Atrial Fibrillation Update 2018:
Obesity and Atrial Fibrillation An Epidemic of Destructive Codependency

Matthew W Ebinger DO
Genesys Regional Medical Center
Disclosures

- None
Questions

- Atrial fibrillation epidemic/Obesity epidemic
- Current Atrial Fibrillation Therapy
- Establish the relationship between RFM and AF
- Determine causality
- Can we do something about it
- What happens then
What We Know
Atrial Fibrillation Epidemic

- Most common sustained cardiac arrhythmia
- Incidence continues to rise
- Why
Obesity Epidemic

• Everyone knows its out of control and its bad

• 78 (34.9%) million adults

• 13 million children
Atrial Fibrillation Epidemic
Age Distribution of People With AF
Compared With U.S. General Population

AF Reduction In Quality of Life

AF Increases Mortality

4-month
HR, 9.62

Post-4 months
HR, 1.66

Survival, %

Years From AF Dx

Years After 4 Mo From AF Dx

MN-white expected
Observed

P<.0001

P<.0001

Mechanisms That Contribute to Atrial Fibrillation

- Autonomic Innervation
- PV's
- Rotors/Wavelets
- VOM
- SVC
Atrial Remodeling

Structural Remodeling
LA Dilatation
LA Fibrosis

Electrical Remodeling
Shortening of Action Potential
Decrease in Ca++ Currents
Fibrotic Atrial Cardiomyopathy

Fibrotic Atrial Cardiomyopathy: A Specific Disease/Syndrome Supplying Substrates for Atrial Fibrillation, Atrial Tachycardia, Sinus Node Disease, AV Node Disease, and Thromboembolic Complications

HANS KOTTKAMP, M.D., F.E.S.C.

- FACM is a specific disease/syndrome supplying substrates for AF and other manifestations.
- The long help concept that “atrial begets atrial fibrillation” does not explain the variable pattern of atrial fibrosis in patients with atrial fibrillation.
- Some patients with new onset of AF have severely scarred atria.
- Other patients with longstanding AF have little fibrosis.
- Tachy-brady syndrome is likely a manifestation of FACM.
- Outcomes of ablation are impacted significantly by the extent of FACM.
- Stroke risk is related to the extent of FACM.
What We Know
Therapy for Atrial Fibrillation

Prevent Thromboemboli

Control ventricular response

Restore/Maintain sinus rhythm

RFM
AFFIRM Study Design

Qualifying AF
Meets Inclusion / Exclusion Criteria

Cardioversion Permitted

Cardioversion Fails
Excluded

Randomize

Rate Control and Anticoagulation
Pharmacologic Trials (2 or more)
Nonpharmacologic Therapies

Rhythm Control and Anticoagulation
Pharmacologic Trials + CV prn (2 or more)
Nonpharmacologic Therapies

American Journal of Cardiology 1997;79:1198-1202
Primary Endpoint: All-Cause Mortality

![Graph showing mortality rates over time with Rhythm and Rate lines, and p = 0.058.](image)

Warfarin Use

% Using Warfarin at Follow-up Visit

Time

0 20 40 60 80 100

BL 2M 4M 1Y 2Y 3Y 4Y 5Y

Rate Rhythm

Treatment Options
Triad of Atrial Fibrillation Treatment

- Rate control
  - Pharmacologic
    - Ca\(^{2+}\) blockers
    - β-blockers
    - Digitalis
    - Amiodarone
  - Nonpharmacologic
    - Ablate and pace

- Maintenance of SR
  - Pharmacologic
    - Class IA
    - Class IC
    - Class III
    - β-blocker
  - Nonpharmacologic
    - Catheter ablation
    - Pacing
    - Surgery
    - Implantable devices

- Stroke prevention
  - Pharmacologic
    - Warfarin
    - Aspirin
    - Thrombin Inhibitor
  - Nonpharmacologic
    - Removal/isolation
    - LA appendage

Prevent Remodeling
- CCB
- ACE-I, ARB
- Statins
- Fish oil
Stroke Risk Stratification

**CHADS**

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac failure</td>
<td>1</td>
</tr>
<tr>
<td>HTN</td>
<td>1</td>
</tr>
<tr>
<td>Age ≥75 y</td>
<td>1</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1</td>
</tr>
<tr>
<td>Stroke</td>
<td>2</td>
</tr>
</tbody>
</table>

**CHA\textsubscript{2}DS\textsubscript{2}-VASc**

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac failure</td>
<td>1</td>
</tr>
<tr>
<td>HTN</td>
<td>1</td>
</tr>
<tr>
<td>Age ≥75 y</td>
<td>2</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1</td>
</tr>
<tr>
<td>Stroke</td>
<td>2</td>
</tr>
<tr>
<td>Vasc dz (MI, PAD, aortic ath)</td>
<td>1</td>
</tr>
<tr>
<td>Age 65-74 y</td>
<td>1</td>
</tr>
<tr>
<td>Sex category (female)</td>
<td>1</td>
</tr>
</tbody>
</table>

Relationship between **CHA\textsubscript{2}DS\textsubscript{2}-VASc** score and annual risk of stroke

ESC Guideline for Anticoagulation

### Clinical Characteristic Score

- H: Hypertension 1
- A: Abnormal renal or liver function (1 each) 1 or 2
- S: Stroke 1
- B: Bleeding 1
- L: Labile INR 1
- E: Elderly age 1
- D: Drugs or alcohol (1 each) 1 or 2

**Maximum Score:** 9
Targets for Novel Anticoagulants

- Oral:
  - TTP889
  - Rivaroxaban
  - Apixaban
  - Edoxaban
  - Betrixaban
  - Darexaban
  - LY517717
  - TAK 42
  - Dabigatran
  - AZD0837

- Parenteral:
  - TFPI (tifacogin)
  - APC (drotrecogin alfa sTM (ART-123)
  - Fondaparinux
  - Semuloparin
  - Idrabiotaparin
  - DX-9065a
  - Otamixaban

- Clotting factors:
  - TF/Vla
  - X
  - IX
  - IXa
  - VIIIa
  - Va
  - AT
  - Xa
  - II
  - IIa
  - Fibrinogen
  - Fibrin

Becattini Throm Res 2012 30
Rate Control

Pharmacologic
Beta blockers: Metoprolol, Esmolol
Calcium channel blockers: Verapamil, Diltiazem
Digoxin
Adenosine

Non-pharmacologic
Atrioventricular nodal ablation/ Pacemaker
Rhythm Control Therapies

Which is better for my patients?
Post AFFIRM Approach

No increase in mortality
  Anticoagulated
  Rate Controlled (documented)

Symptomatic Patients
  Maintenance of Sinus Rhythm
    Pharmacologic
    Ablation
Relationships Between Sinus Rhythm, Treatment, and Survival in the Atrial Fibrillation Follow-Up Investigation of Rhythm Management (AFFIRM) Study

The AFFIRM Investigators*

variables, and time-dependent variables. The following baseline variables were significantly associated with an increased risk of death: increasing age, coronary artery disease, congestive heart failure, diabetes, stroke or transient ischemic attack, smoking, left ventricular dysfunction, and mitral regurgitation. Among the time-dependent variables, the presence of sinus rhythm (SR) was associated with a lower risk of death, as was warfarin use. Antiarrhythmic drugs (AADs) were associated with increased mortality only after adjustment for the presence of SR. Consistent with the original intention-to-treat analysis, AADs were no longer associated with mortality when SR was removed from the model.

Conclusions—Warfarin use improves survival. SR is either an important determinant of survival or a marker for other factors associated with survival that were not recorded, determined, or included in the survival model. Currently available AADs are not associated with improved survival, which suggests that any beneficial antiarrhythmic effects of AADs are offset by their adverse effects. If an effective method for maintaining SR with fewer adverse effects were available, it might be beneficial. (Circulation. 2004;109:1509-1513.)
Rhythm Control
Success Rates
Amiodarone: Effectiveness vs Sotalol, Propafenone

Catheter Ablation Versus Antiarrhythmic Drugs for Atrial Fibrillation
The A4 Study

Randomized, multicenter comparison RFA vs. additional AADs
PAF failed ≥ 1 AAD
Allowed up to 3 ablation procedures
Follow-up 90-365 days, 3 mo. Blanking
AF recurrence >3 min
No restrictions on AADs alone, combo

Haissaguerre. Circ 2008; 188(24):2498-505
AF: Ablation vs. Drugs

Haissaguerre. Circ 2008; 188(24):2498-505
Short Term Success Rates
What GRMC tells Pts

1 Procedure at 12 months

Paroxysmal 70-80% +/- AAD
  - 25% will require second procedure
- Persistent 60-70% +/- AAD
  - 50% will require second procedure
What is going on in Lab 4 its 4 pm already?
Spiral-CT of the Pulmonary Veins
Evolution of AF Ablation

Linear ablation in RA
Focal PV ablation
Segmental ostial PV isolation
Circumferential PV ablation
Ablation of complex atrial electrograms
Tailored ablation:
  Selective PV isolation + widespread RFA of CFAEs
  Antral Ablation of all PV’s ± limited RFA of CFAEs
Antral LA Ablation for PAF:
Complications of Catheter Ablation of AF

<table>
<thead>
<tr>
<th>No. Patients</th>
<th>4000</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIA/Stroke</td>
<td>0.3%</td>
</tr>
<tr>
<td>Tamponade</td>
<td>0.4%</td>
</tr>
<tr>
<td>Pericarditis</td>
<td>1.0%</td>
</tr>
<tr>
<td>Pulmonary Vein Stenosis</td>
<td>3 (0.1%)</td>
</tr>
<tr>
<td>Atrial-Esophageal Fistula</td>
<td>2 (0.1%)</td>
</tr>
<tr>
<td>Phrenic Nerve Injury</td>
<td>2 (0.1%)</td>
</tr>
</tbody>
</table>
Candidates for RF Ablation of AF
Paroxysmal or persistent
Symptomatic, with impaired QOL
Inadequate response to meds

Less Ideal Candidates
- LA > 55-60 mm
- Prosthetic mitral valve
- Persistent AF > 5 years
When is Catheter Ablation Appropriate 1st-Line Therapy for AF?

Young patient with idiopathic AF who is averse to long-term drug therapy
When only feasible rhythm control agent is amiodarone
In patients with low resting HR or sinus node dysfunction

Case Example
41 year old male with recurrent PAF. Episodes occurring every 3-4 months requiring ED visits and DCCV > 4 times per year. Exercises regularly aerobically with resting heart rate in low 40's but asymptomatic. Unpredictable outside of cold beverages as trigger and significantly effecting life at home and work.
Obesity Epidemic

- 🍔🍰🍻🍟 = 😞

- Everyone knows it's out of control and it's bad

- 78 (34.9%) million adults

- 13 million children
Prevalence* of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2013

*Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.

Source: Behavioral Risk Factor Surveillance System, CDC.
Prevalence* of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2013

Summary

- No state had a prevalence of obesity less than 20%.
- 7 states and the District of Columbia had a prevalence of obesity between 20% and <25%.
- 23 states had a prevalence of obesity between 25% and <30%.
- 18 states had a prevalence of obesity between 30% and <35%.
- 2 states (Mississippi and West Virginia) had a prevalence of obesity of 35% or greater.
- The prevalence of obesity was 27.0% in Guam and 27.9% in Puerto Rico.†

http://www.cdc.gov/obesity/data/prevalence-maps.html

*Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.
† Guam and Puerto Rico were the only US territories with obesity data available on the 2013 BRFSS.
Atrial Fibrillation and Obesity: Connecting the Dots

The Long- and Short-Term Impact of Elevated Body Mass Index on the Risk of New Atrial Fibrillation

The WHS (Women’s Health Study)

Usha B. Tedrow, MD, MSc,*† David Conen, MD, MPH,*§ Paul M. Ridker, MD, MPH,†‡ Nancy R. Cook, ScD,‡ Bruce A. Koplan, MD, MPH,*† JoAnn E. Manson, MD, DrPH,‡ Julie E. Buring, ScD,‡ Christine M. Albert, MD, MPH*†‡

Boston, Massachusetts; and Basel, Switzerland
Atrial Fibrillation and Obesity: Connecting the Dots

- WHS randomized, double blind trial of low dose aspirin and it E in 39,876 females without CVD
- Randomization ended March 2004 and 4,324 opted out of prospective follow up leaving 35,545 puts
- Excluded 787 pts with AF at baseline and 449 with missing BMI info
- 34,309 women with mean follow up of 12.9 yrs
Atrial Fibrillation and Obesity: Connecting the Dots

- BMI self reported as weight (kg) divided by self reported height in meter (KG/m²)
- Reports on 24, 36, 60, 72 and 108 months
- WHO normal < 25 kg/m²; overweight 25-29 kg/m²; obese > 30 kg/m²
- Covariates of interest included DM, HTN, HLD, smoking, ETOH and physical activity
- Participants asked to report diagnosis of AF and those who responded were sent additional questionnaire to confirm episodes and collect additional info and permission to review medical record
- Total of 1425 self reports; 93% underwent chart review and 834 were confirmed and only confirmed events were included in analysis
Atrial Fibrillation and Obesity: Connecting the Dots

• Baseline 6185 (18%) were obese

• Obese were more likely to have DM, HTN, HLD and were less likely to exercise and ETOH

• Each 1U increase in BMI was associated with 4.7% increase in AF risk even after adjusting for covariates of age, DM, HTN, HLD physical activity and ETOH

• Even after excluding those women who developed CVD the relationship changed little

• Those who changed BMI had expected decrease and increases in risk
  
  • Small number of patients who decreased BMI category with most >90% staying in same category

• Prevalence of overweight and obese over course of study with 30.8% and 18% at beginning to 34.2% and 24.2% at end
Atrial Fibrillation and Obesity: Connecting the Dots

- Conclusion
  - BMI strongly associated with subsequent development of AF
    - Even after accounting for CVD development and other AF risk factors
  - Relationship linear with each increase in BMI a 4.7% increase in risk of incident AF
  - Study participants who became obese during the first 60 mo had 41% adjusted risk in development in AF compared to those who maintained BMI $\leq 30$ kg/m$^2$
Obesity and AF Relationship: Cause and Effect vs Association?
Electrophysiological, Electroanatomical, and Structural Remodeling of the Atria as Consequences of Sustained Obesity

OBJECTIVES This study sought to delineate the development of global electrophysiological and structural substrate for AF in sustained obesity.

METHODS Ten sheep fed ad libitum calorie-dense diet to induce obesity over 36 weeks were maintained in this state for another 36 weeks; 10 lean sheep with carefully controlled weight served as controls. All sheep underwent electrophysiological and electroanatomic mapping; hemodynamic and imaging assessment (echocardiography and dual-energy x-ray absorptiometry); and histology and molecular evaluation. Evaluation included atrial voltage, conduction velocity (CV), and refractoriness (7 sites, 2 cycle lengths), vulnerability for AF, fatty infiltration, atrial fibrosis, and atrial transforming growth factor (TGF)-b1 expression.
Electrophysiological, Electroanatomical, and Structural Remodeling of the Atria as Consequences of Sustained Obesity

- Study Group
  - 10 Obese sheep
  - 10 Control sheep
- All had the following studies performed
  - 2D echo, Hemodynamic Assessment, EPS (ERP, AF Vulnerability and duration) Electroanatomic Mapping, Histological Assessment (fatty infiltration, fibrosis assessment TGF1 expression)
Electrophysiological, Electroanatomical, and Structural Remodeling of the Atria as Consequences of Sustained Obesity

• Results
  • Structural and Hemodynamics
    • LA was enlarged with increases in pressure without change in LVEF
    • More Fibrosis, Scarring and Fatty Infiltration in Obese Sheep
  • Electrophysiologic Changes
    • Atrial Refractoriness was unchanged while conduction velocities were significantly longer in obese sheep
    • Increases in Complex Fractionated Electrograms
    • Posterior LA voltages were significantly reduced in Obese Sheep
    • Mean number of AF episodes and duration was greater in Obese Sheep
Progressive weight gain has been demonstrated to result in atrial stretch and leads to the development of high-frequency triggers and the substrate for AF. With chronic obesity, there is greater epicardial adipose tissue, activation of the cytokines, and the development of fibrosis. In addition, there is infiltration of the contiguous atrial myocardium by fat cells. All of these result in the milieu of slowed and inhomogeneous conduction that forms the substrate for AF. AF = atrial fibrillation; LA = left atrial; TGF = transforming growth factor.
Conclusion

- Sustained chronic obesity results in chronic stretch, fibrosis, conduction abnormalities and increased vulnerability to AF.

- Increases in TGF-1 previously associated cytokine linked to atrial fibrosis was five times higher in Obese Sheep and is hypothesized to be related to epicardial fat and the associated hypoxia of expanding atrial adipose tissue.
Treatment of Obstructive Sleep Apnea Reduces the Risk of Atrial Fibrillation Recurrence After Catheter Ablation

Adam S. Fein, MD, Alexei Shvilkin, MD, PhD, Dhaval Shah, MD, Charles I. Haffajee, MD, Saumya Das, MD, Kapil Kumar, MD, Daniel B. Kramer, MD, Peter J. Zimetbaum, MD, Alfred E. Buxton, MD, Mark E. Josephson, MD, Elad Anter, MD

Boston, Massachusetts
Treatment of OSA Reduces the Risk of Atrial Fibrillation Recurrence After Catheter Ablation

- Well Documented Association of OSA and AF (nocturnal hypoxemia, increased sympathetic tone, LA stretch, Oxidative stress)

- Beth Israel Deaconess Pts with OSA referred for AF Ablation

- Pts divided into four groups

- Assignment into treatment group CPAP happened preoperative period so + CPAP had therapy for 3 mo prep
Treatment of OSA Reduces the Risk of Atrial Fibrillation Recurrence After Catheter Ablation

- Ablation protocol was standard PVI approach with AAD discontinued 5 t1/2 prior to procedure and amiodarone 2 weeks prior.

- Follow-up pts administered AAD and warfarin with clinic visits (1,3,6,12 mo) and two weeks of transtelephonic monitoring at 3,6,12 mo.

- Absence of arrhythmia AAD were discontinued between 3 an 6 mo.

- Follow up of 1 yr.
Treatment of OSA Reduces the Risk of Atrial Fibrillation Recurrence After Catheter Ablation

- Arrhythmia free survival on AAD was significantly higher in CPAP User vs Non-users 65.6% vs 33.3%

- OSA (+) CPAP (-) pts had 2 fold increase in recurrence of AF as compared to treated group

- CPAP treated had event free survival similar to that of pts without OSA
Can We Do Anything?? 😎👍
Influencing Obesity

Long-Term Effect of Goal-Directed Weight Management in an Atrial Fibrillation Cohort
A Long-Term Follow-Up Study (LEGACY)

Rajeev K. Pathak, MBBS,* Melissa E. Middeldorp,* Megan Meredith,* Abhinav B. Mehta, MAcSt,†
Rajiv Mahajan, MD, PhD,* Christopher X. Wong, MBBS, PhD,*‡ Darragh Twomey, MBBS,* Adrian D. Elliott, PhD,*§
Jonathan M. Kalman, MBBS, PhD,‡ Walter P. Abhayaratna, MBBS, PhD,# Dennis H. Lau, MBBS, PhD,*
Prashanthan Sanders, MBBS, PhD*
Long-Term Effect of Goal-Directed Weight Management in an Atrial Fibrillation Cohort A Long-Term Follow-Up Study (LEGACY)

- Obesity and AF epidemics connected

- ? critical weight loss required to influence AF burden

- ? If fluctuations in weight may affect AF burden
Long-Term Effect of Goal-Directed Weight Management in an Atrial Fibrillation Cohort A Long-Term Follow-Up Study (LEGACY)

- Study Population: Consecutive pts referred for management of parox/persistent AF

- BMI > 27 kg/m² were included

- Exclusion Criteria: Permanent AF, MI, valvular AF, LV dysfunction or < 24mo F/U

- Pts counseled on importance of risk factor management with option to participate in physician led weight program

- Face to face counseling with initial weight reduction by meal plan and behavior modification
Long-Term Effect of Goal-Directed Weight Management in an Atrial Fibrillation Cohort A Long-Term Follow-Up Study (LEGACY)

- <3% weight loss in first 3 mo go super low calorie diet

- Low intensity exercise prescribed 20 min 3x week increased to 200min of moderate exercise weekly

- Goal was 10% reduction of body weight
  - target BMI ≤ 25 kg/m2

- Weight loss divided into 3 groups:
  - group (1)> 10%
  - group (2) 3-9%
  - group (3) <3%

- Weight trend: linear gain or loss or fluctuation if ≥1% on 2 consecutive weight ins
Long-Term Effect of Goal-Directed Weight Management in an Atrial Fibrillation Cohort: A Long-Term Follow-Up Study (LEGACY)

- Weight Fluctuation: >5% (wide), 2-5% (average), <2% (stable)

- Arrhythmia Management: dedicated AF clinic with use of rate vs rhythm control up to physicians
  - Flecanide and Sotalol most common with rare Amio
  - Ablation for symptomatic pts failing AAD
  - AF determined at least annually by ECG and 7 day Holter
  - AF ablation pts eval 3mo post procedure
  - AF was considered any atrial arrhythmia for >30 s
Long-Term Effect of Goal-Directed Weight Management in an Atrial Fibrillation Cohort: A Long-Term Follow-Up Study (LEGACY)

- Freedom from AF without rhythm control:
  - 45.5% (1) 22.2% (2) 13.4% (3)

- Total Freedom from AF
  - 86.2% (1), 65.5% (2), 39.6% (3)
  - no difference in ablation # in three groups
  - sig less AAD in group 1
Long-Term Effect of Goal-Directed Weight Management in an Atrial Fibrillation Cohort A Long-Term Follow-Up Study (LEGACY)

- 179 Pts with weight fluctuation
  - 54 (<2%), 68 (2-5%), 57 (>5%)

- Pts with dedicated weight management plan had sig less weight fluctuation

- After adjustment for baseline BMI effect of weight fluctuation had sig impact on AF recurrence
Long-Term Effect of Goal-Directed Weight Management in an Atrial Fibrillation Cohort A Long-Term Follow-Up Study (LEGACY)

Conclusions:

- Long term weight loss is achievable and results in 6 fold greater freedom from AF
- Weight fluctuations of >5% had adverse effect and may offset benefit of weight loss with 2 fold greater likelihood of AF recurrence
- Physician led weight loss program had significant impact on weight loss and weight fluctuation
- >10% weight loss resulted in no longer requiring AAD or needing ablation in 45.5% in this group!!!
- in the group that lost >10% and were involved in dedicated weight loss program 66% were able to keep weight loss over study duration
Impact of CARDIOrespiratory FITness on Arrhythmia Recurrence in Obese Individuals With Atrial Fibrillation

The CARDIO-FIT Study

Rajeev K. Pathak, MBBS,* Adrian Elliott, PhD,* Melissa E. Middeldorp,* Megan Meredith,* Abhinav B. Mehta, M Act St,† Rajiv Mahajan, MD, PhD,* Jeroen M.L. Hendriks, PhD,* Darragh Twomey, MBBS,* Jonathan M. Kalman, MBBS, PhD,‡ Walter P. Abhayaratna, MBBS, PhD,§ Dennis H. Lau, MBBS, PhD,* Prashanthan Sanders, MBBS, PhD*
Impact of CARDIOrespiratory FITness on Arrhythmia Recurrence in Obese Individuals With Atrial Fibrillation

- Objectives: Evaluate the role of cardiorespiratory fitness and its incremental benefit in rhythm control in obese AF puts

- Same study group of LEGAGCY trial and selected those who had BMI $\geq$ 27 kg/m² and had exercise stress testing at enrollment

- After exclusion 308 pts included in this study arm

- Same offering of dedicated physician lead weight and exercise program
Impact of CARDIOrespiratory FITness on Arrhythmia Recurrence in Obese Individuals With Atrial Fibrillation

- Exercise program: Baseline exercise stress test to look at METs achieved
  - low intensity exercise was prescribed initially for 20 min three times weekly and consisted of aerobic and resistance/strength training
  - exercise loads increased weekly to at least 200 min of moderate intensity exercise per wk
Impact of CARDIOrespiratory FITness on Arrhythmia Recurrence in Obese Individuals With Atrial Fibrillation

- Assessment of Fitness level:
  - Divided into groups based on predicted METS for age: St. James Model
    \[
    \text{Predicted METs} = 14.7 - (0.13 \times \text{age}) \quad \text{w} \quad \text{and} \quad 14.7 - (0.15 \times \text{age}) \quad \text{m}
    \]
  - low (<85% predicted METs)
  - adequate (86-100% predicted METs)
  - high (>100% predicted Mets)
  - Secondary Grouping of Gain (> 2 METs) or Loss (< 2 METs)
Impact of CARDIOrespiratory FITness on Arrhythmia Recurrence in Obese Individuals With Atrial Fibrillation

- Arrhythmia Management: dedicated AF clinic with use of rate vs rhythm control up to physicians

- Flecanide and Sotalol most common with rare Amio

- Ablation for symptomatic pts failing AAD

- AF determined at least annually by ECG and 7 day Holter

- AF ablation pts eval 3mo post procedure

- AF was considered any atrial arrhythmia for \( \geq 30 \) s
Impact of CARDIOrespiratory FITness on Arrhythmia Recurrence in Obese Individuals With Atrial Fibrillation

- Figure A: Ablation Free and Drug Free (without use of rhythm control therapy)
  - Low 12% AF Free
  - Adequate 35% AF Free
  - High 66% AF Free

- Figure B: Rhythm Control Therapy
  - Low 17% AF Free
  - Adequate 76% AF Free
  - High 84% AF Free

- After Adjusting for weight loss there was 20% reduction in AF for each additional MET at baseline cardiorespiratory fitness at baseline
Impact of CARDIOrespiratory FITness on Arrhythmia Recurrence in Obese Individuals With Atrial Fibrillation

- Figure A: Ablation Free and Drug Free (without use of rhythm control therapy)
  - > 2METS 61% AF free
  - < 2METS 18% AF free

- Figure B: Rhythm Control Therapy
  - > 2METS 89% AF free
  - < 2METS 40% AF free

Fitness Gain:
- Higher participation in physician directed > 2METs 83% were in dedicated workout vs 39%
- >2METs gain had sig: More Weight loss, Better BP control, Better lipid profiles and greater decline in LA vol
- As an independent risk factor for every MET gained 12% decline in AF recurrence
Impact of CARDIOrespiratory FITness on Arrhythmia Recurrence in Obese Individuals With Atrial Fibrillation

• Synergistic Effect

• Group 4 (≥10% wt loss and ≥2 METS gain) 75.6% AF free with no rhythm control 😱

• Group 4 (≥10% wt loss and ≥2 METS gain) 94% in AF treatment group 😊

![Figure 4: Outcomes of AF Freedom According to Cardiorespiratory Fitness Gain (>2 METS Gain vs. >2 METS Gain) and Weight Loss (>10% vs. >10% Weight Loss)](image-url)
Impact of CARDIOrespiratory FITness on Arrhythmia Recurrence in Obese Individuals With Atrial Fibrillation

- Strong correlation between cardiopulmonary fitness and AF recurrence
- Independent but synergistic to weight loss
- Dramatic results even off rhythm control therapy
- Strength in this study is that fitness was measured objectively by a highly reproducible test.
Conclusion

- Wow we made it
- Strong correlation between obesity and AF
- Not just associated comorbidities
- Results in poorer outcomes if untreated
- We can make profound impact with weight loss and exercise
- Objective measures for our pts
- Should be part of a AF treatment program
Things to Think About 😞

- Primary Prevention of AF

-🍔 🍕 🍦 🍰 🍟
Thank You 😎