What is it Blood pressure?

**BP= COxSVR**

**What happens if you rapidly infuse 1litre 0.9% Normal Saline into a patient who is euvolaemic?**

-Increase in Preload and SV

Causing an Increase in CO and so increase in MAP ( MAP = CO x SVR,

CO = HR x SV)

It is important to minimise fluctuations in MAP to ensure adequate perfusion of organs, since not all are able to autoregulate.

There is a Negative Feedback via fast, neuronal responses and slower, hormonal responses…

**Fast (Neuronal)**

Increased Cardiac Output is detected by the Arterial baroreceptors (mechanoreceptors) which sense distension of the walls of the carotid sinus, located at the bifurcation of the carotid artery (Cn 9) and the Aortic arch (Cn10).

As BP rises it causes increased Frequency of Action potential firing via the cranial nerves afferents - which rely to the Vasomotor Centre (VMC) located in the Medulla (this has 2 areas: (vasodilator and vasoconstrictor areas)

—> Increased Firing causes inhibition of sympathetic outflow + increased parasympathetic transmission: causes peripheral Vasodilation, decrease in HR and myocardial contractility. Resulting in a return of MAP to normal.

**Explain in details the firing of baroreceptors?**

Baroreceptors - Can be HIGH arterial pressure or LOW pressure.

High pressure baroreceptors are at the carotid sinus and aortic arch = Rapid response, Short term control.

Low Pressure = located within the chambers of the heart and large systemic veins and pulmonary vessels. These receptors bring about changes in blood volume and slower and provide more sustained BP control.

**Slow (Hormonal)**

RAAS - reduced Sympathetic outflow reduces Renin secretion, theefore reduced Aldosterone and Ang2 resulting in a reduction in plasma Volume

ADH secretion from hypothalamus is reduced in response to the reduced plasma osmolarity and increase plasma volume so diuresis occurs.

ANP - atrial stretch via low pressure mechanoreceptors in the great veins and walls of right atrium are activated by increased wall distension releasing ANP and causing Naturesis

**What are the Cardiovascular consequences of activation of the peripheral chemoreceptors?**

The peripheral chemoreceptors (carotid and aortic bodies) are activated by low Pao2 and High PaCo2 ( and the carotid bodies are also activated by low arterial pH)

In addition they are activated when MAP is below 65mHg. Causing Increased Action potential generation- which are relayed to the Respiratory centre in the medulla and pons. The Medullary Respiratory centre has close neuronal connections with the Vasomotor Centre so activation of the Medullary Respiratory centre by Hypoxia, Hypercarbia or Acidosis also causes an increase in Sympathetic Outflow from the Vasomotor Centre.

**What reflexes are elicited by a rapid fall in Blood pressure?**

Baro-receptor reflex - immediate.

- Reduced input due to reduced vessel stretch —> reduced firing.

- Cardio-inhibitory centre is inhibited + VMC is activated leading to increased Symp and reduced parasymp activity. Increased contractility, tachycardia, increased SVR.

CVS response

* redistribution of CO from skin, muscle and viscera to brain and heart

HPA Response

* Increased ADH secretion from posterior Pituitary —-> h20 conservation.
* Increased Adrenaline/Nad release has direct effect on heart and vasculature.

Starling’s forces

* Ultrafiltration at capillaries as Hydrostatic pressure falls and oncotric pressure rises
* Favours interstitial fluid movement into the circulation (0.25mls/kg/min approx 20mls/min)

RAAS

-fall in renal blood flow detected by JGA

-Renin released and Angiotensin 2 formed - causing vasoconstriction and release of aldosterone - which causes sodium an water resorption at DCTs.

**What is the Bainbridge reflex?**

aka atrial reflex = increase in HR due to increase in Central Venous volumes.

increased blood volume is detected by atrial stretch receptors.

can be seen after delivery when large auto transfusion from placenta to mother.

**What is Bezold-Jarisch Reflex?**

Ventricular ischaemia results from activation of ventricular receptors - which leads to bradycardia and hypotension.