

(age, 60 ± 8 yr; male, 68%; diabetes, 35%; duration of hemodialysis therapy, 8 ± 7 yr), short- and long-term scaling exponents (α_1 and α_2) and approximate entropy (ApEn) of 24-hour heart rate dynamics along with traditional time- and frequency-domain heart rate variability (HRV) were analyzed. The patients were subsequently followed up for 31 ± 20 months and the prognostic value of these measures were examined.

Results: During the follow-up, there were 27 deaths (33%); 19 from cardiac causes and 8 from non-cardiac causes. Cox proportional hazards model including age, diabetes, hematocrit, left ventricular ejection fraction and number of diseased coronary arteries revealed that $\alpha_2 > 1.2$, ApEn < 0.77 , triangular index (TI) < 21.5 and ultra-low-frequency power (ULF) < 8.47 ($\ln[\text{ms}^2]$) were independent predictors of both all-cause and cardiac death. The predictive power of α_2 and ApEn were greater than and independent of that of TI and ULF. The combinations of two categories of measures provided a much greater predictive accuracy than each single measure; the positive and negative predictive accuracy of high α_2 + low-ULF for all-cause death were 100% and 76%, respectively, and those of low ApEn + low-ULF for cardiac death were 89% and 85%, respectively.

Conclusion: Alterations of nonlinear heart rate dynamics reflecting increased long-term fractal correlation (α_2) and decreased complexity (ApEn) are independent predictors of death in chronic hemodialysis patients with CAD. Their predictive power is more powerful than that of traditional HRV and combinations of the two categories of measures provide an excellent predictive accuracy that allows clinical use for detecting high risk patients.

1068-118 Circadian Rhythm of Atrioventricular Conduction Predicts Long-Term Survival in Patients With Chronic Atrial Fibrillation

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Background: Lorenz scatter plot of R-R intervals during atrial fibrillation (AF) shows a characteristic sector pattern, in which the 1.0-sec intercept of lower envelope (LE1.0) and the degree of scatter above the envelope (scattering index) provide estimates of the refractoriness and concealment of atrioventricular (AV) conduction, respectively. In patients with chronic AF, these measures show clear circadian rhythms, but the rhythms are blunted in patients with congestive heart failure and chronic AF.

Methods: To examine if alteration in circadian rhythm of AV conduction in chronic AF has prognostic value, we studied a retrospective cohort of 120 patients whose 24-hour Holter ECG at baseline was analyzed with sequential Lorenz scatter plots.

Results: During an observation period of 33 ± 16 months, there were 25 deaths (21%); 13 from cardiac causes and eight from fatal stroke. In all patients both LE1.0 and scattering index showed significant circadian rhythms with acrophases occurring at night; however, in patients dying subsequently from cardiac cause, but not in those from fatal stroke, the circadian rhythms were blunted (the amplitudes were $< 55\%$ of those in surviving patients). Furthermore, reduced circadian amplitude of scattering index predicted cardiac death even after adjustment of coexisting cardiovascular risks (adjusted relative risk [95% confidence interval] per 1-SD decrement, 4.24 [1.54 to 11.6]). When the patients were divided by circadian amplitude of scattering index at 36.5 ms (minus 1-SD), the 5-year cardiac mortality below and above the cutoff were 57% and 6%, respectively (log-rank test, $p < 0.001$).

Conclusions: Blunted circadian rhythm of AV conduction is an independent risk for cardiac death in patients with chronic AF.

MODERATED POSTER SESSION

1090MP Moderated Poster Session...Prevalence, Pathophysiology, and Treatment of Atrial Fibrillation

Monday, March 18, 2002, 9:00 a.m.-11:00 a.m.
Georgia World Congress Center, Hall G

9:00 a.m.

1090MP-121 Hospitalizations for Arrhythmias in the United States, 1985 Through 1999: Importance of Atrial Fibrillation

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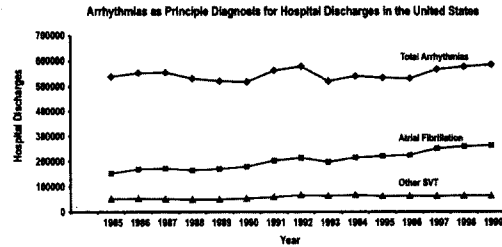
Background: Understanding secular trends in hospitalizations (Hosp) for arrhythmias in the United States is necessary to allow for future estimates of health care utilization.

Methods: Hosp for arrhythmias as a principal discharge diagnosis in the United States were analyzed over the 15-year period from 1985 through 1999. The data were derived from a computerized database (HCIA, Inc., Baltimore, MD) consisting of several million individual patient discharges annually from 1000 or more short-term, general, non-federal hospitals, with statistical projection onto the "universe" of patient discharges.

Results: From 1985-1999, Hosp for arrhythmias increased by 9%. The largest change occurred in the supraventricular tachycardia (SVT) category, which saw a 61% increase over that time period and accounted for 56% of all arrhythmia Hosp by 1999. The increase in SVT Hosp was almost entirely due to Hosp for atrial fibrillation - which, by 1999, accounted for 81% of SVT and 45% of all arrhythmia Hosp, with a 3.5 day average length of stay.

Conclusions: Hosp for arrhythmias in the United States grew during the 1985-1999 time period, largely driven by a 1.7-fold increase in the atrial fibrillation category. This secular trend may represent a true increase in the incidence of atrial fibrillation, and/or a greater

clinical awareness of this arrhythmia. Regardless of the reason, these data suggest that Hosp for atrial fibrillation will have a significant impact on cardiac health care costs for the foreseeable future.



9:12 a.m.

1090MP-122 Pulmonary Vein Macroscopic Characteristics in Humans: Possible Presence of Conduction Pathways During Atrial Fibrillation

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Background: Focal sources of atrial fibrillation (AF) have increasingly been reported to be arising from the pulmonary veins (PVs). Circular mapping techniques have shown the PV's stimuli exits to the left atrium. Detailed description of the PVs macroscopic and histologic characteristics are scanty. There are no studies that focus of the relationship between PV structure and ectopic foci conduction into the atrium. **Methods:** A total of 80 veins were obtained from 22 autopsies. There were 14 men, the median age at death was: 58 ± 23 years, three subjects had a history of AF (1 chronic, 2 paroxysmal). The PVs were cut at the atrial venous junction and at the lung hilus and divided in 3 segments: proximal (atrial venous junction), middle and distal (hilus level). A cut following the long axis of the vessel was done to study the macroscopic characteristics of the lumen. The tissue was processed for histological analysis using hematoxylin-eosin staining. **Results:** There were no differences in macroscopic and histologic characteristics between samples from individuals with AF and controls. The macroscopic examination of 77 vessels (96%) demonstrated folds of tissue on the luminal side. The folds run parallel to the long axis of the vessel in all cases at the middle and distal segments. There was an abrupt change of the morphology at the ostial level in 64 veins (80%) manifested as a "crest-like" structure perpendicular to the folds. The histological analysis showed myocardial sleeves oriented following the long axis of the vessel in the middle and distal portions of the vein in 90% of the samples. This is very different from the ostial level where the orientation of the myocardial fibers runs in spiral manner in 70% of the samples. These findings were independent of the subject age or sex. **Conclusions:** The orientation of the myocardial PV sleeves seen histologically might be responsible for the luminal folds in our samples and may represent preferential conduction pathways of the PV impulses to the left atrium.

9:24 a.m.

1090MP-123 Inflammation Predicts Incident Atrial Fibrillation: Insight From the Cardiovascular Health Study

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Introduction: Inflammation may mediate the onset or persistence of atrial fibrillation (AF). The influence of markers of inflammation, such as C-reactive protein (CRP), on the incidence of AF, however, has not been studied. Using data from the Cardiovascular Health Study (CHS), we tested the hypothesis that elevated CRP predicts the future occurrence of AF.

Methods: The study sample consisted of 5491 subjects from the CHS cohort who had CRP measured at baseline and no prior history of AF. The occurrence of AF was confirmed by self-reported history and by electrocardiograms obtained during annual follow-up visits. The hazard ratio (HR) for developing incident AF was estimated using a Cox proportional hazards model. For statistical analysis, CRP was log-transformed and entered into the model as a continuous variable. For presentation, the hazard ratio comparing the 75th percentile of CRP with the 25th percentile is given.

Results: Of the 5491 subjects with baseline CRP measured, 696 subjects (11.9%) developed incident AF during a mean follow-up of 7 years. In unadjusted analysis, elevated CRP was associated with a higher risk of developing new onset AF during follow-up (HR = 1.20, 95% CI 1.10 to 1.31, $P < 0.0001$). After adjusting for baseline characteristics including age, gender, baseline blood pressure, history of hypertension, diabetes, and coronary artery disease, CRP remained a significant predictor of incident AF (HR = 1.16, 95% CI 1.06 to 1.27, $P = 0.002$).

Conclusion: In this elderly cohort, the baseline concentration of CRP was an independent predictor of incident AF.