Sudden Death Due to Atherosclerotic Heart Disease in the Very Young Adult

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San Antonio, TX and Washington, DC

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Introduction

- Sudden death in young adults is uncommon and frequently attributed to genetic conditions including hypertrophic cardiomyopathy or ion channel diseases.
- Sudden death due to coronary artery disease in those less than 30 years of age is not commonly reported as an etiology.

Eckart RE, et al. *Ann Intern Med* 2004;141:829-34
Maron BJ. *N Engl J Med* 2003;349:1064-75

Study Design

- Review of non-traumatic sudden death within the Department of Defense with an available clinical record or autopsy for adjudication as to the cause of death.
- Sudden death - death or terminal life support within one hour of symptom onset.
- Cardiac death - pathologically confirmed heart disease with clinical circumstances defined as potentially cardiac in etiology or unexplained by pre-existing disease and without identifiable cause on post-mortem examination (idiopathic sudden death).
- Sponsored by the Air Force Medical Research Program (AF/SGRS).

Defining the Cohort

- 1,044 non-traumatic suspected cardiac deaths identified from 1998 to 2008.
  - Excluded 51 (5.1%) subjects for lack of clinical record or autopsy which allowed for determination of cause, 130 (12.5%) subjects for unavailability of records, and 12 (1.2%) subjects for what was determined to be a clear non-cardiac etiology.
- 902 subjects with records available for review in which adjudicated cause of death was of cardiac etiology that form the basis for the cohort under investigation.

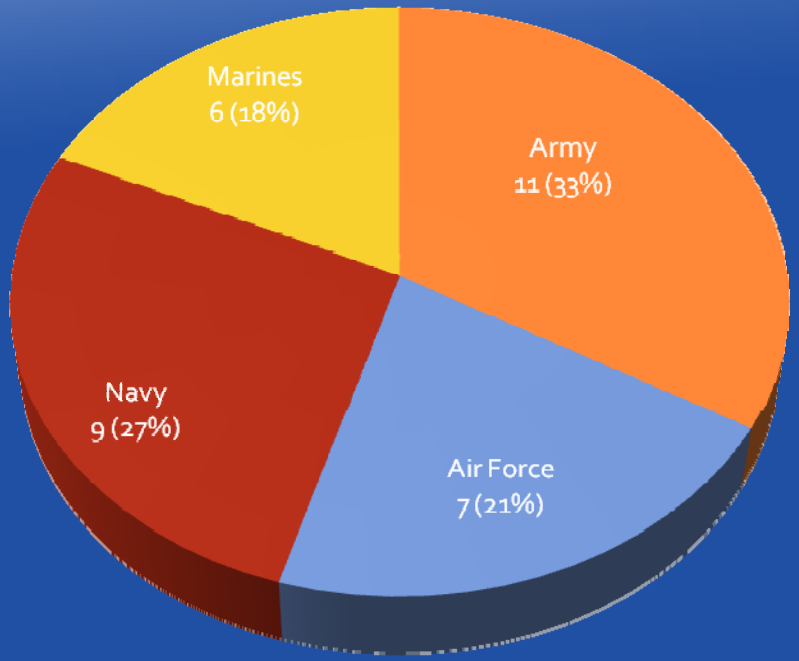
Results

	Age <30 years n=218	Age >30 years n=684	*p*-value
Age, years	24±3	43±7	<0.001
Gender, % male	205 (94.0%)	666 (97.4%)	0.030
Idiopathic SCD	101 (46.3%)	86 (12.6%)	<0.001
Cardiomyopathy	65 (29.8%)	109 (15.9%)	<0.001
Coronary Disease Atherosclerotic disease Anomalous coronary artery	51 (23.4%) 33 (64.7%) 12 (23.5%)	484 (70.8%) 478 (98.8%) 1 (0.2%)	<0.001

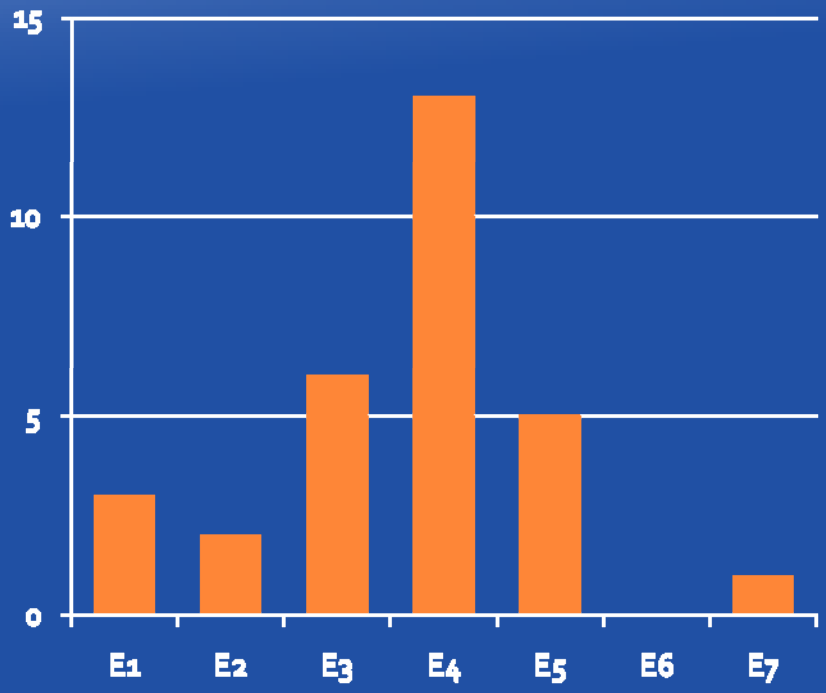
Baseline Characteristics

Military specific findings for those with death due to ASCAD <30 years of age

Branch



Pay Grade



Not shown is the 1 junior Officer

Similar clinical manifestations

	Age <30 years n=33	Age >30 years n=478	*p*-value
Body mass index, kg/m^2	28±3	29±4	0.119
Exertional death	16 (48.5%)	190 (39.8%)	0.323
Prodrome	13 (39.4%)	153 (32.0%)	0.381
Location of Death			
Out-of-hospital	7 (21.2%)	107 (22.4%)	0.672
Emergency Department	15 (45.5%)	249 (52.1%)	
In-hospital	6 (18.2%)	54 (11.3%)	
Antemortem symptoms	3 (9.1%)	58 (12.1%)	0.602

Differential expression of atherosclerotic disease

	Age <30 years n=33	Age >30 years n=478	*p*-value
Myocardial manifestation			
LV thickness, cm	1.6±0.3	1.6±0.4	0.647
Fibrosis	7 (21.2%)	149 (31.2%)	0.314
Necrosis	2(6.1%)	48 (10.0%)	0.658
Coronary artery manifestation			
Multivessel obstructive disease*	13(56.5%)	256 (77.1%)	0.041
Plaque rupture	7 (21.2%)	99 (20.7%)	0.999
Coronary thrombosis	9 (27.3%)	114 (23.9%)	0.814
Aortic atherosclerosis*	6 (30.0%)	160 (63.0%)	0.008

*limited analysis to those cases where specified

Context of Findings

Conclusion

- Sudden death due to atherosclerotic coronary artery disease in those <30 years is much higher than previous series.
- Our differences may be due to this be an active surveillance, all with complete autopsies.
- Death due to atherosclerotic coronary artery disease in the young occurs frequently without a prodrome and is often non-exertional.

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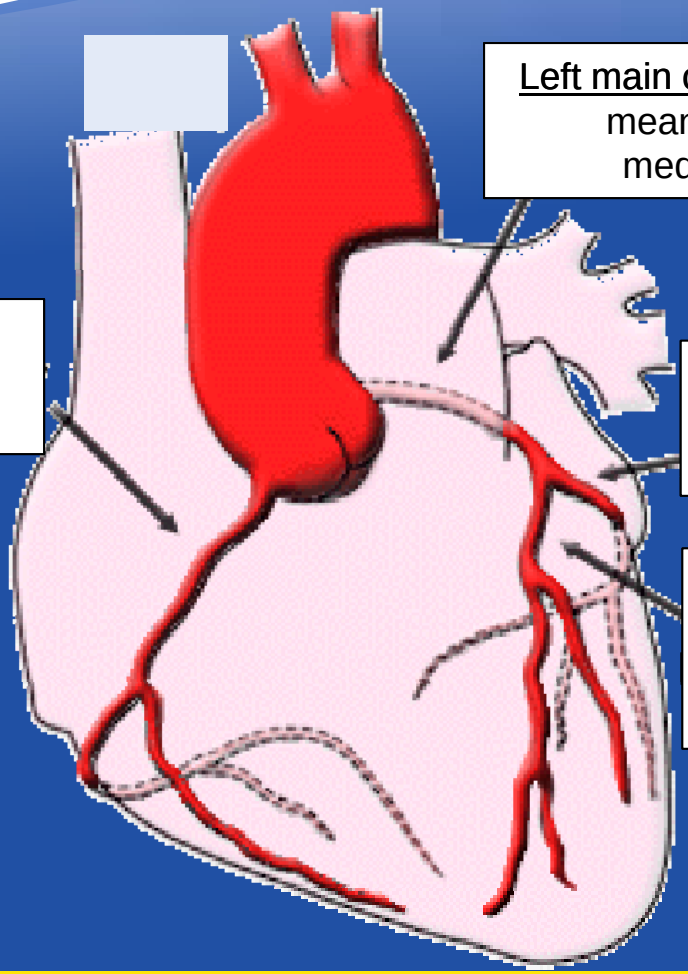
Similar clinical manifestations

	Atherosclerotic CAD n=33	Idiopathic SCD n=101	*p*-value
Age, years	24±3	24±3	0.253
Body mass index, kg/m^2	28±3	27±5	0.521
Exertional death	16 (48.5%)	46(45.5%)	0.926
Prodrome	13 (39.4%)	34 (33.7%)	0.697
Location of Death Out-of-hospital Emergency Department In-hospital	 7 (21.2%) 15 (45.5%) 6 (18.2%)	 23 (22.4%) 60(52.1%) 5 (11.3%)	0.138
Antemortem symptoms	3 (9.1%)	11 (10.9%)	0.999

Differential expression of disease



Left main coronary artery
mean 61±29%
median 68%

Right coronary artery
mean 62±25%
median 60%

Circumflex coronary artery
mean 39±19%
median 50%

Left anterior descending coronary artery
mean 75±20%
median 80%