 1.2%; max = 38.7%). The mean total LAA length was 32.4 ± 11.9 mm and its mean external circuit amounted 58.0 ± 11.0 mm. The LAA volume was correlated with BMI (r = 0.24; p = 0.005). Also the heart weight (r = 0.33; p = 0.000) and the total length of the LAA increased with age (r = 0.21; p = 0.035). In 47% we observed sharp bend (>90º) of main LAA lobe (mean distance from the LAA orifice to the bend = 21.1 ± 7.7 mm).

Conclusions: Left sided SP can act like the LAA and be a source of systemic embolism. Sharp bend shaped LAA (47%) seems to be more hazardous source of thrombi than the others. Further studies (especially clinical) on septal pouch are strongly required.
Lack of Adherence to Anticoagulation Guidelines in Atrial Fibrillation Leads to Increased Risk of Stroke and Other Major Cardiovascular Events

Stefan Bjornsson, David O. Arnar, Karl Andersen

Background: Atrial fibrillation (AF) is a major risk factor for stroke. The CHA2DS2-VASc score is a clinical tool recommended to identify patients with non-valvular AF in need of oral anticoagulant (OAC) therapy. The goal of this study was to determine whether patients with AF in Iceland are receiving OAC therapy according to these guidelines and what the clinical consequences might be of treatment failure.

Materials and Methods: The study included all patients with AF seeking any medical attention at the emergency department of Landspitali University Hospital in Reykjavik over a 6 month period in 2012. Their CHA2DS2-VASc score was calculated and their OAC status was determined. Patients were followed up to 1 year.

Result: 347 patients met the inclusion criteria, 148 women and 199 men. Their mean age was 69.8 ± 15 years. Seventy-seven (22.1%) patients were low to intermediate risk according to CHA2DS2-VASc score (0-1) and 270 (77.9%) were high risk with scores of 2-9. Of the high risk patients, 160 (59.3%) had been prescribed an OAC, 33 (12.2%) low-dose aspirin and 77 (28.5%) were not receiving any anticoagulation. There were three primary endpoints: stroke, MI and all-cause mortality. Their cumulative incidence in the high risk group during the follow-up period was 31 events in 1 year, the incidence rate was 6.9% per year (95% CI: 3.4–12.2) and 19.8% per year (95% CI: 12.1–30.6) in patients receiving OAC and patients not receiving OAC respectively (hazard ratio 0.29, 95% CI: 0.12–0.70, p = 0.006).

Conclusion: Under 60% of high risk AF patients were receiving OAC treatment according to ESC guidelines. It is clear that this treatment is underused in certain populations, but it is unclear why. Stroke, MI and all-cause mortality were significantly lower in AF patients receiving OAC which underscores its importance in the management of AF.

Correlation between Aortic Stiffness and Conventional Risk Factors with Coronary Atherosclerosis

Galina Zemtsova, Mikhail Zemtsovskii, Jelena Abina, Andrei Samarin, Kalju Meigas, Margus Viigimaa

Objective: Coronary atherosclerosis (CA) is associated with formation, progression and calcification of atherosclerotic plaques (Ap). Progression of atherosclerosis in the aorta leads to elevation of aortic stiffness (ASt). Atherosclerosis is influenced by several conventional risk factors (CRF) and clinically manifested in different forms of cardiovascular events. The common input of CRF to the risk of cardiovascular events (CVR) is commonly assessed by Framingham Risk Score (FRS). The aim of our investigation was to assess the relation of ASt and CRF to CA.

Methods: Date of ASt (aortic pulse wave velocity – PWVao, brachial augmentation index – Aixbra, by Arteriograph, Ten-sioMed) and CRF (expressed as CVR by FRS) were collected throughout cross-sectional population based study. The CA was additionally investigated in 10 subjects due to their condition by Computed Tomography (CT) using GE Discovery VCT scanner (GE, USA). Ap calcification was assessed on native CT images and quantified in score units according to Agatston (A.u.). Luminal narrowing of the coronary arteries was assessed on contrast-enhanced CT angiography. Patients were distributed into groups of 20–39, 40–49 and 60–65 years of age.

Results: PWVao was normal-to-optimal (4.11–7.86) in all subjects. The other parameters were without abnormalities only in one subject (group of 20–39 years of age). CA presented in other subjects of Ap of 1–4 arteries and stenosis of 25–50%. Calcification of <100 A.u. was observed in 8 and of 177 A.u. in 1 subject. Aixbra was pathological in 3 subjects from group of 40–49 and in 4 of 60–65 years of age. Aixbra was borderline-normal in one subject from each group. CVR was <10% (2–6%) in the younger and >10% (11–22%) in the older group, despite the similar CA in both groups.

Conclusion: PWVao showed no reaction on CA abnormalities and Aixbra was closely related to absence or presence of CA. The correlation of Aixbra with CA may be due to its additional indirect dependence from coronary arteries' conditions via the left ventricular ejection.

Thyrotoxicosis (AIT) in a Patient with Idiopathic Dilated Cardiomyopathy: A Case Report

Tuuli Teeäär, Jüri Voitik, Piiti Kampus, Kaido Hanni, Julia Reinmets, Jaanus Laanoja

Objective: To illustrate that AIT may have life-threatening consequences which can be treated with thyroidectomy.
**Case Presentation:** In 2014, a 55-year old male presented to North Estonia Medical Centre with electrical storm (>10 episodes of ICD-therapy for monomorphic VT in the last 24 hours).

In 2012, he had been resuscitated from VF during warming-up for a bicycle marathon, subsequently diagnosed with idiopathic dilated cardiomyopathy (LV EDV 109 ml/m², LV EF 29%, RVDd 45 mm, TAPSE 17 mm, and normal coronary angiograms) and prescribed amiodarone due to non-sustained VT in addition to implantation of an ICD. TSH was within normal limits in 2013.

On admission, hyperthyroidism (TSH 0.005 mIU/L, free T4 36.1 pmol/L, free T3 7.0 pmol/L) was the only major deviation found, and RBBB had evolved compared to 2012 (QTc 444 ms). Electrical storm due to late AIT was suspected. ICD tachytherapy was disabled, amiodarone withheld, propylthiouracil combined with a glucocorticoid and an increased dose of metoprolol later followed by flecainide due to recurrent sustained VT with loss of consciousness and need for external defibrillation were commenced. However, VT continued, evolved into defibrillation-resistant, deep sedation of the patient and temporary overdrive pacing only provided some electrical stabilisation. To rapidly control AIT in a life-threatening condition, total thyroidectomy was performed followed by reintroduction of amiodarone (later discontinued for an unknown reason), replacement of metoprolol with propranolol and replacement therapy with levothyroxine. Until day 7 after surgery, the patient experienced sustained VT episodes, but remained electrically relatively stable thereafter. TSH was 3.71 mIU/L, free T4 14.7 pmol/L, free T3 1.3 pmol/L a week after surgery. Histologically, the thyroid gland was normal.

**Conclusion:** Electrical storm can be a rare arrhythmic complication of AIT. Due to its potentially life-threatening consequences, aggressive therapy by thyroidectomy can provide rapid help.

**P-33**

**Initiation of Remote Magnetic Navigation System Stereotaxis in North Estonia Medical Centre:**

**Learning Curve for Ablation of Atrial Fibrillation (AF)**

Priit Kampus¹, Kaido Hanni¹, Jüri Voitk¹, Sille Lobjakas², Jaanus Laanoja¹

¹Cardiologist, Estonia; ²Nurse, Estonia

**Abstract:** Our team has performed AF ablations since 2012 (annually approx. 100 procedures). In May 2014 we started complex catheter ablation procedures with the Stereotaxis system. In the present study we assessed our learning curve for the feasibility of remote circumferential pulmonary vein (PV) isolation procedure in patients with AF using magnetic navigation system Stereotaxis.

**Methods:** To assess the learning curve with Stereotaxis system, we collected main procedural data (procedure-, fluoroscopic- and ablation time, acute PV isolation success and complication rate), and compared these data between three groups: 1. Manual group, last 20 manual procedures (from March to April 2014); 2. Learning curve group, first 20 Stereotaxis procedures (from May to June 2014); and 3. Stereotaxis group, the last 20 Stereotaxis procedures 6 months after the initiation of the system (from December 2014 to January 2015).

**Results:** Main results are presented in table 1. After a half year of procedures with the Stereotaxis system, there was a significant reduction of the ablation-, mapping- and fluoroscopy times and dosages compared to the manual group and the learning curve group with the third group. There were no differences in major complications. During the learning curve, we did not successfully isolate PV in 2 patients.

**Conclusion:** After the short learning curve period with the Stereotaxis system we have significantly reduced the procedure-, ablation- and fluoroscopy times and dosages performing the AF ablation procedures. Magnetic remote navigation system is safe and feasible method for AF ablation with a short learning curve.

**Table 1.** (for Abstract P-33)

<table>
<thead>
<tr>
<th></th>
<th>Group 1 (n = 20) Manual procedures</th>
<th>Group 2 (n = 20) Stereotaxis procedures (learning curve)</th>
<th>Group 3 (n = 20) Stereotaxis procedures (after 6 months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure time (min)</td>
<td>257.5±57.5</td>
<td>274.5±45.7</td>
<td>224.5±25.5*</td>
</tr>
<tr>
<td>Ablation time (min)</td>
<td>124.2±42.1</td>
<td>93.9±37.7</td>
<td>77.6±18.7*</td>
</tr>
<tr>
<td>Mapping time (min)</td>
<td>25.6±6.6</td>
<td>64.5±21.7</td>
<td>37.5±6.4*</td>
</tr>
<tr>
<td>Fluoroscopic exposure time (min)</td>
<td>28.1±11.1</td>
<td>15.8±6.3</td>
<td>10.5±5.8*</td>
</tr>
<tr>
<td>Fluoroscopic radiation dose (mGy)</td>
<td>NA</td>
<td>461.4±427.9</td>
<td>130 ±87.2*</td>
</tr>
<tr>
<td>PV isolation (n)</td>
<td>19</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>Major complications (n)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*p < 0.05, Group 1 vs. Group 2; # p < 0.05, Group 2 vs. Group 3.
Comparison of Four Methods to Assess Training Effect in Heart Failure Patients

Torstein Valbergland, Ketil Isaksen, Peter Scott Munk, Alf Ingolf Larsen

1 Stavanger University Hospital Postboks 8100 4068 Stavanger, Norway, University of Bergen Postboks 7800 5020 Bergen, Norway, Norway; 2 Stavanger University Hospital Postboks 8100 4068 Stavanger, Norway, Norway

Objectives: Standard exercise testing protocols with cardiopulmonary exercise test (CPX) measuring peak VO2 has proven to be less sensitive to detect changes in functional capacity after interventions in patients with heart failure. Therefore we compared four different testing protocols to assess changes after a 12 week exercise rehabilitation program. We performed CPX testing with VO2 and VE/VCO2 slope. Lactate levels measured as area under the curve (AUC) during a sub-maximal endurance test and 6 minute walk test. Lactate levels measured as area under the curve (AUC) during a sub-maximal endurance test and 6 minute walk test.

Methods: 23 patients were randomised to either exercise training (ET) or standard care (SC). All patients were on stable optimal medication and had EF below 35% and were in NYHA II or III. SC group: EF 25.8 ± 5.2, age 65.1 ± 10.8, ET group: EF 26.7 ± 5.0, age 64.9 ± 7.9. The ET group went through a 3 months supervised training program with experienced physiotherapist in a cardiac rehabilitation center and the controls were followed monthly. We did CPX tests on a treadmill with breath to breath gas analysis for peak VO2 and VE/VCO2 slope was calculated with linear regression using all measurements. Lactate AUC was calculated before and after the training intervention using the same test with equal resistance. The reduction in Lactate AUC was then analysed between the groups. 6 minute walk test was performed in accordance with standard protocols. All data were calculated in SPSS 21 using t-test for comparisons of means.

Results: There was a statistical significant difference between the exercise group and control group for 6 minute walk test only with a mean difference of 72.8 meters ± 25.2 and t(21) = -2.888, p = 0.009. 6 minute walk test seems to be more sensitive to detect changes in functional capacity than CPX parameters and serial lactate measurements.

P-35

NT-proBNP as a Predictor of Outcome After Surgical Treatment in Patients with Severe Aortic Stenosis

Vladislav V. Podpalov, V. Sevrukevitch, K. Rubakhov, S. Kurganovich, S. Spiridonau, M. Kolyadko, A. Deev, Y. Ostrovsky

1 Republican Scientific and Practical Centre of Cardiology, Minsk, Belarus; 2 National Research Centre of Preventive Medicine, Moscow, Russia

Objectives: To estimate NT-proBNP role in the prognosis of outcome after surgical treatment in patients with severe aortic stenosis (AS), complicated by atrioventricular valve insufficiency.

Methods: Among all patients treated at the Center during March 2012 – September 2013 there were 49 patients with severe AS and secondary mitral and tricuspid regurgitation. They were included into the prospective study. Surgical treatment consisted of aortic valve replacement (AVR) in combination with atrioventricular valve repair. Follow-up period was 1 year. Laboratory values, including NT-proBNP, and Echo-parameters were compared preoperatively with 1 year after surgery ones.

Results: Average age of the patients was 63.2 ± 10.3 years, proportion of men – 53.1%. Postoperative 30-day mortality was 2.0%, 1-year mortality – 8.2%. There was a significant positive relationship of NT-proBNP with NYHA heart failure functional class (p = 0.002), glomerular filtration rate (p < 0.001), left ventricular (LV) end-systolic diameter (p = 0.004), LV end-diastolic (p = 0.003) and end-systolic (p < 0.001) volumes, mean (p < 0.001) and systolic (p = 0.014) pulmonary artery pressure, LV contractile index (p < 0.001) and a significant negative relationship with body mass index (p < 0.001), aortic valve effective orifice area (p < 0.001), LV ejection fraction (p < 0.001). Using multivariate regression model a significant independent negative relationship was obtained between NT-proBNP level and the following parameters: aortic valve effective orifice area (p < 0.001), LV ejection fraction (p < 0.001). There was a significant decrease in NT-proBNP level 1 year after operation in comparison with preoperative values (p < 0.001). Preoperative level of NT-proBNP didn’t correlate with 1 year survival (p = 0.36). However, a significant negative association was found between preoperative NT-proBNP values and risk factor profile of 5-year survival (p = 0.003) described in previous studies – when NT-proBNP values increased, the probability of 5-year survival decreased.

Conclusions: NT-proBNP can predict 5-year survival in patients with severe AS plus atrioventricular valve insufficiency after AVR in combination with atrioventricular valve repair.

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First Data from Latvian Chronic Thrombembolic Pulmonary Hypertension Register

Andris Skride, Krista Lesina, Helmut Binans, Ainars Rudzitis

1 Pauls Stradins Clinical University Hospital, Latvian Cardiology Center, Riga Stradins University, Latvia; 2 Riga East University Hospital, Latvia, Riga Stradins University, Latvia; 3 Riga Stradins University, Latvia; 4 Pauls Stradins Clinical University Hospital, Latvian Cardiology Center, Latvia

Objective: Chronic thromboembolic pulmonary hypertension (CTEPH) is the end result of persistent obstruction of the pulmonary arteries following episodes of acute and/or recurrent pulmonary emboli when mean pulmonary arterial pressure (mPAP) rises to > 25 mm HG and persists longer than 6 months despite anticoagulation therapy. It is important to recognize CTEPH patients and start specific therapy or refer patients to potentially curative surgery.

Methods: This prospective study included CTEPH (group 4) patients from the whole country since March 2008 until December 2014. Diagnosis was confirmed by right heart catheterization (RHC) and computerized tomography. Patients with mPAP ≥25 mm HG and RV hypertrophy were included in the study group. Four patients were treated with surgical pulmonary thromboendarterectomy (SPE) and 45 patients were treated conservatively using anticoagulation therapy. In the follow-up period of 1–6 years there were four deaths. There were 2 CTEPH patients who were referred to a potentially curative surgery abroad.

Results: Among all patients treated at the Center during March 2012 – September 2013 there were 49 patients with severe AS and secondary mitral and tricuspid regurgitation. They were included into the prospective study. Surgical treatment consisted of aortic valve replacement (AVR) in combination with atrioventricular valve repair. Follow-up period was 1 year. Laboratory values, including NT-proBNP, and Echo-parameters were compared preoperatively with 1 year after surgery ones.

Conclusions: NT-proBNP can predict 5-year survival in patients with severe AS plus atrioventricular valve insufficiency after AVR in combination with atrioventricular valve repair.
mm/Hg and pulmonary capillary wedge pressure (PCWP) ≤15 mm/Hg were included in the registry.

**Results:** In 7 years 26 newly diagnosed consecutive patients were included in registry. 16 patients (61%) of them where females and 10 (39%) males. The mean age was 56 (SD = 17) years, mPAP was 53 mm/Hg (SD = 12), mPCWR was 11 (SD = 4) Wood units. At diagnosis, the majority of patients were in NYHA functional class III (84.61%). Overall, blood group non 0 and group B was more frequent. In all patients, treatment with sildenafil or ambrisentan was started.

**Conclusions:** The prevalence of CTEPH in Latvia is low although the incidence and prevalence of CTEPH are yet to be accurately determined and may be significantly underestimated. At diagnosis of CTEPH the NYHA functional class and pulmonary vascular resistance was already high. Patient screening with ventilation-perfusion (V/Q) scan is mandatory. Despite this, V/Q scan is unavailable in Latvia. Baltic or Nordic – Baltic CTEPH registry should be started to manage this patients in our region.

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**P-37**

**Diagnostic Value of Combining Heart Rate Recovery and P-Wave Alteration with Exercise-Induced ST-Segment Changes for Prediction of Ischemia on Myocardial Perfusion Imaging**

Kamil Tuluce¹, İlhan Köyncu¹, Selcen Yakar Tuluce², Omer Kozan³

¹Department of Cardiology, Karsıyaka State Hospital, Izmir, Turkey; ²Ataturk Training and Research Hospital, Department of Cardiology, Izmir, Turkey; ³Dokuz Eylül University Faculty of Medicine, Department of Cardiology, Izmir, Turkey

**Background:** In patients with suspected coronary artery disease (CAD), ST-segment changes are most widely used criteria during exercise stress test (EST), to determine myocardial ischemia, despite its low accuracy values. In this study, we evaluated the benefit of combining alteration of P-wave duration (Pdur) and heart rate recovery (HRR) percentage parameters in addition to ST segment changes in the detection of CAD.

**Methods:** Patients (n = 369) with suspected CAD who underwent both EST and myocardial perfusion scintigraphy (MPS) were enrolled. P-wave duration was measured at rest and within the first minute of recovery. HRR percentage at the end of the first minute of recovery was calculated.

**Results:** Alteration of Pdur by 20 ms or longer and failure of decreasing HR at the end of the first minute of recovery phase less than 10% of the maximum HR reached during EST were more common in patients with reversible perfusion defects in MPS (p-values < 0.001 for both). Combining the development of significant changes in ST segment with an alteration in Pdur by 20 ms or longer and percentage of HRR in the first minute of recovery phase <10% during EST detected myocardial ischemia with 53% sensitivity, 98% specificity, 94.3% negative predictive value, and 77.8% positive predictive value (table 1).

**Conclusions:** The combination of Pdur alteration and HRR with conventionally used criterion of ST segment alterations in patients with suspected CAD increases specificity, and positive and negative predictive values of EST to detect myocardial ischemia which might reduce the need for implementing other noninvasive expensive techniques.

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**Table 1. Values of effort test variables that detect ischemia in myocardial perfusion scintigraphy (for Abstract P-37)**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cut-off</th>
<th>Specificity (%)</th>
<th>Sensitivity (%)</th>
<th>+PV (%)</th>
<th>-PV (%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-wave elongation</td>
<td>≥20 ms</td>
<td>89.8</td>
<td>57.0</td>
<td>62.8</td>
<td>87.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ST segment changes</td>
<td>Horizontal, downsloping or elevation</td>
<td>90.8</td>
<td>37.2</td>
<td>55.2</td>
<td>82.6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>HRR 1.min</td>
<td>&gt;%10</td>
<td>82.3</td>
<td>64.0</td>
<td>52.4</td>
<td>88.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>P-wave elongation</td>
<td>≥20 ms</td>
<td>98</td>
<td>53</td>
<td>77.8</td>
<td>94.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ST Segment changes</td>
<td>Horizontal, downsloping, elevation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRR 1. min combination</td>
<td>&gt;%10</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

HRR = Heart rate recovery; +PD = positive predictive value; –PD = negative predictive value.
The Relationship between Metabolic Profile and the Sub-Type of Atrial Fibrillation

Una Emilsdottir1, Olafur Skuli Indridason2, Michella Rasmussen3, David O. Arnar3
1University of Copenhagen, Copenhagen, Denmark, 2Landspitali University Hospital, Reykjavik, Iceland, 3Hvidovre University Hospital, Hvidovre, Denmark

Objective: Atrial fibrillation (AF) is a common arrhythmia with a number of risk factors including diabetes and obesity. Accumulating data suggests an important association between AF and metabolic factors but whether or how these metabolic parameters influence the sub-type of AF and outcomes, is unknown. The purpose of this study was to study the association between metabolic profile and the sub-types of AF.

Material and Methods: A total of 262 patients in an AF database constructed at Hvidovre University Hospital in Denmark were studied. All patients had electrocardiographically documented AF. The metabolic profile included body mass index (BMI), blood lipid profile, and the presence of diabetes. Sub-types of AF were classified as either paroxysmal or persistent/permanent.

Results: The median age at first diagnosis for the total group was 61 years (range 22–82) but time from the first diagnosis was lower in the paroxysmal group (1 year vs. 3 years, p < 0.05). In univariate analysis type 2 diabetes was associated with permanent/persistent AF (p = 0.037) but this was no longer significant when corrected for time from AF diagnosis. Type 1 diabetes, lipid profile (HDL cholesterol, LDL cholesterol, VLDL cholesterol). BMI did not associate with the subtype of AF. The same was true for patient gender, smoking status, hypertension, kidney failure and the presence of heart disease such as ischemic heart disease, heart failure and myocardial infarction.

Conclusions: Time from first diagnosis is the key predictor of sub-type of AF. Metabolic factors such as BMI, presence of diabetes and blood lipids had no association with subtype. It remains to be determined whether metabolic profile has any influence on outcomes in AF.
may be used as an independent biochemical marker for atherosclerosis. Based on the results we set out the hypothesis about autocatalytic mechanism of free radical reactions involving natural dicarbonyls and about the common molecular mechanism of vascular wall injury in atherosclerosis and diabetes.

Methods: We present dedicated time–frequency base spectral analysis to detect these points of SCG waveform, triggered by the onset of the R peak in the Electrocardiogram (ECG).

Results and Conclusion: From this development we expect an automated and clinically applicable method for calculating various quantitative indices of the left ventricular systolic and diastolic performance.

References
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Fig. 1. Seismocardiogram nomenclature. MC = Mitral valve closure; IM = isovolumic movement; AO = aortic valve opening; IC = isotonic contraction; RE = rapid ventricular ejection; AC = aortic valve closure; MO = mitral valve opening; RF = rapid ventricular filling; AS = atrial systole; EMD = electromechanical delay [8] (for Abstract P-41).
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