Tactical vs. Competitive Athletes: Closing the SCA Gap

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DISCLAIMER: The opinions and assertions expressed herein are those of the authors and do not reflect the official policy or position of the Uniformed Services University or the Department of Defense CONFLICT OF INTEREST: None

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Closing the Gap – Overview

- Tactical Athlete defined
- SCD rates are higher in tactical vs. competitive athletes
- Evolution of pre-participation cardiac screening
- Modern process of cardiac screening
- Data from the Electrocardiogram Risk Assessment to reduce Sudden cardiac Events (ERASE) CV screening quality improvement project
- Post-event analysis
- Military Cardiac Arrest Program (MiCAP)

What Is A "Tactical Athlete"

1). Definition of an athlete from Bethesda Guidelines: "One who participates in an organized team or individual sport that requires regular competition against others as a central component, places a high premium on excellence and achievement, and requires some form of systematic (and usually intense) training."

2). What is Unique about the Tactical Athlete?:

a. focus is on service rather than competition

b. high demand for speed, strength, and agility in addition to endurance (burst type activity), though often intermittent

c. performance under life-threatening conditions, while carrying heavy gear and equipment

d. may perform under environmental extremes (heat, cold, altitude,weather, etc.)

e. some overlap with standard occupational medicine

f. **Outcome: survival of athlete and others, not just score**

What Is A "Tactical Athlete"

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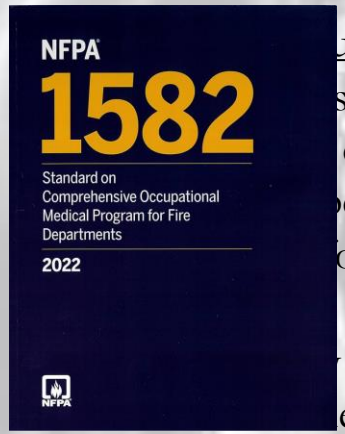
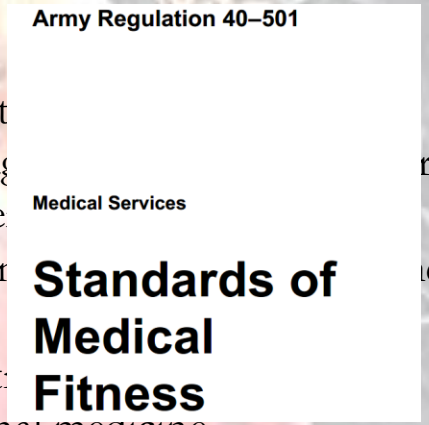
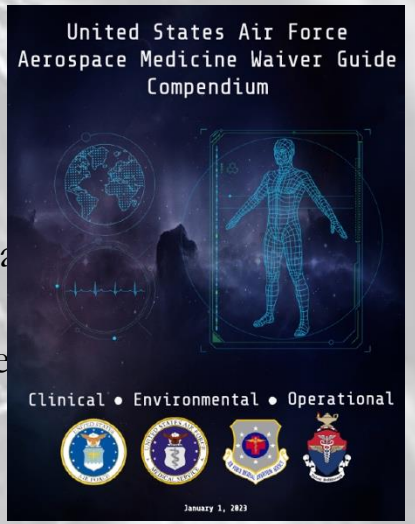






f. **Outcome: survival of athlete <u>and others</u>, not just score**

Understanding Different Roles

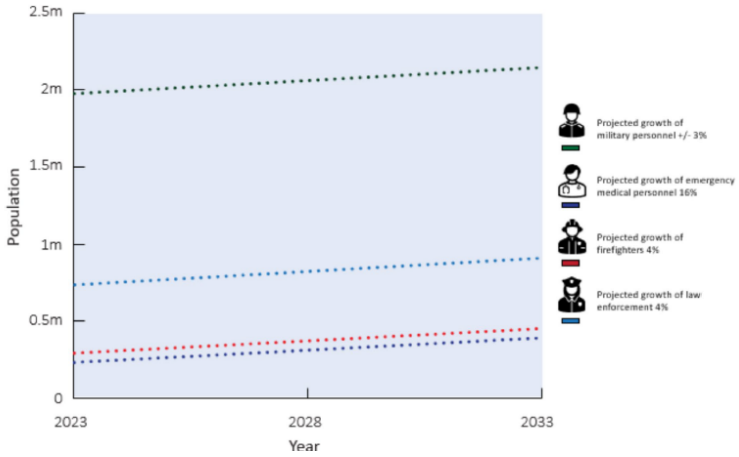
Competitive Athlete

- Competing for personal satisfaction
- Risks can be mitigated with precautions, EAP
- Failure is personal
- Shared decision making

Tactical Athlete

- Duty-bound to perform
- Austere environments preclude EAPs
- Failure has societal impacts
- Joint decision making

Tactical Athletes: Numbers



- Military: 2.1 million
- Fire: 1 million (including volunteers)
- Police: 0.8 million
- EMS: 0.3 million
  - ~2.6-5% of working US. population

- Murphy Current Treatment 2025
- https://usafacts.org/articles/how-many-people-are-in-the-us-military-a-demographic-overview/
- http://www.nfpa.org/research;
- https://nleomf.org/memorial/facts-figures/law-enforcement-facts/
- Cash J Am Coll Emerg Physicians Open. 2022

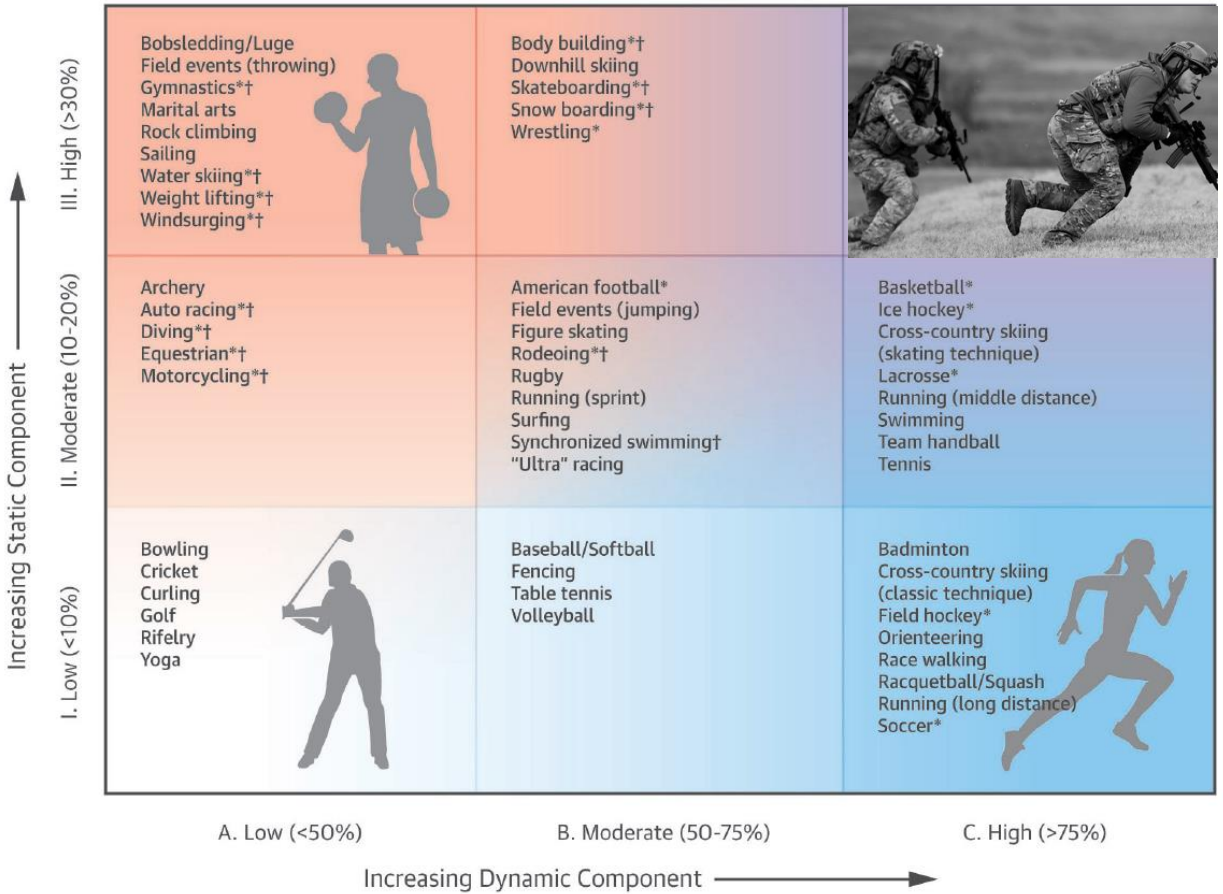
Excess CV Mortality Among TA

- Sudden Cardiac Death
  - 45% of on-duty deaths in fire-fighters
    - 2.8-14.1 fold increase in SCA during alarm period
    - 18.1/100k person-year CV mortality
    - SCD 7-fold more common than death from burns
  - 10% of on-duty law enforcement deaths SCD
    - 25% during altercations; 30-70 fold higher than non-emergency law enforcement

Varvarigou V.*BMJ*. 2014;349:g6534-g6534. Kales SN. *N Engl J Med*. Published online 2007:9

Bethesda Conference Guidelines 2015: Classification of Sports

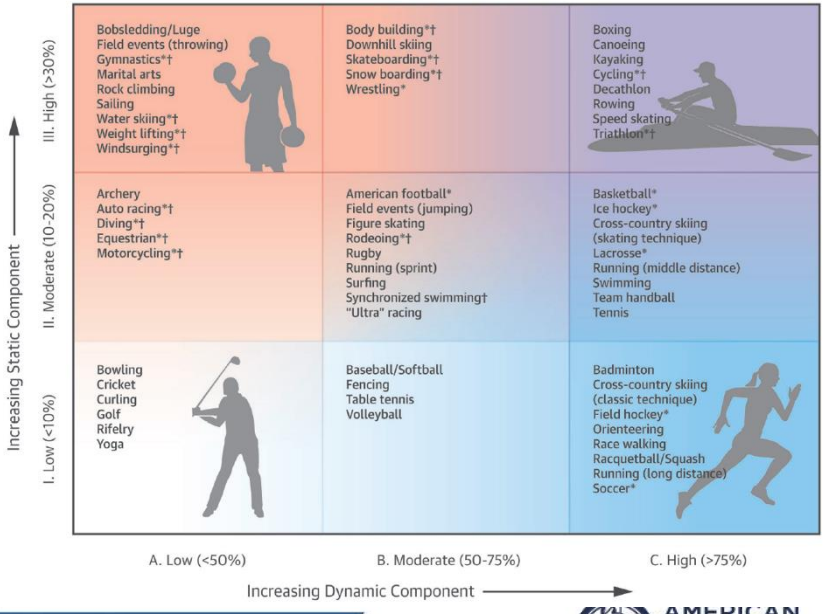
Missing:
Risk of dying
Risk of getting others killed
Environment not controlled
Time and place not chosen



ACC/AHA Cardiovascular Care of the Tactical Athlete

International Experts April 2024 at ACC Heart House in Washington to develop a Scientific Consensus

- 30+ DoD and Sports Cardiology SMEs
- 11 Task Forces
  - Evaluated the CV impact of service
  - Aortopathy; CM; Arrhythmia management
  - Anticipated publication Summer 2026



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THE PROBLEM

THE PROBLEM: Cardiac Events are More Common in Tactical vs. Competitive Athletes

NCAA:

2.3 sudden cardiac deaths per 100,000 athlete-years NCAA athletes

Harmon 2011

MILITARY RECRUITS:

13 sudden cardiac deaths per 100,000 person-years in US Military recruits

Eckart 2004

MILITARY CAREER:

FY16-19 DoD data 5.9 SCA per 100,000 PY ages 17-24

Franzos 2025

FIREFIGHTERS:

18.1 sudden cardiac deaths PER 100,000 PY

Farioli 2015

- Tactical operations are distinctly different from organized sporting events
- Medical response is constrained by the tactical situation
- Even nonfatal events in operational environments convey risk to individual, unit, and mission
- ECG can detect 80-86% of conditions associated with SCD (Mont, 2017; Malhotra, 2019)

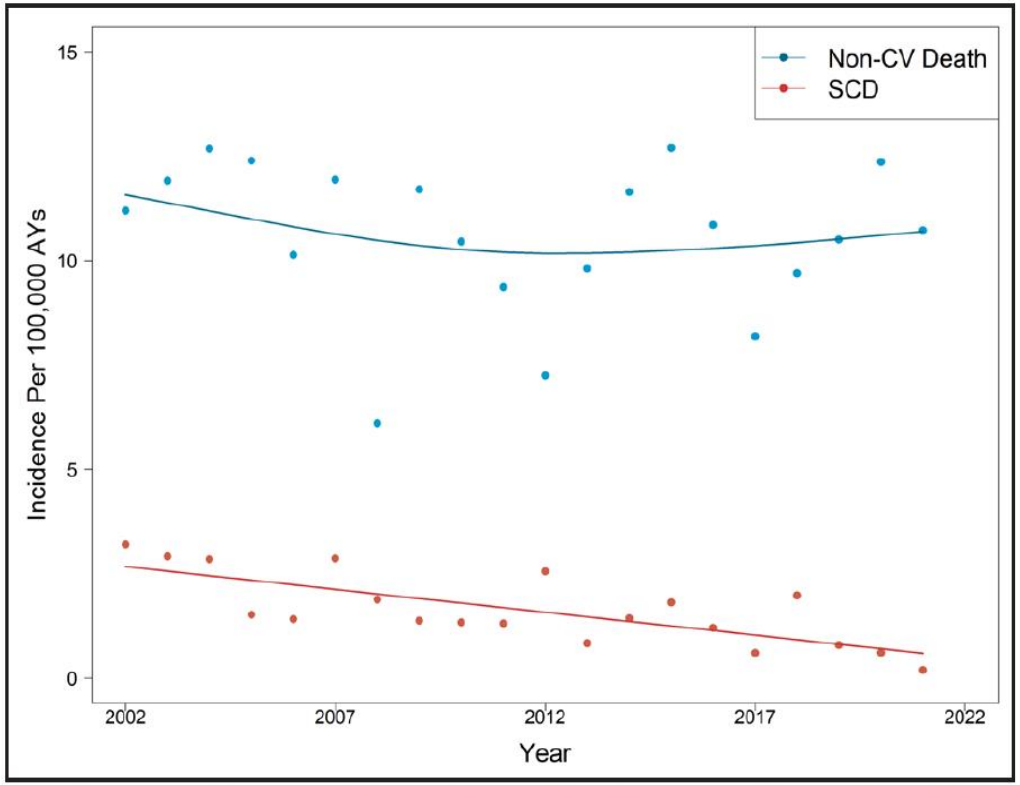


Figure 2. Yearly non-cardiovascular death and sudden cardiac death incidence among National Collegiate Athletic Association athletes.

INCIDENCE (Athlete-Years)

- **Overall = 1.57 per 100K**
- Male = 2.31
- Female = 1.55
- Black = 3.74
- White = 1.74

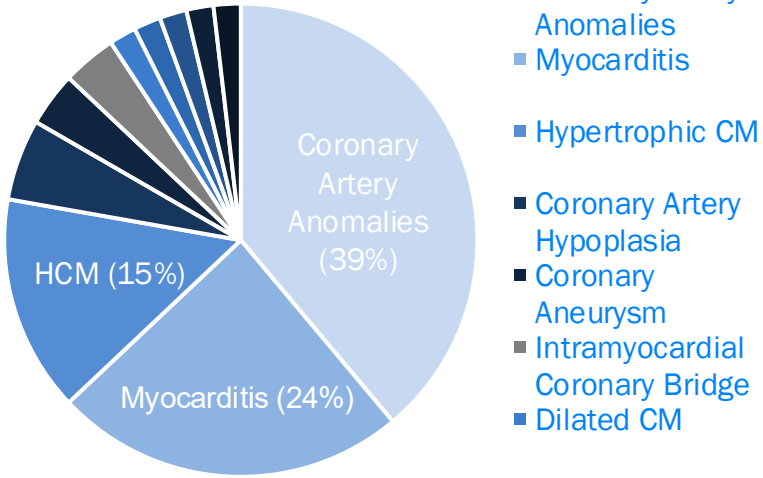
INCIDENCE RATE RATIO (95% CI):

- CV = 0.71 (0.61-0.82)
- Non-CV = 0.98 (0.94-1.04)

Petek BJ et al. Circulation 2023; DOI: 10.1161/circulationaha.123.065908

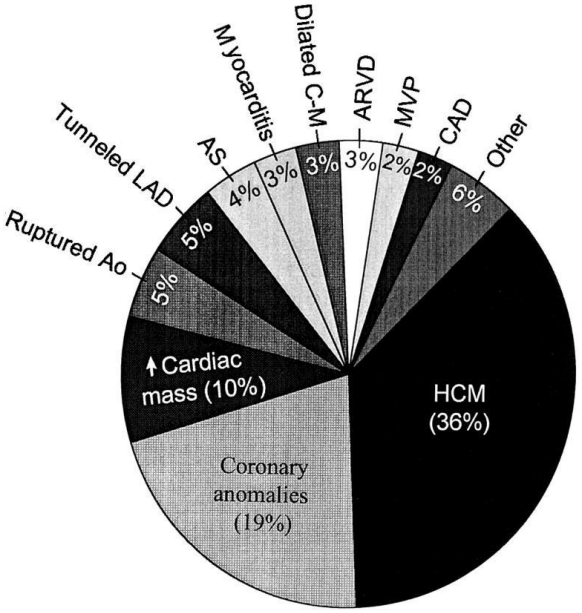
SCD in Recruits

Cardiac Abnormality Identified



Retrospective cohort of recruits using demographic and autopsy date of 126 non-traumatic sudden deaths. One-third reported premortem symptoms. [Eckart, 2004]

SCD in Athletes



Retrospective cohort of young athletes (median age 17) with 158 deaths. [Maron, 1996]

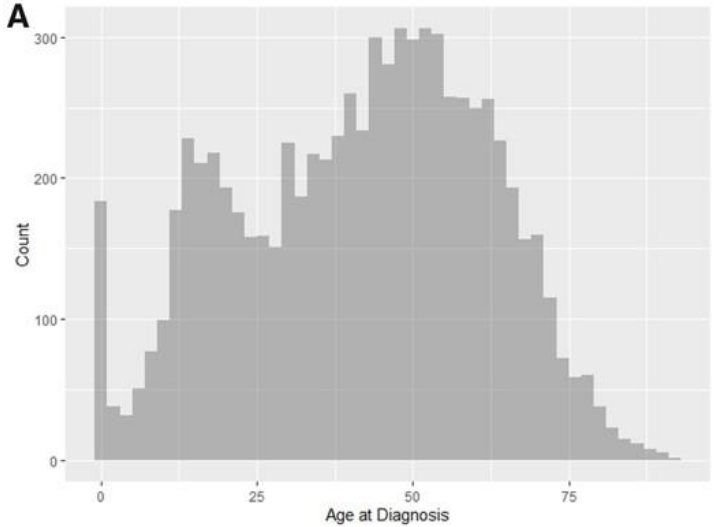
Table 4 Leading Cause-Specific Findings in Adjudicated Unanticipated Sudden Cardiac Death Stratified by Age <35 Years and ≥35 Years and Exertional Status in a Cohort Undergoing Active Surveillance

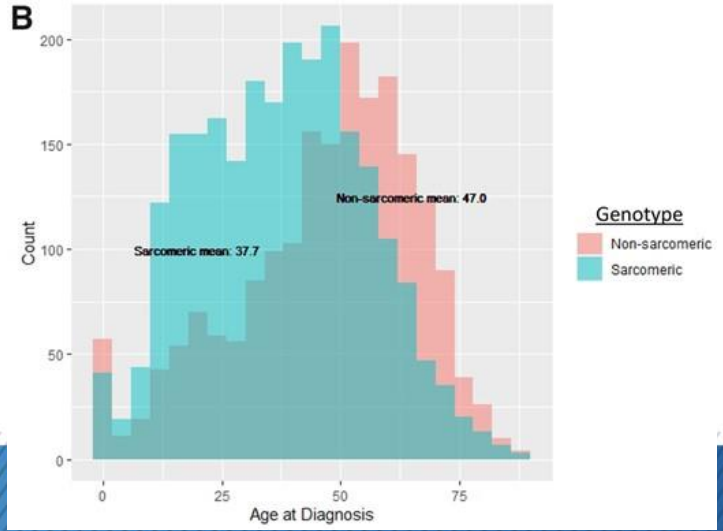
Findings	<35 Yrs of Age		≥35 Yrs of Age	
	Exertional (n = 140)	Nonexertional (n = 158)	Exertional (n = 221)	Nonexertional (n = 383)
Sudden unexplained death	54 (38.6%)	69 (43.7%)	19 (8.6%)	45 (11.8%)
Atherosclerotic disease	34 (24.3%)	35 (22.2%)	172 (77.8%)	270 (70.5%)
Hypertrophic cardiomyopathy	19 (13.6%)	19 (12.0%)	8 (3.6%)	11 (2.9%)
Myocarditis	5 (3.6%)	12 (7.6%)	1 (0.5%)	12 (3.1%)
Idiopathic dilated cardiomyopathy	2 (1.4%)	12 (7.6%)*	5 (2.3%)	16 (4.2%)
Anomalous coronary artery	11 (7.9%)	1 (0.6%)*	0 (0.0%)	1 (0.3%)

Data presented as raw (columnar percent [incidence]). Comparison of exertional versus nonexertional without statistical significance except as annotated (*$p < 0.001$).

CONCLUSIONS:

- Uniform surveillance of SCD within the US Military abandoned in 2011, this is the last study from that robust data source
- Prevention of SCD among < 35 years should focus on etiologies not associated with structural heart disease, e.g., SUD
- Focus on prevention of ASCVD starting at an age younger than normally considered at risk
- Because ASCVD symptoms are not commonly reported, new risk factors and advance, safer imaging may be required





Early- vs. Late-Onset Cardiomyopathies

Impact Across the Career Arc of the Tactical Athlete

- Early-onset HCM typically manifests in adolescence or early adulthood, are more likely to be male, predominant feature is LV thickness, and familial genetics (sarcomeric mutations).
- Late-onset HCM includes more females, predominant feature is LVOT obstruction (gradient > 30mmHg), and sporadic genetics (non-sarcomeric mutations)
- DCM shows a similar but less prominent **bimodal distribution** with cases peaking in childhood and others in mid-adulthood.

Marston 2021, Rubattu 2016, Watkins 2011

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EVOLUTION OF CARDIAC SCREENING

Circulation
Volume 94, Issue 4, 15 August 1996; Pages 850-856
https://doi.org/10.1161/01.CIR.94.4.850

1996

ARTICLE

Cardiovascular Preparticipation Screening of Competitive Athletes

A Statement for Health Professionals From the Sudden Death Committee (Clinical Cardiology) and Congenital Cardiac Defects Committee (Cardiovascular Disease in the Young), American Heart Association

Barry J. Maron, Paul D. Thompson, James C. Puffer, Christopher A. McGrew, William B. Strong, Pamela S. Douglas, Luther T. Clark, Matthew J. Mitten, Michael H. Crawford, Dianne L. Atkins, David J. Driscoll, and Andrew E. Epstein

- "AHA recommends that some form of preparticipation cardiovascular screening."
- "Not prudent to recommend ECG… based on both practical and cost-efficiency considerations [many athletes, few examiners, variable healthcare, low incidence of SCD]."
- "The ECG also has a relatively low specificity as a screening test in athletic populations"

DEPARTMENT OF DEFENSE
ARMED FORCES EPIDEMIOLOGICAL BOARD
5109 LEESBURG PIKE
FALLS CHURCH VA 22041-3258

JAN 2 2 2002

AFEB (15-1a) 2002-03

MEMORANDUM FOR The Assistant Secretary of Defense (Health Affairs)
The Surgeon General, Department of The Army
The Surgeon General, Department of The Navy
The Surgeon General, Department of The Air Force

SUBJECT: Medical Screening for Accession Programs - Electrocardiogram (ECG)

- **Discontinue routine ECG screening.**
- **Safety concerns may justify screening** (e.g., flight) where SCD could have **catastrophic consequences**."
- SCD is an "uncommon occurrence in young persons free of cardiac symptoms."
- "No evidence that routine screening ECG is an effective way of reducing SCD in young persons. In addition, screening will generate **many false-positives**."

DoD Policy was and remains heavily influenced by the 1996 AHA Cardiovascular Screening Guideline

DoD Instruction 6130.03, Volume 1

Medical Standards for Military Service: Appointment, Enlistment, or Induction

- Ensures applicants are:
  - Free of contagious diseases that may endanger the health of other personnel
  - Free of medical conditions or physical defects that may require excessive time lost from duty
  - **Medically capable of performing duties and satisfactorily completing training and initial period of contracted service**
  - Not subject to inconsistencies and inequities based on race, sex, gender identity, sexual orientation
- Outlines medically disqualifying grouped by organ system, including valvular disorders, cardiomyopathies, congenital disorders, and **15 conditions diagnosed principally via ECG**
- Gives waiver authority for medical conditions to each DoD Component (e.g., Army, Navy, Marines, Air Force, Space Force)
- Directs the use of a standardized form for H&P: DD Form 2807-2 “Accessions Medical History Report”

AHA 14-Element Screening Mostly Captured In Accession Screening History & Physical Exam

Table 1. The 14-Element AHA Recommendations for Preparticipation Cardiovascular Screening of Competitive Athletes

Medical history*

Personal history

1. Chest pain/discomfort/tightness/pressure related to exertion
2. Unexplained syncope/near-syncope†
3. Excessive and unexplained dyspnea/fatigue or palpitations, associated with exercise
4. Prior recognition of a heart murmur
5. Elevated systemic blood pressure
6. Prior restriction from participation in sports
7. Prior testing for the heart, ordered by a physician

Family history

8. Premature death (sudden and unexpected, or otherwise) before 50 y of age attributable to heart disease in ≥1 relative
9. Disability from heart disease in close relative <50 y of age
10. Hypertrophic or dilated cardiomyopathy, long-QT syndrome, or other ion channelopathies, Marfan syndrome, or clinically significant arrhythmias; specific knowledge of genetic cardiac conditions in family members

Physical examination

11. Heart murmur‡
12. Femoral pulses to exclude aortic coarctation
13. Physical stigmata of Marfan syndrome
14. Brachial artery blood pressure (sitting position)§

DD Form 2807-2 Accessions Medical History Report

HAVE YOU EVER HAD OR DO YOU NOW HAVE:	YES	NO
EYES/VISION:		
3. Double vision	☐	☐
4. Detached retina or surgery to repair a detached retina	☐	☐
5. Keratoconus, glaucoma, cataracts or surgery for cataracts	☐	☐
6. Vision correction procedure such as Lasik, PRK, or lens implant	☐	☐
7. Night blindness	☐	☐
8. Any other eye condition, injury, or surgery/procedure	☐	☐
EARS/HEARING:		
9. Cholesteatoma	☐	☐
10. Ear drum perforation or tubes inserted into the ear drum(s) in the past 12 months	☐	☐
11. Any other ear surgery or procedure including mastoidectomy	☐	☐
12. Loss of balance or vertigo	☐	☐
13. Hearing loss or use of hearing aid(s)	☐	☐
NOSE, SINUSES, MOUTH, AND LARYNX:		
14. Ear, nose, or throat conditions such as vocal cord dysfunction	☐	☐
15. Recurrent nose bleeds, chronic sinus infections, or sinus surgery	☐	☐
16. Absence of, or disturbance of sense of smell	☐	☐
17. Any surgery of the face, throat, or jaw	☐	☐
DENTAL: *(If you wear braces/aligners, then you must submit a letter from your orthodontist stating that active orthodontic treatment will be completed before beginning active duty)*		
18. Braces or aligners	☐	☐
19. Any tooth or gum problems	☐	☐
LUNGS, CHEST WALL, PLEURA, AND MEDIASTINUM:		
20. Asthma, asthmatic bronchitis, wheezing, shortness of breath, or other breathing problems worsened by exercise, weather, pollens, etc.	☐	☐
21. Prescription for an inhaler, steroids, or any other medication for breathing problem	☐	☐
22. Pneumonia	☐	☐
23. Chronic cough or frequent coughing at night	☐	☐
24. Collapsed lung or other lung condition(s)	☐	☐
25. History of chest, chest wall, or breast surgery	☐	☐
HEART:		
26. Heart murmur or valve problem(s)	☐	☐
27. Palpitations, skipped/abnormal heartbeats, or pounding heart	☐	☐
28. Chest pain/pressure or an abnormal electrocardiogram (EKG)	☐	☐
29. Heart surgery	☐	☐
30. Any other heart condition	☐	☐

AHA 14-Element Screening Mostly Captured In Accession Screening History & Physical Exam

Table 1. The 14-Element AHA Recommendations for Preparticipation Cardiovascular Screening of Competitive Athletes

Medical history*

DD Form 2807-2 Accessions Medical History Report

HAVE YOU EVER HAD OR DO YOU NOW HAVE:	YES	NO
EYES/VISION:		

QUESTIONS NOT DISTINCTLY CAPTURED:

- Have you been previously restricted from participation in sports?
- Have you had prior testing for the heart, ordered by a physician?
- Has one or more relatives had premature death (sudden and unexpected, or otherwise) before 50 years of age attributable to heart disease?
- Has a close relative <50 years of age had disability from heart disease?
- Does a family member have any of these heart conditions: hypertrophic or dilated cardiomyopathy, long-QT syndrome, or other ion channelopathies, Marfan syndrome, or clinically significant arrhythmias; specific knowledge of genetic cardiac conditions in family members?

Nick of Time / U of Washington PPQ

1. Have you ever passed out **DURING exercise**?
2. Do you get chest pain **DURING exercise** that makes you stop exercising?
3. Has a close family member (parent, brother, sister, grandparent, aunt, or uncle) died from a heart problem or survived a sudden cardiac arrest before age of 40?
4. Does a family member have any of these **genetic*** heart conditions:
   - Hypertrophic cardiomyopathy (HCM)
   - Dilated Cardiomyopathy
   - Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC)
   - Marfans Syndrome
   - Long QT syndrome (LQTS)
   - Catecholaminergic Polymorphic Ventricular Tachycardia (CPVT)
   - Brugada syndrome

** Does not include atrial fibrillation, congestive heart failure, coronary artery disease/heart attacks, or supraventricular tachycardia*

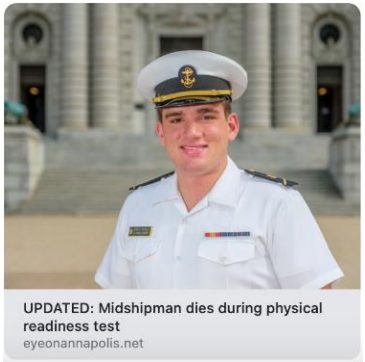
REDUCED FALSE POSITIVE RATE FROM MEDICAL HISTORY

THE PROCESS: Medical Diagnosis

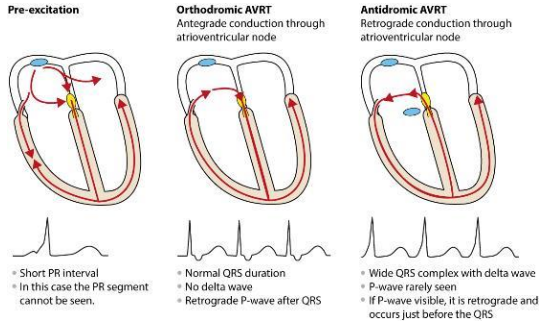
A medical diagnosis is generated by synthesizing data from the patient's history, physical exam, and ancillary tests

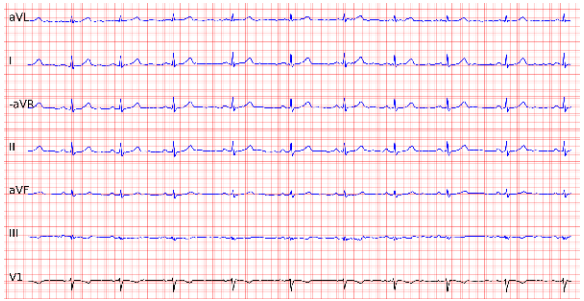
HISTORY (Hx)	PHYSICAL EXAM (PE)	ANCILLARY TESTS
Patient reported	Objective signs	ECG 5X > HX and 10X > PE

Harmon, 2015

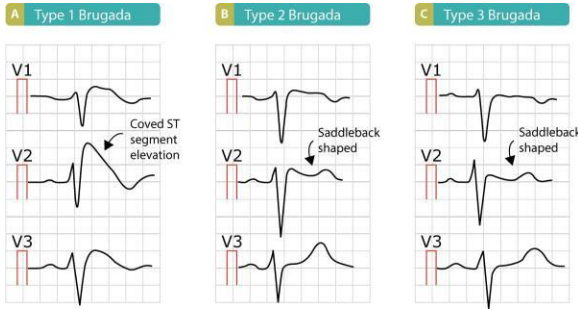


ECG Findings for Conditions associated with SCD



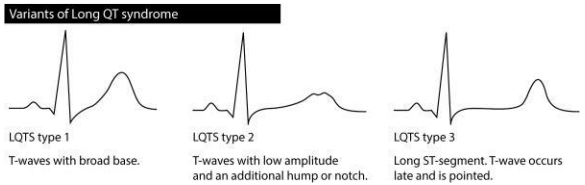


Wolf Parkinson White
1:300



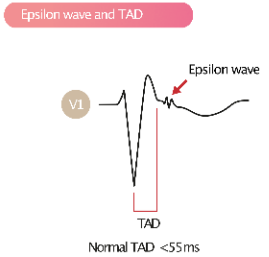
Brugada Syndrome
1:2000

Hypertrophic Cardiomyopathy
1:500



Long QT Syndrome
1:2500 live births

Dilated Cardiomyopathy
1:400



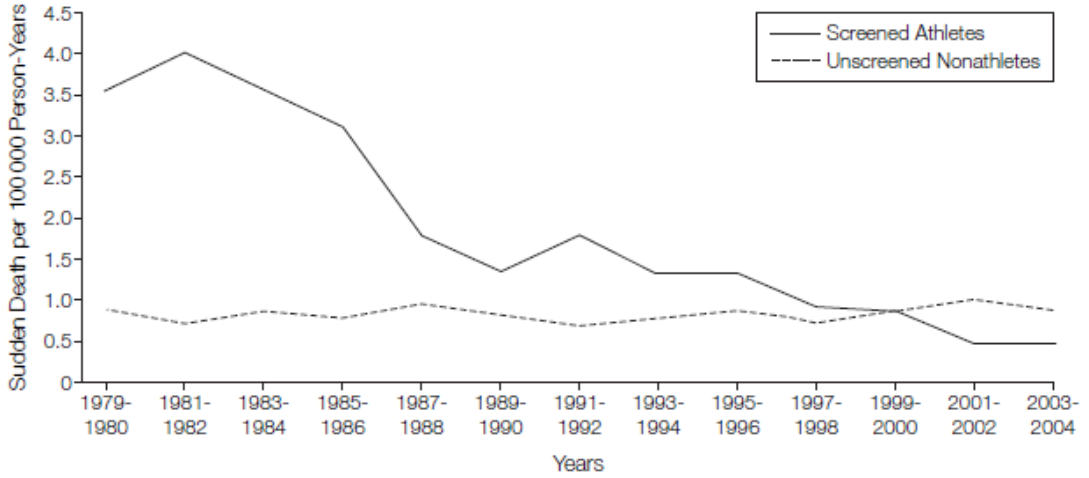
Arrhythmogenic Cardiomyopathy
1:1250

European Society of Cardiology

2005 ESC Guidelines Recommend ECG Screening in young competitive athletes

2006 Corrado shows 89% reduction in SCD among screened Italian athletes

Figure. Annual Incidence Rates of Sudden Cardiovascular Death in Screened Competitive Athletes and Unscreened Nonathletes Aged 12 to 35 Years in the Veneto Region of Italy (1979-2004)



NOT a Randomized Controlled Trial (RCT)

Corrado DA et al. JAMA 2006; 296(13):1593-601

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Outcomes of CV screening in football

NOT a Randomized Controlled Trial (RCT)

11,168 adolescent football players 1996-2016 screened with H&P, ECG, Echo

Diagnosis of conditions at risk for SCD

- HISTORY = 7%
- EXAM = 4%
- ECG = 86%
- ECHO = 29%

Results

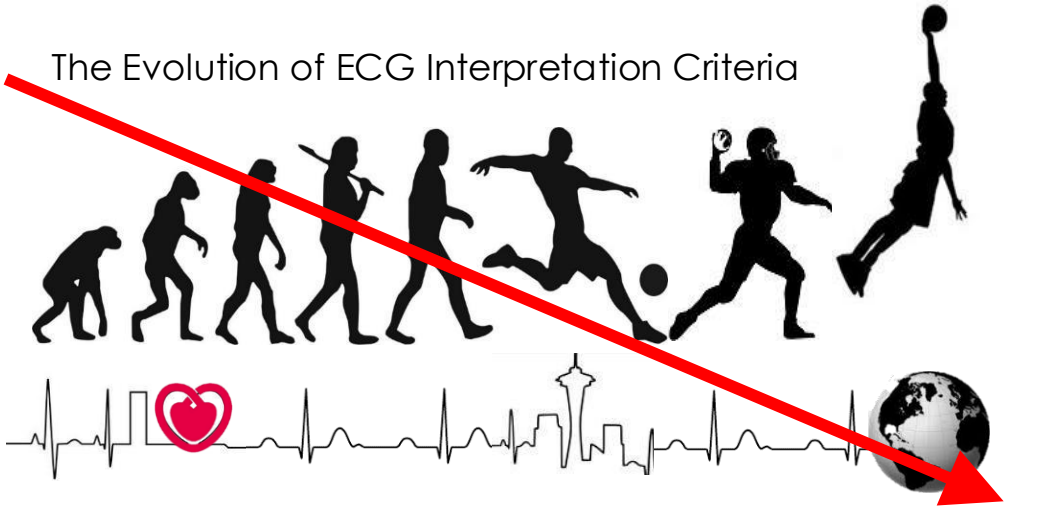
- Total deaths = 23
- SCD = 8
- SCD Rate 6.8 per 100K (no control)

Malhotra A et al. N EnglJ Med 2018; 379:524-34

Table 2. Summary of Cardiac Conditions Detected According to Screening Tool.

Condition	No. of Athletes	No. of Athletes with Abnormal Result			
		History	Examination	ECG	Echocardiography
Any cardiac condition	267	6	76	84	237
Condition associated with sudden cardiac death	42	3	2	36	12
Hypertrophic cardiomyopathy	5	0	0	5	5
Arrhythmogenic right ventricular cardiomyopathy	2	1	0	1	2
Dilated cardiomyopathy	1	1	0	1	1
Coronary-artery anomalies	2	0	0	0	2
Bicuspid aortic valve–associated disease*	3	1	2	0	3
Long-QT syndrome	3	0	0	3	0
Wolff–Parkinson–White ECG pattern	26	0	0	26	0
Other cardiac condition	225	3	74	48	225
Bicuspid aortic valve	68	1	32	15	68
Atrial septal defect	62	1	6	26	62
Aortic regurgitation	29	0	16	2	29
Mitral-valve prolapse	24	0	12	3	24
Patent ductus arteriosus	18	0	1	1	18
Ventricular septal defect	13	0	3	1	13
Pulmonary stenosis	9	1	4	0	9
Cor triatriatum	2	0	0	0	2

The Evolution of ECG Interpretation Criteria



	ESC 2005	ESC 2010	Seattle Criteria 2012	International Criteria 2017
False Positive Rate	15-20%	10-15%	3–6%	1–2%

INTERNATIONAL SUMMIT • ECG INTERPRETATION IN ATHLETES • IC25

Graphic courtesy of Kimberly Harmon, MD
Professor, Depts of Family Med and Ortho/Sports Med
University of Washington

Cardiac Insight Cardea 20/20 Newest Algorithm Embedded

Normal ECG Findings
- Increased QRS voltage for LVH or RVH
- Incomplete RBBB
- Early repolarization/ST segment elevation
- ST elevation followed by T wave inversion V1-V4 in black athletes
- T wave inversion V1-V3 ≤ age 16 years old
- Sinus bradycardia or arrhythmia
- Ectopic atrial or junctional rhythm
- 1° AV block
- Mobitz Type I 2° AV block

Borderline ECG Findings
- Left axis deviation
- Left atrial enlargement
- Right axis deviation
- Right atrial enlargement
- Complete RBBB

Abnormal ECG Findings
- T wave inversion
- ST segment depression
- Pathologic Q waves
- Complete LBBB
- QRS ≥ 140 ms duration
- Epsilon wave
- Ventricular pre-excitation
- Prolonged QT interval
- Brugada Type 1 pattern
- Profound sinus bradycardia < 30 bpm
- PR interval ≥ 400 ms
- Mobitz Type II 2° AV block
- 3° AV block
- ≥ 2 PVCs
- Atrial tachyarrhythmias
- Ventricular arrhythmias

In isolation

2 or more

No further evaluation required in asymptomatic athletes with no family history of inherited cardiac disease or SCD

Further evaluation required to investigate for pathologic cardiovascular disorders associated with SCD in athletes

FALSE(+) RATE
< 2%

LOW
DISQUALIFICATION
RATE

ERASE DATA

ECG Screening Results to Date

	Total Screened	ECG False +	ECG True +	ECG False -	ECG DQ	RTD (rate)	Time per Site
2021: USNA Only – all classes	4,095	53 (1.3%)	16	0	10	13/16 (81%)	42 days
2022: All Academies – 1st yr	3,351	33 (0.94%)	10	0	7	10/10 (100%)	28 days
2024: ECG+Reflex Echo – all Academies	3,466	43 (1.2%)	9	0	3	8/9 (89%)	2 days
2025: ECG+Reflex Echo – Academies & BMT	9,161	134 (1.58%)	24	1	14	TBD	2 days

Up to 2024 only 4 out of 11,092 (0.036%) Cadets/Midshipmen were permanently disqualified (DQ)
2024 disqualification (DQ) for myocarditis - completed treatment and 3 months of exercise restriction, then matriculated in the next year's class

Unpublished data

Rates by Screening Intervention 2025 (n=9,161)

Flag	False+	True+	DQ
ABNL ECG	1.58%	0.26%	0.14%
ABNL Q&A (H&P) [1]	7.64%	0.08%	0.10%
ABNL BP [2]	0.31%	0.02%	0.01%

Flag	Screen+	Echo	Monitor	CCTA	CMR	GXT	EP	ESE	TEE
Overall	11.84%	3.95%	0.36%	0.28%	0.17%	0.84%	0.01%	0.04%	0.01%
ECG	2.03%	1.88%	0.22%	0.08%	0.13%	0.25%	0.01%	0.02%	0.01%
Q&A	8.01%	2.20%	0.19%	0.23%	0.08%	0.65%	0	0.03%	0.01%
BP [3]	1.80%	0.13%	0	0	0.01%	0	0	0	0

1. True+ and DQ cases with **ABNL Q&A** also had **ABNL ECG** in 7 of 10. Three isolated Q&A+ cases showed abnormal findings in three trainees:
   - CCTA = long myocardial bridge
   - Peak exertion = CPVT vs. atypical WPW
   - Recovery = 4-beat run of SVT
2. True+ and DQ cases with **ABNL BP** also flagged for **ABNL ECG**

Unpublished data

POST-EVENT ANALYSIS

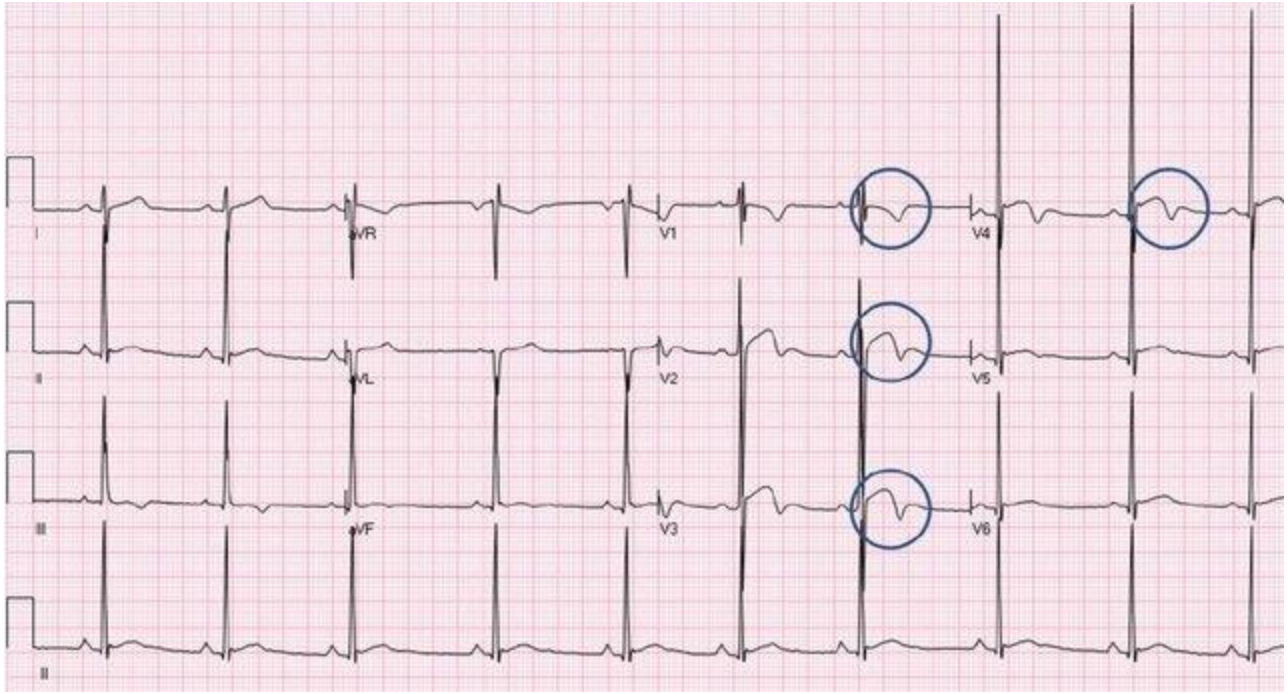
CENTCOM Events

- CENTCOM had ten cardiovascular events in a 3-month period:
  - Four SCA (ages 21-39; one survivor)
  - Three myocardial infarctions (ages 24-34)
  - Three chest pain cases (ages 22-25)

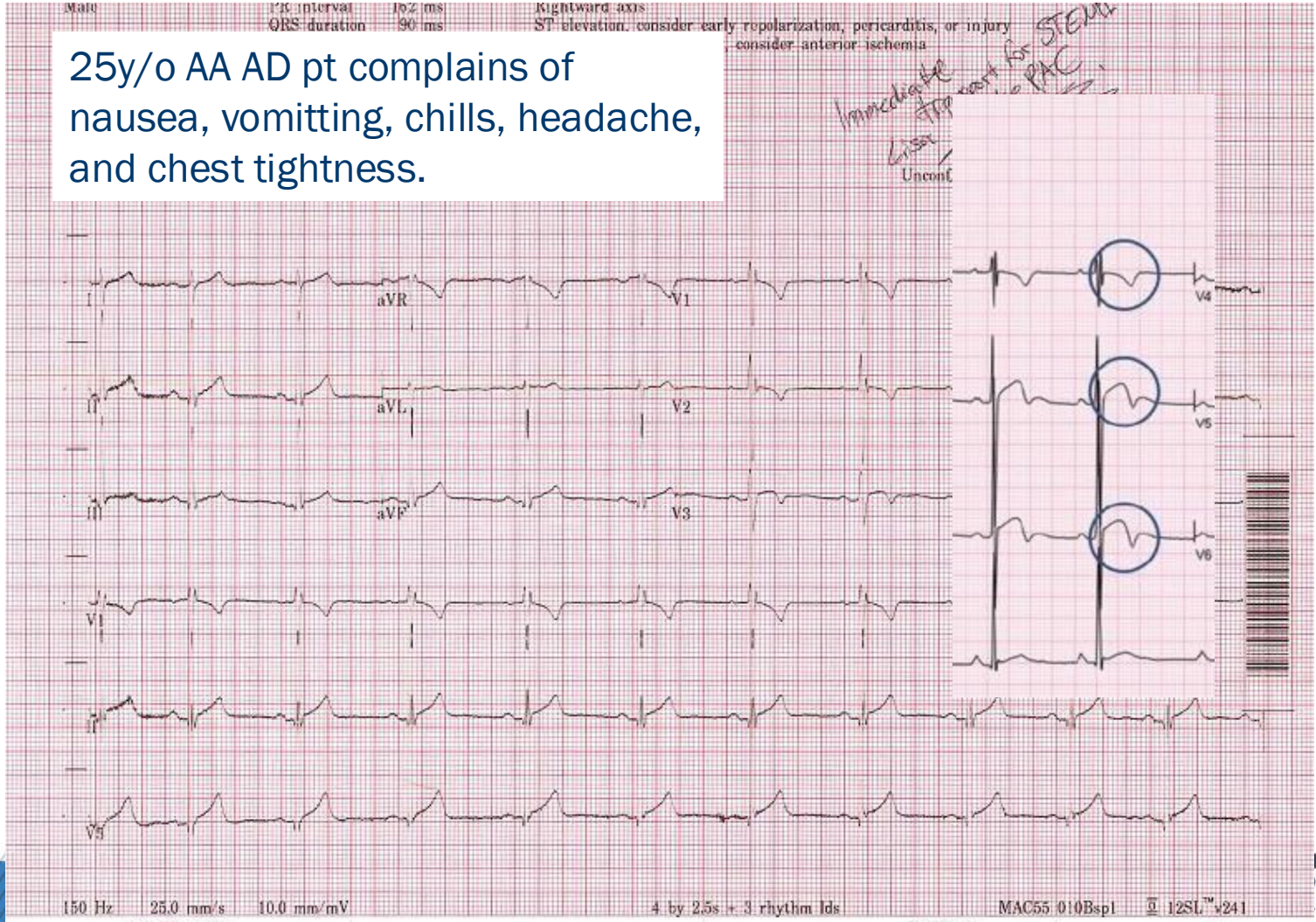
Outcomes from CENTCOM: CV Impact

- Four Cardiac Arrests-
  - Three of four cases had HCM
  - All events occurred during exercise
  - Fourth case drug OD
- Three MI-
  - One had 20 mm septum as well as Cx stenosis (age 34)
  - Cannot rule out vasoconstricting substances present in pre-workout supplements
- Chest pain- all had normal caths.
  - Lack of comparison baseline ECG major contributing factor to emergent cath

”Afro-Caribbean Normal Variant in 17 yo soccer player”



25y/o AA AD pt complains of nausea, vomitting, chills, headache, and chest tightness.



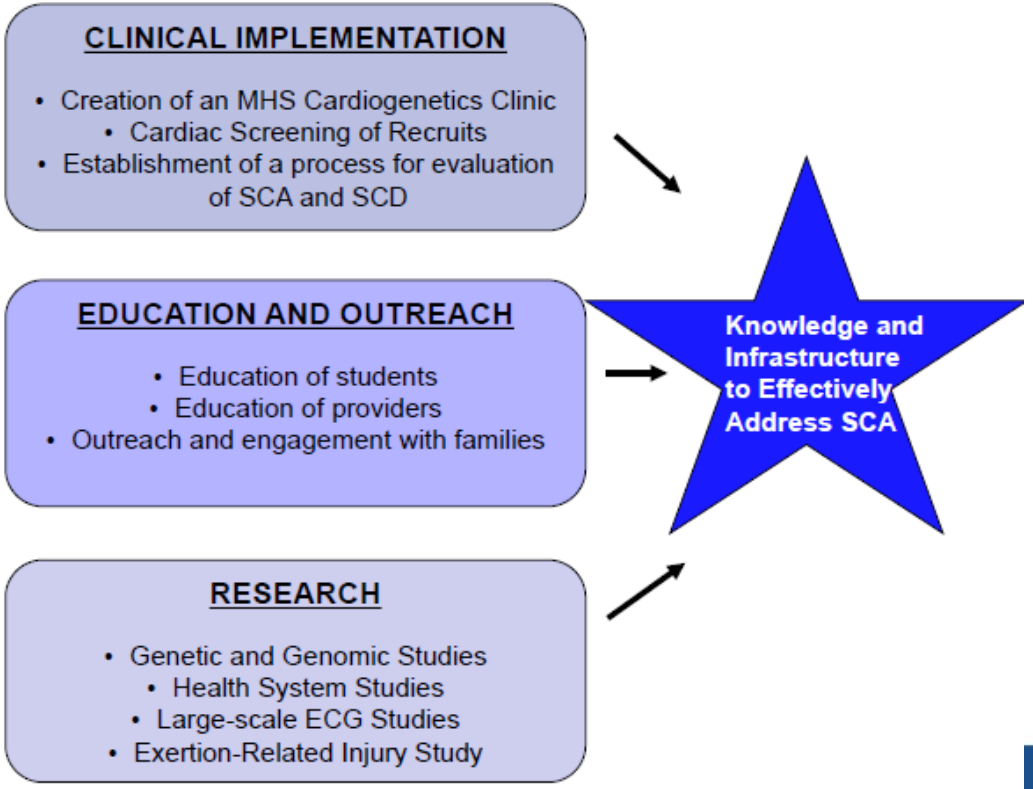
Lessons from CENTCOM

- Four HCM cases should never have been deployed to desert
  - No ECG performed pre-deployment
- Three caths could have been avoided if baseline ECG was available

THE FUTURE

Project MiCAP: Military Cardiac Arrest Program

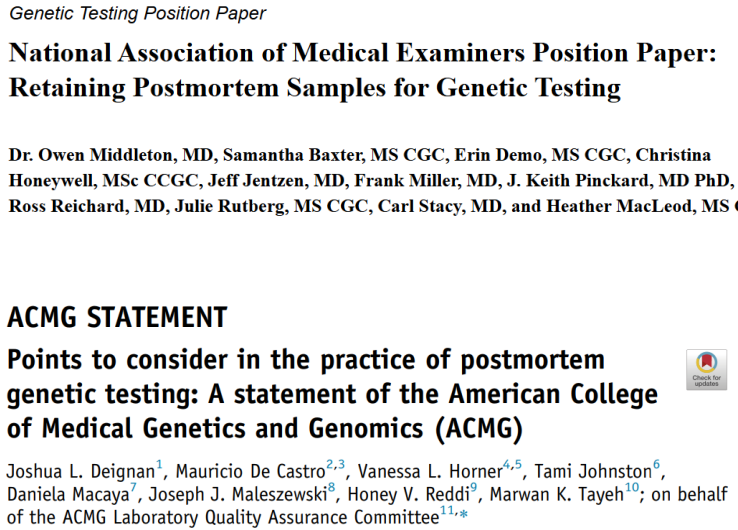
A Multi-Center, Multi-Institution Approach to Cardiac Arrest



MiCAP GOAL = Reduce SCA/SCD in the Active Duty Population by 50% in Ten Years

AMERICAN COLLEGE of CARDIOLOGY

Utilization of Postmortem Genetic Testing



Genetic Testing Position Paper

National Association of Medical Examiners Position Paper: Retaining Postmortem Samples for Genetic Testing

Dr. Owen Middleton, MD, Samantha Baxter, MS CGC, Erin Demo, MS CGC, Christina Honeywell, MSc CCGC, Jeff Jentzen, MD, Frank Miller, MD, J. Keith Pinckard, MD PhD, R. Ross Reichard, MD, Julie Rutberg, MS CGC, Carl Stacy, MD, and Heather MacLeod, MS CGC

ACMG STATEMENT

Points to consider in the practice of postmortem genetic testing: A statement of the American College of Medical Genetics and Genomics (ACMG)

Joshua L. Deignan[1], Mauricio De Castro[2,3], Vanessa L. Horner[4,5], Tami Johnston[6], Daniela Macaya[7], Joseph J. Maleszewski[8], Honey V. Reddi[9], Marwan K. Tayeh[10]; on behalf of the ACMG Laboratory Quality Assurance Committee[11,*]

- Postmortem genetic testing performed in only 3% of cases of sudden death in young, healthy NCAA athletes
- Utilization increasing following publication of guidelines, but barriers remain, including cost, training and access issues

MiCAP Postmortem Genetics Evaluation

Multidisciplinary genetic evaluation of deceased individuals served by the U.S. Military Health System <u>without cost to families</u>

- Selection, coordination, and interpretation of genetic test
- Pre- and post-test discussion with next of kin and relatives
  - Collect family history information
  - Discuss limitations and implications of genetic testing
  - Provide clinical recommendations for relatives
  - Connect to advocacy and support organizations
  - Clinical consult summary for referring provider

Decedent Eligibility

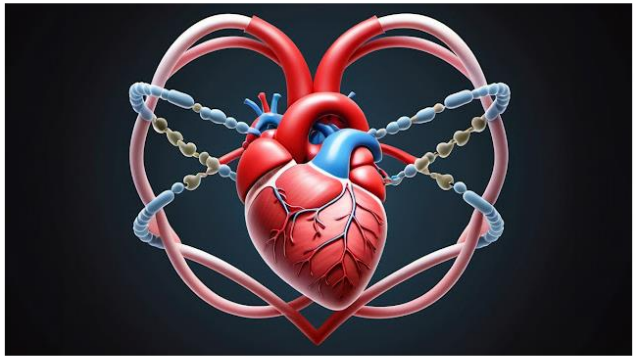
In most cases, eligibility established by meeting at least one of the following:

(1) At the time of death, the decedent was eligible to receive care within the U.S. Military Health System

(2) Decedent had a history of active duty U.S. military service at any time throughout their life

Unlocking Answers to Sudden, Unexplained Deaths Through Postmortem Genetic Testing

USU's MiCAP Program Uses Genetic Testing to Uncover Causes of Sudden Cardiac Death and Safeguard Military Families



October 17, 2024 by Sharon Holland

Imagine losing a loved one to sudden, unexplained death—an event so devastating that even an autopsy can't provide answers. This haunting uncertainty has been a challenge for medical examiners, especially when it comes to younger individuals. But now, thanks to significant advancements in postmortem genetic testing, families are getting the answers they deserve. Leading

- For post-mortem genetic testing contact

MiCAP.genetics@usuhs.edu

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Defining the Tactical Athlete

ACC/AHA Expert Consensus Meeting April 2024, Scientific Statement pending publication

"Tactical athletes are those… including military personnel, firefighters, law enforcement, emergency medical personnel, and others combating emergencies, accidents, natural disasters, and terrorist attacks. Tactical athletes must be ready to face any threat, whether physical, environmental, or psychological, often with little to no advanced notice."

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American Heart Association.

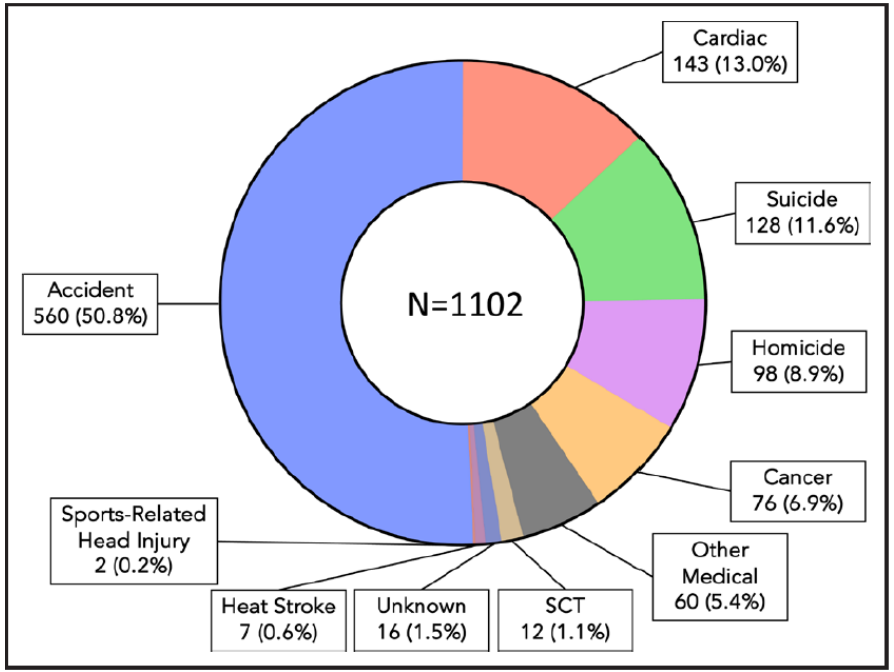
Unique characteristics of the tactical athlete compared with the competitive athlete

1. Focus is on service rather than competition.
2. High demand for speed, strength, and agility in addition to endurance (burst type activity), though often intermittent.
3. Performance under life-threatening conditions, while carrying heavy gear and equipment.
4. May perform under environmental extremes (heat, cold, altitude, weather).
5. Some overlap with standard occupational medicine.
6. Outcome affects survival of athlete and others, not just score.

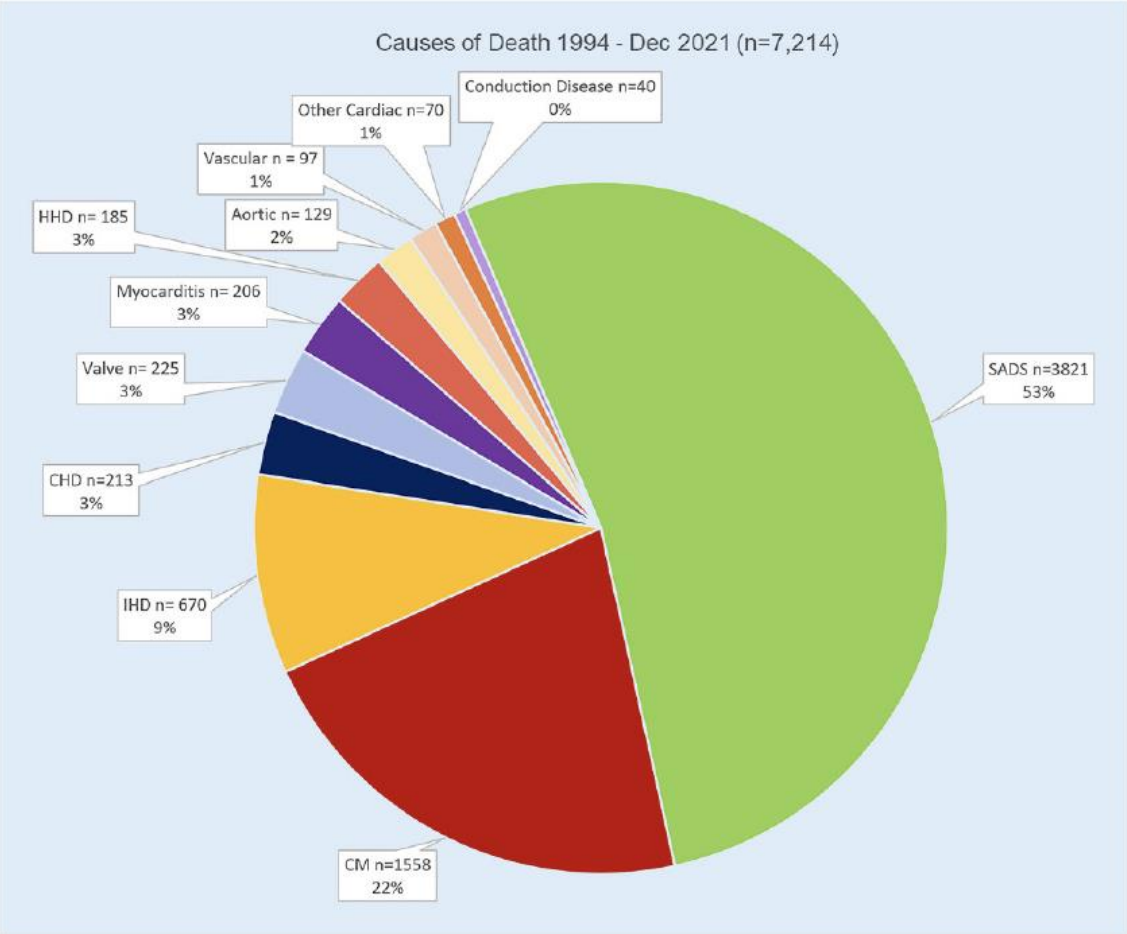
Xu J, Haigney M, Levine B, Dineen E. The Tactical Athlete. *Cardiology Clinics*; 2023, 41: 93-105.

Latest NCAA Data on SCD

- 20-year study
- 4 separate and independent databases
- Total of 1102 deaths
- Total of 143 SCD deaths , 50% during exercise
- POST-MORTEM CAUSES:
  - Sudden Unexplained Death (19.5%)
  - Idiopathic LVH (16.9%)
  - HCM (12.7%)
  - Myocarditis (5.6%)



Petek BJ et al. Circulation 2023; DOI: 10.1161/circulationaha.123.065908



SADS= autopsy-negative Sudden Cardiac Death

CM= Cardiomyopathy

AHA/ACC Scientific Statement

Assessment of the 12-Lead ECG as a Screening Test for Detection of Cardiovascular Disease in Healthy General Populations of Young People (12–25 Years of Age)

A Scientific Statement From the American Heart Association and the American College of Cardiology

Circulation 2014

- Recommend using AHA-14 point cardiovascular screening questions or PPE 4 (Class 1, LOE C).
- Screening ECGs may be considered "provided that close physician involvement and sufficient quality control can be achieved (Class IIb, LOE C)."
- "Universal mass screening with 12-lead ECGs… is not recommended (Class III no evidence of benefit, LOE C)."

Therapeutic Goals – Objection to ECG Screening

Dr. Ben Levine, a leading sports cardiologist, asks, “Why should any additional testing be done in an asymptomatic athlete with no family history of disease?” He gave two answers:

1. Feel better
2. Live longer

   PRIMARY OBJECTION TO ECG SCREENING: you can’t make an asymptomatic person feel better and there are no RCTs and limited evidence that ECG screening saves lives.

3. ADDITIONAL GOAL FOR TACTICAL ATHLETE: Prevent mission compromise – mitigate risk to self, unit, mission