

# ...AND THE BEATS KEEP RUNNIN RUNNIN (IN SPACE)

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# Disclosure Information

*93rd Annual Scientific Meeting*

*Brian "Stitch" Hanshaw, Maj, USAF, MC, FS*

*Michael LaBarbera, MD, PhD*

I have no financial relationships to disclose.

I will not discuss off-label use and/or investigational use in my presentation



# OUTLINE

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Learning Objectives

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Aeromedical and Spaceflight Considerations

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NASA Historical Cases

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NASA Waiver Review

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DoD Services Waiver Guide

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Questions

# LEARNING OBJECTIVES



The audience will gain an appreciation for the potential crew health and mission considerations for considering medical waiver in cases of atrial fibrillation.



The audience will gain an appreciation for the impact of spaceflight, crew performance, and health risks in treatment of atrial fibrillation.

# AEROMEDICAL CONCERNS

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- Most common arrhythmia in aircrew
- Lifetime incidence is 10%, increasing with age
- Distracting symptoms, hemodynamic instability, and possible stroke
  - Reduces cardiac output → degrade G tolerance
- Etiologies: stress, caffeine, alcohol, electrolytes, thyroid, valvular disease, infection, cardiomyopathy
- \*Risk to life, crew, and mission



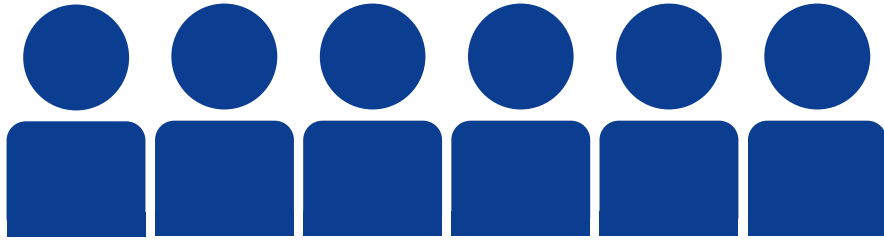


# SPACEFLIGHT CONCERNS

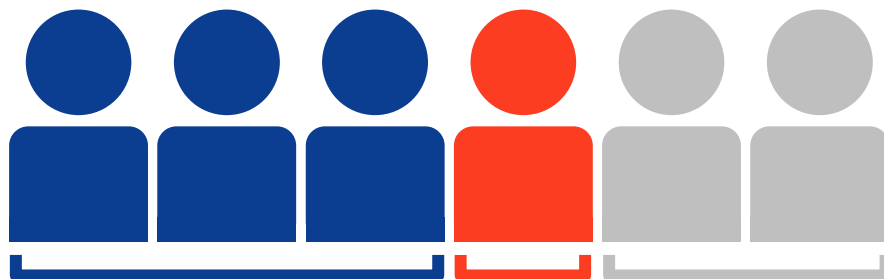
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- Unknown spaceflight impact on cardioembolic event
- Reduced G tolerance
- Limited available resources
  - Diagnostic capability
  - Rate or rhythm control
  - Cardioversion capability considerations
  - LEO vs exploration class missions
- Environmental effects
  - Fluid shifts and atrial stretch
  - Sympathetic activation
  - High sodium diet
- \*Risk to life, crew, and mission

# NASA WAIVER HISTORY FOR AFIB / FLUTTER



- 2 symptomatic
- No hemodynamic instability
- Cardiology consult, ECHO, Holter, stress test, comorbidity assessment



**RFA**

**DCCV**

**SCV**

- 1 recurrence



**PAROXYSMAL**

**PERSISTANT**

- No valvular Afib, thyroid d/z, OSA
- 3 with mild LA enlargement
- 2 positive stress tests in 15 months



**SHORT-DURATION**

**LONG**

- Spaceflight 7m-16y post-diagnosis
- **ASA/MAINTENANCE MEDS**

# NASA WAIVER REVIEW

- Disqualifying for spaceflight → special consideration by the **Multilateral Space Medicine Board (MSMB)**

## Prior to waiver consideration:

- Cardiology consultation
- Thyroid testing, ECG, ECHO, ETT, 24hr Holter x3
- Observe 6 months after episode

## Not eligible for waiver:

- Hemodynamic instability
- Recurrent sustained episodes
- Require maintenance medications

## Waiver potential:

- Lone Afib, isolated episode <10 min
- No secondary cause or hemodynamic instability
- Single episode may be considered (after selection)
- DCCV or prior temporary med use considered
- Ablation may be considered for waiver (including astronaut selection, long-term missions)
- 12 months post-ablation and off meds

## Spaceflight participants on antiarrhythmics:

- Possible if ETT and serial Holters reassuring
- Consider centrifuge for questionable cases

# AEROMEDICAL WAIVER CONSIDERATIONS

## FAA

- Initial application for AME Assisted Special Issuance (AASI): Must defer
- AASI renewal considerations
  - Cardiologist evaluation
    - 24-hr cardiac monitor (<90d)
  - Emboli mitigation for  $\text{CHA}_2\text{DS}_2\text{-VASc} \geq 2$ 
    - Appropriate observation periods for Rx therapy
  - Rate and rhythm well controlled
  - No evidence of CVA, TIA, or other thromboembolic event





## USAF

- Candidates: waiver (maybe)
- Single episode, clear precipitant cause, waiver possible after 3 months
- Cardiologist evaluation
  - CHA<sub>2</sub>DS<sub>2</sub>-VASc score
  - ECG, echo, stress test
  - Holter monitor tracings final month of observation
  - All reports and images
- Labs: CBC, CMP, and TSH
- Ablation therapy – more requirements



## NAVY

- Candidates: waiver (maybe)
- Single episode, clear precipitant cause, waiver possible after 6 months
- Cardiologist evaluation
  - CHA<sub>2</sub>DS<sub>2</sub>-VASc
  - ECG, echo, stress test
  - Ambulatory ECG (final month preferred)
  - All reports and images
- Labs: as required
- Ablation therapy – more requirements



## ARMY

- Candidates: waiver (maybe)
- Single episode, clear precipitant cause, waiver possible after 6 months
- Cardiology evaluation
  - CHA<sub>2</sub>DS<sub>2</sub>-VASc
  - ECG, echo, stress test
  - Three 24-hr Holter monitors at 2-mo intervals
  - All reports and images
- Labs: TSH
- 6-month observation off medications

# QUESTIONS?

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# REFERENCES

- Barr, Y. Atrial Arrhythmia Summit: Summary Report. NASA/TP-2010.
- USAF Waiver Guide (17 Mar 2023)
- U.S. Navy Aeromedical Reference and Waiver Guide (07 Feb 2023)
- Army Flight Surgeon Checklist. Aeromedical Policy Letters and Technical Bulletins (Dec 2021)