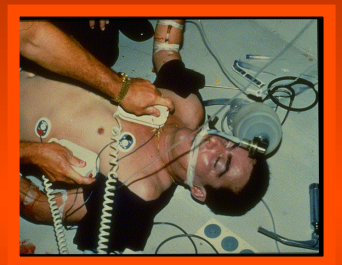
Existential Fun Park…

Why Are You Here??

2013 Ways to Push the Resuscitation Envelope:

Go with the Flow

– *The Sweet Spot, "Snappy" Concepts & Stutter CPR*



Paul E. Pepe, M.D., M.P.H.

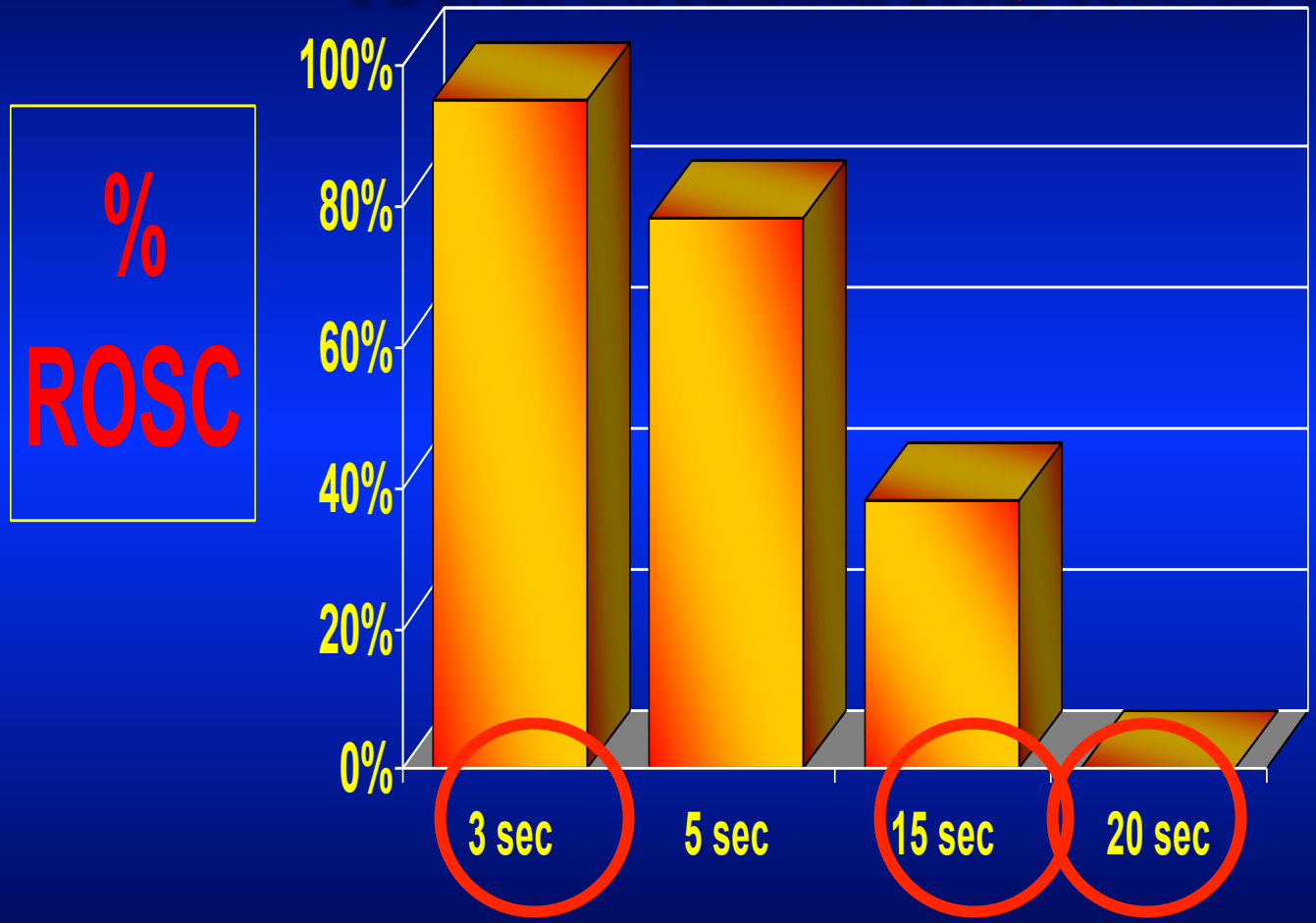
Professor of Medicine, Surgery, Pediatrics, Public Health and Riggs Family Chair in Emergency Medicine

Univ. of Texas Southwestern Medical Center; and Parkland Memorial Hospital; Dallas, USA

Chest Compressions
Critical to Resuscitation…

"Hands-Off" Interval

Yu et al. Circulation 2002; 106:368-72



Delay from Stopping CPR

ORIGINAL CONTRIBUTION

Minimally Interrupted Cardiac Resuscitation by Emergency Medical Services for Out-of-Hospital Cardiac Arrest

Bentley J. Bobrow, MD
Lani L. Clark, BS
Gordon A. Ewy, MD
Vatsal Chikani, MPH
Arthur B. Sanders, MD

Context Out-of-hospital cardiac arrest is a major public health problem.

Objective To investigate whether the survival of patients with out-of-hospital ca diac arrest would improve with minimally interrupted cardiac resuscitation (MICR), a alternate emergency medical services (EMS) protocol.

Design, Setting, and Patients A prospective study of survival-to-hospital di charge between January 1, 2005, and November 22, 2007. Patients with out-o

Chest Compression Rates During Cardiopulmonary Resuscitation Are Suboptimal

A Prospective Study During In-Hospital Cardiac Arrest

Benjamin S. Abella, MD, MPhil; Nathan Sandbo, MD; Peter Vassilatos, MS; Jason P. Alvarado, BA; Nicholas O'Hearn, RN, MSN; Herbert N. Wigder, MD; Paul Hoffman, CRT; Kathleen Tynus, MD; Terry L. Vanden Hoek, MD; Lance B. Becker, MD

Higher Chest Compression Rates Were Significantly Correlated with Initial Return of Spontaneous Circulation

nonsurvivors, 90±17 and 79±18 cpm, respectively; $P=0.0033$).

Conclusions—In-hospital chest compression rates were below published resuscitation recommendations, and suboptimal compression rates in our study correlated with poor return of spontaneous circulation. CPR quality is likely a critical determinant of survival after cardiac arrest, suggesting the need for routine measurement, monitoring, and feedback systems during actual resuscitation. (***Circulation*. 2005;111:428-434.**)

Key Words: cardiopulmonary resuscitation ■ death, sudden ■ heart arrest

Key Finding of Early Studies

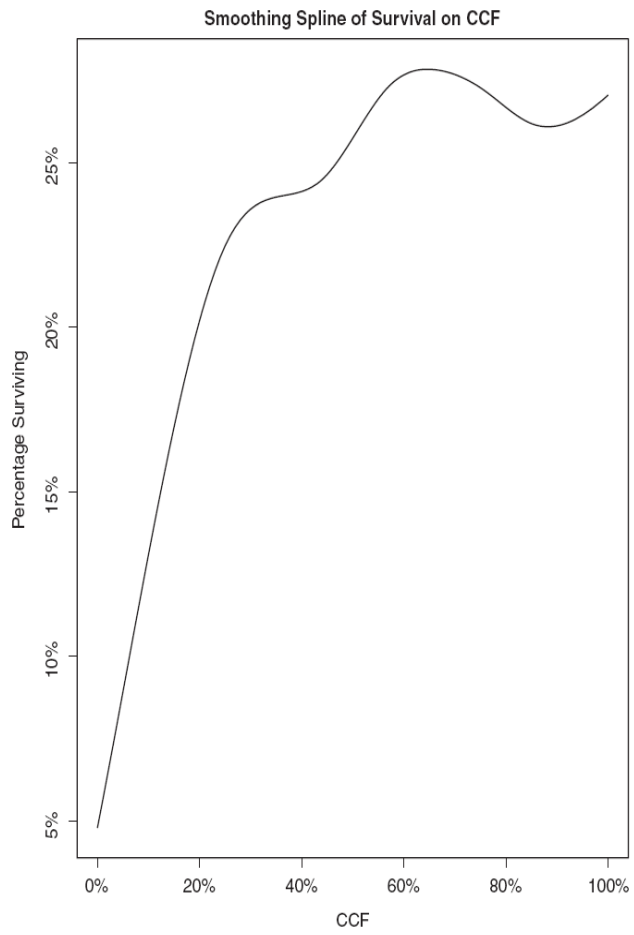
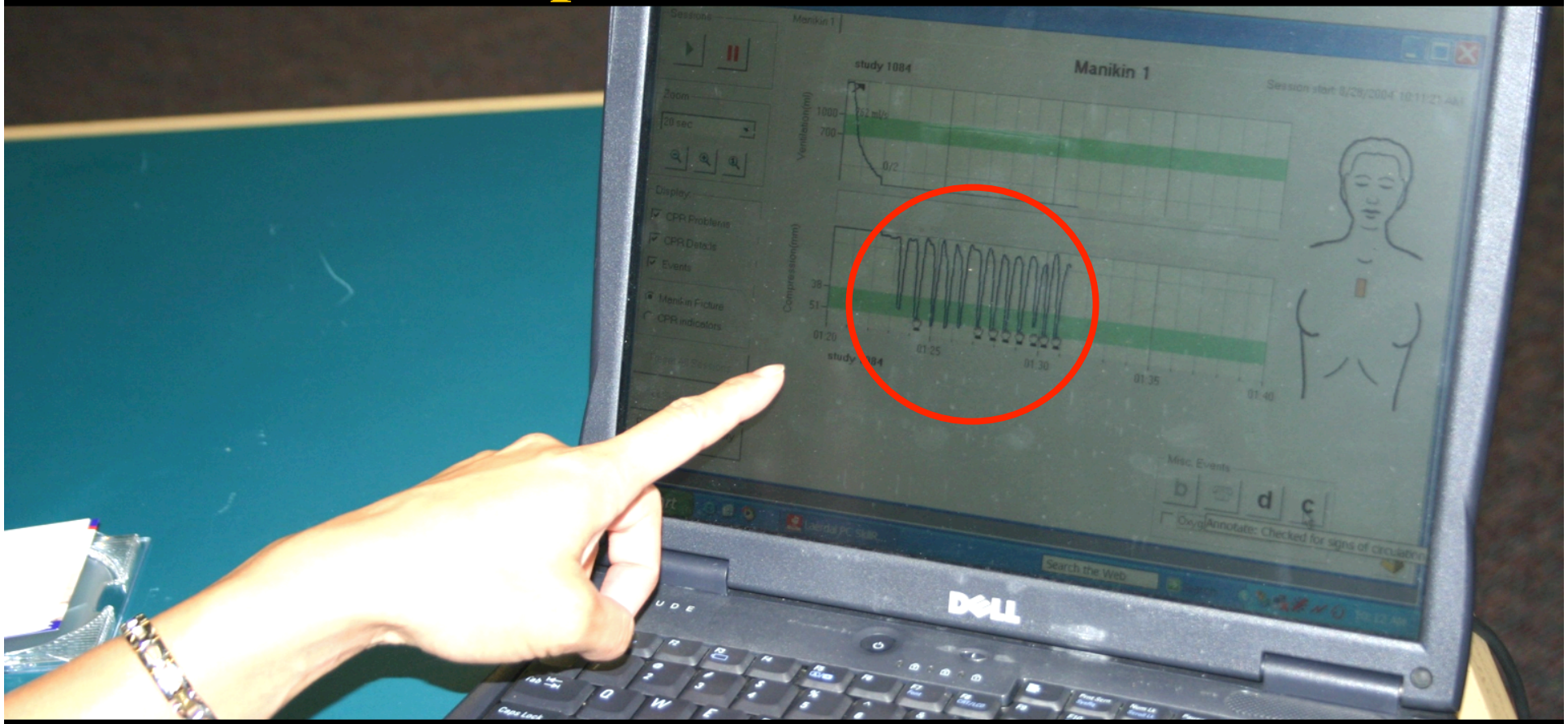


Figure 3. Smoothing spline representing the incremental probability of survival corresponding to a linear increase in chest compression fraction.

Chest Compression Fraction Determines Survival in Patients With Out-of-Hospital Ventricular Fibrillation

i.e., The More Time Medics Spend Doing Chest Compressions, Then the Better the SURVIVAL RATE !!

NIH ROC: Besides Salaries for Expert Personnel to Capture the Data & Outcomes ...



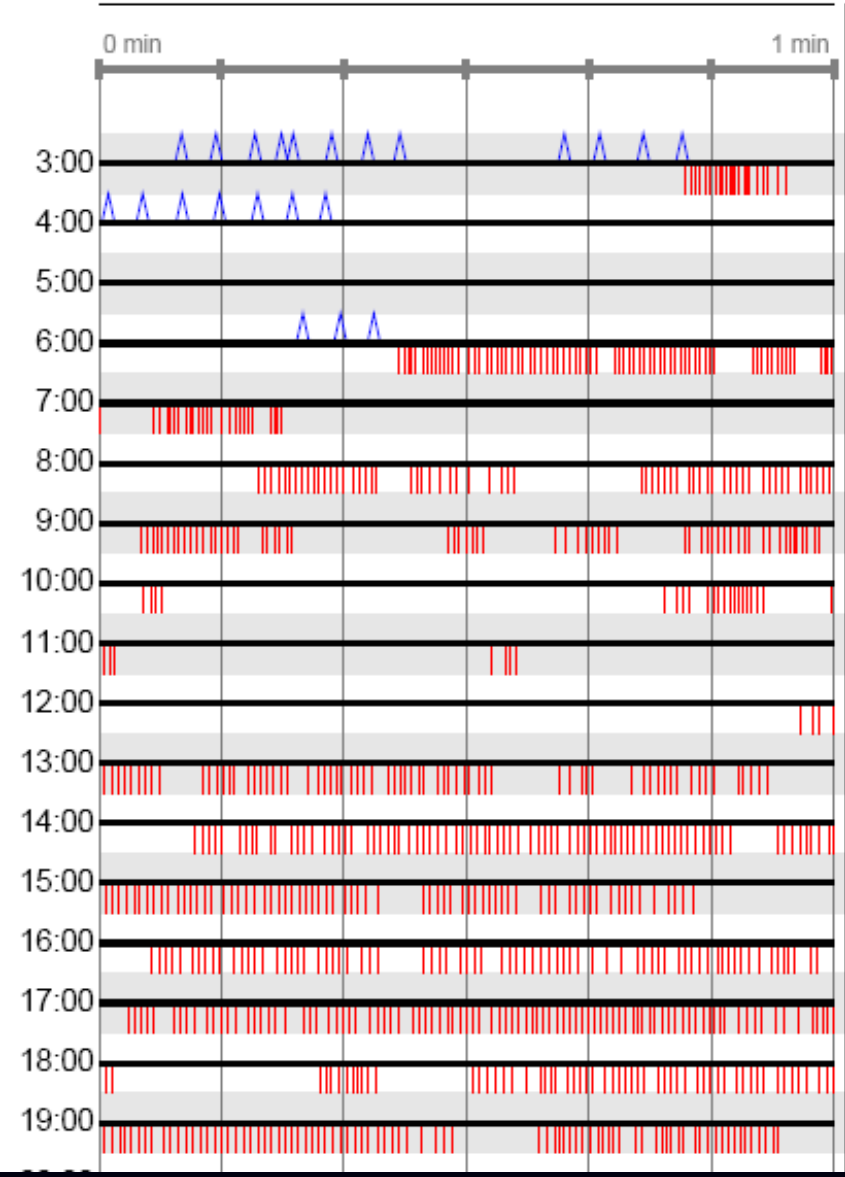
DFR Acquired Monitoring Equipment:

for example, the ability to Capture Sec. to Sec. Performance of CPR

…. Recorded and Measured on Computers!

CPR 2006

CPR QUIK-VIEW

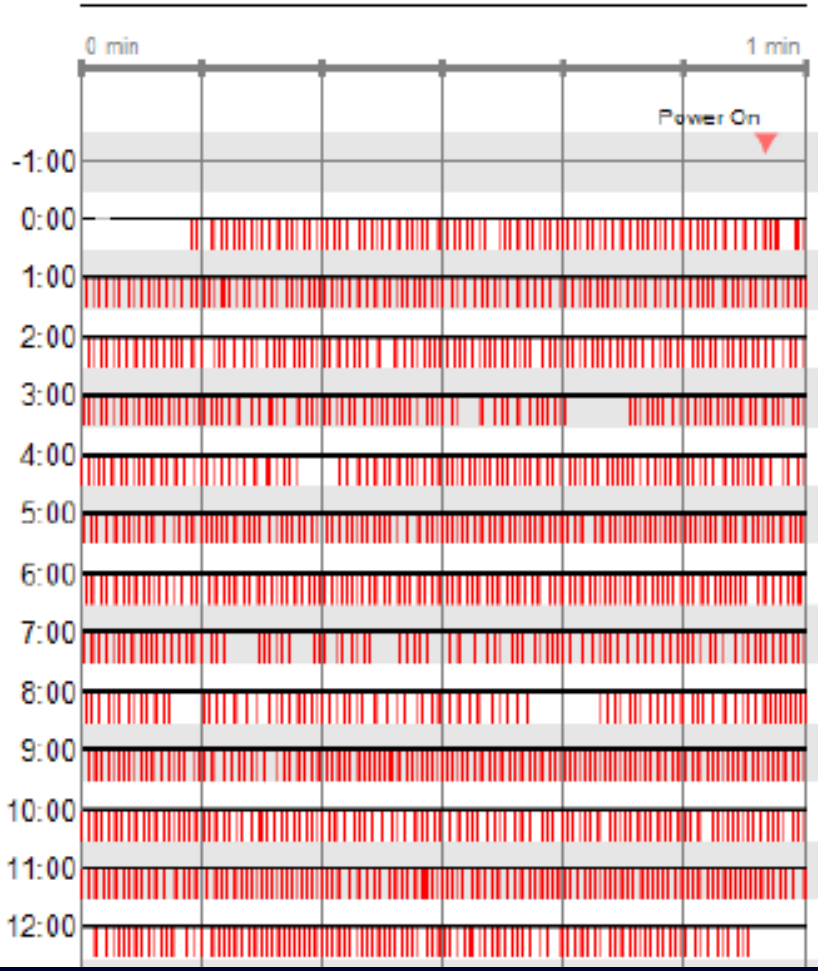


Interval Statistics

CPR Ratio, %	Prompt. CPR Ratio, %	Compr. Ratio, %	Prompt. Compr. Ratio, %	Compr. Rate	Compr. /min	Vent. Rate	Vent. /min
15	--	15	--	163	22	--	12
--	--	--	--	--	--	--	7
--	--	--	--	--	--	--	--
59	--	56	--	145	73	3	3
27	--	21	--	167	26	--	--
63	--	63	--	119	60	--	--
80	--	60	--	123	62	--	--
33	--	20	--	130	21	--	--
9	--	9	--	92	7	--	--
4	--	4	--	--	4	--	--
93	--	77	--	108	69	--	--
87	--	82	--	108	81	--	--
83	--	78	--	107	69	--	--
93	--	88	--	100	74	--	--
100	--	96	--	107	94	--	--
74	--	62	--	107	58	--	--
94	--	84	--	106	83	--	--

CPR 2009

CPR QUIK-VIEW

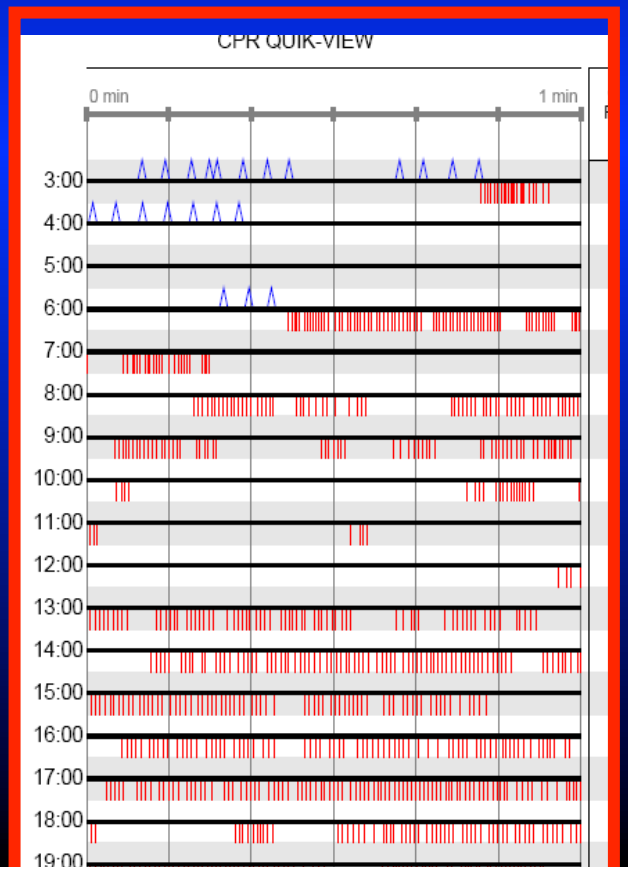


Interval Statistics

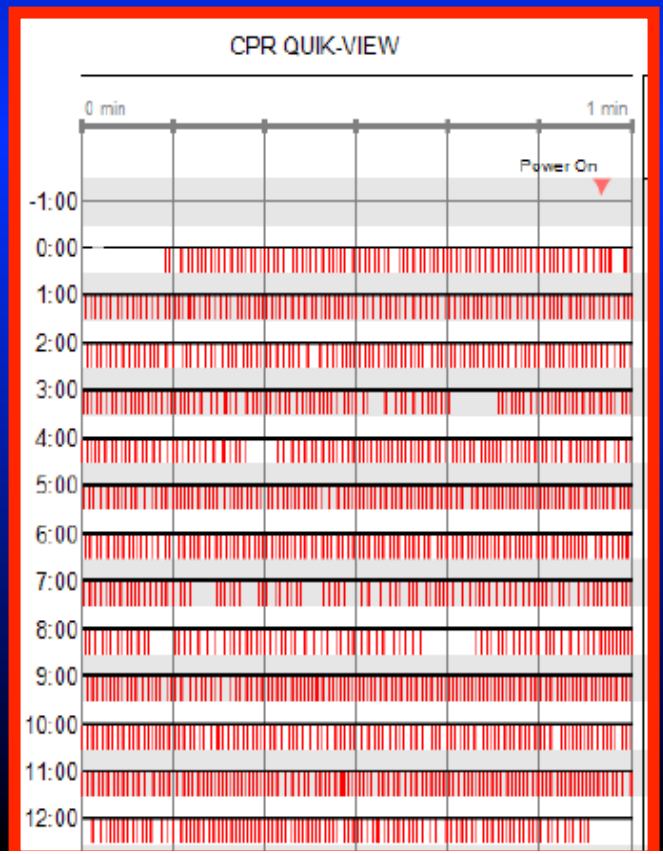
CPR Ratio, %	Prompt. CPR Ratio, %	Compr. Ratio, %	Prompt. Compr. Ratio, %	Compr. Rate	Compr. /min	Vent. Rate	Vent. /min
--	--	--	--	--	--	--	--
86	--	86	--	120	101	--	--
100	--	100	--	118	112	--	--
100	--	100	--	117	111	--	--
100	--	93	--	122	104	--	--
100	--	96	--	127	113	--	--
100	--	100	--	138	130	--	--
100	--	100	--	138	133	--	--
100	--	100	--	108	93	--	--
100	--	92	--	110	92	--	--
100	--	100	--	143	136	--	--
100	--	100	--	136	124	--	--
100	--	100	--	147	141	--	--
94	--	94	--	146	118	--	--

Following Feedback, Re-Training and… *More Re-Training:*

2006



2009



Grants help make Dallas County one of best places to suffer cardiac arrest

10:24 PM CST on Friday, February 26, 2010

By JASON ROBERSON / *The Dallas Morning News*

Steven Shelley is grateful for a federal grant that helped Dallas County medics and firefighters save more cardiac arrest patients last year and send them back to work

Public Health

Cardiac care gets a jolt

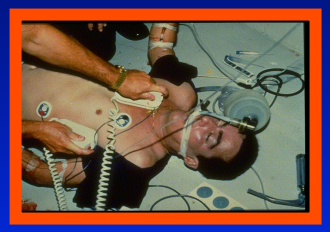
County goes from one of the worst to one of the best places for a heart to stop

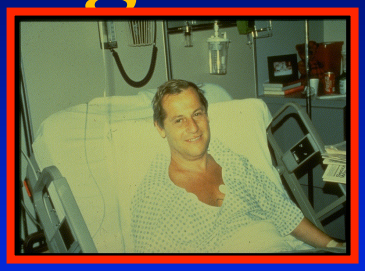
Steven Shelley is grateful for a federal grant that helped Dallas County medics and firefighters save more cardiac arrest patients last year and send them back to work. After finishing a four-hour shift of moving

Impact on Dallas Area Outcomes

Survival to Hospital Discharge

Between 2006 and 2011





Dallas	↑157%
Irving	↑57%
Mesquite	↑100%
Carrollton	↑376%

Push Hard – Push Faster !!!

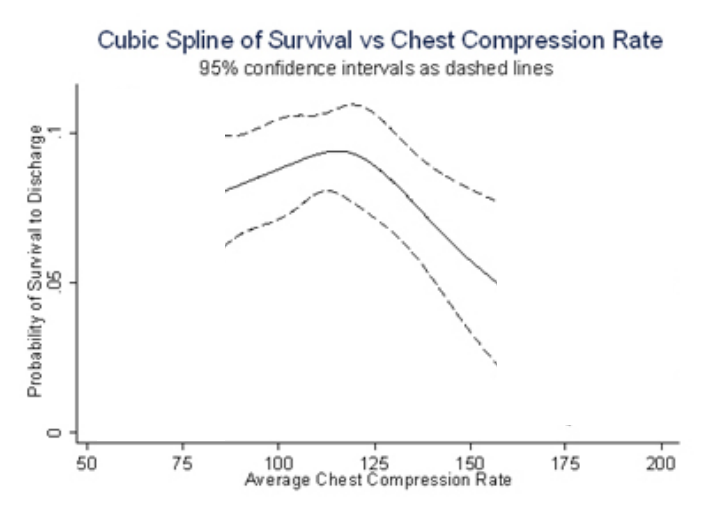
A Message from our Sponsors…

Maybe Not !

Resuscitation Outcomes Consortium Data

"The Sweet Spot of CPR"

Compression Rates Between 100 -120 /min Independently Associated with Increased Survival After Out-of-Hospital Cardiac Arrest



ITD Study

Very Interesting Results …

No Advantage
In Survival Chances
from the ITD Itself ….

…But Another Study (ITD combined with The ACD Pump) was a positive outcome !!

Impedance Threshold Device
"ITD"

- 12 cm H_2O

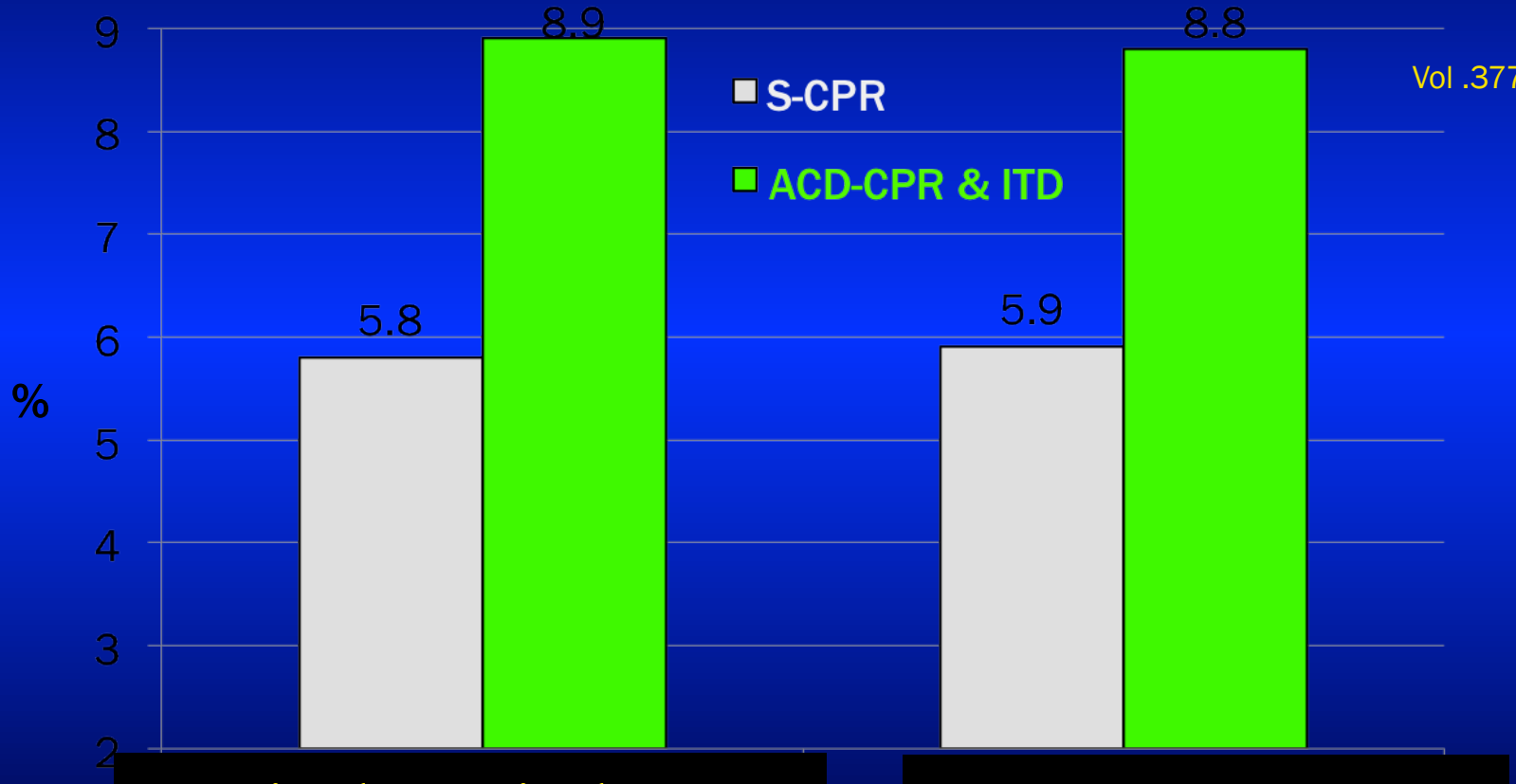
Maybe Not Negatove Study !

Active Compression--Decompression

+

ACD Device

Improved Long-Term Survival with Favorable Neurologic Outcome



Aufderheide et al.
Lancet 2011;
Vol .377(9762):301-311.

Survival to Discharge

53% improvement
(p=0.019)

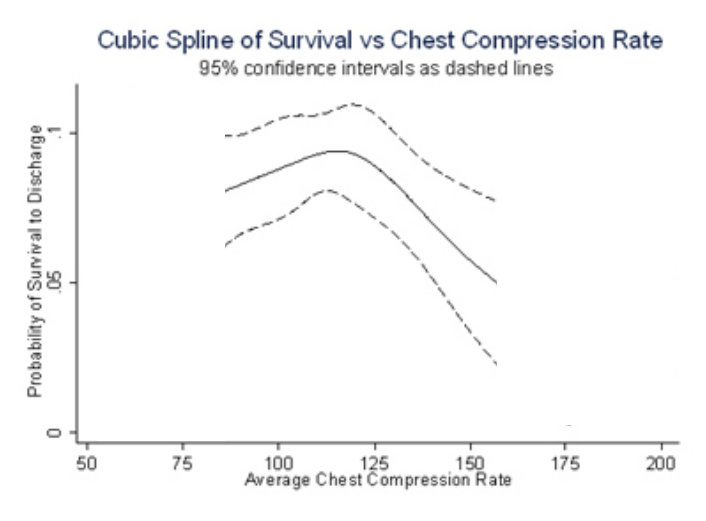
1 Year Survival

49% improvement
(p=0.03)

Resuscitation Outcomes Consortium Data

"The Sweet Spot of CPR"

Compression Rates Between 100 -120 /min Independently Associated with Increased Survival After Out-of-Hospital Cardiac Arrest



The Patient Has a Fractured Fibula….

…on a Mild Sedative…. Can Go Home Tomorrow ..

Some Daring New Concepts

Vasodilators in Cardiac Arrest

Pushing Another Envelope in Resuscitation Science ....

Coronary Perfusion Pressure

"The Key Factor" in Achieving ROSC

(Return of Spontaneous Circulation)

Nitroprusside ??

for Cardiac Arrest ???

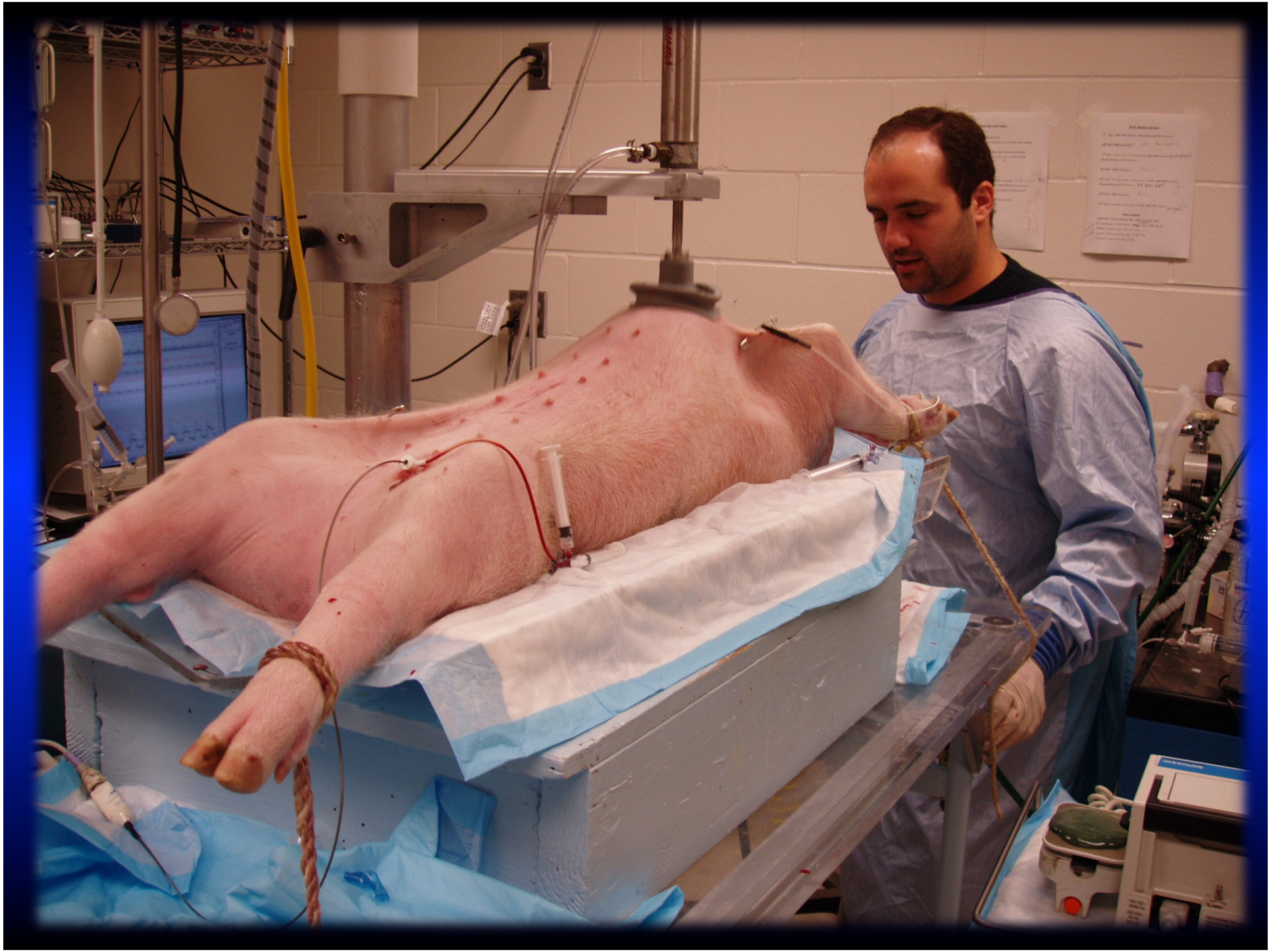
Sodium Nitroprusside (SNP)

- SNP Breaks Down in the Circulation and Releases Nitric Oxide
- Nitric Oxide Decreases Both Preload and Afterload
- So Giving Such a Vasodilator During CPR is Counter-Intuitive!

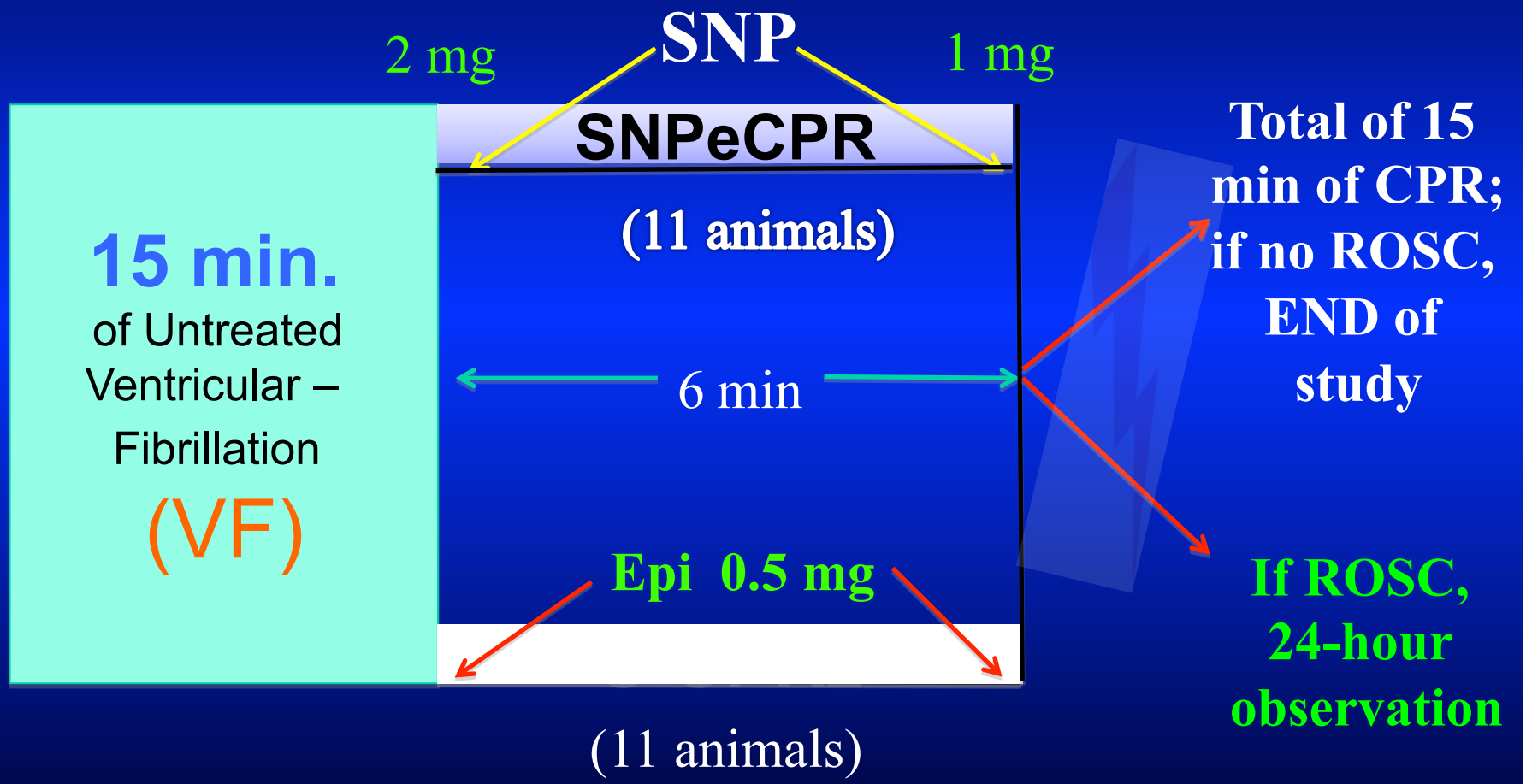
Until You Think of CPR
in Terms of Better Coronary Flow –
Not Better Coronary Pressure

ACD / ITD CPR

Increasing Flow !!

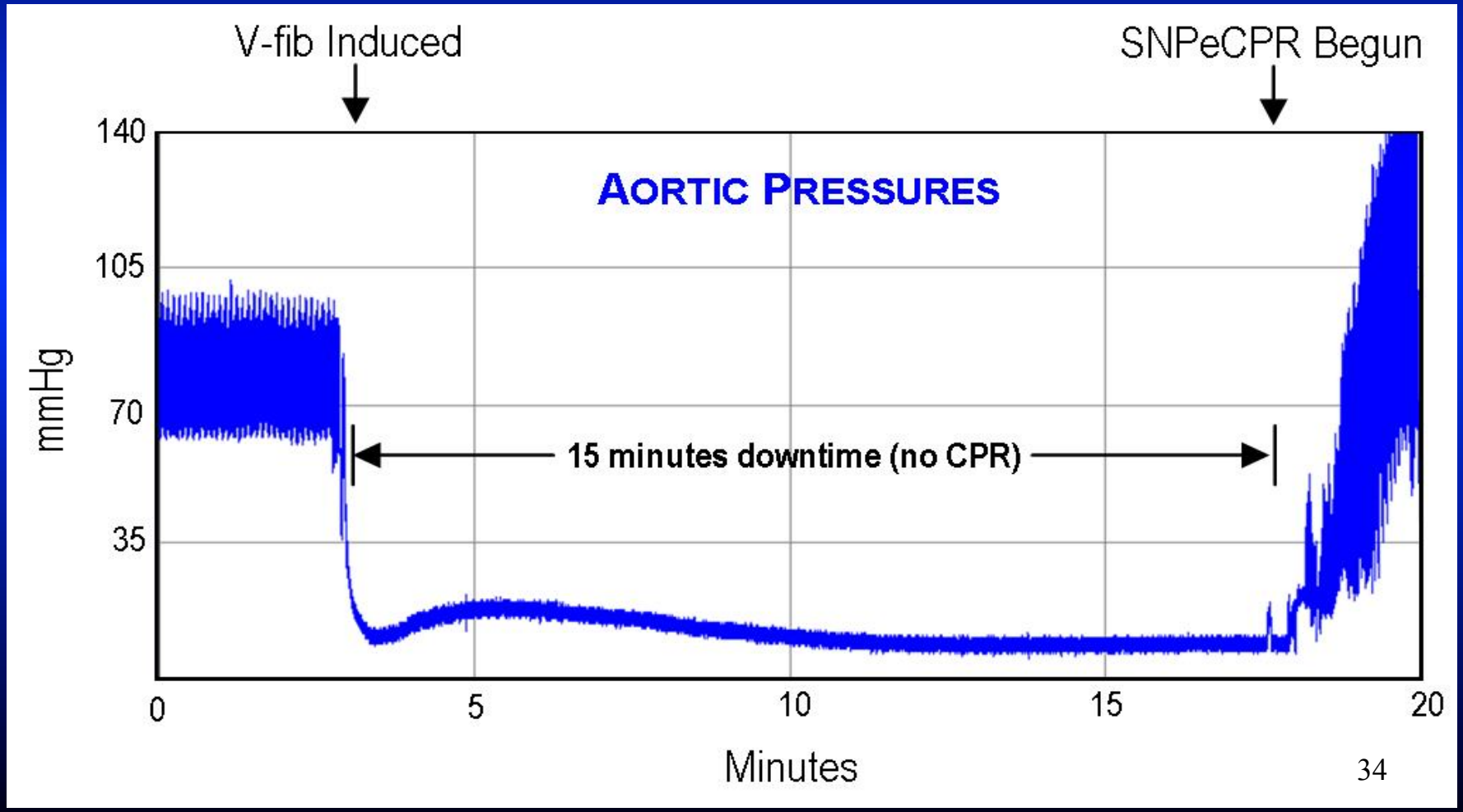


Experimental Protocol

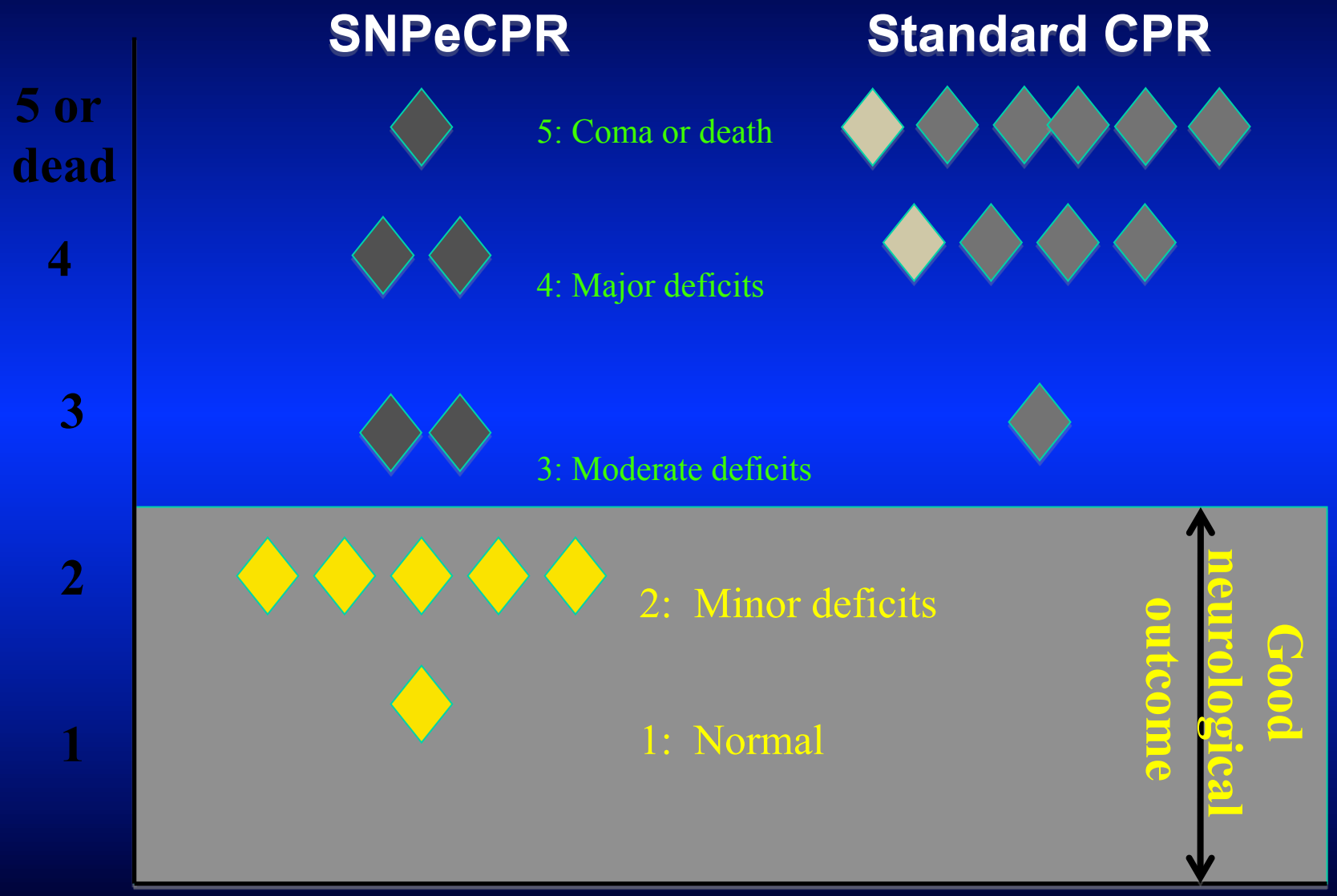


Schultz et al. Resuscitation 2011;82(Suppl 2):S35-40.

SNPeCPR Trial

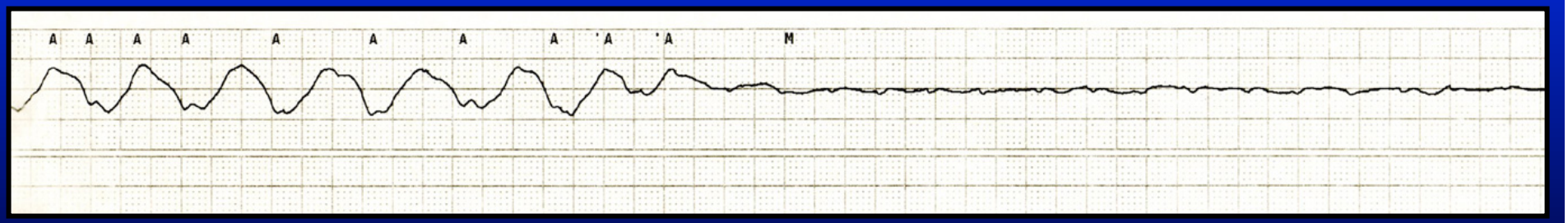


Overall Performance Category



ISCHEMIC POST-CONDITIONING

Can We Make SNPeCPR Even Better?



Background

- During Organ Transplant, Blood Flow is "Trickled"/Stuttered Back In to Prevent Reperfusion Injury
- Might a Similar Strategy Work for Hypoxic Organs in Cardiac Arrest?

Ischemic Post-Conditioning

Would a More Controlled Reperfusion Better Protect the Heart & Brain after Cardiac Arrest with a Protocol That Initially "Stutters" CPR ?

- *Hypothesis:*

–3 min of *20 sec On* --- *20 sec Off* CPR
(called "stutter" CPR)

–Followed by "Enhanced CPR" (ACD-ITD)

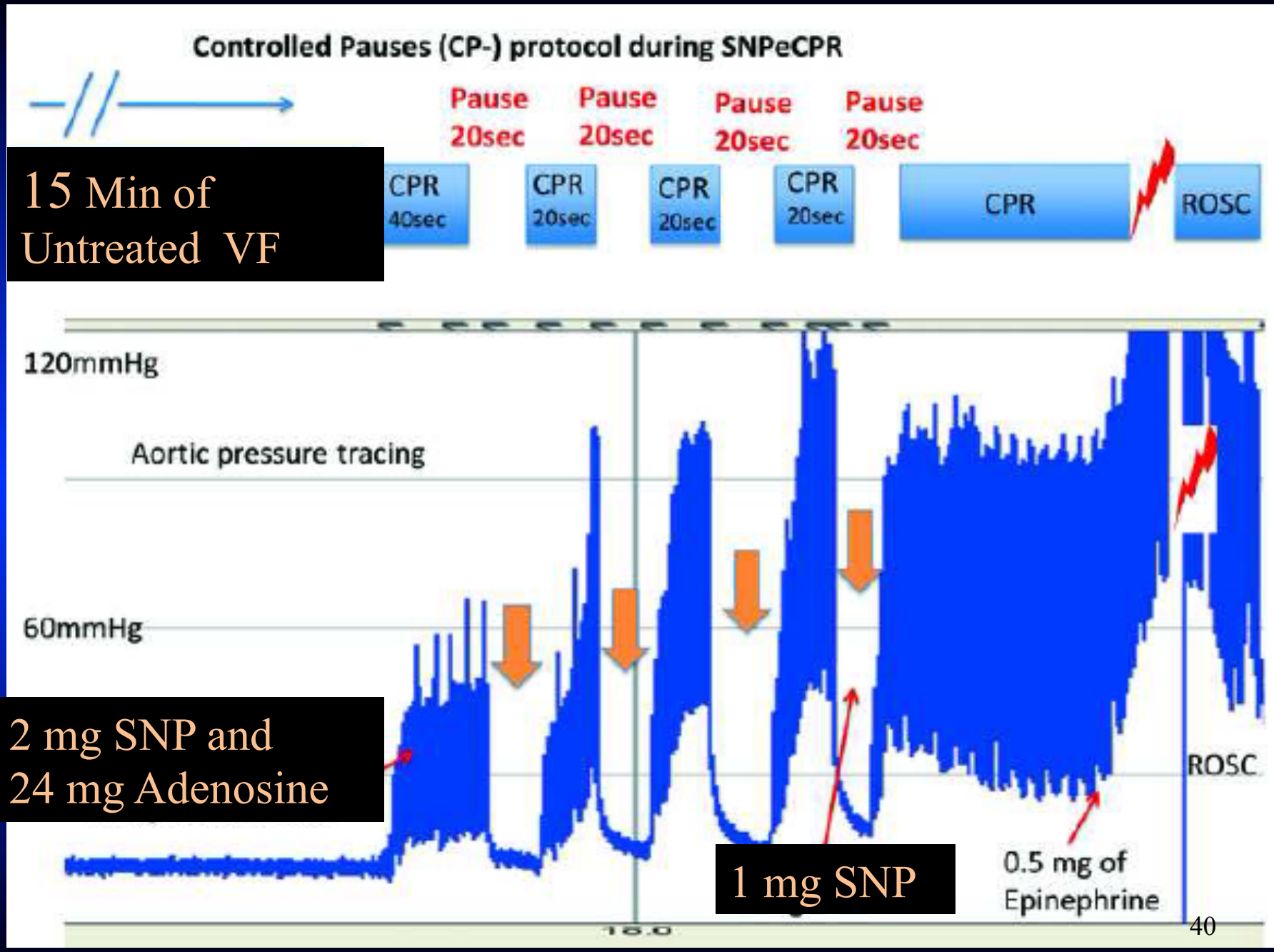
–Along With Non-traditional Drugs (e.g.Adenosine)

Experimental Protocol in Swine

- *Prolonged VF Downtime* (15 min)
- *Randomized as Follows:*
  - Group 1 (n=8); S-CPR (Standard CPR)
  - Group 2 (n=8); SNPeCPR
  - Group 3 (n=8); SNPeCPR + High Dose Adenosine
  - Group 4 (n=8); SNPeCPR + High Dose Adenosine + Controlled Pauses (CP)

**All Got Epinephrine as Needed and Defibrillation Attempt*

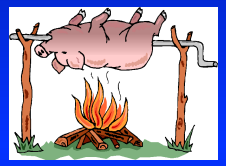
Yannopoulos et al. November AHA 2011


Controlled Pauses (CP-) protocol during SNPeCPR
Pause 20sec
Pause 20sec
Pause 20sec
Pause 20sec
15 Min of Untreated VF
CPR 40sec
CPR 20sec
CPR 20sec
CPR 20sec
CPR
ROSC
120mmHg
Aortic pressure tracing
60mmHg
2 mg SNP and 24 mg Adenosine
ROSC
1 mg SNP
0.5 mg of Epinephrine

Survival at 24 Hours …

Group 1: Std-CPR

- 2/8 survived
- None w/ good neuro @ 24 hrs:



Group 2: SNPeCPR alone

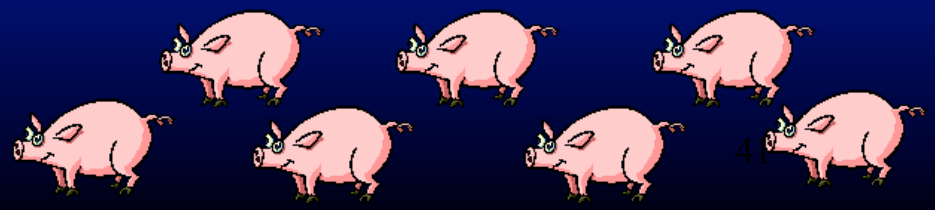
- 7/8 Survived
- 3 w/ Good Neuro @ 24 hours:

Group 3: SNPeCPR & Adenosine

- 8/8 survived
- 4 w/ good neuro @ 24 hours:

Group 4: SNPeCPR, Adenosine and STUTTER CPR

- 8/8 survived
- 7 w/ good neuro @ 24 hours:



Conclusions

- Targeting Flow – Not Pressure –
  … In a More Controlled Manner …
  … May Improve Outcomes

Stay Tuned!

OVERALL CONCLUSIONS...

On the Road to the 22nd Century...


You mean you're still
ALIVE !?

We'll Make Life Better for Future Generations ….

Thanks !

People who find you on Facebook

- High School people you hated
- College people you hated
- Work colleagues you hate
- Actual friends

GraphJam