



CARDIAC ARRHYTHMIAS

ATRIAL PROTECTIVE EFFECTS OF N-3 POLYUNSATURATED FATTY ACIDS: A LONG TERM STUDY IN OVINE CHRONIC HEART FAILURE

ACC Poster Contributions

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Background: The role of n-3 polyunsaturated fatty acids (PUFA) in atrial fibrillation (AF) remains controversial. Little is known about their long term effects on atrial remodeling in chronic heart failure (CHF).

Methods: In this study, CHF was induced by intracoronary doxorubicin infusions. From a total of 20 sheep, there were: 6 PUFA treated CHF (CHF-PUFA), 7 olive oil treated CHF (CHF-CTL) and 7 control (CTL) animals. Open chest electrophysiological study was performed with assessment of bi-atrial effective refractory period (ERP) and conduction velocity. Cardiac function was monitored by magnetic resonance imaging. Tissue PUFA levels were quantified using chromatography.

Results: A 2-3 fold increase in atrial PUFA levels were seen in the CHF-PUFA group. PUFA prevented the development of CHF related left atrial enlargement but not left ventricular or atrial dysfunction. Atrial ERP was significantly lower in the CHF-PUFA group but ERP heterogeneity was unchanged. In addition, PUFA suppressed atrial conduction abnormalities seen in CHF of slowed/heterogeneous conduction and prolonged P wave duration. Duration of Induced AF episodes in CHF-PUFA was shorter although AF inducibility was unaltered.

Conclusions: In this ovine CHF study, chronic PUFA use protected against adverse atrial remodeling by preventing atrial enlargement and conduction abnormalities leading to shorter AF episodes despite lower ERP. The anti-arrhythmic effects of PUFA in CHF require further studies.

PUFA in Chronic Heart Failure

	CTL (n=7)	CHF-CTL (n=7)	CHF-PUFA (n=6)	P value (ANOVA group effect)
Atrial EPA, %	2.9±0.6	3.5±0.5	9.1±1.4†*	<0.001
Atrial DHA, %	2.1±0.2	1.8±0.5	4.3±0.1†*	<0.001
LV EF, %	44±7	36±5†	35±6‡	0.004
LA EDV, ml	29±7	40±2†	28±2*	0.001
LA ESV, ml	19±2	33±5†	21±2*	<0.001
LA EF, %	32±2	25±5†	29±3	0.008
P wave duration, ms	58±6	68±5†	61±1*	0.01
ERP (at 300ms)	171±34	184±40	134±21†*	<0.001
RA, ms	136±19	155±35	116±19†*	<0.001
LA, ms				
Conduction velocity, m/s	0.90±0.16	0.75±0.09†	0.87±0.12*	<0.001
Conduction heterogeneity index	1.20±0.33	1.37±0.35†	1.19±0.21*	<0.001
AF inducibility, %	3±3	22±28	5±5	0.2
AF duration, s	2±4	20±23†	1±1*	0.02

Post-hoc comparisons with p<0.05: †CHF-CTL vs. CTL; ‡CHF-PUFA vs. CTL; *CHF-PUFA vs. CHF-CTL.

EPA, eicosapentaenoic acid; DHA, docosahexaenoic acid; LV, left ventricular; EF, ejection fraction; LA, left atrial; EDV, end-diastolic volume; ESV, end-systolic volume; RA, right atrial; ERP, effective refractory period; AF, atrial fibrillation.