Tests I Wish You'd Never Ordered - Chapter IV

(and things you do that make my life difficult)

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Moderator

ACOI Annual Convention

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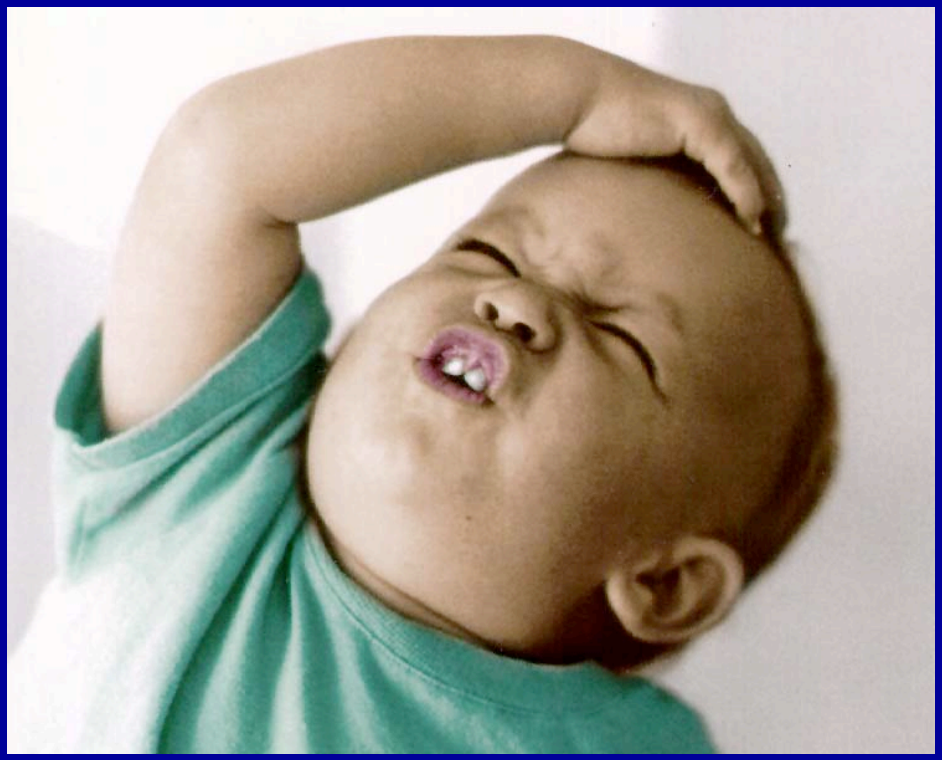
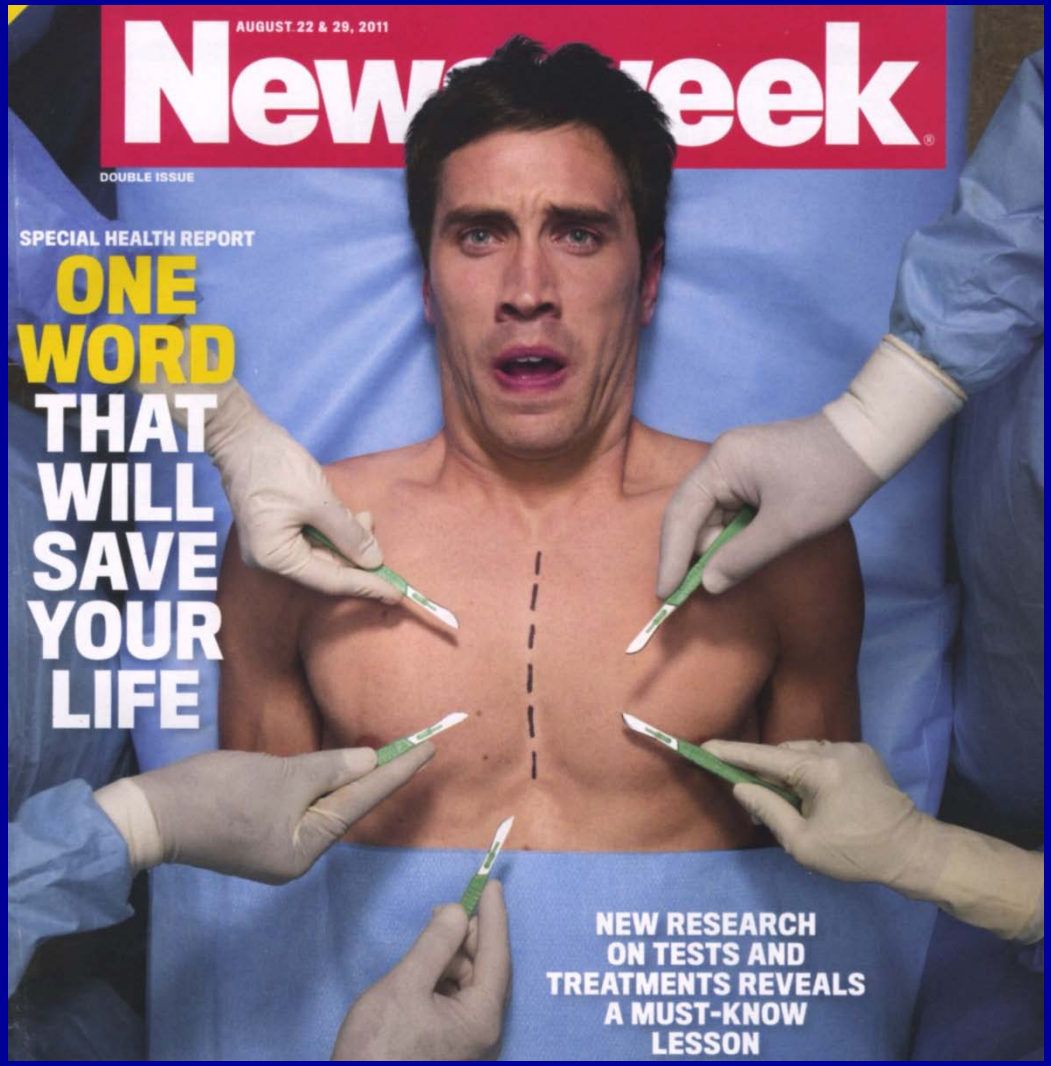
- As I begin rounds w/ my medical resident, she briefly summarizes the reason for our first consultation: antibiotic recommendations for a chronically ventilator-dependant, demented individual who CLEARLY ASPIRATED.
- My thoughts drift off to today's presentation. I comment as to how often these folks get the million dollar workup in our ER, including ABG's, CXR's, CBC, lytes, BUN/creatinine, UA's w/ culture, LFT's, ESR, CRP, and (of course) troponins, in spite of fairly obvious acute events, particularly in a patient with no quality of life

- She proceeds to give me the results of EVERY ONE of the previously mentioned studies!!!!
- OMG!!!



Again, My Premise :

- Most any day on hospital rounds, I see patients having blood drawn for various tests or going for procedures that do not appear (to me) to add to their care; some turn out to be detrimental
- A significant number of my consultations are to explain away tests that would have been better off not ordered
- Do other specialists feel the same?
- Do our opinions get conveyed to our residents, hopefully favorably influencing future patterns of care?


AUGUST 22 & 29, 2011
Newsweek
DOUBLE ISSUE
SPECIAL HEALTH REPORT
ONE WORD THAT WILL SAVE YOUR LIFE
NEW RESEARCH ON TESTS AND TREATMENTS REVEALS A MUST-KNOW LESSON

NO!

Our Previous Opinionated Panelists

- Mark Baldwin, DO (Nephrology)
- Martin Burke, DO (Cardiology)
- John Sutton, DO (Endocrinology)
- Paul Wenig, DO (Rheumatology)
- Sandra Willsie, DO (Pulmonary / Critical Care)
- Mitchell Davis, DO (Gastroenterology)
- Kevin Hubbard, DO (Hematology/Oncology)
- Leonard Hock, DO (Geriatrics)
- Bryan Martin, DO (Allergy/Immunology)
- Robbie Rose, DO (Neurology)

Chapter IV: More Opinionated Panelists

- Martin Burke DO
  Cardiology
  Associate Prof. of Medicine
  U. of Chicago
- Bryan Martin DO (allergy/Immun.)
  Associate Dean GME
  Associate Medical Director
  University Hospital
  Professor of Medicine & Pediatrics
  Ohio State University Medical Center
- Jack Prior DO
  DME Scranton-Temple Residency Program
  Private Practice/Nephrology
  Scranton, PA
- Kevin Hubbard DO
  Hematology/Oncology
  Clinical Professor of Medicine
  Kansas City University of Medicine and Biosciences-COM
- Jerry Blackburn DO
  Infectious Disease
  Clinical Prof. Of Medicine, MSU/COM

The Bleeding Time

“Tests I Wish You’d Never Ordered”

ACOI 2011

Kevin P. Hubbard, DO, FACOI
Clinical Professor of Medicine
Kansas City University of Medicine and Biosciences
College of Osteopathic Medicine

The Case

- 58 y/o obese w/f presents to outpatient surgery for laparoscopic cholecystectomy
- PMHx: DM-II, HTN, hyperlipidemia, osteoarthritis
- PSHx: T&A age 4, appendectomy age 12, TKA age 56
- Meds: metformin, lisinopril, simvastatin, naproxen (on hold for 1 week)
- SocHx: nonsmoker, nondrinker, office work (sedentery), married, two grown children, two grandchildren
- FamHx: CVA, CAD, DM-II, no bleeding diathesis

The Case

- Lab:
  - CBC: WBC 7000 with normal diff, Hb 13.2gm, Hct 43%, plts 226k
  - CMP: Glucose 110, lytes normal, BUN/Creat normal (fasting)
  - PT 12, INR 1.0, PTT 22 (normals for lab)

The Case

- Bleeding Time: >15 min!!!
- It’s 9:30 AM. Patient scheduled for surgery at 10:30 AM

- CONSULT HEMATOLOGY **STAT**!!!!!!!

Questions to Ponder:

- Why was the bleeding time done?
- What do we want to know?
- Is the bleeding time the right test to answer the question?

Why Was The Bleeding Time Done?

- Anesthesia wondered if the patient would be at increased risk for bleeding during the surgery or in the post-operative period
- Rationale: Maybe she has non-alcoholic fatty liver disease (NAFLD, NASH) and might have coagulopathy on that basis

What Do We Want To Know?

- Risk of bleeding during or after surgery
- Additional information that might identify other problems

Is The Bleeding Time The Right Test To Answer The Question?

- The Bleeding Time…
  - An incision 5 mm long x 1 mm deep is made on the lateral aspect of the volar surface of the forearm and the time to cessation of bleeding is measured
  - Constant pressure (supplied by a sphygmomanometer) of 40 mm Hg is applied and a disposable incision device is used to standardize the procedure
  - Equipment and supplies…

1. stopwatch
2. sphygmomanometer
3. filter paper
4. Surgicutt
5. alcohol prep
6. butterfly bandages

Is The Bleeding Time The Right Test To Answer The Question?

- The Bleeding Time…
  - Calibration: None
  - Quality Control:
    No external QC is available. Care must be taken to standardize the procedure. *The protocol must followed exactly!*
  - Procedure…

1. Select a site on the patient's arm on the lateral aspect volar surface that is free of veins, bruises, edematous areas, and scars and is approximately 5 cm below the antecubital crease
2. Clean the site with the alcohol prep

Is The Bleeding Time The Right Test To Answer The Question?

- Procedure…

3. Place the sphygmomanometer around the patient's arm approximately two inches above the elbow and maintain 40 mm Hg
4. Remove the "trigger" safety and place the incision device on the site with minimal pressure so that both ends of the device touch the skin. Do not press hard
5. Depress the "trigger" to make the incision then remove the device.
   Discard the device in a "sharps" container
6. Start the timing device and blot the edge of the incision at 30-second intervals with the filter paper. Do not touch the incision with the filter paper
7. Note the time that bleeding stops and report to the nearest 30 seconds

Is The Bleeding Time The Right Test To Answer The Question?

- Procedure…
  - Note: If the bleeding time exceeds 15 minutes:
    stop the procedure
    apply pressure to stop the bleeding
    report as greater than 15 min
  8. To minimize scaring, bandage with a bandage applied perpendicular to the incision
- Expected results:
  Normal Values: 2- 9 minutes

Is The Bleeding Time The Right Test To Answer The Question?

Errors producing false positive results	Errors producing false negative results
– Blood pressure cuff maintained too high (>40mm Hg.)	– Blood pressure cuff maintained too low (<40 mm Hg)
– Incision too deep, caused by excessive pressure on the incision device	– Incision too shallow
– Disturbing the clot with the filter paper	
– Low fibrinogen (<100 mg/dl) or platelet count (100,00 /mm^3)	

What Can The Bleeding Time Do?

- The bleeding time is a test of platelet function
- It is NOT a test to determine pre-operative or post-operative bleeding (Lind SE,; The bleeding time does not predict surgical bleeding; *Blood;* 1991;77(12) 2547)
- It may be prolonged in such disorders as…
  - Thrombasthenia (Glanzmann's disease)
  - Bernard Soulier Syndrome
  - Von Willebrand's Disease
  - Storage Pool Disease
  - Sensitivity to Asprin

Genetic disorders! Positive family history, positive history of bleeding, etc.

Conclusions

- In patients without a history of bleeding, who have undergone surgical procedures without unanticipated bleeding, the bleeding time is a useless test
- In patients with a positive family history of bleeding who have no personal history of bleeding, routine tests of the coagulation mechanism should be performed; hematology consultation is appropriate if clinical suspicion is present
- In every case…the potential risk of complications should be weighed against the benefit of the surgery
- The “best test” is history taking!

Additional References

- Preoperative hemostatic evaluation: which tests, if any? Rapaport SI, *Blood*; 1983;61(2):229
- Excellent review on *UpToDate*: Preoperative assessment of hemostasis (Coutre, S, et al.; http://www.uptodate.com/contents/preoperative-assessment-of-hemostasis?view=print)

Tests I Wish You Had NEVER Ordered

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Associate Dean for Graduate Medical Education/DIO
Director, Allergy Immunology Fellowship
Professor of Medicine and Pediatrics
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The Screening Food RAST Panel

- This patient …
  - 19 year old college bound student with headaches
  - Occurs after eating: usually
  - No specific associated foods
  - Some increase in GI symptoms with milk and after pizza
  - Normal Physical examination
- Patient and her mother think she may be allergic to foods (actually they are both convinced!)
  - Allergic to milk as a child

The Thinking

- Maybe this is a food allergy
- Common allergic foods
  - Adults: peanuts, tree nuts, fish and shellfish
  - Children: egg, milk, peanuts, soy and wheat
- We will order a screening RAST to rule out food allergy as the cause of these headaches

The screen

- Milk
- Egg
- Wheat
- Soy
- Peanut

- Walnut
- Cashew
- Pistachio
- Pecan
- Shrimp
- Lobster
- Crab
- Cod Fish
- Salmon

The Results

- Milk
- Egg
- Wheat
- Soy
- Peanut

"Positive"
Every test
Of course!

- Walnut
- Cashew
- Pistachio
- Pecan
- Shrimp
- Lobster
- Crab
- Cod Fish
- Salmon

What does this mean?

- Is this patient allergic to each of these foods?
- What is the appropriate dietary manipulation to help this patient feel better?
  - Can she eat any of these foods?
  - Must they all be avoided?
- Must this patient carry injectable epinephrine at all times?
- Is this laboratory error?
  - Should these tests be repeated?

What is the role of Allergy Testing?

- Allergy testing must be interpreted in the context of the patient's specific clinical history
  - History determines the pretest probability of having disease
- False positive results are common
- May have clinically irrelevant IgE
- Allergy testing for foods
  - Sensitive (90%)
  - Not very specific (50%)

Prevalence

- 25% Americans believe they have a food allergy
  - True for both pediatrics and adults
- True prevalence is far less
  - 6% in children < 3 yrs of age
  - Declines over first decade of life
  - 1.5% in adults
    - 0.1% with adverse reaction to food additives

In vitro testing

- Not generally well standardized
- Results reported using percentage, class or numerical ranks
  - Comparison of patient's [IgE] to standard curve
- Higher concentrations generally mean increased chance of reaction on ingestion
- Individual with significant food allergy can have:
  - High, medium, low or even negative in vitro testing.

Pharmacia CAP-FEIA System

- Prospectively evaluated in children and adolescents (0.4-14 yrs)
- Specific antigens have 95% predictive values:
  - Egg 7 kUA/L
  - Milk 15 kUA/L
  - Peanut 14 kUA/L
  - Tree nuts 15 kUA/L
  - Fish 20 kUA/L
- No current recommendations for adults

Sampson, Utility of food specific IgE concentrations in predicting symptomatic food allergy. JACI 2001; 107:891

What Should Drive Food Testing?

- The detailed history determines both what tests to order and the interpretation of results.
- History should determine at a minimum:
  - Implicated food
  - Quantity ingested
  - Time between ingestion and symptoms
  - Reproducibility of symptoms
  - Other factors involved (i.e. exercise)

What to do now?

- This patient
  - extremely low pre-test probability
  - Test results not sufficiently positive to impact on the clinical impression
- This case
  - Illustrates disadvantage of performing testing on patients whose histories are not consistent with allergic disease

Irrelevant results confuse the situation!

Is Further Testing Indicated?

- You know the answer to that!
- Available testing
  - Repeat RAST Testing
  - Skin Prick Testing
  - Trial Elimination Diet
  - Food Diary
  - Food challenge
- These are potentially expensive, and/or time consuming and/or difficult and unlikely to provide additional data

What's the Good Doctor to DO?

- One could begin to explain:
  - The limitations of the tests for allergies…
  - The fact that this was a SCREENING exam
  - The meaning of the tests in relation to the patient's symptoms
- One could call upon a friendly Allergy Immunology Consultant
  - The screening test indicates the need for you to see an allergist
  - To explain away these spurious results…..

Summary

- In evaluating allergic symptoms the history determines the best test and helps interpret the results of the test
- Food allergy in particular is poorly standardized
- Tests that are relatively sensitive, but poorly specific can be trouble.
- Positive tests for IgE may not be clinically relevant

Tests I Wished You Never Ordered..... CPK and Troponins

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Professor of Medicine
University of Chicago

Disclosures of Conflict

- I AM A Cardiologist!
- How did I get here?

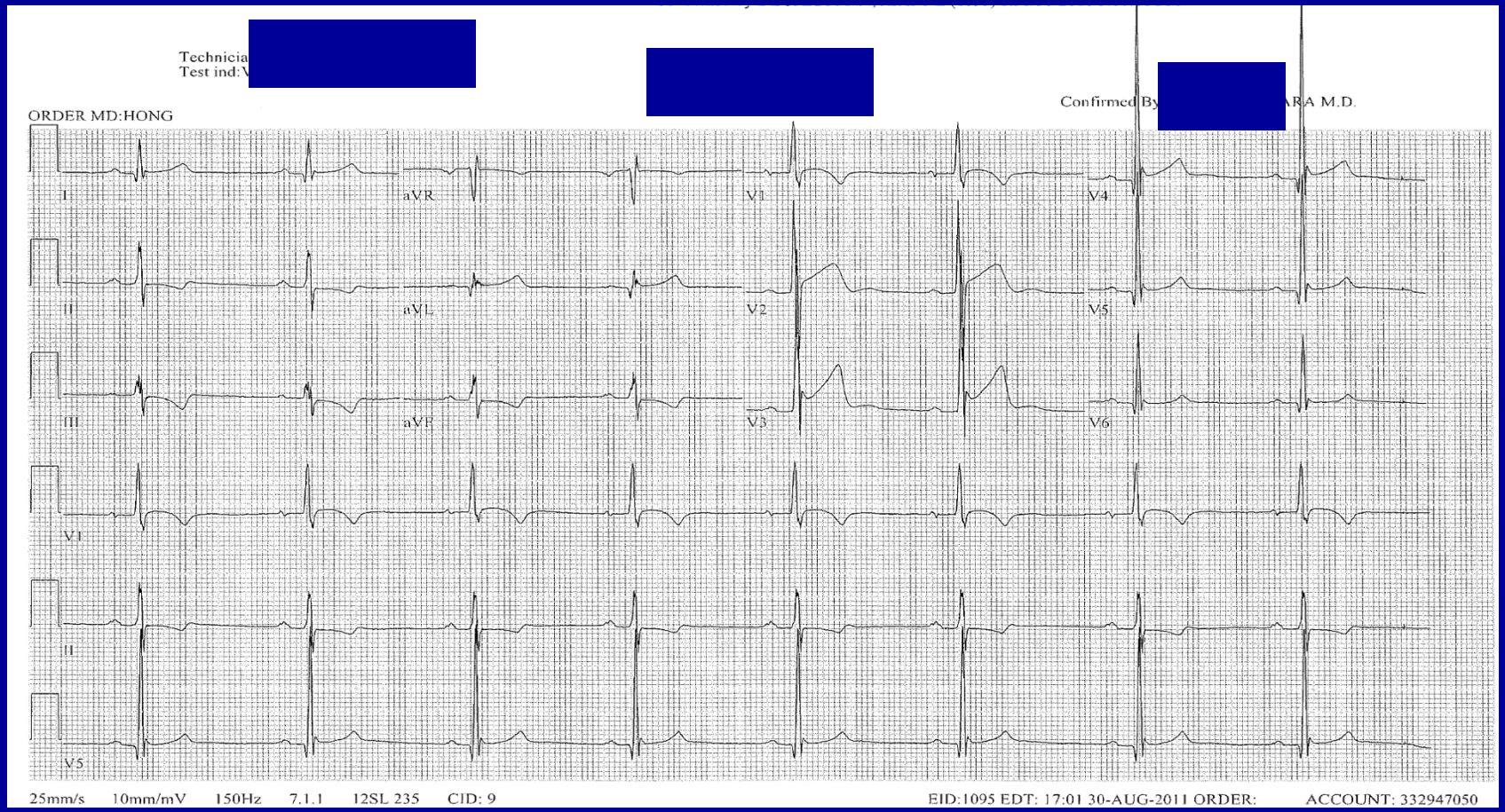
History

- 28 y/o AA male presents to ER just after dinner with chest pain worse with inspiration. He is recovering from the Chicago Marathon that he finished that morning. The pain is intermittently worse with associated lightheadedness. He has no medical history, takes no medications. His family history is benign. He denies illicit drug use or tobacco.

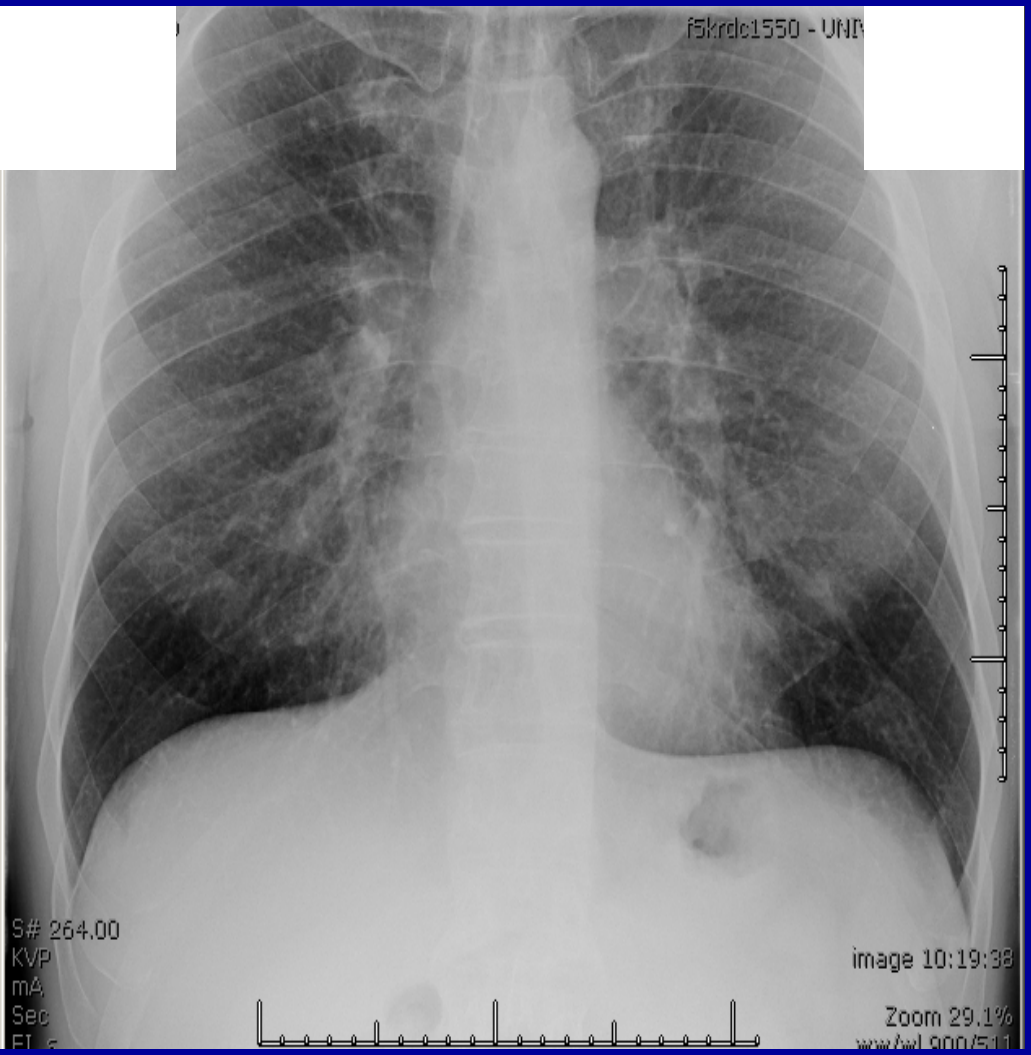
Physical Exam

- His BP is 115/60 mmHg. His HR is 50 bpm. RR is 20/min with mild splinting. He is afebrile. His whole body is tender. HEENT is normal. Lungs are clear to auscultation. Heart is normal S1S2 with an S4. No murmurs. Abdomen is benign. Extremities are sore but without C/C/E. Neurologic exam is normal.

Electrocardiogram



PA/Lat Chest X-ray



Selected Laboratory

- Na-140; K-4.0; Cl-110; CO2-25; BUN-25; Cr-1.0
- WBC-11K; Hb-15; HCT-55; PLT 393K
- CPK -550; MB-39; MB index=7%

Holy #$%^&&

- Cardiac Catheterization lab activated!

CPK

- Creatine kinase can be subdivided into three isoenzymes:
  - **MM, MB, and BB.**
  - **The MM fraction is present in both cardiac and skeletal muscle**
  - **The MB fraction is much more specific for cardiac muscle: about 15 to 40% of CK in cardiac muscle is MB, while less than 2% in skeletal muscle is MB.**
  - **The BB fraction (found in brain, bowel, and bladder) is not routinely measured.**

CPK

- The CK-MB is part of total CK and provides more specificity for cardiac muscle injury than other striated muscle. However its sensitivity is lower due to its presence in skeletal muscle.

- It tends to increase within 3 to 4 hours of myocardial necrosis, then peak in a day and return to normal within 36 hours. It is less sensitive than troponins. (Saenger and Jaffe, 2007) (Kumar and Cannon, Part I, 2009)

- The CK-MB is also useful for diagnosis of reinfarction or extensive of an MI because it begins to fall after a day, so subsequent elevations are indicative of another event. (Chattington et al, 1994)

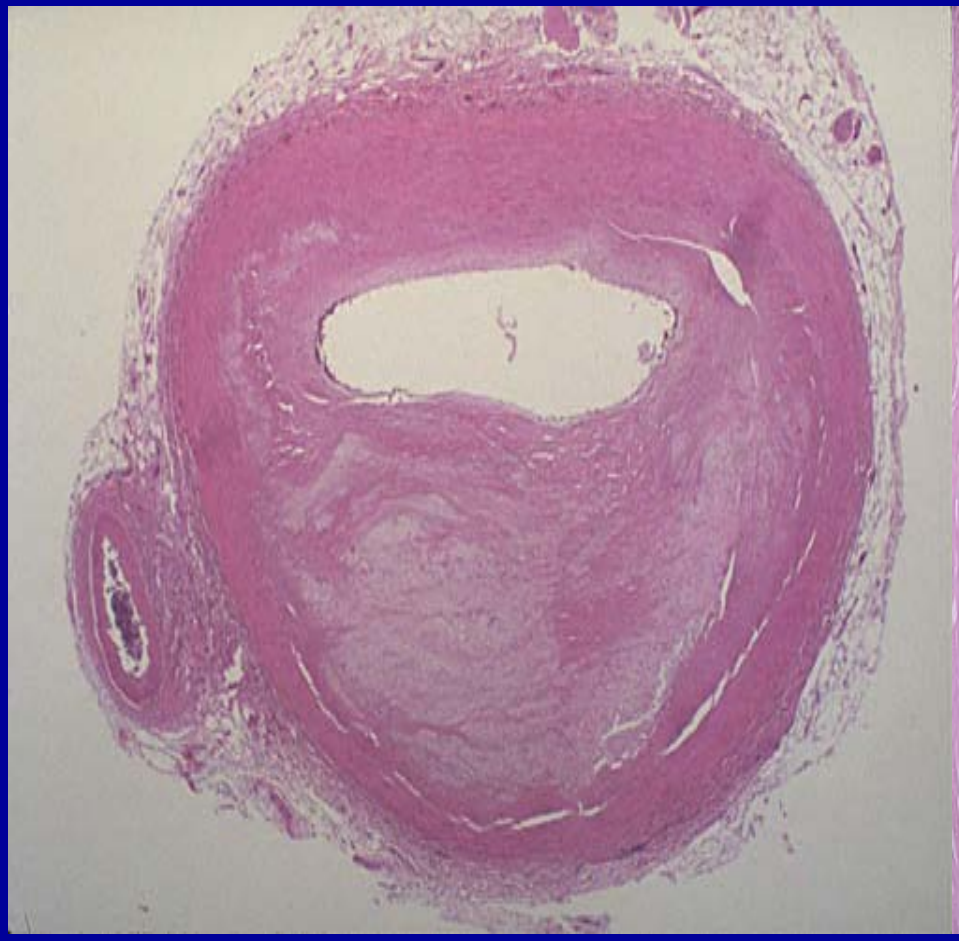
Troponins

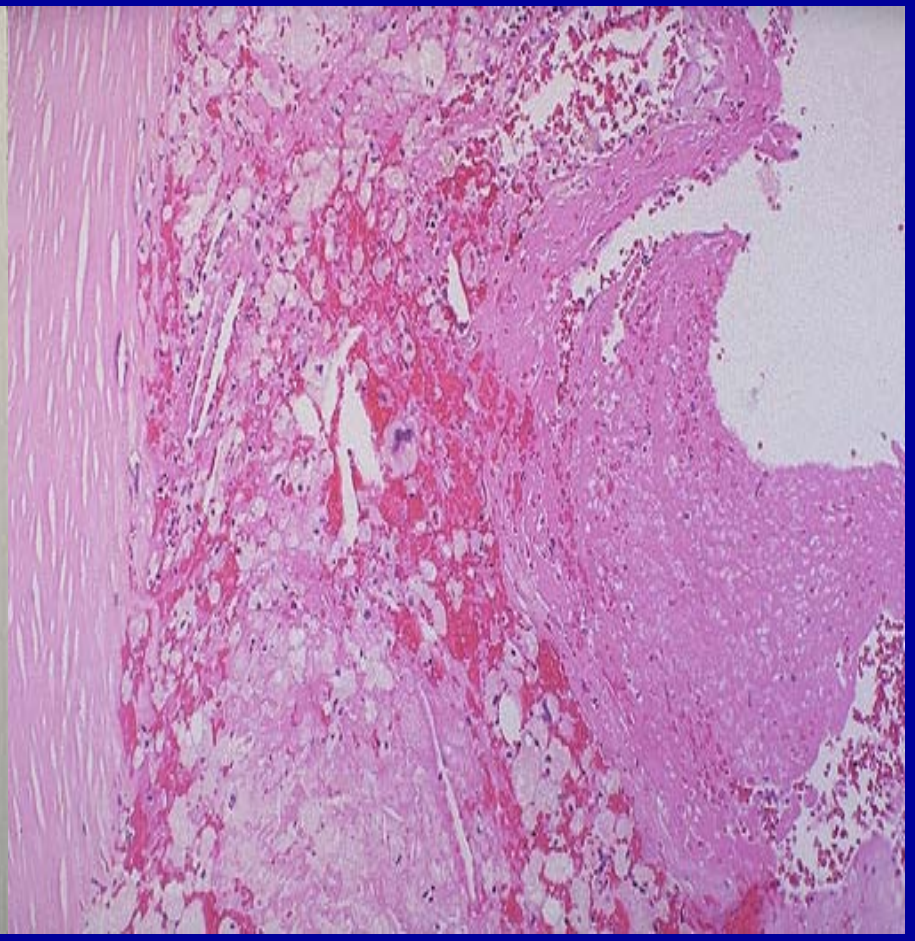
- Troponin has two particular structural components in cardiac muscle.
    - I and T
- They are highly sensitive and specific for myocardial injury--more so than CK-MB--and help to exclude elevations of CK with skeletal muscle trauma.
- Troponins will begin to increase in MI within 3 to 12 hours, about the same time frame as CK-MB. However, the rate of rise for early infarction may not be as dramatic as for CK-MB.
- Troponins will remain elevated longer than CK--up to 5 to 10 days for troponin I and up to 2 weeks for troponin T.

Troponins

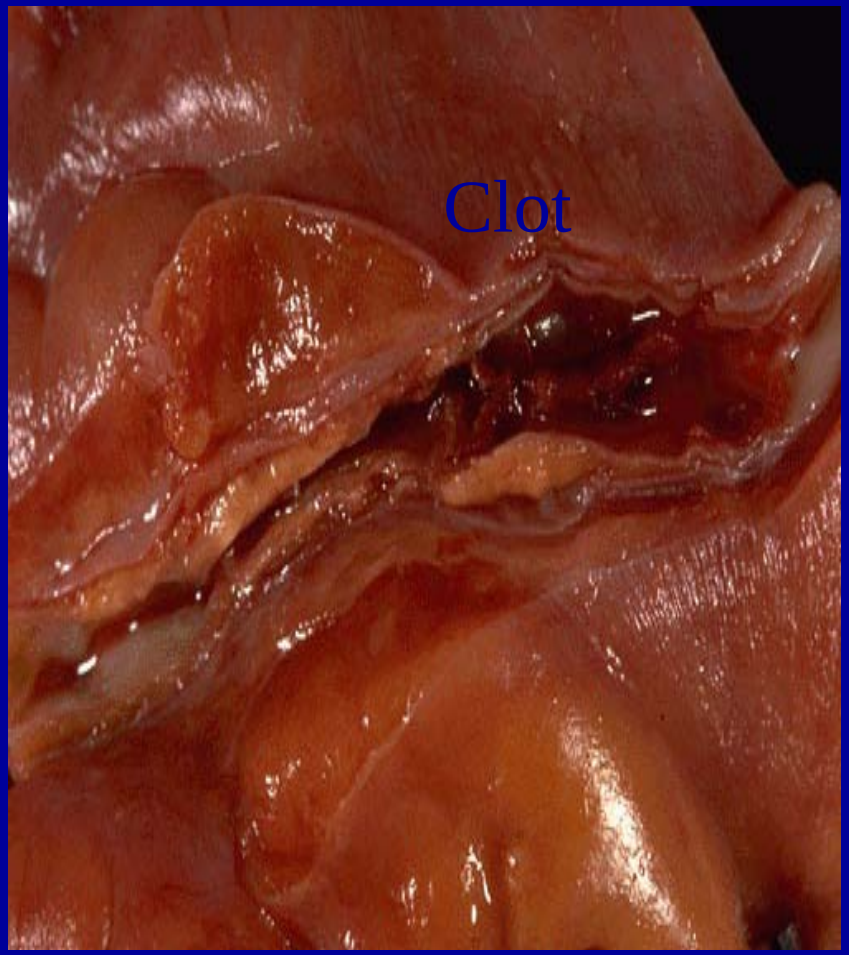
- This makes troponins a superior marker for diagnosing subacute myocardial infarction; better and more specific than lactate dehydrogenase (LDH).
- However, this continued elevation has the disadvantage of making it more difficult to diagnose re-infarction or extension of infarction in a patient who has already suffered an initial MI.
- Troponin I is the preferred biomarker as Troponin T lacks some specificity because elevations can appear with skeletal myopathies and with renal failure. (Kost et al, 1998) (Kumar and Cannon, Part I, 2009)

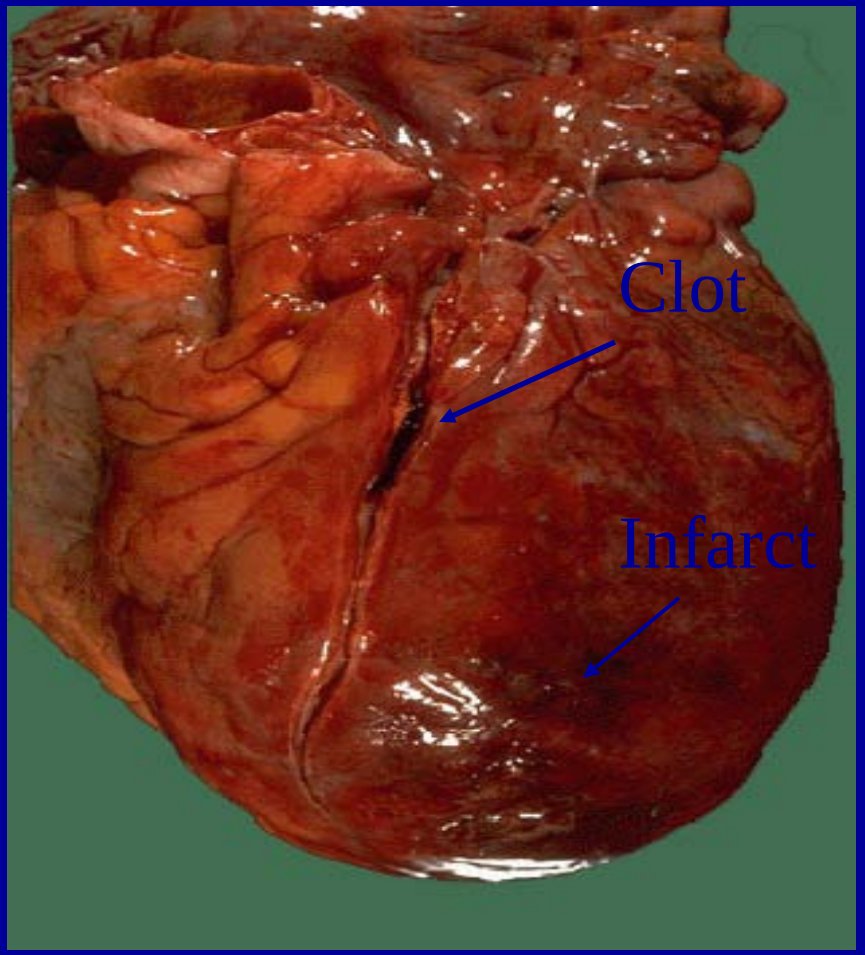
Pathophysiology-Ischemia

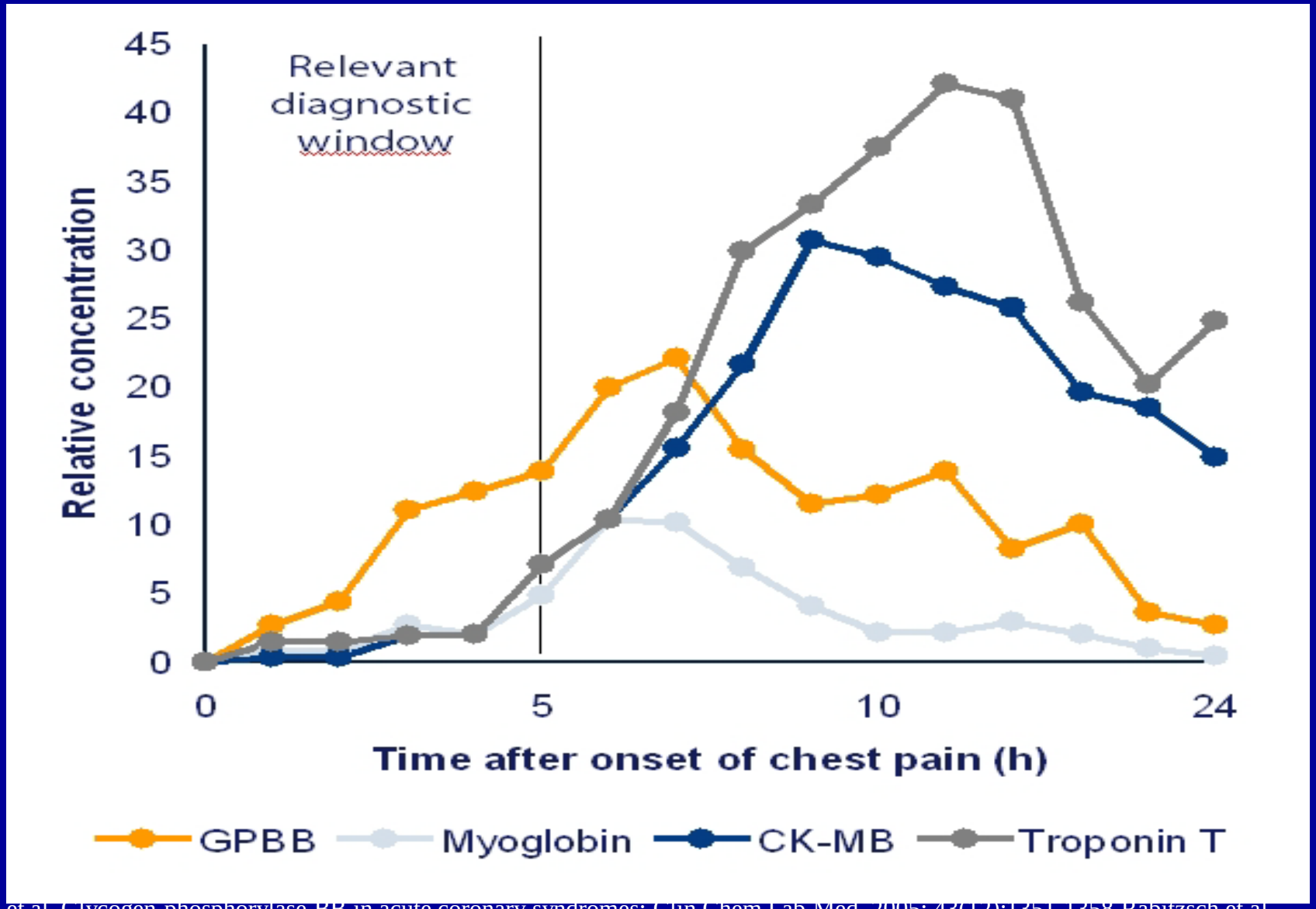




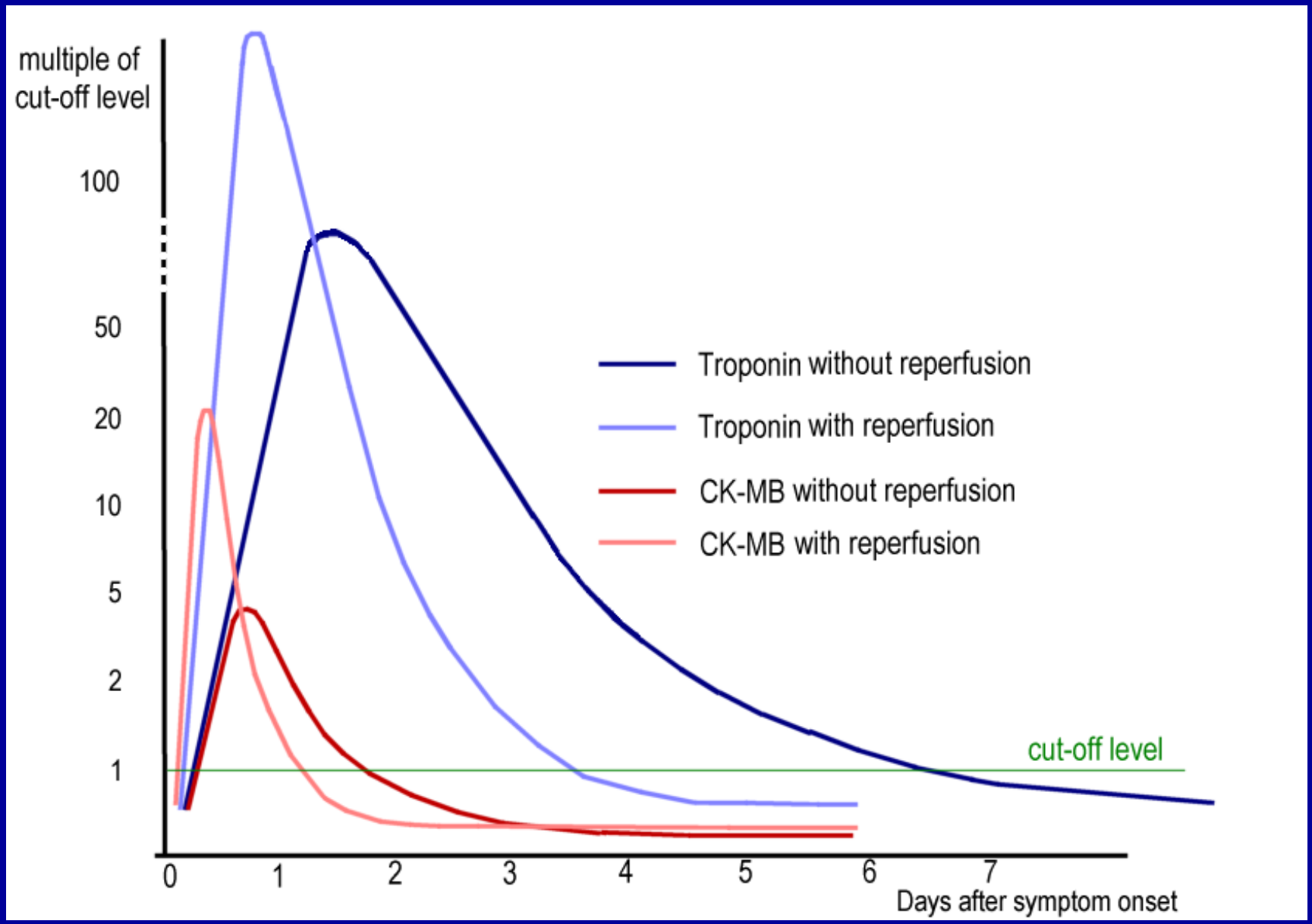
Pathophysiology-Thrombosis/MI







Peetz et al. Glycogen phosphorylase BB in acute coronary syndromes; Clin Chem Lab Med. 2005; 43(12):1351-1358 Rabitzsch et al. Immunoenzymometric Assay of Human Glycogen Phosphorylase Isoenzyme BB in Diagnosis of Ischemic Myocardial Injury; Clin Chem Lab Med. 1995; 41(7):966-978



Modified from ACC/AHA Practice Guidelines

Outcome

- Working Diagnosis
  - Musculoskeletal Dysfunction
  - Early Repolarization
  - Hypertrophy—right and left ventricular
- Treatment
  - Osteopathic Manipulative Therapy

Tests I Wish You'd Never Ordered - Infectious Disease

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A true story:

- A healthy, intelligent, gentleman of European descent was seen in my office, accompanied by his very “proper” wife of 50+ years, for evaluation and possible treatment of syphilis, this all the result of a +VDRL (and subsequent +FTA) ordered by a superb neurologist “to be complete” in the workup of a mild peripheral neuropathy
- The neurologist readily admitted that syphilis was the most remote diagnosis he would have ever considered. In fact, even after the serologies were found to be positive, he judged no connection between these and his working diagnoses in the evaluation of this patient

- Over an hour was spent w/ the couple, assuring both the pt and his wife that these studies were perfectly compatible with infection contracted long before their marriage, and were of no important medical significance (at least to me)
- There was no evidence to suggest cardiovascular or neurosyphilis; diagnosis: late latent syphilis
- Tx: arguably unnecessary; however, insisted upon by both the pt and his wife. 3 weekly injections of benzathine penicillin were given w/o adverse event
- Following tx, he was referred back to his family physician

- Several months later, his family physician informed me that his wife was never able to forgive him for this, totally destroying their marriage

- As a result, he went out to his backyard, put a gun in his mouth and ended it all……..

Summary

- Many tests are frequently ordered that add little or nothing to the care of the patient. They are often expensive, inconvenient, and/or uncomfortable. They are also, at times, dangerous and occasionally fatal
- Often justified as necessary in the era of "defensive medicine", they sometimes create more problems than they supposedly solve
- **If a test result will not change the care of the patient, maybe you should not order the test**

Someday, YOU will be a patient