

Web-HUMAN Startup

1) Open your browser - IE

2) Turn off Popup Blocker

- Tools menu

- Popup Blocker

• Toggle to off

3) Go to web-HUMAN

<http://www.skidmore.edu/academics/human>

Dead Space Determination A Time-Limited Experiment

The relevant variables in HUMAN

- **VENT**
- **TIDVOL**
- **RESPRT**

So VENT = TIDVOL * RESPRT

- **AVENT**
- **DSPCEB**

& AVENT = (TIDAL-DSPCEB) * RESPRT

**Student *web*-HUMAN Experiment
Determination of Anatomical Dead Space**

Design:

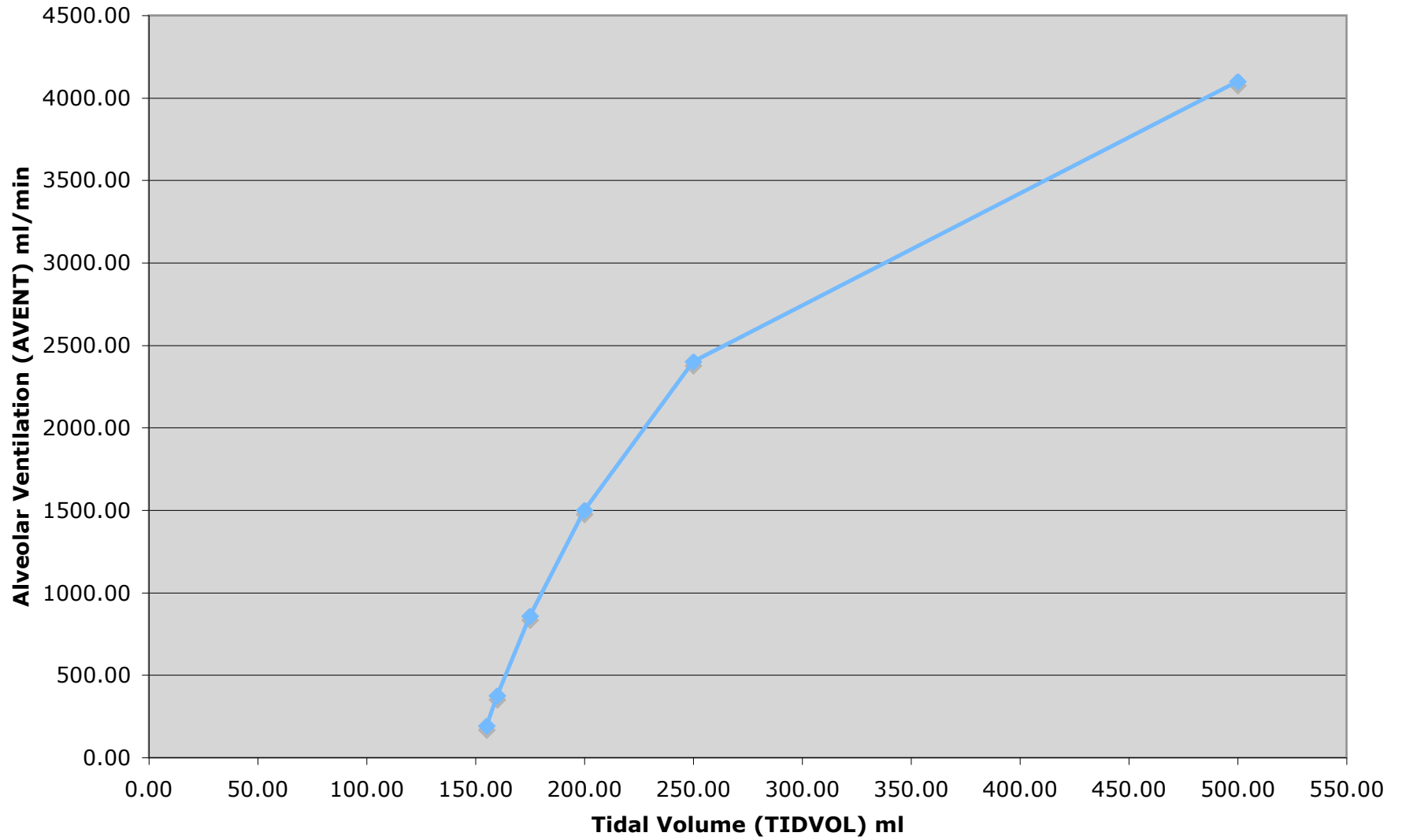
- **Always keep lung ventilation (VENT) at 6 L/min.**
- **Progressively reduce tidal volume (ARVOL).**
- **Observe effect on alveolar ventilation (AVENT).**
- **Run for only 1 min. to prevent other responses!**

Sample Results:

**Effects On AVENT of Progressive Reduction of
TIDVOL**

TIDVOL (ml)	RESPRT (/min)	VENT L/min	AVENT (ml/min)
500	12	6.0	4100
250	24	6.0	2400
200	30	6.0	1500
175	34.29	6.0	857
160	37.5	6.0	375
155	38.71	6.0	193.5

Alveolar Ventilation f Tidal Volume



Sample Student Experiment

Basic Renal Calculations

Basic Principles

a. Determining Reabsorbed Load (mg/min)

Reabsorbed load = Filtered load – Excreted load

-all are mass flow (mg/min)

b. Determining mass flows

Mass flow = Conc. * Volume Flow

Design

For any urine substance of interest (e.g. Na, K, Protein, etc.)

we look in HUMAN for

Conc. & Volume Flow of that substance

- in the urine'
- in the filtrate (plasma)

Example – Sodium Excretion

Overview:

Reabsorbed = Filtered – Excreted

1) Na Excreted (mg/min)

Urine Concentration * Urine Volume

U24NA * 24 hr urine volume <= HUMAN

116 meq/L * 1490 ml/24 hr day
1.490 L/day

= 172.84 meq/day Excreted

2) Na Filtered (mg/min)

Plasma Concentration * GFR

PNA * GFR <= HUMAN

144 meq/L * 125 ml/min (0.125 L/min)
0.125 L/min
7.5 L/Hr
180 L / 24 Hr

= 25,920 meq/day Filtered

3) Summary

Na Filtered = 25,920 meq/day

Na Excreted = 172.84 meq/day

Virtually ALL filtered Na is reabsorbed.

Example –Protein Excretion

Overview:

Reabsorbed = Filtered – Excreted

1) Protein Excreted (g/min)

Urine Concentration * Urine Volume

U24PR * 24 hr urine volume <= HUMAN

0.035 g/100 ml * 1490 ml/24 hr day
0.35 g/L 1.490 L/day

= 0.5253 g/day Excreted

2) Protein Filtered* (g/min)

Plasma Concentration * GFR

PPR * GFR <= HUMAN

7.3 g/dL * 125 ml/min
73.0 g/L 0.125 L/min
7.5 L/Hr
180 L / 24 Hr

= 13140 g/day Filtered*

3) Summary

Protein Filtered* = 13140 g/day

Protein Excreted = 0.5253 g/day

Virtually no protein in the urine. Why?

What assumption is incorrect above?*