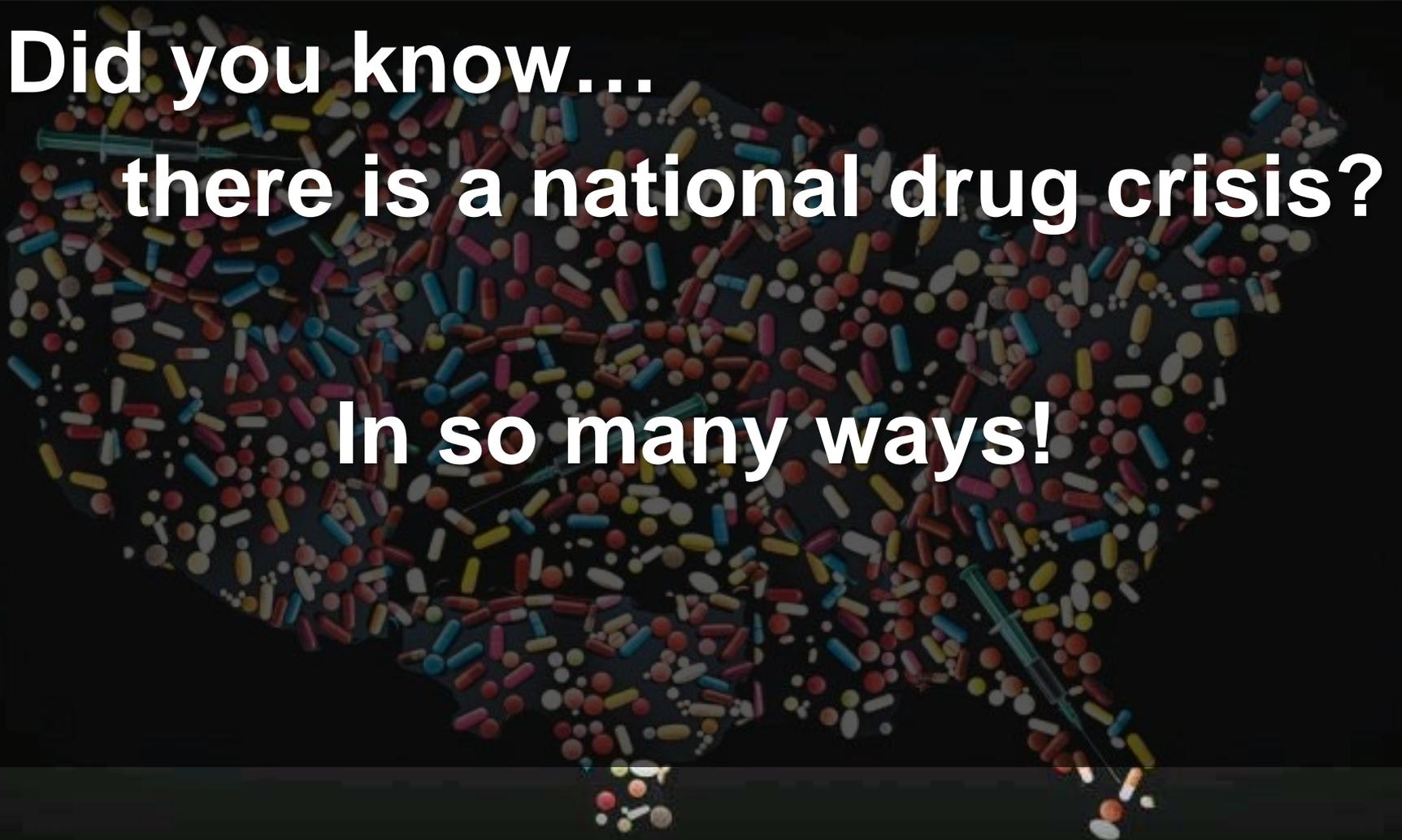


News You can Use

Did you know...

there is a national drug crisis?

In so many ways!



Drug Crisis in America



1. Addiction to narcotics is overwhelming
2. Naloxone may become in short supply and more expensive
3. EMS drugs are more and more difficult to find for system use
4. Alternative drugs needed (system memo last month)

*Frustrations mount...and
fatigue sets in*

We have to adapt to the ever present danger facing our future

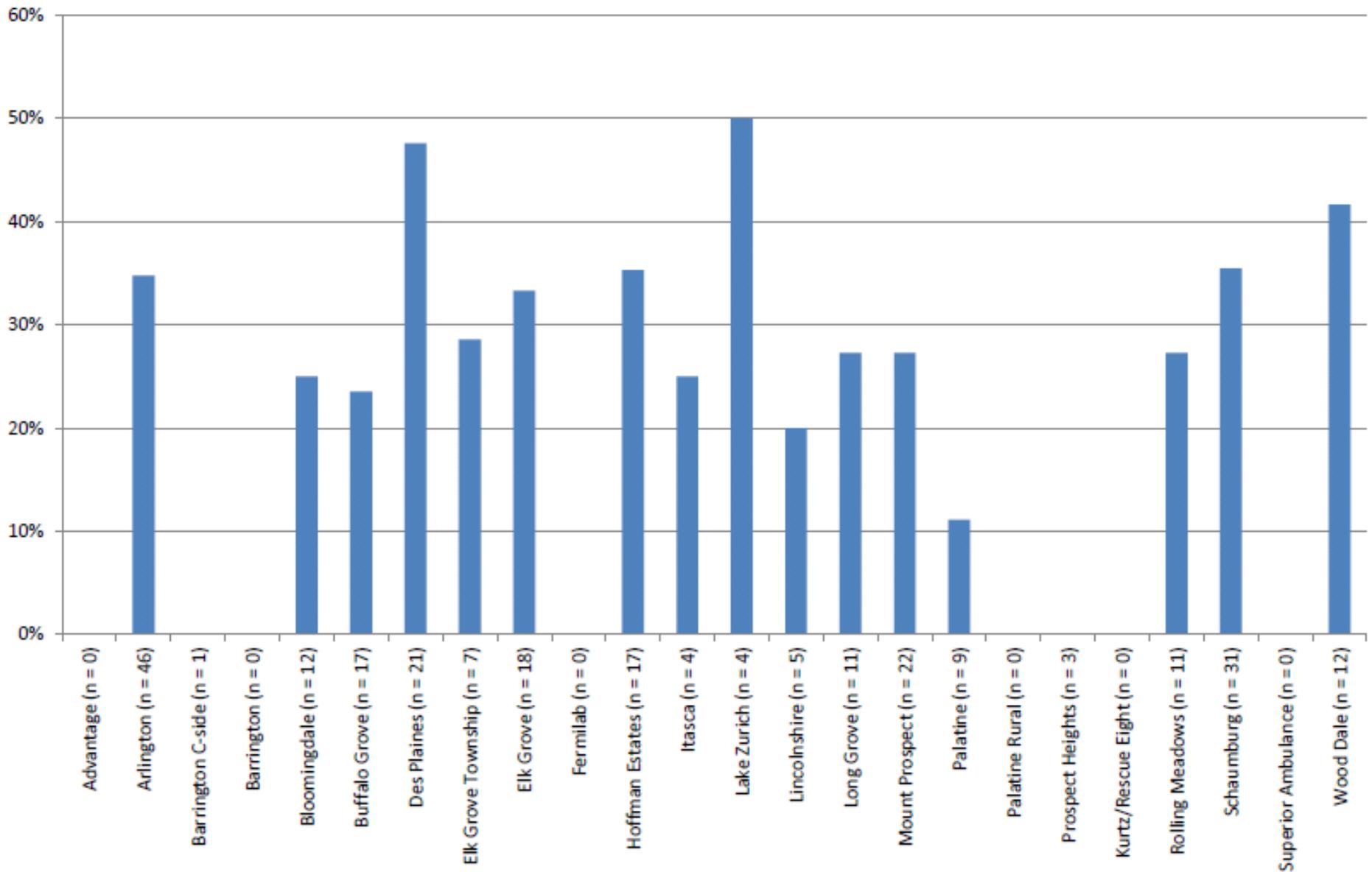


Opiate Epidemic Is Changing Pain Management

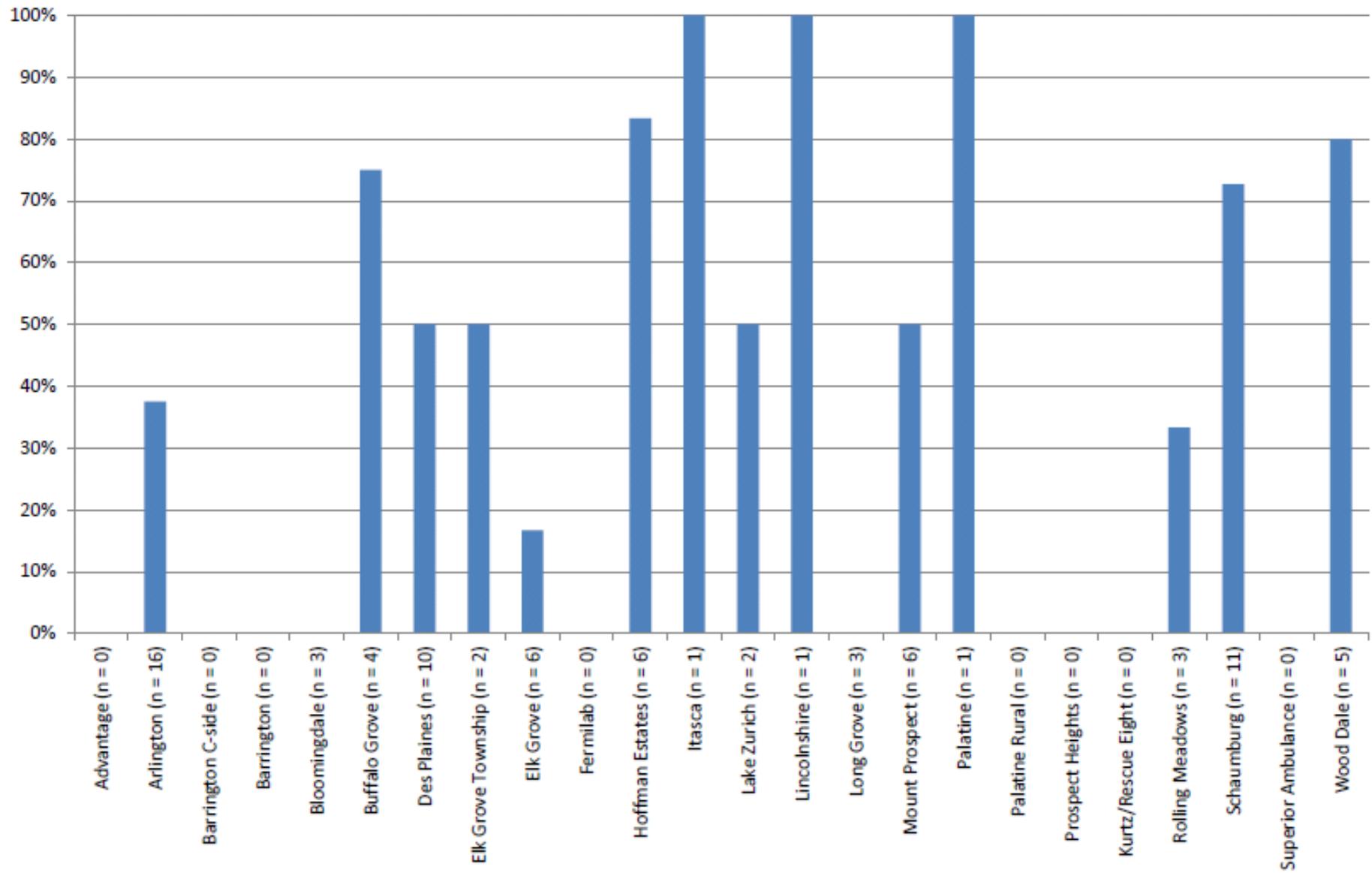
reforming the way we treat pain

- Dangers Of Opioids*
- The Opiate Epidemic*
- Alternative Treatments*

2017 Naloxone Administration Percent of Calls Where Medics per SOP Gave Incorrect Doses



2017 Naloxone Administration Percentage of Incorrecting Dosing with 2mg First Dose Documented



DRUG OVERDOSE / POISONING

Case by case
determination if time
sensitive

GENERAL APPROACH

1. **History:** Determine method of injury: ingestion, injected, absorbed, or inhaled; pts often unreliable historians.
2. **IMC** special considerations:
 - Uncooperative behavior may be due to intoxication/poisoning; do not get distracted from assessment of underlying pathology
 - Anticipate hypoxia, respiratory arrest, seizure activity, dysrhythmias, and/or vomiting
 - Assess need for advanced airway if GCS \leq 8, aspiration risk, or airway compromised unless otherwise specified
 - Support ventilations w/ 15L O₂/BVM if respiratory depression, hypercarbic ventilatory failure
 - Large bore IV/IO NS titrated to adequate perfusion (SBP \geq 90; MAP \geq 65); monitor ECG
 - Impaired patients may not refuse treatment/transport
3. If AMS, seizure activity, or focal neurologic deficit: Assess **blood glucose**; If $<$ 70: treat per Hypoglycemia SOP
4. **If possible opiate toxicity** w/ AMS & respiratory depression/arrest: **NALOXONE** IVP/IO [ALS] IN/IM (EMR/BLS)
If spontaneously breathing: 0.4 mg; repeat q. 30 sec until ventilations increase up to 4 mg
If apneic: 1 mg. May repeat q. 30 sec until breathing resumes up to 4 mg. All additional doses require OLMC.
5. **Anxiety/serotonin syndrome:** **MIDAZOLAM** 2 mg increments **slow IVP q. 2 min** (0.2 mg/kg IN) up to 10 mg titrated to response
Tonic clonic seizures: **MIDAZOLAM** 2 mg increments IVP/IO **q. 30-60 sec** (0.2 mg/kg IN) up to 10 mg IVP/IN/IO pm
If IV/IO unable/IN contraindicated - **IM:** 5-10 mg (0.1-0.2 mg/kg) max 10 mg single dose
All routes. May repeat to total of 20 mg pm if SBP \geq 90 (MAP \geq 65) unless contraindicated.
If hypovolemic, elderly, debilitated, chronic dx (HF/COPD); and/or on opiates or CNS depressants: \downarrow total dose to **0.1 mg/kg** for anxiety.
6. **If excited delirium, violent, severe agitation:** **KETAMINE** 2 mg/kg slow IVP (over 1 min) or 4 mg/kg IN/IM
May repeat at $\frac{1}{2}$ dose after 10 min up to max of 4 mg/kg (500 mg). Do not give to pts with schizophrenia, psychosis, or bipolar mania.

BETA BLOCKER

"LOLs" - See list on Pulmonary Edema/Cardiogenic shock SOP.

6. If HR $<$ 60 & SBP $<$ 90 (MAP $<$ 65): & unresponsive to atropine, norepinephrine, & pacing per Bradycardia w/ Pulse SOP:
GLUCAGON 1 mg IVP/IN/IO/IM.

CYCLIC ANTIDEPRESSANTS

(Block Na channels and alpha receptors): Adapin, Amitriptyline, Amoxapine, Anafranil, Desipramine, Desyrel, Doxepin, Elavil, Endep, Imipramine, Lorbitol, Ludiomil, Norpramine, Pamelor, Sinequan, Triavil, Tofranil, Vivactil. These DO NOT include serotonin reuptake inhibitors (SSRIs) like Paxil, Prozac, Luvox, Zoloft

6. If hypotensive: **IV/IO NS wide open up to 1 L**

4. **If possible opiate toxicity** w/ AMS & respiratory depression/arrest: **NALOXONE** IVP/IO [ALS] IN/IM (EMR/BLS)
If spontaneously breathing: 0.4 mg; repeat q. 30 sec until ventilations increase up to 4 mg
If apneic: 1 mg. May repeat q. 30 sec until breathing resumes up to 4 mg. All additional doses require OLMC.

Crew Member
[Dropdown menu]

OK Cancel Delete Repeat Last

Was the Medication Administered Prior to YOUR AGENCIES Care?

Yes No

Select "Yes".

Leave the "Crew Member" blank.

Time Medication Administered

04/22/2018 21:32:54

Choose the appropriate "Person" who administered the Naloxone.

Person Administering Medication was a

Search Person Administering Medi

Paramedic	EMT	Paramedic Student	Critical Care Paramedic	First Responder	Registered Nurse	Other Healthcare Professional	Patient/Lay Person	Physician	Other Non-Healthcare Professional
CT Technologist	Physician Assistant	Respiratory Therapist	Law Enforcement	Student	Less...				

Favorites A-D E-H I-L M-N O-P Q-T U-Z #

Medication Given

Search Medication Given

Naloxone	Oxygen	Normal saline	Aspirin	Nitroglycerin	Fentanyl	Ondansetron	Morphine	Albuterol	More...
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NREMT Opportunity

*Please see the Seminar schedule for those that want to sit in on NREMT practical testing practice or need to make up CE hours

The memo on NREMT testing for medics currently state licensed will be coming soon now that this agenda is complete.



Summer time is not always fun
time...



Summer Emergencies

Susan Wood, RN Paramedic

NWC EMSS

May 2018 CE

Objectives and Goals



- Allergic Reactions vs. anaphylaxis
 - Assessment findings and treatment goals
- Heat emergencies
 - Cramps vs. exhaustion vs. stroke
- Submersion
 - Near drowning care

Submersion Injury

- Immersion: a body part to be covered in liquid; not necessarily the entire body but the oral and nasal passage to be affected
- Submersion: the entire body to be covered in liquid
- Interval time: survival trends correlate to the initial airway compromise and ventilatory efforts

Environmental: SUBMERSION INCIDENT

Notes:

- All victims of submersion who require any form of resuscitation (including rescue breathing alone) should be transported to the hospital for evaluation and monitoring, even if they appear to be alert and demonstrate effective cardiorespiratory function at the scene (Class I, LOE C).
- All persons submerged \leq 1 hour should be resuscitated unless there are signs of obvious death.

1. ITC special considerations:

BLS

- **Rescue and removal:** Ensure EMS safety during the rescue process; only rescuers with appropriate training and equipment should enter moving or deep water to attempt rescue
 - Rescue personnel should wear protective garments if water temp is $< 70^{\circ}$
 - A safety line should be attached to the rescue swimmer
 - Patient should be kept in a horizontal position if at all possible. Cold-induced hypovolemia, cold myocardium, and impaired reflexes may result in significant hypotension. If hypothermic, appropriate rewarming should be done concurrent with resuscitation.
 - **Selective spine precautions** only if circumstances suggest a spine injury
 - **EMERGENT:** If awake with good respiratory effort, yet congested and increased work of breathing: O_2 /C-PAP mask to deliver 5-10 cm PEEP; use 15 L/NRM if CPAP unavailable or contraindicated. If SBP falls < 90 (MAP < 65): Titrate PEEP down to 5 cm; remove C-PAP if hypotension persists
 - **CRITICAL: If unresponsive and ineffective ventilations with a pulse:** Ventilate using BLS airways and BVM. No need to clear airway of aspirated water by any means other than suction. Abdominal thrusts contraindicated. Pts usually respond after a few ventilations. Consider need for advanced airway if patient does not respond to initial bag and mask ventilations.
 - **CRITICAL: If unresponsive, apneic and pulseless:** CPR using traditional A-B-C approach due to hypoxic nature of arrest. Rx per appropriate SOP.
 - Vomiting is common in those who require compressions & ventilations; prepare suction
 - Remove wet clothing; dry patient as possible—especially the chest before applying pads and defibrillating pt
 - If pt is cold: refer to HYPOTHERMIA SOP p. 29
2. Evaluate for \uparrow ICP: (\uparrow SBP, widened PP; \downarrow pulse, abnormal respiratory pattern, gaze palsies, HA, vomiting)
If present; treat per **Head Trauma SOP** p. 47
3. **Enroute:** Complete ITC: IV NS TKO [ALS]

SOP p. 30

Epidemiology



Most prevalent in children < 4yo and 15-19 yo

Medical conditions can increase risk

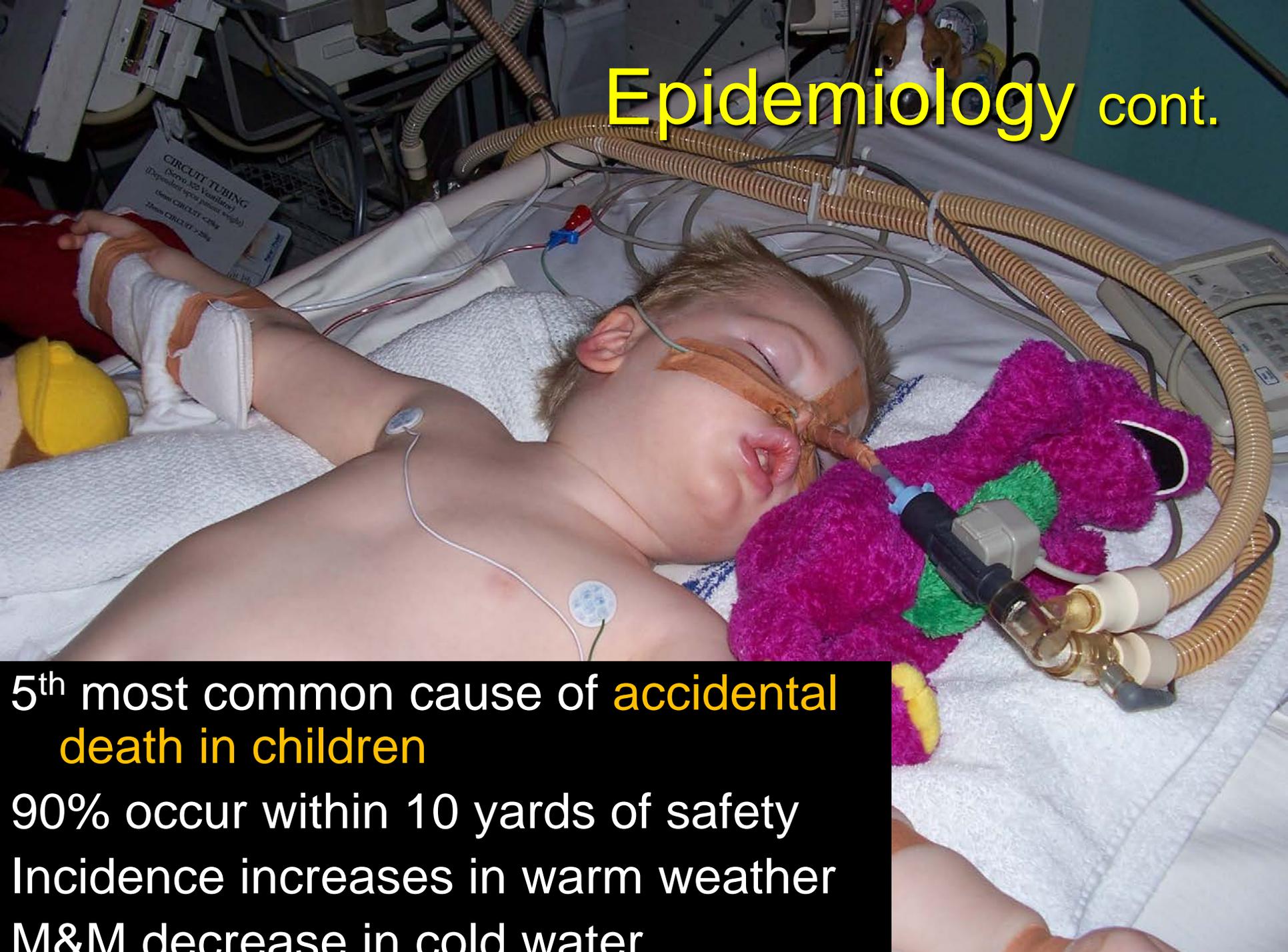
Epilepsy, cardiac disease

Most water accidents occur on surface; not serious

Drownings account for 5% of all water accidents

Elderly – bathtub incidents

Epidemiology cont.



5th most common cause of **accidental death in children**

90% occur within 10 yards of safety

Incidence increases in warm weather

M&M decrease in cold water

Drowning does not always occur in large bodies of water

large bodies of water

Adult can drown in a few inches of water

Infants can drown in many receptacles



Sequence of events



Victim tries to
keep **head above water**

Deep inhalations before
submersion and **instinctive
downward movement of
arms**

Sequence of events

Blood shunts to
heart and brain

Victim holds
breath while
struggling to raise
himself in the water

Early hypoxia stage overrides
apnea reflex

Tachycardia

Hypertension

Hypercarbia

Acidosis



**Prolonged holding breath/apnea produces
CO₂ retention & hypoxia**

**Breakpoint reached – involuntary inspiration
& swallowing efforts**

*Water enters mouth,
pharynx and stomach
stimulating laryngospasm and bronchospasm*



Hypoxemia, **hypoxia and acidosis worsens**

Lungs: Airway resistance increases, reflex pulmonary vessel constriction, ↓ compliance,

↓ **surfactant** and **fluids shifts** across alveolar membranes **into alveoli**

Agitation ceases –
victim **loses**
consciousness



Following unconsciousness

Reflex swallowing and inspiration continues
→ gastric distension

Secondary emesis & apnea

85%-90%: **Laryngospasm aborted** –
fluid enters lung

Extinction of reflexes: EEG flattens,
blood/brain barrier breaks down

Hypotension, bradycardia, asystole

Environmental:--SUBMERSION-INCIDENT-

Notes:

- All victims of submersion who require any form of resuscitation (including rescue breathing alone) should be transported to the hospital for evaluation and monitoring, even if they appear to be alert and demonstrate effective cardiopulmonary function at the scene. (Class I, LOE C)
- All persons submerged \leq 1 hour should be resuscitated unless there are signs of obvious death.

1. → ITC special considerations:

- **Rescue and removal:** Ensure EMS safety during the rescue process; only rescuers with appropriate training and equipment should enter moving or deep water to attempt rescue.
→ Rescue personnel should wear protective garments if water temp is $<$ 70°
→ A safety line should be attached to the rescue swimmer
→ Patient should be kept in a horizontal position if at all possible. Cold-induced hypovolemia, cold myocardium, and impaired reflexes may result in significant hypotension. If hypothermic, appropriate rewarming should be done concurrent with resuscitation.
- **Selective spine precautions** only if circumstances suggest a spine injury
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- Remove wet clothing; dry patient as possible—especially the chest before applying pads and defibrillating pt
- If pt is cold: refer to HYPOTHERMIA SOP p. 29

ELS

2. → Evaluate for ↑ICP: (↑SBP, widened PP; ↓pulse, abnormal respiratory pattern, gaze palsies, HA, vomiting) If present: treat per Head Trauma SOP p. 47

3. → Enroute: Complete ITC: IV NS-TKO (ALS)

Diving-related emergencies

Note: Consider decompression illness even if an apparently safe dive according to the tables or computer

ITC special considerations:

- Position supine or in recovery position
- Consider transport to hyperbaric chamber: See Carbon Monoxide Poisoning SOP for chamber locations
- If assistance is needed: Diver Alert Network (DAN) (519) 684-8111

Sequence of events

Hypothermia → loses consciousness → drowns

Impaired judgment & marked behavior changes

Significant hypotension from diuresis due to central hypervolemia following peripheral vasoconstriction and ↑ hydrostatic pressures on body tissues under water

Sequence of events

Loss of consciousness when core temp
32° – 33 C° (89.6°- 91.4° F)

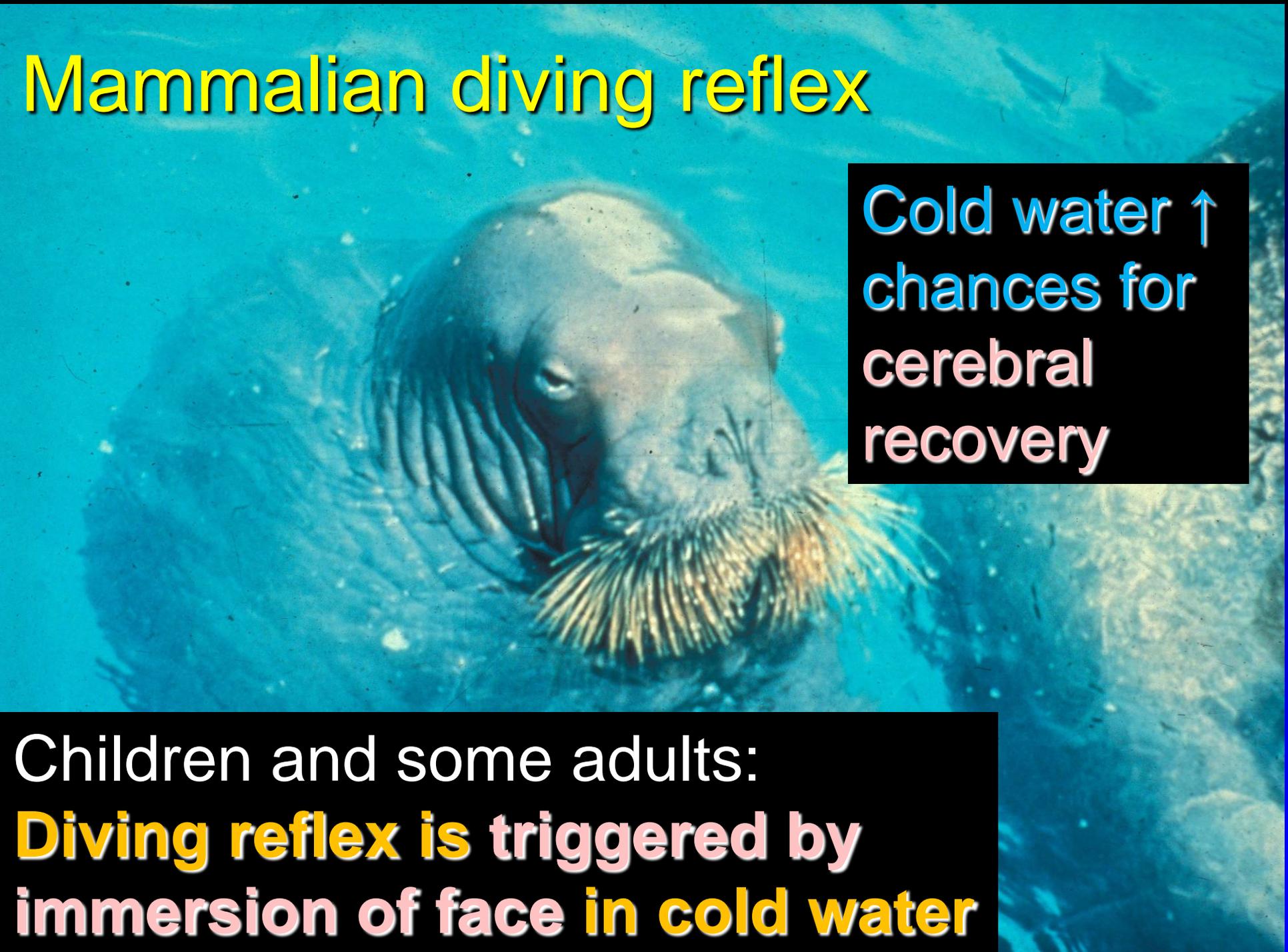
Swimming ceases and drowning occurs

Brain death may occur in 10-15 minutes

VF occurs at 28°- 32° C (82.4°- 89.6° F)

Asystole likely at 22° C (61° F)

Mammalian diving reflex

A photograph of a walrus swimming underwater. The walrus is the central focus, with its head and whiskers visible. The water is a clear, deep blue. The walrus appears to be in a relaxed, swimming posture.

Cold water ↑
chances for
cerebral
recovery

Children and some adults:
**Diving reflex is triggered by
immersion of face in cold water**

Morbidity

Immediate and continued CPR

Cold heart, hard to start – don't give up!

No brain death determination for 24 hours

Pupils may remain fixed and dilated;

EEG may be flat –
may resume activity
after 24 hours



Assessment



All persons submerged ≤ 1 hour should be resuscitated unless signs of obvious death

Ensure own safety

Wear PFD within 10 ft of water or water temp $< 70^{\circ}$

Attach safety line to rescue swimmers

Determine total # of patients

C-spine stabilization

Unnecessary *unless* history of diving into shallow areas, use of a water slide, high-powered personal watercraft (PWC), boating crash or entry into water from a height,



Cardiac Arrest in Drowning

CPR is as easy as
C-A-B



Compressions

Push hard and fast
on the center of
the victim's chest



Airway

Tilt the victim's head
back and lift the chin
to open the airway



Breathing

Give mouth-to-mouth
rescue breaths

American Heart
Association 

Learn and Live

©2010 American Heart Association 10/10DS3849

Follow The ABC's of CPR



• Airway



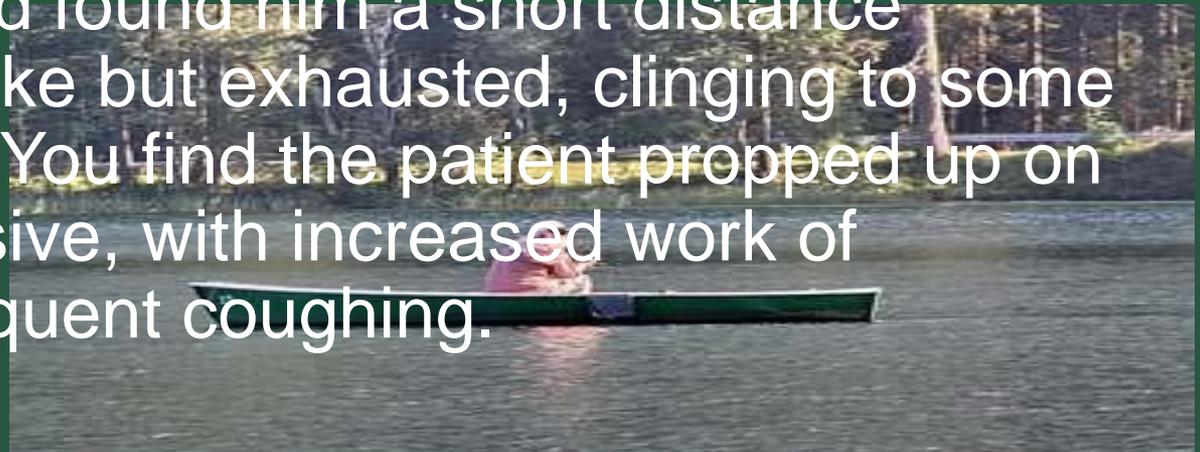
• Breathing



• Circulation

Scenario 5

EMS is dispatched to a local recreation area for a possible drowning. Witnesses state a ~ 60/ y/o local male resident was seen leaning over the side of his boat reaching for something floating in the water, then falling out of the boat. There is a strong current and he was noted to struggle for a short time before disappearing under the water. Witnesses state they immediately drove their boats to the site where he was last seen, and found him a short distance downstream, awake but exhausted, clinging to some rocks, coughing. You find the patient propped up on the bank, responsive, with increased work of breathing and frequent coughing.



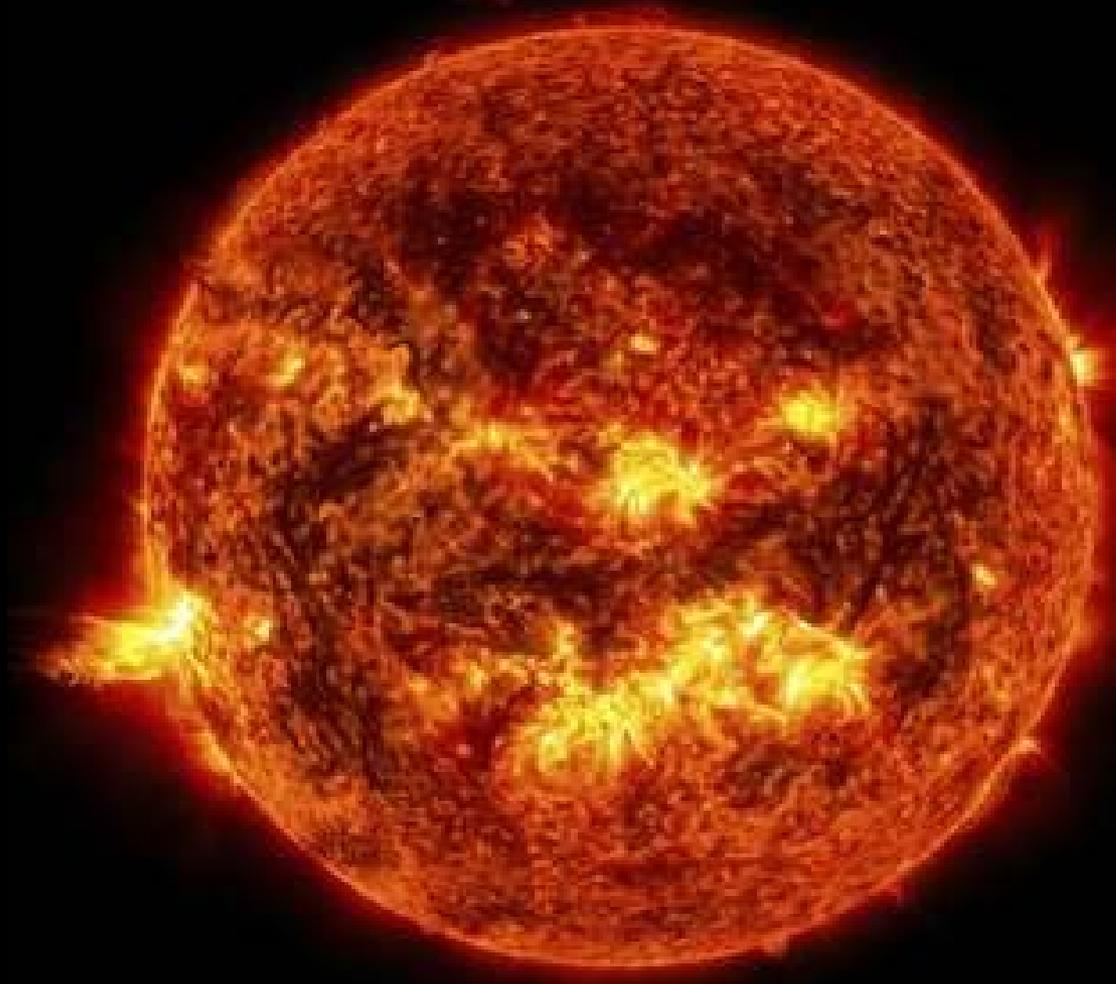
CC/HPI: “It’s hard to breathe”

PMH-Meds: No PMH or meds – “I don’t go to doctors.” Admits to daily ETOH use.

PE: A&O X 4. BP 156/86, P 118, ECG ST, R 26, SpO2 91%, ETCO2 32 and square. Auscultation of BS reveal “congestion” / rhonchi throughout. No accessory muscle use noted. He is able to speak 3-4 words at a time. Skin is pale & moist, & is shivering mildly (still in wet clothing).

Pulses strong, reg. - ST. He moves everything, and denies pain. T 96.4 F

Heat Emergencies

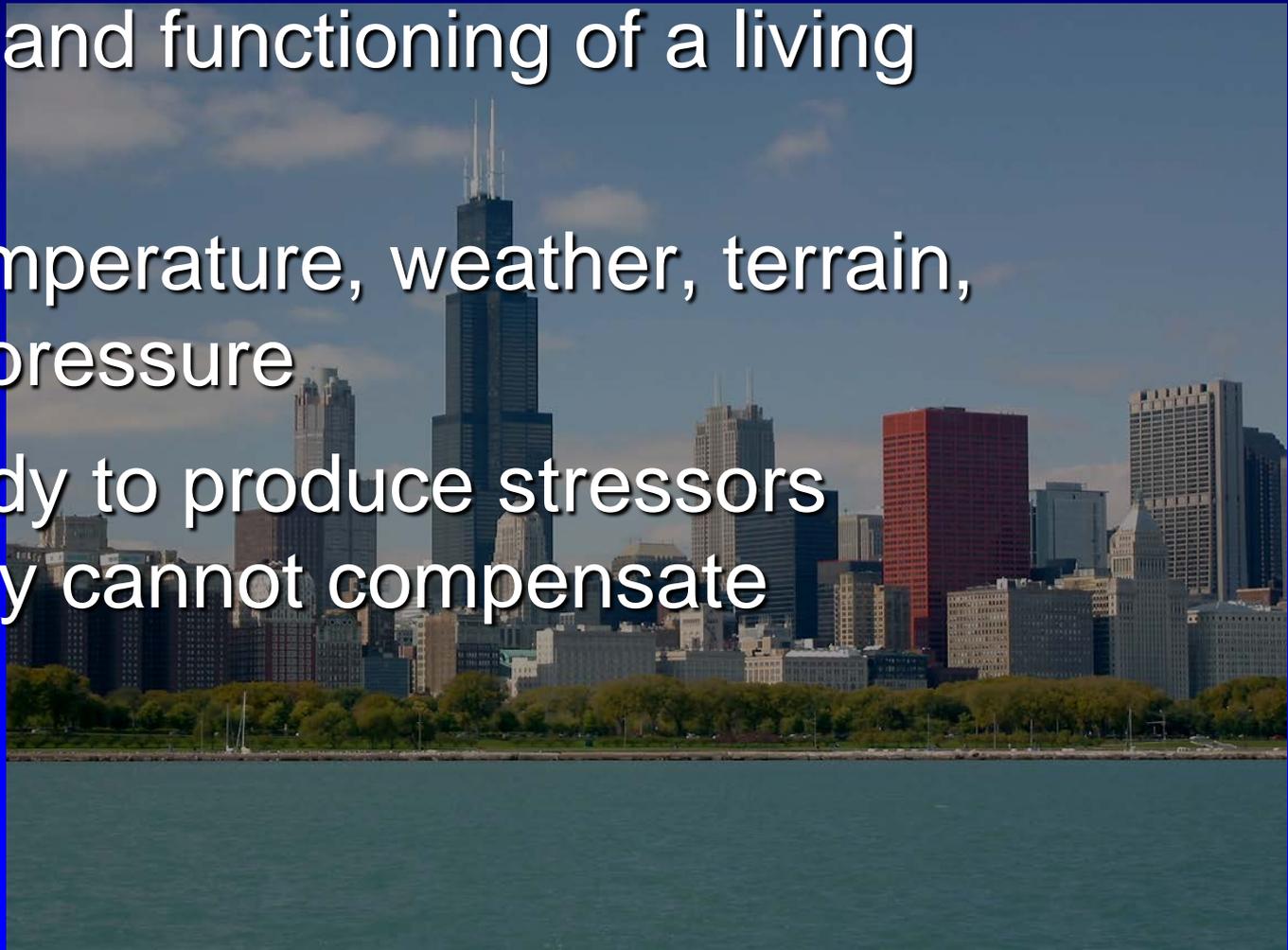


Environment

Surrounding external factors that affect the development and functioning of a living organism

Affected by temperature, weather, terrain, atmospheric pressure

Can act on body to produce stressors for which body cannot compensate



Heat illness defined

Pathologic/physiologic response
to maintain normal
temperatures
in response to thermal
challenge

Normal thermoregulatory
mechanisms overwhelmed
Inadequate heat dissipation





Hyperthermia

Unusually high core temp
can be d/t a hot environment
or from exertion in such an environment

Most heat injuries occur
early in the summer
before people become
acclimated to the
season's temps

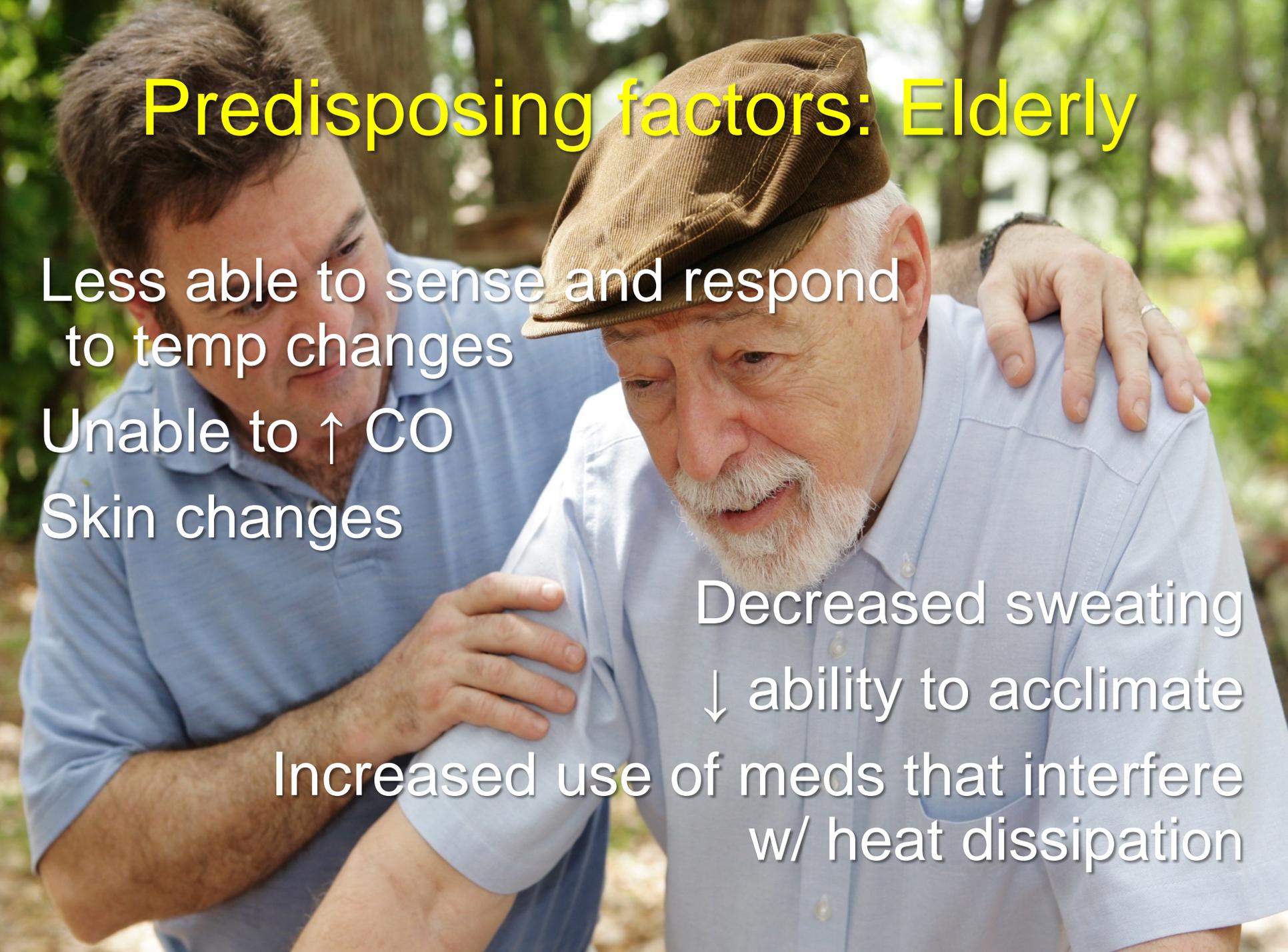


Predisposing factors: Drugs

Increase heat production

- Amphetamines, LSD
- Phencyclidine
- Cocaine
- MAO inhibitors



A young man with dark hair and a beard, wearing a light blue polo shirt, is supporting an elderly man with a white beard and a brown flat cap. The elderly man is wearing a light blue button-down shirt. They are outdoors in a wooded area with green trees in the background. The young man has his hands on the elderly man's shoulders, one on the left and one on the right, providing support. The elderly man is looking down and to the right with a slight smile.

Predisposing factors: Elderly

Less able to sense and respond
to temp changes

Unable to \uparrow CO

Skin changes

Decreased sweating

\downarrow ability to acclimate

Increased use of meds that interfere
w/ heat dissipation

CV disease; atherosclerosis, HF, HTN

Obesity; diabetes

↑ Heat load: Fever, seizures, hyperthyroid,
agitated psych conditions

Parkinson's Dx

Adrenal tumor

Malnutrition

Alcoholism,

Alzheimer's disease



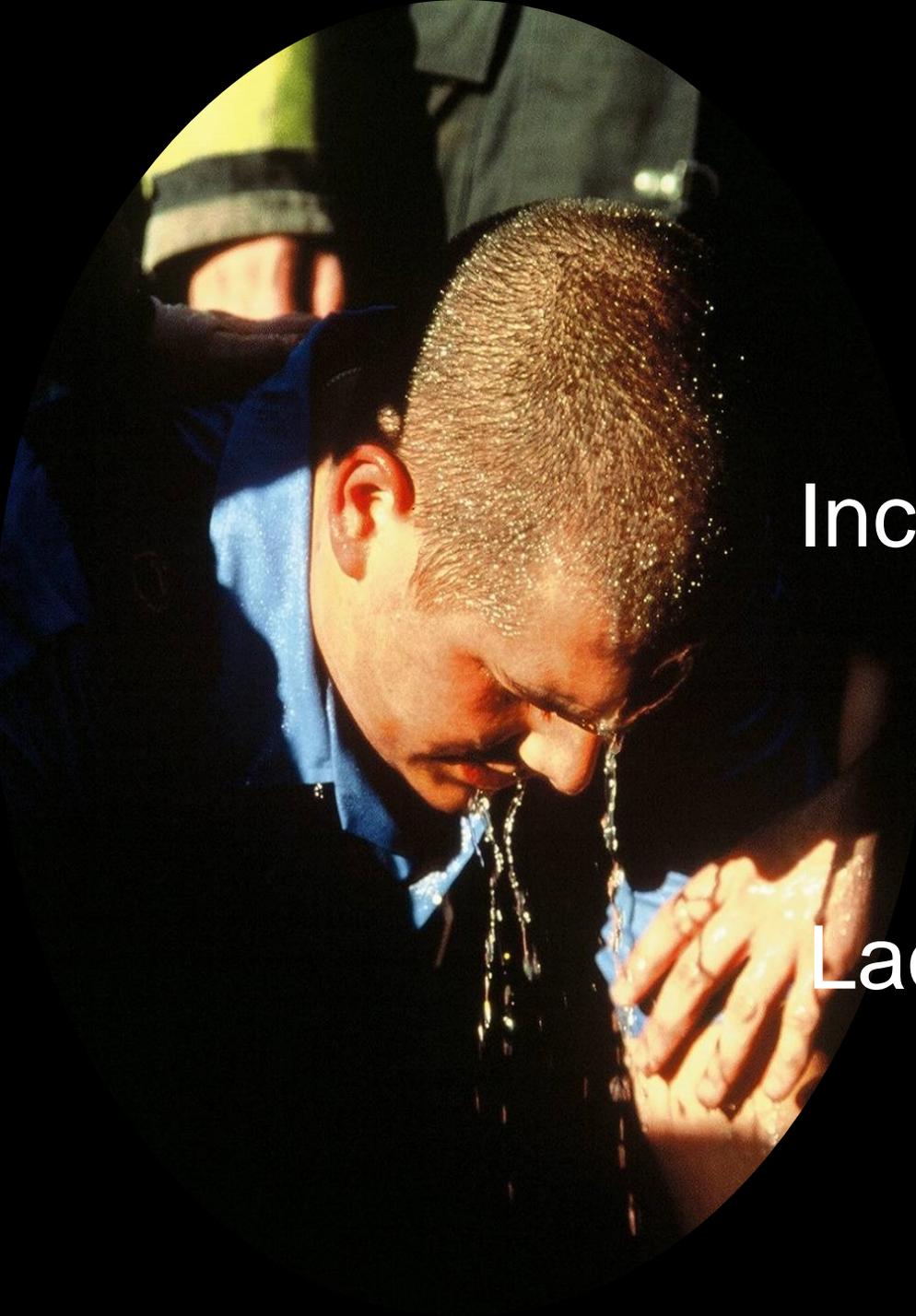
Predisposing factors

Dehydration

Increased internal heat load

Skin/sweat gland abnormalities

Lack of acclimatization



Body's compensatory responses

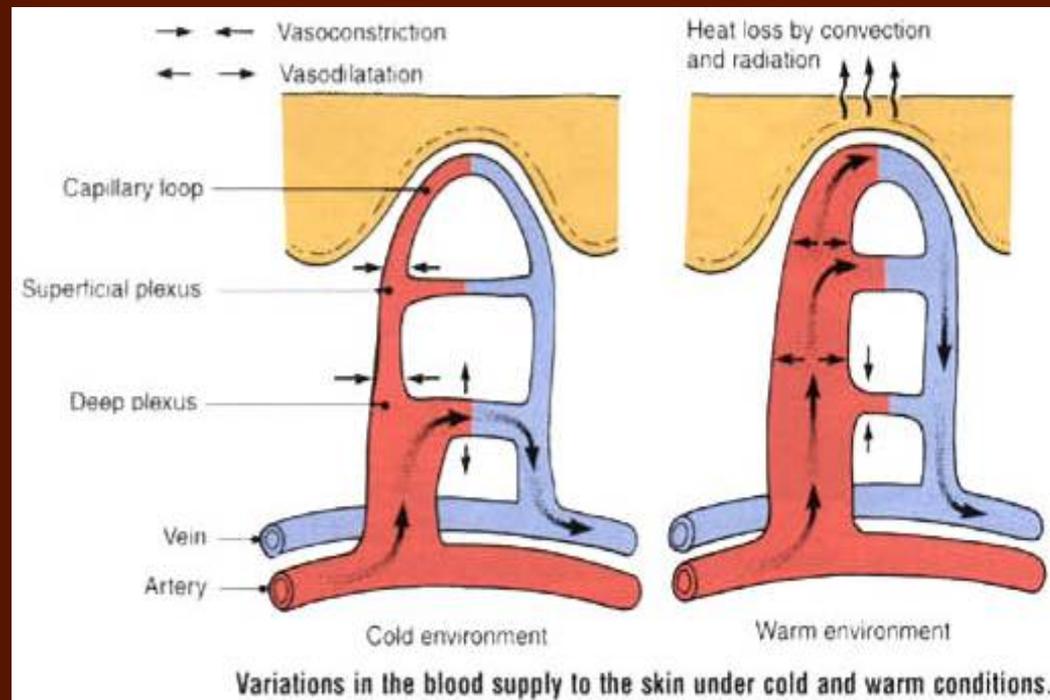
Peripheral blood flow

Blood is directed toward or away from skin surface

Vasodilation \uparrow blood flow 7-20 X normal helping radiation & convection

Increases CO 2-4 X

Opposite response to cold



Body's compensatory responses

Sweating: Accounts for most heat loss up to 95°F or humidity < 75%

High humidity reduces effectiveness

Lose 1.5 L sweat/hr or 882 Kcal/hr

Body tolerates volume loss of 5% without difficulty

Illness occurs with losses of $\geq 7\%$ w/o fluid replacement



Reactions to ↑ body temps

Stumbling or clumsiness, H/A, nausea,
sweating subtle changes in mental status

102°F: Joint/muscle pain, drowsiness,
fatigue

>104°F: ↓ awareness, disoriented

106°F: Seizures

108°F: Irreversible
brain damage



Heat Emergencies

- Heat Cramps (Lower acuity)
 - Think the basics
 - Sidelines of a marathon

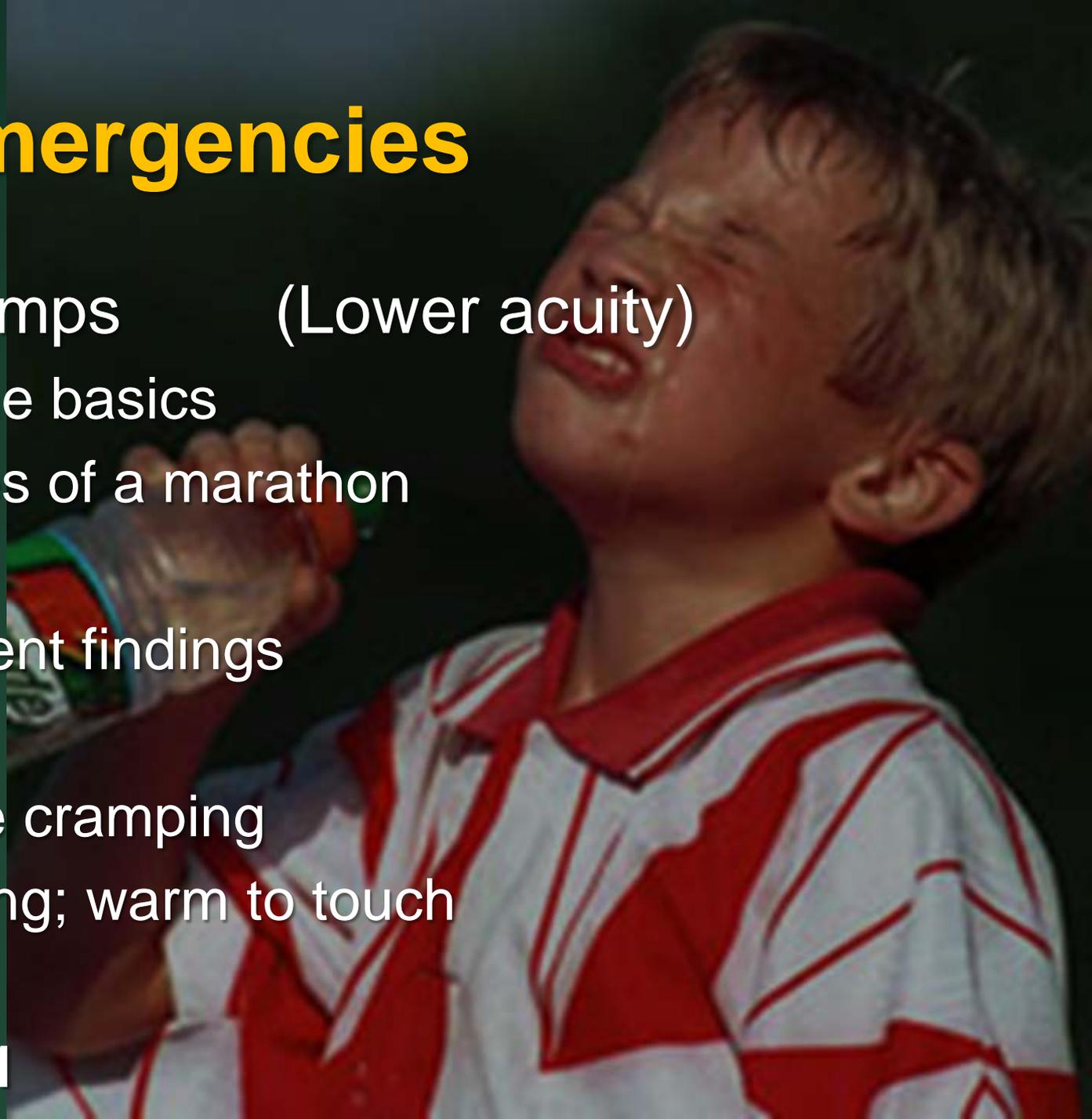
Assessment findings

fatigue

muscle cramping

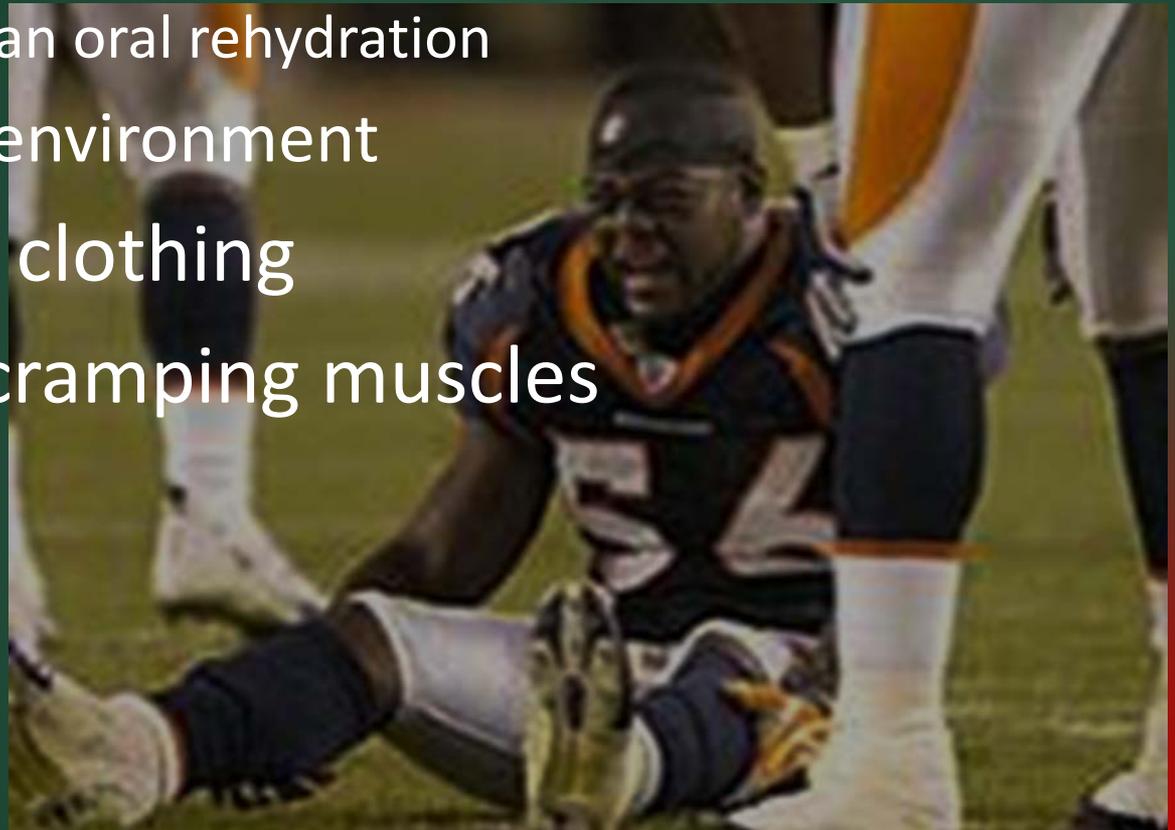
sweating; warm to touch

SOP p. 31



Heat Cramps (Lower Acuity)

- Treatment
 - If the patient is c/o nausea &/or vomiting
 - IVFs rather than oral rehydration
 - Take to a cool environment
- Remove excess clothing
- *No massage to cramping muscles



Heat Exhaustion vs. Stroke

Exhaustion assessment

- Sweating (*significant)
- Weak; lethargic
- Cool and pale skin
- Fast, weak pulse
- N / V
- Possible syncope

Stroke assessment

- NO sweating; dry skin
- AMS / unconscious
- Hot skin w/temp $>103^{\circ}$ F
- Rapid pulse



Exhaustion

Goal :
rehydrate & prevent
further harm

Emergent to critical in nature

Time sensitive pt

Move patient to cool environment while removing excess clothing



Treatment

- 200 mL IVF challenges to maintain SBP at least 90 (MAP 65)
- Vomiting and aspiration precautions; have suction ready

- Consider ondansetron if nauseous
- Place on monitor
- Continuous assessment for change in MS and potential sz



Treatment

Glucose check
IVF's for SBP < 110
200 mL increments to maintain SBP 90 (MAP 65)

Place supine w/ feet elevated

Monitor ECG

- Move to cool environment & remove excess clothing to rapid cool pt
- Use cold packs to cheeks, palms, and soles of feet
- Addition on neck, chest, groin, axillae, and temples
- Mist with cool water or fan
- Be AWARE of sz activity
 - give midazolam 2 mg increments Q 30-60 sec up to 10 mg

HOTTEST STRETCH SO FAR

FOX 5 AccuWeather TEAM

98° 98° 98°

Heat Index:
~105°

94°

93° 93° 92°

Sat Sun Mon Tue Wed Thu Fri

Average High: 88°

Heat stroke

Body can no longer cool itself
Usually after ≥ 3 days of heat wave
 \uparrow temp causes neuro dysfunction & multi-system organ damage

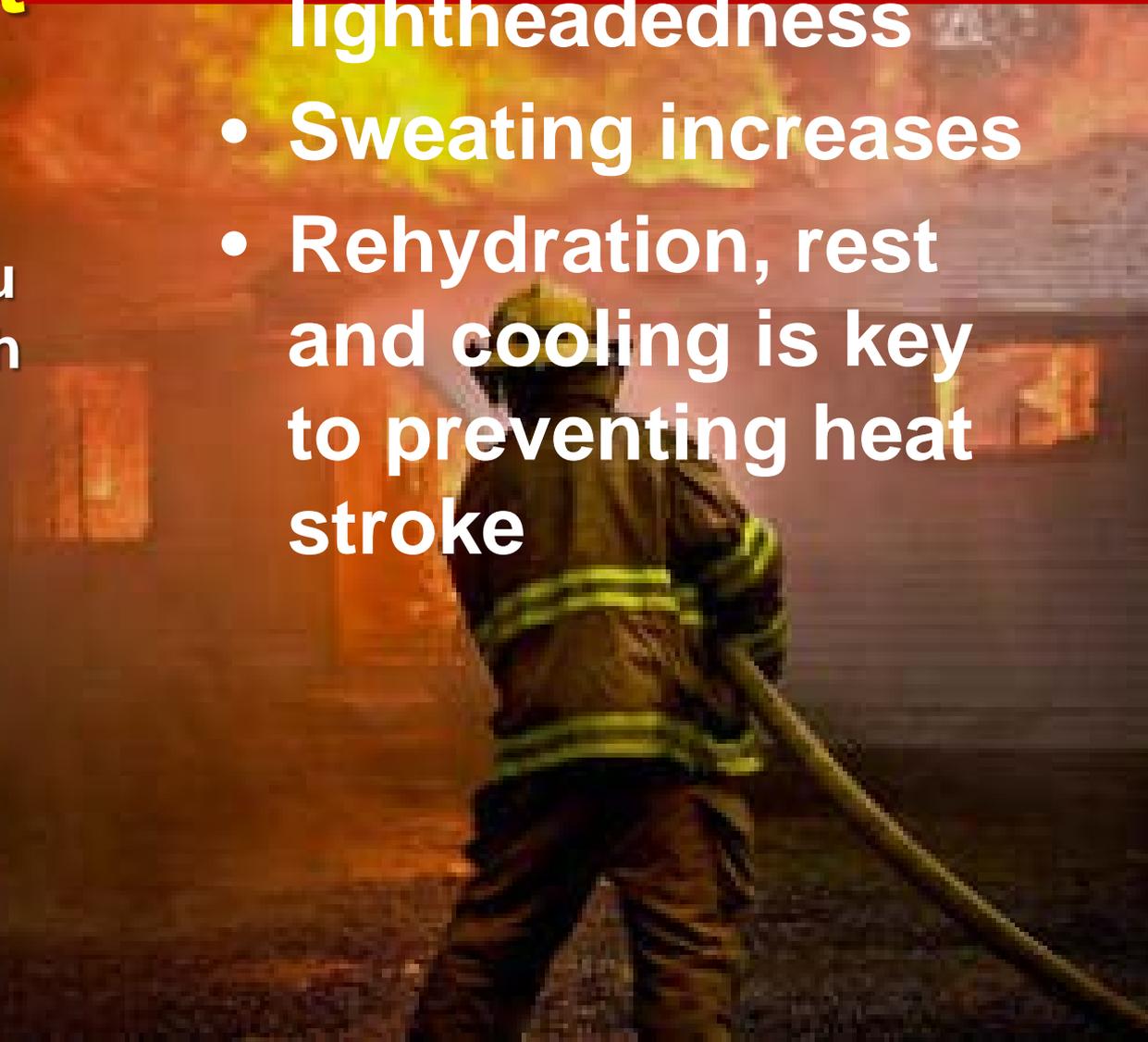
Medical emergency!

FF are definitely at risk!

**The next patient
could be you if you
are not careful with
rehab techniques**

**Always follow
protocol without
deviation**

- **Starts w/ a bit of
dizziness & a little
lightheadedness**
- **Sweating increases**
- **Rehydration, rest
and cooling is key
to preventing heat
stroke**



Scenario 3



Paramedics called to the park for the 28F sitting on the park bench

CC/HPI: Pt has her eyes closed, with head resting,

PMH-Meds: Diphenhydramine for allergies; had a late night “celebrating” her boyfriend’s birthday at the bar

PE: Her face is flushed and warm to the touch with sweating noted on skin.

BP 96/50, P 130, weak, R 32, able to clearly speak but appears tired from trying to get in a quick 5 mile run in-now feels nauseous.

Lungs clear, O2 sat 95%, EtCO2 58 w/ square shaped waveform

Paramedics called to the train station where a 45/M is lying on the ground



Scenario 4

CC/HPI: Pt has his eyes closed, not responsive to verbal stimuli, only groans to verbal stimuli and is noted to be wearing multiple layers of coats.

PMH-Meds: UNKNOWN

PE: His face is cherry red; hot to touch w/ dry skin

T: 106° F, BP 80/50, P 112, R 32, after pulling off multiple layers his skin is hot to touch

Lungs clear, O2 sat 93%, EtCO2 58 w/ square shaped waveform;

ALLERGIC Reactions / ANAPHYLACTIC Shock

1. IMC special considerations:

- Repeat assessments for patent airway, airway edema; wheezing, respiratory effort & adequacy of perfusion
- Ask about a history of allergies vs. asthma; determine if EpiPen used
- Apply venous constricting band proximal to bite or injection site if swelling is ↑ rapidly
- Attempt to identify and/or remove inciting cause: scrape away stinger
- Apply ice/cold pack to bite or injection site unless contraindicated
- Do NOT start IV, give meds, or take BP in same extremity as a bite or injection site

LOWER ACUITY: LOCAL Reaction

No AMS, hives and edema at site of exposure or GI distress after food ingestion; SBP ≥ 90 (MAP ≥ 65)

- Observe for progression and transport

LOWER ACUITY: Mild SYSTEMIC Reaction

SBP ≥ 90 (MAP ≥ 65)

S&S: Peripheral tingling, warmth, fullness in mouth and throat, nasal congestion, periorbital swelling, rash, itching, tearing, and sneezing

- DIPHENHYDRAMINE 1 mg/kg (max 50 mg) PO [BLS]

EMERGENCY: Moderate SYSTEMIC Reaction

SBP ≥ 90 (MAP ≥ 65)

S&S: Above PLUS bronchospasm, dyspnea, wheezing, edema of airways, larynx, or soft tissues; cough, flushing, N&V, warmth, or anxiety

- EPINEPHRINE (1mg/1mL) 0.3 mg (mL) IM (vastus lateralis muscle) [BLS]
 - Caution: P > 100, CVD/HTN; on beta blockers, digoxin, MAO inhibitors; or pregnant
 - May repeat in 5-10 minutes; **DO NOT DELAY TRANSPORT waiting for a response**
- DIPHENHYDRAMINE 50 mg IVP; if no IV give IM
- If wheezing: ALBUTEROL 2.5 mg & IPRATROPIUM 0.5 mg via HHN/mask. Add O₂ 6 L/NC if SpO₂ < 94% [BLS]

CRITICAL: Severe SYSTEMIC Reaction/ANAPHYLACTIC Shock

SBP < 90

Likely allergy; 2 or more of the following occurring rapidly after exposure:

- Skin signs:** Itching, flushing, hives, swelling/edema
- Respiratory compromise:** Severe dyspnea, hypoxia, decreased/absent lung sounds, wheeze, stridor, hoarseness
- Cardiovascular collapse:** HYPOTENSION; dysrhythmias; syncope, or coma

Others: GI edema (dysphagia, intense abdominal cramping/pain, diarrhea, vomiting)

Life-
threatening
Time
sensitive
pt

2. IMC special considerations:

- EPINEPHRINE (1mg/1mL) 0.5 mg IM (vastus lateralis muscle) [BLS] while attempting airway & vascular access
- If airway/ventilations severely compromised: Rx per DAI SOP
- IV NS consecutive 200 mL IVF challenges; Goal: SBP ≥ 90 (MAP ≥ 65); reassess after every 200 mL



As soon as vascular access is successful:

- EPINEPHRINE (1mg/10mL) titrate in 0.1 mg IVP/IO doses q 1 min to a

If on beta blockers & not responding to Epi:

What does the Immune system do?

Defends body against foreign substances
antigens (foreign proteins)/pathogens

Combats infection

What are the major components?

- Blood
- Bone marrow
- Lymphatic system



What triggers an Immune system response?

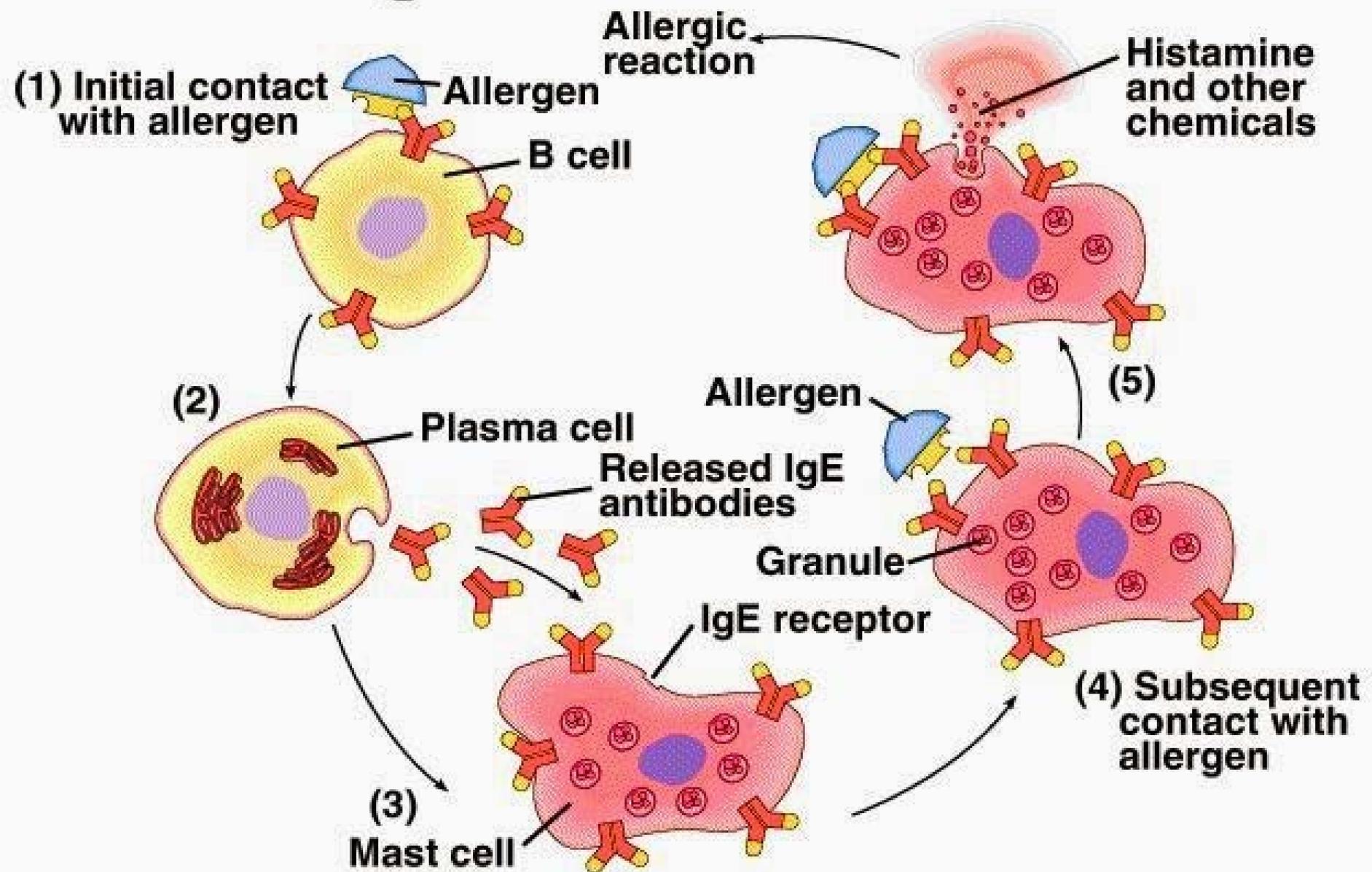
Invading substances –
allergens/antigens

Goal of the response?

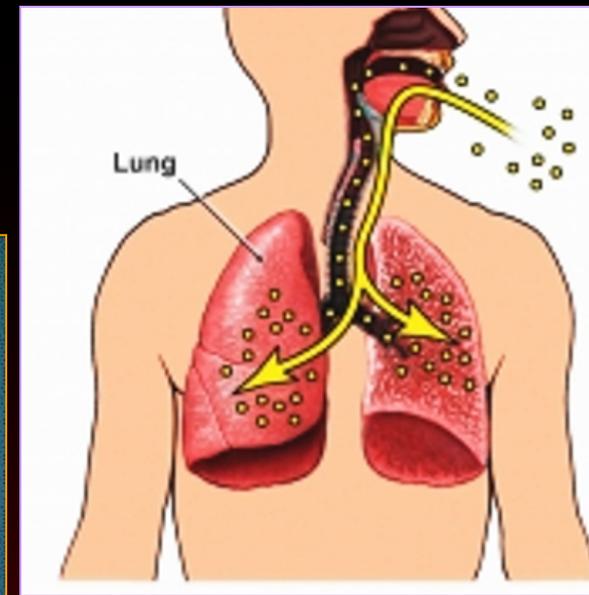
Destroy or inactivate
pathogens, abnormal cells,
or foreign molecules (toxins
secreted by bacteria
or released following
destruction of bacteria)



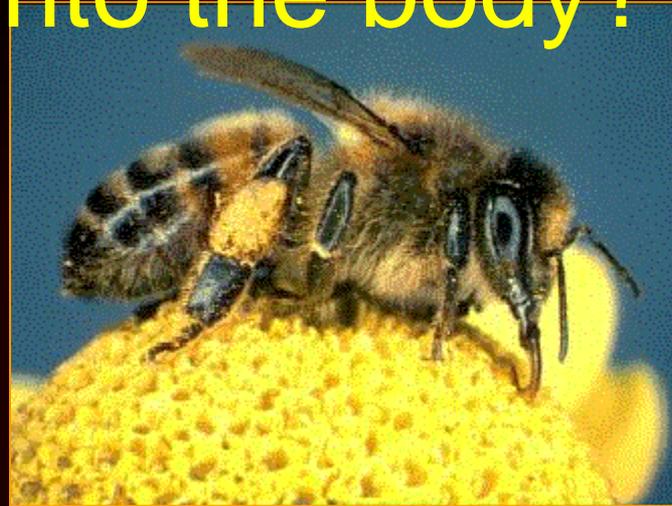
An Allergic Reaction — Overview



How are antigens introduced into the body?



Inhalation



Envenomation



Medication

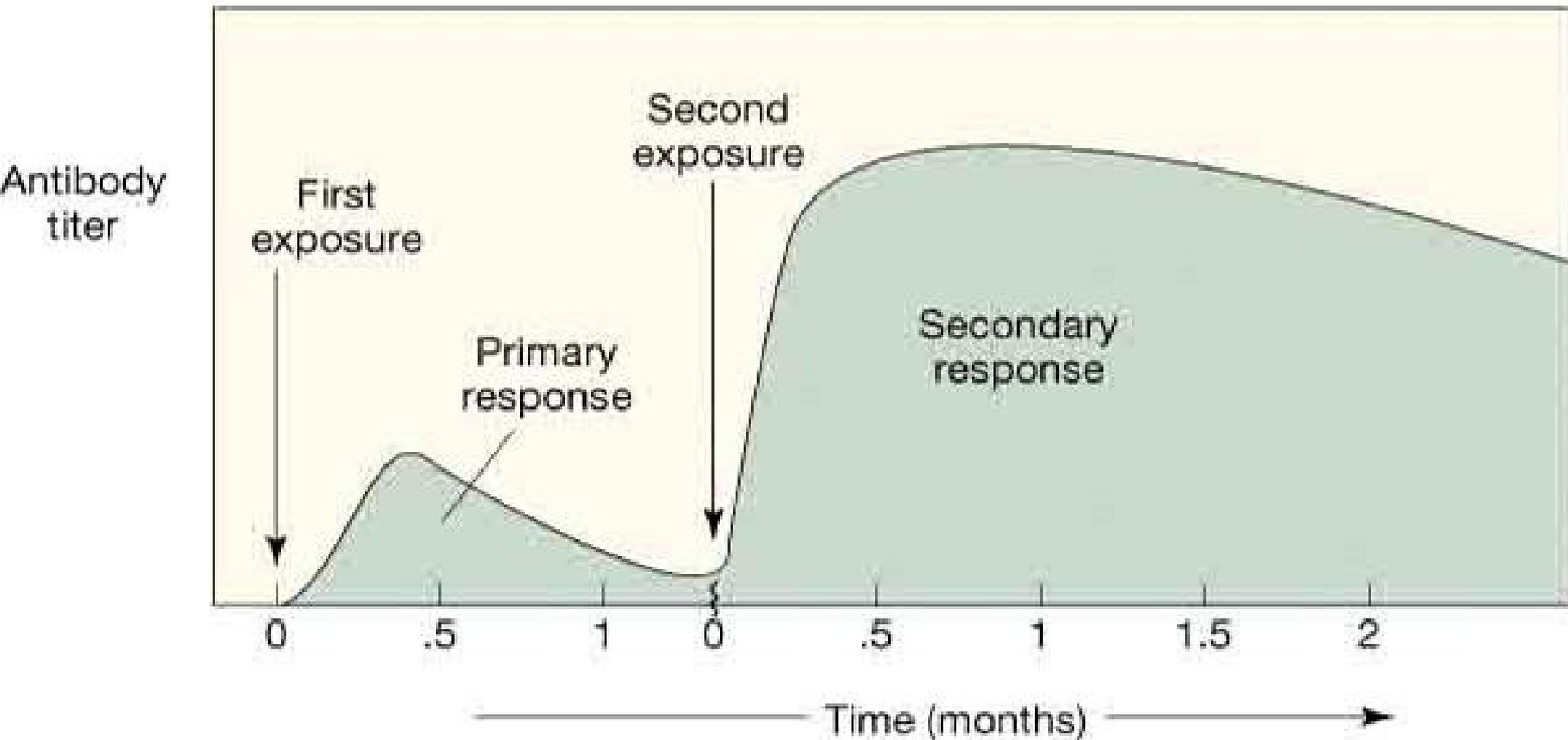


Topical contact



Oral ingestion

Primary and secondary immune responses



Food hypersensitivities

35%-55% anaphylaxis caused by food allergies

6%-8% children; 3%-4% adults
have food allergies

Incidence increasing

Accidental exposures are
common and unpredictable

Onset of S&S usually occur
w/in minutes but may be
delayed several hours



Food allergies

Children & adults (usually not outgrown)

Peanuts, tree nuts

Shellfish, fish

Bisulfites, MSG



Foods: Common triggers

Additional triggers in children (commonly outgrown) if food is eliminated from diet for 1-2 years

Cow's milk

Eggs

Soy

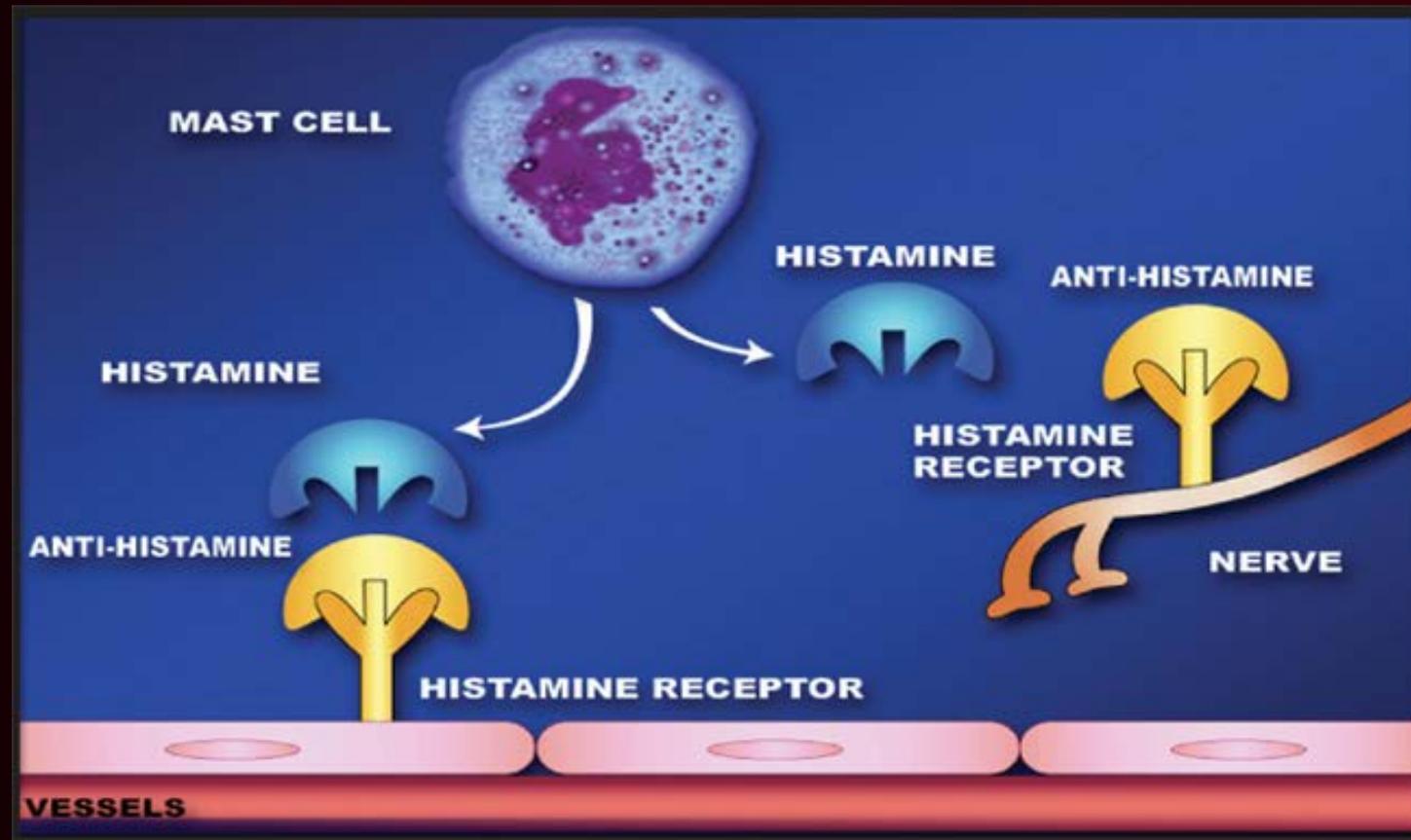
Wheat

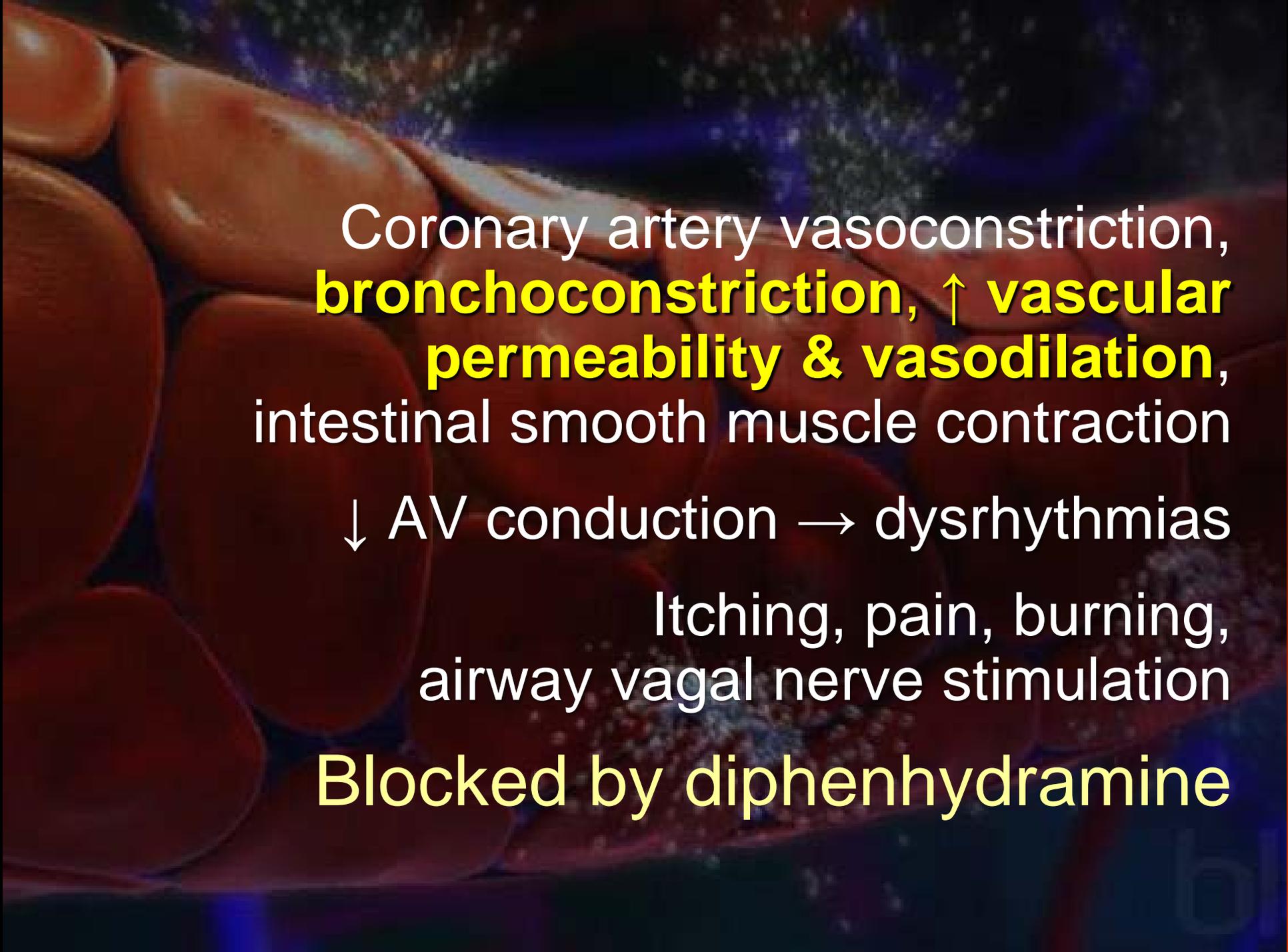


Histamine

Most important chemical released in allergic reactions

Stored preformed in mast cell granules,
probably complexed to heparin



A microscopic view of red blood cells, showing their characteristic biconcave disc shape and reddish-orange color. The cells are arranged in a somewhat organized pattern, with some overlapping. The background is dark and slightly blurred, emphasizing the individual cells.

Coronary artery vasoconstriction,
bronchoconstriction, ↑ vascular permeability & vasodilation,
intestinal smooth muscle contraction

↓ AV conduction → dysrhythmias

Itching, pain, burning,
airway vagal nerve stimulation

Blocked by diphenhydramine

Histamine levels

Takes 2½ min to appear in blood

Peaks in 5 min

Returns to baseline in 15-30 min

Histamine released to limit exposure to Ag

- Bronchoconstriction limits amount inhaled
- ↑ gastric acid destroys ingested Ag
- ↑ intestinal motility moves it through...
- Vasodilation + cap permeability removes Ag from circulation

Reaction severity affected by

Quantity of the antigen

Route of exposure and
rapidity of absorption

Most risk: parenteral

Least risk: topical

PMH of asthma or
cardiac disease

Patients taking beta
blockers



Patient assessment

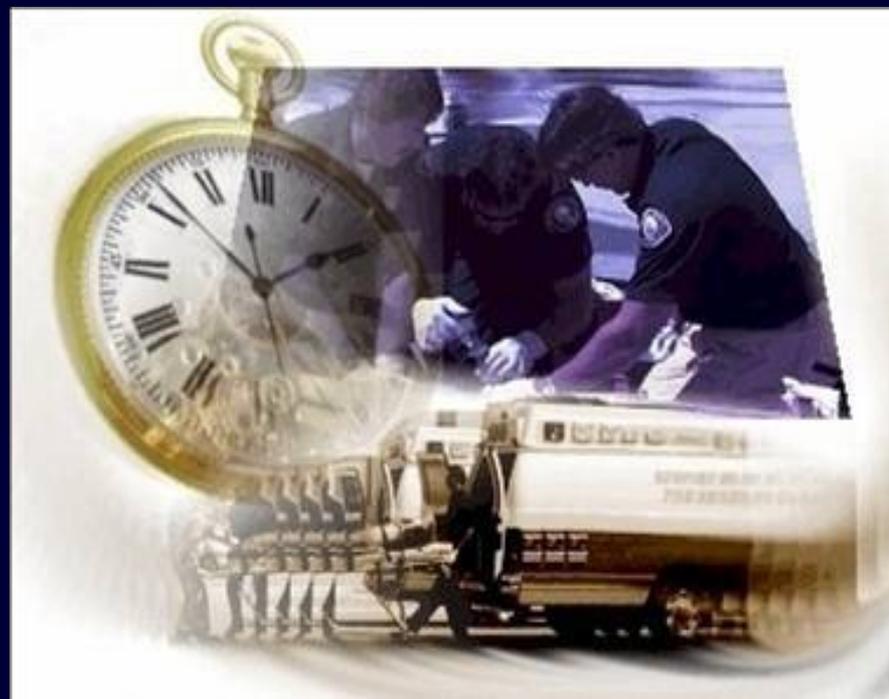
Maintain high index of suspicion

Abrupt onset w/ variable course - mild to fatal

Sooner onset of S&S = more severe reaction

Some pts need Rx
before exam is done

May not have time to
identify etiologic agent



Primary assessment

Safe for EMS? Insects still present?

Medic Alert jewelry?

General LOC

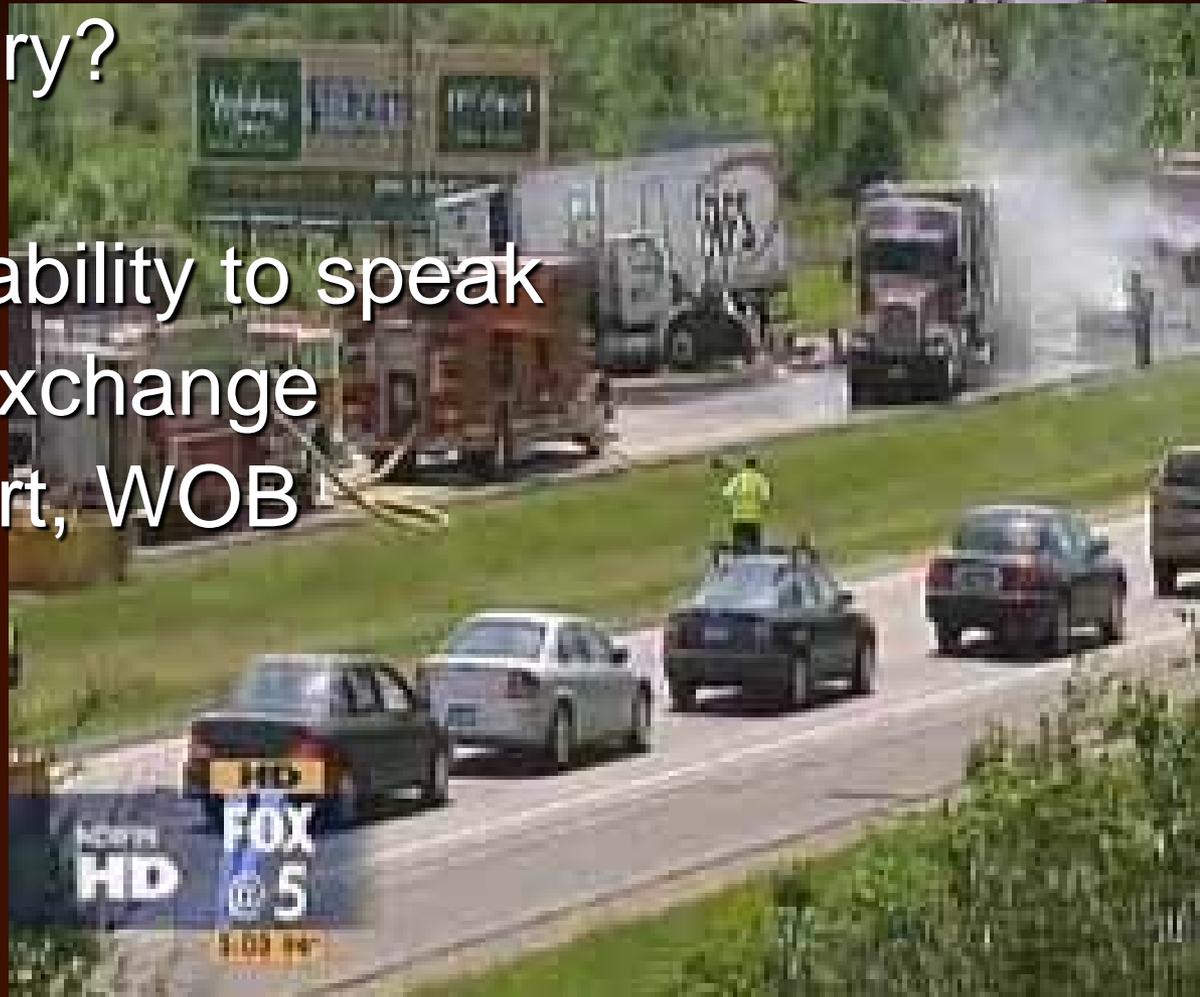
Airway: Edema, ability to speak

Breathing: Gas exchange

General RR, effort, WOB

Skin color; SpO₂

Capnography



FOX
HD

FOX
@ 5
8:00 AM

Upper airway S&S

Hypersalivation

Laryngeal edema,
change in voice
(hoarseness) may
progress to stridor

↑ secretions, nasal
congestion, rhinitis,
sneezing



Lower airways

Dyspnea; tightness in chest and throat

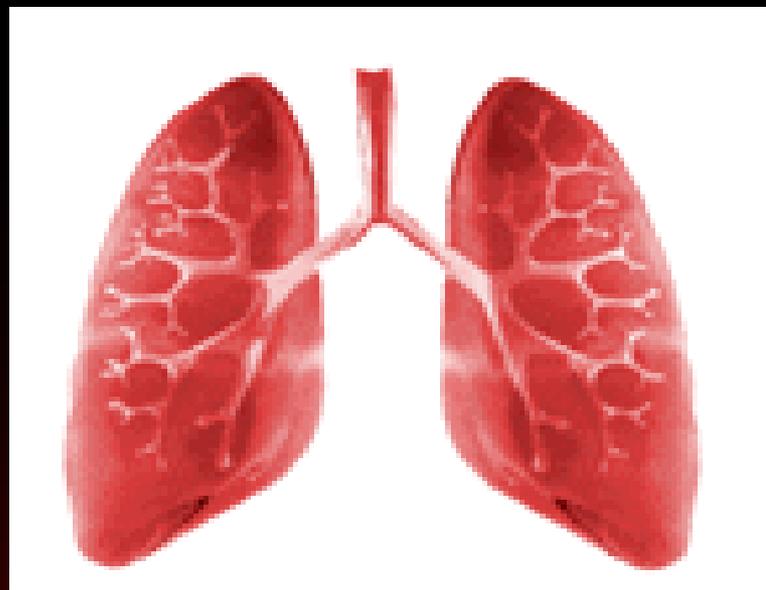
Coughing, retractions

Wheezing d/t intense bronchial swelling and spasm. May be evident w/o stethoscope.

No wheezing or diminished breath sounds may mean no breathing!

Bronchospasm and laryngeal edema may induce swift respiratory arrest

Tachypnea



Circulatory status

Assess:

General pulse rate
(fast or slow),
quality,
rhythmicity;

ECG



Signs of cardiovascular decompensation / impairment

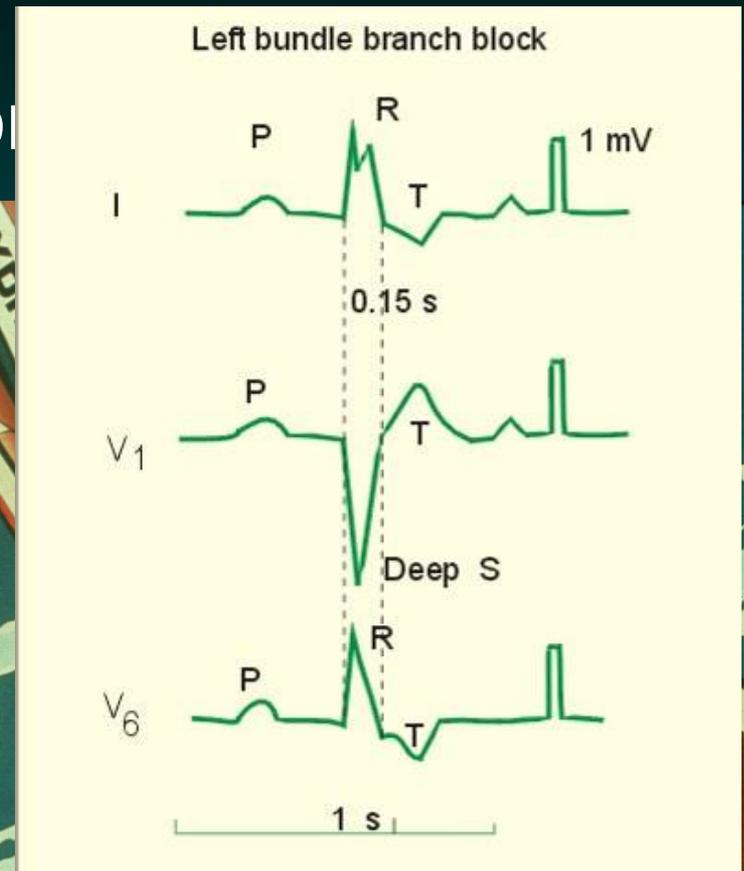
Chest pain, tachycardia

Dysrhythmias: ST, AF, AV & IV conduction delays, transient LBBB

↓ BP: peripheral vasodilation losses d/t ↑ capillary permeability & marked plasma losses

ACS; Cardiomyopathy

CV collapse, shock and coma



What is included in the secondary assessment?

Full set of vital signs

BP: Stable or unstable?

Will fall w/ significant
vasodilation & capillary leak

P: HR, rhythmicity, quality,
location (reflex tachycardia)

↓ HR late in anaphylaxis -
ominous

RR, pattern, depth, effort

Will initially increase,
severe obstruction can ↓ rate





History of allergies to food, meds, plants, insect stings, environmental triggers, bites or others?



Meds

EpiPen prescribed?

Done anything to relieve the symptoms?

Have they taken a *NEW* medication?

Are they on ACE inhibitors, beta blockers, allergy meds?



PMH

If so, When? How severe?

What were the S&S?

Did pt go to hospital?

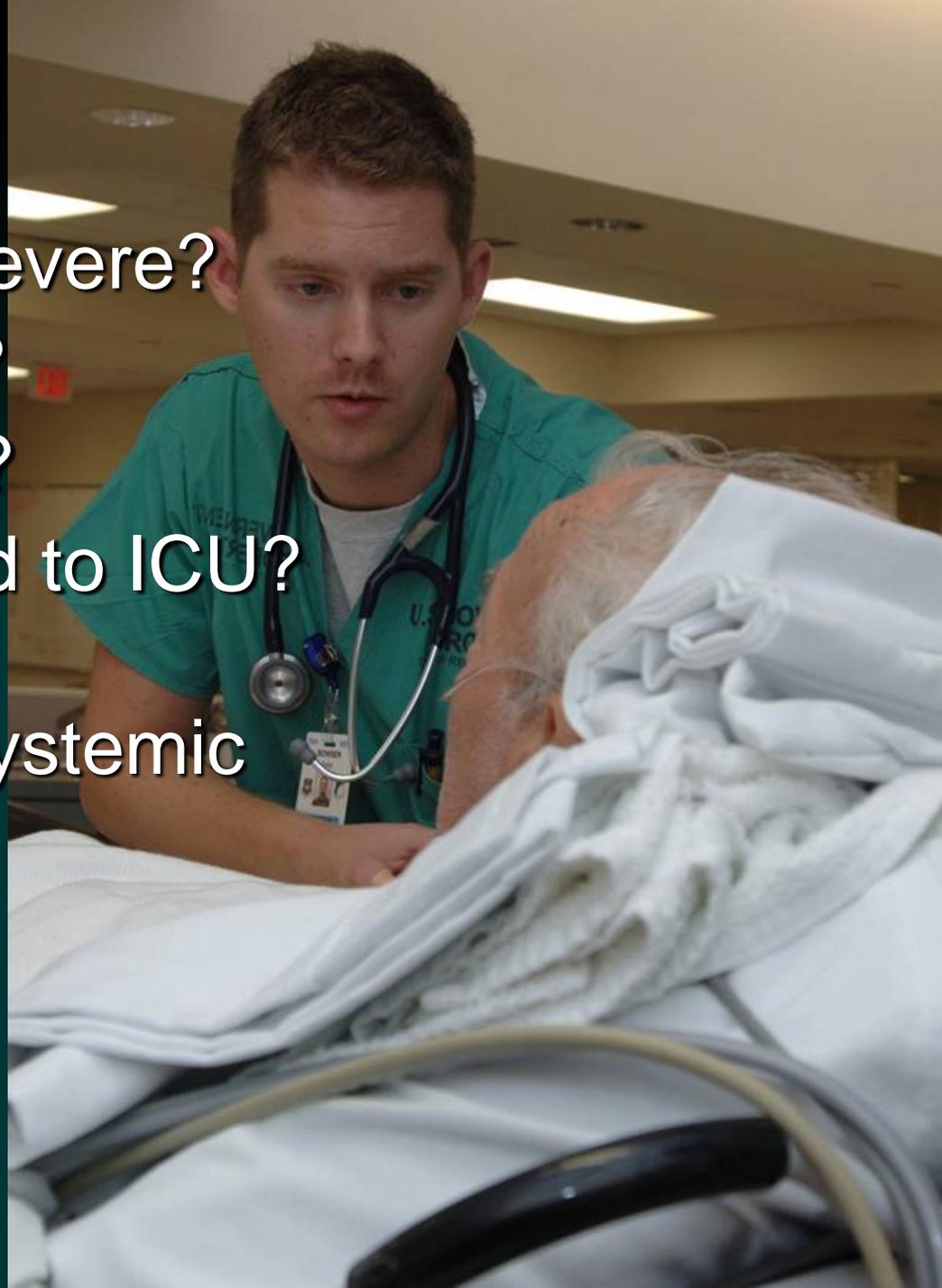
Intubated or admitted to ICU?

Response to Rx

Risk of recurrent systemic
reactions ~28%

Significant PMH?

Asthma, CVD



Neurological S&S

Anxiety, apprehension, restlessness

AMS, confusion, disorientation, decreased
LOC

Dizziness

Headache

Perioral tingling

Seizure, syncope, coma

Skin

A close-up photograph of a person's back, showing a diffuse, fine, red rash. The rash is characterized by small, red, raised bumps that are spread across the entire visible area of the back. The skin appears warm and flushed.

Warmth, redness, flushing

Pruritus: Itching of palms, soles of feet, or back of throat may be an early sign

Fine, red, rash appears diffusely involving face, chest, back, and abdomen

Mucus membranes

A close-up photograph of a person's face, focusing on the eyes, nose, and mouth. The person's eyes are closed, and there is noticeable swelling (edema) of the eyelids. The lips are also significantly swollen and appear bright red. The person is wearing gold hoop earrings. The background is a plain, light blue surface.

Edema, burning

↑ secretions

Drooling, rhinorrhea

Bloating, abdominal pain,
cramping

Hyperactive bowel sounds

Hypersalivation

N, V, diarrhea

Dysphagia

Loss of bowel control

Release of vasodilating
endotoxins that
contribute to shock
progression



Clinical management - goals

Eliminate inciting agent ASAP

Resolve immediate life-threats

Impede further mediator release

Inhibit then reverse target organ effects

Identify underlying
cause to avoid
future incidents



S&S local reaction

No AMS

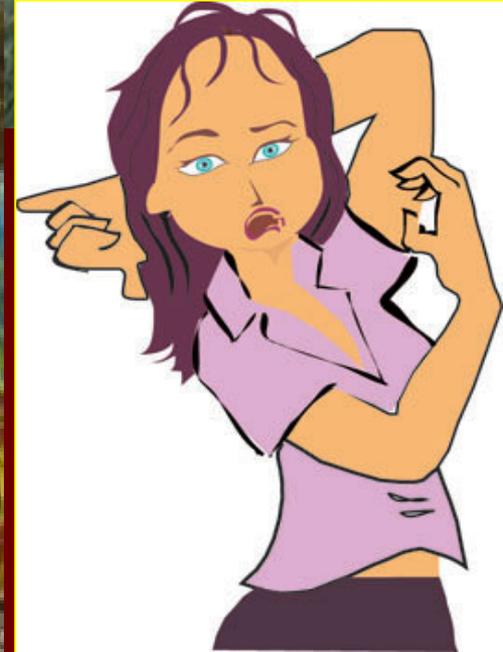
Pruritis – lasts 3-4 hrs

Hives (urticaria) & edema at site of exposure

Contact dermatitis

N / V, cramping or diarrhea after food ingestion

BP \geq 90



Local reaction Rx

Airway OK

No wheezing

Observe for
progression
& transport

Ask OLMC for
diphenhydramine
order if severe
swelling/itching



Wasp sting to
back of leg

General mgt cont.

Cold pack to site unless contraindicated
NO IV, meds, or BP in same extremity as
bite/injection site

Keep extremity
dependent
(lower than heart)



Mild *systemic* reaction: BP > 90

Mast cells/basophils involved
all over body

Peripheral tingling, warmth

Fullness in mouth & throat;
scratchy sensation; airway OK

Nasal congestion, rhinitis,
sneezing

Periorbital
swelling, tearing

NO wheezing



Which medication should be given first to an awake and alert patient with a mild systemic allergic reaction?

Why?



Diphenhydramine

Action: H1 blocker antihistamine

Does not eliminate histamine already in circulation; prevents more from being released

Oral dose reaches peak blood levels 2 to 3 hrs after consumption

Effects last for 4 to 6 hours

Diphenhydramine side effects

Drowsiness, blurred vision ataxia

Thickened bronchial secretions

Dry mouth

↑ Pulse

↓ BP

Dizziness

Paradoxical stimulation,
esp. in children



***Moderate* systemic reaction**

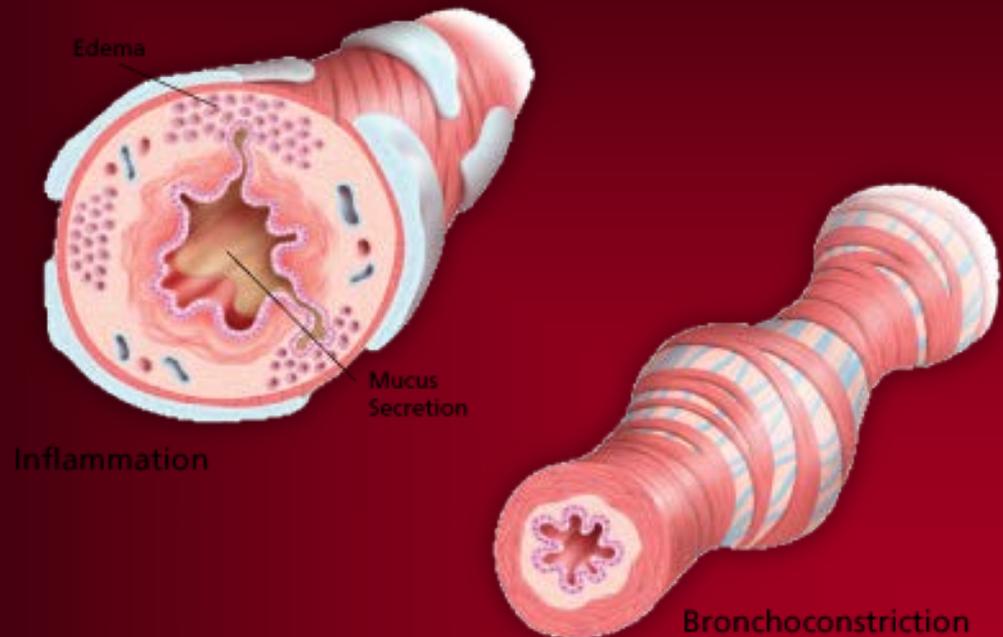
Any of above S&S plus
Bronchospasm, dyspnea,
wheezing, edema of
airways, larynx, or soft
tissues; cough, flushing,
N&V, warmth, or anxiety

BP > 90



Priorities

- Early recognition of deterioration
- Rapid relief of airflow obstruction
- Prevent/correct hypoxemia
- Reduce work of breathing
- Bronchodilation
- Reduce inflammation



Which drug should be given **first** to an alert and oriented hemodynamically stable adult with a moderate systemic allergic reaction?

- A. Epinephrine
- B. Magnesium sulfate
- C. Albuterol & ipratropium
- D. Diphenhydramine

What's the difference between the 2 forms of epinephrine?

Route & dose determines effects

Epi 1 mg/1 mL NS; given **IM**; slower absorption + lower doses = **beta** predominates

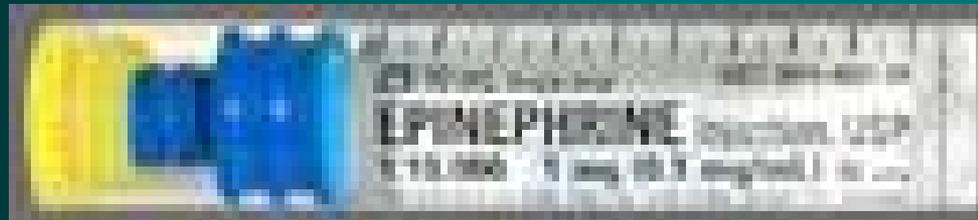
*Intended effect: **bronchodilation***

Epi 1 mg/10 mL NS; given **IV/IO**; faster absorption + higher doses = **alpha** effects added

*Intended effect: **vasoconstriction***

Radial pulse present

Pt is pulseless or hypotensive



Epinephrine for moderate allergic reactions

Dose: 1mg/1mL 0.3 mg IM

Onset 5-10 min;

Use epi vial



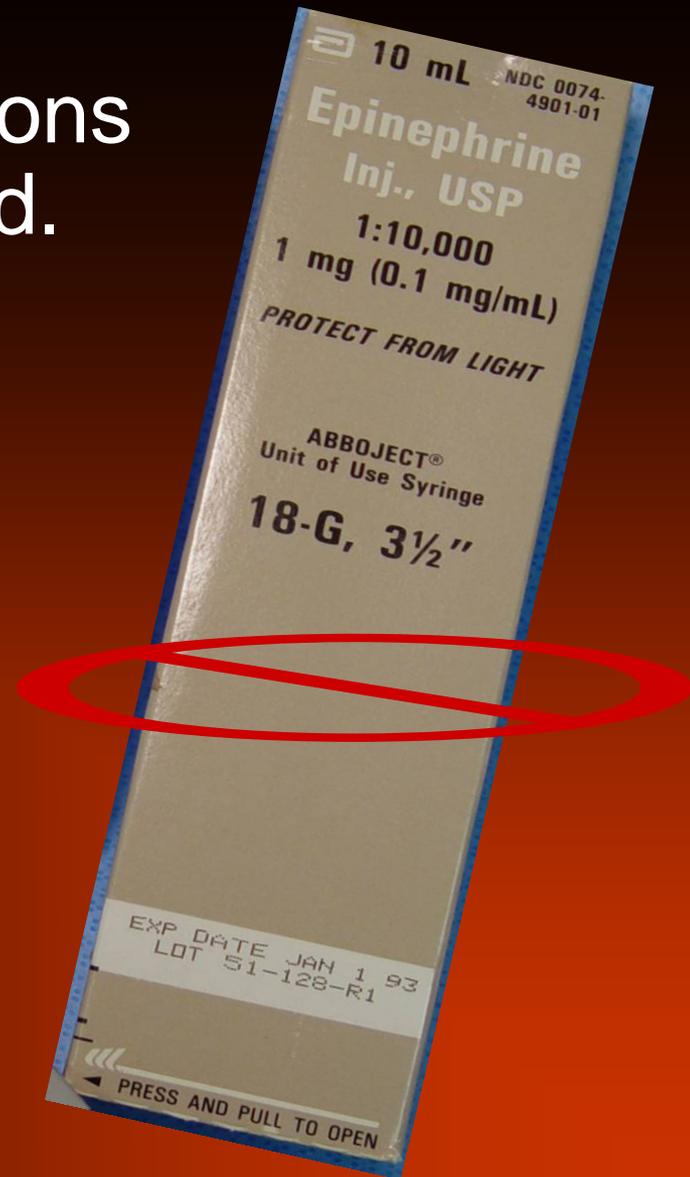
Why IM instead of IV?

Pts w/ moderate allergic reactions need their bronchioles dilated. They **DO NOT** need their vessels constricted!

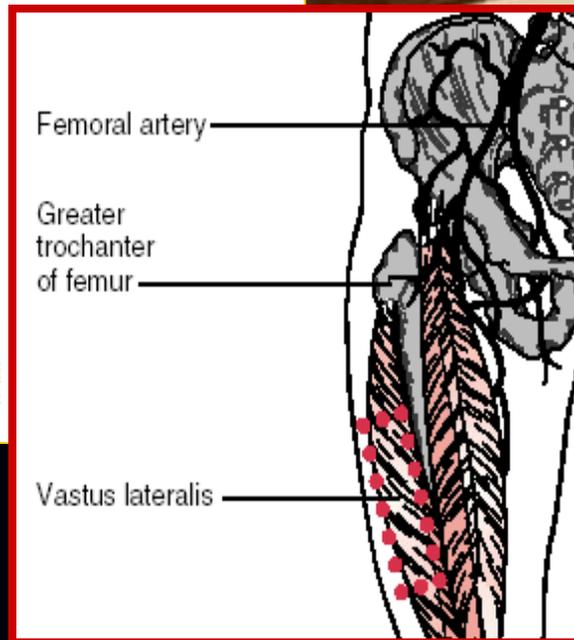
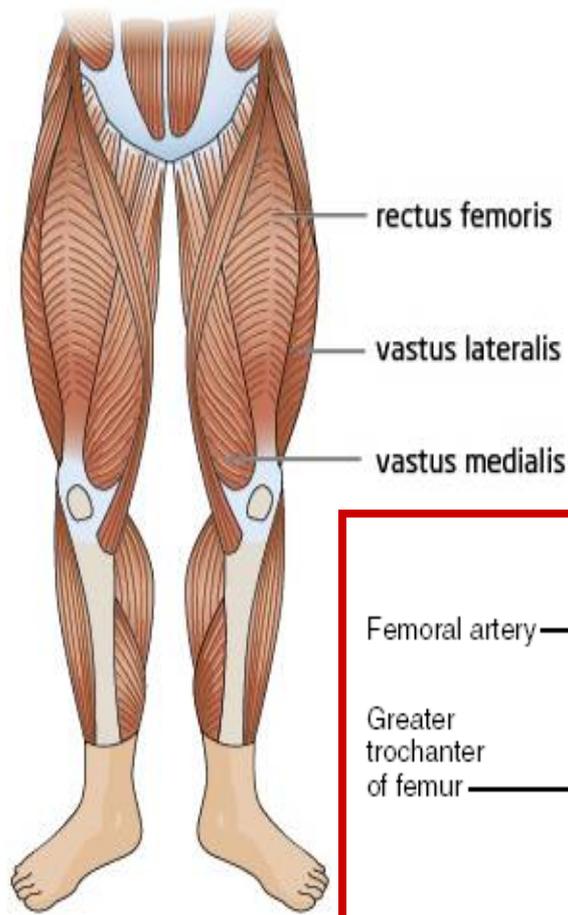
Easy to remember:

IV epi affects the vessels

IV epi only given to hypotensive or pulseless patients



Correct site for IM epi



Greater absorption due to greater blood flow through a large muscle

Epinephrine action for moderate allergic reaction

Catecholamine/sympathomimetic
Beta effect promotes bronchodilation
Increases CO through + inotropic effects



So, what does *caution* mean?

Risk/benefit analysis

- Consider age; existing conditions
- Other causes of wheezing (HF)?

12 L ECG if CVD or
+ risk factors

O₂ to offset ↑ demand

May need to ↓ dose;
monitor for SE

Start IV in case needed



Epi precautions

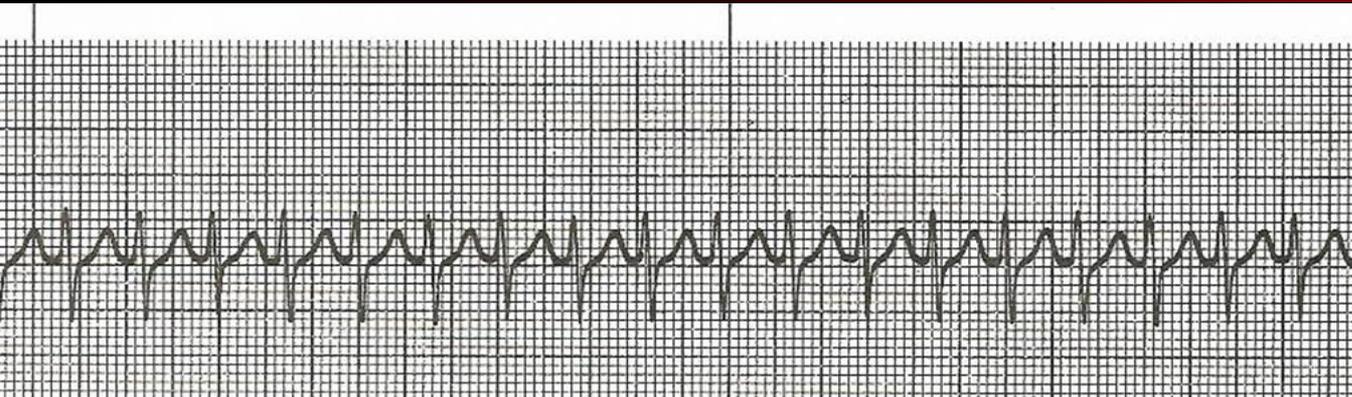
HR > 100; hypertensive

Hx CVD

On β blockers: Epi will cause
pure α responses

On MAO inhibitors: can cause
severe HTN

Pregnant



Epinephrine side effects

Remember, huge sympathetic stimulant!

CNS: HA, dizziness, tremors, restlessness, anxiety

CV: Tachycardia, palpitations, HTN, vasoconstriction, \uparrow myocardial O_2 consumption

Do not give to patients in HF!

Can worsen myocardial ischemia & HTN

GI: N / V

Revs the engine!

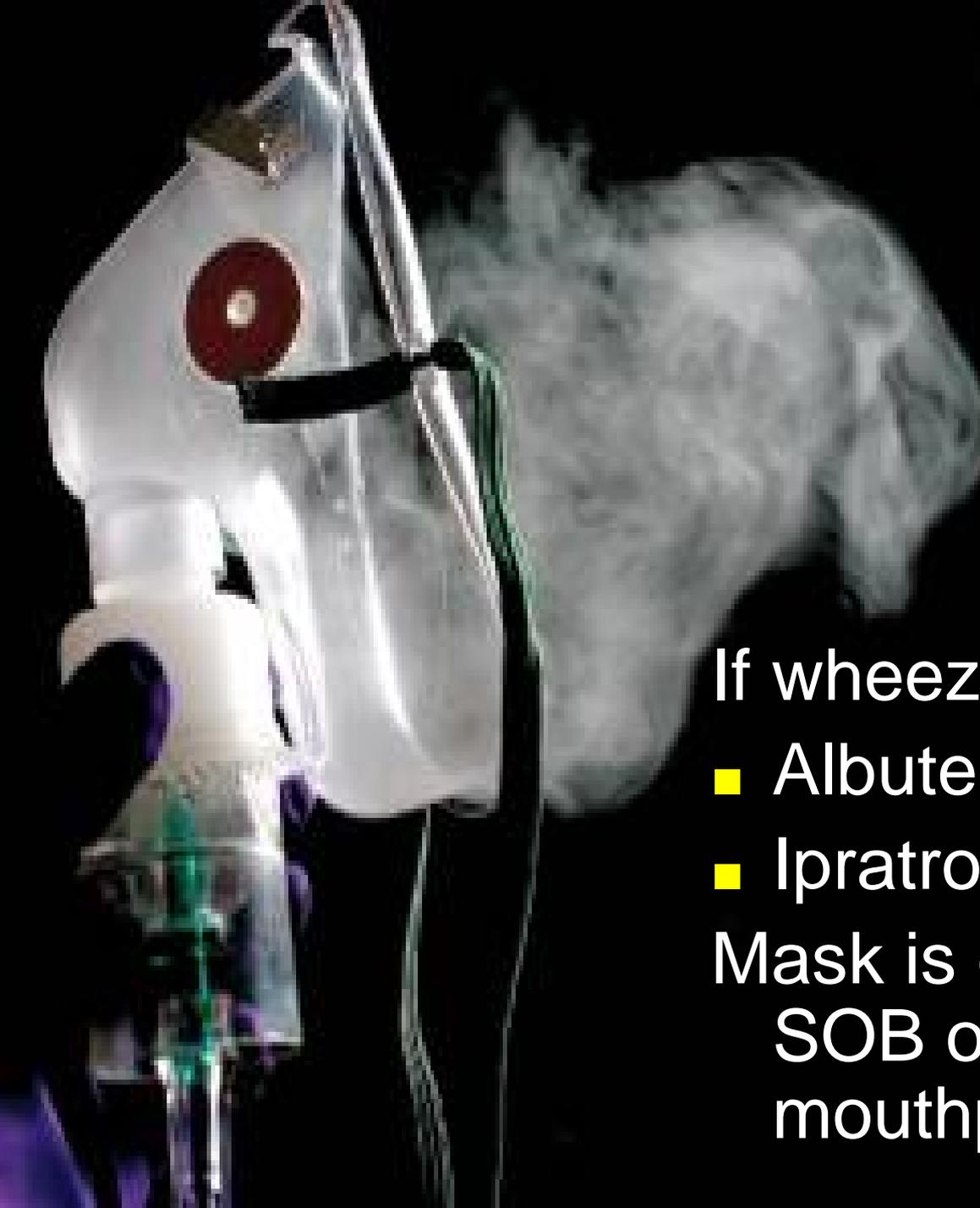


What next?

Patient needs a longer acting antihistamine...



Diphenhydramine 50 mg IVP/IO; no IV/IO-IM



Moderate reaction Rx

If wheezing after epi:

- Albuterol 2.5 mg +
- Ipratropium 0.5 mg/HHN

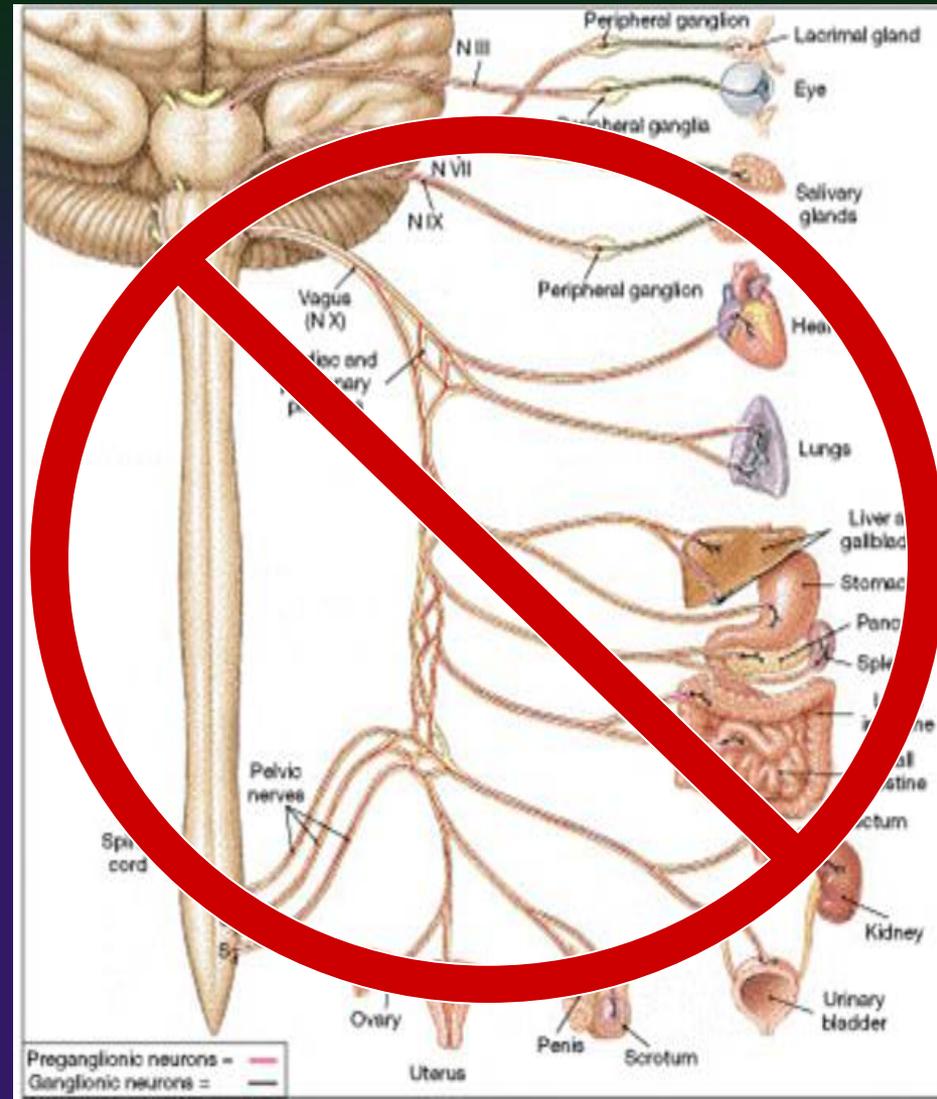
Mask is effective if pt is
SOB or may struggle w/
mouthpiece

Why is ipratropium added to albuterol?

Long-acting
anti-cholinergic
(blocks vagal tone)

Relaxes smooth
muscle → broncho-
dilates w/o side
effects to the SNS

Additive effect to
albuterol



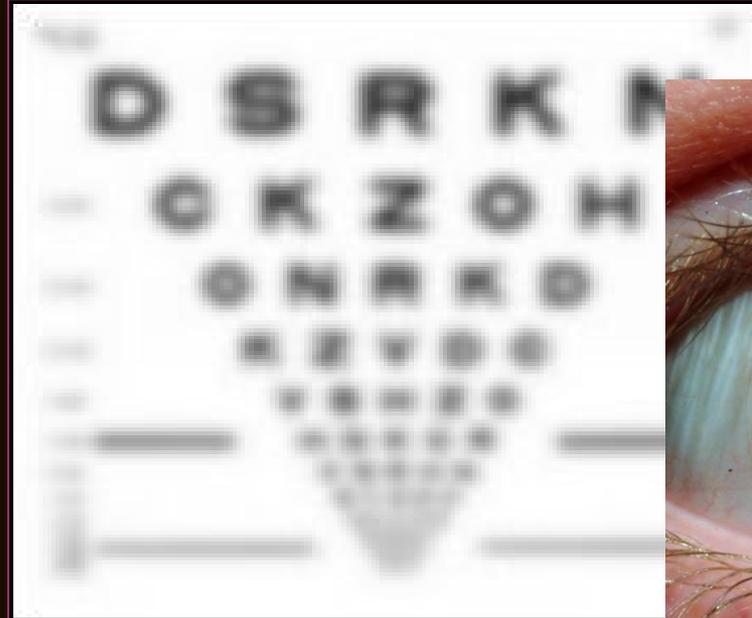
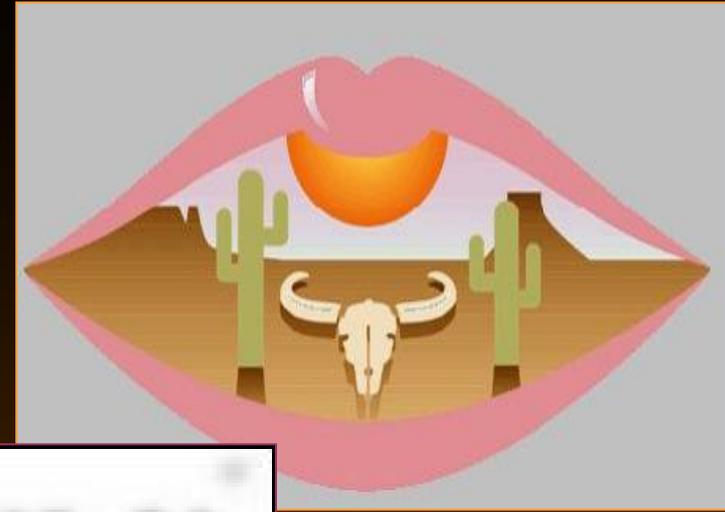
Ipratropium side effects

Dry mouth, nausea

Abnormal taste in mouth

Blurred vision (mist leaking
exposing eyes)

Dilated pupils



Severe allergic reaction:

*Life threatening - needs
immediate interventions*

Can develop within 30-60
sec & cause death w/in
min after exposure to
substance that sets off
chain of biochemical
events

Shorter interval between
exposure & reaction =
more severe reaction

Anaphylaxis



"It's not you—it's my anaphylaxis."

Myth: Anaphylaxis is rare

Reality

- Anaphylaxis is underreported
- Incidence seems to be increasing
- Up to 41 million Americans at risk
- 1:3000 persons suffers from anaphylaxis to some allergen
- 63,000 new cases per year
- 5% of adults may have a Hx of anaphylaxis

Myth: Cause of anaphylaxis is always obvious

Reality

Idiopathic anaphylaxis is common
(no cause is found)

Triggers may be hidden

- Foods
- Latex

Patient may not recall details of exposure
or clinical course

Pediatric anaphylaxis

- 218 cases of anaphylaxis
- Mean age 7.4 yo
- 98 % had skin / mucosal symptoms
- 68 % respiratory
- 44 % GI
- 2 % hypotension
- 67% previous history



Etiology of anaphylaxis

Contact with substance to which person is extremely hypersensitive

Route often injection: allergen becomes widely distributed

Injected antibiotics – 800 deaths/yr

Bee and wasp stings: 40-50 deaths/yr

Foods

Latex

Inhaled allergens



Course of anaphylaxis

Uniphasic course: majority of pts

- Develop S&S
- Recover w/ appropriate therapy
- Remain asymptomatic

Biphasic reaction (20%)

- Second wave of S&S recurs 4-8 hrs after initial remission w/o further exposure
- Small % rebounds at 24-48 hrs

Morbidity factors for anaphylaxis

Estimated 500-1000
deaths/year

70% of deaths due to
airway compromise

30% due to circulatory
collapse



Anaphylaxis fatalities

Risk factors

- Failure to give epinephrine immediately
- Beta blocker, ACEI therapy
- Hx asthma, cardiac disease
- IV/injected allergen: Lg doses IV agents more likely to result in severe reactions than small doses given by another route

Diagnosing anaphylaxis

Based on clinical S&S, exposure history

Skin, respiratory, CV S&S most common

Some cases may be difficult to diagnose

- Vasovagal syncope
- Systemic mastocytosis (extra mast cells)



Intense bronchospasm
Decreased/absent breath
sounds or diffuse
wheezes

Cough

Throat tightness

Stridor

Laryngeal edema
(angioedema)

Difficulty speaking

Hoarseness

Severe dyspnea

Cyanosis

Resp failure

Respiratory S & S

Cardiovascular S&S

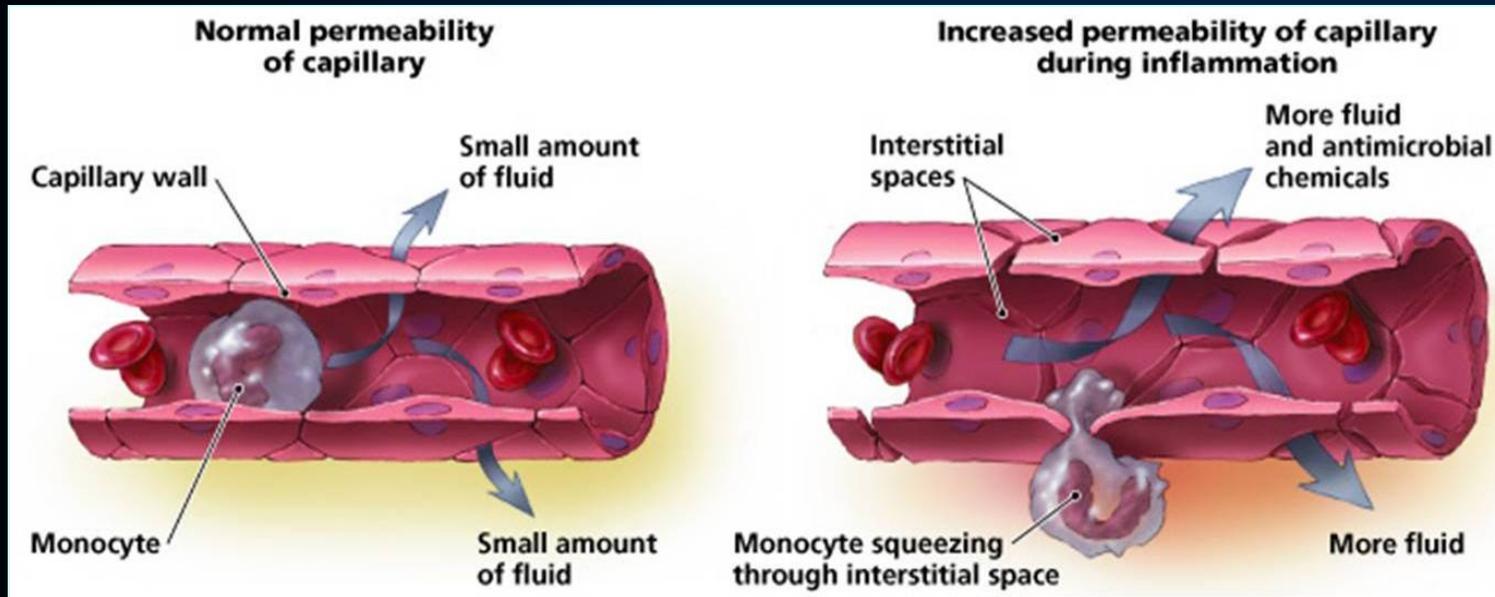
Tachy/bradycardias

Cardiovascular collapse/shock:

Hypotension d/t vasodilation

and 3rd space losses

Chest pain



Myth: Anaphylaxis *always* presents w/ cutaneous S&S

Reality

10%-20% of anaphylaxis cases have NO hives or other skin signs

80% of food-induced fatal anaphylaxis cases had no cutaneous S or S



IMC special considerations

Time sensitive patient!

Consider need for early DAI if airway severely compromised:

Progressive stridor, severe dysphonia or aphonia (inability to speak), laryngeal edema, massive tongue swelling, face and neck swelling, hypoxemia



Scenario 2



Paramedics called to a picnic area for a woman with a bee sting.

Scenario 2



CC/HPI: Friend stated she (40/F) was drinking a pop & a bee must have flown inside she become unconscious right before medics arrived

PMH-Meds: Very allergic to bee stings; did not have her EpiPen with her

No other PMH, meds or allergies known

PE: Facial edema w/ audible stridor noted, wt ~150 lbs

BP 78/50, P 142, ECG ST, R 30, shallow, Lungs decreased BS bilat, O2 sat 77% RA

Questions?



THAT'S A WRAP