CIRCULATORY SHOCK

(Excellent info in text)

- Definition: Inadequate BF throughout the body or inadequate perfusion to meet the needs of the tissues

- Tissues become ischemic and hypoxic.
  - If severe enough... tissues could be damaged or die (infarction).
  - Brain, Heart, and Kidneys are especially vulnerable.

- Many types with names based on cause:
  1. **Hypovolemic shock** (a.k.a. hemorrhagic shock) – loss of blood volume causes the drop in BP. Also caused by severe dehydration

  2. **Vascular shock** – vasodilation causes ↓BP.
     - This category includes:
       - **Neurogenic shock** – vasodilation due to damage of vasomotor center or spinal cord ↓sympathetic impulses to vessels. Vasomotor tone is decreased. ↓BP
       - **Anaphylactic shock** – severe allergic reaction causes systemic vasodilation. Therefore ↓BP
       - **Septic shock** – due to a bacterial infection of the blood. Toxins released by bacteria cause vasodilation. Therefore ↓BP

  3. **Cardiogenic shock** – poor pumping action of the heart produces ↓CO (cardiac output) and therefore ↓BP. Tissues are not perfused sufficiently.
3 STAGES OF CIRCULATORY SHOCK

1) COMPENSATED STAGE
There has been a temporary deficit of BP but your homeostatic mechanisms regulating BP have kicked in and are maintaining sufficient BP
- **Baroreceptor reflexes** (& possibly **Chemoreceptor reflexes**) that ↑HR and cause vasoconstriction.
- **Renin-angiotensin-aldosterone mechanism** results in vasoconstriction and retention of Na⁺ and water to maintain BV
- **Vasopressin / ADH** results in retention of water to maintain BV and possibly vasoconstriction.
- **Fluids shift from ISF into blood** to maintain BV and BP resulting in intense thirst.

Note: Some or all of above may be involved depending on severity.

2) PROGRESSIVE STAGE
- **reduced BF to the heart** reduces pumping efficiency of the heart and therefore ↓CO
- **BF is now slower** and **blood is more likely to clot**, especially in smaller vessels
- **Hypoxic tissues** will try to ↑ their BF locally by:
  1. **↑permeability of nearby capillaries** but this results in a **fluid shift from plasma out to ISF** thus ↓BV
  2. **dilating nearby vessels** but this ↓ systemic BP even further and therefore ↓ venous return to heart even more.

This cycle repeats itself becoming a **PFBM** resulting in ever ↓CO and ever ↓ tissue perfusion.

**TREATMENT:**
- “**fluid challenge**” Give fluids by IV to boost BV and BP
- give **vasoconstrictive drugs** such as **dopamine** to boost BP
- **anti-inflammatory meds** to reduce dilation of vessels and reduce permeability of capillaries

3) IRREVERSIBLE STAGE
- Irreversible damage has already been done to many organs.
- **Ischemia** and **hypoxia** have produced multiple **infarctions** in multiple organs.
- Even if BV and BP are restored by medical care, as soon as they are halted organs will fail and death is inevitable.