**302.** White blood cell count as a marker of acute inflammation in patients with positive stress echocardiography.

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The aim of this study was to assess whether positive exercise stress echocardiography (ESE) uncovered presence of acute inflammation and whether extent of stress induced myocardial ischemia (m.i.) have impact on total white blood cell count (WBCC).

**Methods:** In the study group of 69 patients (46 male and 23 female; mean age 59.7 ± 6.5 years) with known or suspected coronary artery disease sub-maximal or symptom limited bicycle ESE was performed. ESE identified ischemia by the occurrence of wall motion abnormality (WMA) with stress-positive ESE. In all patients before and after ESE wall motion score (WMS) was calculated. At baseline and after ESE, in all pts total and differential white blood cell count were measured.

**Results:** During ESE 40 (58%) patients had new, transient WMA, while 29 (42%) pts were without ischemia. Baseline value of total WBCC was significantly higher in patients with positive compared to those with negative ESE (7.7 ± 2.5 vs 6.1 ± 2.1 x 10⁹/L, P < 0.01), as well as the value of neutrophil count (P < 0.05). In pts (n = 24) with positive ESE and increased WMS less or equal 3, baseline value of total WBCC was significantly lower than in pts (n = 16) with increased WMS > 3 (6.9 ± 2.3 vs 8.5 ± 2.1 x 10⁹/L, P < 0.05). After ESE, in pts with stress induced WMA, WBCC increased by 18.2%. Increase in total WBCC was more pronounced in pts with increased WMS > 3 than in pts with increased WMS less or equal 3 (25.8% vs 14.5%). In pts without stress induced WMA, total WBCC slightly changed after ESE (by - 3.3%) compared to baseline value.

**Conclusion:** Our results suggest that an acute inflammatory process may be present in patients with positive ESE and that more severe myocardial ischemia is associated with significantly higher baseline WBCC and greater increase in total WBCC after ESE.

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**303.** Relation of plasma levels of proinflammatory cytokines and presence of myocardial viability in early phase after acute myocardial infarction.

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Proinflammatory cytokines such as tumor necrosis factor alpha (TNF-alpha) and interleukin-6 (IL-6) can potentiate heart muscle damage during acute myocardial infarction (AMI). Whether changes in their plasma levels after AMI are dependent on the presence of myocardial viability is unclear.

The aim of the study was to estimate the relation between plasma levels of TNF-alpha and IL-6 and the presence of reversible and irreversible myocardial dysfunction in pts early after AMI treated thrombolitically.

**Material and methods:** In 32 pts (mean age 59.8 ± 12.4) with AMI plasma levels of TNF-alpha and IL-6 were evaluated on the 2nd and 10th day after thrombolysis. Based on the response of dysfunctional segments of myocardium to dobutamine infusion pts were divided into four groups: A – sustained improvement of contractility, B – biphasic (improvement followed by worsening), C – only worsening, D – no change. Myocardial viability was evidenced by improvement of systolic function in at least 2 contiguous segments.

**Results:** No significant differences among all four groups in plasma levels of TNF-alpha and IL-6 were found on the 2nd day after thrombolytic treatment. On the 10th day plasma levels of both TNF-alpha and IL-6 decreased in all four groups and were the lowest in group A, intermediate in group B and the highest in the group C and D.

<table>
<thead>
<tr>
<th></th>
<th>2nd day</th>
<th>10th day</th>
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</thead>
<tbody>
<tr>
<td>TNF</td>
<td>33.2 ± 8.6</td>
<td>14.6 ± 6.3*</td>
</tr>
<tr>
<td>IL-6</td>
<td>106.2 ± 22.8</td>
<td>66.1 ± 19.7*</td>
</tr>
</tbody>
</table>

*p < 0.05 vs 2nd day; **p < 0.01 vs 2nd day; #p < 0.05 vs A, vs C, vs D; &p < 0.05 vs C, vs D

**Conclusion:** Decrease in plasma levels of TNF-alpha and IL-6 in early phase after AMI is more pronounced in patients with myocardial viability in infarct zone (group A and B). This decline in plasma cytokines levels is attenuated by the presence of residual ischemia in these patients (group B).
304 Quantitative myocardial contrast echo parameters are better predictors of ventricular recovery after acute myocardial infarction treated with primary angioplasty than final angiographic data.

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TIMI myocardial perfusion grade (TIMI MFG) and quantitative myocardial contrast echo (MCE) can assess microcirculation integrity after primary PTCA (PPTCA) and could be useful to evaluate prognosis after acute MI. The aim of our study is to compare accuracy of both methods to predict myocardial function recovery during follow-up in acute MI.

Methods: MCE studies were performed after PPTCA in 27 p with acute MI with Contrast Pulse Sequencing (CPS, a new real-time technique from Acuson-Siemens)® and Sonovue in continuous infusion. Sequences of 300 frames with a temporal resolution of 50 ms were acquired in apical views, digitally stored and processed with proprietary software. Final angiographic result was assessed with TIMI blood flow classification and TIMI MFG. 68 akinesic segments (S) were selected for MCE analysis. A qualitative score from 0 to 2 (0=no contrast; 1=patchy contrast; 2=homogeneous contrast) was assigned to each S. A mean MCE score was calculated for each p. Quantitative analysis was done as follows: time-myocardial contrast intensity (MCI) curves were obtained and after fitting to an exponential curve, MCE derived A (plateau MCI), B (rate of MCI rise) and their product AxB were calculated for each S. 2D echocardiography was performed 3 months later to assess improvement in wall motion systolic index (WMSI). Mean MCE parameters were also calculated for each p. A 2D echocardiography was performed 3 months later to assess improvement in wall motion systolic index (WMSI). Results: No significant differences in MCE score were observed between p with or without improvement in wall motion systolic index (WMSI). Calculated for each p. A 2D echocardiography was performed 3 months later to assess improvement in wall motion systolic index (WMSI). Mean MCE parameters were also calculated for each p. A 2D echocardiography was performed 3 months later to assess improvement in wall motion systolic index (WMSI). Conclusion: TIMI myocardial perfusion grade (TIMI MFG) and quantitative myocardial contrast echo parameters are better predictors of ventricular recovery after acute myocardial infarction treated with primary angioplasty than final angiographic data.

305 Strain rate imaging in patients with coronary artery disease after 10 weeks training at different intensities.

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Purpose: Physical exercise is strongly recommended in both primary and secondary prevention of coronary artery disease (CAD), but data on effects of exercise intensity are sparse. Thus, the aim of the study was to evaluate the effects of two different aerobic exercise-training programs of uphill treadmill walking on maximal oxygen uptake (VO2peak), myocardial contraction and peak myocardial blood flow using ultrasound Strain Rate Imaging (SRI).

Methods: 17 subjects with angiographically documented CAD were enrolled in the study. They were randomly assigned to either moderate (M) (40 min continuous walking at 50-60% of VO2 peak) or high (H) intensity exercise (4 x 4 min interval walking at 80-90% of VO2peak). Training was carried out under supervision 3 times per week for 10 weeks. Peak systolic strain rate (SR) was calculated in a 16-segment model of the left ventricle (LV), and the mean value for each subject was used in analysis. Because of the between-group difference at pretest and to avoid regression-towards-the-mean, changes in SR were computed by analysis of covariance (ANCOVA) (postSR = c + preSRb + groupb).

Results: VO2peak increased more after high than moderate training intensity (32 vs 38 to 32 vs 34, p<0.05). 227 of 272 segments were analysable with SRI at both tests. For both groups together, mean SR was unchanged from pre to posttest (1.12 vs. 1.14 ± 0.72, p=0.05). No significant correlation was observed between MCE score and TIMI MFG blood flow classification (R=0.21, p=0.4) nor TIMI MFG (R=0.28, p=0.3). When angiographic data were compared with the quantitative MCE parameters, no significant correlation with any of them was observed (the highest correlation was found between TIMI MFG and myocardial blood flow index) (R=0.39, p=0.1). Perfusion MCE parameters correlated well with WMSI improvement, especially (B (R=0.58, p=0.01) and AxB (R=0.61, p=0.009), whereas no significant correlation was seen between TIMI MFG and WMSI improvement (R=0.1, p=0.8).

Conclusion: No correlation is observed between TIMI MFG and MCE parameters after PPTCA. Quantitative MCE analysis provides better information concerning ventricular function recovery during follow-up than final angiographic data after primary PTCA.

307 The impact of early infarct expansion on late ventricular remodelling - an echocardiographic five-year follow-up.


Left ventricular remodelling after anterior myocardial infarction (AMI) has been related to location and size of AMI, and patency of the infarct related artery. The role of infarct expansion on late ventricular remodelling has not been well defined. Aim: To assess the impact of early infarct expansion (IE) on late ventricular remodelling during a five-year echocardiographic (echo) follow-up period after AMI. Additional, we have studied whether IE differs between patients (pts) with or without thrombolysis.

Methods: We have studied 58 pts with AMI admitted in our Institute, (mean age 56±5 years; 58 males; 32 given thrombolytic therapy) by 2D-echo, on days: 1, 7, 30 and 12 months and 6 and also 1.5, 4.5 years after AMI. We have determined LV end-diastolic (EDI) and end-systolic (ESI) volume indexes; ejection fraction (EF)-calculated by Simpson's rule; infarct expansion index (IEI) -defined as endocardial circumference/thickness ratio; mean thickness of asynergic/thickness of non-asynergic segment. We defined infarct expansion as: IEI>1 and/or TR<0.75 and/or in total endocardial length with 5% on day 7 in the same views. Results: In pts who had IE on day 7 after AMI, we observed a progressively increase of EDI and ESI and decrease of EF from 1 month exam (p<0.01), to 6 month (p<0.01), to 12 month (p<0.001) and to 59 month (p<0.0001). In pts with IEI<1 and/or TR>0.75 on repeated exams we haven’t found significant differences of EDI, ESI and IE (see table below)

Time-dependent ventricular remodelling

**Thrombolysis**

<table>
<thead>
<tr>
<th>Time</th>
<th>No thrombolysis</th>
<th>p</th>
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<tbody>
<tr>
<td>7 day</td>
<td>5 years</td>
<td>7 day</td>
</tr>
<tr>
<td>EDI(mm)</td>
<td>76±16</td>
<td>94±21</td>
</tr>
<tr>
<td>ESI(mm)</td>
<td>41±16</td>
<td>68±19</td>
</tr>
<tr>
<td>EF(%)</td>
<td>46±4</td>
<td>36±5</td>
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</tbody>
</table>

Conclusions: Our study showed that the pts with early IE after AMI (accompanied by IEI and TR) evolved with increasing left ventricular volumes (EDI and ESI) and progressively decreased systolic function that have continued for 5 years after AMI. We found no significant differences between patients with or without thrombolysis.
308
Corrected TIMI frame count correlates with stenosis severity and predicts functional improvement after percutaneous coronary intervention.

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Introduction: The corrected TIMI frame count (cTFC) has been shown to be an index of coronary flow. Tissue Doppler imaging (TDI) can detect early ventricular dysfunction not detected by conventional methods. We hypothesize that: 1. TDI can detect abnormal regional function in non infarcted but chronically hyperperfused myocardium. 2. Improved cTFC post percutaneous coronary intervention (PCI) is associated with early functional improvement.

Methods: Twenty nine patients (M/F: 19/10, age 67±9 years) with stable angina, and without prior myocardial infarction underwent cardiac catheterization, during which wall motion analysis (centerline method), quantitative coronary angiography (QCA) and TFC (using a centerline counter on a cine viewer) was measured. All patients had a standard 2-D and Doppler echocardiography and Pulsed wave TFC of systolic (Sm) and diastolic velocities (early: Em, late: Am) from the perfusion territories of the left anterior descendens (LAD), the circumflex (CX) and the right coronary artery (RCA), using the apical views, before and 24 hours after PCI.

Results: All patients underwent elective PCI (19 LAD, 4 CX and 6 RCA stenoses, range 61±84%). There was TIMI grade 3 flow before and after PCI. Regional wall motion (centerline method and wall motion score with echocardiography) was normal in all patients before and after PCI. Significant improvement in the following parameters was observed post PCI (mean ± SD): QCA, 72±12% to 8±1%; cTFC, 35±19 to 22±8; Sm, 5±4.1 to 8±1.1; p <0.005 for all. An improvement was also seen in diastolic function E/A ratio from 0.87±0.23 to 0.97±0.2. A significant correlation was found between cTFC and stenosis severity pre PCI (r=0.58, p=0.0028), and the improvement in cTFC and the regional Sm values post PCI (r=0.79, p<0.0001).

Multiplication regression analysis showed that only improvement in the cTFC was important in predicting regional functional recovery within 24-hours post PCI (p=0.0005). In conclusion, TDI could detect regional abnormal function in non infarcted but hyperperfused myocardium, which was undetected by conventional methods. The cTFC correlates with stenosis severity, and that improvement in cTFC (coronary flow) predicts early functional recovery after PCI.

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How many patients with ischemic left ventricular dysfunction do recover in contractile function following revascularization?

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1Erasmus Medical Center Rotterdam, Cardiology Dept., Rotterdam, Netherlands; 2Leiden University Medical Center, Cardiology, Leiden, Netherlands

Background: Contractile function in patients with ischemic left ventricular (LV) dysfunction may improve after myocardial revascularization. Currently, the incidence of recovery of contractile function following revascularization in these patients is unclear.

Methods and Results: To assess the incidence of improvement of function after revascularization, 258 consecutive patients (age, 59±12 years) with a severely depressed left ventricular ejection fraction (LVEF) due to chronic coronary artery disease, and heart failure symptoms were studied. All patients underwent radionuclide ventriculography and resting 2D echocardiography before and 3 to 6 months after revascularization. At baseline, 130 (32%) segments were normal and 2775 (68%) were dysfunctional. Improvement following revascularization was present in 736 (27%) of the 2775 dysfunctional segments. Overall, LVEF improved from 29±7 to 32±9 (p<0.0001). A clinically significant improvement of LVEF (>5% postrevascularization) was present in 101 (39%) patients. Improvement of LVEF following revascularization was frequently observed in patients with a more severely impaired baseline LVEF. At least 3 segments with improvement of function were needed for an improvement of LVEF ≥ 5%.

Conclusions: Myocardial revascularization resulted in a clinically significant improvement of LVEF in 39% of patients with ischemic LV dysfunction. Improvement of LVEF following revascularization was frequently observed in patients with a more severely depressed LV function.

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Echocardiographic predictors of short term evolution of patients with cardiogenic shock.

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Aim of the study: Echocardiography is one of the main methods of evaluation and follow-up of patients with acute myocardial infarction, but little data exists yet on the echocardiographic parameters that could be used in assessing the prognosis of patients with cardiogenic shock. We aimed to evaluate the role of early echocardiography in determining the short-term (in hospital) prognosis of these patients.

Material and Methods: 626 patients (pts), mean age 65±12 years old, hospitalized between June 1999 - Oct 2002 in our Department with a diagnosis of acute myocardial infarction (AMI). Forty-seven seven pts (7.5%) developed cardiogenic shock. Clinical criteria for CS were hypotension (SBP<90 mmHg) for at least 30 minutes, signs of organ hyperperfusion, confirming hemodynamic or radiographic features. Cardiovascular death during hospitalization was considered as the main end-point.

Results: All pts underwent echocardiographical study within 24 hours from hospitalization. Cardiovascular death during the hospitalization period occurred in 23 pts (3.7%). In the early echocardiographic study, we found: 1. TDI could detect regional abnormal function in non infarcted but hyperperfused myocardium. 2. The corrected TIMI frame count (cTFC) is an index of coronary flow. Tissue Doppler imaging (TDI) can detect early ventricular dysfunction not detected by conventional methods. 3. Improved cTFC post percutaneous coronary intervention (PCI) is associated with early functional improvement. 4. Corrected cTFC correlates with stenosis severity, and that improvement in cTFC (coronary flow) predicts early functional recovery after PCI.

Echocardiographic parameters that could be used in assessing the short-term (in hospital) prognosis of patients with cardiogenic shock.