insufficiently reflect the complete ventricular mass electrically activated. The application of electrical precordial mapping is time consuming, and may not detect the information content as recorded by magnetocardiography. Magnetocardiographic precordial mapping (MCG) with synchroneous recording of 49 channels using SQUID sensors was performed in a magnetically shielded room (background noise < 5 fT/$\sqrt{Hz}$) in normal persons (norm), in post-myocardial infarction patients (post-MI pts) and in patients prone to sustained ventricular tachycardia (VT-pts). Visual or automatic definition of the T-wave's end in single channels was unreliable with or without filtering due to the high sensitivity of the recording. Thus, the dispersion was determined by analysing the synchronicity of the end of T-wave: the amplitudes of all tracings were normalized, summed up and filtered. The QT-dispersion was quantified in this sum curve as the negative slope of the end of the T-wave, indicating a non-homogeneity of cardiac repolarization.

Results:

| Group | N | Downslope of MCG-T-wave map |
|---|---|---|
| Norm | 25 | −2.6 ± 1.3 |
| Post-MI-pts | 30 | −1.7 ± 0.9 |
| VT-pts | 12 | −1.2 ± 0.9 |

significance: norm vs post-MI: p = 0.002, norm vs VT-pts: p = 0.004, post-MI vs VT-pts: p = 0.05

Thus, the inhomogeneity in repolarization in the 49-channel precordial magnetocardiographic mapping is indicated by a slow downslope of the end of the combined T-wave in VT-patients. This downslope is intermediate in post-MI-patients without arrhythmias and steep in normals.

## 1018-50 Analysis of Phase and Envelope of High Frequency Components in the Magnetocardiogram to Identify High Risk Patients

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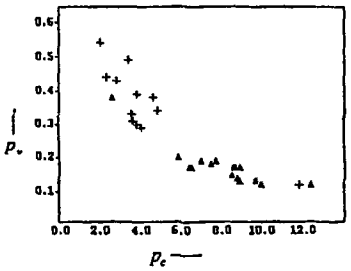
Low amplitude fragmented cardiac signals are usullay not detectable within the QRS complex due to inadequate filtering; variable signals are eliminated by the signal averaging technique. To investigate if low amplitude cardiac signals within the QRS complex different from background noise characterize patients (pts) with high risk of malignant tachyarrhythmias, single-beat high resolution magnetocardiographic recordings (MCG) of 16 normal persons (NORM) and 12 patients mit ventricular tachyarrhythmias (VTVF) were investigated. Multichannel MCG was recorded in a highly shielded room with a background noise of < 5 fT/$\sqrt{Hz}$. Complex binomial bandpass filtering (70–100 Hz) was applied to preserve fragmented activity during ventricular activation (i.e. within the QRS). Unpredictable ($P_v$) and periodic changes ($P_c$) of the low amplitude fragmented signals within QRS were calculated by analysis of phase and envelope of these signals (representing combined time and frequency analysis) and graphically displayed.

*Results:* Presentation of $P_v$ and $P_c$ of cardiac low amplitude signals in consecutive single-beat analysis. Identification of periodic, however variable micropotentials within and after the QRS complex, differentiating NORM from VTVF (N: normal persons, +: VTVF persons).




Single-beat analysis of high resolution magnetocardiogram using binomial filtering and 2-dimensional spectrotemporal analysis identified variable irregular micropotentials even with the QRS to identify patients with malignant tachyarrythmias.

## 1018-51 Non-Invasive Recording of the Arrhythmogenic Substrate Within the QRS-Complex Using Magnetocardiography

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Electrical instability of the ventricular myocardium is characterized by fragmented electrograms during its activation. Signal averaged ECG (SAECG) only detects "late potentials" longer than the QRS-complex. To investigate the clinical significance of pathologic activation within the total QRS complex, high-resolution magnetocardiographic mapping was performed in 26 normal persons (NORM), 32 post-MI patients (33 ± 7 days after MI) without symptomatic arrhythmias (aMI-pts), and in 24 pts with ventricular tachycardia (VT-pts). The magnetocardiogram (MCG) was recorded in a shielded room (multi-sensor SQUID-system, 37 channels, noise < 5 fT/$\sqrt{Hz}$) and analyzed using binomial non-recursive filtering providing a linear phase response of the MCG. A score (FI) characterized the extent of the intraventricular fragmentation. MCG results were compared to signal average ECG findings (SAECG).

*Results:*

| Group | FI | Positive SAECG |
|---|---|---|
| NORM | 20 ± 6 | 0/27 |
| aMI-pts | 28 ± 11 | 3/32 |
| VT-pts | 50 ± 17 | 11/22 |

NORM vs aMI: p = 0.002, NORM vs VTVF: p = 0.0001, aMI vs VTVF: p = 0.0001

During 1-year-follow-up of the post-MI pts, 2 pts having higher score values (34, 40, resp.) suffered from arrhythmic events.

Thus, high-resolution magnetocardiographic mapping with QRS analysis using new filtering techniques allowed identification of patients prone to malignant tachyarrhythmias and may reveal a prognostic relevance.

## 1018-52 Clinical Significance of Ventricular Late Potentials in Idiopathic Dilated Cardiomyopathy — A Prospective Study in 120 Patients

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Signal-averaged ECG (SAECG) was performed in 120 patients with idiopathic dilated cardiomyopathy (DCM, 50 ± 12 years, EF 31 ± 11%). DCM was defined as cardiomegaly with left ventricular EF ≤ 50% in the absence of any coronary stenosis > 50% by angiography, and no history of hypertension or valvular disease. All 120 study patients with DCM were prospectively followed beginning from the time of SAECG analysis until May 1995. Major arrhythmic events during follow-up were defined as sustained VT or VF, or sudden cardiac death, i.e. death within 1 hour after the onset of symptoms or unwitnessed death.

In patients without bundle branch block (n = 82), time domain analysis of the SAECG (Corazonics PREDICTOR) was used to detect late potentials. Late potentials were considered to be present if 1) QRS-duration was > 114 ms, and 2) RMS 40 was < 20 μV and/or LAS 40 was > 38 ms at 40 Hz filtering. In patients with bundle branch block (QRS > 110 ms; n = 38), spectrotemporal analysis of the SAECG was performed automatically with the use of software (FFT-Plus, ART). Late potentials were considered to be present if a normality factor of < 30% was derived from analysis of the x, y or z lead.

*Results:* SAECG revealed ventricular late potentials in 22 of 120 patients with DCM (18%). During 11 ± 6 months follow-up, 14 of 120 study patients with DCM (12%) had a major arrhythmic event as defined above. Major arrhythmic events did occur in 3 of 22 patients with late potentials (14%) and in 11 of 98 patients without late potentials (11%). Sensitivity, specifity, positive and negative predictive accuracy of late potentials for the occurrence of major arrhythmic events were 21%, 82%, 14% and 89% respectively.

*Conclusion:* In this selected patient population with idiopathic dilated cardiomyopathy, ventricular late potentials detected by SAECG have a low sensitivity and a low positive predictive accuracy for the occurrence of major arrhythmic events during follow-up.