

(Foundation Block 5)

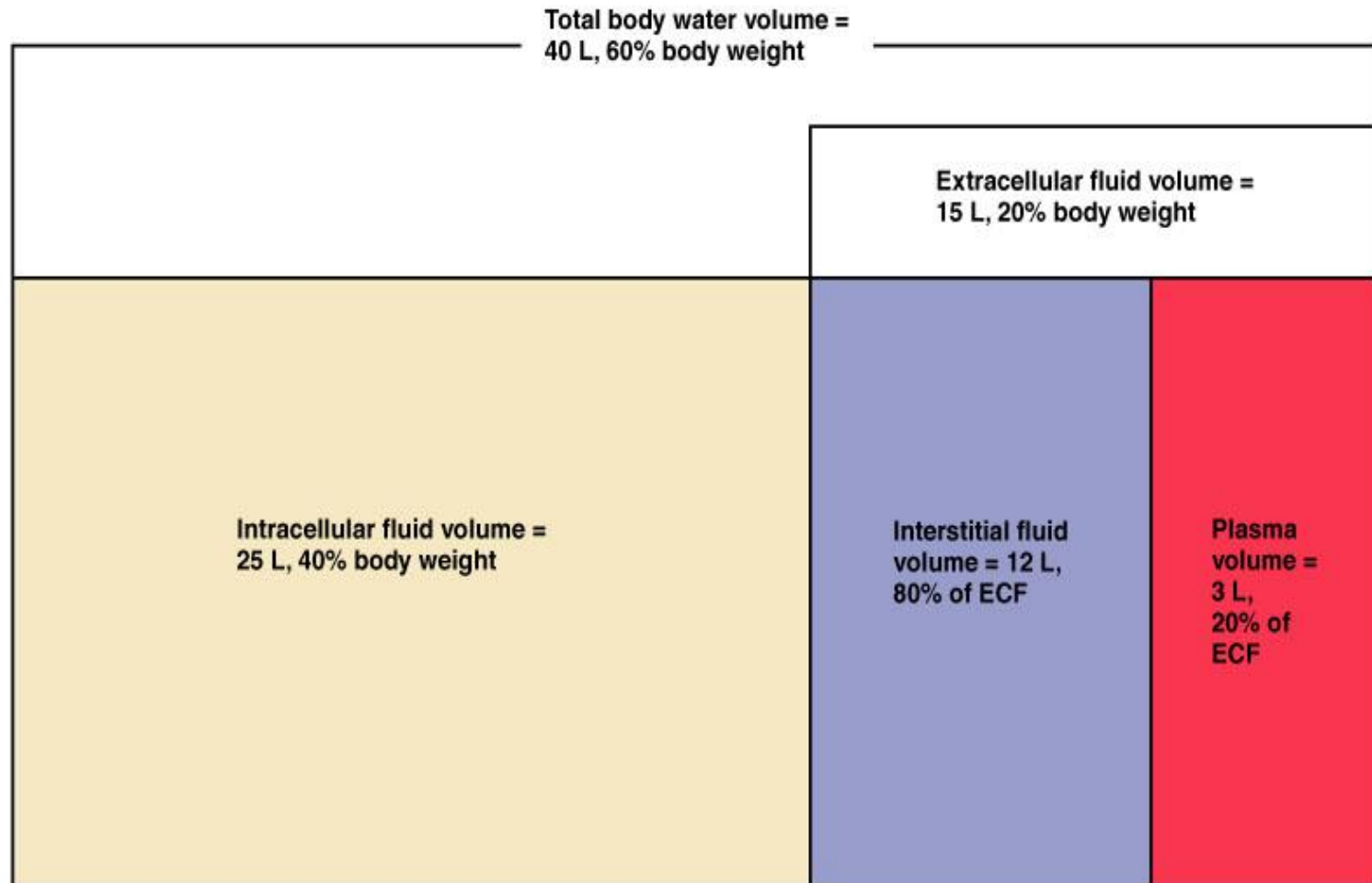
Homeostasis II

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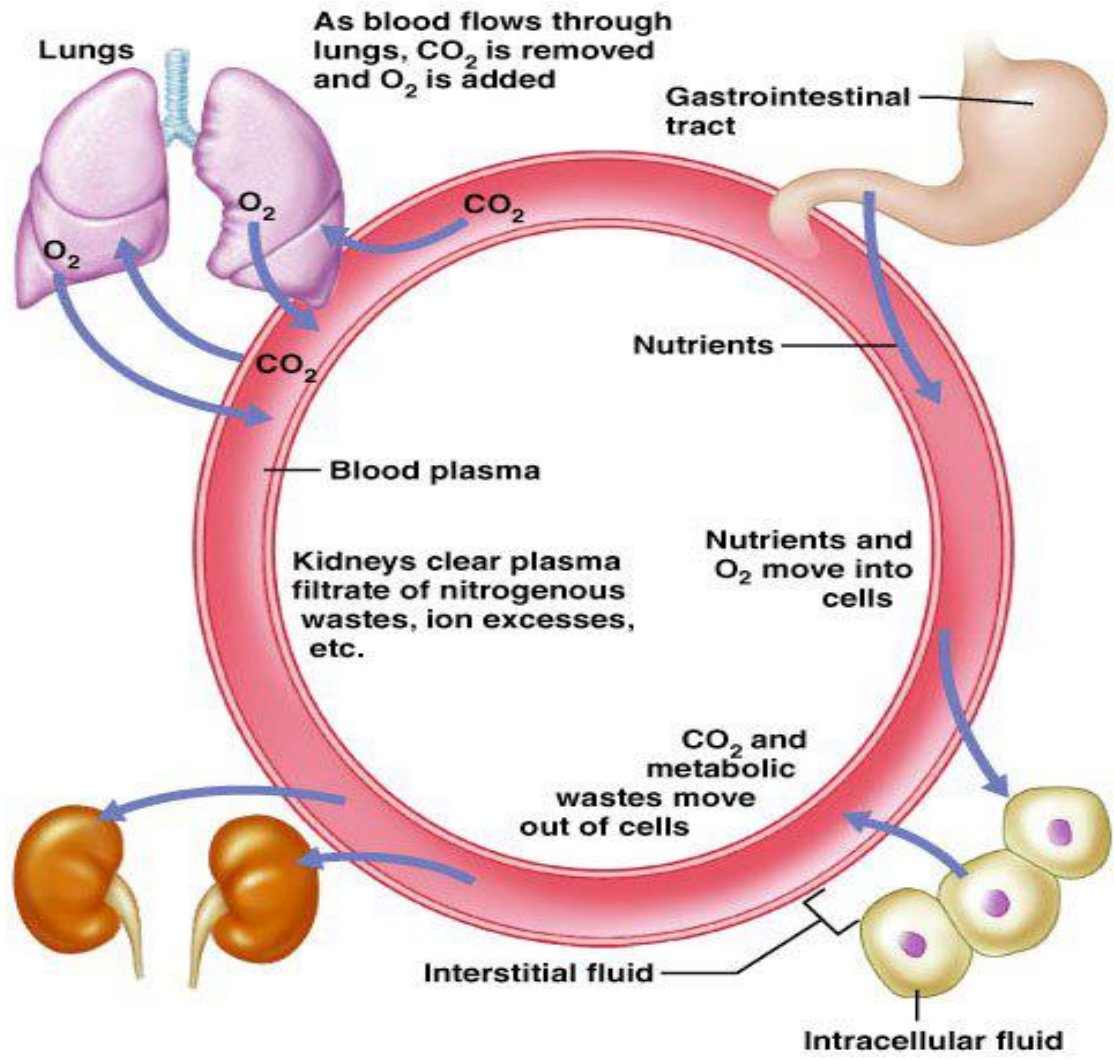
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Fluid Compartments



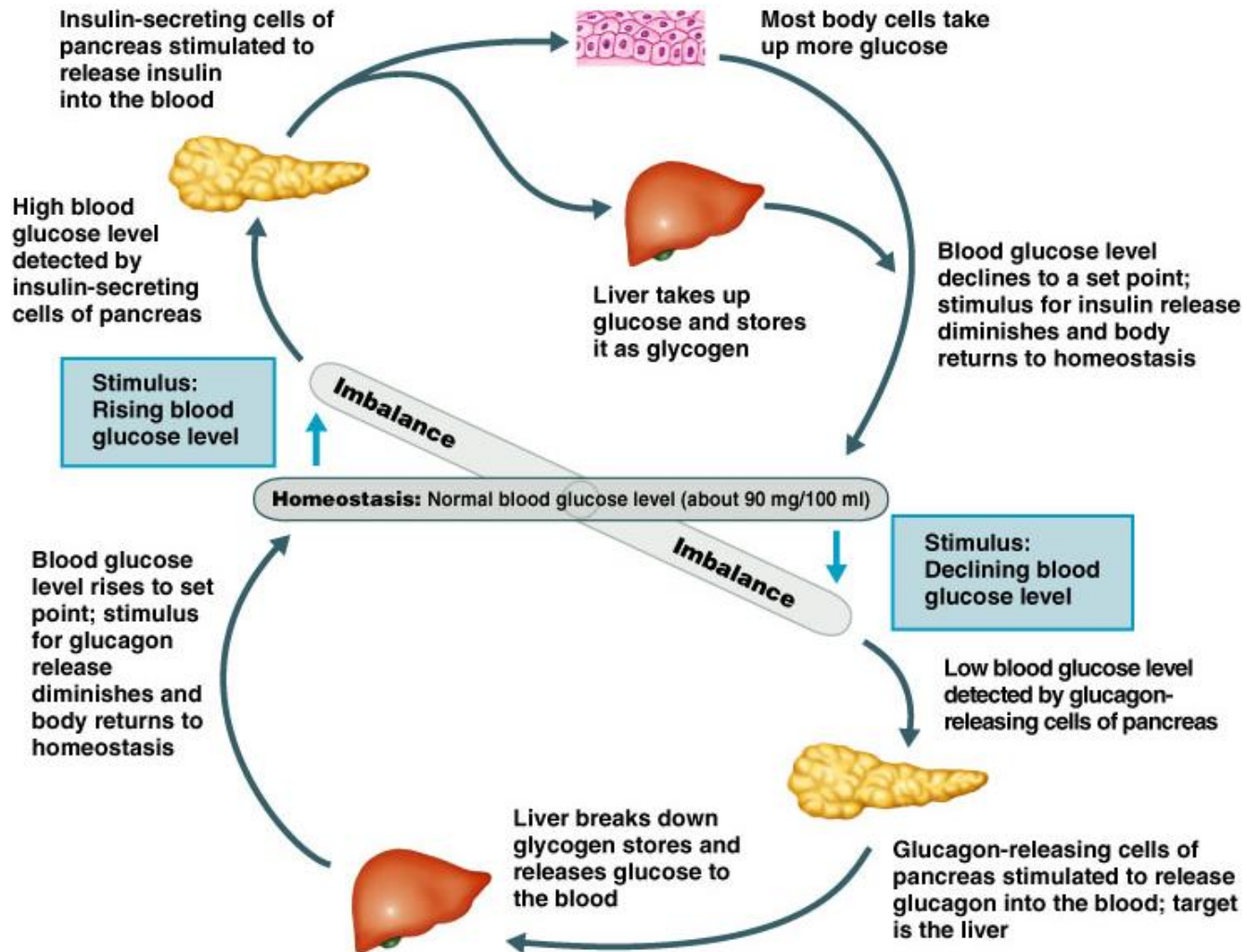
Extracellular and Intracellular Fluids

- Ion fluxes are restricted and move selectively by active transport.
- Nutrients, respiratory gases, and wastes move Unidirectionally.
- Plasma is the only fluid that circulates throughout the body and links external and internal Environments
- Osmolalities of all body fluids are equal; changes in solute concentrations are quickly followed by osmotic changes



Continuous exchange of Body Fluids

Feedback



Volumes And Osmolarities of ECF and ICF

In Abnormal States.

- **Some factors can cause the change:**
 - dehydration
 - intravenous infusion (IV)
 - abnormal sweating.
 - etc..

- **Changes in volume :**

1. Volume contraction.

2. Volume expansion.

Changes in volume

Volume contraction

removing

- 1- ***isotonic*** solution.
- 2- ***hypertonic*** solution.
- 3- ***hypotonic*** solution.

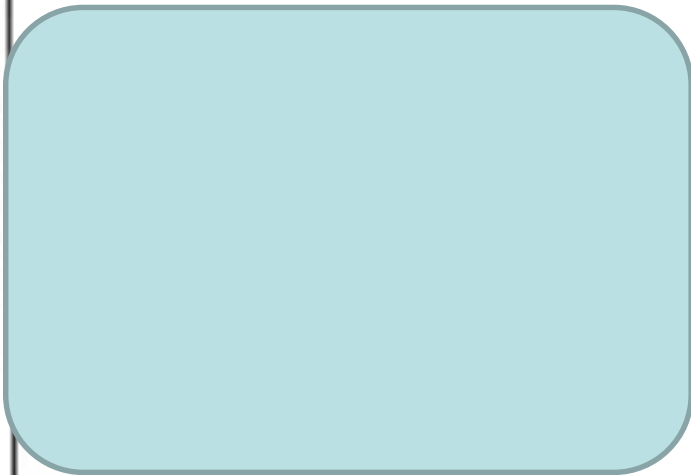
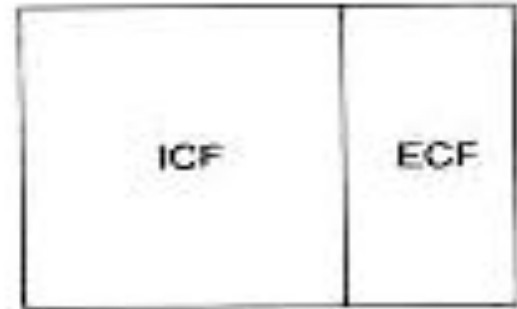
Volume expansion

Adding

- 1- ***isotonic*** solution.
- 2- ***hypertonic*** solution.
- 3- ***hypotonic*** solution.

**1- Loss of iso-osmotic
fluid
e.g. Diarrhea**

NORMAL STATE



Volume contraction:

1. Diarrhea.

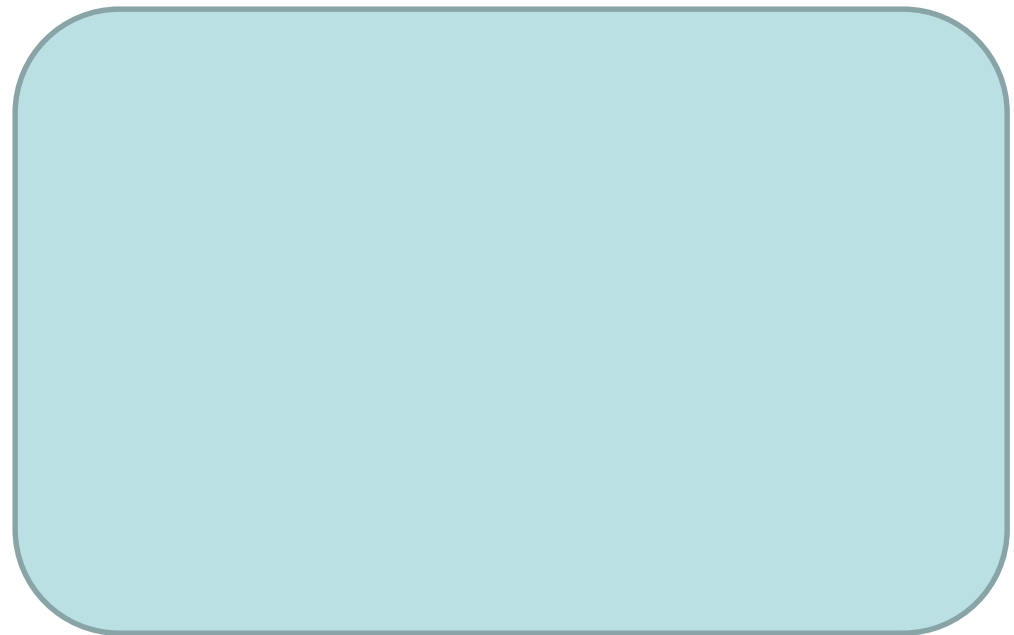
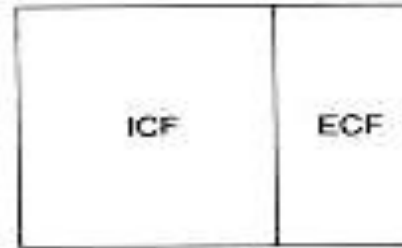
- osmolarity of fluid lost \approx osmolarity of ECF

(loss of isosmotic fluid).

- ↓ volume in ECF.
- ↓ arterial pressure.

**2. Loss of hypotonic solution
e.g. Water deprivation**

NORMAL STATE



2. Water deprivation :

- Osmolarity and volume will change

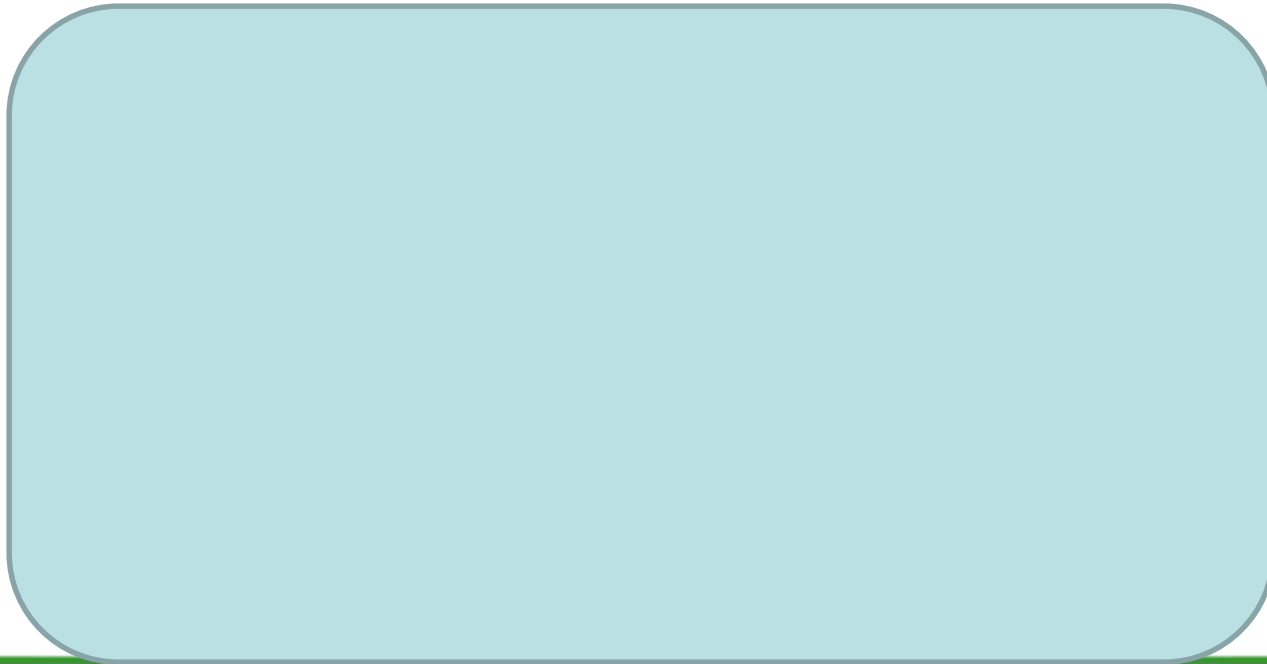
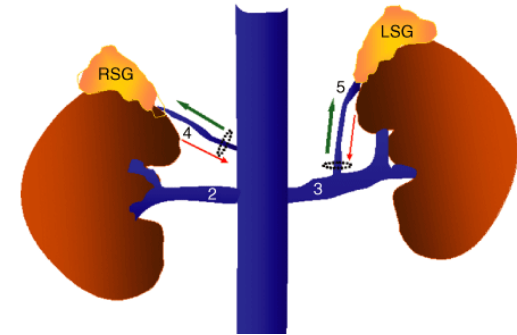
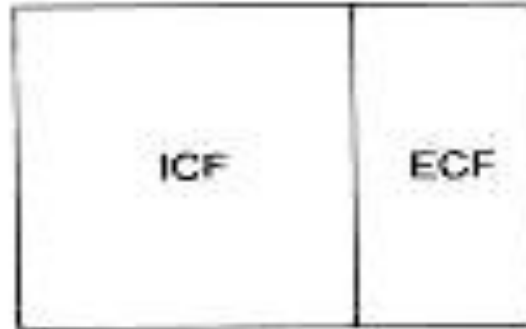
.

-  Osmolarity in both ECF and ICF.

-  Volume in both ECF and ICF.

3- Loss of hypertonic sol. e.g. Adrenal insufficiency

NORMAL STATE

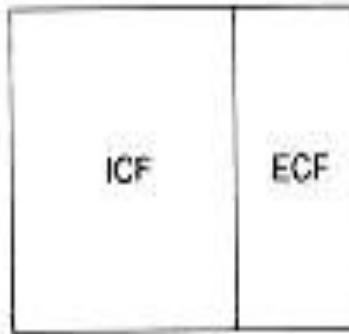


3. Loss of hypertonic solution e.g. Adrenal insufficiency:

i.e. Aldosterone deficiency.

- ↓ - Na⁺ in the ECF.**
- ↓ - osmolarity in both .**
- ↓ - in ECF volume.**
- ↑ - in ICF volume.**

NORMAL STATE



VOLUME CONTRACTION

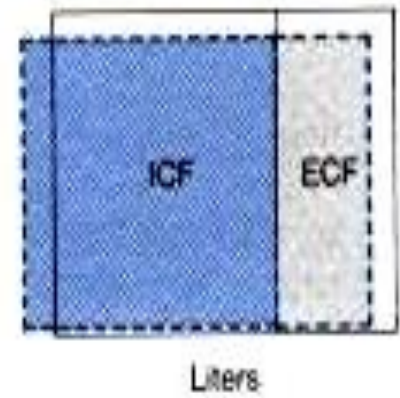
Diarrhea



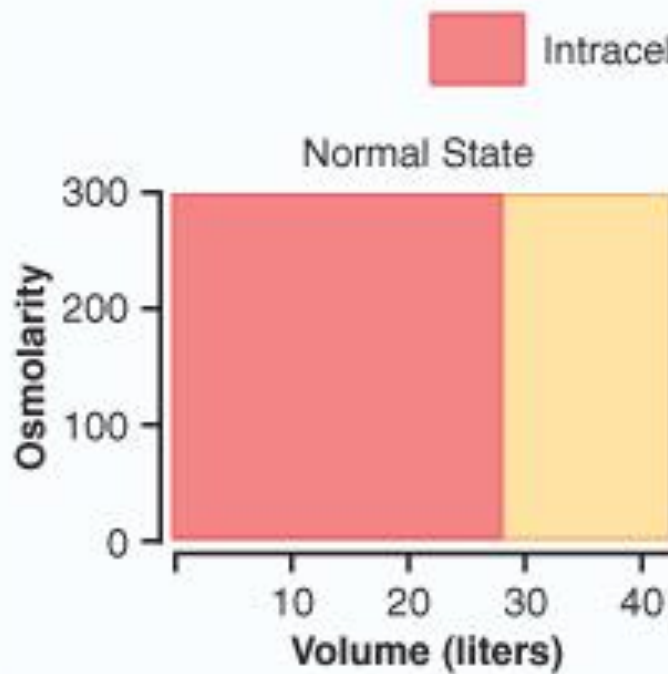
Water deprivation



Adrenal insufficiency



Volume Expansion



Extracellular fluid

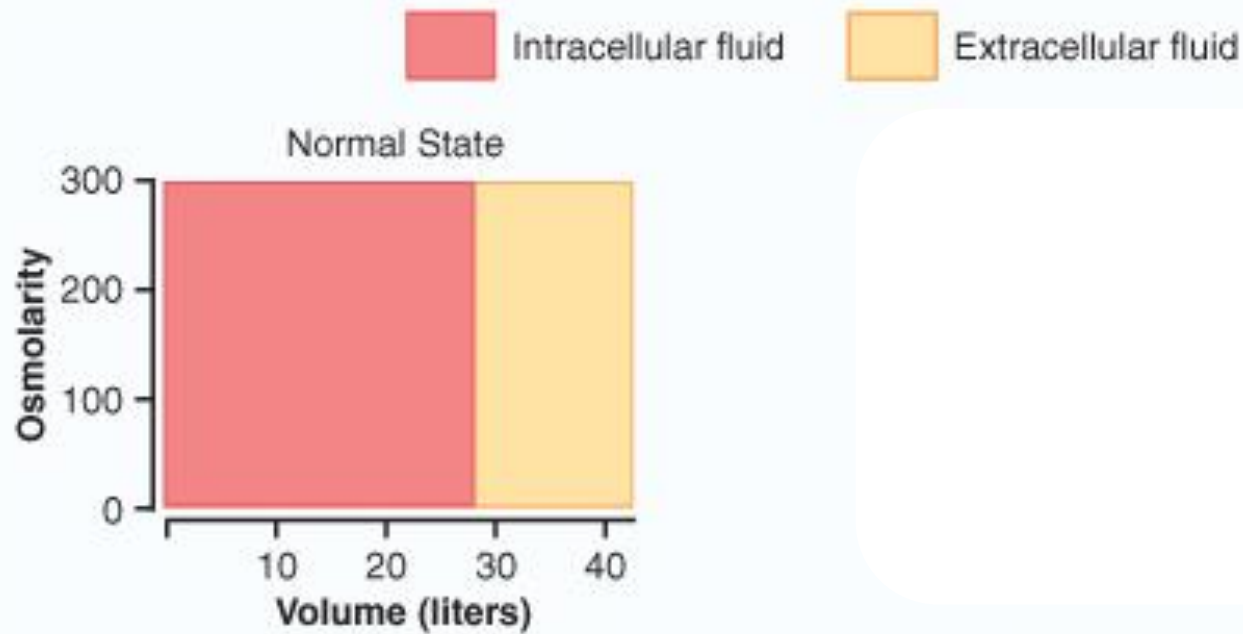


1. Adding of isotonic NaCl.

Volume Expansion

1. Infusion of isotonic NaCl.

- ↑ in ECF volume.
- No change in osmolarity.
- *Isomotic expansion* .



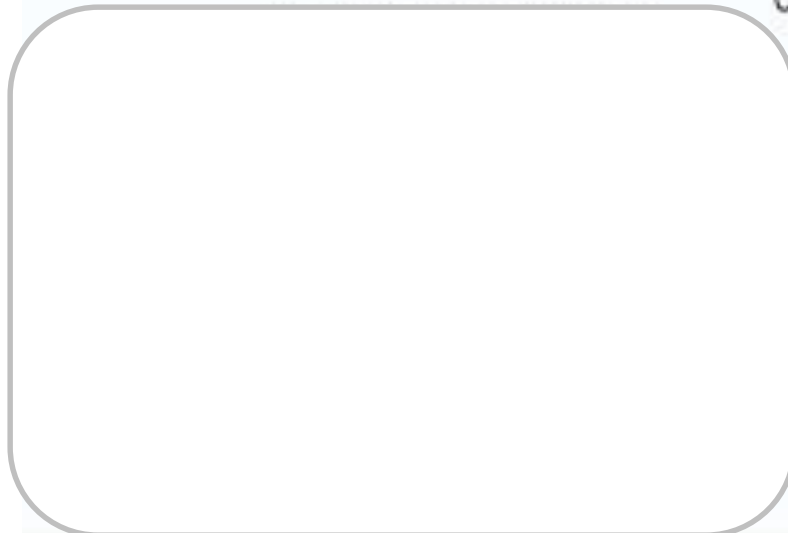
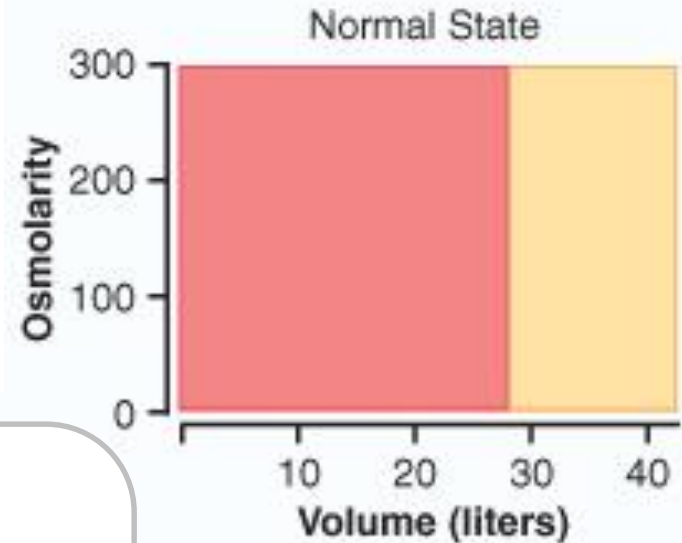
2- High NaCl intake

2. High NaCl intake.

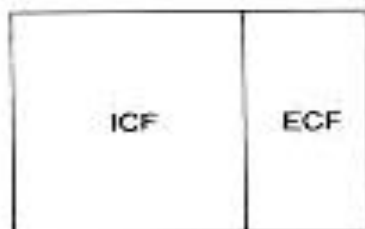
- ↑ eating salt.
- ↑ osmolarity in both.
- ↓ volume of ICF .
- ↑ volume of ECF .
- ***hyperosmotic volume expansion.***

3- Adding hypotonic solution e.g. Syndrome of inappropriate antidiuretic hormone (SIADH)

- ↑ volume
- ↓ osmolarity

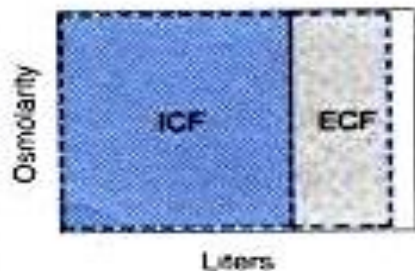


NORMAL STATE

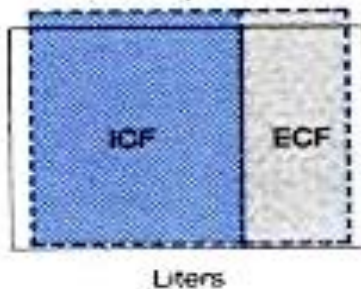


VOLUME CONTRACTION

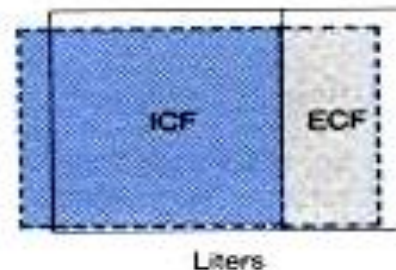
Diarrhea



Water deprivation

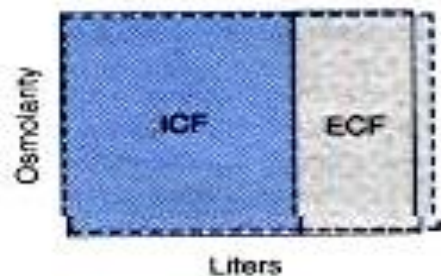


Adrenal insufficiency

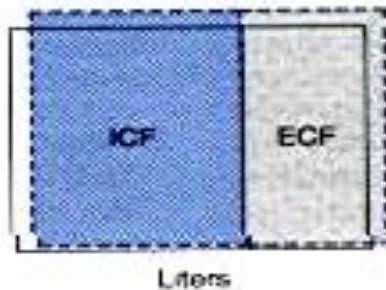


VOLUME EXPANSION

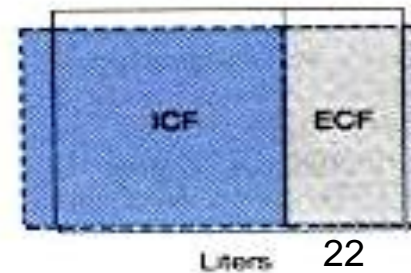
Infusion of isotonic NaCl



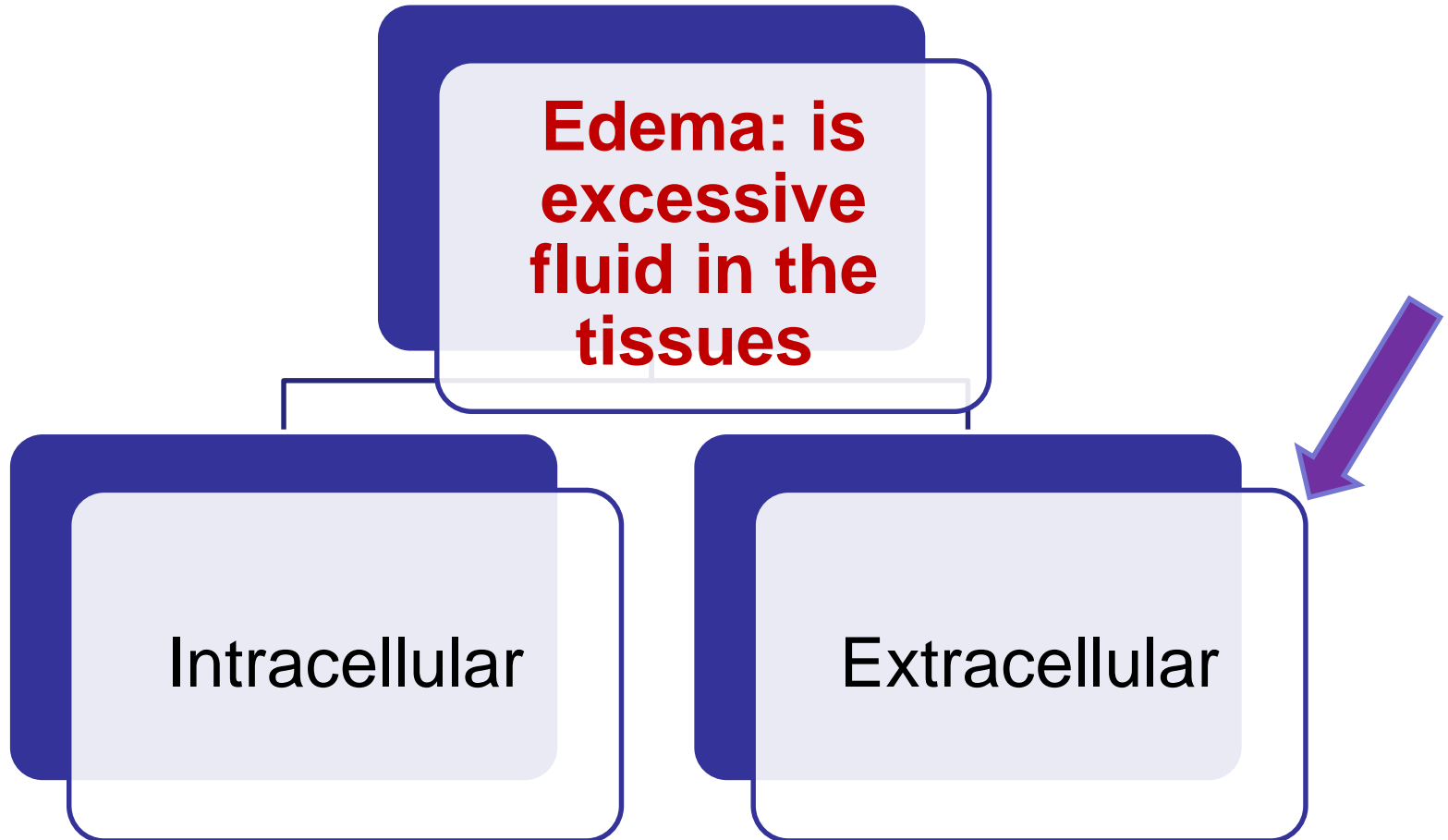
High NaCl intake



SIADH



Edema

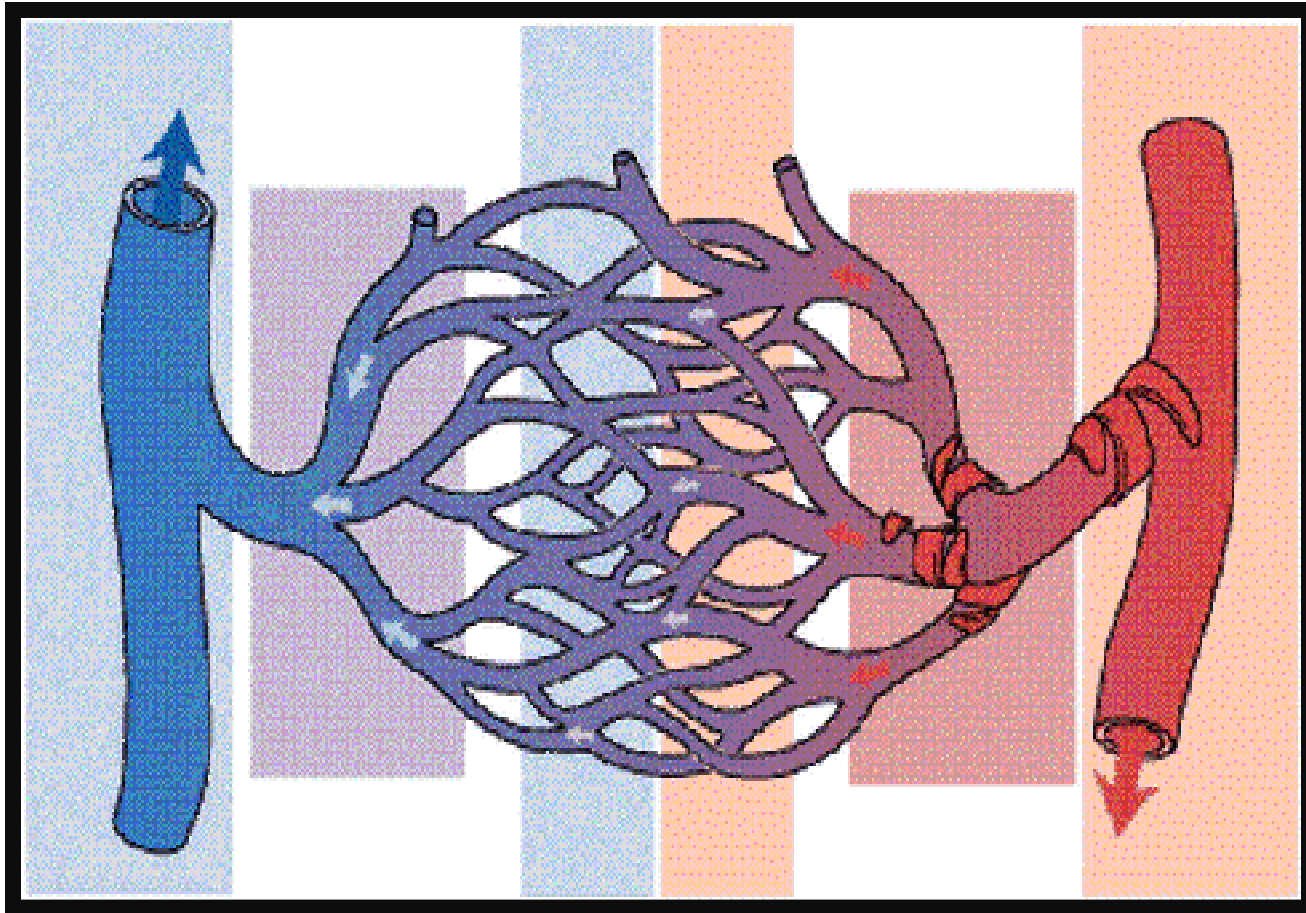


- Edema occurs mainly in the ECF compartment



Extracellular Edema

common clinical cause is excessive capillary fluid filtration.



Intracellular Edema:

inflammation of tissues.



↑ membrane permeability.



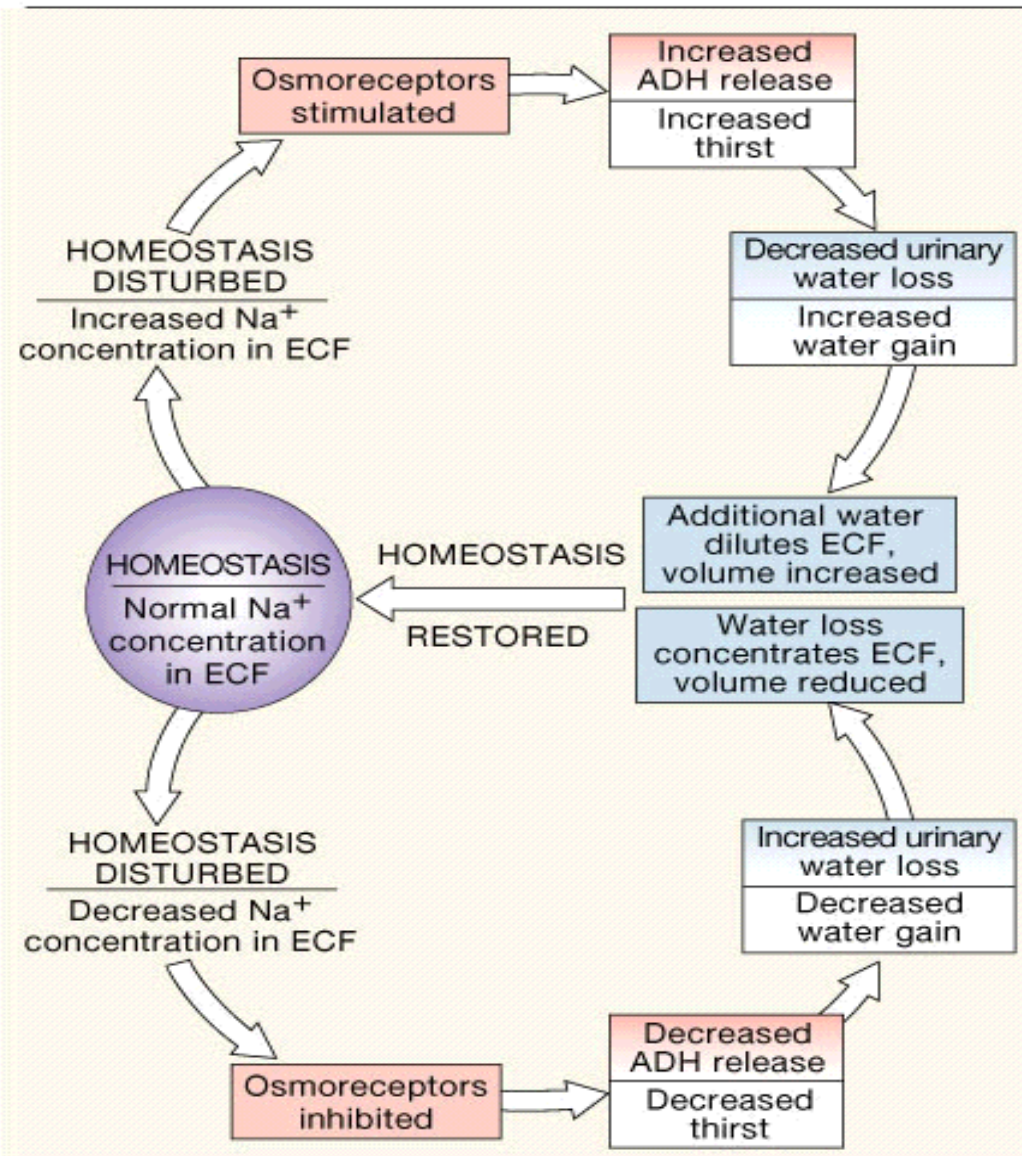
Na inside cells.

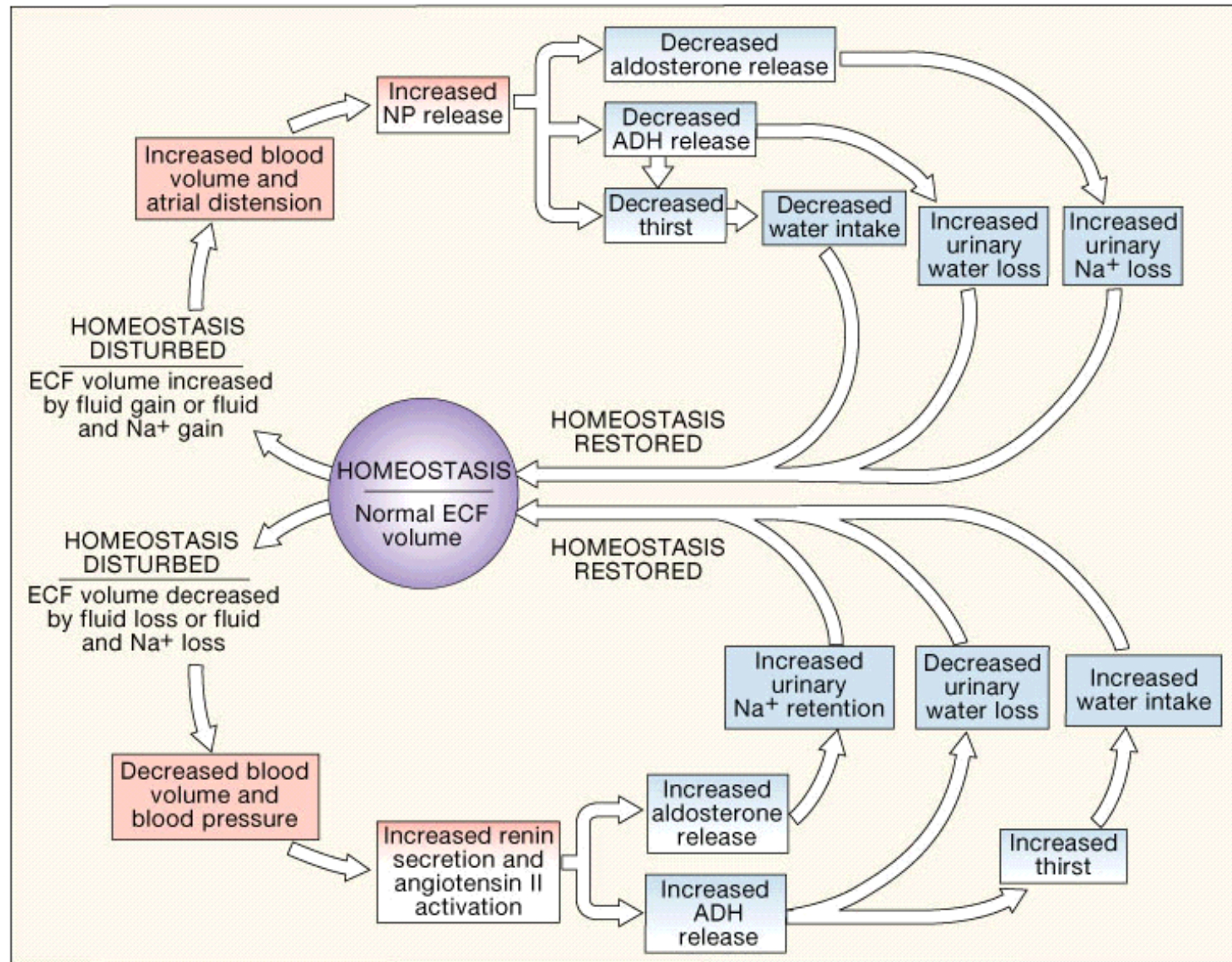


water



edema





Thanks