



# **Dr. Alo's Cardiology Review**

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# HistoryandPhysical.net

- Correct H&P
- Correct Consult
- People judge you by these! Make sure you know how to do H&Ps and Consults correctly.





# History!

- 90% of your diagnosis
- They tell you what they have
- Get a good exercise/exertion history

**HistoryandPhysical.net**





# 3 P's of Chest Pain!

**Positional?** - Lying back/arching back elicits pain

- Pericarditis

**Producible?** – touching/moving

- Costochondritis- relieved with NSAIDs?
- Musculoskeletal- pectoral strain/tear

**Pleuritic?** - changes with breathing

- Pneumonia
- Pneumothorax
- Pleuritis/pleurisy
- Pericarditis
- Pulmonary embolus
- Pleural effusion
- Fractures (ribs)

(All start with “P”. All have can fever. MI can have fever.)





# How good is history?

Retrospective Study by Swap and Nagurney in JAMA Nov. 2005

## **Sx and Likelihood Ratio: (positive)**

- Radiates to one arm or shoulder 4.7
- Radiates to both arms or shoulders 4.1
- Associated with exertion 2.4
- Radiation to left arm 2.3
- Associated with diaphoresis 2.0
- Associated with nausea and vomiting 1.9
- Worse than or similar to previous MI or Angina 1.8
- Described as pressure 1.3





# How bad is history?

## Sx and likelihood ratio: (negative)

- Described as pleuritic 0.2
- Described as positional 0.3
- Described as sharp 0.3
- Well circumscribed 0.5
- Reproducible c palpation 0.8
- Inframammary location 0.8
- Not associated c location 0.8





# Risk Factors

- **Smoking – single worst thing**
- Obesity
- Hypertension
- Diabetes Mellitus
- Male Sex
- Low HDL—under 40
- Total Cholesterol and LDL Elevated
- Age-- > 45 for male/55 for female
- Family History—event in first degree relative <55 male <65 female
- Known CAD





# Risk Equivalents

- Prior MI, CABG, STENT
- Known CAD (CVA, MI, Carotid Disease)
- AAA
- PAD
- DM





# Timi Risk Score

1. Age over 65
2. Aspirin within last 7 days (prior to admission)
3. Any 3 of the following: DM, HTN, Chol, Tobacco, FHx (see FHx below)
4. Known CAD/Previous MI.
5. Two episodes of chest pain lasting more than 20 minutes each in last 24 hours.
6. Non-negative cardiac markers (includes indeterminate)
7. ST deviation by more than 0.5mm up or down.

One point for each of the above. Seven is maximum.

Score of 0-2 less than 3% chance of MI or death.

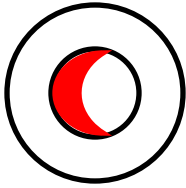
Score of 3 gives 5% chance of MI or death.

Score of 4 gives 7% chance of MI or death.

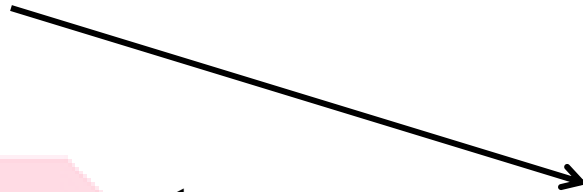
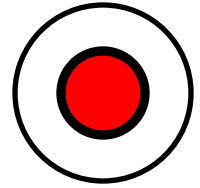
Score of 5 gives 12% chance of MI or death.

Score of 6-7 gives 19% chance of MI or death.





# ACS



## NSTEMI

Medical Management

Then cath within 72 hours

### Medical Management:

- O<sub>2</sub>**
- ASA 325**
- Clopidigrel 600**
- Enoxaparin/heparin**
- IIb/IIIa Inhibitors**
- Beta Blocker**
- Statin 80**
- ACEI**
- Hgb > 10**

## STEMI

Open the artery!

Cath lab or tPA in 90 minutes

**Q**

### Optional:

Nitroglycerin- venodilator

### Don't give:

Morphine- vaso and venodilator

### SAAB Treatment:

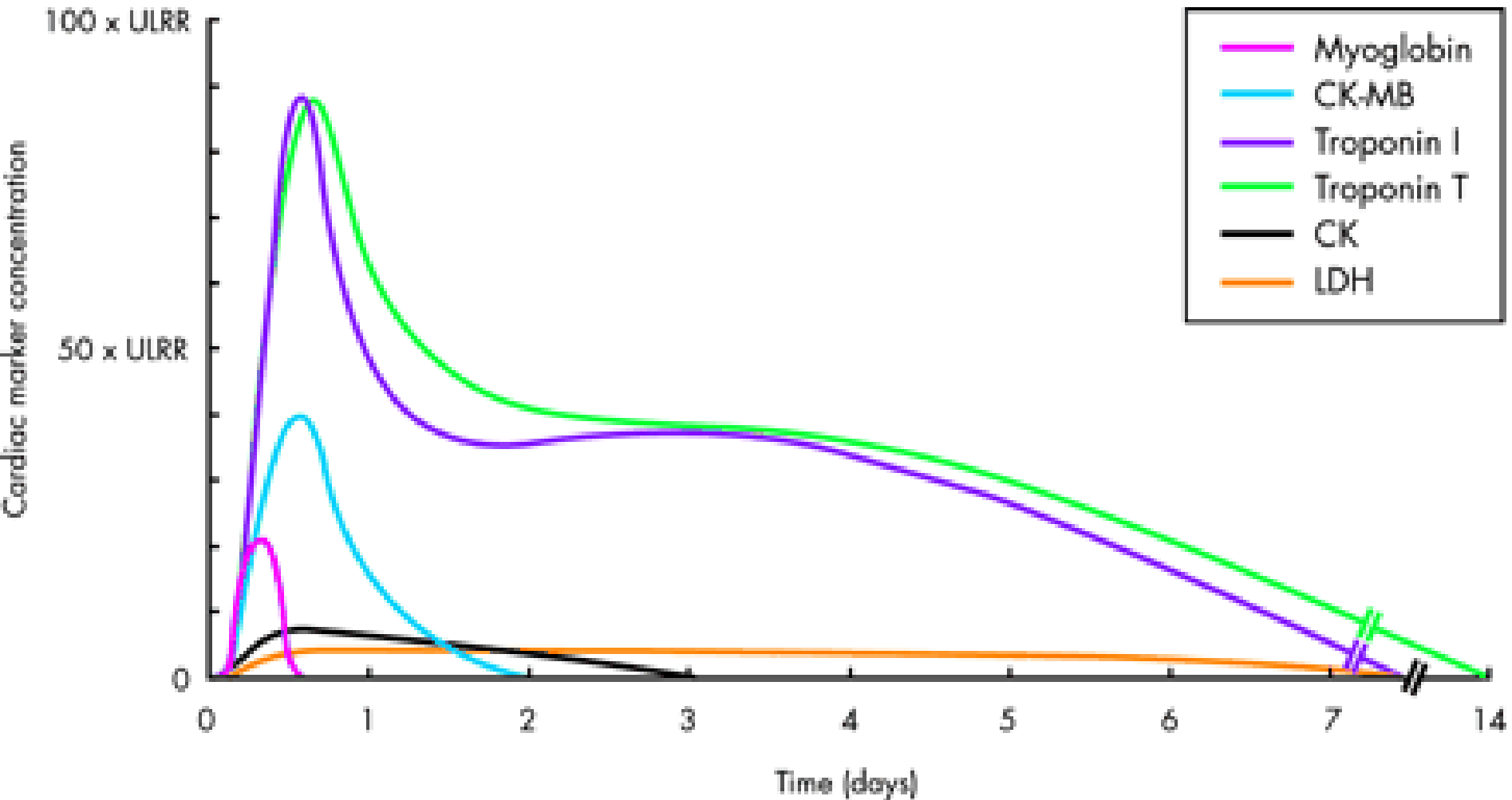
- **Statin**
- **Asprin**
- **ACEI**
- **Beta Blocker**

**90% Reduction in Mortality!**





# Cardiac Enzymes

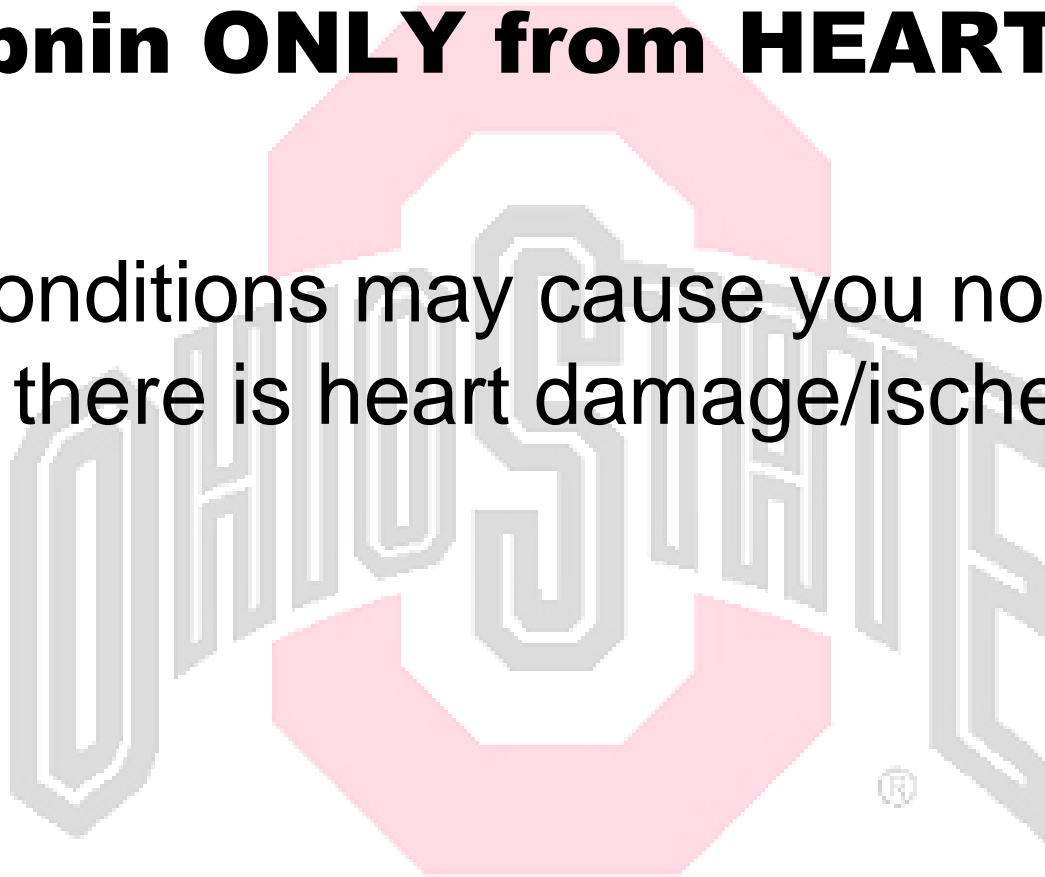




# Tropnin

**Tropnin ONLY from HEART!!!!!!!**

Other conditions may cause you not to clear it, but there is heart damage/ischemia.





# ST Elevations

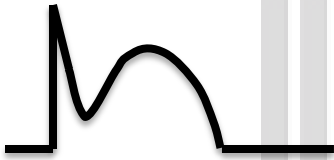
## Limb Leads

Up to 1mm is ok

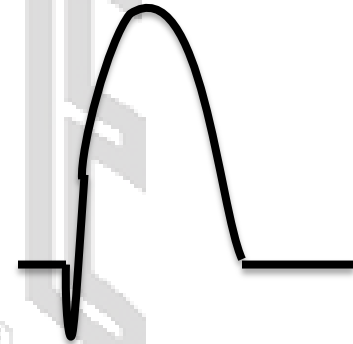
## Chest Leads

Up to 3mm is ok

**ANY NEW ELEVATION IS NOT OK!**



Shape Doesn't Matter!

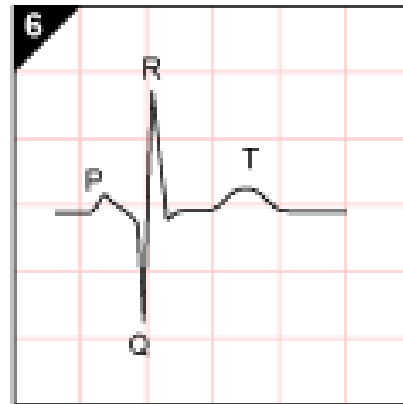
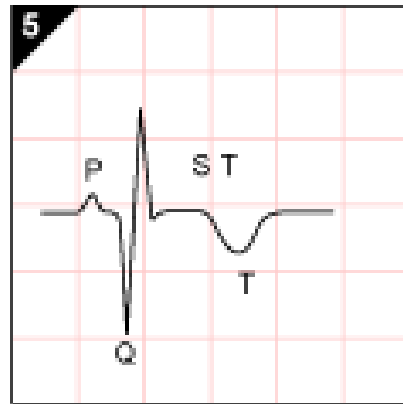
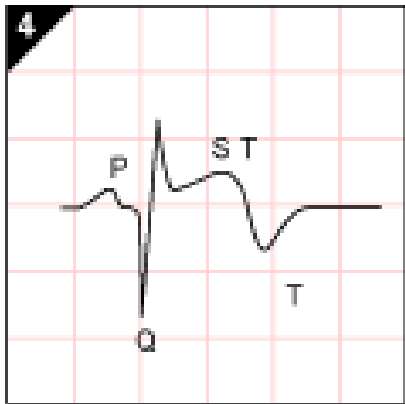
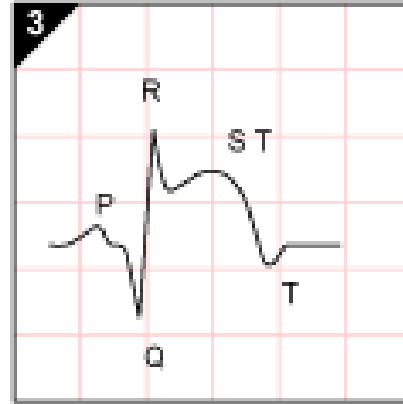
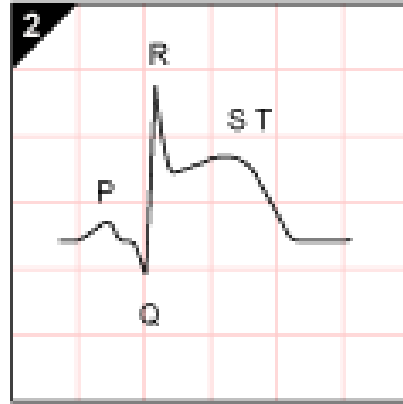
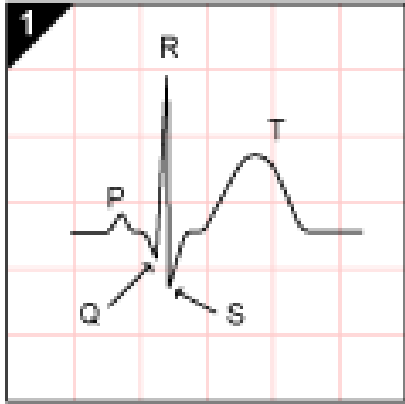


Shape Matters!





# Sequence of events in STEMI



- 1, Hyperacute T waves
2. ST elevations
3. T wave inversions
4. Q Waves





# Reciprocal Changes

- Inferior reciprocates to AVL and I
- Anterior reciprocates to Inferior leads
- Lateral reciprocates to Inferior leads





# RCA vs LCA

## **RCA:**

Hypotensive  
Bradycardic  
Arrhythmias  
Slow

## **LCA:**

Hypertensive  
Tachycardic  
Pain  
Anxiety





# Medications

- ASA- 160-325mg bolus, then 81-160mg per day, start ASAP, then stay on indefinitely. ISIS-2 trial showed 23% RRR.
  - Irreversible inhibition of cyclooxygenase pathway in platelets, blocking formation of thromboxane A<sub>2</sub>, and platelet aggregation
  - In AMI, ASA reduced the risk of death by 20-25%
  - In UA, ASA reduced the risk of fatal or nonfatal MI by 71% during the acute phase, 60% at 3 months, and 52% at 2 years
- Plavix- 300mg-1200mg bolus, then 75mg/day if PCI planned. If no PCI, continue for 1-9 months. If CABG planned, hold plavix. CURE & CAPRIE Trial 8.7% RRR compared to ASA.
- O<sub>2</sub>- myocytes need O<sub>2</sub>, give it. Decreased O<sub>2</sub> causes CP.





# Meds

- B-Blocker- metoprolol 5mg IV x 3 doses. Then 50mg bid, then 100mg bid. Timi 2b trial. Immediate IV therapy versus deferred PO therapy, no difference except in low risk category, 7 deaths for deferred group. Lower incidence of reinfarction and recurrent chest pain in immediate IV group. MIAMI Trial showed 13% RRR in death s/p AMI in first 15 days of trial. ISIS-1 Trial 15% RRR in 7 days. Bottomline: Early Beta Blockade equals better clinical outcomes.
- Lovenox- Timi 11B trial and ESSENCE Trial showed 20% RRR in primary endpoint, RISC trial showed heparin to be useless.
- IIb/IIIa inhibitor (if going to cath)





# Meds

- Lipitor- 80mg now, then 40mg daily. PROVE-IT/Timi 22 Trials, the lower the LDL the better. Showed that in acute setting decreases mortality. 16-28% RRR for 80mg atorvastatin compared to 40mg pravastatin. Also relieved unstable angina and rehospitalization. Aggressive lipid lowering decreased all cause mortality, MI, rehospitalization, revascularization, compared to less aggressive lipid lowering. MIRACL Trial showed reduction in recurrent acute coronary ischemia at 16 weeks and showed benefit for all patients discharged with ACS or AMI.





# Meds

- ACEI- GISSI-3, SAVE, AIRE, TRACE trials showed 20% reduction in mortality. 11% reduction in mortality at 6 weeks. Prevents myocardial remodeling. Even at 4 years follow up, ACEI showed benefit and that early trends continued.
- Nitroglycerin PO or GTT (no mortality benefit, good symptom relief for pain)
- **Morphine contraindicated.** CRUSADE Trial.





# CRUSADE Trial

## Intravenous Morphine May Increase Mortality in Non-ST Segment Elevation Acute Coronary Syndromes

May 10, 2005 — Intravenous morphine given for chest pain in the setting of non-ST segment elevation acute coronary syndromes (NSTEMI ACS) increases mortality, according to the results of a retrospective registry study published online in the American Heart Journal. The investigators suggest maximizing use of nitroglycerine before using morphine, and they recommend randomized trials to evaluate this safety concern.

"Although intravenous morphine is commonly used for the treatment of chest pain in patients presenting with NSTEMI ACS, its safety has not been evaluated," write Trip J. Meine, MD, from Duke University Medical Center in Durham, North Carolina, and colleagues from the CRUSADE (Can Rapid Risk Stratification of Unstable Angina Patients Suppress ADverse Outcomes with Early Implementation of the ACC/AHA Guidelines) Quality Improvement Initiative. "The CRUSADE Initiative is a nonrandomized, retrospective, observational registry enrolling patients with NSTEMI ACS to evaluate acute medications and interventions, in-hospital outcomes, and discharge treatments."

From Jan. 2001 through June 2003, 57,039 patients presented with NSTEMI ACS at 443 hospitals across the U.S., and 17,003 (29.8%) of these received morphine within 24 hours of presentation.

**Compared with patients not treated with morphine, patients treated with any morphine had a higher adjusted risk of death (odds ratio [OR], 1.48; 95% confidence interval [CI], 1.33 - 1.64). Compared with patients receiving nitroglycerin, patients treated with morphine also had a higher adjusted likelihood of death (OR, 1.50; 95% CI, 1.26 - 1.78). Morphine use was associated with increased in-hospital mortality (OR, 1.41; 95% CI, 1.26 - 1.57), based on a propensity score matching method. The increased risk of death in patients receiving morphine was consistent in all evaluated subgroups.**





# SAAB Treatment

- **Statin**
- **Asprin**
- **ACEI**
- **Beta Blocker**

**90% Reduction in Mortality!**

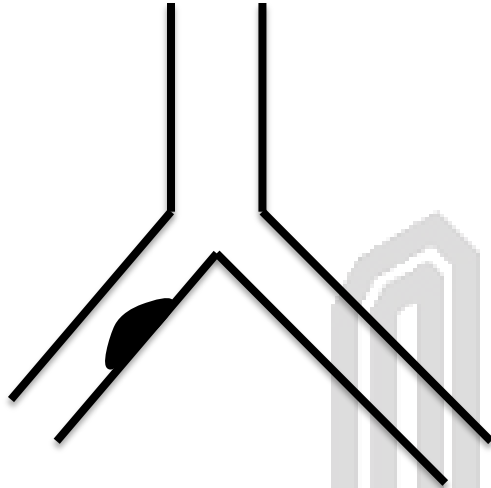




# Stress Testing

## EKG

Everyone



## Stress

### •Exercise

- Increase HR
- Vasodilation
- Functional Capacity

### •Pharmacologic

- Adenosine
  - Vasodilation
- Dobutamine
  - Increase HR

## Imaging

### •Nuclear

- Tracer uptake
- Reversible defects

### •Echo

- Wall Motion Analysis
- Hypokinesis

## Possibilities:

- Exercise Only
- Exercise Nuclear
- Exercise Echo
- Adenosine Nuclear
- Dobutamine Echo
- Dobutamine Nuclear





# Stress Testing

Look at pretest probability of CHD. Low 5%, Int 25-75%, High 90% chance that they have CHD.

**Low Risk Patient:** PPV of 21%

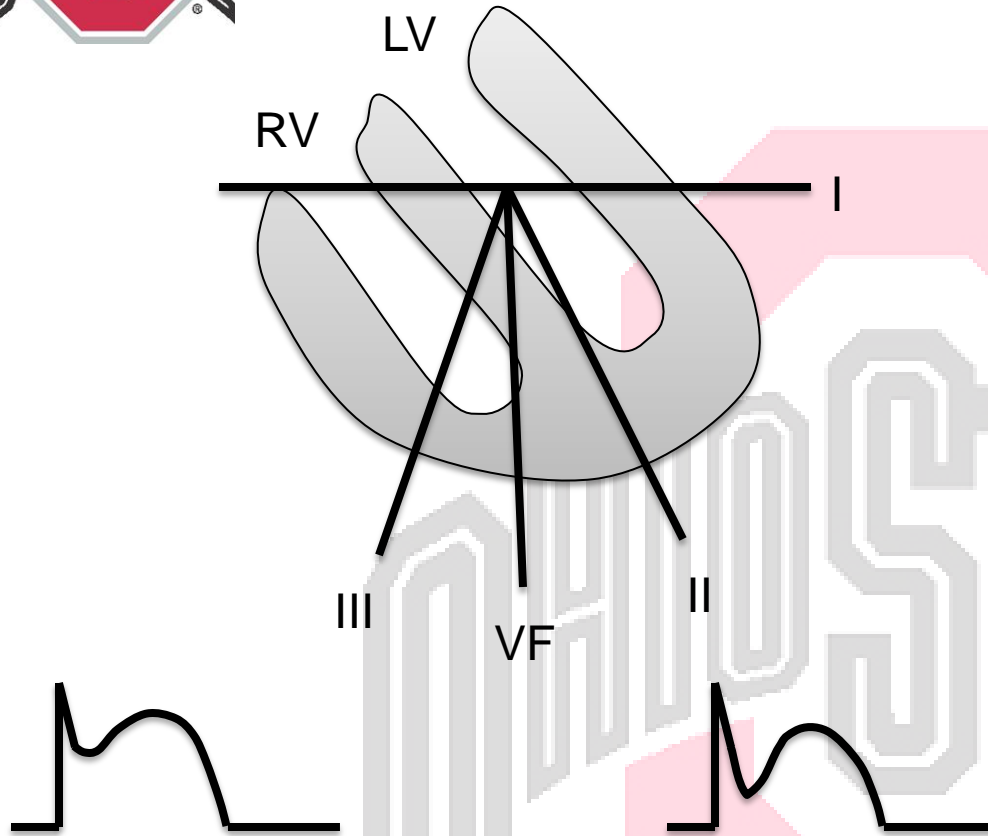
**High Risk Patient:** PPV of 90%. If + goes to 98%. If neg drops to 83% PPV. So really, it's a waste of time if high pretest probability.

**Intermediate Risk:** If pos PPV goes up to 83%. If neg probability of CHD drops to 36%. This is a good test.





# RV Infarct



If ST elevation in III is higher than II, then RV infarct.

If ST elevation higher in II, then LV inferior wall MI.

## Sx:

1. Hypotension
2. JVD/Edema
3. Clear Lungs

## Tx:

1. Fluids
2. Wipe Off Nitro

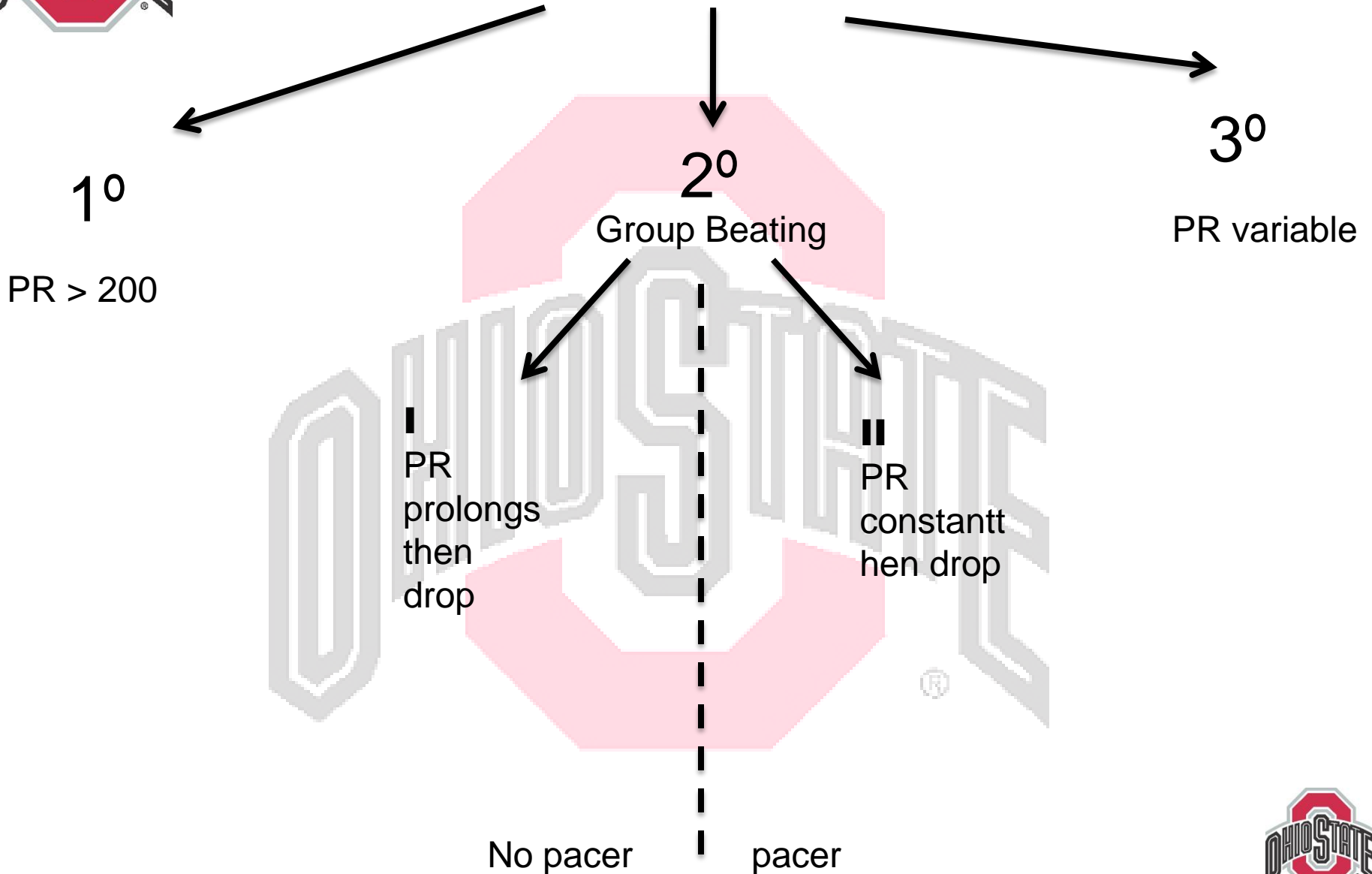
## Don't:

1. Beta Blockers
2. Nitro
3. Morphine





# AV Blocks





# Arrhythmias

## NARROW (SVTS)

1. Sinus Tach
2. Atrial Tach
3. Junctional Tach
4. MAT
5. Afib
6. Atrial Flutter
7. AVNRT
8. AVRT

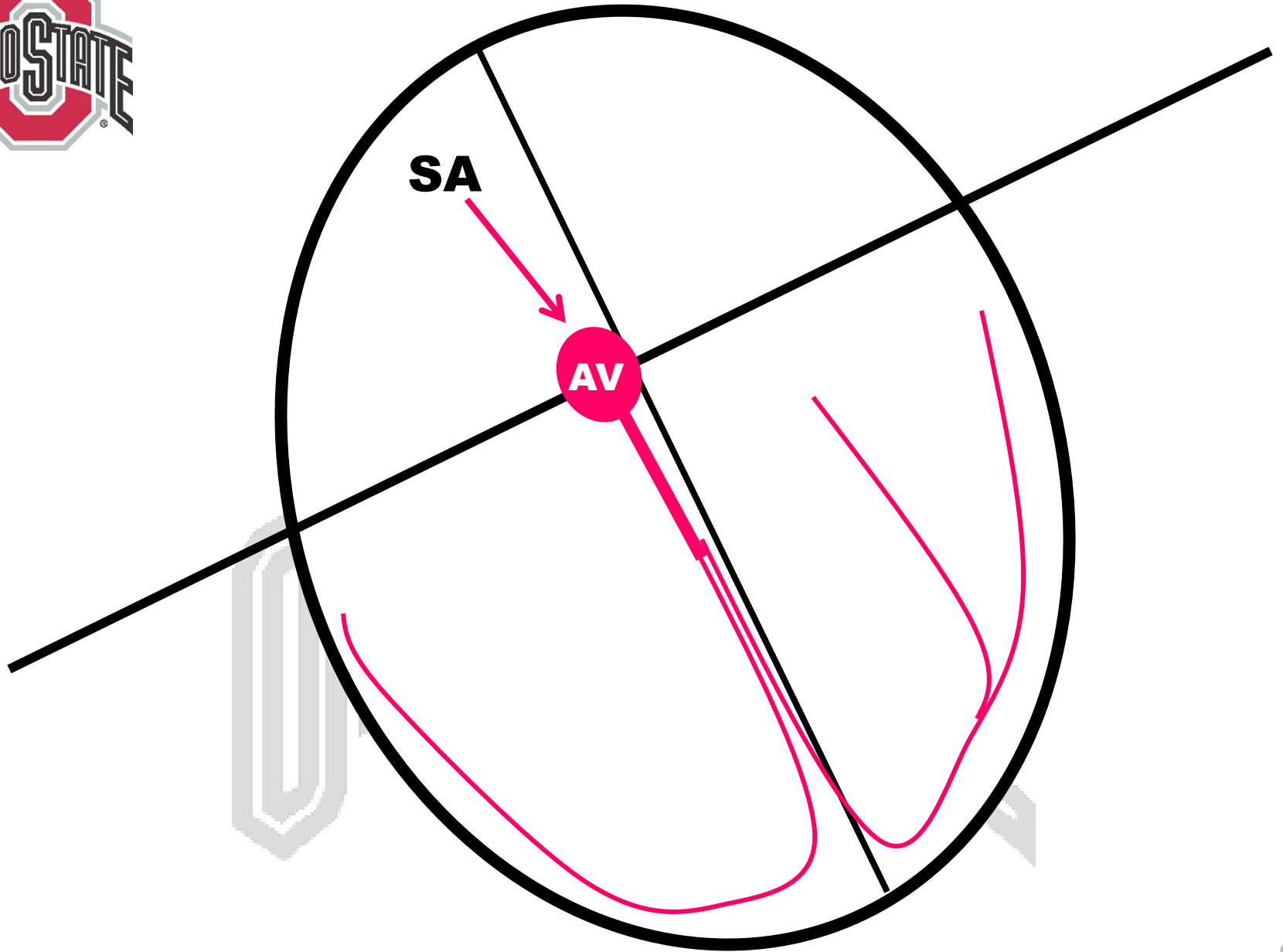
Irr irr

## WIDE

VT/VF

SVT c aberrancy  
LBBB  
RBBB







# Atrial Fibrillation

- Rate Control vs Rhythm Control
- **CHADS2 Score**
  - 0-1: Aspirin alone is ok
  - 2+: Need coumadin





# ACLS Protocols



## Asystole/PEA

Chest compressions  
Epi/Vasopressin  
Atropine if slow PEA

## VF/VT (pulseless)

Chest compressions  
Defib  
Amiodarone/Mg  
Lidocaine





# HTN

- Normal 115/75
- For every 20/10 higher, your risk for stroke doubles
- Identify risk factors
- In young look for secondary causes





# Secondary HTN

- **Obstructive Sleep Apnea**
- Renal Artery Stenosis
- Carcinoid
- Fibromuscular Dysplasia- Young women
- Atherosclerosis- gives RAS, older men
- Pheochromocytoma- rare
- Hyperaldosteronism





# HTN

## **Vasodilators:**

Hydralazine

ACEI

Nitro

CCB

Alpha Blockers

Thiazides

## **Rate Drugs:**

Beta Blockers

CCBs

## **RAAS:**

ACEI

Aldactone Antagonists

## **Diuretics:**

Thiazide

Loops

Aldactone Antagonists





# HTN

Diabetes: ACEI/ARB

Heart Failure: DIURETIC, BB, ACEI/ARB, ALDO ANT

Post MI: BB, ACEI

CKD: ACEI/ARB

CVA: THIAZ, ACEI



## COMPELLING INDICATIONS FOR INDIVIDUAL DRUG CLASSES

### COMPELLING INDICATION

### INITIAL THERAPY OPTIONS

- Heart failure
- Post myocardial infarction
- High CVD risk
- Diabetes
- Chronic kidney disease
- Recurrent stroke prevention

THIAZ, BB, ACEI, ARB, ALDO ANT  
BB, ACEI, ALDO ANT  
THIAZ, BB, ACEI, CCB  
THIAZ, BB, ACEI, ARB, CCB  
ACEI, ARB  
THIAZ, ACEI



# Diabetes

- Cardiometabolic syndrome
- Insulin Resistance
- Metabolic Syndrome
- Equivalent to Coronary Artery Disease
- Either **Type 1** or **Type 2** (not IDDM or NIDDM)





**92%**

Fasting Blood Sugar < 100  
1 Hour after meal < 140  
HgA1c < 6

## **INSULIN RESISTANCE**

Genetic  
(you were born with it)

Older  
Heavier  
Inactive  
Eat more  
Steroids  
Stress  
Pregnant  
Birth Control Pills

## **PANCREAS**

(Keeps making more and more insulin)

I'm tired



I quit



**DIABETES**

Solution?

Diet, Exercise, Weight Loss, Metformin





# Metformin

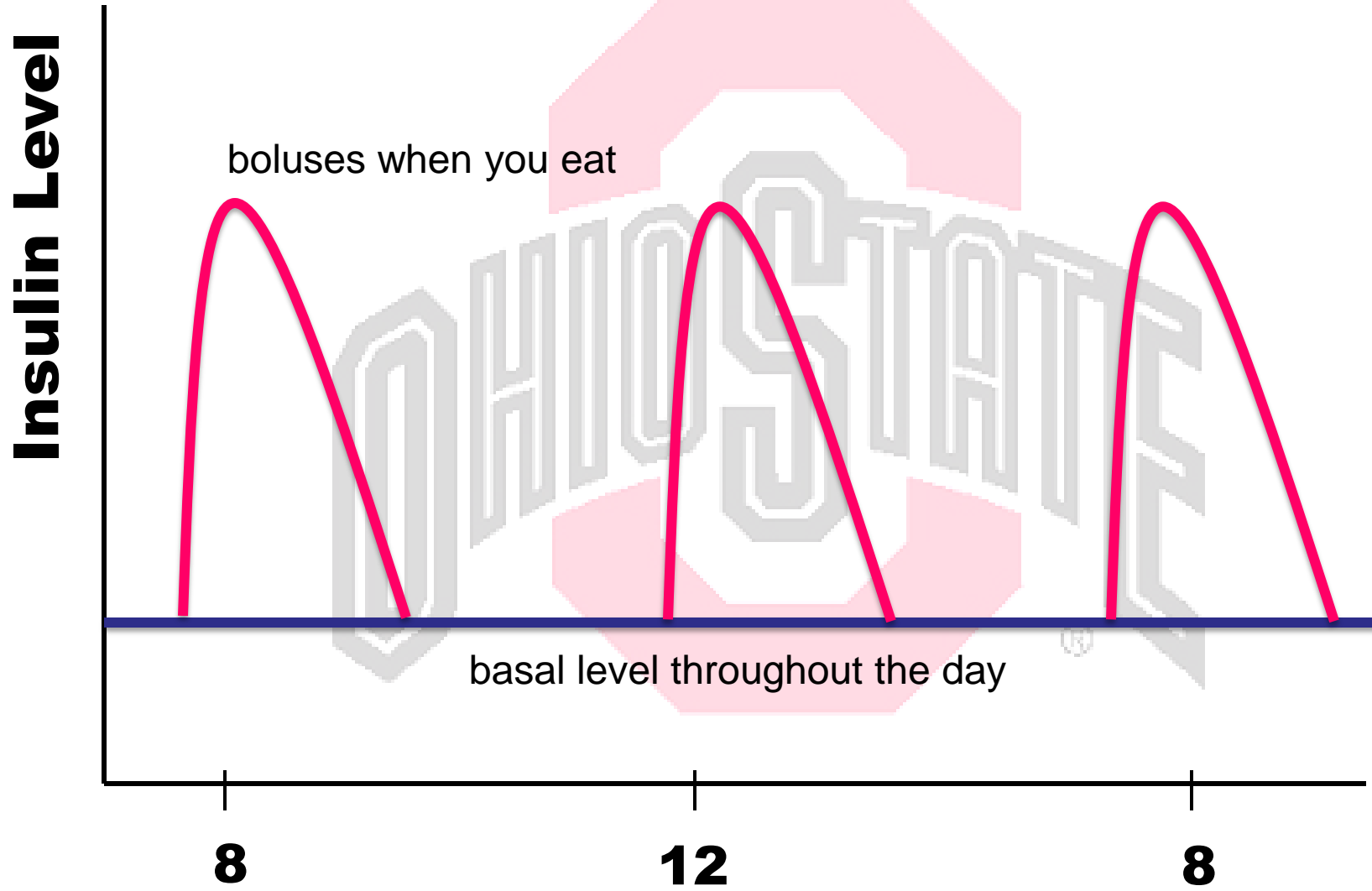
- Diabetes Prevention Trial demonstrated that even 20-30 years later, patients that did diet, exercise, and metformin for only a few years still showed a benefit even 20 years later
- Does **NOT CAUSE** lactic acidosis (although boards love this question)
- Contrast Nephropathy most common
- Cheapest and best drug for Type 2
- Titrate it over 4 weeks





# Normal Insulin Secretion

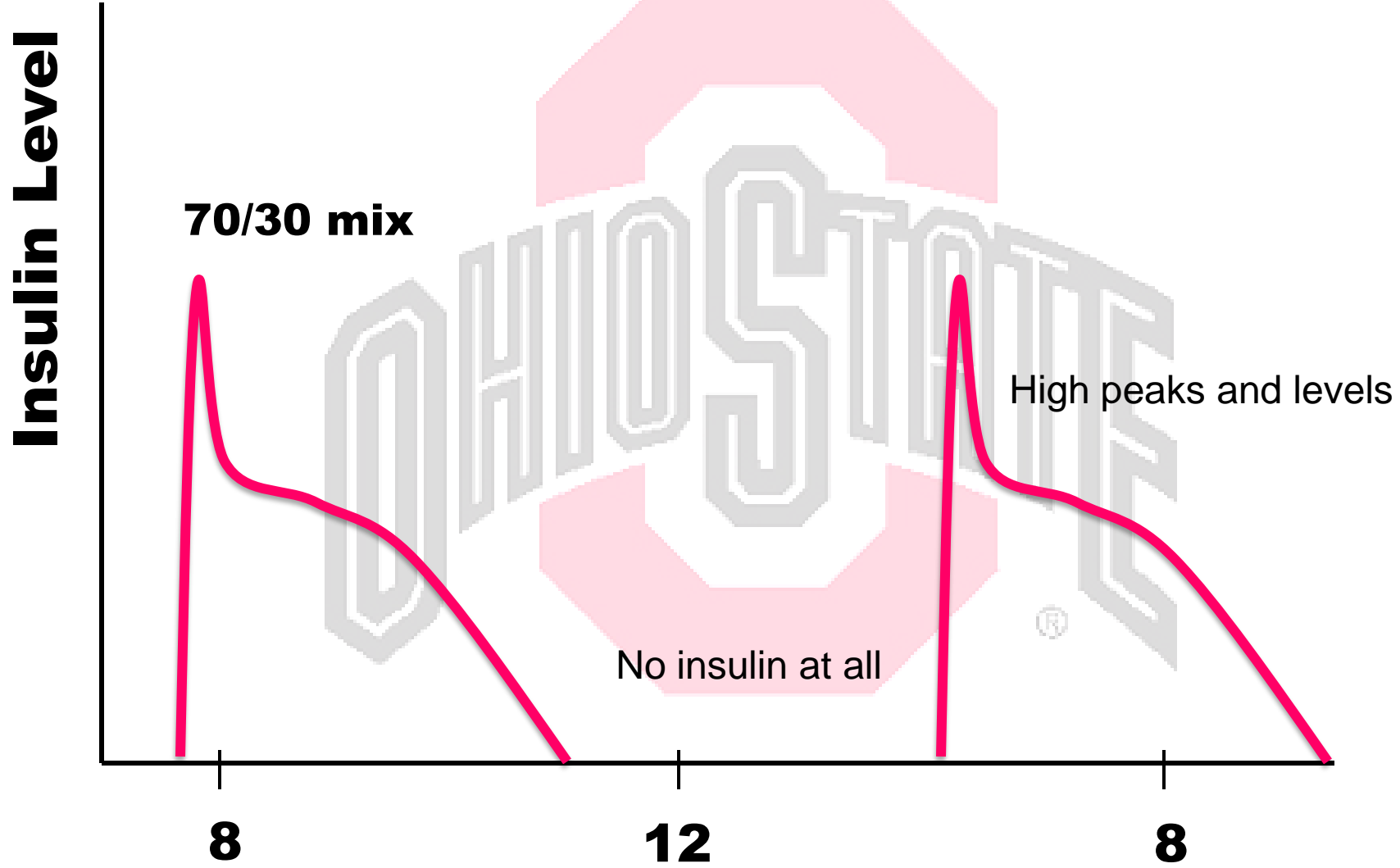
In a non-diabetic, this is what happens. We need to mimic this as much as possible.





# Old Insulin Regimen

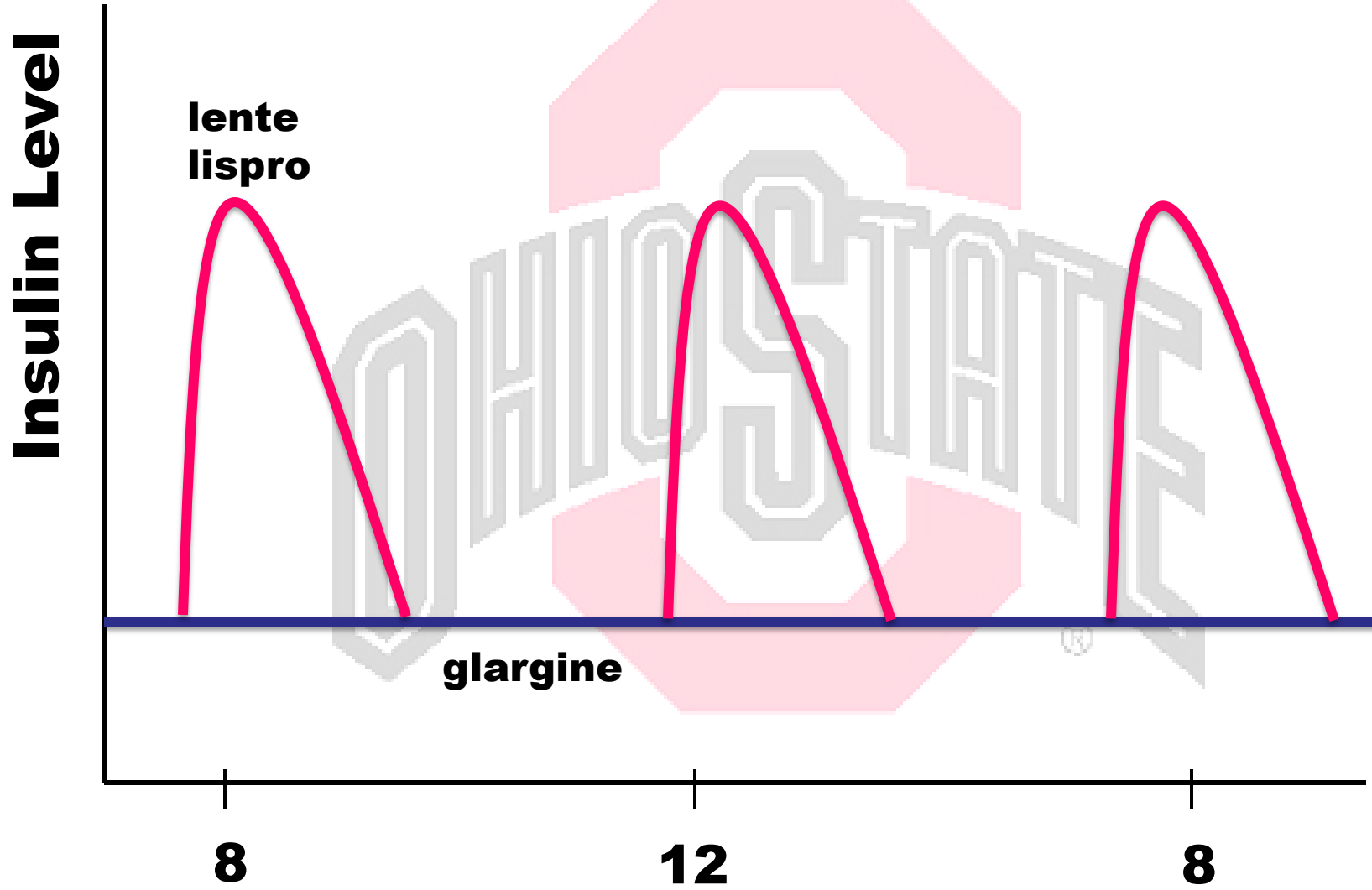
Not natural, lots of peaks and valleys. Very hard to manage diabetes and achieve a good HgbA1c. Lots of hyper and hypo episodes.





# Current Insulin Regimen

ADA now wants everyone to be on a basal/bolus regimen. More natural, better HgbA1c.





# NEW ADA Guidelines

- HgbA1C > 6.5% now **EQUALS** diabetes!
- In addition to impaired fasting glucose and impaired glucose tolerance, an A1C range of 5.7–6.4% has been included as a category of increased risk for future diabetes.
- Start Metformin right away along with diet and exercise
- Add basal insulin
- Use sulfanylureas- Glimepiride (3<sup>rd</sup> generation, more specific to Beta cells)
- Use new agents incretins, glp (januvia and byetta) sooner





# Weight Loss

- 85-90% can be achieved with diet alone.
- The last 10% can be trimmed off with exercise.
- Exercise is good for cardiovascular health, not good for weight loss





# Exercise?

- Assuming you weigh 200 pounds, if you walk or jog for 3 miles you will burn about 300 calories. That's not much! That's one plain bagel from Panera.
- A 200 pound person doing squats for 2 minutes straight, non-stop burns 320 calories. That's only 2 minutes of resistance training! Even if you aren't putting up any weight, just your body weight. Two minutes, 320 calories. Better to do two minutes of squats than run for 3 miles if you just want to burn calories.

**Don't say "Diet AND exercise"**





# PCOS

- Polycystic Ovarian Syndrome should be renamed: Syndrome of Severe Insulin Resistance and Androgen Excess
- Lots of testosterone and insulin resistance
- A small minority actually has cysts on ovaries
- May end up on 4.5 grams of metformin
- May also need to block testosterone





# Signs and Symptoms?

- **PCOS and Type 2** have similar signs and symptoms: (mainly due to insulin resistance) Irregular periods, or no periods, acanthosis nigricans, abdominal straiie, feeling of fatigue after large carb meals (hypoglycemia)
- **PCOS** also has: hirsutism, coarse hair, acne. (due to additional testosterone)





# Dyslipidemia

## ATP III Classification of LDL, Total, and HDL Cholesterol (mg/dL)

### LDL Cholesterol – Primary Target of Therapy

<100	Optimal
100-129	Near optimal/above optimal
130-159	Borderline high
160-189	High
≥190	Very high

### Total Cholesterol

<200	Desirable
200-239	Borderline high
≥240	High

### HDL Cholesterol

<40	Low
≥60	High

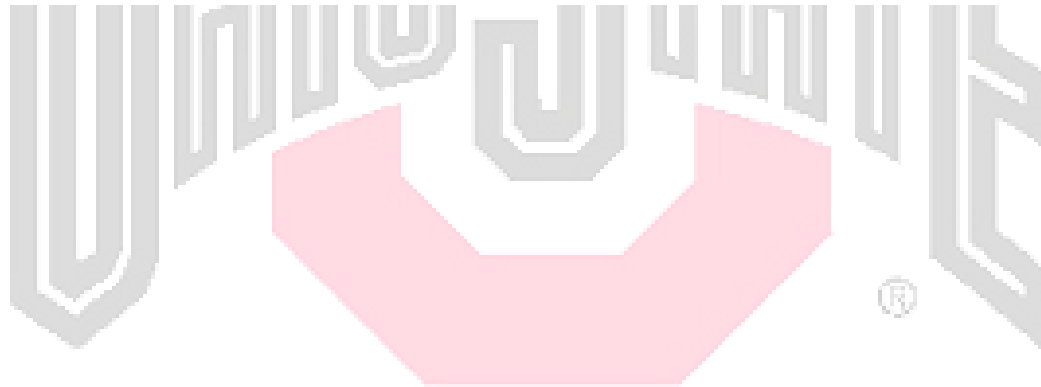




# Dyslipidemia

## ATP III Classification of Serum Triglycerides (mg/dL)

<150	Normal
150-199	Borderline high
200-499	High
≥500	Very high





# Dyslipidemia

## Major Risk Factors (Exclusive of LDL Cholesterol) That Modify LDL Goals

Cigarette smoking

Hypertension (BP  $\geq$ 140/90 mmHg or on antihypertensive medication)

Low HDL cholesterol (<40 mg/dL)\*

Family history of premature CHD (CHD in male first degree relative <55 years; CHD in female first degree relative <65 years)

Age (men  $\geq$ 45 years; women  $\geq$ 55 years)

*\* HDL cholesterol  $\geq$ 60 mg/dL counts as a "negative" risk factor; its presence removes one risk factor from the total count.*



## Drugs Affecting Lipoprotein Metabolism



Drug Class	Agents and Daily Doses	Lipid/Lipoprotein Effects	Side Effects	Contraindications	
HMG CoA reductase inhibitors (statins)	Lovastatin (20-80 mg)	LDL	↓18-55%	Myopathy Increased liver enzymes	Absolute: • Active or chronic liver disease  Relative: • Concomitant use of certain drugs*
	Pravastatin (20-40 mg)	HDL	↑5-15%		
	Simvastatin (20-80 mg)	TG	↓7-30%		
	Fluvastatin (20-80 mg)				
	Atorvastatin (10-80 mg) Cerivastatin (0.4-0.8 mg)				
Bile acid sequestrants	Cholestyramine (4-16 g)	LDL	↓15-30%	Gastrointestinal distress Constipation Decreased absorption of other drugs	Absolute: • dysbeta-lipoproteinemia • TG >400 mg/dL  Relative: • TG >200 mg/dL
	Colestipol (5-20 g)	HDL	↑3-5%		
	Colesevelam (2.6-3.8 g)	TG	No change or increase		
Nicotinic acid	Immediate release (crystalline) nicotinic acid (1.5-3 gm), extended release nicotinic acid (Niaspan®) (1-2 g), sustained release nicotinic acid (1-2 g)	LDL HDL TG	↓5-25% ↑15-35% ↓20-50%	Flushing Hyperglycemia Hyperuricemia (or gout) Upper GI distress Hepatotoxicity	Absolute: • Chronic liver disease • Severe gout  Relative: • Diabetes • Hyperuricemia • Peptic ulcer disease
Fibric acids	Gemfibrozil (600 mg BID)	LDL	↓5-20%	Dyspepsia Gallstones Myopathy	Absolute: • Severe renal disease • Severe hepatic disease
	Fenofibrate (200 mg)		<i>(may be increased in patients with high TG)</i>		
	Clofibrate	HDL	↑10-20%		
	(1000 mg BID)	TG	↓20-50%		

\* Cyclosporine, macrolide antibiotics, various anti-fungal agents, and cytochrome P-450 inhibitors (fibrates and niacin should be used with appropriate caution).



# Statin Therapy

**GET TO GOALS!**

- TC- 120-140
- LDL - <70

**DON'T MESS AROUND!**





# Metabolic Syndrome

## Clinical Identification of the Metabolic Syndrome – Any 3 of the Following:

### Risk Factor

### Defining Level

Abdominal obesity\*

Waist circumference<sup>†</sup>

Men

>102 cm (>40 in)

Women

>88 cm (>35 in)

Triglycerides

≥150 mg/dL

HDL cholesterol

Men

<40 mg/dL

Women

<50 mg/dL

Blood pressure

≥130/≥85 mmHg

Fasting glucose

≥110 mg/dL





# Metabolic Syndrome

- Is nothing more than selecting out the worst diabetics.
- Insulin resistance, high LDL, low HDL, high triglycerides, biggest waistlines, highest pro-inflammatory states, high BP.
- It's that simple... the worst of the worst!
- That's why they do so poorly and are at a higher cardiovascular risk than the rest of society.





# Syncope

**Sudden, brief loss of consciousness! Global hypoperfusion of the brain. This can not be a neurological condition. It is always cardiac.**

**Lightheadedness, weakness, blurred, vision, then pass out.**

**History tells you the entire story! Get a good history. If there are witnesses, even better!**

**Hypoperfusion of the brain can give you a seizure. A seizure usually last more than 5 minutes. Seizure usually involves tonic clonic movements and sometimes loss of bladder control.**





# Synccope

## Neurocardiogenic

Vasovagal,  
vasodepressor  
Pain, stress,  
performance,  
emotion, strong  
coughing, exercise,  
micturition,  
defecation,  
swallowing, carotid  
sinus

## Cardiac

Arrhythmias  
Valvular Disease  
CAD/MI  
Congenital  
PE

## Orthostatic Hypotension

Dehydration,  
alcohol, hot  
day, no AC,  
drugs,  
autonomic  
insufficiency,  
anemia





# Syncope

## IT IS NOT NEUROLOGICAL! IT'S CARDIAC!

- **Cardiac-** Rule out arrhythmia or obstruction (these can be deadly)
- **Neurocardiogenic** (vasovagal, vasodepressor, situational, micturition, etc)
- **Orthostatic-** dehydration, drugs, alcohol, etc
- **Autonomic Insufficiency-** type 2 DM





# Syncope Workup

- History – 95% of answer
- EKG
- CBC, BMP
- Echo
- Stress – If risk factors and EKG suggest likelihood of CAD
- Holter/Loop – If still unknown and suspect arrhythmia

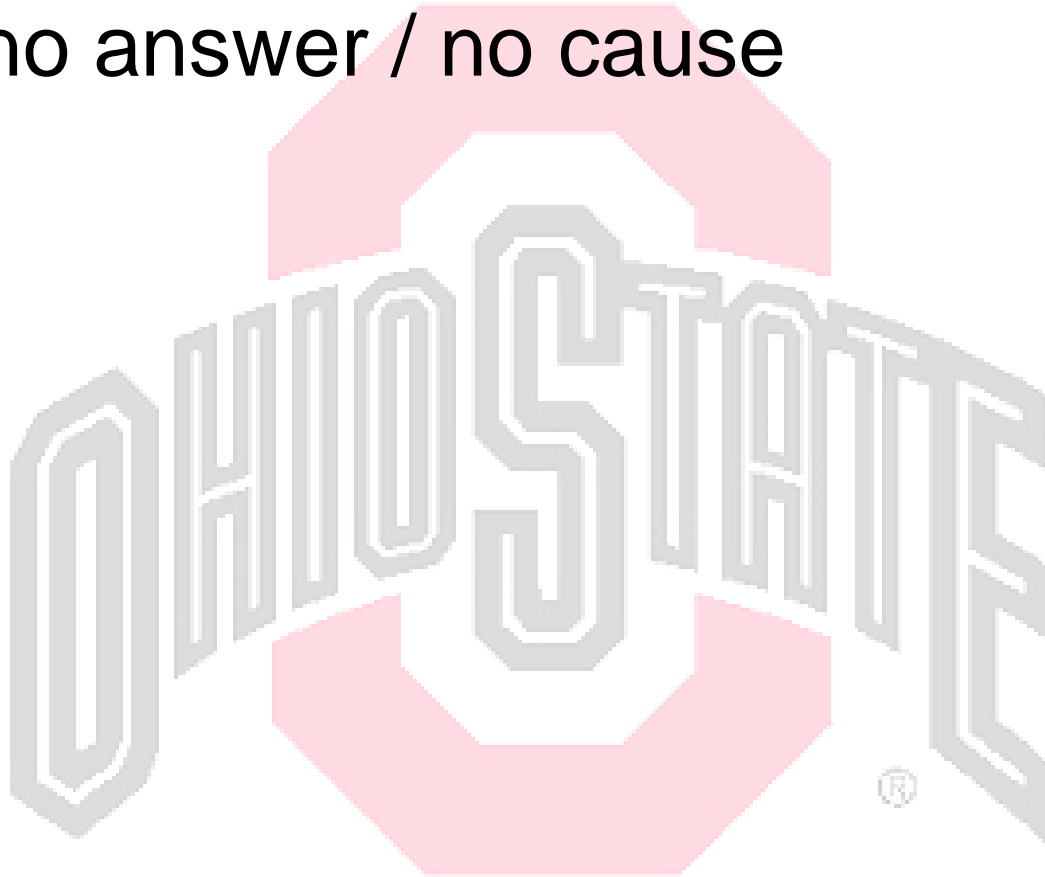
**NO CAROTID DOPPLERS!**





# Syncope

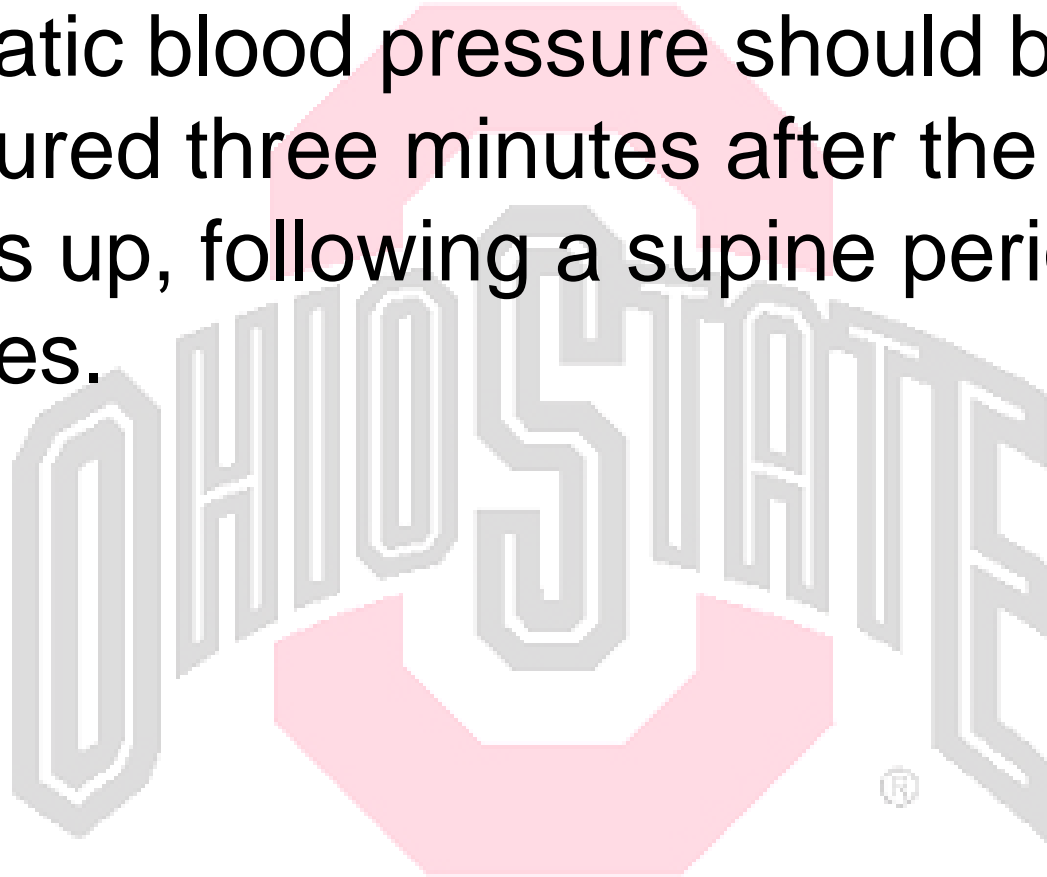
- 34% no answer / no cause





# Orthostatic BP

Orthostatic blood pressure should be measured three minutes after the patient stands up, following a supine period of five minutes.





# **Gap Acidosis**

## **LMESUK-R**

**Lactic Acidosis- hypooxygenation**

**Methanol/Ethanol- Ingestion**

**Ethylene Glycol- Antifreeze**

**Salicylate- Asprin**

**Uremia- Kidneys**

**Ketoacidosis - Glucose**

**Rhabdomyolysis- Muscles**





# Heart Failure

## Systolic

- Poor Squeeze
- Low EF
- All have Diastolic as well

## Diastolic

- Poor Relaxation
- Age, thick ventricle





# HF Causes

- CAD – Prior MI or Occlusive CAD
- Infections- Viral, HIV, Coxsackie B, Chagas, Lyme,
- Toxin- EtOH, doxorubicin, adriamycin
- Metabolic- Beriberi, Uremia
- Thyroid, Pregnancy
- Rheum- SLE, Scleroderma
- Idiopathic- 50% of rest





# Heart Failure

**IS A CLINICAL DIAGNOSIS**

**YOU DO NOT NEED A SINGLE TEST!**

Sure, an echo ultimately will tell us which type they have, and will help guide treatment, but isn't necessary for diagnosis. If they are in heart failure, they are in heart failure.





# Systolic HF

- Diet (low Na), Exercise, Daily weights, TED Hose, Relieve ischemia
- **ACEI/ARB**
- **B-Blocker**
- **Aldosterone Antagonists**
- Diuretics
- Hydralazine + Nitrates (work but hard to tolerate)
- Digoxin- improves contractility while slowing down rate. Keeps patient out of the hospital and keeps them feeling better, but does not change mortality or morbidity.
- Anticoagulation
- Biventricular Pacing/ICD





# Diastolic HF

## Treatment

- Diuresis for volume overload
- HR and BP control
  - B-Blocker, ACE-I, CCB, ARB
- Relief of Ischemia

**No one really knows much more beyond this!**





# AloDiet.com

- AloDiet.com – Free cardiologist approved weight loss plan

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