End-tidal CO_2 use in pre-hospital trauma

Rio Grande Trauma Conference 2024

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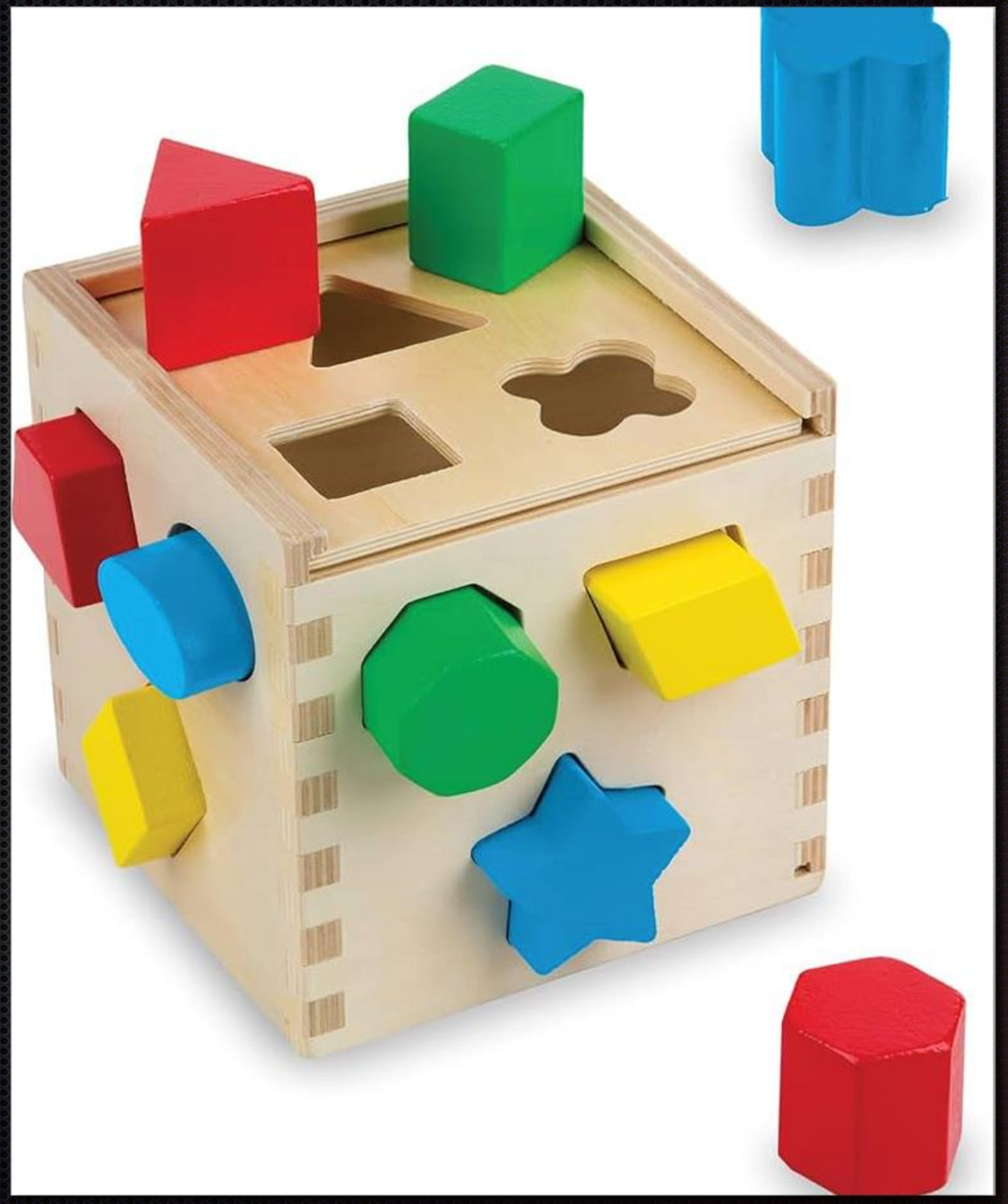
Everyone likes a new toy…

The literature of $EtCO_2$ and cardiac arrest goes back to at least 2010![1]

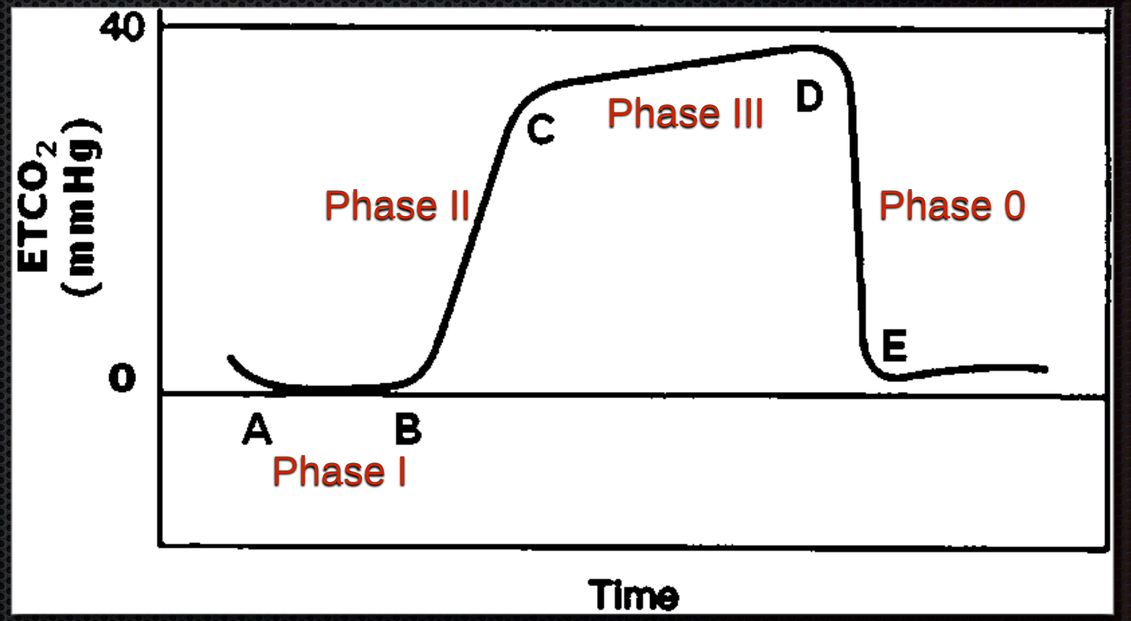
Let’s reignite the passion for $EtCO_2$!

Numbers and shapes



A wave is a Cycle

- Inspiration
  - Phase 0
- Exhalation:
  - Phase I
  - Phase II
  - Phase III

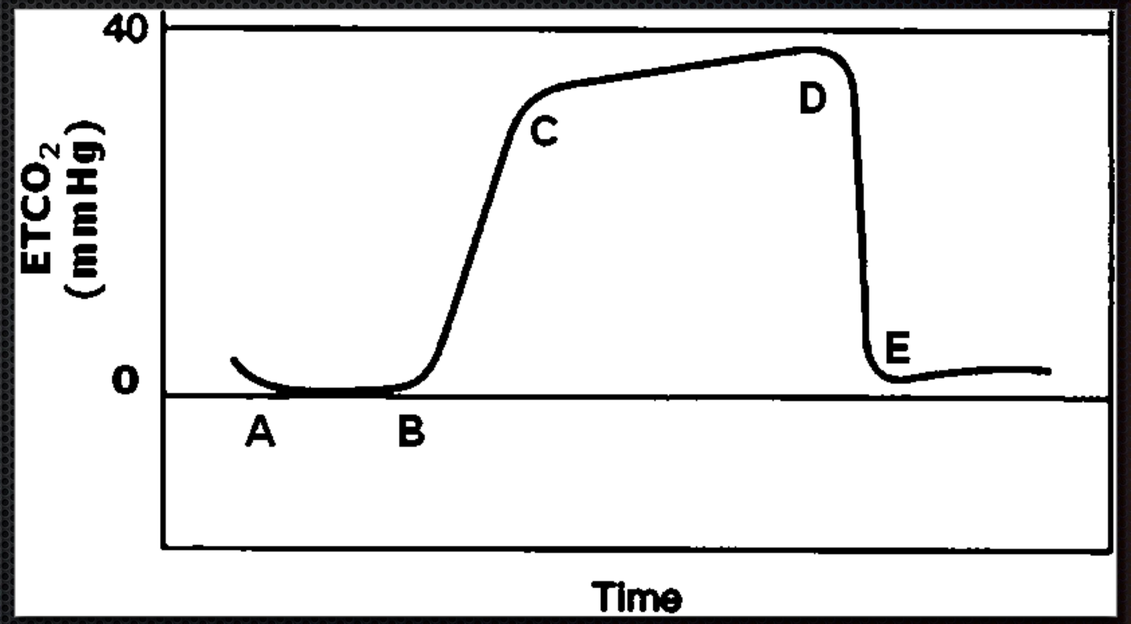


Numbers

- 38
- 10^{2}
- $20?^{2}$
- 30^{3}
- 34^{3}

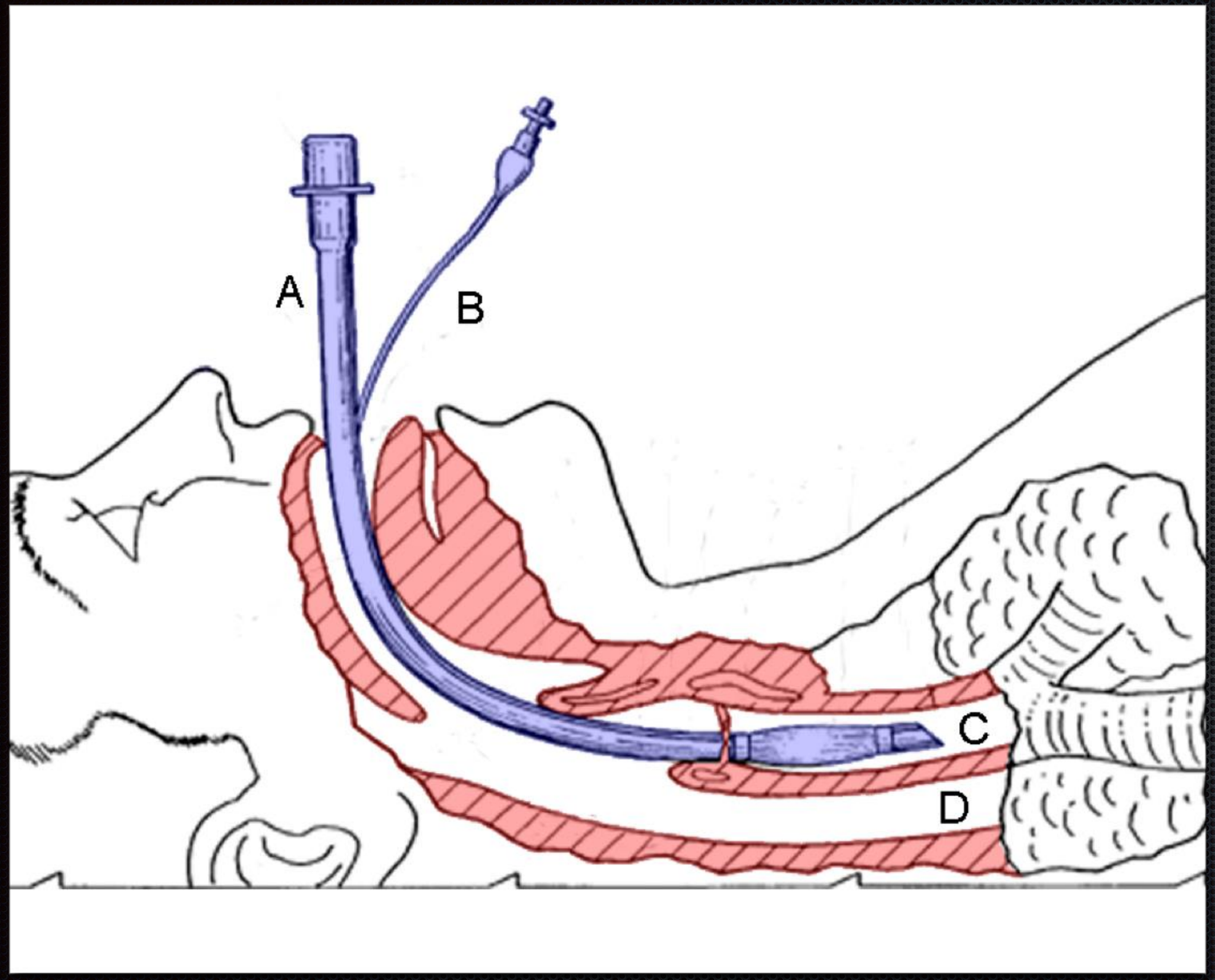
Putting shapes to numbers

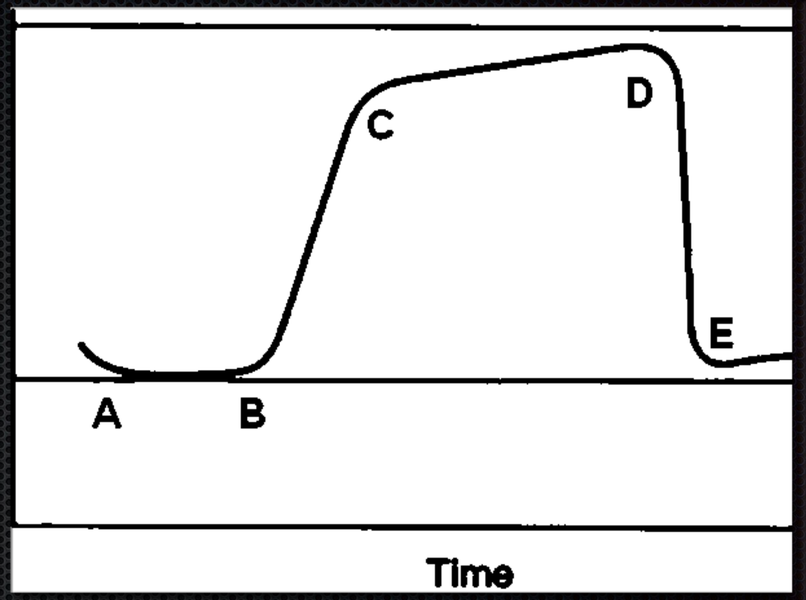
- The numbers from the last slide belong at….
  - D



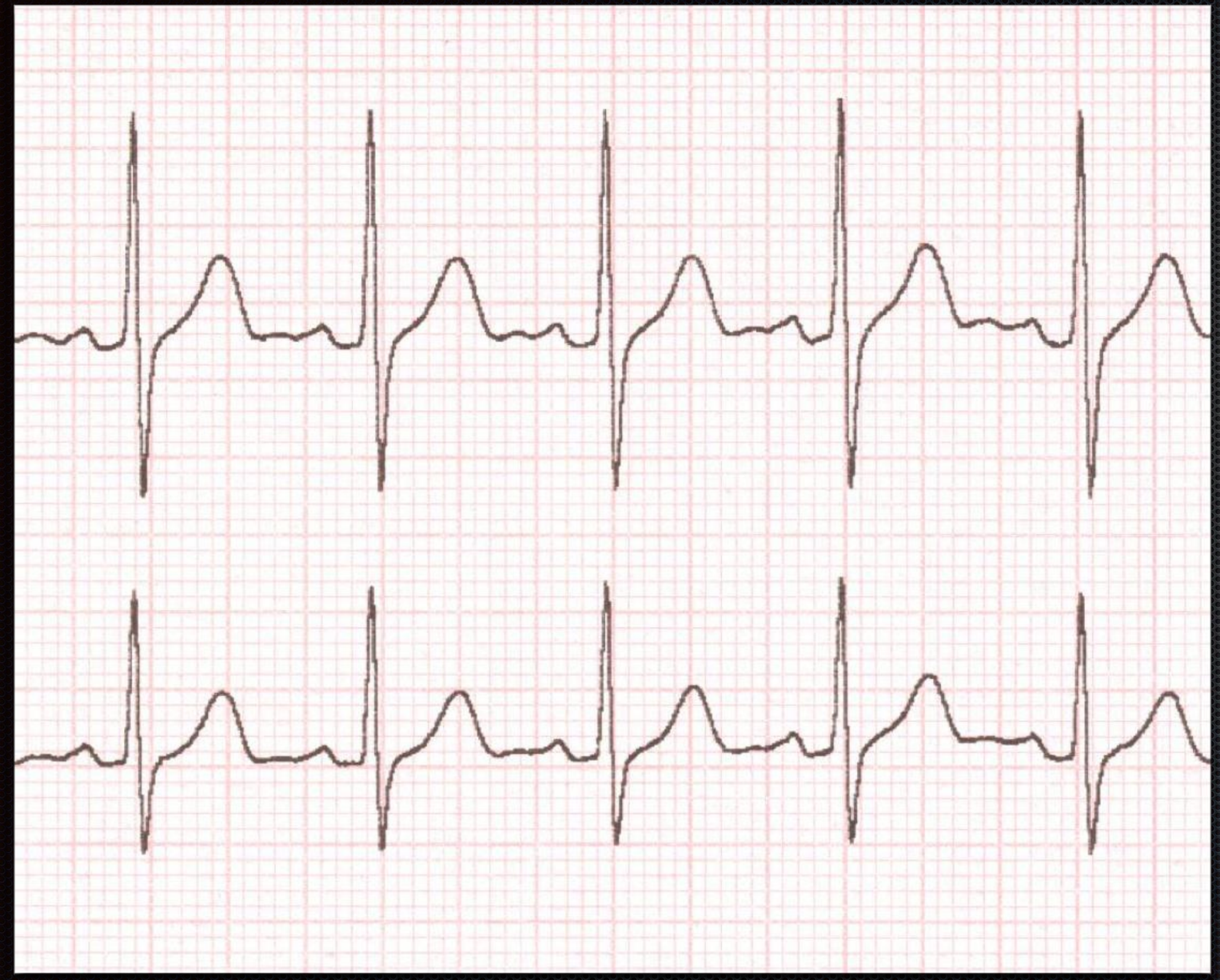
So why do we use it?

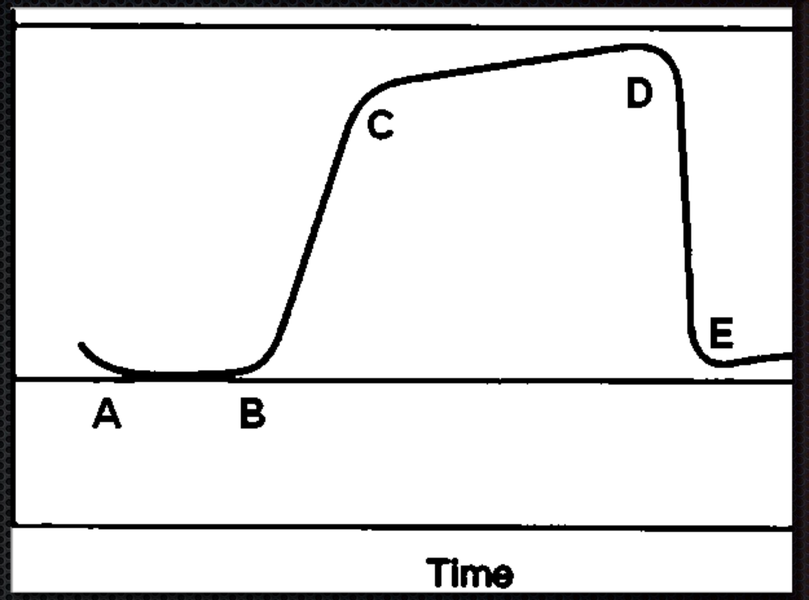
The bridge of basic science to clinical practice


A
B
C
D

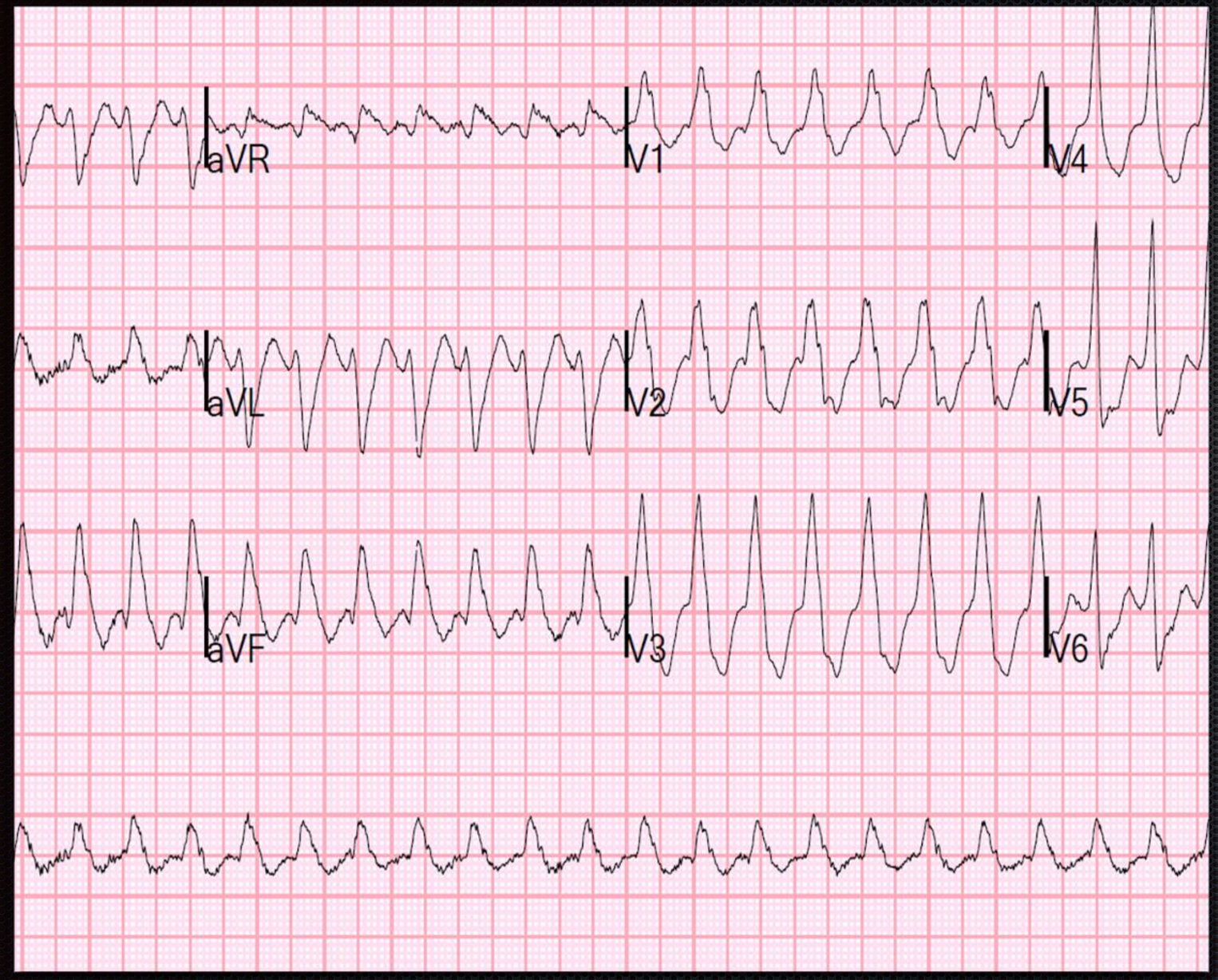

C
D
E
A
B
Time

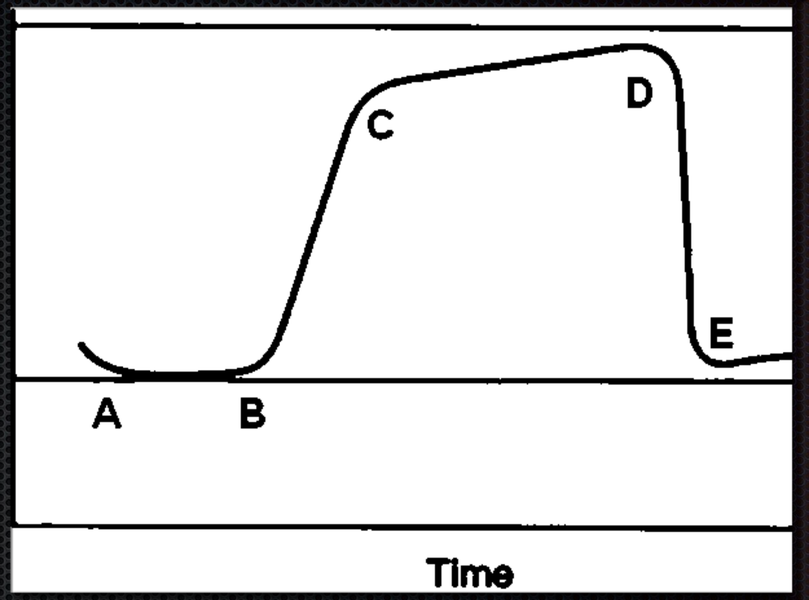

C
2.0
< 2.0
B
0.5
<0.5
A
0.03
Easy Cap II CO2 Detector
CHECK




C
D
E
A
B
Time

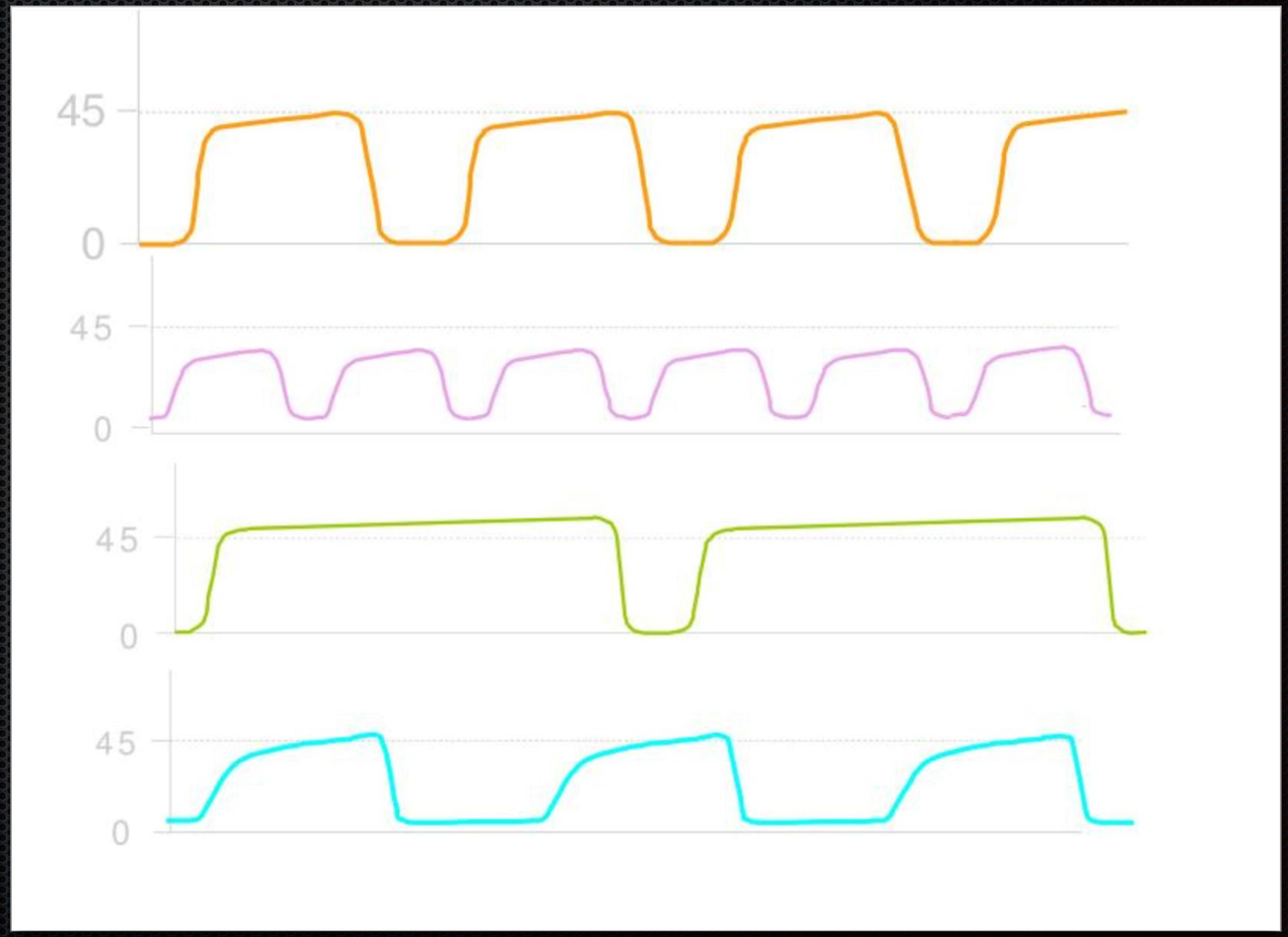

MakeAGIF.com


aVR
V1
V4
aVL
V2
V5
aVF
V3
V6


C
D
E
A
B
Time

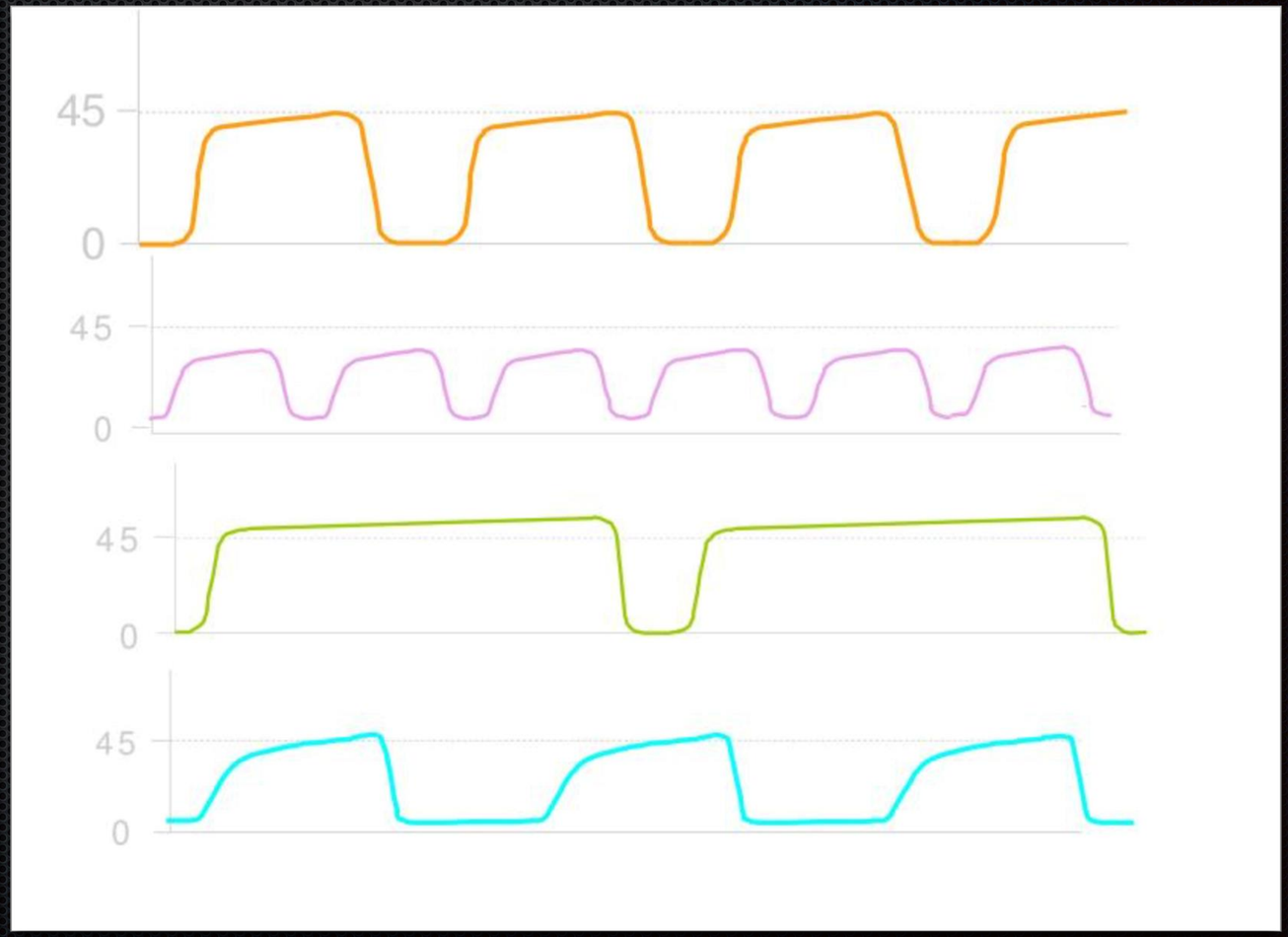
Guess the pathology

- Pink:
  - Hyperventilation



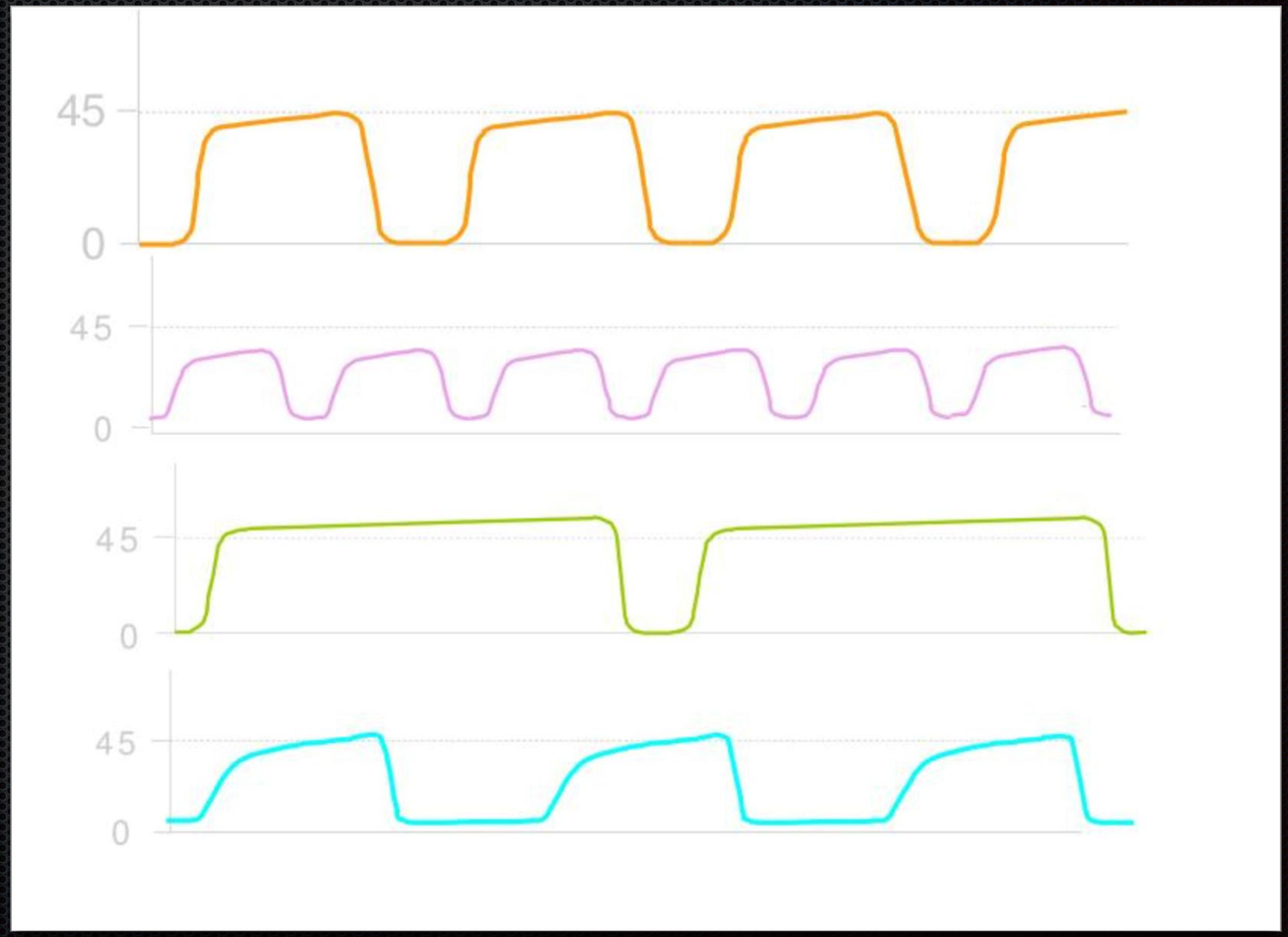
Guess the pathology

- Green:
  - Hypoventilation



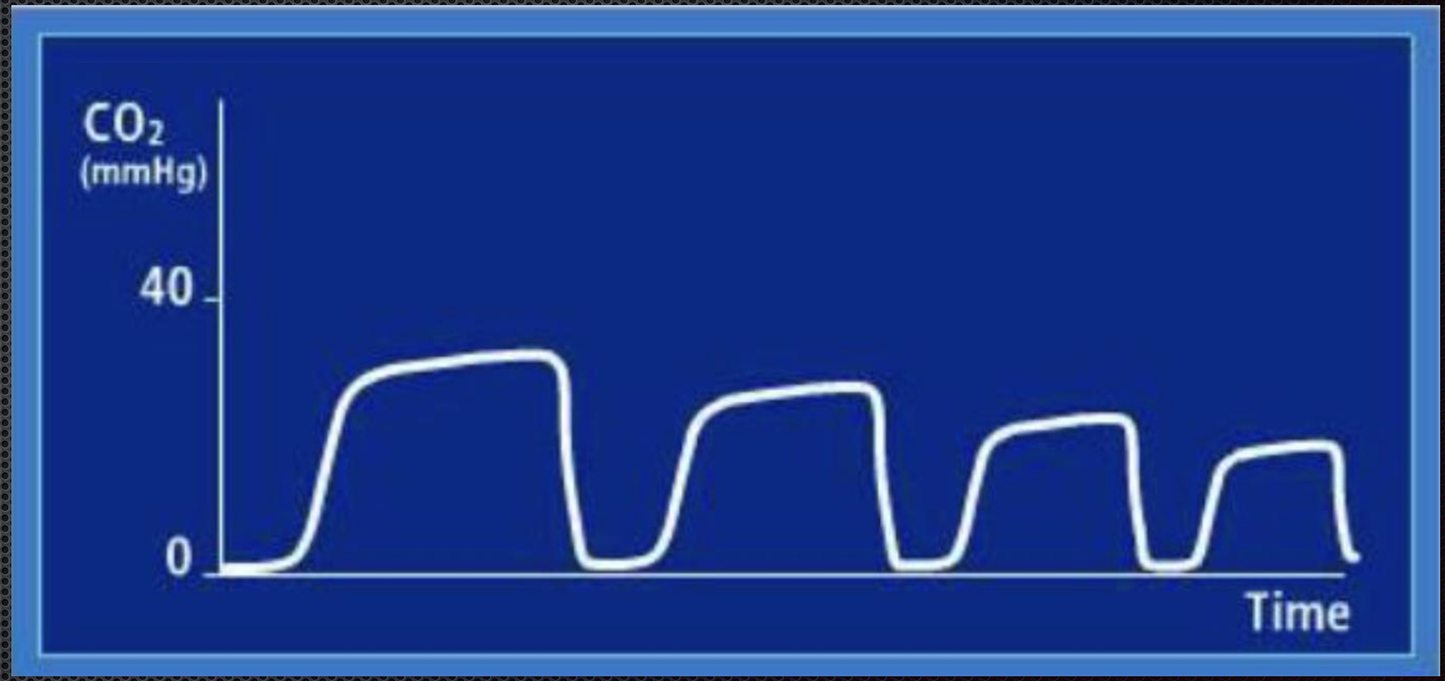
Guess the pathology

- Blue:
  - Obstructive pathology



Guess the pathology

- Impending cardiac collapse?

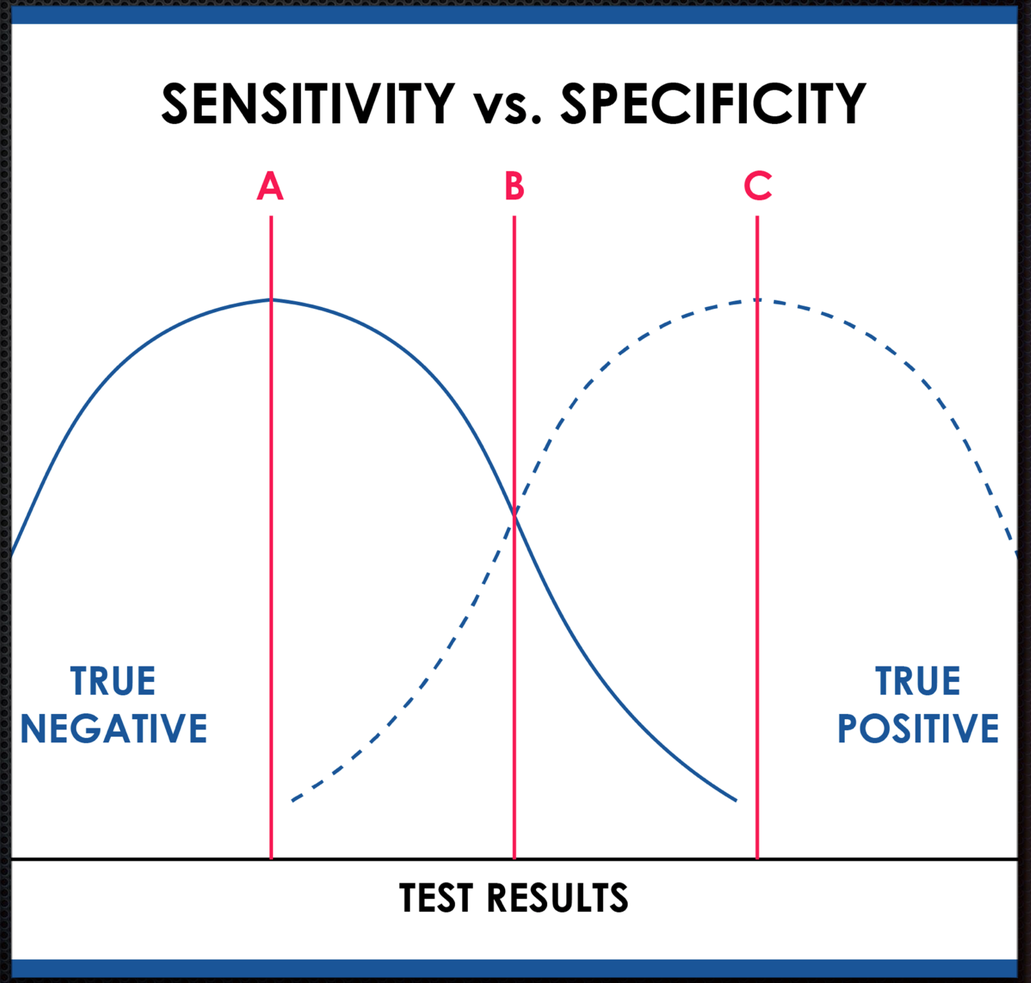


Going a bridge further…

From basic science, to clinical, to bleeding edge…

Sensitivity and Specificity

- What can it catch?
- What can it exclude?



Can $EtCO_2$ exclude severe injury?

- NC measurements, first 30 min
- Severe[4]:
  - ICU admission
  - Invasive procedure
  - Transfusion/acute blood loss
  - Clinically significant CT scan
- A cut-off of 30 mmHg[4]

Original Contribution

End-tidal carbon dioxide and occult injury in trauma patients☆
$ETCO_2$ does not rule out severe injury

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Can $EtCO_2$ exclude severe injury?

- No. But it can predict poorer outcomes

Can $EtCO_2$ predict transfusion need?

- 30 and 35[5]
  - Below 30 - bad
  - Above 35 - better
- Occult shock[5]

End-tidal CO_2 on admission is associated with hemorrhagic shock and predicts the need for massive transfusion as defined by the critical administration threshold: A pilot study☆

Melvin E. Stone Jr.[a,b,*], Stanley Kalata[b], Anna Liveris[a], Zachary Adorno[a], Shira Yellin[a], Edward Chao[a,b], Srinivas H. Reddy[a,b], Michael Jones[a,b], Carlos Vargas[a], Sheldon Teperman[a,b]

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Brush the dust off your capno!

$EtCO_2$ less than 30 is bad
$EtCO_2$ greater than 35 is…
$EtCO_2$ less than 10 is futility
Changing waves - change in patient

Works cited

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- 3. Maslow A, Stearns G, Bert A, et al. Monitoring end-tidal carbon dioxide during weaning from cardiopulmonary bypass in patients without significant lung disease. Anesth Analg. 2001;92(2):306-313. doi:10.1213/00000539-200102000-00004
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- 5. Stone ME, Kalata S, Liveris A, et al. End-tidal CO2 on admission is associated with hemorrhagic shock and predicts the need for massive transfusion as defined by the critical administration threshold: A pilot study. Injury. 2017;48(1):51-57. doi:10.1016/J.INJURY.2016.07.007


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