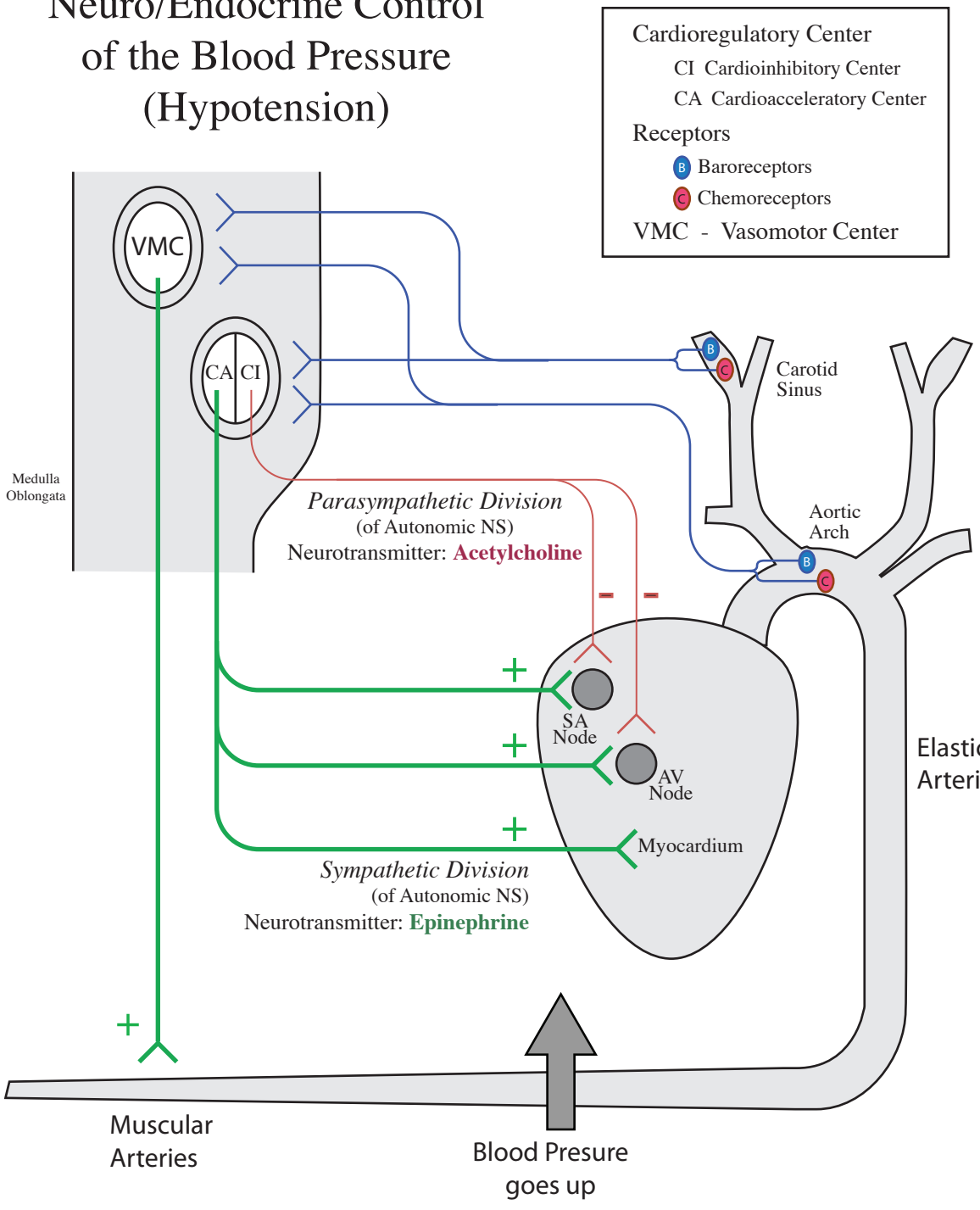
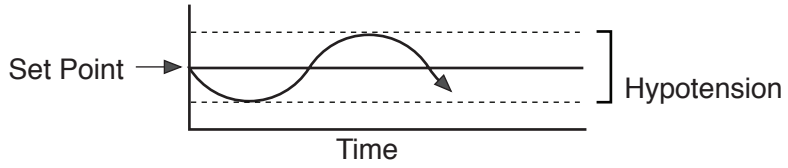
Schematics on the

Neuro/Endocrine Control of the Blood Pressure

by Noel Ways

Neuro/Endocrine Control of the Blood Pressure (Hypotension)

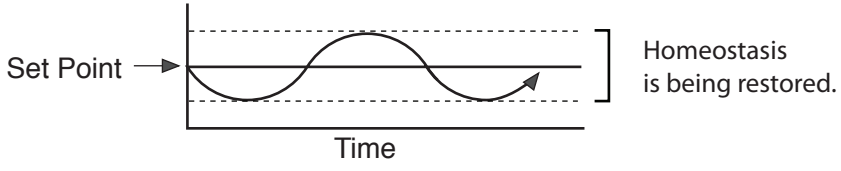




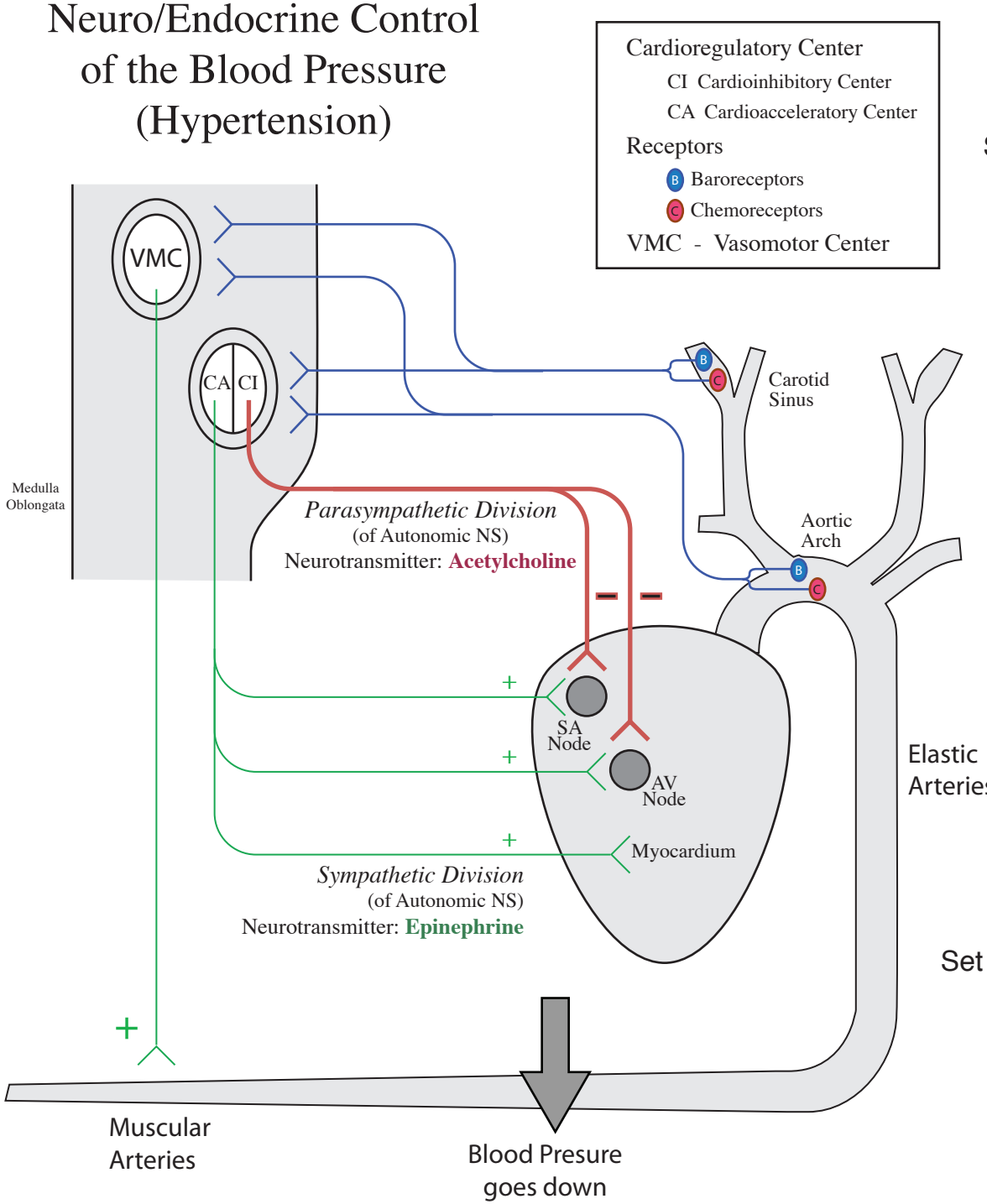
Baroreceptors relay physiological stress of hypotension to the vasomotor center, which ***increases*** sympathetic stimulation to muscular arteries resulting in ***vasoconstriction*** resulting in an increase in peripheral resistance.

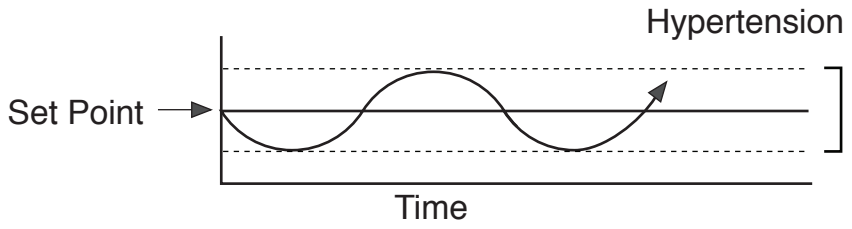
Likewise, baroreceptors inform the cardioregulatory center, which ***decreases*** parasympathetic stimulation, and ***increases*** sympathetic stimulation. This results in an increase in heart rate and a more forceful contraction by the myocardium. Therefore, cardiac output increases, and blood pressure increases.

Blood Pressure returns to the setpoint and homeostasis is restored.



Neuro/Endocrine Control of the Blood Pressure (Hypertension)

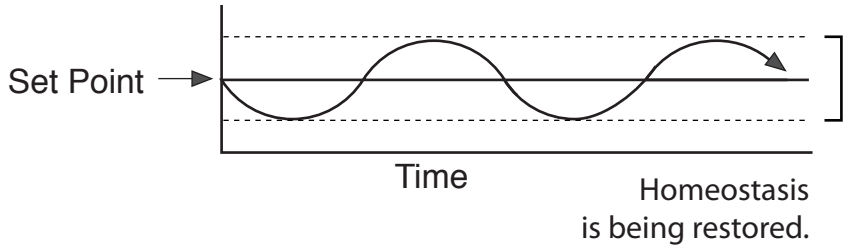




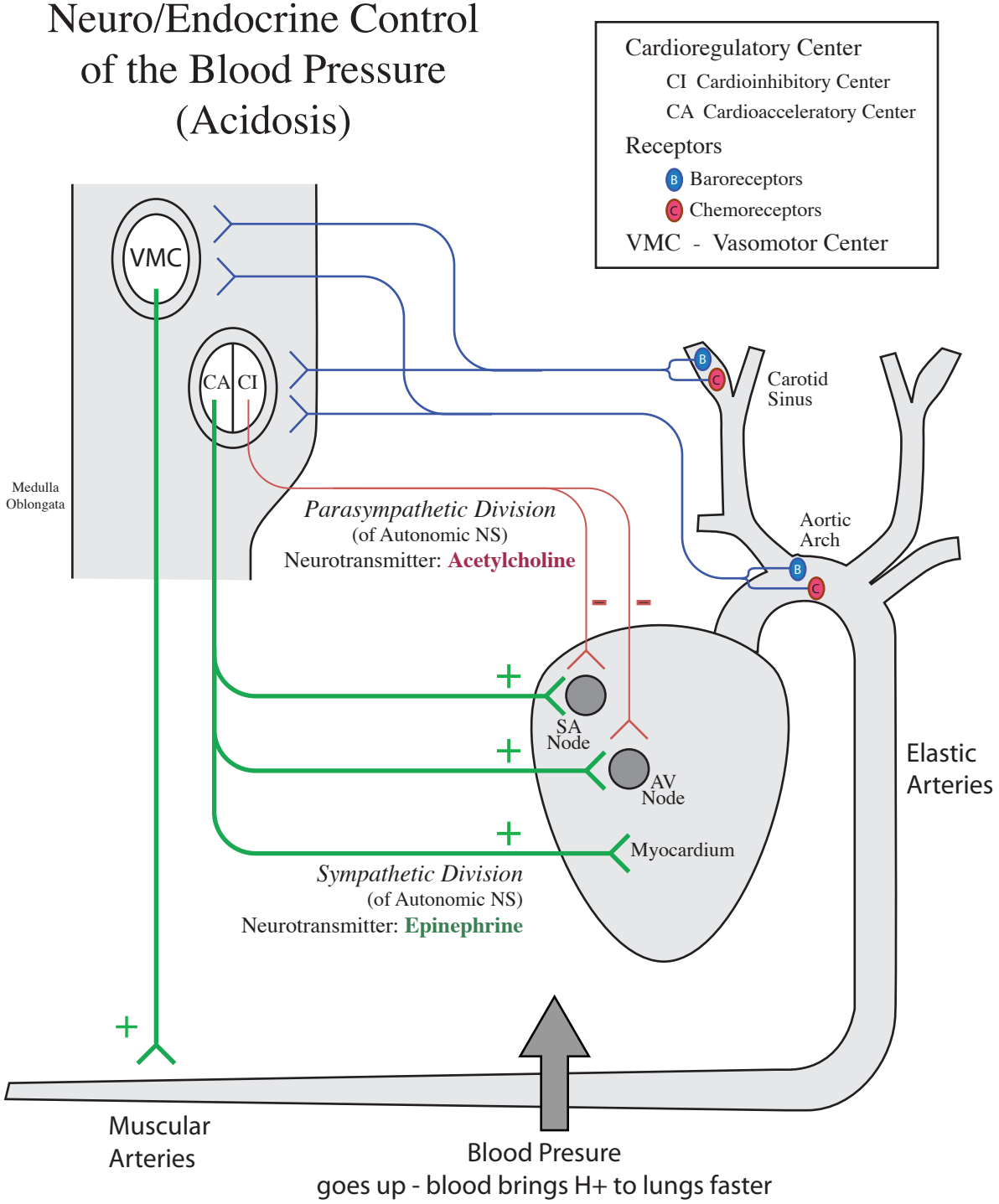
Baroreceptors relay physiological stress of hypertension to the vasomotor center, which ***decreases*** sympathetic stimulation resulting in ***vasodilation*** of muscular arteries (note, there is no parasympathetic innervation for blood vessels).

Likewise, baroreceptors inform the cardioregulatory center, which ***increases*** parasympathetic stimulation and ***decreases*** sympathetic stimulation. This results in an decrease in heart rate and a less forceful contraction by the myocardium. Cardiac output goes down, blood pressure goes down.

Blood Pressure will return to the setpoint and homeostasis is restored.



Neuro/Endocrine Control of the Blood Pressure (Acidosis)



Normal pH for the blood ranges between 7.35 to 7.45 (slightly alkaline, or basic).

An increase in physiological activity results in more CO_2 production resulting in an acidification of the blood. pH has been disrupted.

$$\uparrow CO_2 + H_2O \rightleftharpoons \uparrow H_2CO_3 \rightleftharpoons \uparrow H^+ + \uparrow HCO_3^-$$

Body Cells

Interstitium

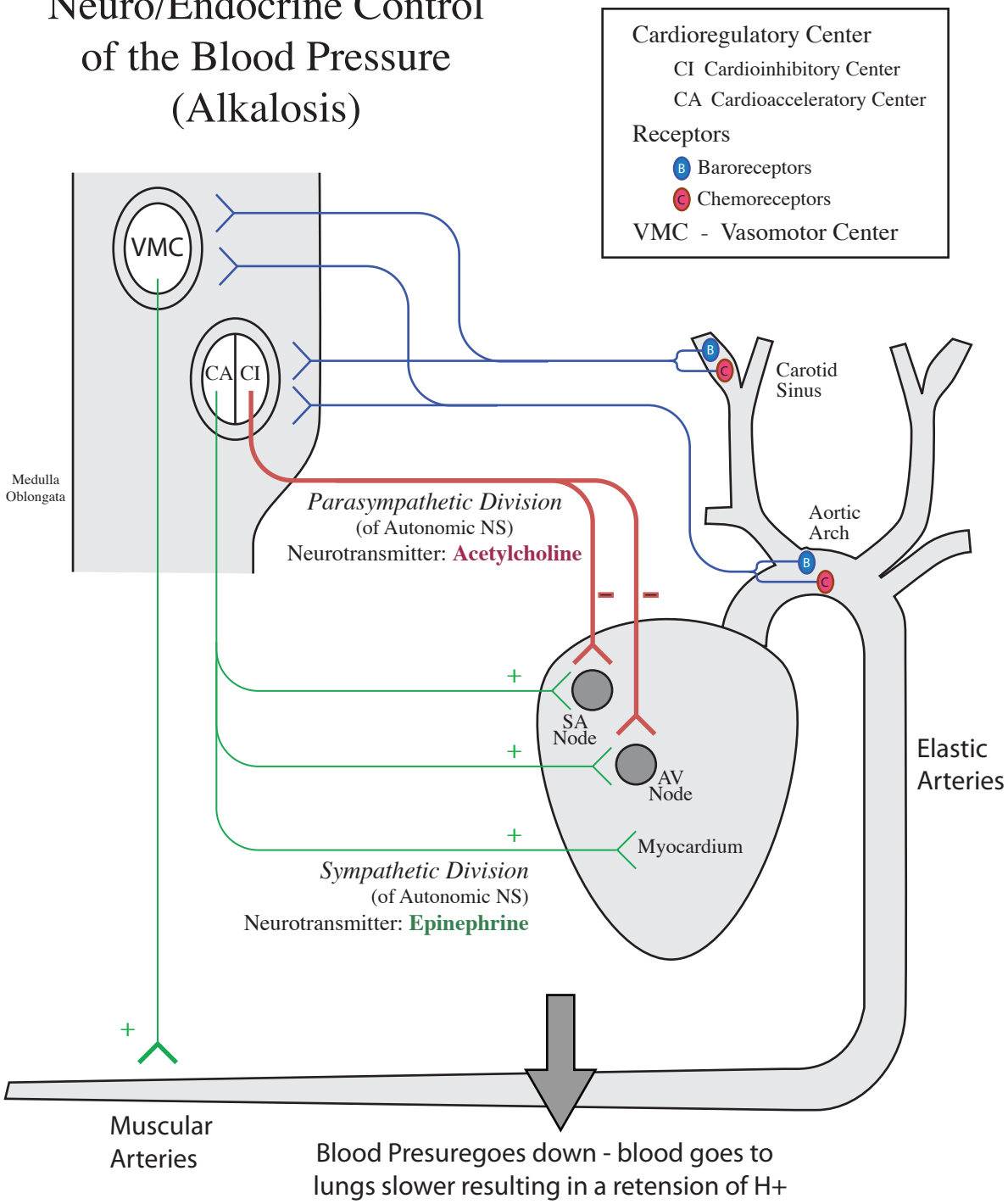
Chemoreceptors inform vasomotor center, which increases sympathetic stimulation resulting in vasoconstriction resulting in an increase is periperal resistance. Likewise, the cardioregulatory center increases sympathetic stimulation and decreases parasympathetic stimulation. The heart beats more forcefully and at a more rapid rate. As cardiac output increases the blood moves faster, bringing the acidified blood to the lungs.

At the lungs, H^+ reacts with HCO_3^- forming water, raising the pH. Homeostasis is restored. Note also that CO_2 has reformed and will be exhaled.

$$\uparrow H^+ + \uparrow HCO_3^- \rightleftharpoons \uparrow H_2CO_3 \rightleftharpoons \uparrow CO_2 + H_2O$$

Alveoli of Lungs

Neuro/Endocrine Control of the Blood Pressure (Alkalosis)



Normal pH for the blood ranges between 7.35 to 7.45 (slightly alkaline or basic).

A decrease in physiological activity results in less CO_2 production that results in alkalinization of the blood. pH has been disrupted.

$$\uparrow CO_2 + H_2O \rightleftharpoons H_2CO_3 \rightleftharpoons \uparrow H^+ + HCO_3^-$$

Body Cells

Interstitium

Chemoreceptors inform the vasomotor center, which decreases sympathetic stimulation of the muscular arteries. Vasodilation occurs and therefore a decrease in peripheral resistance. Likewise, the cardioregulatory center reduces sympathetic stimulation and increases parasympathetic stimulation. The heart beats less forcefully and at a slower rate. Cardiac output goes down and the blood moves slower, bringing the blood to the lungs at a slower rate.

At the lungs, less H^+ can react with HCO_3^- because of the slower delivery. Therefore, H^+ is retained, and the pH will lower (become for acid). Homeostasis is restored.

$$\uparrow H^+ + HCO_3^- \rightleftharpoons H_2CO_3 \rightleftharpoons \uparrow CO_2 + H_2O$$

Alveoli of Lungs

Schematic on the
Neuro/Endocrine Control of the Blood Pressure