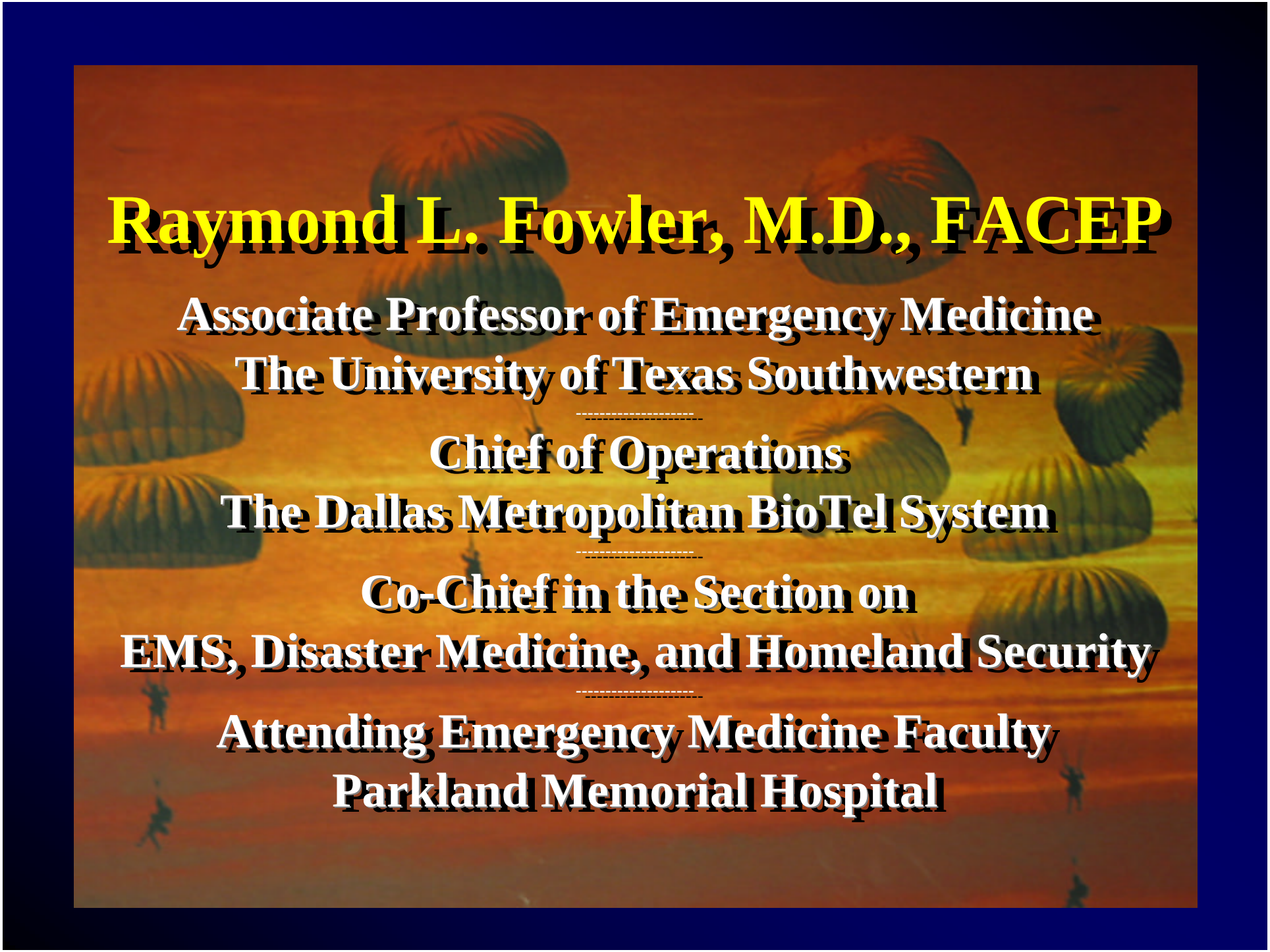
The Future is Now

8/16/2007


Raymond L. Fowler, M.D., FACEP
Associate Professor of Emergency Medicine
The University of Texas Southwestern
Chief of Operations
The Dallas Metropolitan BioTel System
Co-Chief in the Section on
EMS, Disaster Medicine, and Homeland Security
Attending Emergency Medicine Faculty
Parkland Memorial Hospital


www.utsw.ws

The medical and ethical performance of EMS professionals has never been more important than it is today

The emerging of a profession:

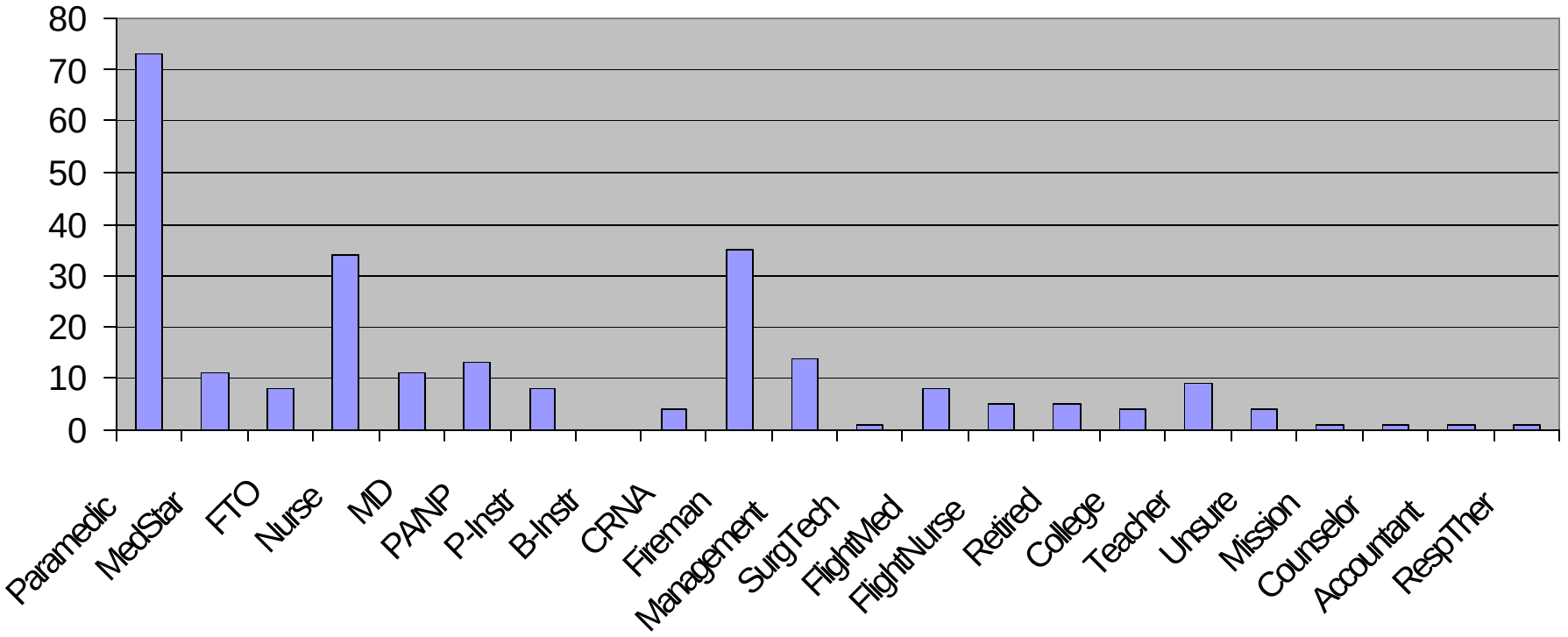
The End of the Beginning

8/16/2007

The End of the Beginning

- Innocence is over
- You are COMPLETELY accountable for what you do
- Becoming a professional requires you to always be able to explain your actions
- EMS is ONLY and ALWAYS about patient care

5 Year Future Plans for MedStar Interviewees (N = 189)



8/16/2007

We have to face the fact
that medics in many cases,
perhaps most cases,
will be “passing through”
the field enroute to
other careers,
or parallel careers

“I think we should create a whole career track where after five years, the paramedic is guaranteed a slot in medical school, followed by a residency program in emergency medicine. It's career progression.”

Bruce Dubin, DO, JD
Associate Dean for Academic Affairs
University of North Texas
Health Science Center

EMS is, after all, a great deal about critical care medicine

Part of excellence is performing superior medical histories and physical exams

Approaching the Patient

“See what you see!”

“People look, but they don’t see”

…A. Fowler, Jr.

Alertness?
Level of distress?
Noises?
Respirations?
The pulse rate?
Skin?
Obvious things (bleeding)

The "art" of medicine is missing from so many practitioners…

…are they not looking, or have they lost interest?

History Taking:

This seems to be a
“lost black art” for
so many medical providers

What happened?
When?
LOC?
Major system symptoms?
Co-morbid conditions?

Above all: RISK???

8/16/2007

Case #1

8/16/2007

A 60 BF is in her bedroom where she was found by her son a few minutes ago. She is semiconscious, breathing rapidly, and pale with a systolic of 80 and a pulse rate of 120

Her neck veins are flat, her trachea is in the midline, and there is no evidence of chest trauma. No edema is present.

Diagnosis? Treatment?

8/16/2007

Signs of Shock

Early

Weak, thirsty, lightheaded
Pale, then sweaty
Tachycardia
Tachypnea

Late

Hypotension
Altered LOC
Cardiac arrest
Death

Blood pressure =

(Cardiac output) x
(Volume) x
(Peripheral resistance)

Shock

Cardiogenic

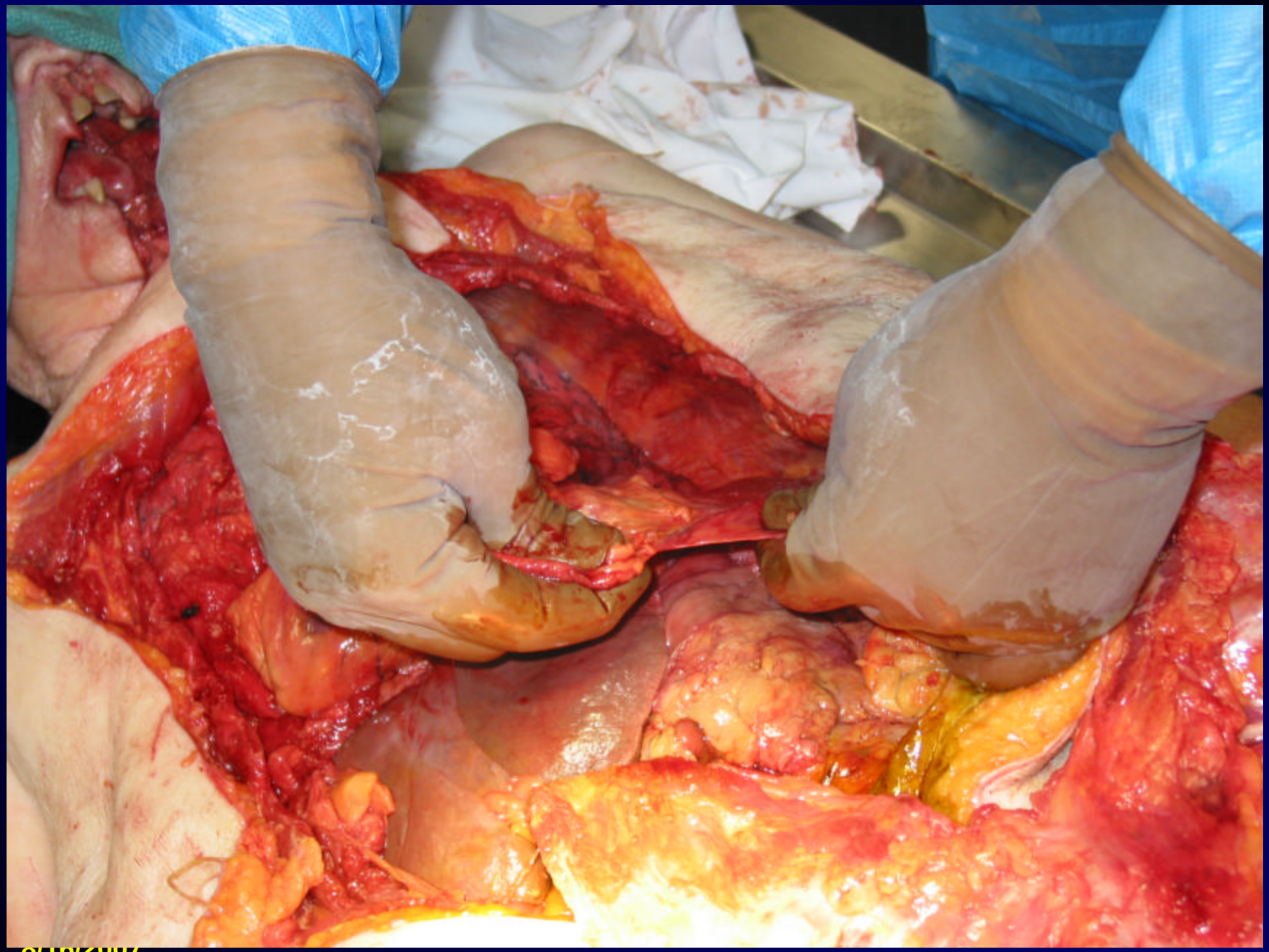
- Rapid pulse
- Distended neck veins
- Cyanosis

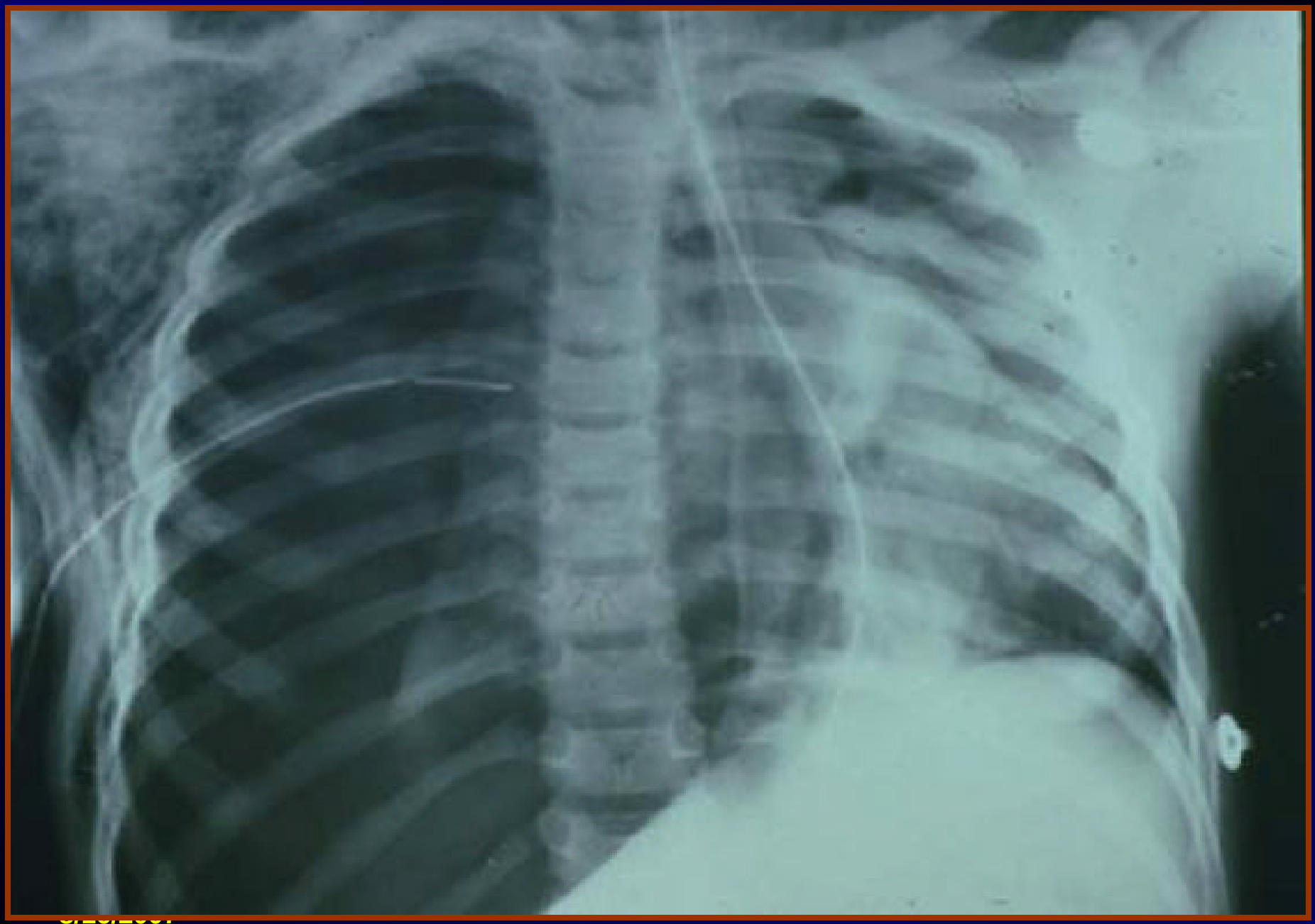
Volume Loss

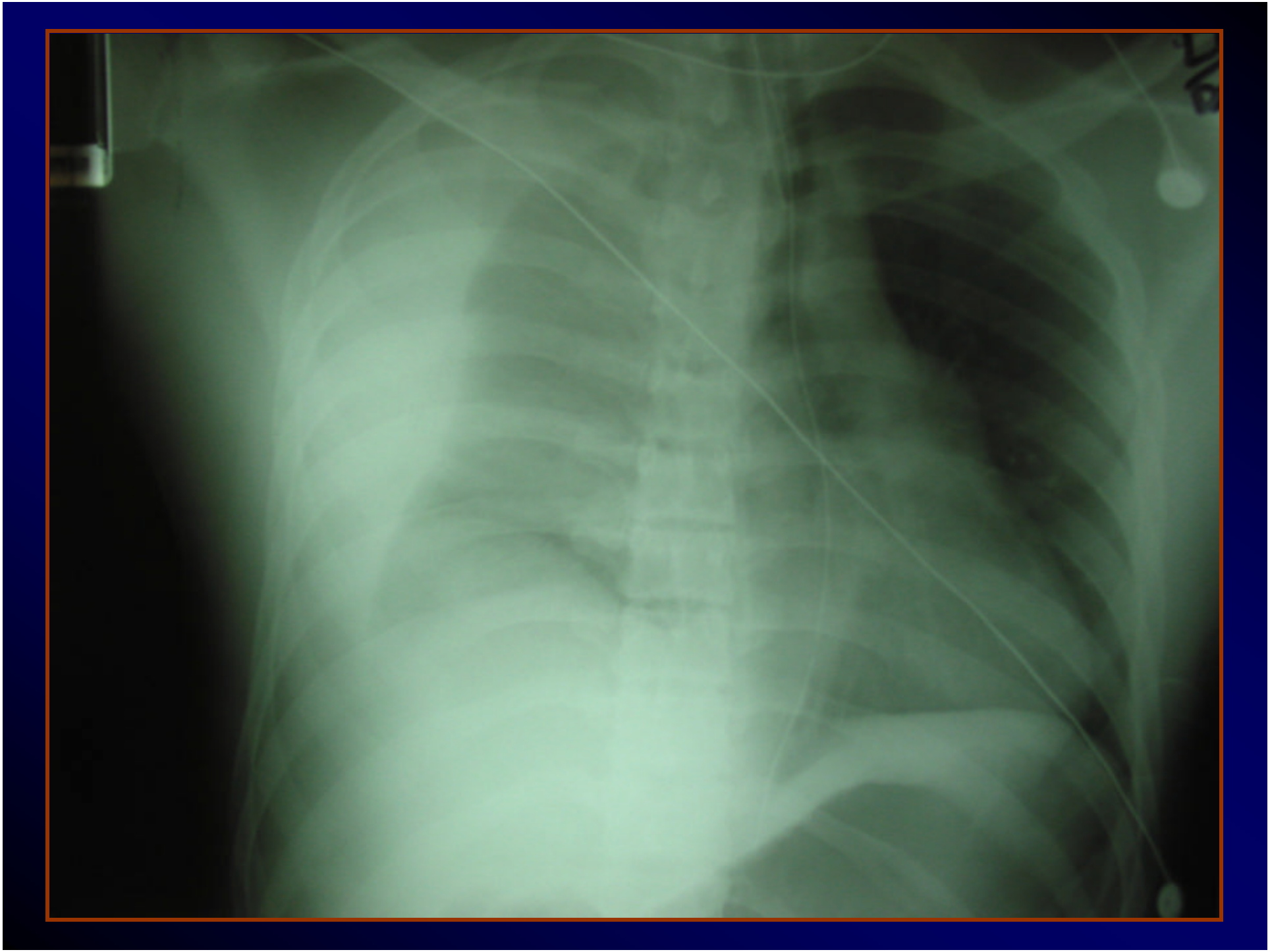
- Rapid pulse
- Flat neck veins
- Pale

Vasodilatory

- Variable pulse
- Flat neck veins
- Pale or pink







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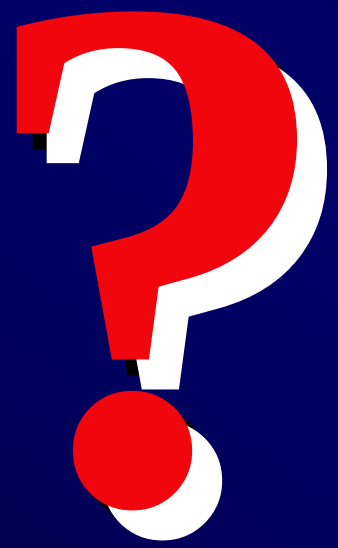
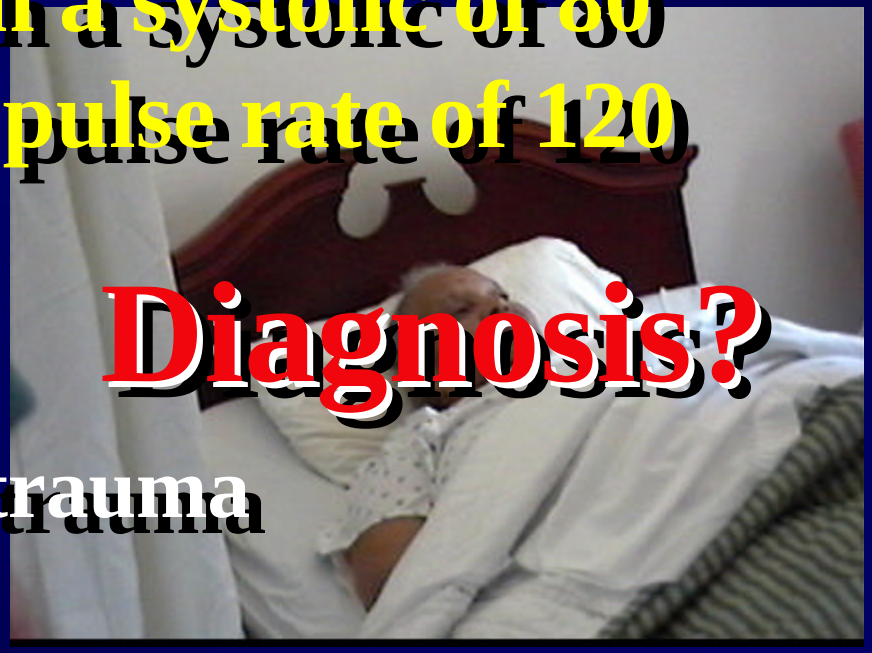


SO!! A 60 BF:
Older person….
She is semiconscious,
Breathing rapidly,
pale
with a systolic of 80
and a pulse rate of 120



Diagnosis?

Flat neck veins
Midline trachea
No chest or abdominal trauma
No edema

Septic Shock!

8/16/2007

…but just when you thought life was getting easy…

Hemorrhagic Shock associated with Bradycardia

1: J Trauma. 1998 Sep;45(3):534-9. Related Articles, Links

LWWonline
Lippincott Williams & Wilkins

Relative bradycardia in patients with traumatic hypotension.

Demetriades D, Chan LS, Bhasin P, Berne TV, Ramicone E, Huicochea F, Velmahos G, Cornwell EE, Belzberg H, Murray J, Asensio JA.

Department of Surgery, University of Southern California, Los Angeles 90033, USA.
demetria@hsc.usc.edu

8/16/2007

Incidence of Bradycardia With Hemorrhagic Shock:

Reported to be as high As 40% in some cases!

CONCLUSION:

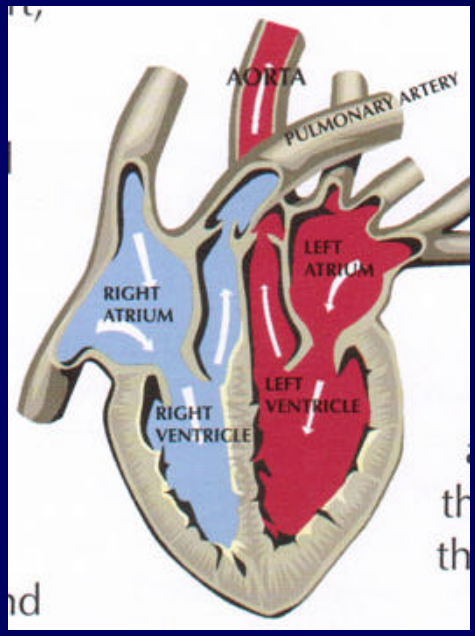
Relative bradycardia in hypotensive trauma patients is a common hemodynamic finding.

Mortality among tachycardic patients was more predictable than among bradycardic patients…

The presence of relative bradycardia in some subgroups of patients with severe injuries seems to be associated with better prognosis than the presence of tachycardia.

Take Home Message:

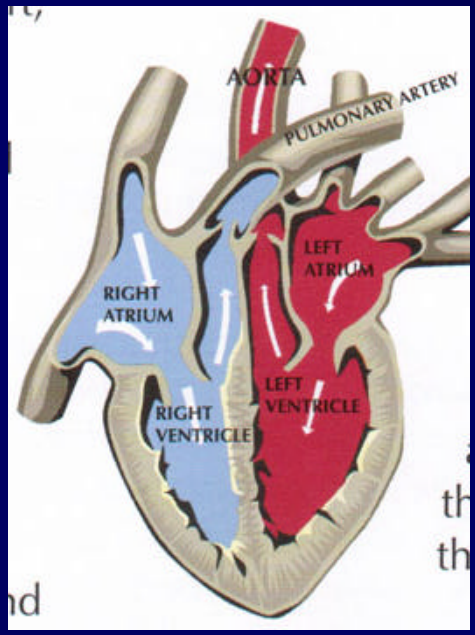
A slow pulse rate does NOT rule out Hemorrhagic Shock!



Take Home Message:

ESPECIALLY IF THE PATIENT IS ON A BETA BLOCKER

Atenolol, propranolol, labetalol



What is the most common cause Of tachycardia in your patients?

In EMS, probably excitement. But, it may well be drugs such as Albuterol or meth/coke, or shock

Signs of Shock AGAIN!

Early

Weak, thirsty, lightheaded
Pale, then sweaty
Tachycardia
Tachypnea
Diminished urinary output

Late

Hypotension
Altered LOC
Cardiac arrest
Death

8/16/2007

Case #2

A guy is found on the street
With altered mental status,
Smelling strongly of ETOH,
And blows to his face

You find him to be confused, with slurred speech, pale, bradycardic, flat neck veins, midline trachea.

He was well until this happened. He has no medical problems and takes no medications.

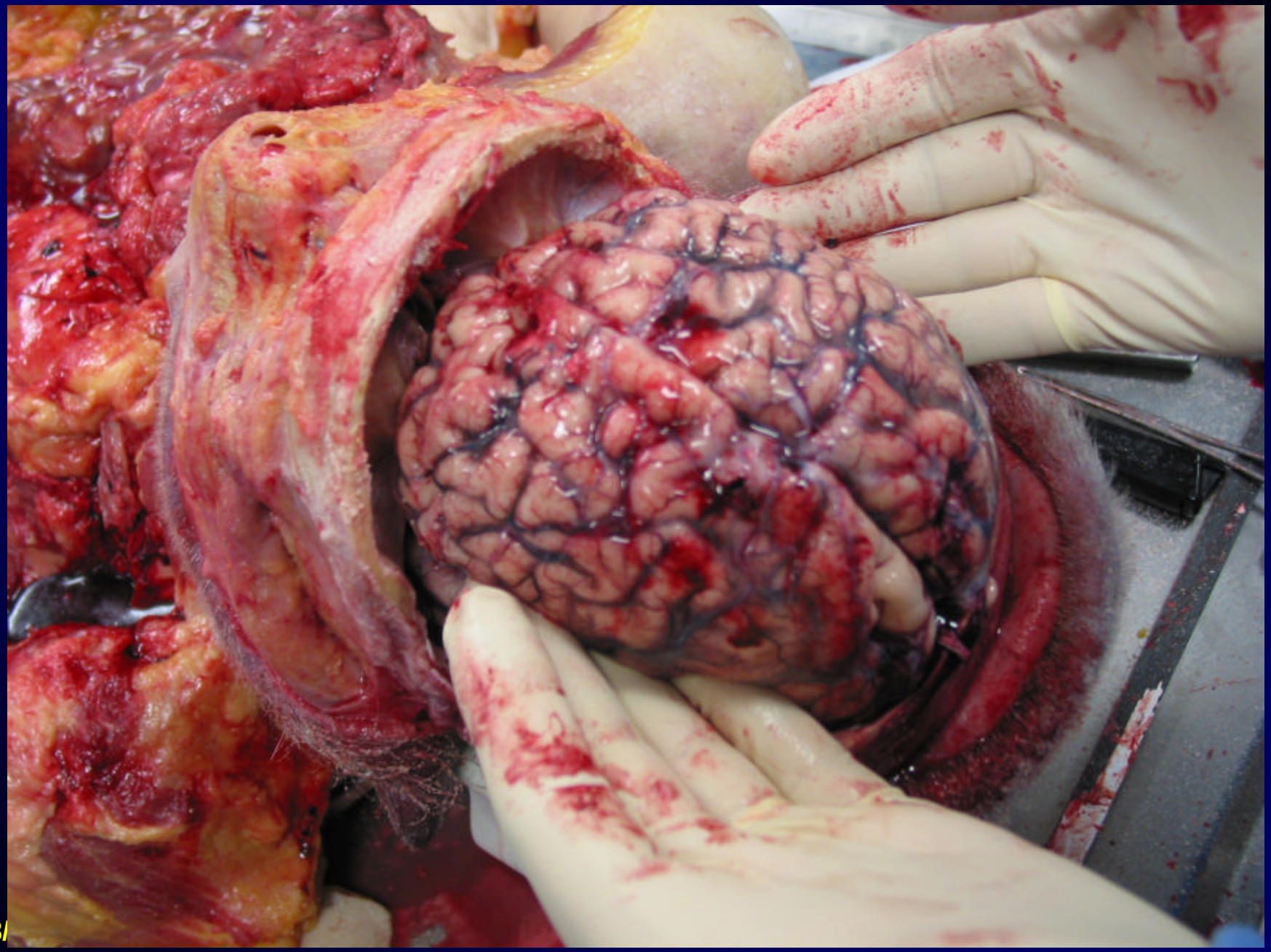
8/16/2007

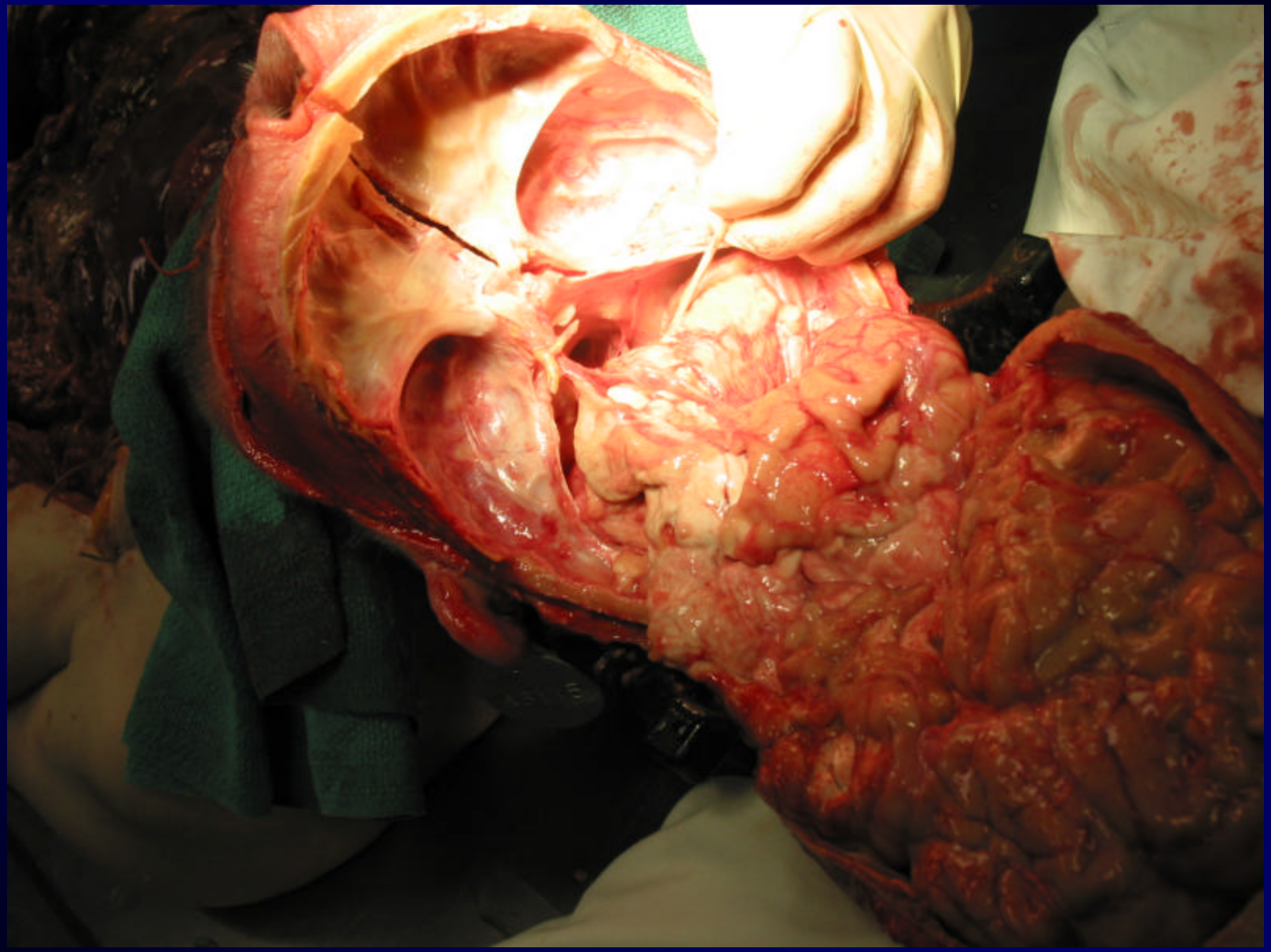
Here we have a patient, previously well (okay, bad habits) but now with altered mental status and facial trauma

Always assume that someone with head trauma MAY have an intracranial bleed until proven otherwise!

…and of course, give considerations to CSpine issues…

CAN'T CLEAR THE CSPINE WHEN THE PATIENT IS ALTERED!





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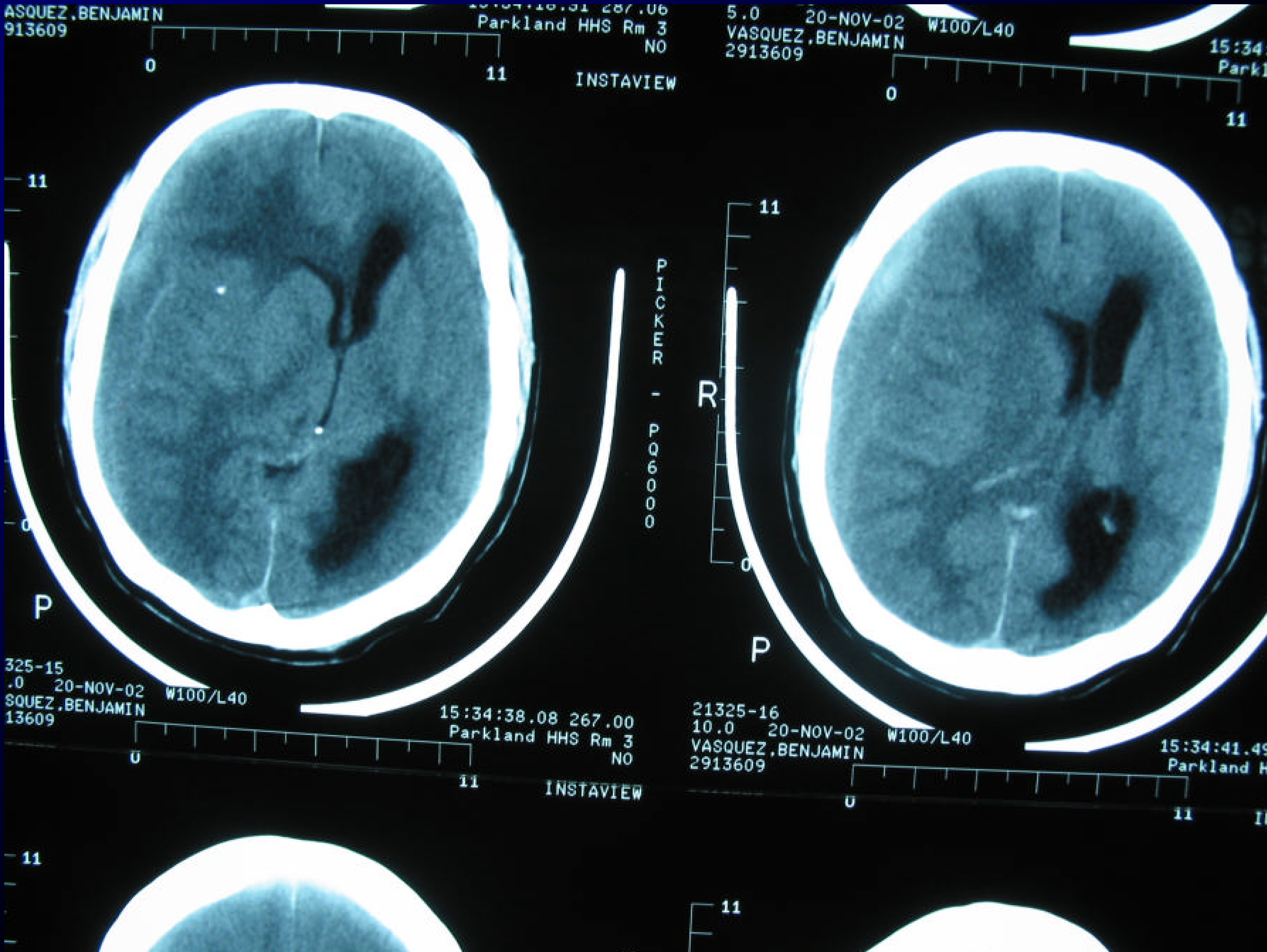
ASQUEZ,BENJAMIN
913609
Parkland HHS Rm 3
NO
INSTAVIEW
5.0 20-NOV-02 W100/L40
VASQUEZ,BENJAMIN
2913609
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13609
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Parkland HHS Rm 3
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INSTAVIEW
21325-16
10.0 20-NOV-02 W100/L40
VASQUEZ,BENJAMIN
2913609
15:34:41.49
P

CAT Scans in The Field?

Well, not any time soon,
Though in Odessa, Texas
One of the first studies
On field ultrasound machines
Is now being conducted!

Ultra Assessment Tool

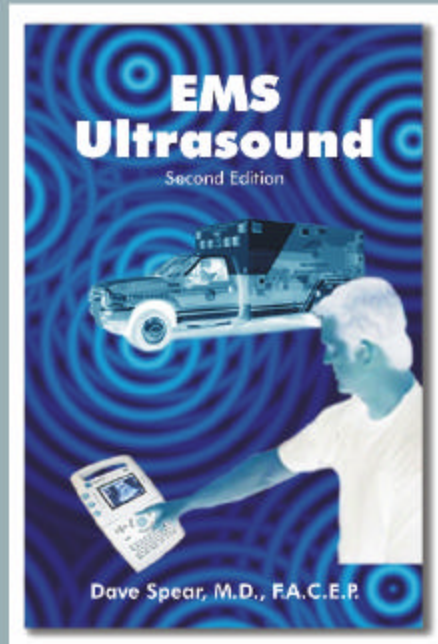
An Odessa (Texas) Fire Dept. EMS crew views an ultrasound image of a fetus while en route to the hospital.

8/16/2007

P.O. Box 13831
Odessa, TX 79768
1-800-806-1982
432-333-9377
staff@911sono.com

EXPLORING EMS ULTRASOUND

Something New In Prehospital Care



Paramedics and flight nurses have begun using portable ultrasound machines. These machines allow detection of blood in the abdomen of trauma patients, evaluation of cardiac motion in critical patients, and detection of pregnancy.

Learn the basics of ultrasound and find out how these devices can be used in the field and in the emergency room.

About the Author

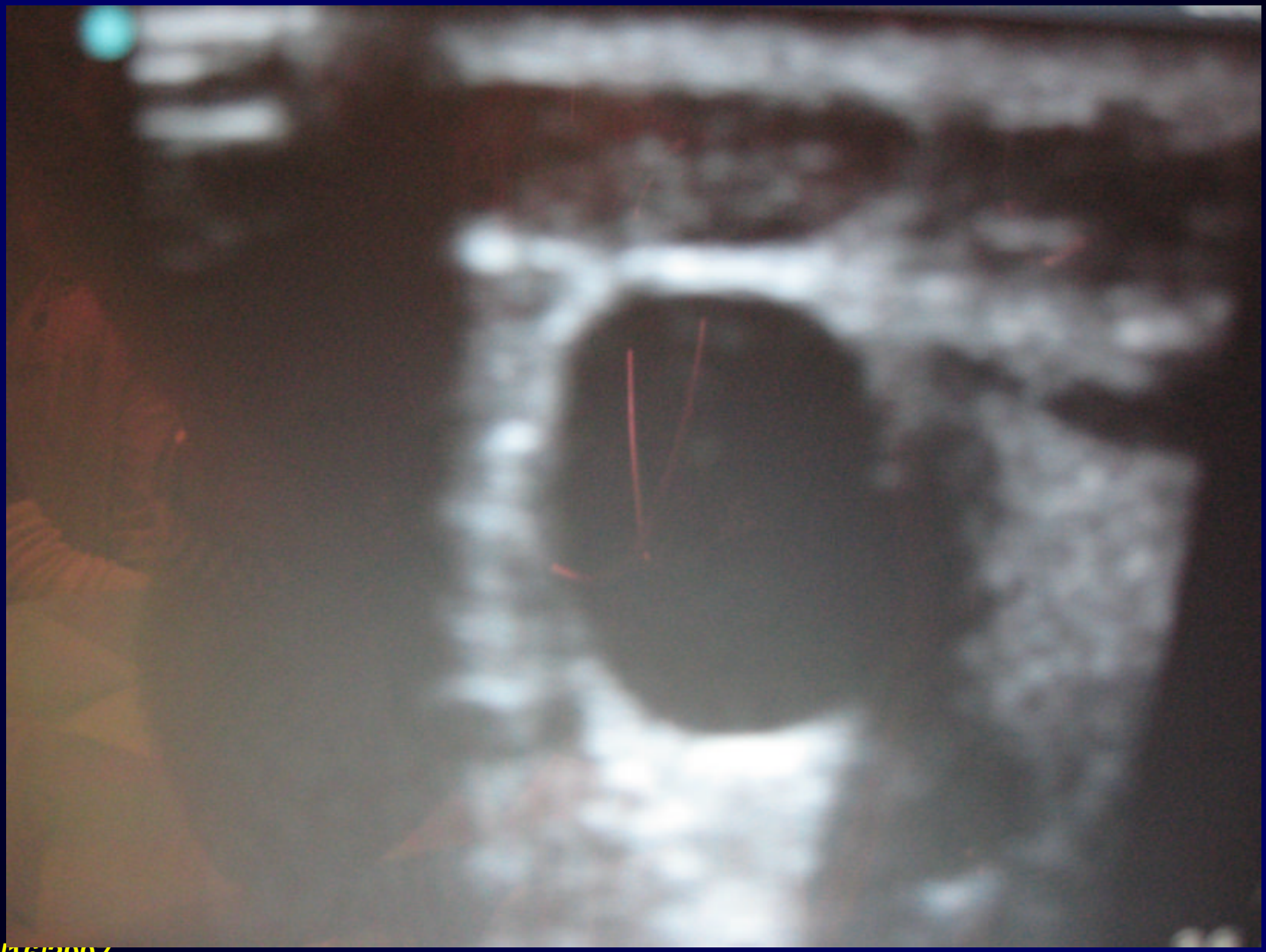
BRINGING ULTRASOUND TO EMS

911Sono.com

EMS Ultrasound
Second Edition
by Dave Spear, M.D., F.A.C.E.P.
ISBN# 0-9707677-2-2

8/16

8/16/2007



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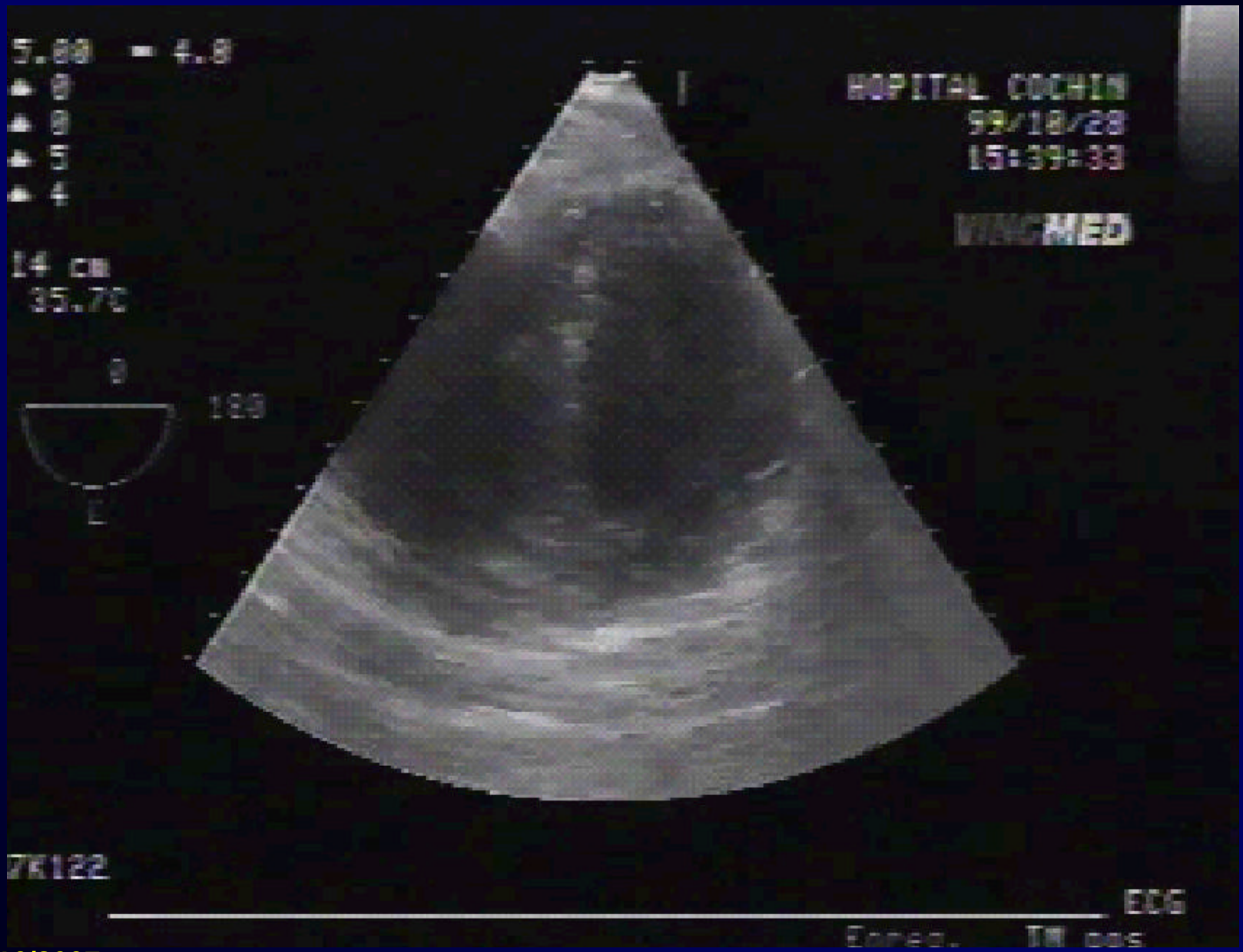


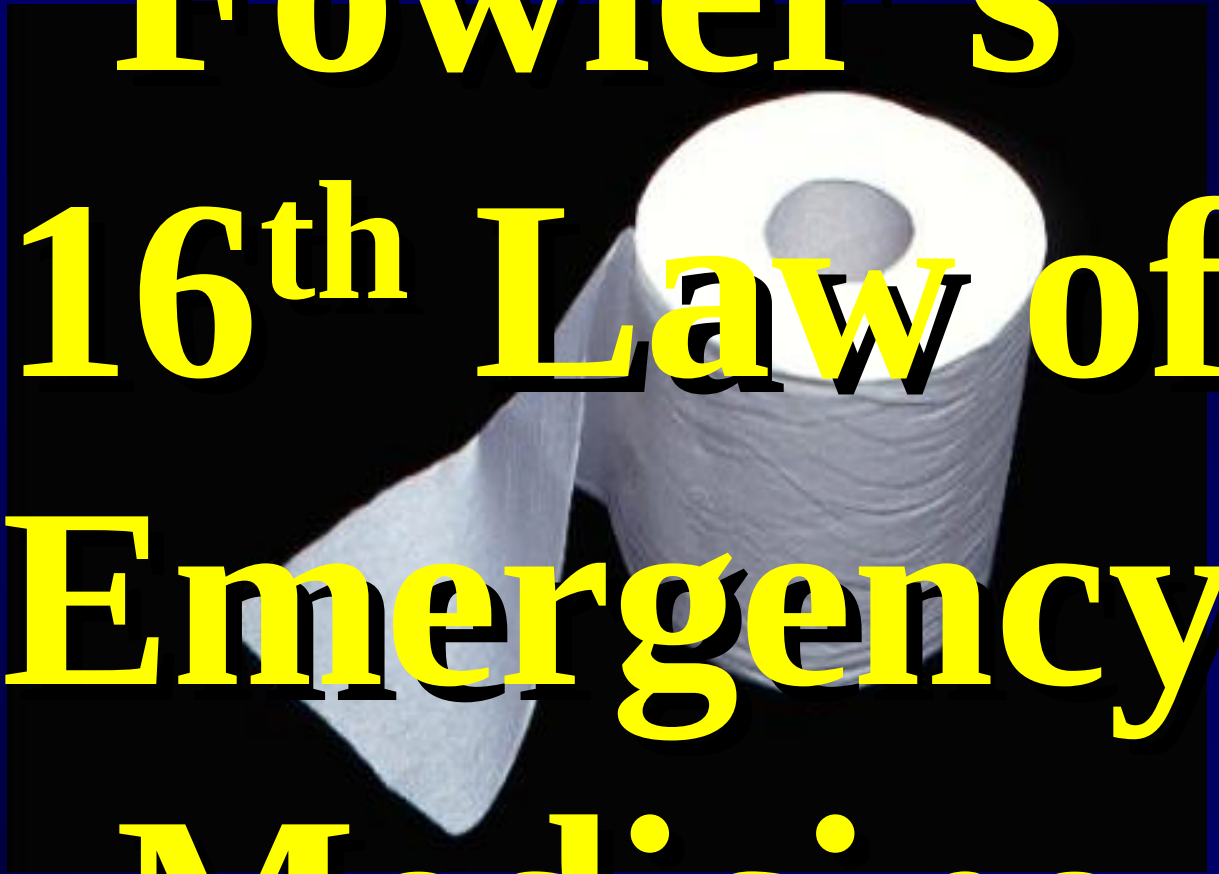
8/16/2007

Beware of the patient With altered mental status!

Something is WRONG With the computer

It is either trauma, drugs, hypoxia, or possibly crazy

Fowler's 16th Law of Emergency Medicine



8/16/2007

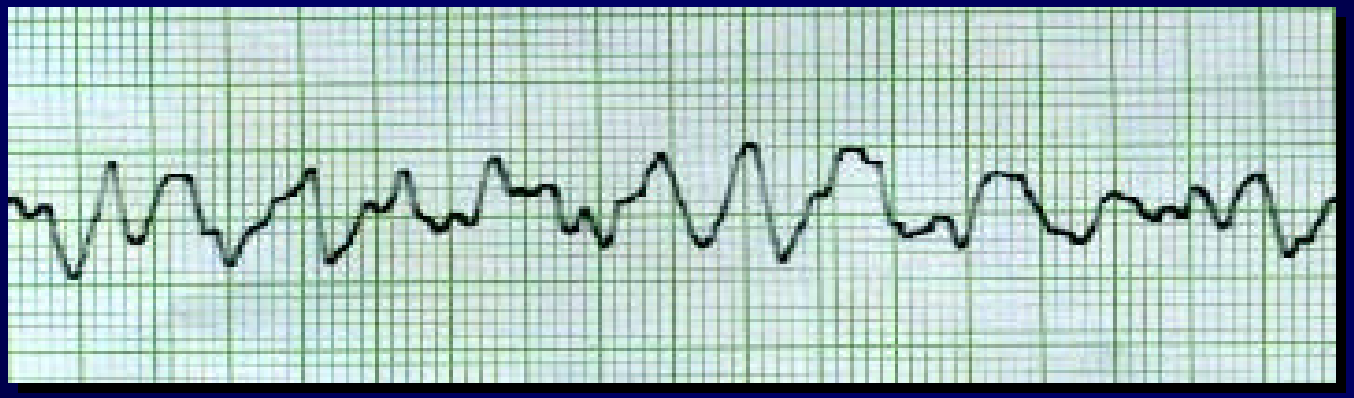
“Stool Sign”

8/16/2007

8/16/2007

Case #3

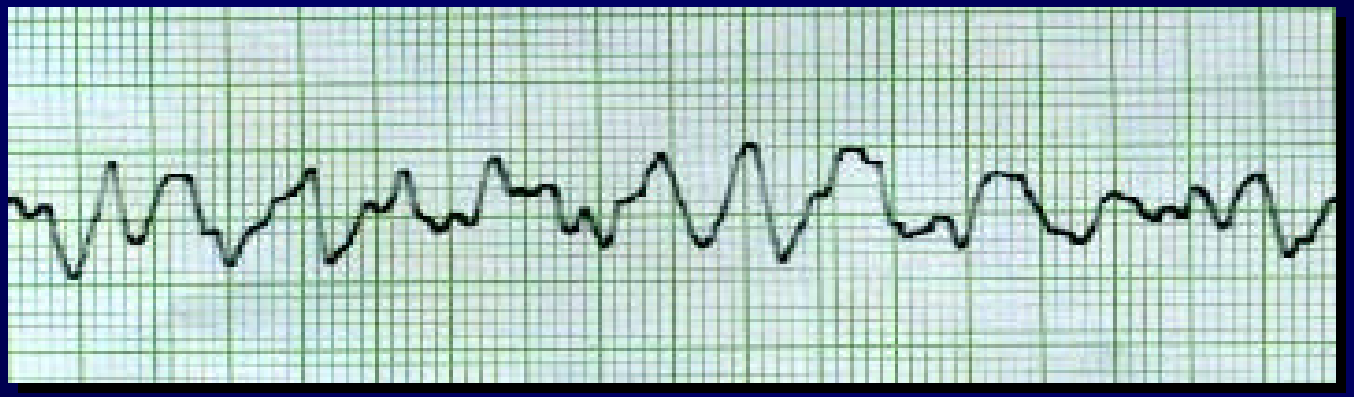
A 55 year old man
is found down in Cardiac Arrest
by his wife. EMS is called.
Citizen CPR is being done



He was well until this happened.
He has no medical problems
and takes no medications.

8/16/2007

After defibrillation the patient remains in VF

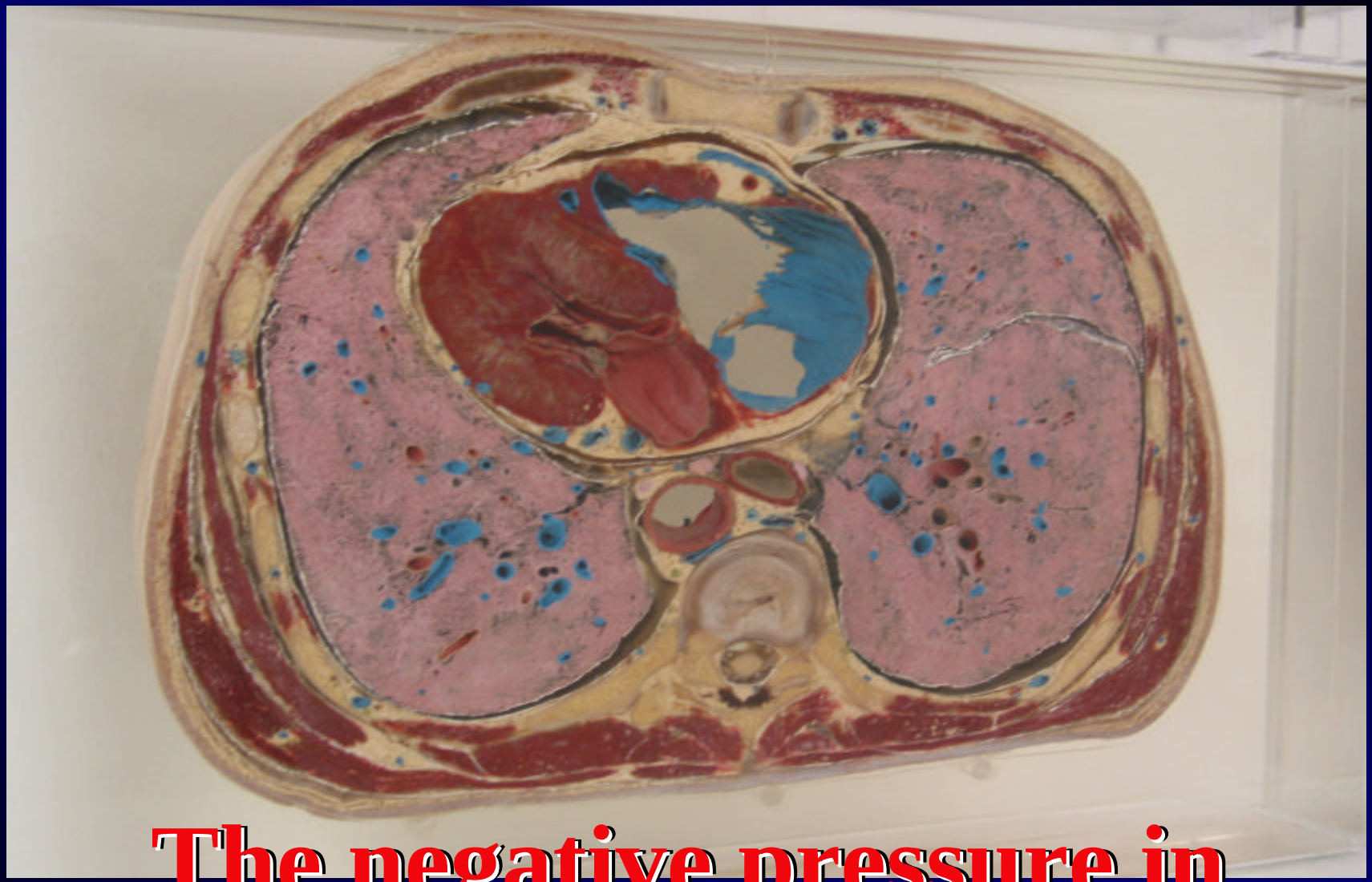


He does not improve after administration of CPR, epinephrine, or amiodarone, or repeated defibrillation

What do you do??

Crank up the defib until you smell meat burning?

The heart only pumps out what it gets back!



The negative pressure in the thorax PULLS blood back!

I repeat,

"The negative pressure in the thorax PULLS blood back!"

Blood pressure =

(Cardiac output) x
(Volume) x
(Peripheral resistance)

Cardiac Output =

Pulse Rate

x

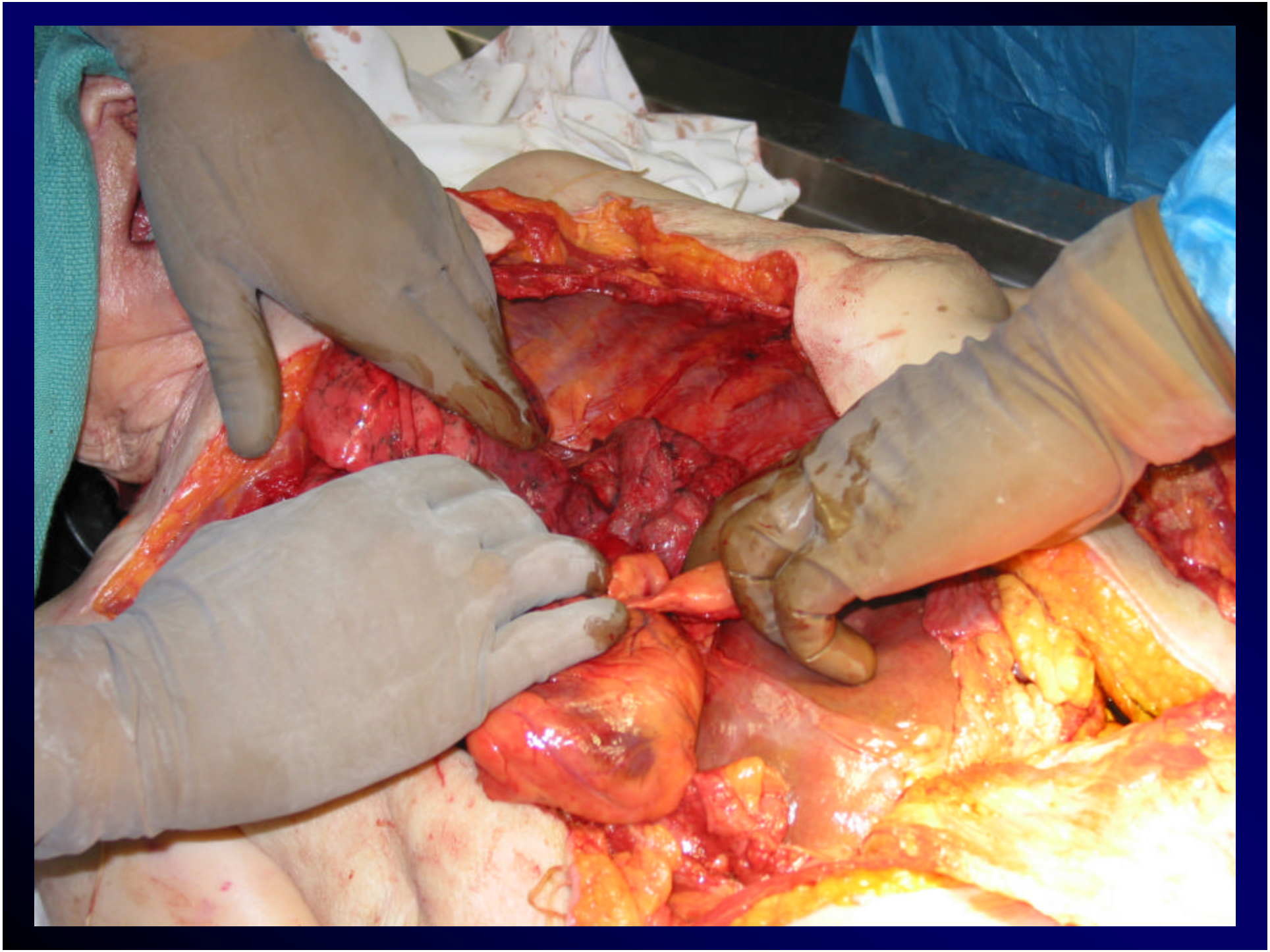
Stroke Volume

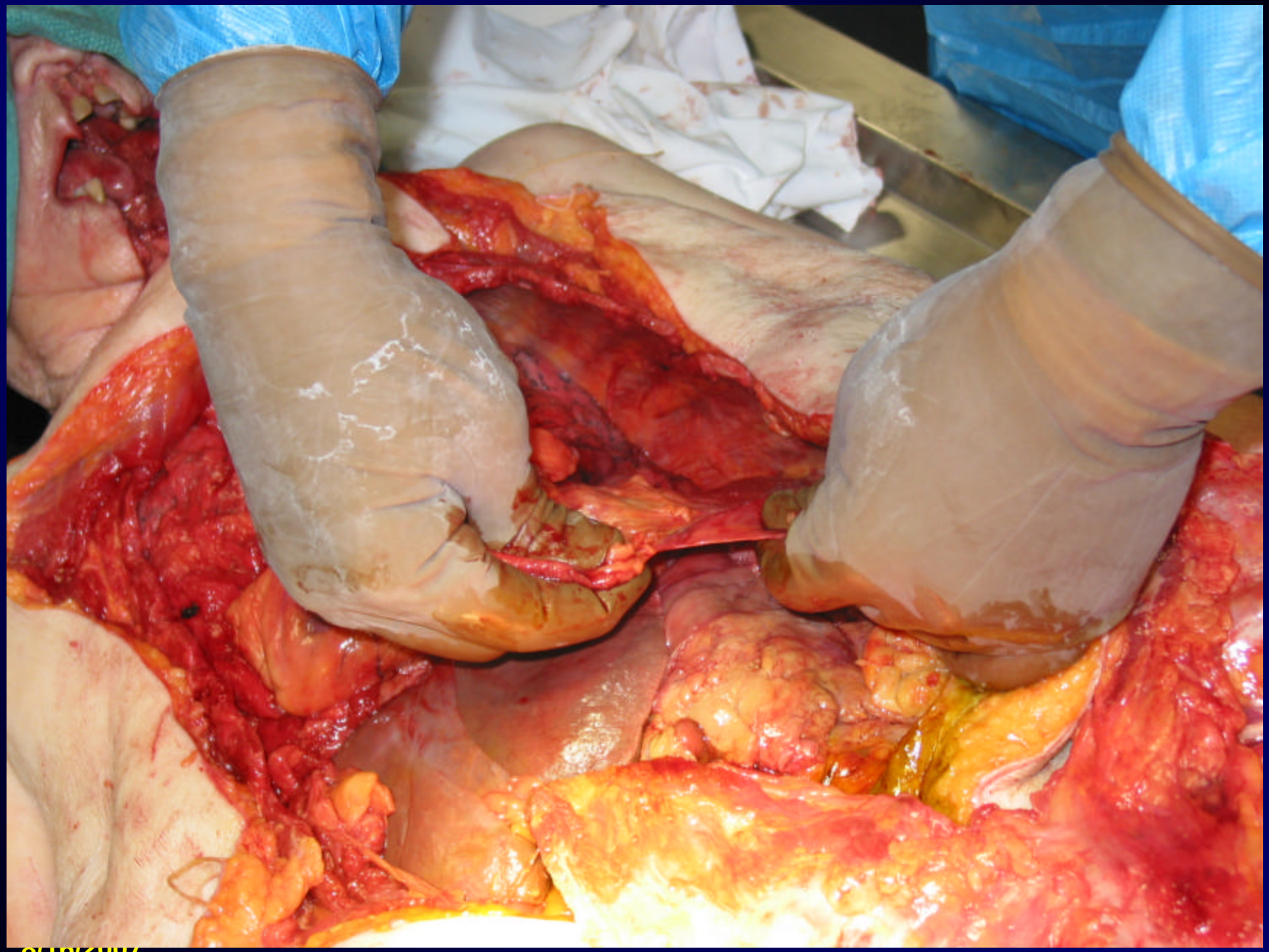
Understanding the body by regions

Positive pressure

Negative pressure

Positive pressure





The negative pressure inside the thorax “pulls” blood back from the positive pressure areas.

Positive pressure

Negative pressure

Positive pressure

Maintaining the “negativity” of the pressure inside of the thorax is one of the most vital areas of understanding resuscitation

Negative pressure

Positive Pressure in the Thorax decreases Venous Return!!

Breathing the patient too fast INCREASES pressure inside the chest!

8/16/2007

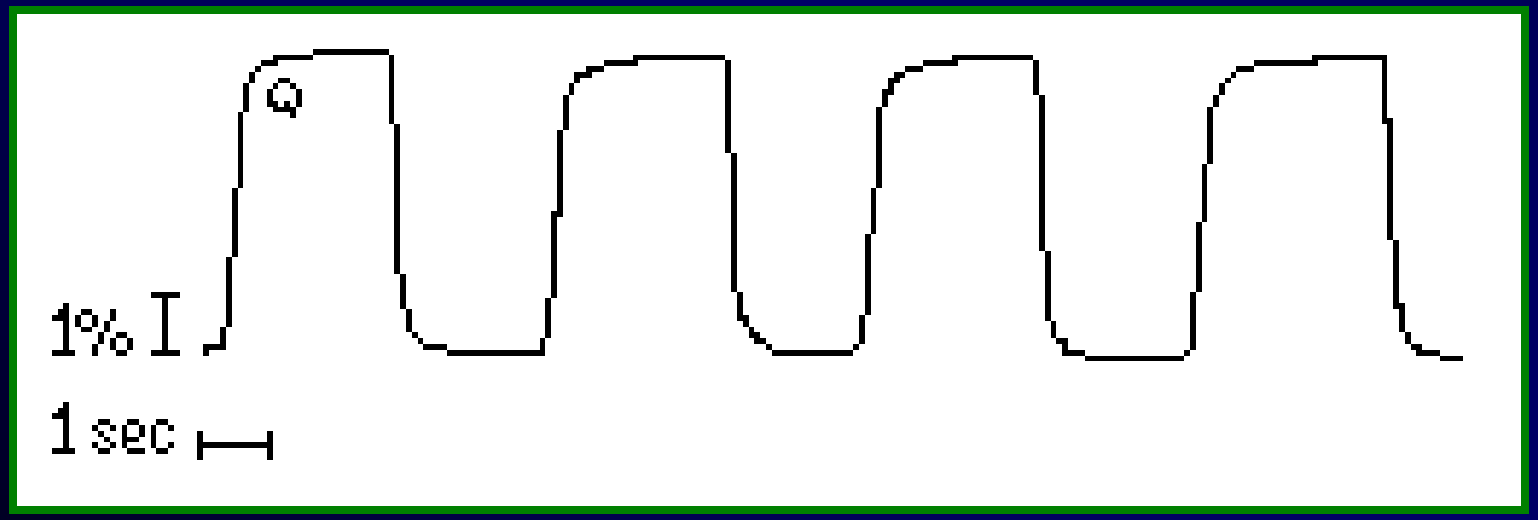
8/16/2007

8/16/2007

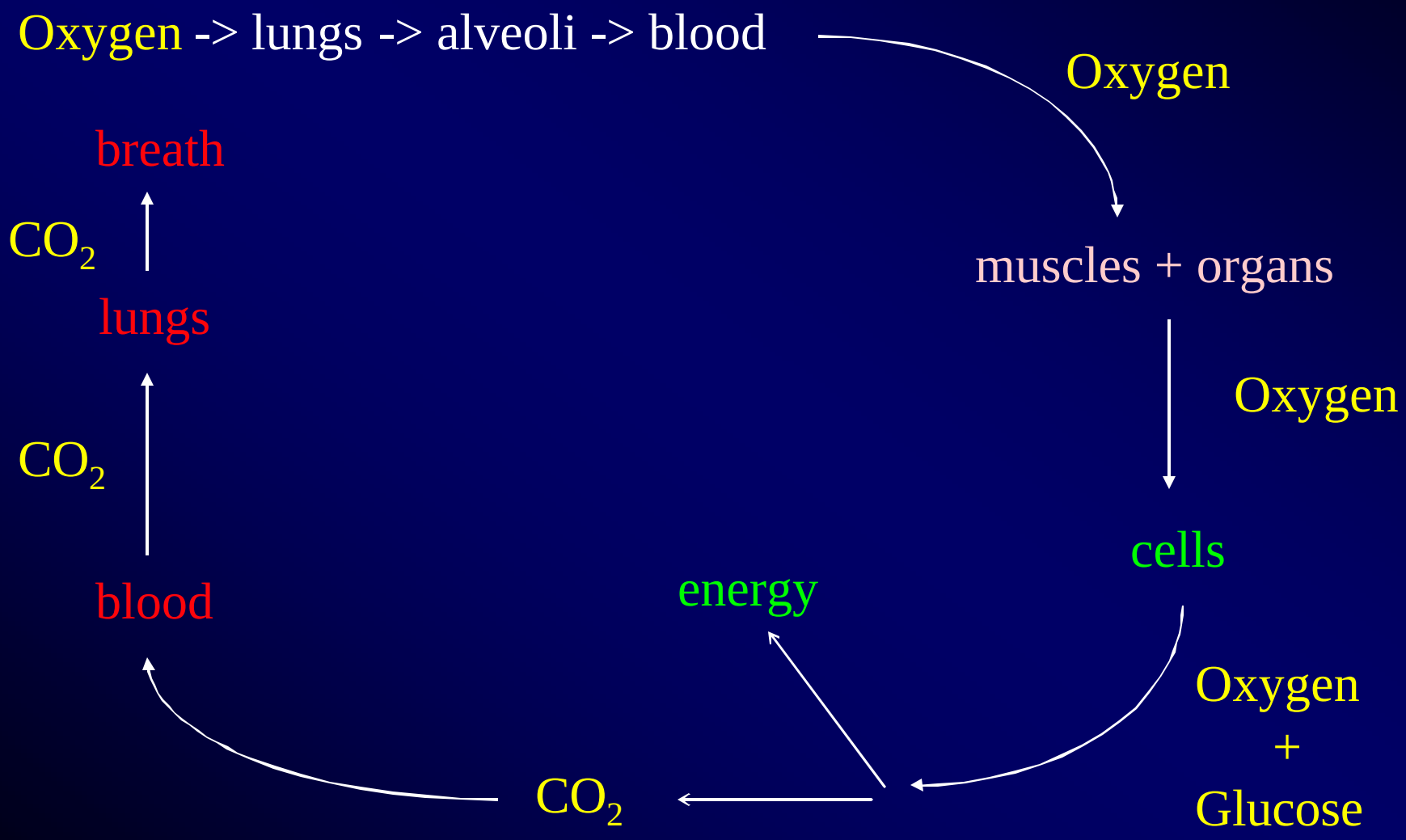
A one hand squeeze at a rate of one every eight seconds is ALL the ventilation that a patient in circulatory collapse needs!

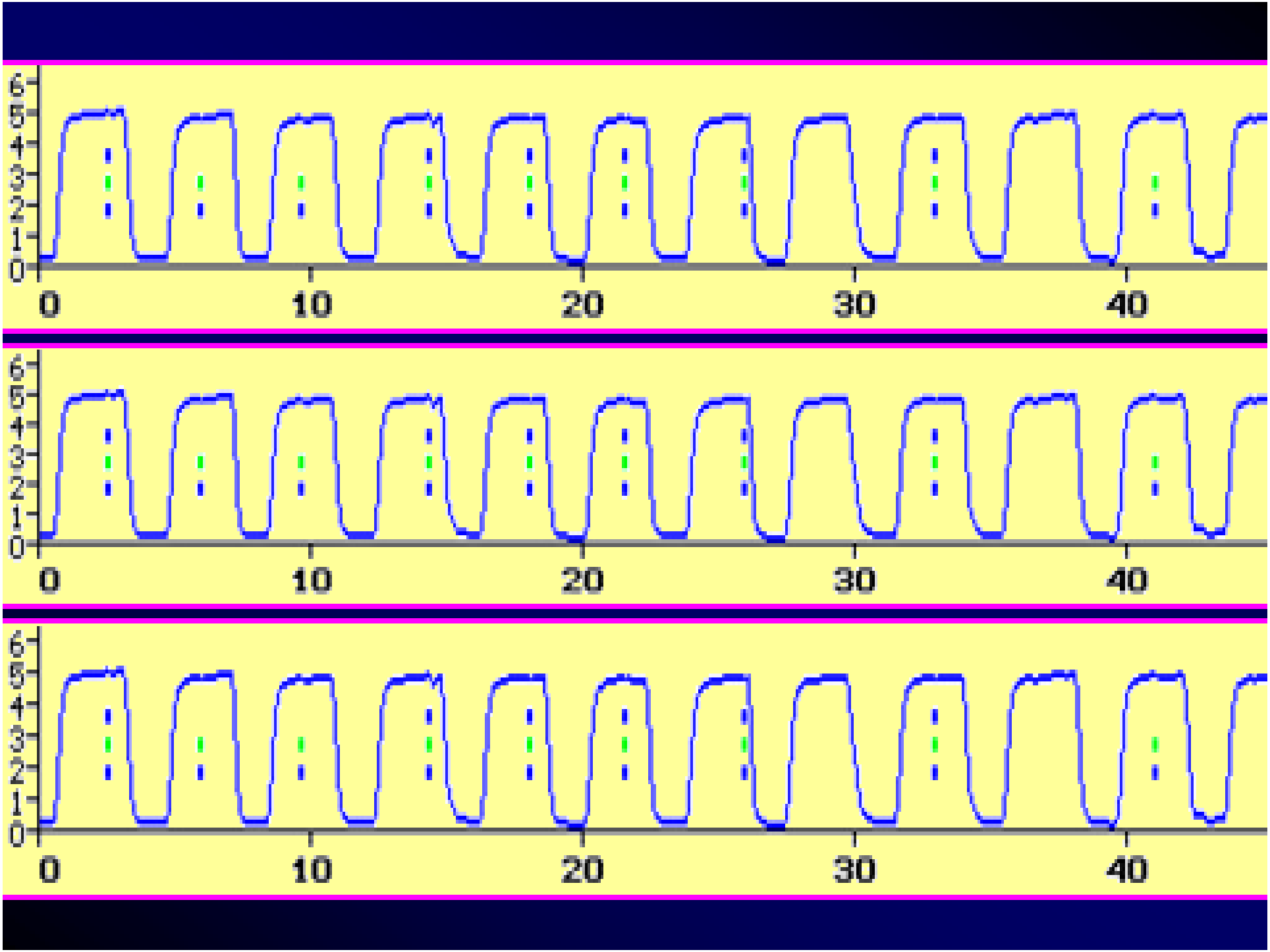
Breathing the patient faster than that may reduce venous return, worsen shock, and kill the patient!

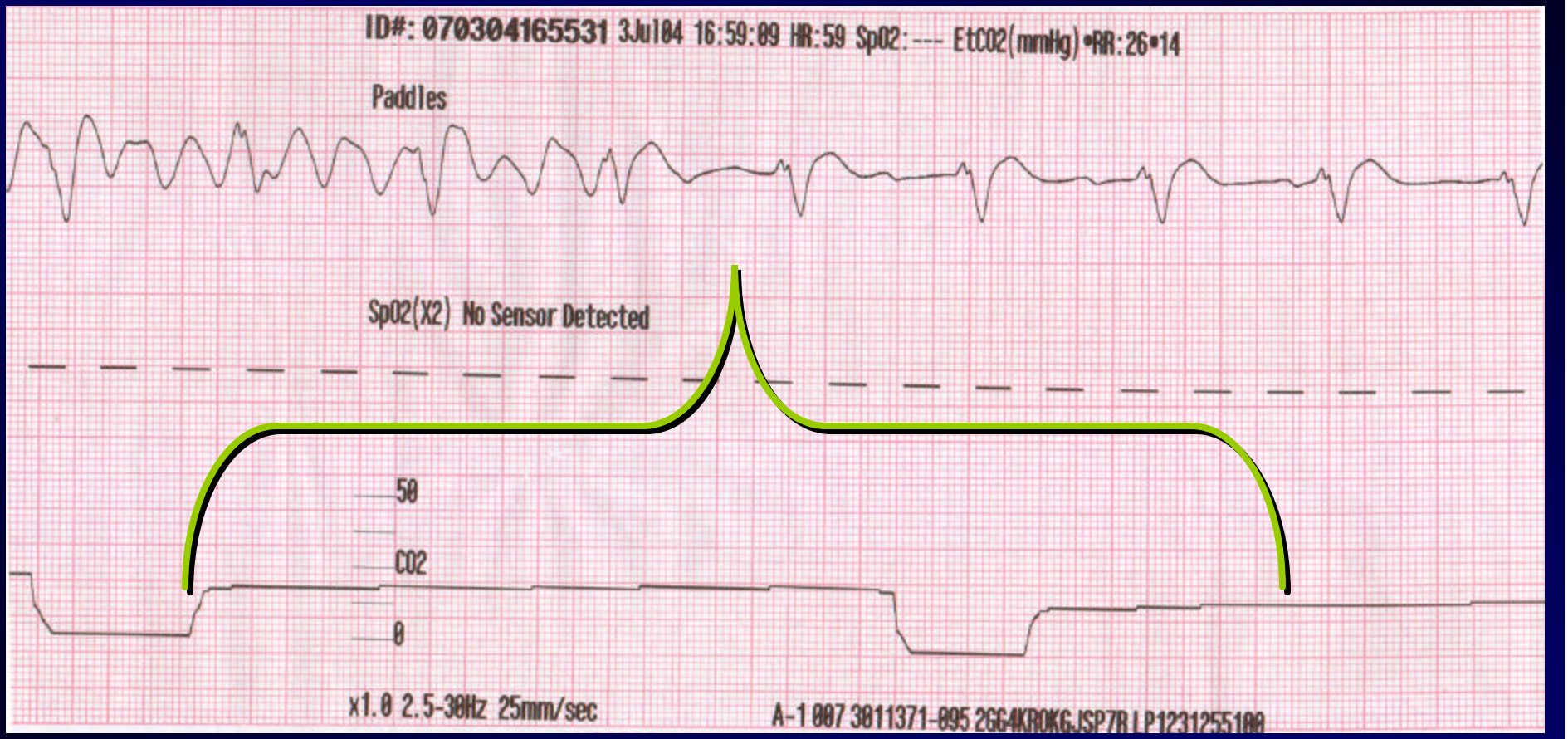
Let capnography guide you!



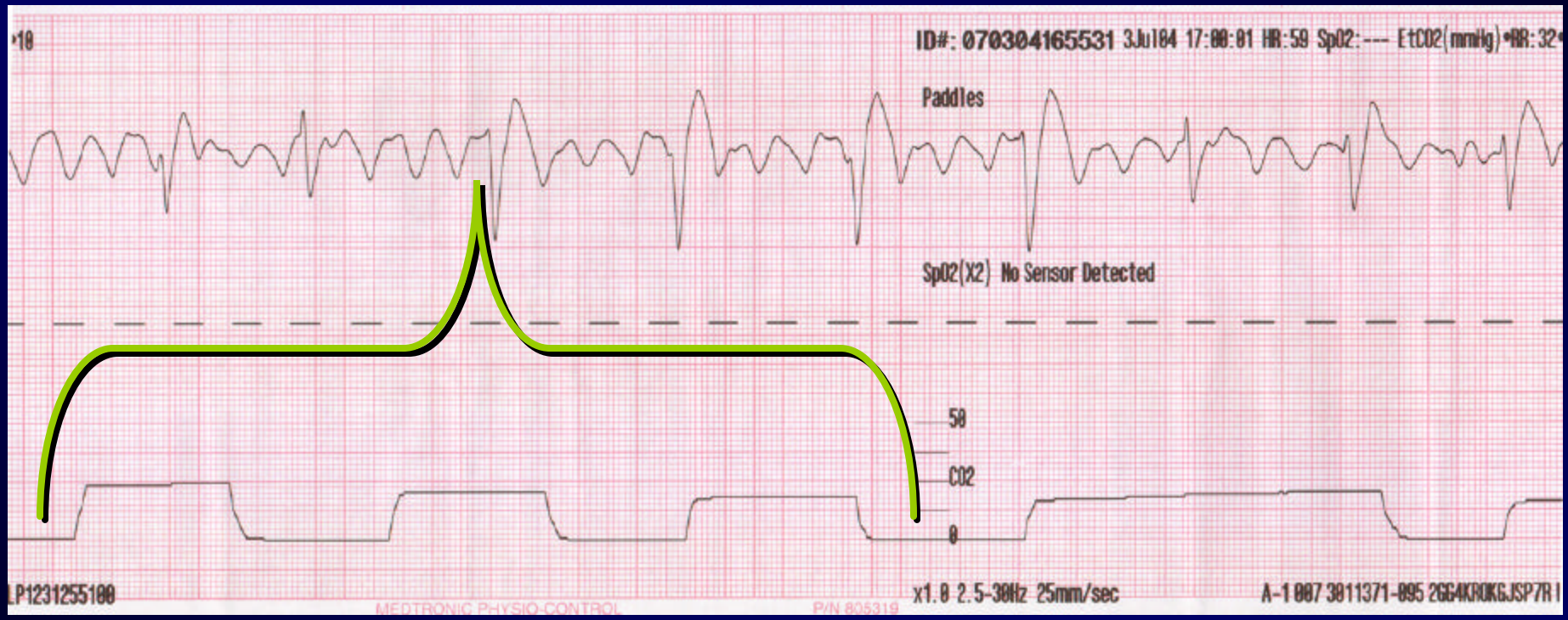
Physiology


Oxygen -> lungs -> alveoli -> blood
Oxygen
muscles + organs
Oxygen
cells
Oxygen
+
Glucose
energy
CO_2
blood
CO_2
lungs
breath
CO_2


0
1
2
3
4
5
6
0
10
20
30
40


ID#: 070304165531 3Jul04 16:59:09 HR:59 SpO2:--- EtCO2(mmHg) •RR:26•14
Paddles
SpO2(X2) No Sensor Detected
50
CO2
0
x1.0 2.5-30Hz 25mm/sec
A-1 007 3011371-095 2GG4KR0KGJSP7R LP1231255100

8/16/2007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Paddles
SpO2(X2) No Sensor Detected
50
CO2
0
LP1231255100
x1.0 2.5-30Hz 25mm/sec
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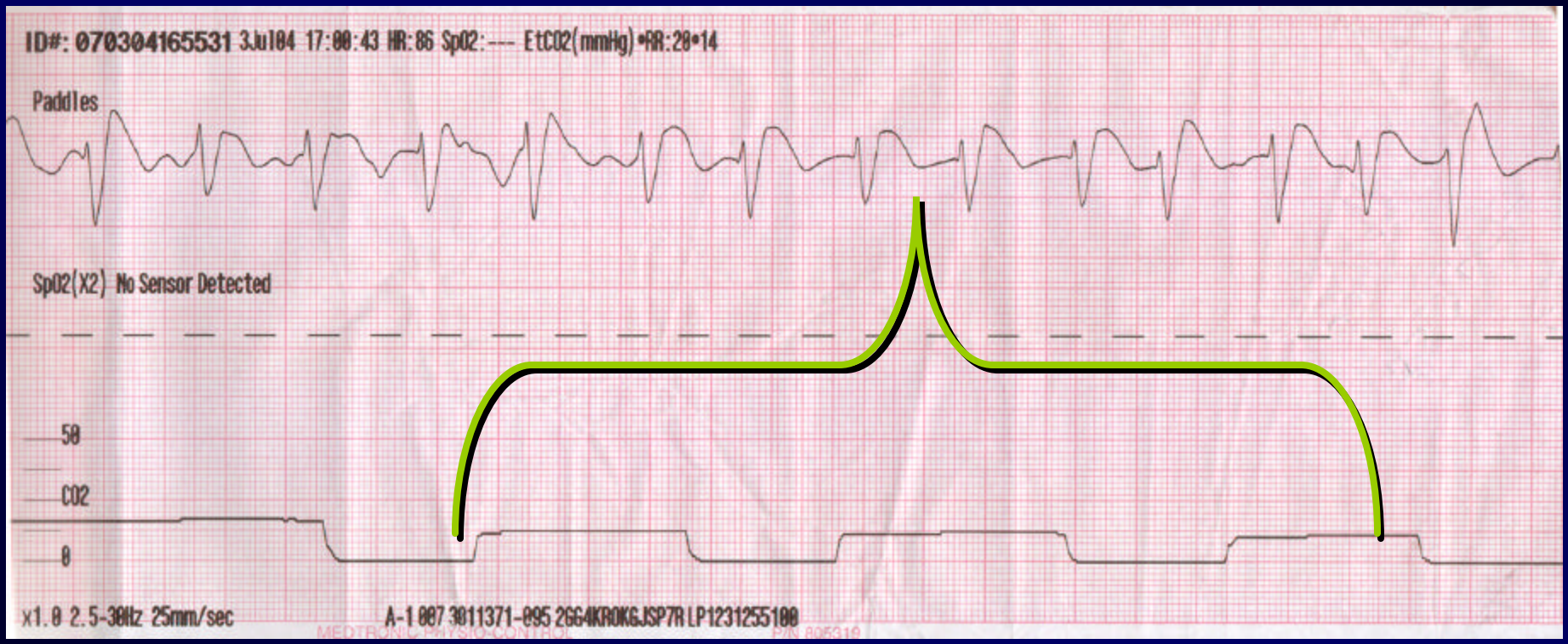
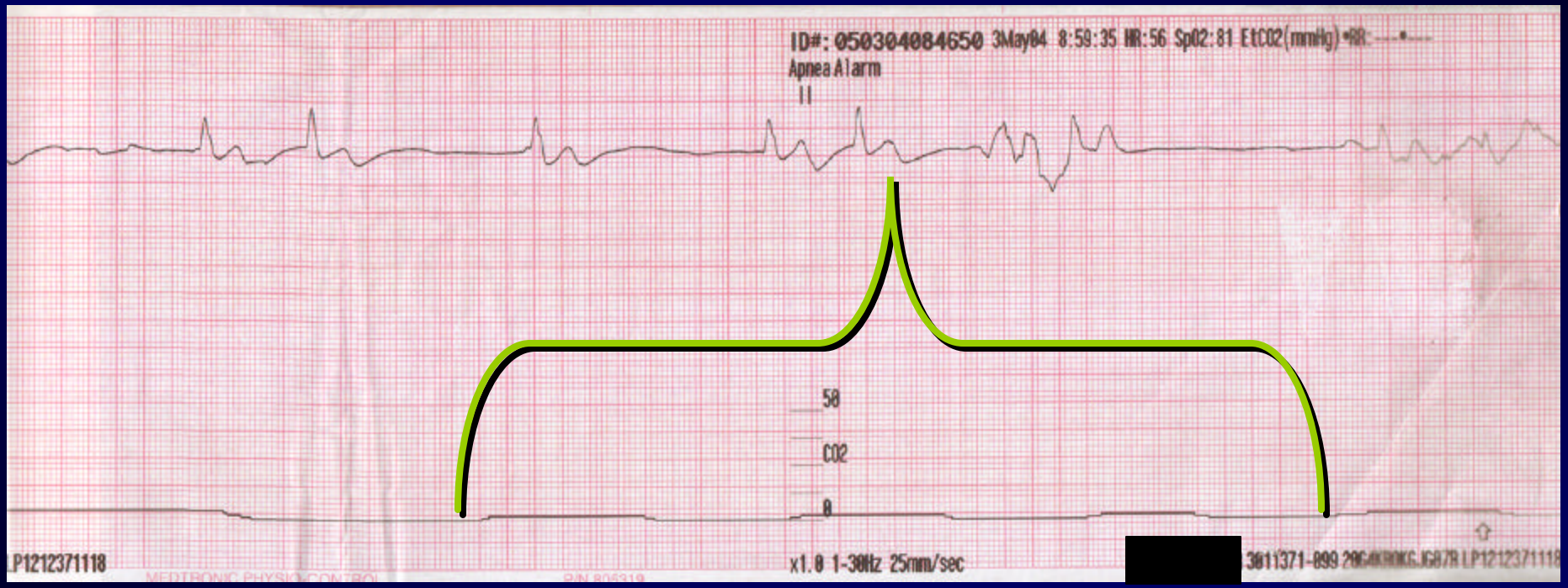
MEDTRONIC PHYSIO-CONTROL
P/N 805319

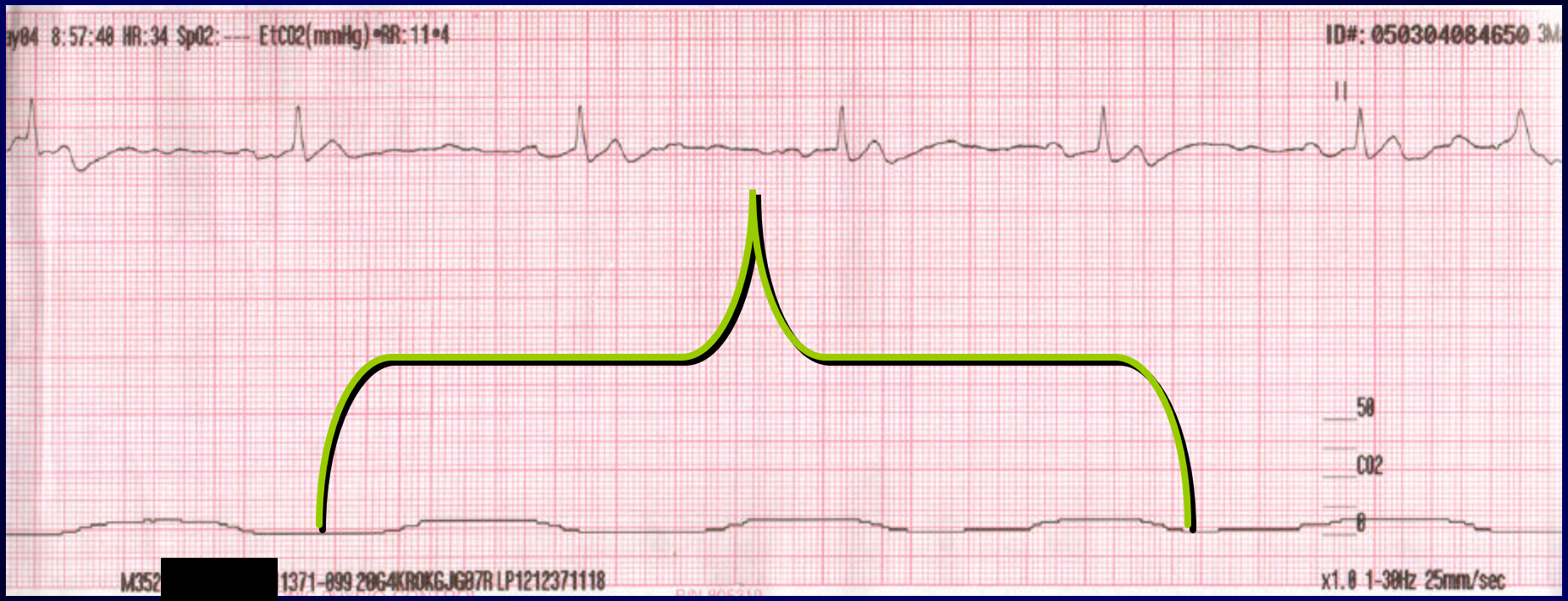
8/16/2007


ID#: 070304165531 3Jul04 17:00:43 HR:86 SpO2:--- EtCO2(mmHg) •RR:20•14
Paddles
SpO2(X2) No Sensor Detected
50
CO2
0
x1.0 2.5-30Hz 25mm/sec
A-1 007 3011371-095 2GG4KR0KGJSP7R LP1231255100

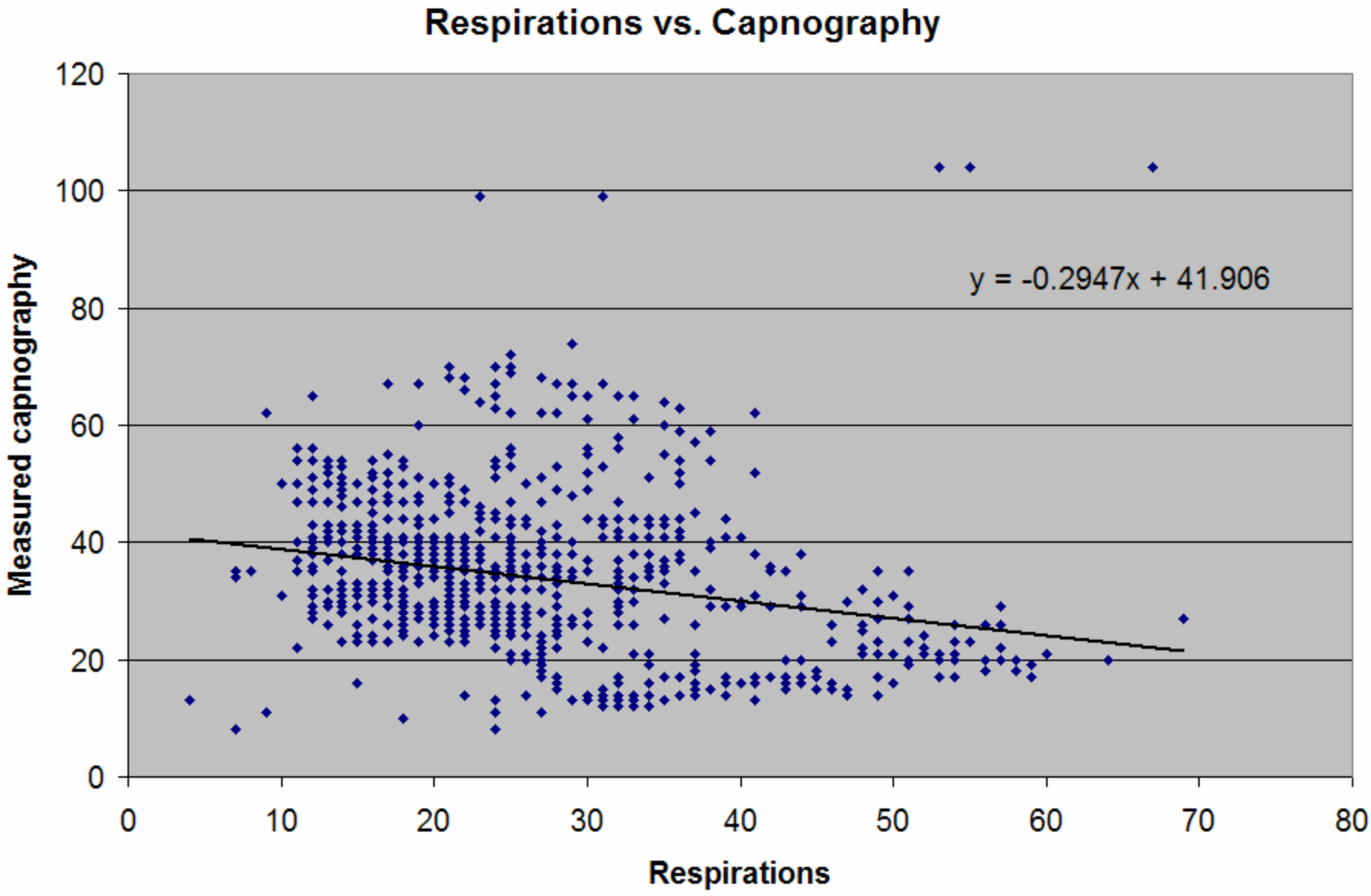
8/16/2007


ID#: 050304084650 3May04 8:59:35 HR:56 SpO2:81 EtCO2(mmHg)
Apnea Alarm
II
50
CO2
0
x1.0 1-30Hz 25mm/sec

8/16/2007


8:57:48 HR:34 SpO2:--- EtCO2(mmHg) RR:11
ID#: 050304084650
II
50
CO2
0
x1.0 1-30Hz 25mm/sec

8/16/2007


Respirations vs. Capnography
Measured capnography
Respirations
y = -0.2947x + 41.906
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80

8/16/2007

Colorimetric method

- A (purple) = < 4 mm Hg
- B (tan) = 4-15 mm Hg
- C (yellow) = > 15 mm Hg

Start with the rate of eight, and then measure capnography every five minutes.

Below 20 mmHG CO_2, then slow to 1 every 10 seconds.

Above 40 mmHg CO_2, then increase rate to 1 every 6 seconds.

8/16/2007

Airway Management

Ruminating on a tough subject

8/16/2007

Is mannequin training enough?

What did Wang find?

Intubation in the hands of many EMS professionals:

1. Over-manipulates the airway,
2. Causes aspiration
3. Causes prolonged hypoxia
4. Is a route for overventilation
5. Increases mortality 30% in TBI Patients

Multivariate Predictors of Failed Prehospital Endotracheal Intubation

Henry E. Wang, MD, Douglas F. Kupas, MD, Paul M. Paris, MD, Robyn R. Bates, MS, Joseph P. Costantino, DrPH and Donald M. Yealy, MD

From the Department of Emergency Medicine, University of Pittsburgh School of Medicine (HEW, PMP, RRB, DMY), Pittsburgh, PA; the Department of Emergency Medicine, Geisinger Health System (DFK), Danville, PA; and the Department of Biostatistics, Graduate School of Public Health, University of Pittsburgh (JPC), Pittsburgh, PA.

8/16/2007

Of 61 factors potentially related to ETI failure, multivariate logistic regression revealed the following significant covariates associated with ETI failure (odds ratio; 95% confidence interval; likelihood ratio p-value):

presence of clenched jaw/trismus
(9.718; 95% CI = 4.594 to 20.558; p < 0.0001);

inability to pass the endotracheal tube through the vocal cords
(7.653; 95% CI = 3.561 to 16.447; p < 0.0001);

inability to visualize the vocal cords
(7.638; 95% CI = 3.966 to 14.707; p < 0.0001);

intact gag reflex
(7.060; 95% CI = 3.552 to 14.033; p < 0.0001);

intravenous access established prior to ETI attempt
(3.180; 95% CI = 1.640 to 6.164; p = 0.0005);

increased weight (ordinal scale)
(1.555; 95% CI = 1.242 to 1.947; p = 0.0001);

electrocardiographic monitoring established prior to ETI attempt
(0.199; 95% CI = 0.084 to 0.469; p = 0.0003).

ORAL ENDOTRACHEAL INTUBATION

Indications:

1. Respiratory or cardiac arrest
2. Unconsciousness without a gag reflex
3. Decreased minute volume, due to decreased respiratory rate or volume
4. Possible airway obstruction
5. GCS ≤ 8

Contraindications:

1. None in the presence of hypoxia, unresponsive to ventilation, need for advanced airway or cardiopulmonary arrest

Procedure:

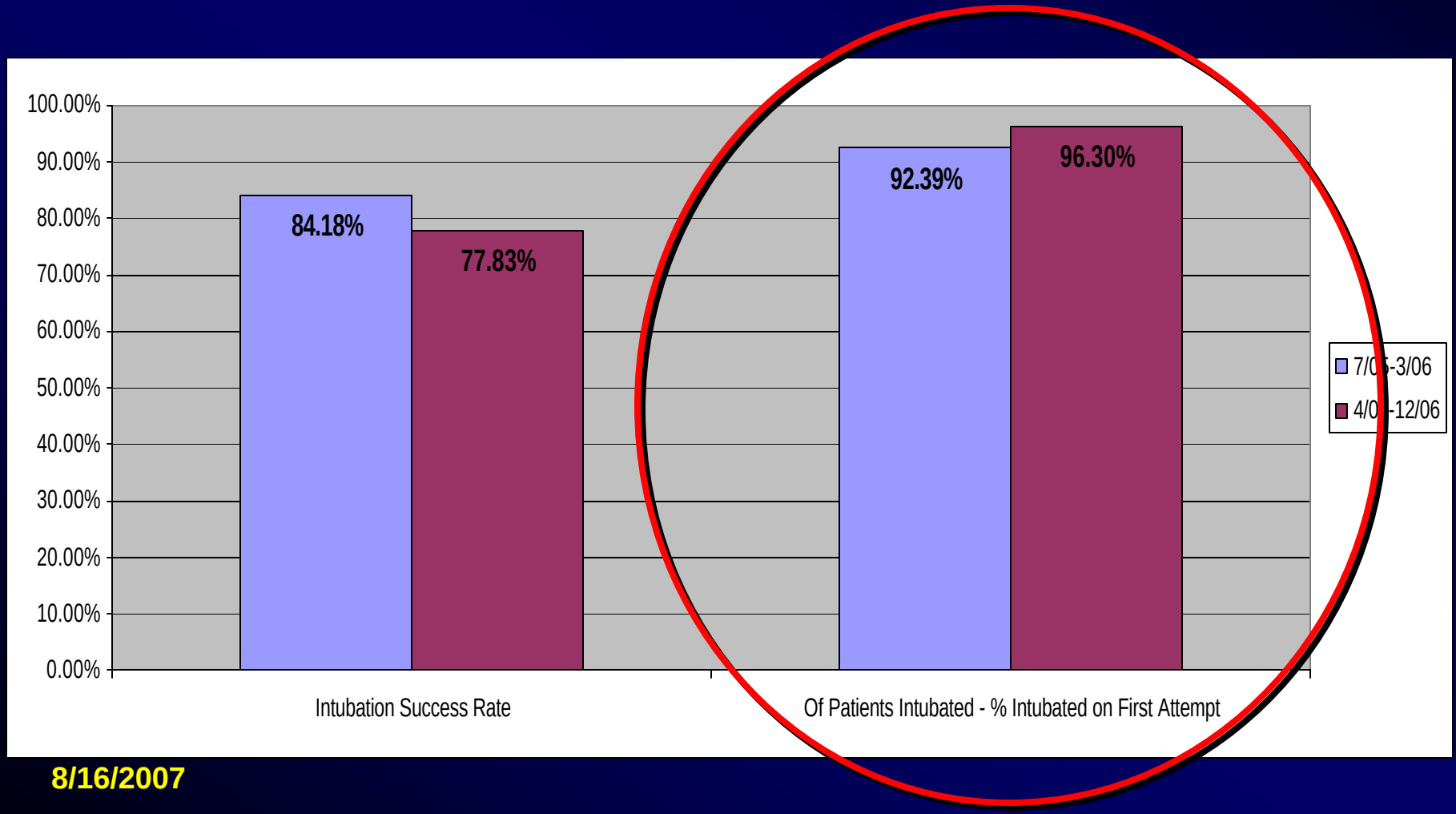
1. Preoxygenate the patient, if possible
2. Assemble and check equipment

15. IF ETT Intubation is unsuccessful after ONE attempt, insert a Combitube.

tongue

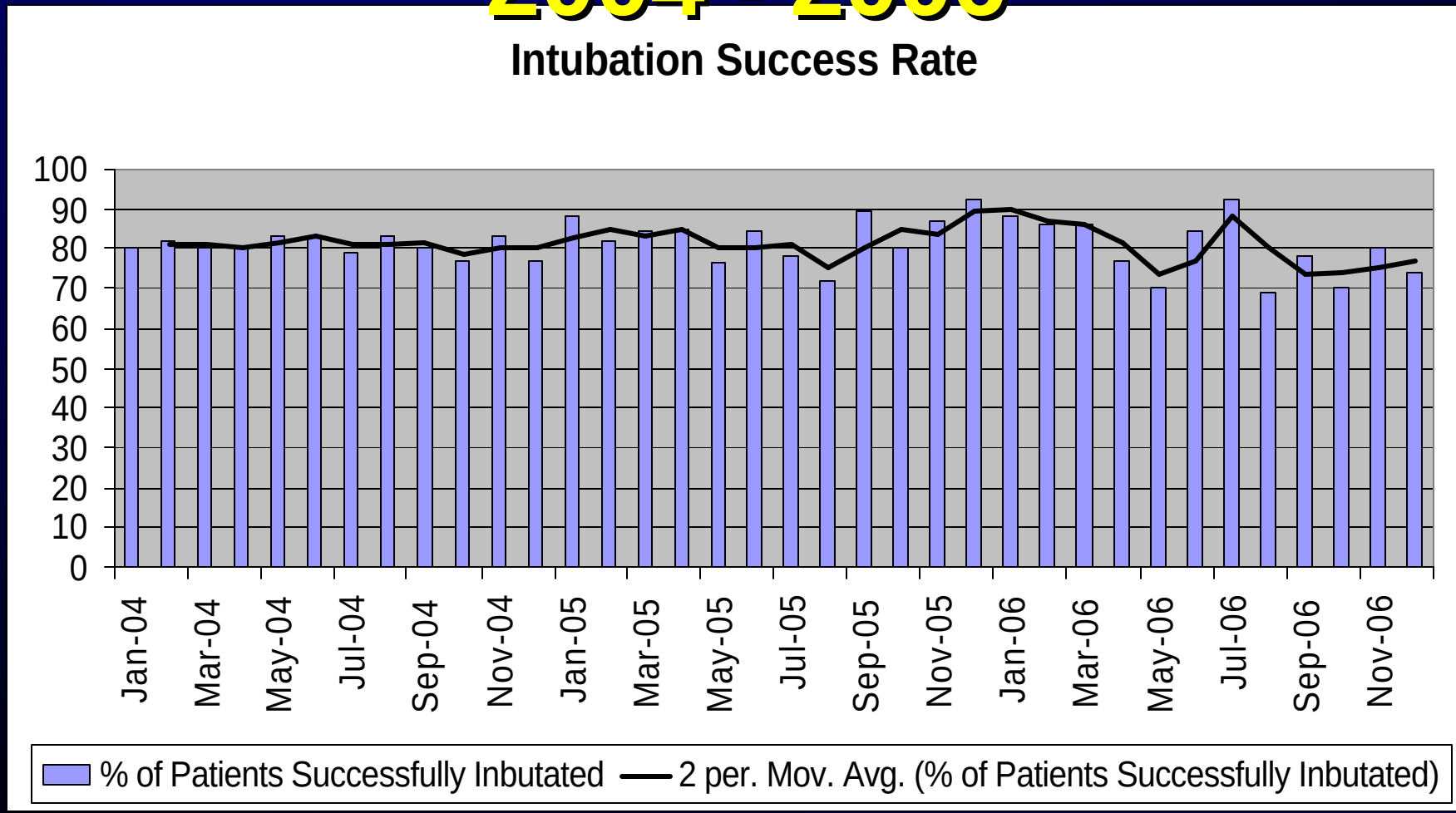
6. The tip of curved blades should be placed in the vallecula while the tip of straight blades should be extended beyond the epiglottis.
7. Lift the epiglottis either directly or indirectly, visualizing the vocal cords.
8. Slip the endotracheal tube and stylet past the vocal cords about ½ to 1 inch. Gentle, downward pressure on the cricoid cartilage (Sellick's maneuver) may assist.
9. While holding onto the tube, attempt and assess ventilations
10. If the chest rises and breath sounds are present, inflate the distal cuff with 5 to 10 ml of air
11. Confirm proper airway placement and assesses the quality of ventilations
12. Record capnographic change, breath sound locations and chest rise and fall
13. Secure tube with an endolock device
14. Continuously reassess breath sounds
15. If ETT intubation is unsuccessful after **one** attempt, insert a Combitube.

ETT Intubations
July 2005 – December 2006



8/16/2007

MedStar
ET Intubation Success Rates
2004 - 2006



Airway

The King LTS-D

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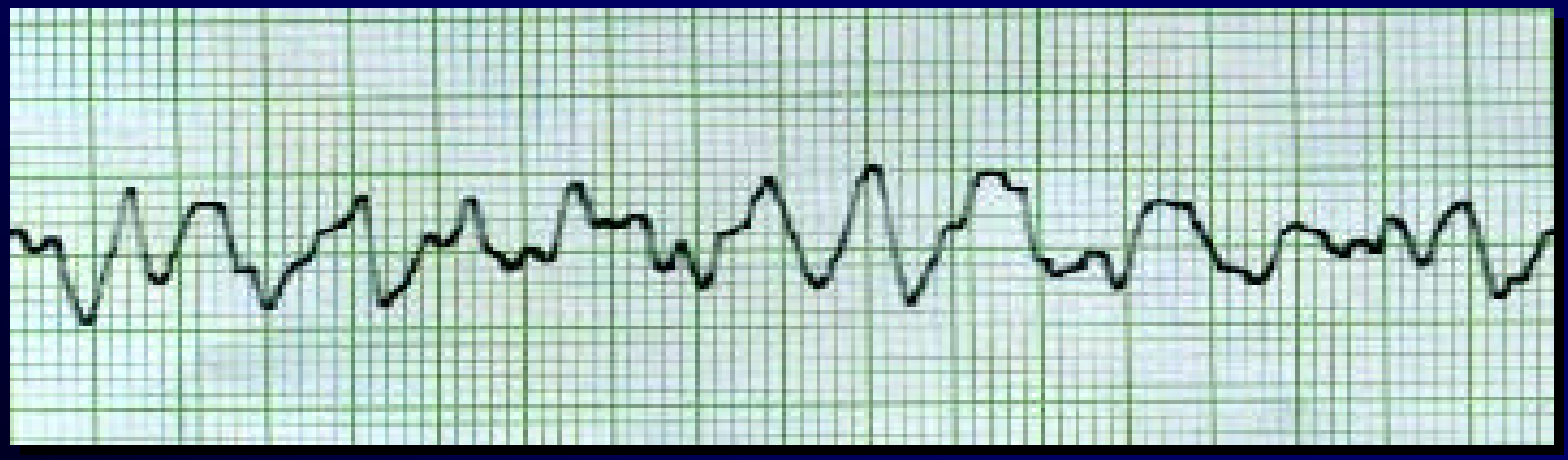
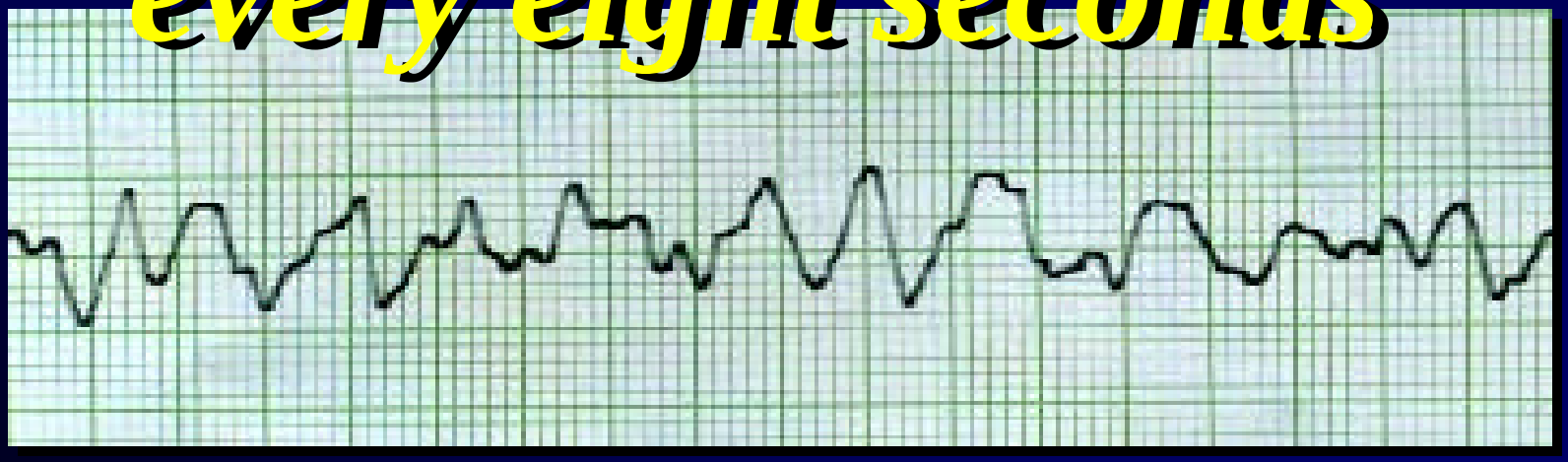
American Heart Association recommends using capnography to guide the rate of ventilation during cardiac arrest.

So, what do we do with this guy??



Make SURE that his ventilation rate is a one hand squeeze every eight seconds



Evaluate capnography or capnometry five minutes later

Adjust the ventilation rate from there

…and, if you do this…
AND YOU MUST…
you will likely be the only person on the team who understands that this is now the standard

EMS is leading the emergency medicine industry in critical care ventilation

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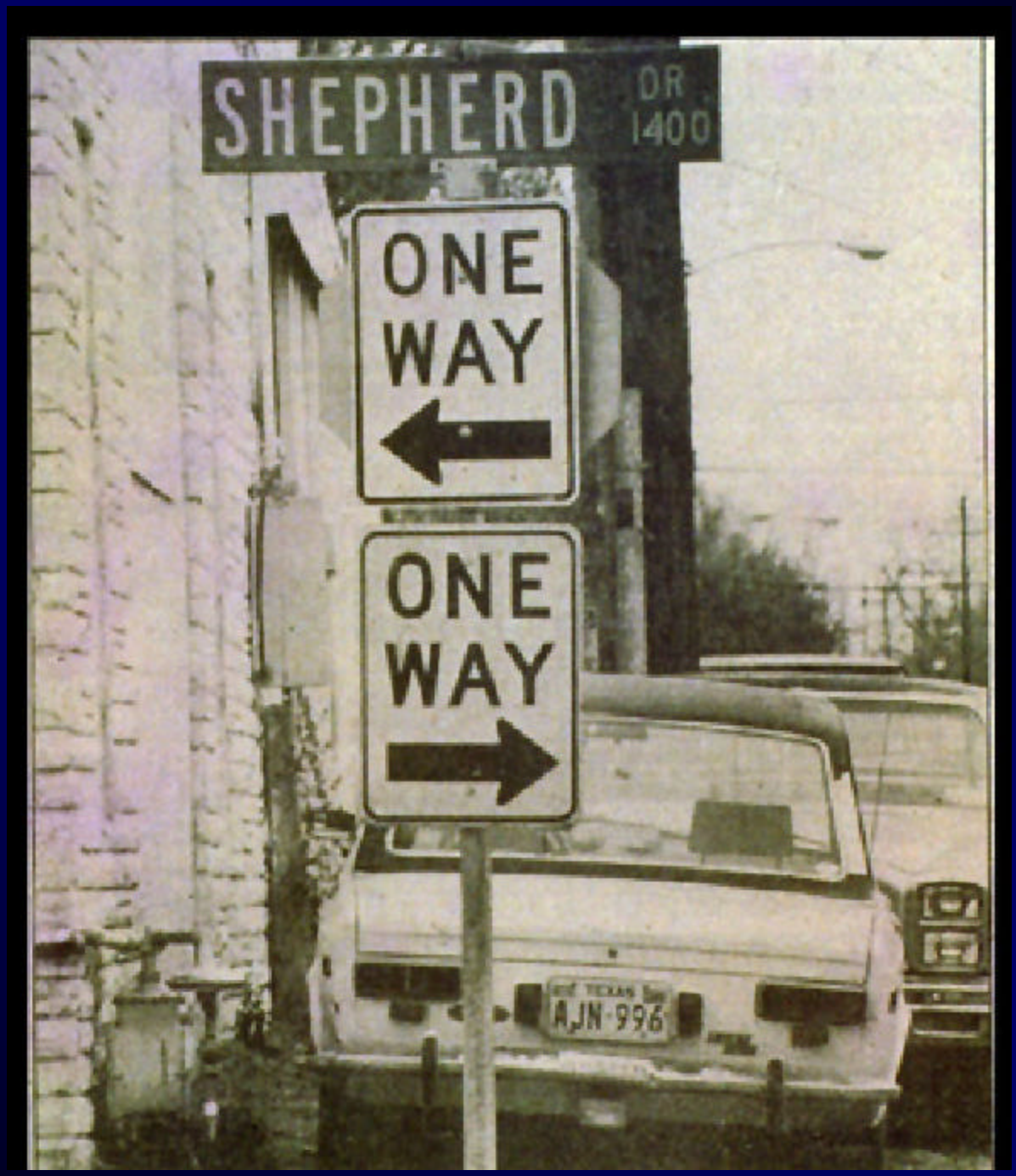

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Case #4

8/16/2007

Call goes down:
Several people down
at Local Stadium
at the playoff game

LOC reported on many
Seizures present on a few

Mass panic is in effect
Hundreds have been trampled as thousands storm out of the building

Many are lying on the ground, showing pinpoint pupils, extreme salivation, dyspnea, wheezing, and muscle fasciculations

Considerations:

Protect yourself…prepared???

Dead animals present?

Up hill, upwind

Avoid contamination

Red survey

"Get 'em in,
get 'em out!"

Primary Survey

LOC/Airway/Cspine
Respiratory Rate and Labor
Pulses, Neck and Wrist
Skin CMT/CRT
Neck appearance, NVD, Trachea
Chest appearance
Breath sounds present and equal
Brief exam of abd, pelvis, LE, UE, Back

Red Survey

Many Victims?

- LOC
- Position Airway
- Not breathing? Move on
- Pulseless? Move on

Nerve Gas:

How much atropine do you have?
Mark I kits available?

Give atropine until secretions dry up, not necessarily pupils getting small

Chlorine/Mustard:

Coughing and airway stuff
Oxygen
Albuterol
Decontamination
Transfer

Cyanide:

Oxygen

Ventilation support

Must have cyanide kit

Three drugs still IN (amyl nitrite, Na^+ nitrite, Na^+ thiosulfate)

Transfer

Constant Scene Assessment:

The new standard for EMS

Even prior to the initiation of incident command

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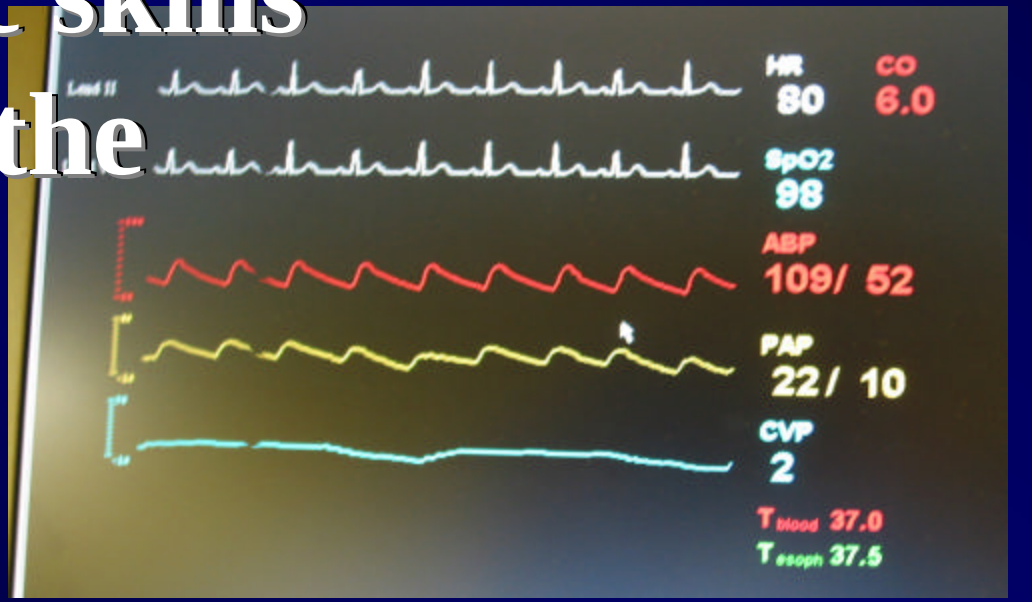
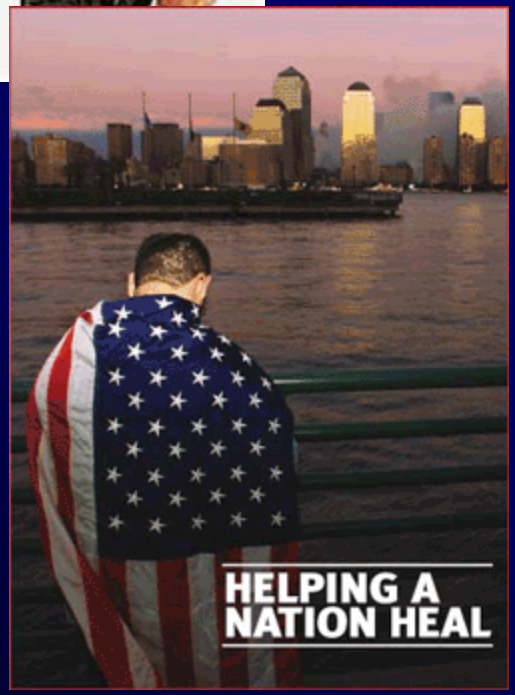
Uphill and upwind isn't enough:

You have to apply your same diagnostic skills to "diagnosing the environment"





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UZBEKISTAN
Aqcheh
Meymaneh
Morghab
TERRORISM
Who would do this?
Afghanistan
Copyright 2001rock.com

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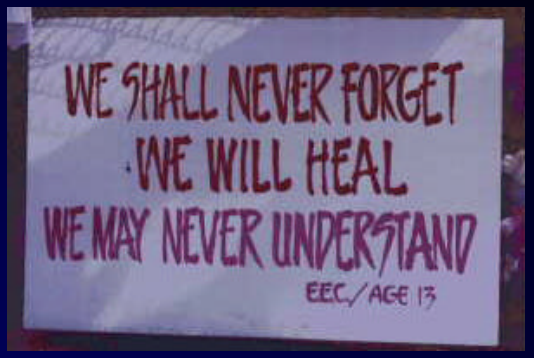
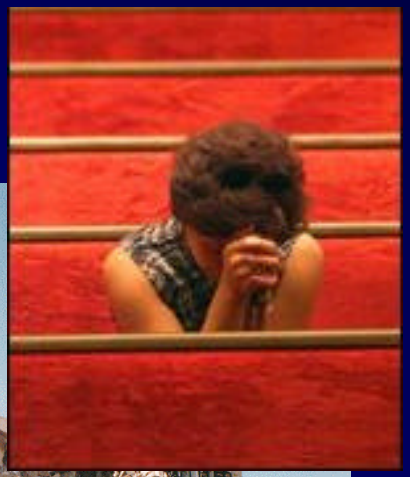

WE SHALL NEVER FORGET
WE WILL HEAL
WE MAY NEVER UNDERSTAND
EEC/AGE 13


FDNY

8/16/2007



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Synthesis

8/16/2007

The professionalism of EMS continues to grow

You, the heroes of the streets, must concentrate harder than ever to stay on top of your job

Whoever you are, wherever you work…

…only your best, every time, is enough

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www.rayfowler.com

www.emergencymedicine.ws

"the emergency medicine website"

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Thank you for your kind attention!

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