In chapter 1 we describe a short introduction and the outline of this thesis.

In chapter 2 a systemic review and meta-analysis is performed evaluating the prognostic value of viability tested with low dose dobutamine echocardiography early after acute myocardial infarction. The main finding of this meta-analysis is that significantly more ischemic events occur in patients with proven viability early after AMI (not treated with primary PCI), without differences in mortality. This increase in ischemic events results in a more than twofold increase in revascularization procedures in viable patients.

The conclusion of this meta-analysis seems to have clinical implications. As it appears that viability detects a potential substrate for ischemic events, an invasive approach in viable patients might be beneficial by addressing the infarct related artery (IRA) in order to reduce future ischemic events. Therefore, randomized studies are needed to investigate the prognostic value of viability after AMI in patients not treated with primary PCI, comparing optimal medical treatment with a revascularization strategy.

In chapter 3 we describe the rationale and design of the VIAMI trial. A randomized clinical trial investigating whether or not a strategy of viability guided angioplasty with stenting after AMI in patients treated with thrombolysis (or who were too late for reperfusion therapy), would reduce the occurrence of a composite end point of death, reinfarction, or unstable angina. All inclusion and exclusion criteria are described extensively with the definitions of the primary and secondary end points.

Chapter 4 addresses the main results of the VIAMI trial after 1 year follow up. Eventually, we randomly assigned 216 patients with viability (demonstrated with low-dose dobutamine echocardiography) to an invasive or a conservative strategy. In the invasive group (106 patients) stenting of the infarct-related coronary artery was intended with abciximab as adjunct treatment. In the conservative group (110 patients) an ischemia-guided approach was adopted with stress testing before hospital discharge. After a positive test for ischemia coronary angiography was strongly recommended. Seventy-five (75) patients without viability served as registry group.

Patients with viability in the infarct-area significantly benefit from an early invasive strategy. The primary combined endpoint of death, recurrent myocardial infarction and unstable angina was 7.5% in the invasive group and 17.3% in the conservative group (Hazard ratio 0.42; 95% CI 0.18-0.96; p=0.032).

Importantly, there were no significant differences between patients treated with or without fibrinolysis. Both patient groups showed the same benefit. This invasive approach results in a clear reduction in ischemic events and a long-term uneventful clinical course. In the patients without viability, the risk of recurrent ischemia remains low.

In chapter 5 the long-term follow up of patients included in the VIAMI-trial are described (median 8 years). In total 291 patients were enrolled in the VIAMI-trial.
During the long-term follow-up 14 patients were considered lost to follow-up (4.8%).
The first year clinical benefit of in-hospital stenting of the infarct-related coronary artery is sustained during long-term follow-up in patients with acute myocardial infarction and proven viability in the infarct-area. The combined endpoint of death, recurrent myocardial infarction and unstable angina was 20.8% in the invasive group and 32.7% in the conservative group (Hazard ratio 0.59; 95% CI 0.36-0.99, p=0.049).

In chapter 6 the results of the echocardiographic follow up of the VIAMI-trial are shown. We retrospectively investigated 224 patients with a well evaluable baseline and follow up echocardiogram. Patients underwent viability-testing within 72 hours after AMI. Follow up echocardiography was performed at a mean of 205 days. In this echocardiographic sub-study patients were divided in three groups. Group 1: viable and revascularized before follow up echocardiogram. Group 2: viable but medically treated. Group 3: non-viable patients. Revascularization in the patients with viability in the early phase after AMI results in a significant improvement in left ventricular (LV) function. Without revascularization, these patients experience an increase in LV-volumes but with conservation of LV ejection fraction. The absence of viability results in ventricular dilatation and deterioration of the LV ejection fraction, irrespective of revascularization status. The number of viable segments and revascularization during the follow up period are independent predictors for LV ejection fraction improvement, especially in patients with lower ejection fraction at baseline.

In chapter 7 a prediction model for myocardial viability with the use of electrocardiographic parameters (admission and discharge) is developed. Of all patients who were initially included in the VIAMI-trial, 213 patients with proven viability and 72 without viability had well evaluable electrocardiograms. The number of pathological Q waves, persistent ST-segment elevation with positive or negative T waves on discharge ECG were all strong independent negative predictors for the present of myocardial viability (area under the curve (AUC) of 73%, 95% CI 66-80%). To calculate scores that can easily be used in practice to determine the risk of myocardial viability, regression coefficients were converted to risk scores. Especially in the low (1-3) and high (≥16) values, our model is useful in clinical practice with high and respectively low probabilities of myocardial viability. For the intermediate risk values (4-15) alternative testing should be recommended.

In chapter 8, the main conclusions are described with discussion about future perspectives of the assessment of myocardial viability in patients with coronary artery disease.