Questions 1-6

1) A healthy man who is 1.7 m in height, what is his estimated Functional Residual Capacity (FRC)

A) 1.5 L
B) 2.26 L
C) 3.36 L
D) Not enough information

2) Same patient above was involved in MVA and developed ARDS requiring mechanical ventilation with the volume-controlled mode with tidal volume 450 ml, PEEP 10 cmH$_2$O, Peak Inspiratory Pressure 35 cmH$_2$O, Plateau pressure 25 cmH$_2$O, peak inspiratory flow 60 L/min. What is the calculated compliance in ml/cmH$_2$O?

A) 40
B) 30
C) 30
D) 20

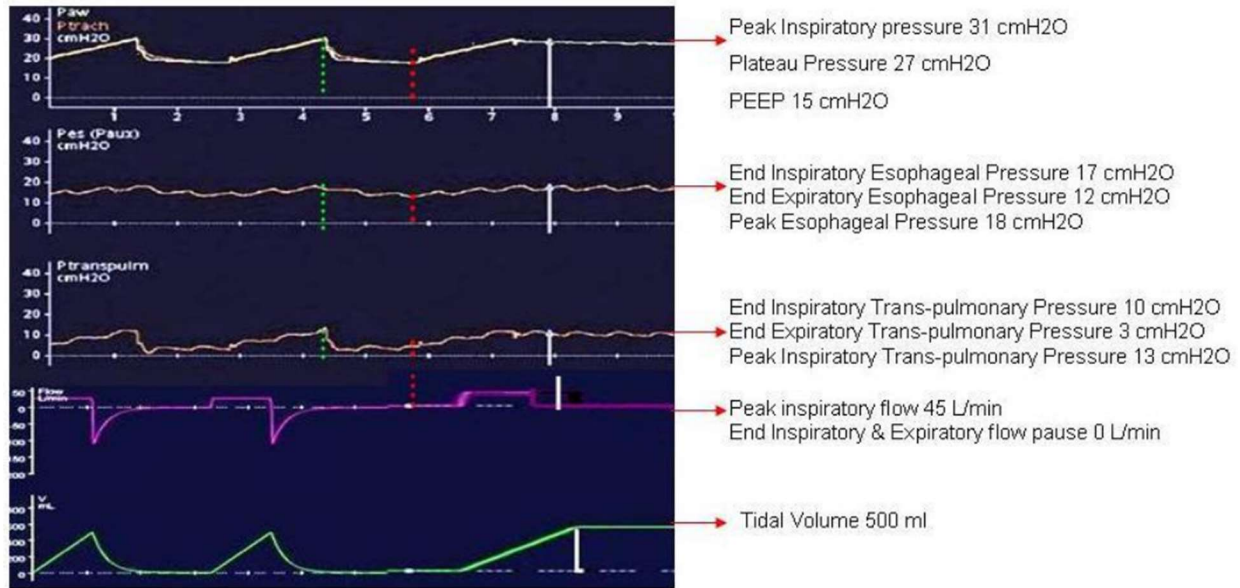3) What is his elastance in cmH$_2$O/L

A) 13
B) 23
C) 33
D) 43

4) What is the resistance in cmH$_2$O/L/S

A) 5
B) 10
C) 15
D) 20

5) Now what is his estimated Functional Residual Capacity (FRC)

A) 1.562 L
B) 1.125 L
C) 0.937 L
D) Not enough information

6) Patient has become more hypoxic and hypercapnic requiring increasing tidal volume to 500 ml and PEEP to 15 cmH2O. You inserted an esophageal balloon for more information (figure below). What is his lung compliance and chest compliance in ml/cmH$_2$O?

Peak Inspiratory pressure 31 cmH2O

Plateau Pressure 27 cmH2O

PEEP 15 cmH2O

End Inspiratory Esophageal Pressure 17 cmH2O
End Expiratory Esophageal Pressure 12 cmH2O
Peak Esophageal Pressure 18 cmH2O

End Inspiratory Trans-pulmonary Pressure 10 cmH2O
End Expiratory Trans-pulmonary Pressure 3 cmH2O
Peak Inspiratory Trans-pulmonary Pressure 13 cmH2O

Peak inspiratory flow 45 L/min
End Inspiratory & Expiratory flow pause 0 L/min

Tidal Volume 500 ml

A) 50 & 50
B) 70 & 100
C) 20 & 30
D) 40 & 60

7) Trans-Pulmonary pressure is:

A) Peak airway pressure - Plateau pressure
B) Peak airway pressure – Esophageal pressure
C) Plateau pressure – Esophageal pressure
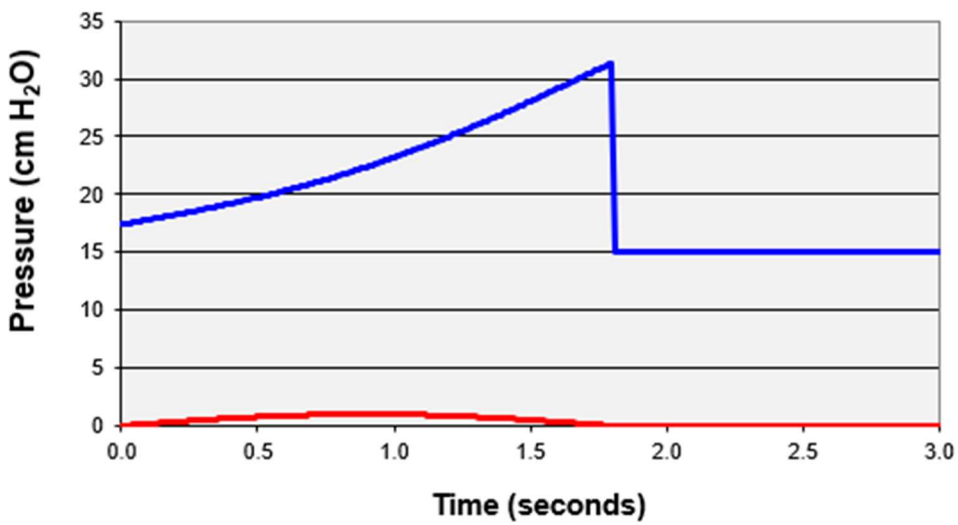D) Esophageal pressure – Plateau pressure

8) Time constant in seconds equals:

A) Resistance x Elastance
B) Resistance x Compliance
C) Resistance x Flow
D) Compliance x Flow

9) In the figure below, what is the approximate time constant in seconds?
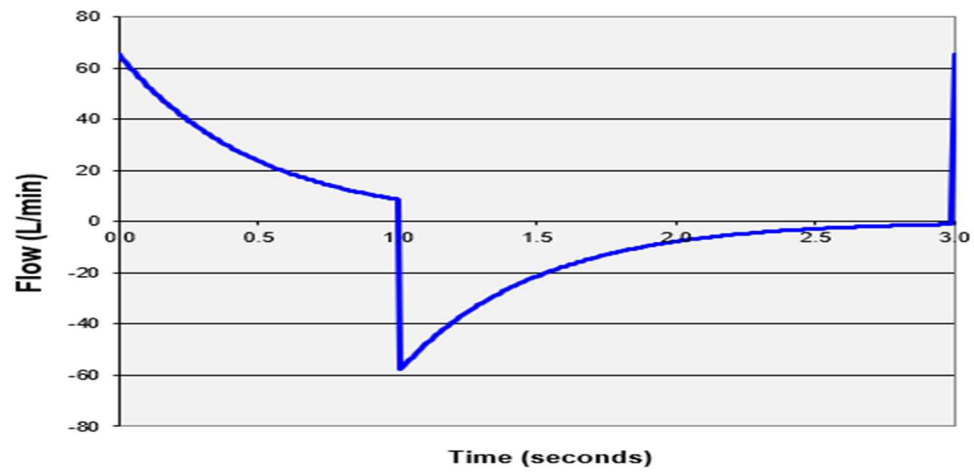
A) 0.5
B) 1
C) 1.5
D) 2

10) In the figure below, what is the Stress Index?

A) < 1
B) 1
C) > 1