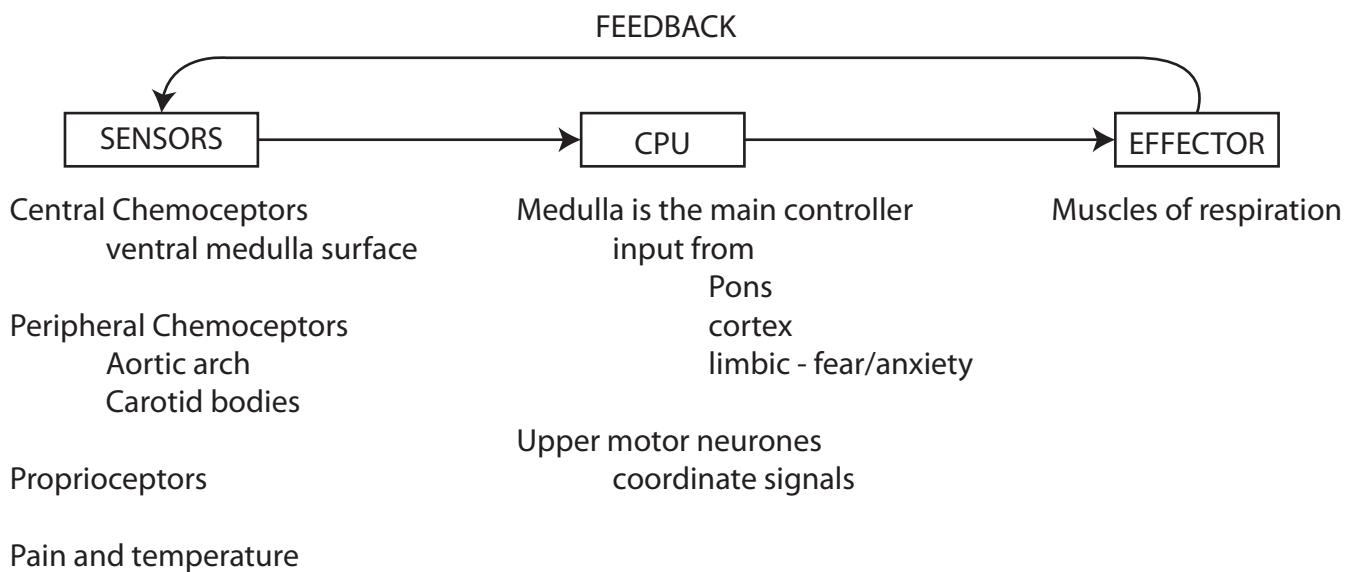


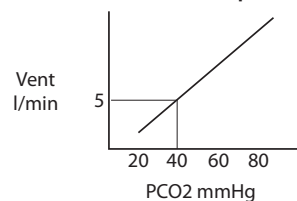
March 2010  
QUESTION 06

List the physiological factors that increase respiratory rate. Include an explanation of the mechanism by which each achieves this increase



### PCO<sub>2</sub>

most important variable, normal value is 35 - 45 mmHg  
demonstrates a near linear relationship with ventilation (RR x tidal volume)



changes in CO<sub>2</sub> sensed by central chemoceptors

CO<sub>2</sub> diffuses across the BBB and combines with H<sub>2</sub>O to form carbonic acid  
the central chemoceptor senses the change in H<sup>+</sup> ion concentration  
the medulla increases ventilation

### pH

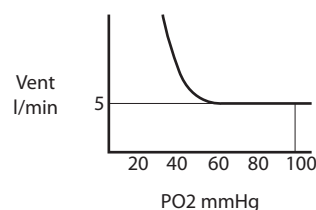
normal value is 7.4

sensed by peripheral chemoceptors (H<sup>+</sup> is ionised therefore cannot cross BBB)

decreased pH increased ventilation - decreasing CO<sub>2</sub> which corrects/compensates underlying process  
increased pH decreases ventilation - increasing CO<sub>2</sub> retention which corrects/compensates

### PO<sub>2</sub>

not related to ventilation within normal physiological ranges (normal value 90-100mmHg)  
when below 60mmHg, peripheral chemoceptors increase ventilation rapidly (hypoxic drive)



### Other

Proprioceptors in joint increase ventilation, although the mechanism is not completely clear  
Fear via the limbic system increases ventilation, so too increased temp and pain