Acute Coronary Syndromes: Broken Hearts and Spare Parts

David Schneider, MD, FAAFP

ACTIVITY DISCLAIMER

The material presented here is being made available by the American Academy of Family Physicians for educational purposes only. Please note that medical information is constantly changing; the information contained in this activity was accurate at the time of publication. This material is not intended to represent the only, nor necessarily best, methods or procedures appropriate for the medical situations discussed. Rather, it is intended to present an approach, view, statement, or opinion of the faculty, which may be helpful to others who face similar situations.

The AAFP disclaims any and all liability for injury or other damages resulting to any individual using this material and for all claims that might arise out of the use of the techniques demonstrated therein by such individuals, whether these claims shall be asserted by a physician or any other person. Physicians may wish to check specific details such as drug doses and contraindications, etc., in standard sources prior to clinical application. This material might contain recommendations/guidelines developed by other organizations. Please note that although these guidelines might be included, this does not necessarily imply the endorsement by the AAFP.

This CME session is supported by an educational grant to the AAFP from AstraZeneca.

DISCLOSURE

It is the policy of the AAFP that all individuals in a position to control content disclose any relationships with commercial interests upon nomination/invitation of participation. Disclosure documents are reviewed for potential conflict of interest (COI), and if identified, conflicts are resolved prior to confirmation of participation. Only those participants who had no conflict of interest or who agreed to an identified resolution process prior to their participation were involved in this CME activity.

All individuals in a position to control content for this session have indicated they have no relevant financial relationships to disclose.

The content of my material/presentation in this CME activity will not include discussion of unapproved or investigational uses of products or devices.

David Schneider, MD, FAAFP

Faculty physician/Didactics Director/Procedures Director, Santa Rosa Family Medicine Residency, California; Professor of Family and Community Medicine, University of California, San Francisco (UCSF) School of Medicine

Dr. Schneider cares for the underserved in Santa Rosa, California, serving Latino, Southeast Asian, and Eritrean populations. He has taught the breadth and depth of family medicine for more than 20 years, and his professional interests include the physician-patient relationship and clinical skills. Cardiovascular system conditions are one of his specialty topics, and he points to "the growing body of evidence suggesting that lifestyle is as effective as, or more effective than, pharmacological interventions in primary prevention." Dr. Schneider also focuses on conditions of the endocrine system (especially thyroid); skin conditions and dermatology; primary prevention; and procedures. Board certified in both family medicine and integrative holistic medicine, he produces Dr. Dave’s To Your Health segments for Wine Country Radio and BlogTalkRadio.com.

Learning Objectives

• Implement evidence-based secondary prevention recommendations in post-ACS patients.
• Use evidence-based criteria in determining safe and effective medications to prescribe at discharge post-ACS.
• Counsel patient to address concerns in the period immediately following discharge for ACS, with an emphasis on assessing and monitoring for psychosocial issues that may impact post-ACS outcomes.
• Prescribe cardiac rehabilitation for post-ACS patients, emphasizing coordination of care and follow-up.

Associated Session(s)

• Acute Coronary Syndromes: PBL
What is Acute Coronary Syndrome?

- AHA: “…an umbrella term used to cover any group of clinical symptoms compatible with acute myocardial ischemia.”
  - “Acute myocardial ischemia is chest pain due to insufficient blood supply to the heart muscle that results from coronary artery disease.”
- Practically speaking: ACS means acute MI or unstable angina.

AES Question

Which of the following does NOT qualify as unstable angina?

A. Angina of longer duration.
B. Angina with more pain (0-10 scale).
C. Angina occurring at lower activity level.
D. Angina of very recent onset.
E. None of the above (all are unstable angina).

Unstable Angina

- Unstable angina:
  - Angina at rest (esp > 20 min)
  - New onset angina limiting physical activity
  - Increasing angina
    - More frequent
    - Longer duration
  - Occurs with lower exertion
- Angina that occurs early after infarction or revascularization is also considered by many to be unstable angina.

Symptoms of ACS/MI

- Chest pain/angina
- 
- N +/- V
- Indigestion
- Dyspnea
- Sweating
- Dizziness, light-headedness
- Fatigue
- Pain in:
  - Either arm
  - Jaw
  - Neck
  - Back
  - Abdomen
Atypical MI Symptoms

• 1/3 had no CP
• Atypical sx:
  – Dyspnea alone
  – Weakness
  – Nausea and/or vomiting
  – Palpitations
  – Syncope
  – Cardiac arrest
• More likely to be older, diabetic, women.

Silent MI

• New info: Circulation, 5/16:
  – Mean F/U 13.2 yrs.
  – 703 incident MI’s:
    • 45% silent MI.
    • Silent MI → ↑ mortality, though sl lower than clinical MI.

Angina & MI in Women

• Women more likely than men to c/o atypical sx
  (burning/sharp; neck/jaw).
• Women still get typical angina, too!
• MI more likely to go undetected in women, esp young
  (40% unrecognized 35-39 yo vs 27% @ 75-79).
• Study of 515 women w/Mi:
  – Only 30% had prodromal CP; CP during MI in only 57%.
  – Dyspnea in 58%.
• High index of suspicion for CAD in women.

DDx of Chest Pain

• Cardiovascular
  – Ischemic (<20-30%, but 2-4% of MI’s are missed)
    • Office: ~10% stable angina; 2-4% ischemia/MI
  – Non-ischemic
    • Aortic dissection*
    • Myocarditis
    • Pericarditis

Other Causes of CP

• Pulmonary (5%)
  – PE*
  – Tension pneumothorax*
  – PNA
  – Pleurisy/pleuritis
• Psych
  – Depression
  – Anxiety d/o’s
  – Somatoform d/o’s
  – Delusional d/o’s
• MSK (33-50%)
  – Cervical disc dz
  – Costochondritis
  – Fibromyalgia
  – Herpes zoster
    (before the rash)
  – Neuropathic pain
  – Rib fracture
  – Sternoclavicular arthritis

GI Causes of CP (10-20%)

• Biliary
  – Cholangitis
  – Cholecystitis
  – Choledocholithiasis
  – Biliary colic
• Peptic ulcer disease
  – Nonperforating
  – Perforating*
• Esophageal
  – Esophagitis
  – Spasm
  – Reflux
  – Rupture*
• Pancreatitis
Life-Threatening Causes of Chest Pain

- Dissection (aneurysm)*
- Embolism (pulmonary)*
- Acute coronary syndrome*
- Tension pneumothorax*
- Hole in GI tract
  - Esophageal rupture
  - Perforated ulcer

(And Taxes....)

© David M Schneider, MD

Features Suggesting MI

<table>
<thead>
<tr>
<th>Chest feature</th>
<th>Likelihood ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain in chest or left arm</td>
<td>2.7</td>
</tr>
<tr>
<td>Chest pain radiation</td>
<td>2.9-4.7</td>
</tr>
<tr>
<td>Left arm</td>
<td>2.3</td>
</tr>
<tr>
<td>Both left and right arm</td>
<td>4.1-7.1</td>
</tr>
<tr>
<td>Chest pain most important symptom</td>
<td>2.0</td>
</tr>
<tr>
<td>No of myocardial infarction or other vascular events</td>
<td>1.5-3.0</td>
</tr>
<tr>
<td>Nausea or vomiting</td>
<td>1.9</td>
</tr>
<tr>
<td>Diaphoresis</td>
<td>2.0</td>
</tr>
<tr>
<td>Hypotension on auscultation</td>
<td>3.2</td>
</tr>
<tr>
<td>Pulmonary crackles on auscultation</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Sx Suggesting Non-Ischemic CP

- Duration:
  - Days
  - Few seconds or less
- Radiates above mandible or to legs
- Pleuritic (sharp, non-exertional, positional)
- Located only in mid- or low-Abdomen
- Can be Localized w/1 finger
- Reproducible by Movement or palpation

CP in ED: HEART Score

- History
- EKG
- Age
- Risk factors
- Troponin

- 0-3: 0.9-2.5% risk of CV event ➔ D/C
  - 2013 validation study: 0-3➢1.7% had MACE➢98.3% sens.
- ≥ 7 ➔ high risk, Major Adverse Cardiovascular Event

Risk factors: "HOT CAD"
- HTN
- Obesity
- Tobacco/Smoking w/in 1 mo
- Cholesterol (Hyperlipidemia)
- Ancestry (FH)
- DM
- Age
- ≥65 year
- 45-65 year
- <45 year

Risk factors
- ≥3 risk factors or h/o atherosclerotic dz
- 1 or 2 risk factors
- No risk factors known

Troponin
- ≥2x normal limit
- 1-2x normal limit
- ≤ normal limit

History
- Highly suspicious
- Moderately suspicious
- Slightly suspicious

EGC
- Significant ST depression
- NS repolarization disturbance
- Normal

Age
- ≥65 year
- 45-65 year
- <45 year

Risk factors
- 1 or 2 risk factors
- No risk factors known

Troponin
- ≥2x normal limit
- 1-2x normal limit
- ≤ normal limit
HEART Pathway w/2nd Troponin

- If 1st or 2nd troponin ↑ → manage as ACS.
- HEART ≤3 + neg 2nd troponin:
  - Neg 2nd troponin @ 3 hr → 100% sensitivity & NPV (2015, N=282).
  - Neg 2nd trop @ 4 hr → 100% sens & NPV; 83% specificity (2011, N = 1070).
  - Neg 2nd trop @ 3 hr → 99-99.6% sens (2013, N=1005).
  - Earlier D/C, less testing, lower costs.

ACS: UA vs MI

- Unstable angina:
  - NO elevation in cardiac enzymes.
  - +/- Ischemic ECG changes—transient.
- MI:
  - Elevated cardiac enzymes → rise & fall.
  - Evolving ECG changes.
- Cardiac enzymes may not ↑ for hours, so UA may be indistinguishable from non-ST elevation MI at presentation (see HEART score).

Diagnosis of Acute MI

- Rise & fall of cardiac biomarkers AND at least one of:
  - Ischemic sx
  - ECG changes
  - Imaging evidence of new myocardial loss or wall motion abnormality

Cardiac Enzymes

- Troponins most sensitive & specific
  - TnI & TnT are equivalent.
  - Tn now preferred to dx reinfarction—≥20% ↑ 3-6 hrs after prior value suggests reinfarction.
  - [Low sensitivity until ≥4 - 6 hrs after sx onset.
  - Enzymes may not rise for 12 hrs (see HEART).]

<table>
<thead>
<tr>
<th>Enzyme</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>CK-MB</td>
<td>3 – 12 hr</td>
<td>18 – 24 hr</td>
<td>36 – 48 hr</td>
</tr>
<tr>
<td>Troponins</td>
<td>3 – 12 hr</td>
<td>18 – 24 hr</td>
<td>7 – 10 days</td>
</tr>
</tbody>
</table>

Nonischemic Causes of Elevated Cardiac Enzymes

- Cardiac ischemia/injury without infarction
- HF (heart failure)
- Myocarditis
- Rapid atrial fib
- PE
- Proximal aortic dissection
- Chronic (or acute) renal insufficiency
- Sepsis, critical illness
- Look for rise & fall – not just elevation.

ACS: 123, ABC (Squared)

1. Emergency management
   a) Monitor
   b) MONA
   c) Early risk stratification
2. EKG
   a) STEMI → reperfuse
   b) NSTEMI → might not reperfuse
3. (ABC)^2 meds
Nitrate Precautions in ACS

- Contraindicated if PDE-5 inhibitors within 24 hrs (hypotension):
  - Sildenafil (Viagra and Revatio)
  - Vardenafil (Levitra, Staxyn)
  - Tadalafil (Cialis, Adcirca) – may need to wait 48 hrs.
- [Extreme caution if inferior MI & possible RV involvement.]
  - RVMI ➔ dependent on preload to maintain cardiac output (RV not working well).
  - Consider FLUIDS – ↑ neck veins may NOT be due to fluid overload in this situation!!

AES Question

All pts presenting w/MI should receive supplemental oxygen.

A. True.  
B. False.

Oxygen—Friend or Foe?

- Cochrane 2016:
  - 5 trials, N=1173.
  - Inconsistent & low quality evidence.
  - No effect of O₂ on mortality or infarct size.
  - No RCT evidence to support routine use of O₂ MI, can’t R/O harmful effect.

Oxygen—Friend or Foe?

- AVOID trial 2015 (p-Cochrane): 
  - Multicenter RCT, 441 STEMI pts.
  - 8 L O₂ mask vs RA.
  - 7.7% in RA arm rec’d O₂ for sat < 94% (4L NC, few 8L mask).
  - In normoxemic pts, routine high-flow O₂ NOT assoc’d w/↓ pain or infarct size.
  - Larger infarct (early CK, 6 mo MRI).
  - In hosp: 5X ↑ recurrent MI, 29% ↑ arrhythmia.

Oxygen—Friend or Foe?

- O₂ may ↑ coronary artery & other vasoconstriction.
- Hyperoxia (PaO₂ > 300) may harm organs (resp failure, cerebral hypoperfusion) or worsen outcomes - uncertain.
- *O₂ should be treated like all other medical therapies, for which physicians balance efficacy and side-effect profiles. Until larger studies are available, O₂ should not be routinely administered to patients unless oxygen saturations are <94%.

Initial Meds

- Immediate ASA 162 – 325 mg chewed.
  - CURRENT-OASIS 7 Trial (2010): 
    - No difference in outcomes w/low dose (75-100 mg) or higher dose (300-325);
    - GI bleeding w/low dose.
  - ACC 2013 STEMI guideline: 162-325 mg pre-PCI.
  - Ticagrelor ➔ must use ≤100 mg ASA.
  - Need rapid absorption - do NOT use EC.
  - Do not use if anaphylactic reaction.

Initial Meds

- CURRENT-OASIS 7 Trial (2010): 
  - No difference in outcomes w/low dose (75-100 mg) or higher dose (300-325);
  - GI bleeding w/low dose.
  - ACC 2013 STEMI guideline: 162-325 mg pre-PCI.
  - Ticagrelor ➔ must use ≤100 mg ASA.
  - Need rapid absorption - do NOT use EC.
  - Do not use if anaphylactic reaction.
Time Out: Early Risk Stratification

• All ACS pts should have **early risk stratification** w/in 4-6 hrs.
  – **TIMI risk score** - predicts 14- & 30-day mortality.
    • Has been used in ED to stratify risk.
    • In-hospital (did not perform as well as TIMI score).
    • 6 month & 1 yr: ≈ or sl better than TIMI.

Diagnosis of Acute MI

• Rise & fall of cardiac biomarkers **AND** at least one of:
  – Ischemic sx
  – **ECG changes**
    – Imaging evidence of new myocardial loss or wall motion abnormality

Step 2: Look at the ECG

• **ST elevation**
  – ST-elevation MI (**STEMI**).
  – Prinzmetal’s angina (**transient ST ↑**).
• **No ST elevation**
  – ST depression – angina or **NSTEMI**.
  – T wave inversions – NSTEMI or increased risk for acute MI.

Initial ECG in ACS

• Initial ECG may be non-diagnostic in 45%, **normal** in 20%.
• Non-diagnostic initial ECG + pt w/high suspicion of MI (including continued sx) ➔ **repeat ECG** every 5-10 minutes (ACC).
• **SERIAL ECG’s** - remember to order f/u ECG.

EKG Changes in MI

• **ST segments**:
  – **ST depression** ➔ myocardial **ischemia**.
  – **Elevation** (immediately post plaque-rupture) ➔ myocardial **injury**.
    • Resolution of ST elevation suggests reperefusion.
    • Persistent ST elevation: consider **ventricular aneurysm**.
• **T wave inversions** ➔ ischemia/injury.
• **Q waves**:
  – Develop ~12 hrs post plaque-rupture ➔ **infarction**.
  – Typically permanent.

AES Question

1. A
2. B
3. C

Which is baseline for comparing ST segments?
What’s Elevation & Depression?

- **Baseline is the TP segment** – electrical neutrality.
  - T wave is ventricular repolarization.
  - P wave is atrial depolarization.
  - Between T & P is the only point in ECG when heart is not “doing” anything, electrically speaking.

Review: Summary of EKG Criteria

- **Everything is 1 mm, except V2 & V3 are weird.**
  - **ST elevation:** 1 mm (except V2-V3; age/gender criteria).
  - **ST depression:** 1 mm (except V2-V3).
  - [Measure 2 small boxes after J point.]
  - Q waves: 1 mm wide + 1 mm deep (except V2-V3).
  - Everything should be in 2 contiguous leads.
  - Not d/t pericarditis or LV aneurysm.

New Onset LBBB ➜ Assume STEMI

- **Q waves: 1 mm wide + 1 mm deep (except V2-V3).**
- **Everything should be in 2 contiguous leads.**
- Not d/t pericarditis or LV aneurysm.

ECG Localization of MI: ST Elevations

- **V1 – V2:** septal, anteroseptal
- **V3 – V4:** anterior, anteroseptal
- **V1-V3** may be apical/anteroapical
- **V4 – V6:** lateral
- I, aVL, V5, V6: lateral
- II, III, aVF: inferior
- Check V4R – V6R – RVMI (ACC/AHA)

Reciprocal ECG Changes

- **ST depressions**
  - Anterior MI: II, III, aVF (inferior leads).
  - Lateral MI: II, III, aVF (inferior) + V1-V2 (anterior).
  - Inferior MI: V1-V3, I, aVL (anterior, +/- lateral).
  - “Inferior partners with everything.”
Inferior MI, Reciprocal Depressions

Inferior MI → R-Sided EKG

Where's the MI?

Extensive Anterior + Lateral

ACS: 123, ABC (Squared)

1. Emergency management
   a) Monitor
   b) MONA (?O₂?)
   c) Early risk stratification
2. EKG
   a) STEMI → reperfuse
   b) NSTEMI → might not reperfuse
3. (ABC)² meds

ABC's of MI Drugs

- ASA + Anticoagulant
- B-Blockers
- Clot inhibitor (non-ASA antithrombotic) + Cholesterol (statin)

↓ Morbidity, mortality, 2nd MI.
• Guideline- & evidence-based.
How & When to Give β-Blockers

- Early β-blockade is preferred (rec I/LOE B).
  - Oral β-blockers within 24 hrs of presentation.
  - IV β-blockers only for MI pts w/o contraindications and with HTN or ongoing ischemia, if hemodynamically stable.
- Pt w/early contraindications to β-blockers should be reassessed after 24 hrs for β-blocker appropriateness (I/C).
- β-blockers save lives → D/C NTG, not β-B, if ↓BP.

Meds in STEMI

- Already received ASA, β-blockers.
- Clot inhibitors (added to ASA):
  - Benefits: ↓ death, MI.
  - Loading dose, give in addition to ASA.

Antithrombotics in STEMI

- If PCI:
  - Ticagrelor (Brilinta™) 180 mg - usu preferred.
    - If ticagrelor given, ASA dose must be ≤100 mg.
    - Risk of bradycardia, caution esp w/2nd & 3rd heart block.
  - Prasugrel (Efient™) 60 mg (NOT if H/O CVA or TIA).
    - Improved outcomes - ongoing trial similar w/ticagrelor.
  - Clopidogrel (Plavix™) 600 mg.
- If thrombolysis:
  - Clopidogrel 300 mg if age ≤75; 75 mg if >75.

Anticoagulants in STEMI: Principles

- Procedure (e.g., CABG) which might require reversing anticoag → unfractionated heparin - reversible w/protonam.
  - PCI: UFH preferred w/ticagrelor or prasugrel.
  - High bleeding risk → bivalirudin (but ↑ stent thrombosis).
  - Thrombolysis/no reperfusion → enoxaparin (fondaparinux if bleeding risk).
- Duration (uncomplicated reperfusion):
  - PCI: stop heparin (or bivalirudin) at end of procedure.
  - Thrombolysis: UFH = 2 d; LMWH/fondaparinux = 8 d or D/C.

Statins in STEMI

- High-intensity statin therapy should be initiated or continued in all patients with STEMI and no contraindications to its use.
  - Start as early as possible.
  - Atorvastatin 80 mg daily.
    - ARMYDA-ACS (industry-sponsored): early atorvastatin (12 hr before PCI) ↑ 30-day outcomes.
  - Caution: high-dose statins associated w/new DM - but benefit > risk.

Summary: STEMI Reperfusion Guidelines

- Pt w/onset of ischemic sx w/in 12 hrs:
  - PCI-capable (1st medical contact [FMC]-balloon time ≤90 min) → PCI (IA).
    - Non-PCI-capable:
      - If door-in-door-out (DIDO) ≤30 min AND FMC-balloon time at referral hospital ≤120 min → transfer (IB).
      - FMC-balloon >120 → thrombolysis, no transfer (IB).
  - See supplemental info.
Sicker STEMI Pts Get More Leeway

- PCI at any time if cardiogenic shock, acute/severe HF - incl transfer for PCI (IIa/B).
- Consider PCI 12-24 hrs if ongoing ischemia (IIa/B).
- Consider TL 12-24 hrs if lg area of myocardium at risk, hemodynamic instability (IIa/C).

PCI: Stents

- Bare metal:
  - Metal = foreign body ➔ ↑ risk of in-stent thrombosis – clopidogrel + ASA decreases risk.
  - Epithelialization may progress to in-stent stenosis.
- Drug-eluting:
  - Delay epithelialization, maintaining bare metal longer ➔ ↓ stenosis but ↑ thrombosis.

AES Question

Dual antiplatelet therapy after MI should be given for:
A. 1-12 months
B. 90 days
C. Indefinitely
D. At least 12 months
E. The heck of it

Dual Antiplatelet Therapy: Stents

- Aspirin: continue indefinitely for all stents.
- Post ACS: all stents ≥12 months (I/B).
- Clopidogrel 75 mg daily (preferred - 2016).
- Prasugrel 10 mg daily (not if h/o CVA or ↑ bleed risk), IIa (reasonable).
- Ticagrelor 90 mg bid, IIa, bid dosing.
- NNT = 33-53.
- Hitch: ESC & others ➔ reeval @ 6 mo, ?D/C?

DAPT Trial—2014

- 9961 pts – 26% p-MI, 17% unstable angina.
  - Drug-eluting stents only (1/2 = 1st gen, ½ = 2nd gen).
  - 18 extra mo DAPT (= 30 mo).
  - ↓ Stent thrombosis (HR 0.29, NNT=100).
  - ↓ MI (HR 0.47, NNT=100).
  - ↓ MACE + cerebrovascular (HR 0.71, NNT=63).
  - 56% more mod/severe bleeding (NNH=57).
  - ↓ All-cause mortality (HR 1.36, NNH=200).

DAPT Score—2016

- DAPT score ≥2 ➔ favorable benefit/risk ratio for prolonged DAPT (53% ↓ ischemic events; no sig ↑ bleeding).
- DAPT score ≤2 ➔ unfavorable benefit/risk ratio (no sig diff ischemic events; 114% ↑ bleeding!!!).
- Choose well!
- http://tools.acc.org/DAPTriskapp/

Age ≥75  ➔ 2
Age ≤65 y ➔ 3
Age ≥65 y ➔ 1
Current smoker ➔ 1
DM ➔ 1
MI at presentation ➔ 1
Prior PCI or MI ➔ 1
Stent diameter ≤3 mm ➔ 1
Failure-eluting stent ➔ 1
CHF or LVEF <30% ➔ 2
Saphenous vein graft PCI ➔ 2
Testing After STEMI (Late Risk Stratification)

- LVEF: ↓ EF  ➔ ↑ mortality.
  - Echo - wait for recovery after reperfusion (stunned myocardium)  ➔ 14 days.
- Stress test (guide CV rehab, eval for residual ischemia):
  - If revascularization: few wks after D/C.
  - No revascularization: pre-D/C, if no recurrent angina or CHF.

Meds After STEMI (D/C + Office)

- ACEI (Rec I/LOE A):
  - HF.
  - LVEF <40%.
  - Anterior STEMI.
  - ARB may be used if ACEI not tolerated (rec I/LOE B).
  - May be given to all p-MI pts (IIaA = “reasonable”).
- Aldosterone antagonist:
  - LVEF <40 & on ACEI + β-blocker (IIb).
- Statin (I).
- Dual antiplatelet therapy ≥12 mo.
  - ASA 81 mg indefinitely (I/A).
  - P2Y12 “grel” drug 12 mo or more (I/B).

Mnemonic: Post-MI Meds

- ASA
- β-blocker
- Cholesterol (statin)
- DAPT.
- Extra A’s (ACEI/ARB, Aldo antagonist)

Reperfusion in NSTEMI

- TIMI risk score early stratification:
  - TIMI risk score ≥5 (maybe ≥3) may benefit from early PCI.
  - Sicker pts + DM + renal dysfunc benefit.
- Thrombolysis is NOT useful in NSTEMI, and may be harmful.
- O/w similar management to STEMI.

Summary of ACS Management

- Everybody (unless contra):
  - Morphine
  - O₂ Emergency
  - NTG Mgmt
  - ASA
  - β-blocker
  - GPi inhibitor (“grel”)
  - Statin (cholesterol)
  - Stress test:
    - Pre-D/C if no reperf
    - Few weeks later if PCI
- Low EF: ACEI
- Heparinoid:
  - PCI: UFH, bivali
  - STEMI + TL: enoxaparin
  - STEMI w/o rep: UFH or enoxaparin
  - NSTEMI:
    - Invasive: UFH, enoxaparin
    - Non-invasive: enoxaparin, UFH
    - Fondaparinux if higher bleed risk

52 yo M, Squeezing SSCP, Rad LUE, EKG WNL 6 Mo Prior ➔ NSTEMI
### Post-ACS Management: 2° Prevention

- **Healthy diet** – ≥ 5 servings of vegetables & fruits/day, low sat fat, olive oil as main fat, low starch, high fiber.
- **Appropriate exercise.**
- **Control of risk factors.**
  - ASA - indefinite.
  - Statin - no more treat to target! (controversial).
  - ß-blocker - indefinite.
  - Smoking cessation.
  - Control BP & glc.

### AES Question

Which of the following is NOT a strong recommendation for post-MI prevention/mgmnt?

A. Screen for depression after MI.
B. Cardiac rehab may be optional for pts who are already seeing a cardiovascular care specialist.
C. Influenza shot should be given to all post-MI pts.
D. Healthy lifestyle including diet, exercise.
E. None of the above.

### Specific 2° Prevention of MI

- **Influenza vaccine**, if available
  - ↓ CV death, CV events, effect may last 1 yr.
  - Give during hosp for MI, or up to 8 wks later.
- **Fish oil?** (Fish or supplements)
  - Conflicting evidence - but heterogeneous trials.
  - Some trials may be underpowered to detect effects in pts on maximal p-MI tx.
  - Very low risk - why not?
  - Avg dose in + trials ~1.8 g omega-3 (NOT oil).

### Depression After MI

- **Depression is common after MI:**
  - 3X > general population.
  - 16-20% meet depression criteria in hospital p-MI.
  - 33% have sx of depression.
  - Evidence review: prevalence 7-47%.
  - 35-60% of those depressed p-MI stay depressed > 1 month.
  - ½ w/major depression & 42% w/”minor” sx remained depressed at 1 year.

### Consequences of Post-MI Depression

- Reduced adherence.
- ↑ p-MI mortality.
- Possible ↑ hosp readmission & nonfatal CV events.
- ↑ Suicide risk p-MI:
  - ARR 3.25 if no prior psych condition.
  - ARR 64 if prior psych condition.

### Does Tx of P-MI Depression Help?

- **Treatments used:**
  - SSRI’s.
  - Psychosocial - psychotherapy, CBT, self-help.
- Depression improved.
- Cardiac endpoints & mortality may ↓, but poor quality &/or underpowered studies.
Recommendations: Depression

- Use a standardized depression checklist to screen periodically post-MI (SOR A).
  - No specific tool recommended.
  - PHQ-2 OK, if + PHQ-9.
- Treat depression if present (SOR A).
  - SSRI’s preferred > TCA’s, but actually poor evidence.
  - Psychotherapy may help, no specific type recommended.

• Use PHQ-2 or PHQ-9 to screen periodically post-MI.

Cardiac Rehabilitation

- All eligible pts with ACS or p-CABG or p-PCI should be referred to a comprehensive outpatient CV rehabilitation program prior to D/C or during 1st F/U office visit. (I/A)
  - All eligible outpts with the dx of ACS, CABG or PCI (I/A), chronic angina (I/B), and/or PAD (I/A) within the last year should be referred.
  - Home-based CV rehab program OK for low-risk pts. (I/A)

Impact of Cardiac Rehab

- ↓ CV (26-36%) &/or total (26%) mortality.
- ↓ Recurrent MI (47%).
- ↓ Hospitalization (18%).
- ↑ Aerobic capacity.
- Mild improvement in LVEF if EF<40.
- ↑ QOL.

Have We Forgotten?

- Cardiac rehabilitation is underutilized.
  - 14-20% of eligible pts are referred.
  - Pts w/depression are less likely to complete cardiac rehab (OR = 5.6).
  - Women less likely to complete (OR = 2.5).
  - Convenience factors.
  - Language & cultural barriers.
  - Strength of physician recommendation.

Does Lifestyle Work in 2° Prevention?

- YES!
  - Ornish: ↓ angina, ↓ CV events, ↑ QOL.
  - Lyon Heart Study: Medit diet ↓ CV events, ↓ mortality, ↓ CA.
  - Meditation ↓ CAD adverse outcomes.
  - See Supplemental Materials for many fun details.

Long-Term Adherence to Meds

- Less expensive medications.
- Enroll pt in a diet and exercise program.
- Enroll pt in a post-D/C comprehensive cardiac rehabilitation program.
- Help pt find programs that help pay for meds.
- Minimize # of meds given at D/C.
- Schedule F/U w/cardiologist (and FP!!).
- System of med tracking (pillbox, calendar, alarm).
Practice Recommendations

- Unless contraindicated, pts should remain on ASA, β-blockers, and high-intensity statin after an ACS/MI for 2° prevention (SOR A).
- Post-MI pts w/LVEF <40% should be placed on ACEI (ARB 2nd choice) + aldosterone antagonist indefinitely (SOR A).
- After ACS or revascularization (CABG, PCI), all eligible pts should be referred to a comprehensive outpatient CV rehabilitation program prior to D/C or during 1st F/U office visit. (SOR A)

Questions

Contact Info

- David Schneider, MD
- Work email: schneid2@sutterhealth.org

Supplemental Material

CAD is Common

- 15.5 million adults ≥20 (6.2%).
- 750,000 MI’s/yr (550K new + 200K recurrent).
- Additional 160,000 silent MI’s/yr (est).
- 1 MI per 42 seconds.
- Avg age 1st MI: M = 65.1 years; F = 72.0 yrs.
- 117,000 deaths d/t MI + 250K additional CAD.

Silent MI—2

- Prior studies showed silent MI 22-44% of MI’s.
- ARIC odds ratios:
  - Silent MI: men ➔ OR 1.7 vs women (?!?)
  - Clinical MI: men ➔ OR 3.5 vs women.
  - CAD death: silent MI ➔ 3.06; clinical ➔ 4.74.
Common Noncardiac Causes of CP

- **MSK** (chest wall, costochondritis): palpation reproduces tenderness.
  - NB: R/I costochondritis does **NOT** R/O ACS.
- **GERD**: burning retrosternal pain, acid brash.
- **Panic/anxiety**: validated questionnaire.
- **Pericarditis**:
  - Pleuritic CP, ↑ during supine & inspiration, ↓ leaning fwd.
  - Diffuse ST changes on EKG.
  - +/- pericardial friction rub.

CP Characteristics: Low MI Risk

<table>
<thead>
<tr>
<th>Pain descriptor</th>
<th>Positive LR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleuritic</td>
<td>0.2</td>
</tr>
<tr>
<td>Positional</td>
<td>0.3</td>
</tr>
<tr>
<td>Sharp</td>
<td>0.3</td>
</tr>
<tr>
<td>Reproducible w/palpation</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Ruling In Dx Does NOT R/O MI

- **Common sense**.
- **2007 ED study**:
  - 1999 pts; 77 (4%) had MI.
  - 30% (599) given clear-cut non-cardiac dx.
    - MACE: in-hosp RR = 0.32; 30-day RR = 0.45.
    - Still a 4% event rate @ 30 days (too hi for ED D/C).

Angina in Women

- Women **more likely than men** to c/o **atypical** sx:
  - Pain: more intense, sharp, burning
  - Location: more often in neck, throat than men
  - Inciting factors: more likely assoc’d w/sleep, rest, mental stress
  - 2014 study: minor differences, many not clinically important.
- NB: Women still get **typical angina**, too!
- **High suspicion for CAD in women w/risk factors or sx**.
- Women underestimate CAD risk & mortality (& less aware of atypical sx), though improving.

Unrecognized MI in Women

- MI is more likely to go undetected in women, esp young women (40% unrecognized 35 – 39 yo vs 27% @ 75-79).
- Women **more likely than men** to have pain in neck, jaw, back, & to have nausea w/CP.
- **Study of 515 women w/MI**:
  - Only 30% had prodromal CP.
  - CP during MI in only 57%.
  - **Dyspnea** in 58%.

Chest Pain in the ED

- 8-10 million ED visits annually for chest pain.
- $5-10 billion/yr for chest pain ED visits.
- ~10% of ED visits for CP have MI.
Other CP Risk Scores

- **TIMI risk score:**
  - Predicts 14- & 30-day mortality.
  - Has been used in ED to stratify risk, MI.
- **GRACE model** (harder to calculate):
  - In-hospital (did not perform as well as TIMI).
  - 6 month & 1 yr: = or sl better than TIMI.
  - Risk increases w/score—both.
  - Also used to stratify risk & guide management.

Type 1 vs Type 2 MI

- **Type 1:**
  - Spont MI d/t plaque rupture/ulceration/fissuring etc → intraluminal thrombus → ↓ myocardial blood flow or distal plt emboli w/consequent myocyte necrosis.
  - Good evidence for mgmt.
- **Type 2 (controversial):**
  - Supply/demand mismatch, w/o plaque rupture, w/ myocardial necrosis.
  - Older, more comorbidities.
  - May have higher mortality & complications.
  - Less evidence.
  - Treat underlying condition.

Initial Meds—Not ASA

- **Sublingual NTG** 0.4 mg q 5 min X3.
  - IV NTG if persistent pain, CHF, HTN
  - D/C NTG if BP too low—more important to give β-blockers.
- **Morphine** 2 – 4 mg IV. Repeat prn.
  - Relieves pain, anxiety.
  - Reduces sympathetic stimulation caused by
  - Replete K if below 4 (2X ↑ in VF if < 3.6).

Detail: Criteria for ST Changes

- **ST Elevation:**
  - Men:
    - ≥ 40: 2 mm in V2-V3; 1 mm in other leads.
    - < 40: 2.5 mm in V2-V3; 1 mm in others.
  - Women:
    - 1.5 mm in V2-V3; 1 mm in other leads.
- **ST depression (men & women):**
  - 0.5 mm in V2-V3, 1 mm in other leads.
  - Horizontal or downsloping ST depression of 0.5 mm in 2 contiguous leads.

ST Elevation DDx

- Healthy young men—esp V2 (concave up).
- Early repolarization (notched J in V4).
- LVH.
- LBBB.
- Pericarditis (diffuse ST ↑, w/PR ↓).
- PE.
- Prinzmetal’s angina (transient).
- T’K’ (tall/tented T’s, wide QRS, downsloping ST).
- Brugada syndrome.
- Persistent ST elevation may be seen with ventricular aneurysm.

β-blocker Contraindications

- Active bronchospasm
- Severe bradycardia
- Heart block > 1° (if no pacemaker)
- Pulmonary edema
- Hypotension with or without shock
- Overt heart failure should be brought under medical control
  - Most pts w/MI d/t cocaine should not be treated with beta blockers (risk of coronary artery spasm, severe HTN)
New Antiplatelet Agents – 3
• Neither prasugrel nor ticagrelor has been studied in thrombolysis, and should not be used.
• If no reperfusion, antithrombotic = ticagrelor or clopidogrel (prasugrel = clopidogrel).

Prolonged DAPT: A Tradeoff
• Meta-analysis 2016, N=33,051. DAPT duration:
  – 12 vs 3-6 mo: no difference in death, major hemorrhage, MI, stent thrombosis.
  – 18-48 mo vs 6-12 months; no difference in all-cause death, but ↑ major hemorrhage (OR 1.58), ↓ MI (OR 0.67), ↓ stent thrombosis (OR 0.42).
  – Analysis 2 RCT’s ➔ DAPT >1 year after MI assoc w/↓ composite risk of CV death, MI, or stroke (HR 0.84), but ↑ major bleeding (HR 2.32).

Question/Poll Everywhere
High intensity statin should be given before PCI if possible.
A. True.
B. False.

New(er) STEMI Reperfusion Guidelines
• PCI-capable hospital, do PCI (cardiologist):
  – STEMI w/< 12 hrs of sx—incl contraindication to TL, regardless of time to first medical contact. (IB)
  – Consider in STEMI w/ongoing ischemia (clinical, EKG) between 12 and 24 hours after sx onset. (IIa, B)
  – STEMI w/cardiogenic shock or acute severe HF, irrespective of time delay from MI onset. (IB)

New STEMI Reperfusion Guidelines—2
• Non-PCI-capable hospital:
  – If PCI can’t be done w/in 120 min of 1st medical contact ➔ thrombolysis (if no contraindication). (IA)
  – Consider TL in STEMI if ongoing ischemia w/in 12-24 hr of sx onset, and either:
    • Lg area of myocardium @ risk, OR
    • Hemodynamic instability.
    • IIa C.
Transfer to PCI-Capable Hospital

- For 1st PCI w/in 30 min (door-in-door-out) + first contact-to-balloon time ≤ 120 min—preferred.
- After TL:
  - “Suitable” STEMI pts w/cardiogenic shock or acute severe HF. (IB)
  - “Reasonable” if failed reperfusion. (IIa,B)
- If no reperfusion:
  - Cardiogenic shock or acute, severe CHF.
  - High risk finding on pre-D/C noninvasive test.

Stents

- Stent (bare-metal or drug-eluting) is useful in primary PCI for pts w/STEMI. (LOE A)
- Bare-metal stents (LOE C):
  - Pts w/high bleeding risk.
  - Inability to comply w/ 1 year of dual antiplatelet therapy (DAPT).
  - Anticipated invasive or surgical procedure in next year.
- Selected pts may get PTCA w/o stent.

DAPT for Stent in Stable IHD

- Bare metal: 1-12 months.
- Drug-eluting: ≥ 6-12 mo if not high risk for bleeding.

STEMI W/O Reperfusion

- Pts may benefit from clopidogrel even if not reperfused.
  - COMMIT-CCS2: ~1/2 of pts on clopidogrel were not reperfused, still mortality benefit.
  - Uncertain dose: COMMIT-CCS2 used 600 mg; NSTEMI study used 300.

Absolute Contraindications to Thrombolysis

- H/O any intracranial hemorrhage.
- H/O ischemic stroke w/in 3 months*.
- Cerebral vascular malformation or 1st or metastatic intracranial malignancy.
- Sx/signs suggestive of aortic dissection.
- Bleeding diathesis or active bleeding (except menses*).
- Significant closed-head or facial trauma w/in 3 months.
- ST depression—unless posterior MI or ST↑ aVR.
Thrombolysis Summary

- Contraindications:
  - Bleed in brain or high risk of brain bleed.
  - Meds or conditions that ↑ bleeding risk anywhere.
  - ST depression—unless true posterior MI.
- Use thrombolysis only if you have a hospital or other institutional protocol or worksheet.
  - Too hard to remember all contraindications & requirements.

NSTEMI Management: Differences vs STEMI

- Enoxaparin (if no renal failure, and no CABG within 24 hr) or heparin.
- No reperfusion ➔ pre-D/C stress test (as in STEMI).
- Measure LVEF – echo (same).
- Statin (same).
- ACEI if EF <40%, DM, HTN (same, less evidence).
- GP2b/3a inhib depends on troponin, anticoagulant, other emerging factors.

TIMI Risk Score

- Age ≥ 65 years
- ≥ 3 risk factors for CHD (HTN, DM, dyslipidemia, smoking, + FH of early MI)
- Prior coronary stenosis of ≥ 50%
- ST segment deviation on admission ECG
- ≥ 2 anginal episodes in prior 24 hours
- Elevated serum cardiac biomarkers
- Use of ASA in prior seven days

A TIMI Score Mnemonic

- **A** ge
- **A** SA use
- **R** isk factors
- **P** rior stenosis
- **E** nzymes
- **A** ngina recently
- **ST** elevation

- TIMI score & composite event rate (death/MI/revasc):
  - 0-1 = low risk (4.7%)
  - 2-3 = intermediate risk (8-13%)
  - ≥ 4 = high risk (20-41%)

STEMI After Non-Cardiac Admission

- Similar management.
- Different baseline characteristics, worse outcomes vs ED.
  - Inpts older, more comorbidities, more cardiac arrest & cardiogenic shock ➔ ↑ LOS, less likely to be D/C’d to home.
  - Time from recognition of ischemic event to 1st EKG longer in inpatients (88% w/ 90 min, vs 91% in ED); fewer get PCI.
  - Survival to D/C may be 1/3 lower.
  - ↑ 1-yr mortality (16.9% vs 9.4%) vs pts who presented to ED.

2012 Guideline—Summary of NSTEMI Pts Who Benefit From Early Invasive Strategy

- Hemodynamic instability or cardiogenic shock.
- Severe LV dysfunction or heart failure.
- Recurrent or persistent rest angina despite intensive medical therapy.
- New or worsening mitral regurgitation or new ventricular septal defect.
- Sustained ventricular arrhythmias.
- Recent PCI (6 mo) or prior CABG.
- DM or renal dysfunction (new guideline).
Preventing Premature Platelet Pill D/C

• ACC recs include:
  – If pt unlikely/unable to comply w/1 yr DAPT ($ or other) ➔ avoid DES.
  – Plan to delay elective surg >1yr; if unable to delay, consider BMS.
  – If unexpected surgery, cont ASA & restart anti-plt med ASAP.
  – Pt education.
• Risk: MI, stent thrombosis.

Stress Testing in Stable Angina

• 2012 ACC/AHA guidelines still recommend stress testing for most pts w/stable angina in order to:
  – Confirm dx
  – Evaluate efficacy of therapy
  – Obtain prognostic info
  – Identify “high risk” pts who might need PCI
• Hold anti-ischemic drugs for 4-5 half-lives (~48 hrs).

Which Stress Test?

• **Exercise is preferred** over pharmacologic.
• Pharmacologic stress (pt can’t exercise to goal):
  – Vasodilators—↑ coronary blood flow.
    • Adenosine.
    • Regadenoson (Lexiscan™).
    • Dipyridamole.
  – Inotrope—↑ HR & contractility.
    • Dobutamine – preferred for stress echo.

Key Questions—Stress Testing

• Can pt exercise? Exercise preferred, if able.
• Is EKG interpretable?
  – LBBB, ST changes.
  – Ventricular pacer.
  – Pre-excitation.
• What is the **indication** for stress test?
  • Cardiac comorbidities.
    – Prior revascularization.
    – Digoxin.

Which Stress Test?

• Exercise EKG test (treadmill—ETT).
  – 1st test for most pts, including women.
  – ETT may be less specific in women.
  – Insufficient evidence to recommend imaging in all women.
  – Useful if normal resting EKG.
  – Difficult to interpret if:
    • Unable to exercise to goal.
    • Baseline EKG abnormalities.

Contraindications to Stress Test

<table>
<thead>
<tr>
<th>Absolute Contraindications</th>
<th>Relative Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute MI w/in 48 hrs</td>
<td>Left main CAD or equivalent</td>
</tr>
<tr>
<td>Unstable angina</td>
<td>Moderately severe heart dz</td>
</tr>
<tr>
<td>Symptomatic severe AS</td>
<td>Electrolyte abnormalities</td>
</tr>
<tr>
<td>Uncontrolled sev. failure</td>
<td>Severe HTN (SBP &gt;120 &amp; DBP &gt;90)</td>
</tr>
<tr>
<td>Acute PE or pulmonary infarction</td>
<td>Tachy- or bradyarythmias, incl AFib w/RV</td>
</tr>
<tr>
<td>Active endocarditis</td>
<td>Hypertrophic cardiomyopathy &amp; other</td>
</tr>
<tr>
<td>Acute aortic dissection</td>
<td>Pulmonary embolism &amp; other</td>
</tr>
<tr>
<td>Acute noncardiac disorder that may affect or be aggravated by exercise (eg, infection, renal failure, thyrotox)</td>
<td>Severe CPD with trouble breathing</td>
</tr>
<tr>
<td>Inability to obtain consent</td>
<td>Mental or physical impairment leading to inability to cooperate</td>
</tr>
<tr>
<td></td>
<td>High-degree AV block</td>
</tr>
</tbody>
</table>

Circulation 2007;115(6):813-8

Stress Testing in Stable Angina

Circulation 2007;115(6):813-8

Stress Testing in Stable Angina

Circulation 2012;126:3097-137

Which Stress Test?

Circulation 2012;126:3097-137

Which Stress Test?

Circulation 2012;126:3097-137

Contraindications to Stress Test

Circulation 2002;106:1883-92

Stress Testing in Stable Angina

Circulation 2002;106:1883-92

Contraindications to Stress Test

Circulation 2002;106:1883-92

Which Stress Test?

Circulation 2002;106:1883-92

Key Questions—Stress Testing

Circulation 2002;106:1883-92

Contraindications to Stress Test

Circulation 2002;106:1883-92

Which Stress Test?
Contraindications to Stress Agents

- Vasodilators:
  - RAD/asthma.
  - Hypotension.
  - Sinus node dysfunction.
  - High degree AV block.
  - Oral dipyridamole—may use dipyridamole for stress, not adenosine or regadenoson.
- Dobutamine:
  - Ventricular arrhythmias.
  - Recent MI (w/in 3 days).
  - Unstable angina.
  - Significant LV outflow obstruction.
  - Aortic dissection.
  - Severe HTN.

Rule: When To Image

- Baseline EKG abnormalities:
  - LBBB.
  - LVH.
  - Prior revascularization.
  - Pacemaker.
  - Pre-excitation.
  - Reeding nonspecific ST-T abnormalities.
  - Digoxin.

- Pt can’t exercise to a sufficient degree to obtain an adequate routine exercise test.

Selecting the Right Test

- Pt can exercise:
  - No prior revasc:
    - Interpretable EKG: Exercise treadmill test
      - Note: high risk pts benefit from exercise MPI or echo—prognostic info.
    - Uninterpretable EKG: exercise MPI or echo.
  - Prior revasc: exercise MPI or echo.

Selecting the Right Test

- Pt can NOT exercise:
  - Pharm stress MPI or echo (MPI if Afib or wall motion abnormality).
  - Low likelihood → can use pharm stress echo.
  - Known CAD (testing for prognosis):
    - Stress MPI or echo.
    - If pt can exercise, do exercise not pharm.
    - If interpretable EKG, & pt can exercise, ETT is an option.

Just Do It!

- You don’t have to be a cardiologist to refer to a cardiac rehab program.
- Part of comprehensive care of the p-MI pt.
- One of Dr Dave’s rules: “Never blindly entrust the care of your pts to specialists.”
  - Get the info from other docs.
  - Continue to participate in pt’s care—incl meds, rehab, etc.

Statins vs Lifestyle—1° Prevention

<table>
<thead>
<tr>
<th>Condition</th>
<th>Statins</th>
<th>Lifestyle</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV Dz</td>
<td>↓ 25%</td>
<td>↓ 70-87%</td>
</tr>
<tr>
<td>DM</td>
<td>↑ 18%</td>
<td>↑ 91-93%</td>
</tr>
<tr>
<td>HTN</td>
<td>↓ 78%</td>
<td></td>
</tr>
<tr>
<td>All-cause mortality</td>
<td>↓ 14%</td>
<td>↓ 45-69%</td>
</tr>
<tr>
<td>CA</td>
<td>↓ 36-70%</td>
<td></td>
</tr>
<tr>
<td>MI</td>
<td>↓ 41%</td>
<td></td>
</tr>
<tr>
<td>Stroke—total/ischemic</td>
<td>↓ 22%</td>
<td>↓ 55-55%/71-80%</td>
</tr>
<tr>
<td>CAD</td>
<td>↓ 27%</td>
<td>↓ 59-70%</td>
</tr>
<tr>
<td>HF</td>
<td>↓ 52-57%</td>
<td></td>
</tr>
<tr>
<td>SCD</td>
<td>↓ 32%</td>
<td></td>
</tr>
<tr>
<td>Revascularization</td>
<td>↓ 38%</td>
<td></td>
</tr>
</tbody>
</table>

Yes, your pts should still take statins when appropriate! Statins save lives—AND so does healthy lifestyle!
Primary Prevention Rules!

- Primary prevention is best, when possible – prevent dz before it is evident.
- 1° prevention reduced death by 4-fold vs 2° prevention in study that synthesized data & used mathematical modeling.

Secondary Prevention

Mediterranean Diet – 2013

- Purported 1° prevention study in Spain.
  - 48.5% w/DM2.
  - 82.7% w/HTN.
  - 72.3% w/dyslipidemia.
  - Mean BMI = 29.9.
- 1° endpoint (MI/CVA/CV death):
  - Med diet w/nuts: 28% ↓
  - Med diet w/EVOO: 30% ↓
- 39% ↓ stroke (2° endpoint).
- No adverse effects of diet.

The Ornish Program

- Intensive lifestyle program in CAD pts:
  - Low fat, low carb, vegetarian diet (difficult to adhere).
  - Aerobic exercise (30 min/session, 3 hr/week).
  - Stress management training.
  - Smoking cessation.
  - Group psychosocial support.
- Regression of atherosclerosis & ↓ CV events, 5 yr F/U.

More-nish

- Intensive lifestyle program assoc’d w/less hostility & psychological distress, esp in those w/best adherence.
- Ornish program → ↓ angina in CAD pts.
  - 74% angina-free at 1 year.
  - 9% more moved from limiting angina to mild.
  - Improved exercise capacity & QOL.
  - 757 men/395 women, only 12 week study.

Lifestyle in 2° Prevention

- Mediterranean diet
  - Lyon Heart Study: 27 mo flu → 73% ↓ in nonfatal MI, 70% ↓ overall mortality.
  - Lyon Heart Study flu: 46 mo flu → 72% ↓ cardiac death + nonfatal MI (combo), 56% ↓ overall mortality, 47% ↓ all endpoints combined; 61% ↓ CAF.
  - Indo-Mediterranean Diet Heart Study: ~50% ↓ total cardiac endpoints, SCD, nonfatal MI vs NCEP diet.
Mediterranean Diet – 2

• Italian study: 2.8 kg more wt loss than “prudent diet”, lower CRP, less insulin resistance, almost 50% ↓ metabolic insulin resistance @ 2 yrs.
• Esposito et al: obese women, 2 yrs Med diet + exercise vs general info on diet/exer → BMI ↓ by 4.2 more, lower CRP in Med diet group

Mediterranean Diet – 3

• Heart Institute of Spokane Diet Intervention & Evaluation Trial: small study, Med diet = low fat, both ~70% ↓ events vs usual care.
• Greek Study of ACS (GREECS): validated diet score – closer to Med diet → less severe MI (troponin), 19% ↓ recurrence

Mediterranean Diet – 4

• GISSI-Prevenzione Study: advice to increase their consumption of fish, fruit, raw and cooked vegetables and olive oil, 42 mo:
  – Those most adherent to Med diet had 49% ↓ mortality vs worst quartile.
  – Ω-3 ↓ SCD 58% in pts w/systolic HF.
  – Ω-3 save more lives than pravastatin.
  – 30% ↓ CAD death, 45% ↓ SCD.

Mediterranean Diet – 5

• EPIC-Elderly Study: 2700 pts >60 yo, 6.7 yrs – 20% better adherence to Med diet (standardized scale) → 18% ↓ mortality
• Trichopoulou et al: 20% better adherence to Med diet → 27% lower mortality in pts w/preexisting CAD.

Mediterranean Diet – 6

• Systematic review:
  – “…benefits from the Mediterranean diet were significant in all studies…. reduction in the risk of coronary heart disease varied from 8% to 45%…”
  – “The systematically reviewed studies reveal a cardio-protective effect of the Mediterranean diet and point to this dietary pattern as highly appropriate for public health objectives.”

Med Diet & Atrial Fib??

• ↓ Adherence to Mediterranean diet → ↑ Afib risk.
• Better Med diet adherence → ↑ chance of spontaneous conversion of AF to SR.
More Lifestyle in 2° Prevention

• GOSPEL Study: 3200 p-MI pts (Italy), 3-yr intensive intervention (exercise, diet, psychosocial stress, less deterioration of body weight control) → ↓ in 2° endpoints:
  - 48% ↓ nonfatal MI.
  - 33% ↓ CV mortality + nonfatal MI and stroke.
  - 36% ↓ cardiac death + nonfatal MI.

ArchIM2008;168:2194‐204

Meditation

• 201 African-American pts w/>50% stenosis on cath.
  - 20 min TM daily (after full training) vs 20 min “heart-healthy behaviors”/day (exercise, relax, healthy meal, etc).
  - 5.4 yrs f/u → 48% ↓ in combined endpoint (total mortality + MI + CVA).
  - 24% ↓ 2° endpt (CV mortality + revasc + CV hospitalization).
  - SBP ↓ by 5.

Meditation – 2

• Mindfulness meditation reduces CAD adverse outcomes.
• TM mostly 1° prevention studies in high risk elderly pts w/HTN or pre-HTN, 36 mo survival:
  - TM = 100%
  - Mindfulness meditation = 87.5%
  - “Relaxation” = 65%
  - F/U 7.6 yrs (max 18.8 yrs) → 23% ↓ total mortality, 30% ↓ CV mortality.


Meditation – 3

• TM vs usual care, pilot study in CAD pts:
  - Less exercise-induced ischemia.
  - Better exercise tolerance.

AmJCardiol1996;78:77–80

Because I’m From Wine Country…

• Alcohol consumption and mortality in patients with cardiovascular disease: a meta-analysis.
  - J-shaped curve for CV mortality.
  - 22% ↓ in CV mortality – max protection at 26 g/day.
  - 18% ↓ in all-cause mortality – max protection at 5‐10 g/day.
  - Conclusion: mod alcohol consumption of 5-25 g/day in pts w/CV dz = assoc w/ ↓ CV & total mortality.

JACC 2010;55:1339‐47

Buzz Kill: Not Too Much Wine

• Stroke, e-Pub online 1/25/15.
• Swedish Twin Registry.
• > 2 servings/day of ETOH → 34% ↑ stroke risk.
• Stroke risk of >2 ETOH/day during midlife predominated over typical risk factors (HTN, DM) til ~ 75 yo.
ICD-10 Codes

- ACS: I24.9.
- Unstable angina: I20.0.
- STEMI: I21.xx
  - Ant wall STEMI = I21.0.
  - AWMI involving LAD = I21.02.
- NSTEMI: I21.4.