Top 10 Clinical Problems in Emergency Medicine

Colin G. Kaide, MD, FACEP, FAAEM, UHM
Associate Professor of Emergency Medicine
Board-Certified Specialist in Hyperbaric Medicine
Specialist in Wound Care
The Ohio State University Wexner Medical Center

Emergency Medicine

- Incredible variety of problems
  - Spans all specialties
- Daunting amount to know about each
  - One step beyond
- Keeping current

What's New!

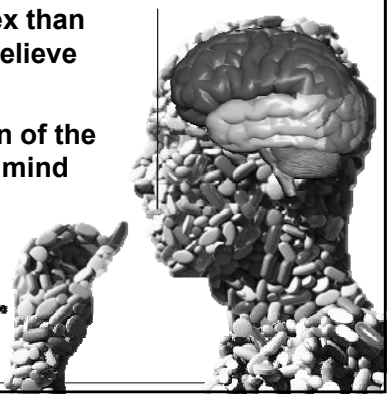
- Scope of a problem
- Background
- What is new!

Patients In Pain

Walking the Fine Line

Pain

- **More complex than we used to believe**
  - **Interaction of the body and mind**



The Two Faces of Pain*

- **Acute pain**, for the most part, results from disease, inflammation, or injury to tissues.
  - Comes on suddenly
  - Accompanied by anxiety or emotional distress
  - The cause can be diagnosed and treated
  - Self-limiting
  - Can become chronic

*National Institute of Neurological Disorders and Stroke

The Two Faces of Pain*

- **Chronic pain** may be a disease itself
  - Exacerbated by environmental and psychological factors
  - Resistant to most medical treatments.
- A person can have 2 or more co-existing chronic pain conditions
  - Chronic fatigue syndrome, endometriosis, fibromyalgia, inflammatory bowel disease, interstitial cystitis, temporomandibular joint dysfunction, and vulvodynia.

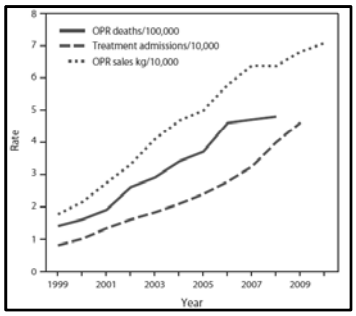
*National Institute of Neurological Disorders and Stroke

Mechanism-Genetic Factors

- Animal and human studies: Genetic factors determining who gets pain after nerve injury
- Clinical experience: Pts with chronic pain have personal or family hx of migraine, IBS, Fibromyalgia, etc!

"Pain Genes??"

Rates Of Opioid Pain Reliever (OPR) Overdose Death, OPR Treatment Admission, And Kilograms Of OPR Sold -- United States, 1999–2010



CDC. Vital Signs: Overdoses of Prescription Opioid Pain Relievers —United States, 1999-2008. MMWR 2011; 60: 1-6.

Pain…What's New

What Lies in the Future

Neuroplasticity

As Pain Becomes Chronic…

- Increasing excitatory pathways
- Decreasing dependency on the original pain input
- Increasingly abnormal (non-physiologic and inappropriate) pain processing

National Institute of Neurological Disorders and Stroke

NINDS

"The dramatic changes that occur with injury and persistent pain underscore that chronic pain should be considered a disease of the nervous system, not just prolonged acute pain or a symptom of an injury."

Induced Gene Expression	⇨	**Changes in Processing of Pain**
New Trophic Factors	⇨	**Rewiring of the Spinal Cord**
Enhanced Release of Neurotransmitters	⇨	**Amplifies Pain Signals**

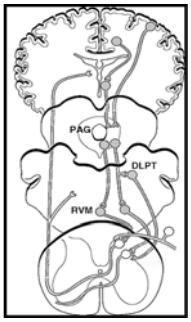
Serotonin & Norepinephrine Dysregulation

- Descending pathways modulate the ascending signals
  - NE & Serotonin are key neurotransmitters that promote pain inhibition

Alterations Develop = Problems

Serotonin & Norepinephrine Dysregulation

- In the ascending pain pathways…
  - Increased excitation
  - Decreased inhibition from above



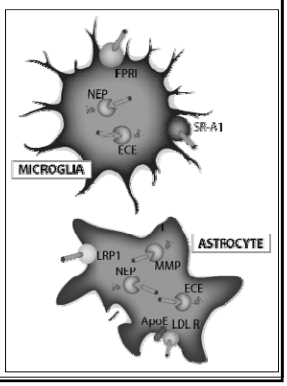
Emotions & Painful Physical Symptoms…

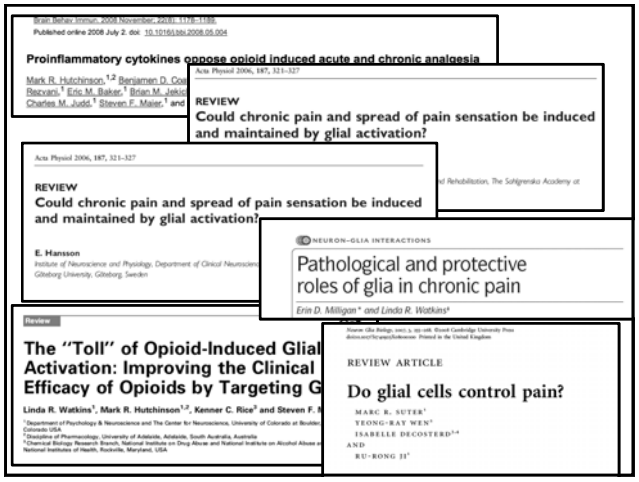
A Shared Neurochemical Link in Depression??

- Dysregulation of serotonin and norepinephrine (NE) in the brain…
  - Strongly associated with depression
- The same imbalance of serotonin and NE in the spinal cord…

Enter The Glial Cells

- Just "Cement" and nourishment?
- Maybe not!
- Maybe one of the keys to chronic pain!





Role of Glial Cells

- Glia cause immune-associated cells in CNS to migrate to the region of the dorsal horn associated with nerve injury
- Glia release cytokines
  - Enhance dorsal horn excitability and release glutamate and prostaglandins from pain receptors which perpetuates the pain signal

Glial Cells and Glycine

- **Glycine BLOCKS inter-neurons which normally transfer pain sensation to the brain**
- **Glial cells release large amounts of PGs after injury**
- **PGs inhibit glycine**
- **Therefore…blockade is broken!**

Opiates and Glia

- **Glial activation occur in response to opioids—opposes, enhances tolerance, dependence**
- **Not by usual opioid receptors**
  - Toll-like receptor 4 (TLR4)

Not Lost On Big Pharma…

New Therapies

Table from Scientific American, Dec 2009

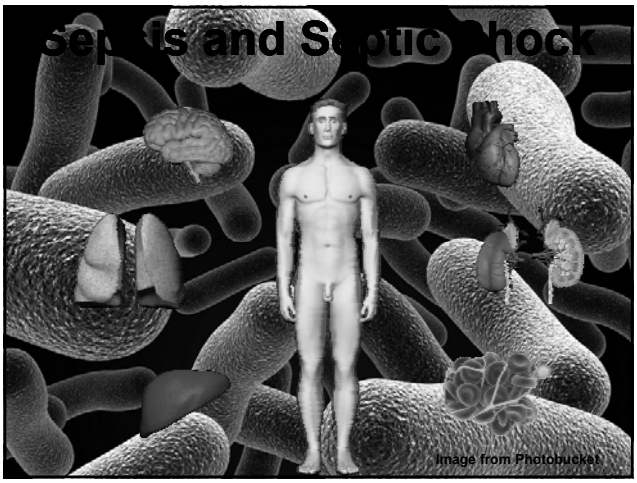
QUIETING OVERACTIVE GLIA

Several substances have been shown to modulate the activity of glia and are being tested as potential treatments for neuropathic pain or for the reduction of opiate tolerance and withdrawal. (Asterisks denote drugs already marketed for other uses.)

SUBSTANCE	MECHANISM	TESTING STAGE
AV411*	Inhibits astrocyte activity	Human tests for efficacy in enhancing morphine action and reducing withdrawal symptoms; safety tests for pain completed
Etanercept*	Anti-inflammatory signals quiet glia	Human tests for postsurgical neuropathic pain reduction
Interleukins* (cytokines)	Anti-inflammatory signals quiet glia	Cell and animal tests for pain
JWH-015	Activates pain-dampening CB2 cannabinoid receptors	Cell and animal tests for pain
Methionine sulfoximine*	Inhibits astrocyte neurotransmitter processing	Cell and animal tests for pain
Minocycline*	Inhibits activation of microglia	Cell and animal tests for pain
Propentofylline	Inhibits astrocyte activity	Human safety tests for pain completed
Sativex*	Activates cannabinoid receptors	Human efficacy tests for cancer-related and HIV-related neuropathic pain and diabetic neuropathy
SLC022	Inhibits astrocyte activity	Human efficacy tests for herpes-related neuropathic pain

What Else?

- Blockers to prevent pain signals from being amplified
- Transplantation of Chromaffin
- Blockers of *tachykinins-neurokinin* A and substance P
- Immune Modulation



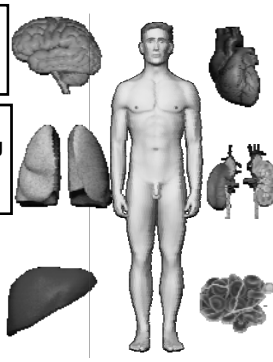
The Definition of Sepsis

- Sepsis = SIRS with a presumed or confirmed infectious process
- SIRS = Systemic Inflammatory Response Syndrome (2 or more)
  - Temperature >38°C/100.4°F or <36°C/96.8°F
  - HR > 90/min
  - Respirations > 20/min
  - WBC > 12,000 or < 4,000

The Sepsis Spectrum

- Sepsis = SIRS + Infection
- Severe Sepsis = Sepsis + End Organ Failure
- Septic Shock = Severe Sepsis + Hemodynamic Instability

Sepsis and Septic Shock



Altered Consciousness
Confusion
Psychosis

Tachypnea
PaO_2 <70 mm Hg
SaO_2 <90%
PaO_2/FiO_2 δ300

Jaundice
Enzymes
Albumin
PT

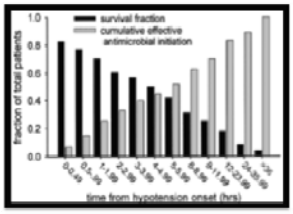
Tachycardia
Hypotension
Altered CVP
Altered PAOP

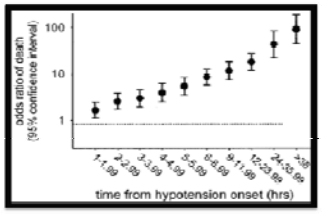
Oliguria
Anuria
Creatinine

Platelets
PT/APTT
Protein C
D-dimer

Jaundice

Antibiotics - Minutes Matter



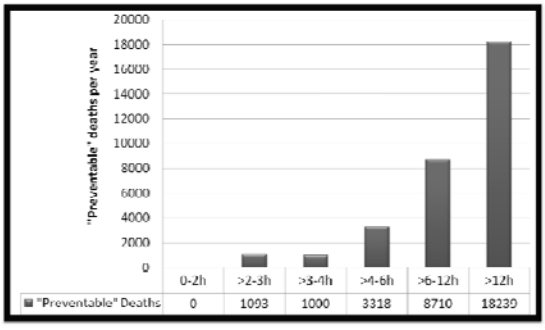


Every hour in delay of appropriate abx = 7.6% lower survival

Median time to appropriate atbx = 6h

Kumar et al. Crit Care Med 2006; 34: 1589-96.

Preventable Deaths in Septic Shock



Adapted from Kumar et al. Crit Care Med 2006; 34: 1589-96.

Impact!

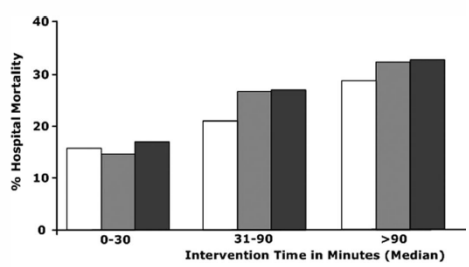
By getting door-to-balloon times of <2h for ALL STEMI patients, we would save
4775 lives per year (13 people a day)

By getting shock-to-antibiotic times of <2h for ALL septic shock patients, we would save…

32,360 lives per year
(89 people a day)
(3.7 people an hour)

(3.5 times the effect of STEMI intervention))

Effect Of A Rapid Response System For Patients In Shock On Time To Treatment And Mortality During 5 Years
Sebat Et Al Crit Care Med 2007; 35: 2568-2575



☐ Time to 2L Fluids ☐ Time to Shock Alert ☐ Time to CVC

34

The Sepsis Six – To De Delivered Within 1 Hour

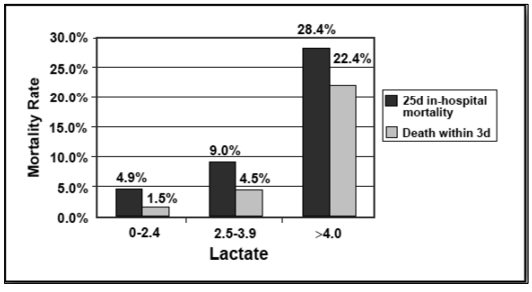
…and Identify Severe Sepsis and Septic Shock

3 Treatments
- High-flow oxygen
- IV antibiotics
- Fluid challenge

3 Investigations
- Blood cultures
- Measure lactate
- Measure urine output

Daniels et al. Emerg Med J 2010

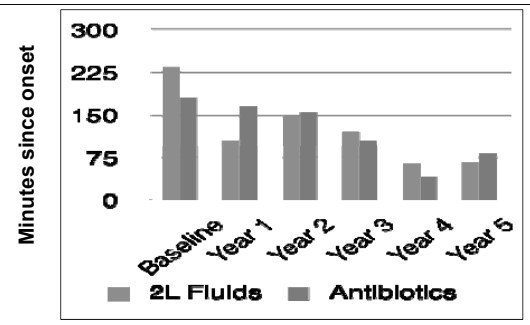
Lactate and Mortality



Sepsis Management

- Aggressive Care Matters!
  - Two large bore IVs
  - Antibiotics
  - 2 L NS, unless contraindicated
  - Central Access and Vasopressors in ED

Effect of a rapid response system for patients in shock on time to treatment and mortality during 5 years
Sebat et al Crit Care Med 2007; 35: 2568-2575



Among septic shock patients, mortality decreased from 50% to 10% NNT = 2.5

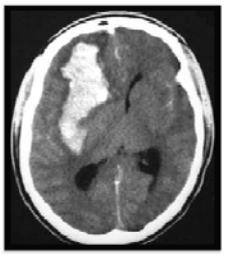
Top 10 Adult Emergencies

Maxwell Hill, MD
Assistant Professor
Department of Emergency Medicine
The Ohio State University Wexner Medical Center

STROKE

Really, One Initial Question?

Ischemic vs. Hemorrhagic



Immediate HEAD CT!

- ABC's
- Vital Signs
- Check Glucose!
  - Aphasia and right sided hemiplegia with hypoglycemia is a good stroke mimic!

  Embarrassing to miss this one!!
- Give NALOXONE if clinically indicated

Immediate Workup

- EKG
- CXR
- INR
- CBC with Platelets
- Chem-7
- Toxicology Screen

Hemorrhagic Stroke

(15% of Acute Strokes, ICH and SAH)

- Close Monitoring of Mental Status and VS
- Correct Bleeding Disorders
- Manage Blood Pressure
- Transfer to Neurosurgical Care

BP Control in ICH

- Treat for MAP > 130mmHg
  - Labetalol 20mg boluses, Nicardipine, Esmolol, Nitroprusside drips
- Beware Hypotension
  - IV Fluids and Pressor Support

Ischemic Stroke

(85% of Acute Strokes)

- Time of Onset (last normal)
- Calculate NINDS/NIH Stroke Scale
- STROKE ALERT/Telestroke
- Consider Thrombolysis, tPA
- Close Monitoring of Mental Status and VS
- Consider Transfer to Stroke Center

National Institute of Health Stroke Scale

Score of 0 - 42

- Score of 0 — No Stroke Symptoms
- Score of 1-4 — Mild Stroke
- Score of 5-15 — Moderate Stroke
- Score of 16-20 — Moderate to Severe Stroke
- Score of 21-42 — Severe Stroke

NIH Stroke Scale

1. LOC, Orientation, Response
2. Gaze
3. Visual Fields
4. Motor – Face
5. Motor – Arm
6. Motor – Leg
7. Limb Ataxia
8. Sensory
9. Language
10. Dysarthria
11. Inattention/Extinction

http://www.nihstrokescale.org/

Thrombolysis ? Inclusion Criteria

- > 18 years old
- Diagnosis of Ischemic Stroke causing measurable deficit
- < 3 hours after symptom onset
- New 3 - 4.5 hour window

http://stroke.ahajournals.org/content/44/3/870/T10.expansion.html

Exclusion Criteria

- Previous IC Bleed
- Head trauma <3 months
- Previous Stroke <3 months
- IC neoplasm, AVM, aneurysm
- INR of > 1.7
- Platelets < 100,000
- BP > 185/110
- Recent IC or Spinal
- Sx Active Internal Bleed

New 3 - 4.5 hour window, with Relative Exclusion Criteria

http://stroke.ahajournals.org/content/44/3/870/T10.expansion.html

Blood Pressure Control?

- Labetalol 20mg boluses
- Esmolol, Nicardipine, Hydralazine, etc.
- Get the BP down so they can get thrombolytics

tPA

- 0.9mg/kg (max of 90mg) infused over 1 hour, 10% bolus over 1st minute.

Further Management

- tPA = ICU,
- Consider transfer to Stroke Center
- Continue to control BP if tPA given
- Continuous Monitoring of VS and MS
- Permissive Hypertension if NO thrombolysis

  Don't treat for BP <220/120

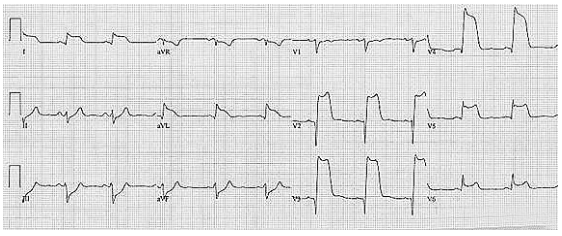
CHEST PAIN

Image from Photobucket

Acute Coronary Syndrome

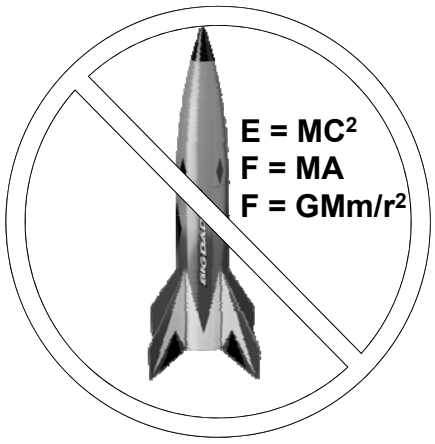
- Acceptable miss rate = 0%
  - i.e. you may get sued
- Actual miss rate ≈ 2%

CP and . . .



324mg ASA, 600mg Plavix, Heparin Drip, NTG, CATH LAB!

Image from Photobucket

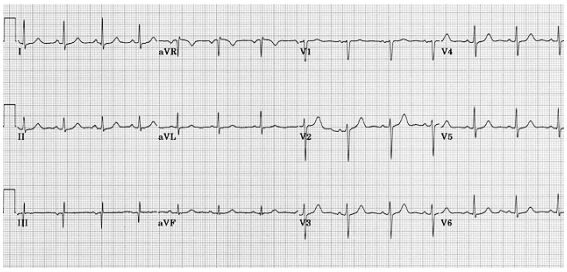


AHA/ACC Goals

- D2B- Door to Balloon Time of < 90 minutes
- Door to Needle Time for tPA of < 30 minutes
- DIDO- Door In Door Out < 30 minutes
- Transfer Door to Balloon time of < 120 minutes

VS.

CP and . . .



Aspirin, sure, but then what?

In the ED

- Further Risk Stratify
  - History and HPI
  - Physical Exam
  - CXR
  - Repeat EKG
  - Troponins
  - BNP

Treatment Strategies

- Serial Troponins
- Serial EKGs
- Observational Stay
- Admission
- Outpatient Follow-up
- Cardiology Referral
- PCP Referral for outpatient Stress Test

A Brief Foray Into RADIATION!

- CXR = 0.08mSV
- Abdominal CT = 10mSV

Image from Photobucket

Non-Invasive Cardiac Evaluation

Exercise Stress Test	Nuclear Stress Test
• Functional	• SPECT "MIBI"
• Cheap ≈ $ 900	• Functional
• Sensitivity 70%	• Exercise ≈ $6000
• Specificity 70%	• Pharmacologic ≈ $7500
• No Radiation	• Sensitivity 90%
	• Specificity 75%
	• 12-22 mSv

Non-Invasive Cardiac Evaluation

Stress Echo

- Functional
- Exercise ≈ $3300
- Pharmacologic ≈ $4500
- Sensitivity 85%
- Specificity 85%
- No Radiation
- Operator Dependent
- Cardiac MRI
  - Sensitivity 85%

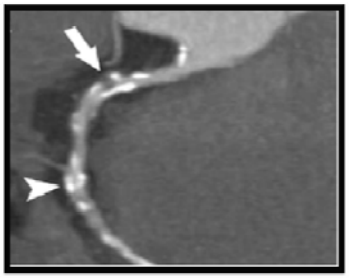
Other Options

  - Specificity 80%
  - $3800
- Cardiac PET
  - Specificity ≈ 100%
  - Sensitivity 85%
  - 8mSv, $9500

Cardiac CTA

- Low Risk Chest Pain
- Anatomic Study (not Functional)
- 4-15 mSv

Cardiac CTA



Cardiac CTA

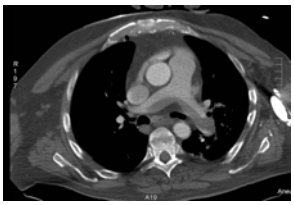
- Negative Predicative Value ≈ 100%
- Cheap- $ 1500
- Quick- <15 minutes
- Long Term Reassurance

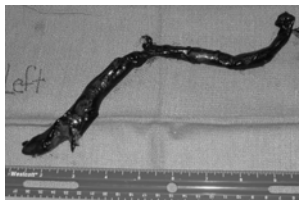
Top 10 Clinical Problems in Emergency Medicine

Colin G. Kaide, MD, FACEP, FAAEM, UHM
Associate Professor of Emergency Medicine
Board-Certified Specialist in Hyperbaric Medicine
Specialist in Wound Care
The Ohio State University Wexner Medical Center

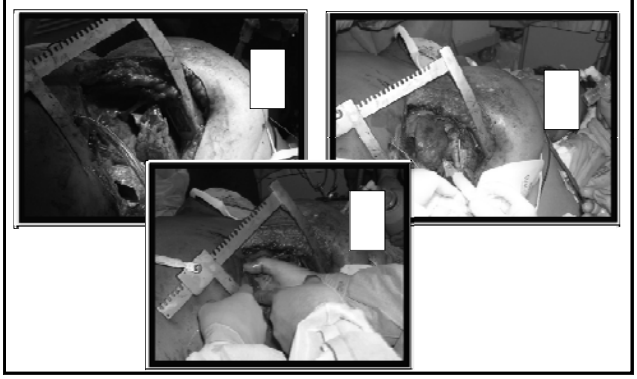
Venous Thromboembolism

VTE = DVT + PE





Resuscitative Thoracotomy for Presumed PE



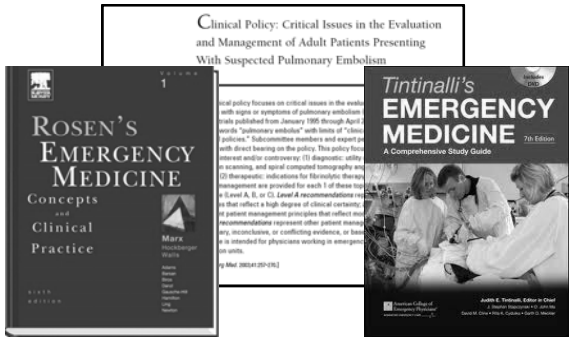
Epidemiology of VTE

- 2,000,000 Americans have DVT/yr
- 300,000 die from PE, most result from DVT
  - More than AIDS and Breast cancer combined1
- Risk is 1/1000 ED visits

Risk of Clotting

Thrombophilic Status	RR of Clot	% Pop	% of VTE
OCPs	4	----------	----------
Factor V Leiden (Heterozygous)	5-7	5-15	12-40%
Factor V Leiden + OCPs	30-35	----------	----------
Prothrombin Gene Mutation	3	2%	6-18%
Prothrombin Gene Mutation + OCP	16	----------	----------
Protein C Deficiency	7	0.2%	5-15%
Protein S Deficiency	6	Unknown	5-15%
Antithrombin III	5	0.02-1%	4%
Hyper-Homocysteinemia	2-4	Unknown	----------
Antiphospholipid Syndrome		2-4%	5-10%

Jeff Kline



Diagnosis of PE

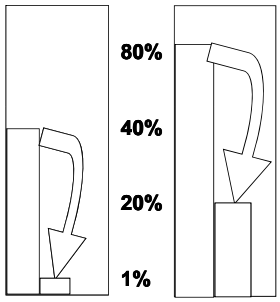
- Bayes Theorem RULES!
  - Very simply stated…Pretest probability influences posttest probability
- The goal of all testing is to get the post-test probability down to an acceptable number (< 1%)

"Estimation of pretest probability of the disease is imperative for proper application of results of diagnostic testing"
- ACEP Clinical Policy on PE

American College of Emergency Physicians®

Goal: Get to a Good PreTP

- If the Pre-test probability is low enough*…
  - A good D-dimer with confers a Post-test probability of < 1%
- But, if PTP is too high…



* 40% = Wells Moderate = 6 points = Gestalt "not high"

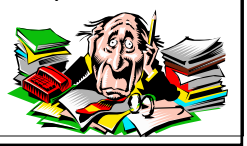
Wells Criteria

Criteria	Points
Suspected DVT	3.0
An alternative diagnosis is less likely than PE	3.0
Heart rate >100 beats/min	1.5
Immobilization or surgery in the previous 4 wk	1.5
Previous DVT/PE	1.5
Hemoptysis	1.0
Malignancy (on treatment, treated in the past 6 mo or palliative)	1.0

Score Range	Mean Probability of PE, %	% With This Score	Interpretation of Risk
<2 points	3.6	40	Low
>6 points	66.7	7	High

The "Guess" Criteria

- 2603 patients evaluated by any of 142 clinicians
- Clinicians guessed at was a "low pre-test probability patient"
- Data suggests that we can accurately define Low PTP (< 15%)
- We can define "Not High" (< 40%)



Use Any Method You Want…

Rule to Assign PTP	Post Test Probability + Negative DD
Wells "Moderate"	0.9%
Gestalt < 40%	0.5%

Yes…It Really Does Not Matter!

Can I Send a PE Home?

- **We already do! DVTs**
- **Studies suggest this is safe in the right patients**
- **Scoring systems (any positive = Home treatment is not indicated)**
  - **PESI**
  - **sPESI**
  - **Hestia**

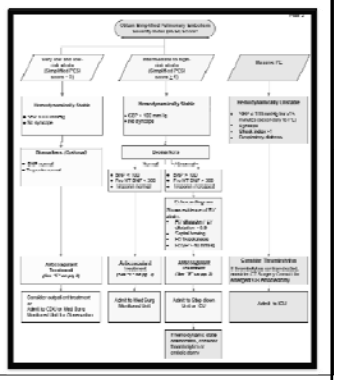
Simplified Pulmonary Embolism Severity Index

Simplified Pulmonary Embolism Severity Index
Age > 80 years?
Cardiopulmonary co-morbidity?
History of cancer?
Arterial oxyhaemoglobin saturation level <90%?
Systolic blood pressure <100 mmHg?
Pulse frequency ≥110 beats/min?

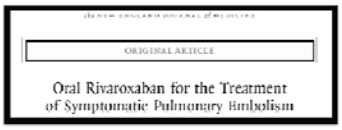
Blood Coagulation, Fibrinolysis and Cellular Haemostasis
Thrombosis and Haemostasis 109.1/2013

OSU PE Diagnosis and Treatment Algorithm

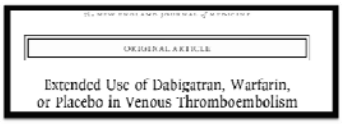
Consider outpatient treatment
<u>or</u>
Admit to CDU or Med Surg
Monitored Unit for Observation



New Agents For PE


ORIGINAL ARTICLE

Oral Rivaroxaban for the Treatment of Symptomatic Pulmonary Embolism

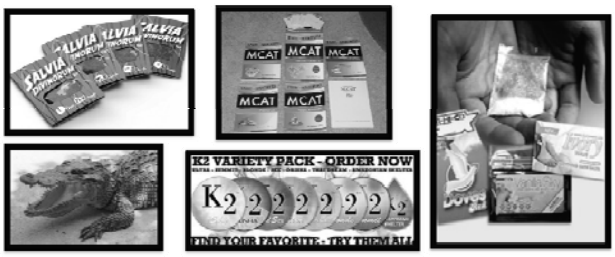

ORIGINAL ARTICLE

Extended Use of Dabigatran, Warfarin, or Placebo in Venous Thromboembolism

When Do I Use Thrombolytics ?

- 5% of PE may qualify
- Thrombolytics for confirmed PE plus:
  - Persistent hypotension (SBP < 100)
  - +/- Persistent severe hypoxemia
  - +/- Right heart strain on Echocardiogram

New Drugs of Abuse



Why?

- New drugs are created for a number of reasons
  - To fill a niche for cheap, easy to make, sometimes "legal" agents
  - To circumvent existing laws
  - To make a new experience
- Can pose new clinical challenges
  - Recognizing
  - Managing

Salvia Divinorum

- Sierra Mazatec region of Southern Mexico
  - Used by shamans as an "entheogen"
- Psychedelic effects last minutes to < 1h

Image from Photobucket

Salvia Divinorum

- **Most potent natural hallucinogen**
- ***Salvinorin A* is the main active psychotopic molecule**
  - Kappa-Opioid agonist
  - Seemingly little harm
- **Many have a "bad trip"**
- **20 seconds!!**

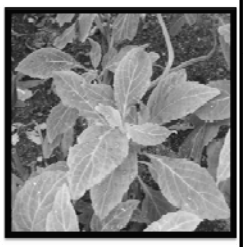


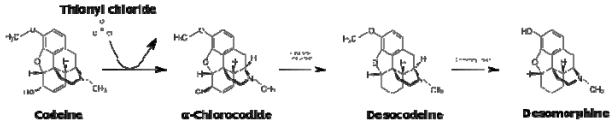
Image from Photobucket

Crocodile aka: Krokodil (крокодил)

- **Desomorphine**
  - **Dihydrodesoxymorphine**
  - **8-10x morphine; 3x Heroin**
  - **Lasts 1-2 hours**
- **Invented in 1932, problems started in 2002. Problem in Russia in 2010**
- **Easy synthesis from Codeine**

Crocodile aka: Krokodil (крокодил)

- **Named for the scaly skin in users and from synthesis from chlorocodide**
- **Took "10 minutes"**



Sloppy Synthesis

Image from http://www.ericdunbar.com/drugs/street/krokodil.htm

Average LE of a Krok User is 2-3 Years!

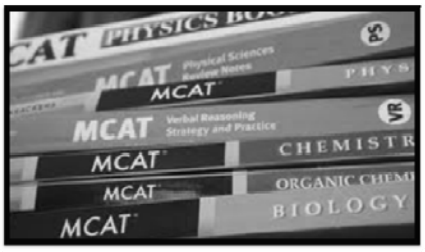
Image from http://www.ericdunbar.com/drugs/street/krokodil.htm

A Different Croc User

MCAT/CAT

- Mephedrone (4-methylmethcathinone)
  - Amphetamine and cathinone derivative
  - Chemically like "Khat"
  - Swallow, snort or inject

MCAT/CAT



Khat

Image from Wikipedia

MCAT/CAT

- MDMA, amphetamine and cocaine-like experience
  - Euphoria, enhanced mood, improved mental function, sexual stimulation,
- Stimulant effects and the bad stuff
  - Bruxism, hyperthermia, hallucinations, delusions

K2 (Spice)

- Synthetic cannabis is a piece of the THC molecule
  - Legal in some places
  - Known as K2 and Spice

K2

- Produces a cannabis like effect
- Depends on which piece of the molecule you get…

K2

- John W. Huffman, Clemson University, is the first to create the synthetic analog to THC
- JWH-018, JWH O73 and many others are used

Bath Salts

- Bath salts is the "street name" for designer drugs based on substituted cathinones
  - Similar to amphetamines and cocaine
- Different drugs…same moniker
  - Originally Methylenedioxypyrovalerone (MDPV)
  - New drugs now exist

Bath Salts

- Typically cause stimulant effects via DA, NE and Serotonin
  - Swallowed, snorted, smoked or ingested

Top 10 Adult Emergencies

Maxwell Hill, MD
Assistant Professor
Department of Emergency Medicine
The Ohio State University Wexner Medical Center

EXCITED DELIRIUM

"Mmmmm, Bath Salts"

http://www.charlydmiller.com/LIB02/2002jems.html

Excited Delirium- Definition

Not in DSM-IV or ICD-9

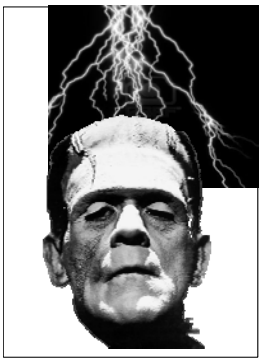
- Altered Mental Status
- Severe Psychomotor Agitation
- Autonomic Instability

Epidemiology

- Males < 40 Years Old
- Acute Drug Intoxication/Withdrawal
  - Cocaine, Methamphetamines, PCP, LSD, "Bath Salts", EtOH withdrawal, etc.
- Underlying Psychiatric Illness

SYMPATHETIC STORM

- STIMULANT Intoxication
- Exaggerated Adrenergic Response
- Severe HYPERTHERMIA (Central Dopaminergic)
- Metabolic Acidosis



Clinical Features

- Tachycardia
- Hypertension
- Hyperthermia
- Diaphoresis
- Tachypnea
- Confusion
- Paranoia
- Hallucinations
- Increased Pain Tolerance
- Aggression
- Agitation
- Inappropriately Clothed
- Unusual Strength
- Unusual Endurance
- Noncompliance

Immediate Management

Goal = Safety for Staff and Patient

- Physical Restraints
- Chemical Restraints

Physical Restraint

The Means to an End

- OVERWHELMING Force
  - At *least* 5-6 people, the bigger the better. One to control each limb/head, one to provide medications
- FOUR POINT Supine Restraints
  - "Leathers" or Hard Restraints, NO HOG TIE/PRONE!
- Cardiac Monitor

Chemical Restraints

DON'T MESS WITH IV, GO IM!

- Sedative Hypnotics
- Antipsychotics

Sedatives

	Onset
• MIDAZOLAM	
– IM 5mg	10-15 minutes
– IV 2-5mg	3-5 minutes
• LORAZEPAM	
– IM 4mg	15-30 minutes
– IV 2-4mg	2-5 minutes
• DIAZEPAM	
– IM 10mg	15-30 minutes
– IV 5-10MG	2-5 minutes

Antipsychotics

	Onset
• HALOPERIDOL	
– IM 5-20mg	15 minutes
– IV 5-10mg	10 minutes
• DROPERIDOL	
– IM 5mg	3-5 minutes
– IV 2.5-5mg	10 minutes

ATYPICALS?

Sedative + Antipsychotic?

You Betcha!

Ketamine?

		Onset
• IM	4-5mg/kg	3-5 minutes
• IV	2mg/kg	1 minute

IM vs. IV ?

Intubate?

Phew! Now What?

Testing

- Monitor
- EKG
- RECTAL TEMP
- Blood Sugar
- Chem-7
- CK
- Blood Gas
- Urine Drug Screen
- Head CT
- Airway
- IV Fluids

Management

- Wet and Windy!
- Redose Sedation Meds
- Work up underlying cause
- Workup Injuries
- Admit ICU vs Floor

MINOR HEAD INJURY

Mild Traumatic Brain Injury

- 1.5 million Mild TBIs yearly
- 300,000 Sports Related TBIs
- Increased Awareness of Concussions
- Increased Medical Investigation
- Increased Concern for Student Athletes

Who Needs a Scan?

- Canadian Head CT Rule (GCS of 13-15)
- New Orleans Head CT Rule (GCS of 15)
- If any of the criteria are positive, SCAN AWAY!
- Sensitivity approaches 100%

Canadian HCT Rules

- GCS <15 2 hours post-injury
- Suspected open/depressed skull fracture
- Any signs of Basilar Skull fracture
- Vomiting ≥ 2 episodes
- Age ≥ 65
- Amnesia before impact ≥ 30 minutes
- Dangerous Mechanism

New Orleans HCT Rules

- Headache
- Vomiting
- Age > 60
- EtOH or Drug Intoxication
- Persistent Anterograde Amnesia
- Visible Trauma Above Clavicle
- Seizure

NEXUS II

- Evidence of a significant skull fracture
- Scalp Hematoma
- Neurologic deficit
- Altered level of alertness
- Abnormal Behavior
- Coagulopathy
- Persistent Vomiting
- Age 65 and older

National Emergency X-ray Utilization Study

Acute Evaluation

- SAC- Standardized Assessment of Concussion
- SCAT2- Sports Concussion Assessment Tool 2
- WPTAS- Westmead Post-Traumatic Assessment and Cognitive Testing

WPTAS

- What is your name?
- What is the name of this place?
- Why are you here?
- What month is it?
- What year is it?
- What town are you in?
- How old are you?
- What is your date of birth?
- What time of day is it?
- Three picture Recall

Recommendations

- NO return to play that day
- Multiple Guidelines for Management
- Period of Physical and Cognitive Rest
- Out of the ED- NO play until reevaluated

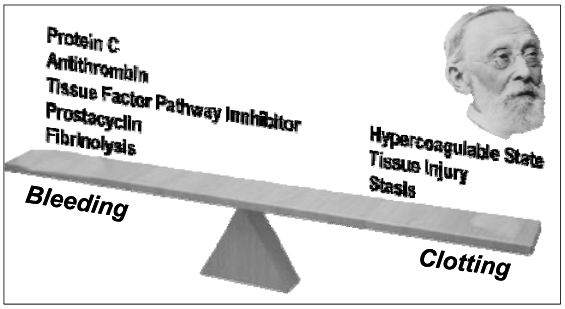
2008 Consensus Statement on Concussions in Sport

- 6 day return to play
- Graduated Return to Play
- Cognitive and Physical Rest Until Asymptomatic

Top 10 Clinical Problems in Emergency Medicine

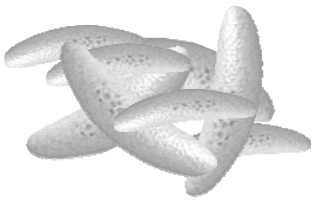
Colin G. Kaide, MD, FACEP, FAAEM, UHM
Associate Professor of Emergency Medicine
Board-Certified Specialist in Hyperbaric Medicine
Specialist in Wound Care
The Ohio State University Wexner Medical Center

A Balance



Hemostasis Has 2 Parts

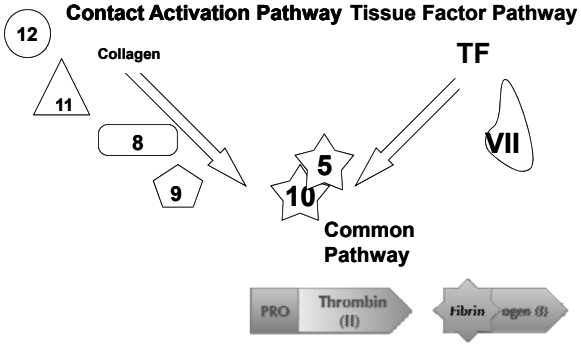
- **Primary Hemostasis: Platelet Aggregation**



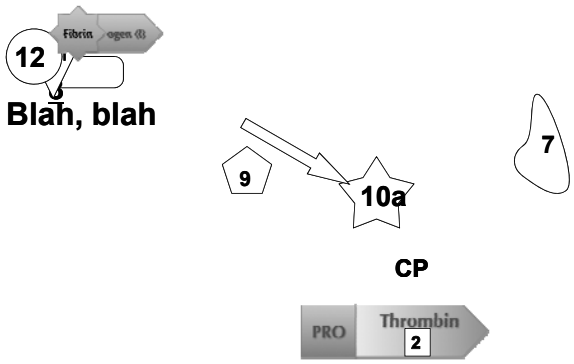
Coagulation: Getting to Fibrin

- **2 pathways lead to fibrin via the common pathway**
- **This is a "Gross Simplification" of the system**

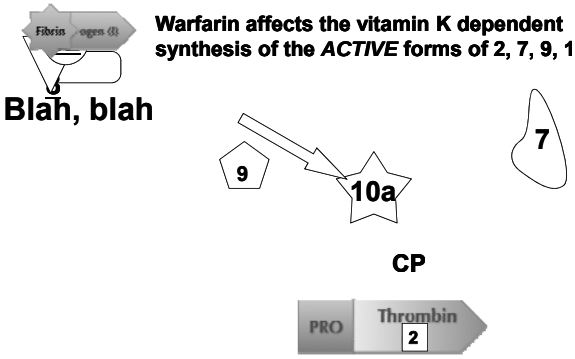
Secondary Hemostasis



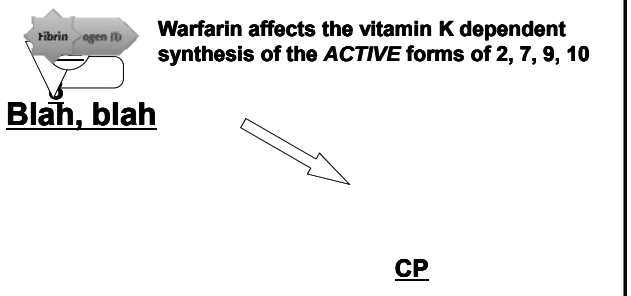
Simple…and All You Need to Know!



Warfarin (Coumadin®)



Warfarin (Coumadin®)

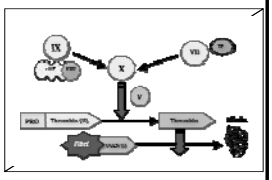


Warfarin Reversal

- 2 parts to treatment
  - Sustained reversal
  - Immediate reversal

Vitamin K

- Allows for the generation of active forms of II, VII, IX, and X
- No more SQ dosing
  - Oral or IV



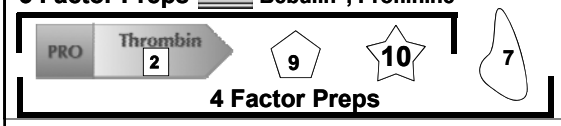
Fresh Frozen Plasma (FFP)

- Each ml of FFP contains:
  - 1 unit @ coagulation factor
  - 200-250 ml volume = 200-250 units of @ factor
  - $250/unit

Prothrombin Complex Concentrate (PCC)

- A mix of NON-ACTIVATED clotting factors
- 2 types of mixes: 3 factor and 4 factor
  - 3 factor preps have only small amounts of 7

3 Factor Preps Bebulin®, Profilnine®



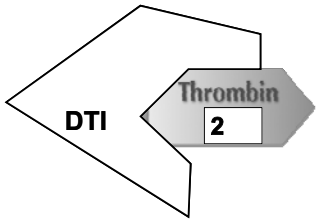
Warfarin and PCC

- Good Reversal *in vivo and in the lab*
- Cost ~ $0.59/Unit
- Dosing is not consistent we use the INR based dosing
  - INR 2-4 25 Units/kg
  - INR 4-6 35 Units/kg
  - INR >6 50 Units/kg

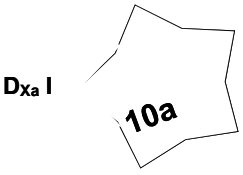
The New Anticoagulants

- The Direct Thrombin Inhibitors
  - Dabigatran (Pradaxa®) – The first oral DTI
- The 10a Inhibitors
  - Rivaroxaban (Xarelto®) – The First oral 10a inhibitor
  - Apixaban is coming soon

Direct Thrombin Inhibitors - DTIs



Direct 10a Inhibitors



Rivaroxaban *(Xarelto®)*

These Present and Interesting Challenge

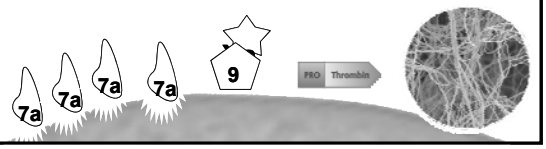
Rivaroxaban
(Xarelto®)

CP

Dabigatran
(Pradaxa®)

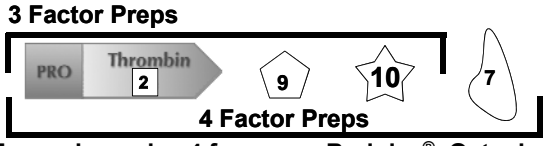
Factor VII (rVIIa) NovoSeven®

- It also binds to platelets and promotes Factor X activation and thrombin generation
- 1 mg vial = 1000 mcg x $1.10/mcg = $1100
  - ✓ 90 mcg/kg x 70 kg x $1.10 = $6930!
  - ✓ q 2h till bleeding is controlled. Assume 8 initial doses = $6930 x 8 doses = $55,440!!!



PCCs

- In the US 3 fx only: Bebulin®, Profilnine®



- Everywhere else 4 fx preps: Beriplex®, Octaplex® and many others

aPCC: Feiba® *

*Not FDA approved for this indication

- FEIBA "Factor Eight Inhibitor Bypassing Activity"
- Activated 2, 7, 9, 10

Direct Thrombin Inhibitors (Dabigatran)

*Not FDA approved for this indication

- rVIIa
  - Worked on markers and in rats/rabbits
  - Inconsistent results in human volunteer studies
  - Case reports showed questionable reversal
- High dose 4 fx PCC and aPCC (Feiba®)
  - Worked on markers & rats/rabbits
  - Complete reversal in volunteer ex vivo studies

Direct Xa Inhibitors (Rivaroxaban)

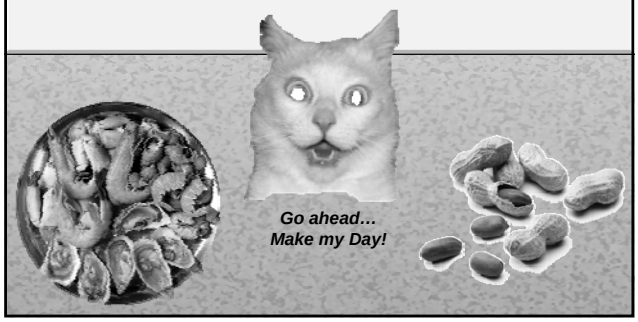
*Not FDA approved for this indication

- ☐ • rVIIa
  - ✓ Worked on markers and in rats/rabbits
- ☐ • aPCC (Feiba®)
  - ✓ Worked on markers and in rats/rabbits
  - ✓ Human volunteer studies…
- ✚/– • 4 Factor PCCs
  - ✓ Inconsistent results

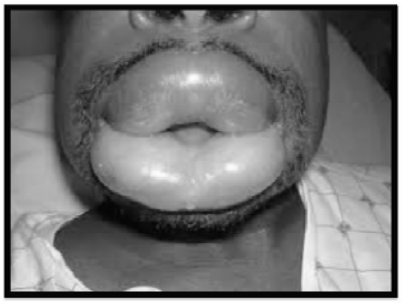
Top 10 Adult Emergencies

Maxwell Hill, MD
Assistant Professor
Department of Emergency Medicine
The Ohio State University Wexner Medical Center

ALLERGIC REACTIONS



VS



Otolaryngology - Head and Neck Surgery

Or This

www.aafp.org

Anaphylaxis

- Respiratory Compromise
- Hypotension/End Organ Dysfunction
- Mucosal/Oral Involvement

Treatment for Anaphylaxis

EPINEPHRINE!

- 0.3 mg IM Immediately!
- (0.01mg/kg for kids)

Adjuncts

- IV Fluids- Wide Open
- Diphenhydramine 25-50mg IV
- Famotidine 20mg IV
- Albuterol Nebulizer for Bronchospasm
- Solumedrol 125mg IV
- Oxygen
- Consider low dose Benzos

Not Responding to IM Epi? REPEAT, still no response? Uh Oh!

Epinephrine Drip

A do it yourself guide!

- 1mg of Epinephrine
  - ✓ 1ml of 1:1000 Anaphylaxis Epi -or- 10ml of 1:10000 Cardiac Epi
- Inject into a 1L bag of Normal Saline
- SHAKE (don't stir)
- 1ml of solution = 1mcg of Epinephrine
- Start drip at 120ml/hr (2mcg/min)
- Titrate up/down as needed

On B-Blocker?

- May not respond to Epinephrine
- GLUCAGON- 5mg IV over 5 minutes

Then What?

- Observe for 6-10 hours
  - ✓Biphasic Anaphylaxis
- Home with EpiPen and with Steroids

Angioedema

- ACEI Induced
- HAE
- Anaphylaxis
- Idiopathic

New England Journal of Medicine, 365;2, July 14 2011

Airway, Airway, AIRWAY!

- Stridor or Respiratory Distress
- Tongue Enlargement
- MOST Experienced Person Manages Airway
- ENT backup, call them down!

Treatment

- AIRWAY
- The Usual (no clinical evidence)
  - Epinephrine, Antihistamines, Steroids
- The UNUSUAL and NEW
  - Ecallantide
  - Icatibant
  - Human C1-esterase inhibitor
  - FFP