

# Quick Review: Winter's Formula

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### Abstract

This brief review will discuss when to administer bicarbonate.

### WHEN IS IT PRODUCTIVE TO ADMINISTER BICARBONATE ?

#### CASE # 1: 60 YR. OLD MALE, SEPTIC SHOCK

- Pulse 116 BP 96/42
- pH = 7.15
- pO2 = 80
- pCO2 = 30
- HCO3- = 16

### SHOULD YOU GIVE BICARB ?

#### CASE # 2: 66 YR. OLD FEMALE, 2 HOURS S/P CABG

- Pulse 98, NSR BP 98/56
- pH = 7.18
- pO2 = 74
- pCO2 = 31
- HCO3- = 10

### SHOULD YOU GIVE BICARB ?

#### ACID/BASE BUFFERING:



Direction is dependent on concentration

### THE WINTER'S FORMULA: A GUIDE TO BICARB ADMINISTRATION

$$\text{PCO} = (\text{HCO}_3^-) \times 1.5 + 8 (+/- 4)$$

If the observed pCO<sub>2</sub> is HIGHER than the calculated pCO<sub>2</sub>,

then the body is not handling intercellular CO<sub>2</sub> well & extracellular bicarbonate will not be able to enter the cellular environment

Figure 1

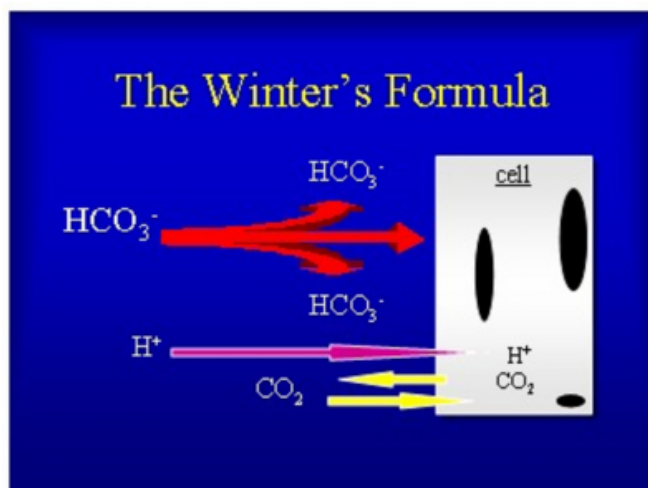
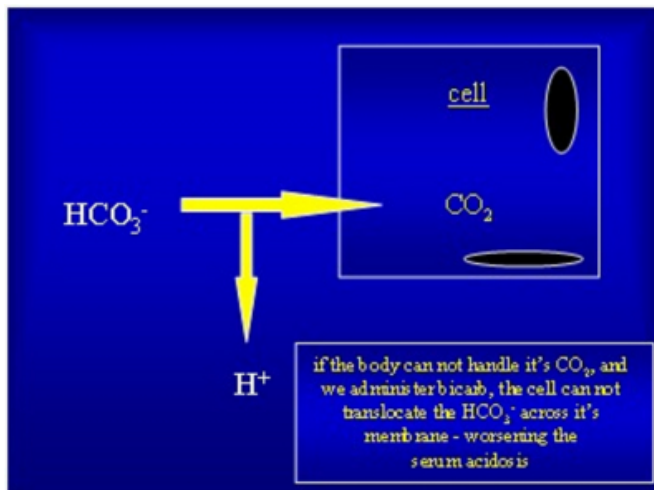


Figure 2



**CASE # 1: 60 YR. OLD MALE, SEPTIC SHOCK**

- Pulse 116 BP 96/42
- pH = 7.15
- $\text{pO}_2 = 80$
- $\text{pCO}_2 = 30$
- $\text{HCO}_3^- = 16$

**SHOULD YOU GIVE BICARB ?**

- $\text{pCO}_2 = (\text{HCO}_3^-) \times 1.5 + 8 (+/- 4)$
- $\text{pCO}_2 = (16) \times 1.5 + 8 (+/- 4)$

- $\text{pCO}_2 = 24 + 8 (+/- 4)$
- $\text{pCO}_2 = 32 +/- 4$

\* Observed  $\text{pCO}_2$  is 30: the body is buffering the  $\text{CO}_2$  well - it is physiologically a good idea to administer bicarbonate !

**CASE # 2: 66 YR. OLD FEMALE, 2 HOURS S/P CABG**

- Pulse 98, NSR BP 98/56
- pH = 7.18
- $\text{pO}_2 = 74$
- $\text{pCO}_2 = 31$
- $\text{HCO}_3^- = 10$

**SHOULD YOU GIVE BICARB ?**

- $\text{pCO}_2 = (\text{HCO}_3^-) \times 1.5 + 8 (+/- 4)$
- $\text{pCO}_2 = (10) \times 1.5 + 8 (+/- 4)$
- $\text{pCO}_2 = 15 + 8 (+/- 4)$
- $\text{pCO}_2 = 23 +/- 4$

observed  $\text{pCO}_2$  is 31: the body is NOT buffering the  $\text{CO}_2$  well - it is physiologically wrong to administer bicarbonate !

**References**

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