

The background features a light gray gradient with several realistic water droplets of various sizes scattered across the frame. A faint, circular, textured pattern is visible in the upper center, resembling a fingerprint or a similar circular motif.

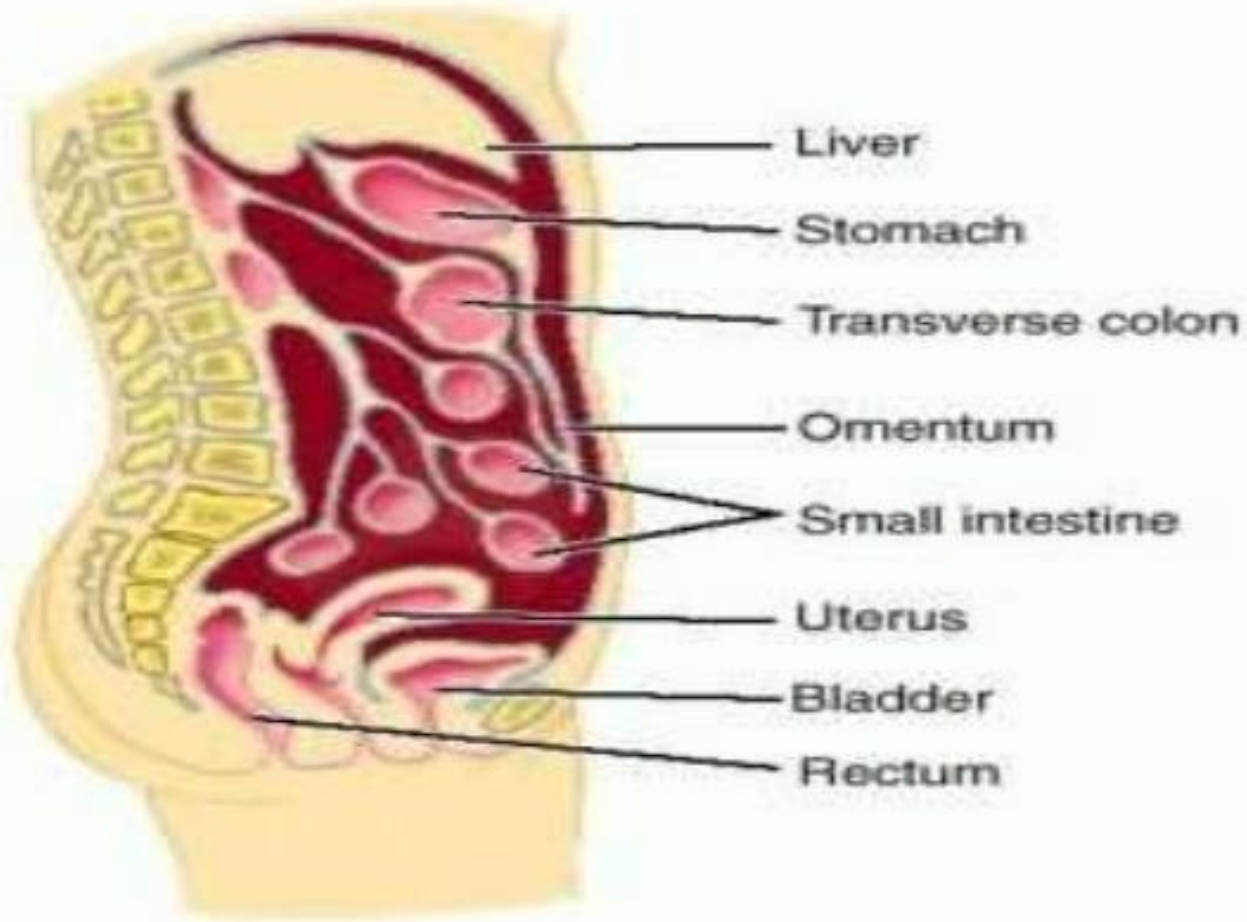
PERITONEAL DIALYSIS

DR.M.AMERIAN





Anatomy





Peritoneal dialysis: Introduction

- **Peritoneal dialysis**(PD) is a treatment for patients with severe chronic kidney disease.
- A dialysis technique that uses the patient's own body tissue-**peritoneal membrane** inside the abdominal cavity as a filter.



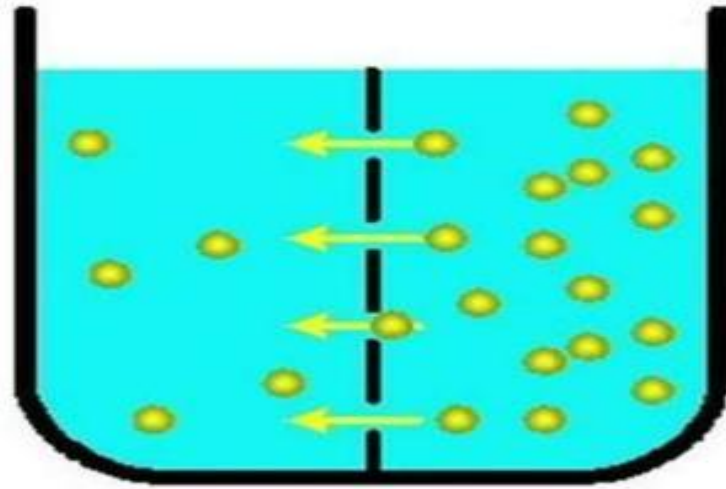


Physiology

- The semipermeable peritoneal membrane allows solutes and water to be transported from the vascular system to the peritoneal cavity and vice versa.

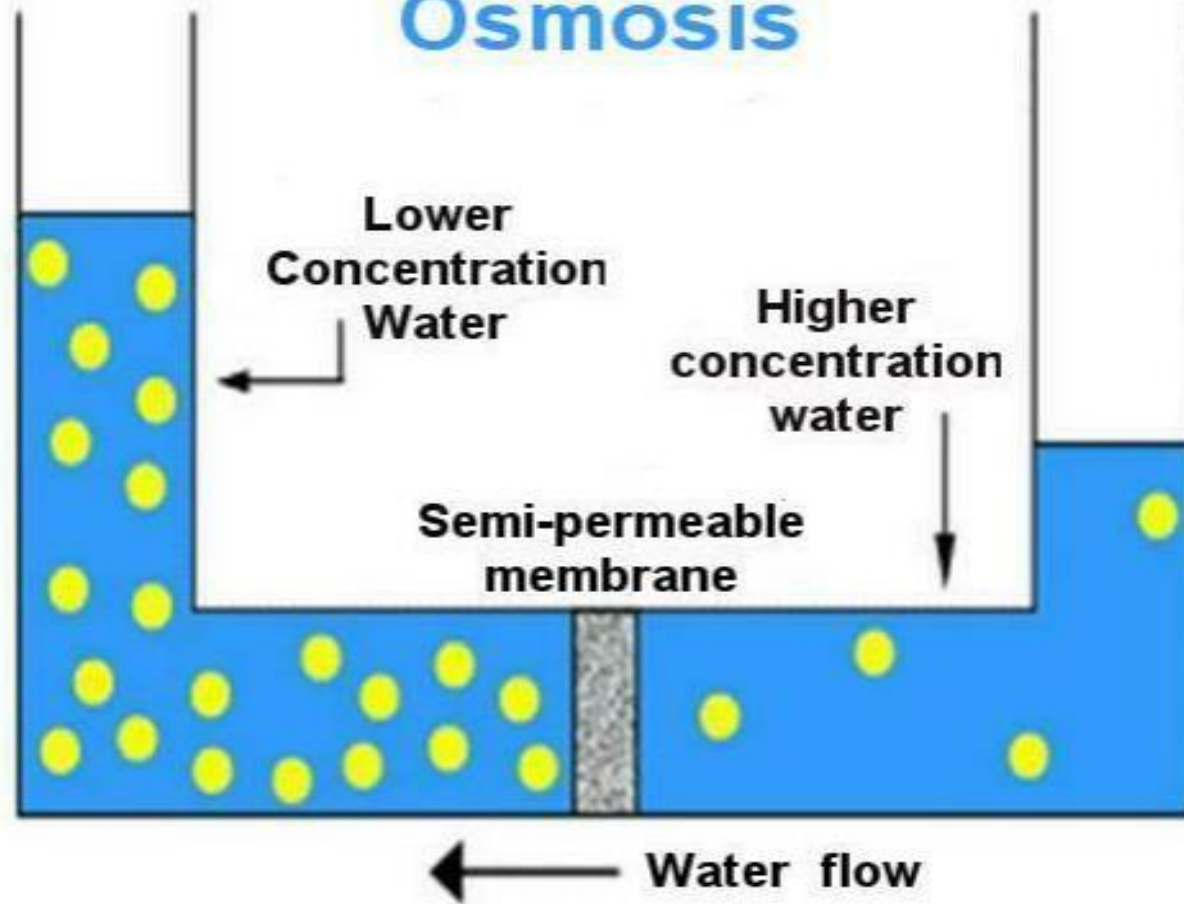


Diffusion



Solvent moves by a concentration gradient

Osmosis



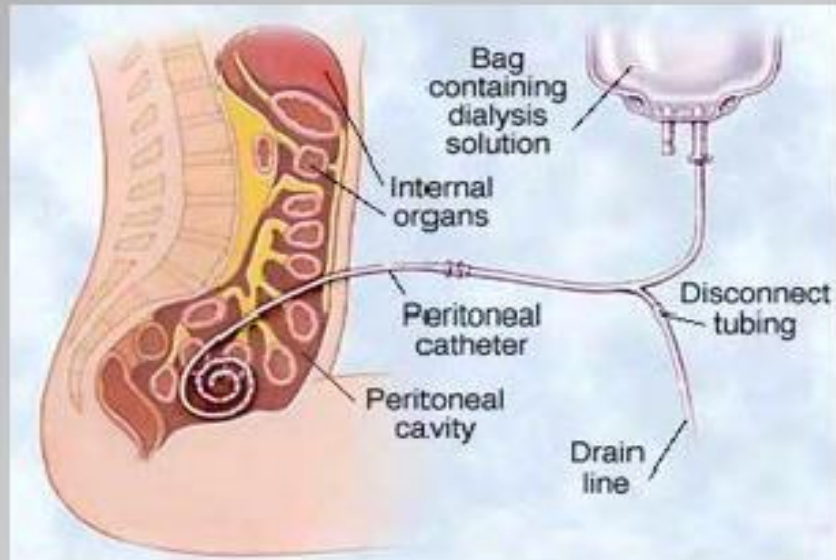


Ultrafiltration

Occurs because of a pressure gradient

Convection

Occurs as solvent drag. Solvent brings the solute with it.

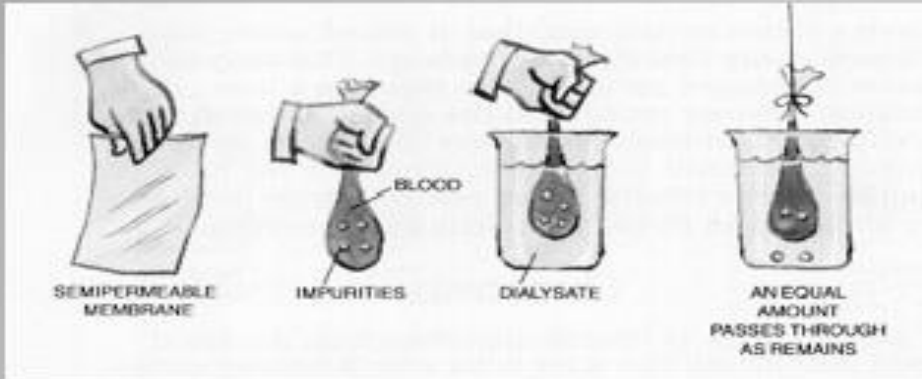


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Principles of PD

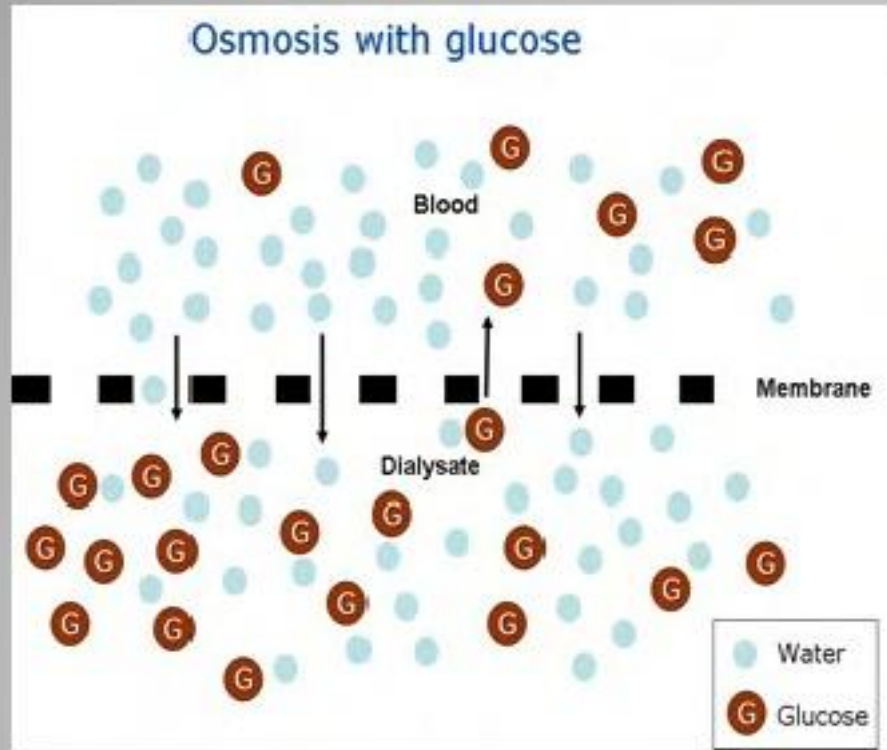
The **abdominal cavity**, hold the large organs of the digestive system, is lined by the **peritoneum**.

In PD, special **fluid** is instilled through a **permanent catheter** in the lower abdomen.



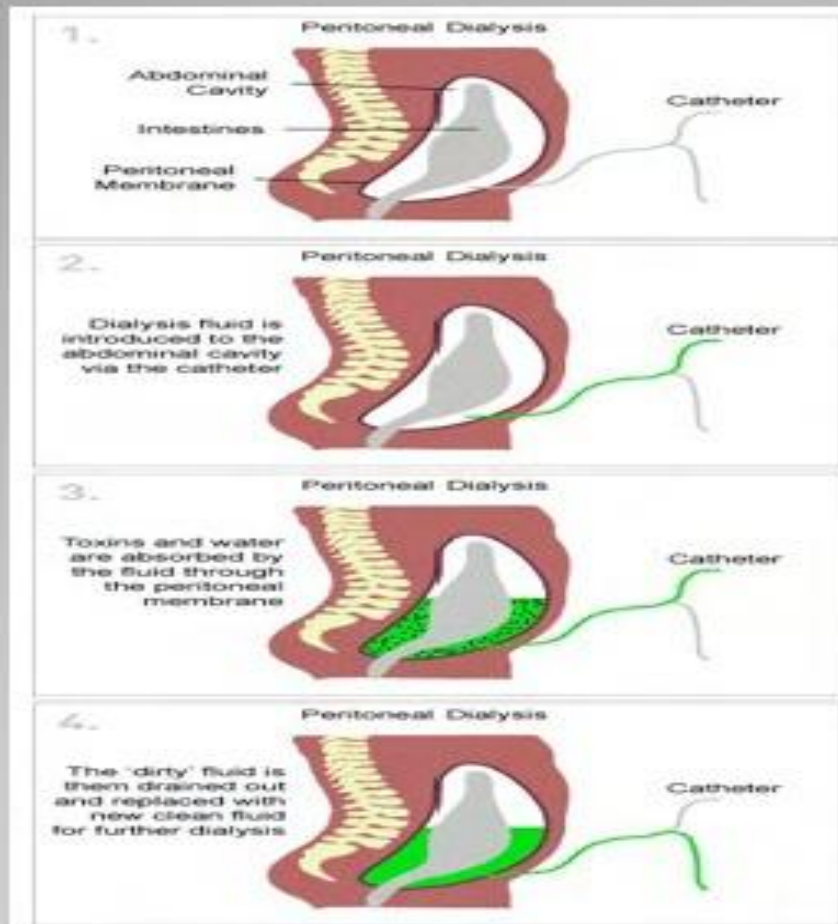
- **Solutes** are transported across the membrane by **diffusion**.
- The driving force is the **concentration gradient** between the PD fluid and the blood.
- **Waste products** present in the blood per fusing the **peritoneum** will diffuse from the blood vessels into the "**cleaner**" dialysis fluid.

Principles of PD



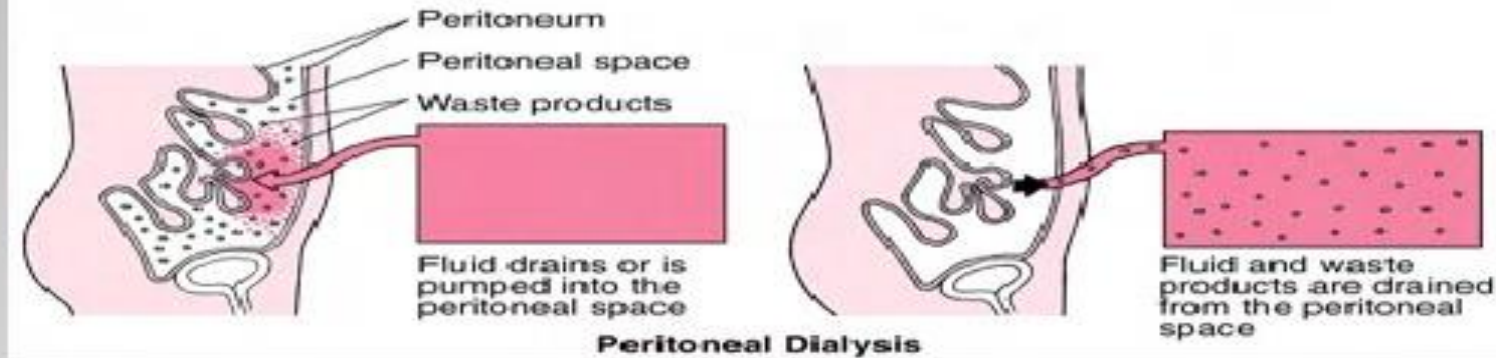
- An **osmotic pressure gradient** is applied by the addition to the dialysis fluid of an osmotic agent which will “**suck**” fluid from the blood.
- The concentration of this osmotic agent is chosen to give just the fluid removal needed. In most cases **glucose** is used to create the osmotic pressure.
- Fluid is removed by **ultrafiltration** driven by an osmotic pressure gradient. (Eg. **Yellow/Green/Red Bags**)

Principles of PD



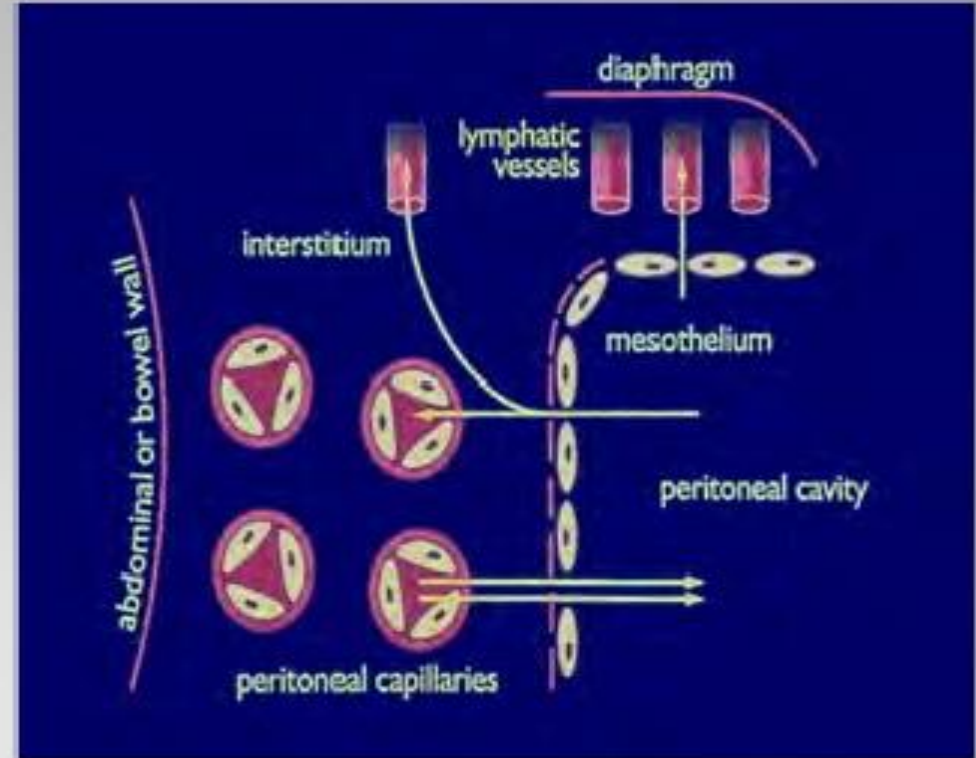
- The **dialysis fluid** should be instilled for 4 to 6 hours.
- When the dialysis fluid is drained from the abdominal cavity, it contains **waste products** and **excess fluid** extracted from the blood.
- PD is most often applied and effective as a **continuous therapy**. In this way it is a more physiological treatment than Haemodialysis (**HD**)

Principles of PD



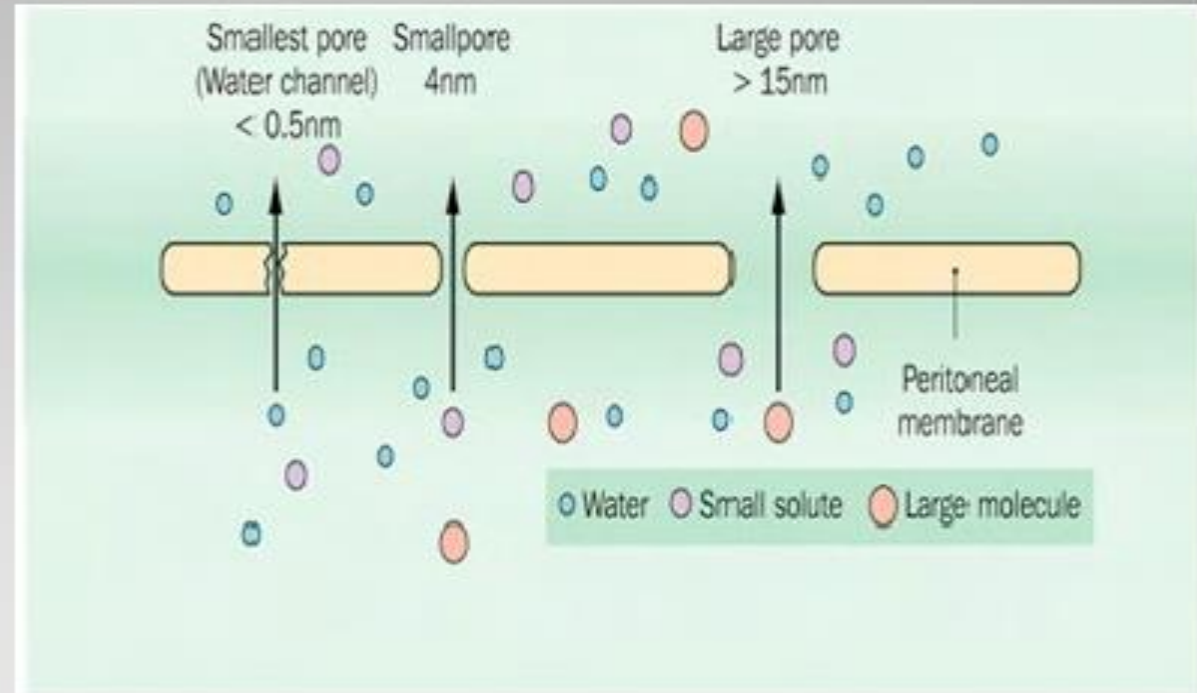
Principles PD / HD

- The abdominal cavity and all the organs contained in it are lined by a **thin smooth membrane**, the peritoneum.
- It is a **loose connective tissue** containing blood vessels and nerves.
- If put under the microscope, three layers can be identified between the peritoneal cavity and the blood stream.
- The **capillary wall** / the **interstitium** / the **mesothelium**
- Each of these is a barrier to the transport of fluid and solutes.



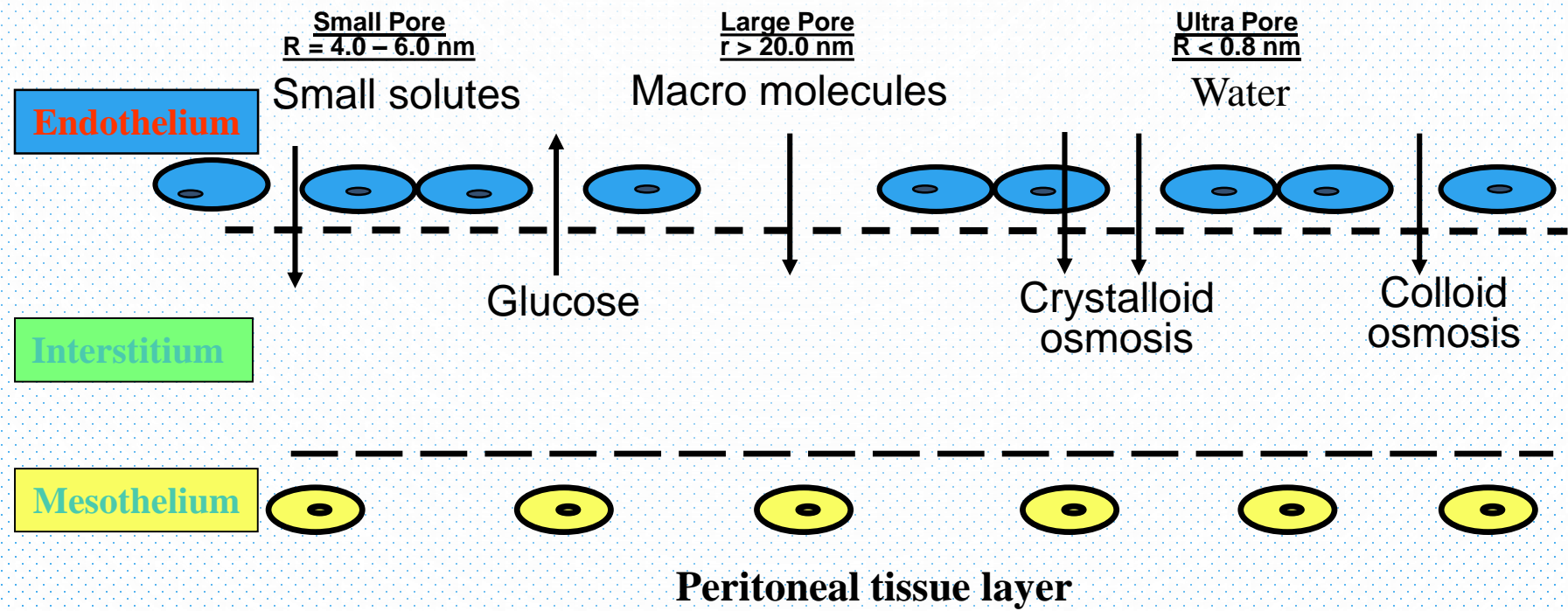
The Peritoneum

- Transport capacity for the fluid across the Peritoneal membrane varies greatly between patients.
- Mainly the pore area and the capacity to reabsorb fluid which affect fluid removal

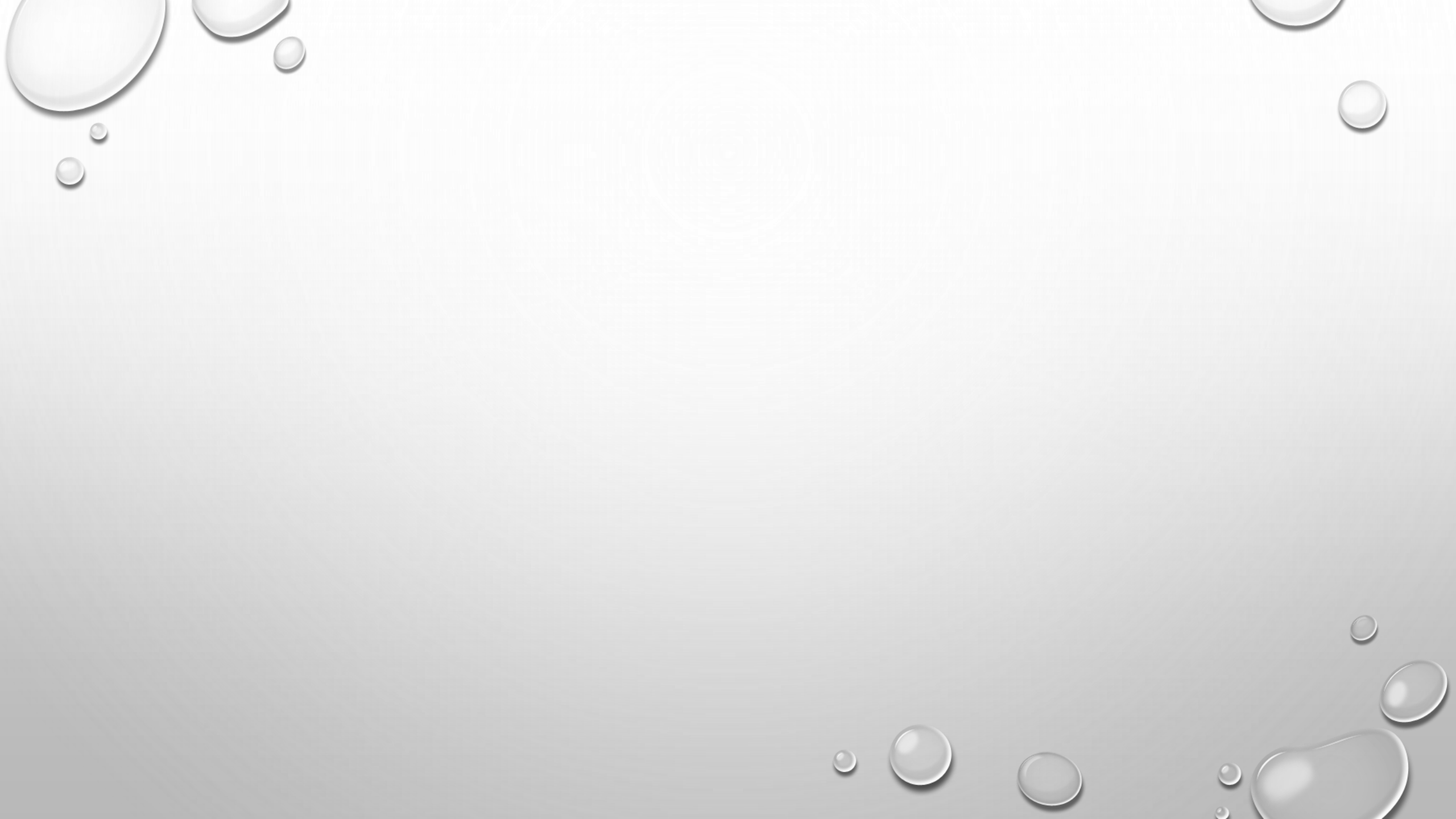


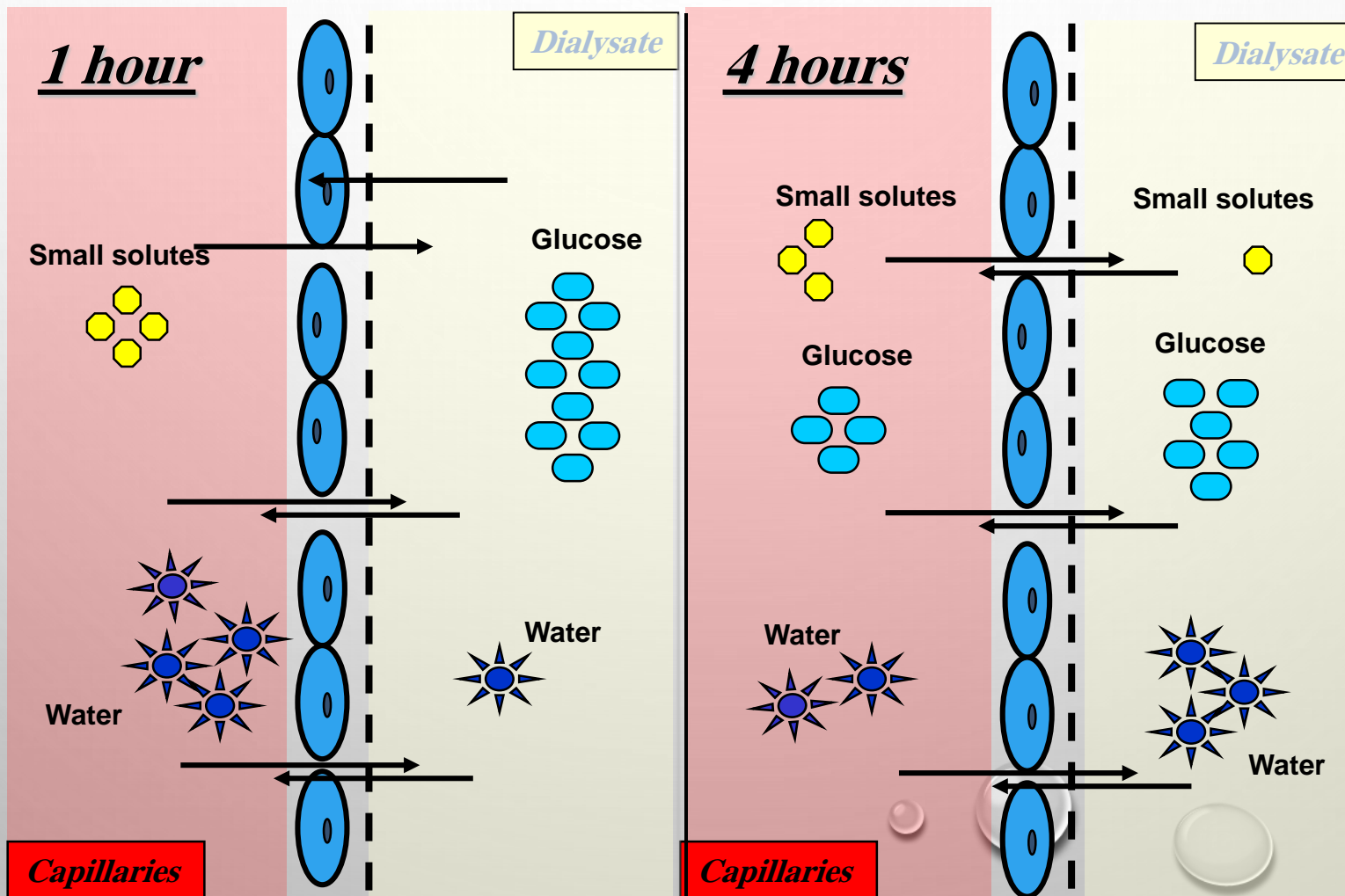
Fluid Removal

Capillaries



Dialysate





- So.....
Both **solute** and **fluid removal** in PD is controlled by
- 1) **glucose** concentration
- 2) **dwel** time
- 3) **volume**
- 4) **peritoneal membrane characteristics**

Fluid Removal



Treatment of choice for....

- ❑ Patients with RF unable or unwilling to undergo HD or renal transplantation
 - Diabetic patients
 - Patients with cardiovascular diseases eg:heart failure
 - Older patients
 - Patients at risk of adverse effects of systemic heparin
 - Patients with severe hypertension





Contra indications

Absolute contra indications

- Peritoneal fibrosis and adhesions following intra abdominal operations
- Inflammatory gut diseases





Relative contra indications

- Hernias
- Significant loin pain
- Psychosis
- Diverticulosis
- Colostomy
- Obesity
- Significant decrease of lung functions





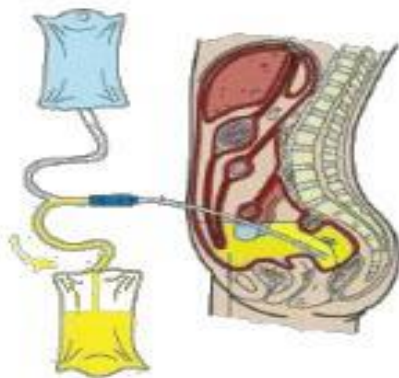
- Catheters have two cuffs, which are made of Dacron polyester.
- The cuffs:
 - stabilize the catheter
 - limit movement
 - prevent leak
 - provide a barrier against microorganism
- Cuff placement :
 - adjacent to the peritoneum
 - subcutaneously.
- The subcutaneous tunnel (5 to 10 cm long) further protects against bacterial infection



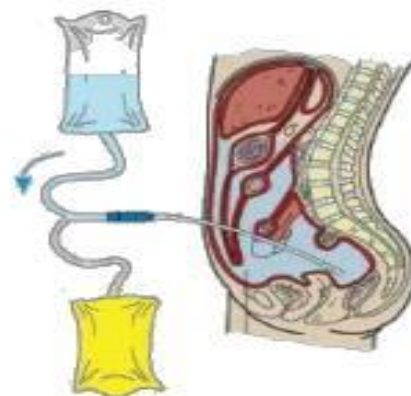
B. Process

- 1. Infusion-** 1 to 3 liters of sterile dialysate solution is infused through the dialysis catheter into the abdominal cavity which comes into contact with the peritoneal membrane.
- 2. Dwell** - The membrane is semi-permeable and acts as a filter which allows waste products and excess fluid to pass from the blood stream, across the membrane and into the dialysis solution.
- 3. Drain** - After a specified dwell time the fluid containing the waste and excess fluid is drained out. **(however!!!)**

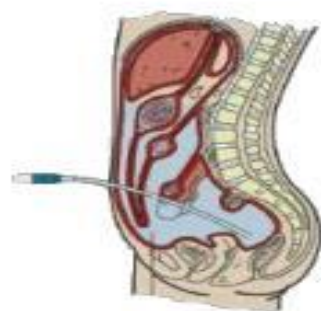
1- Drain -



2- Infusion-



3- Dwell -



C. Types

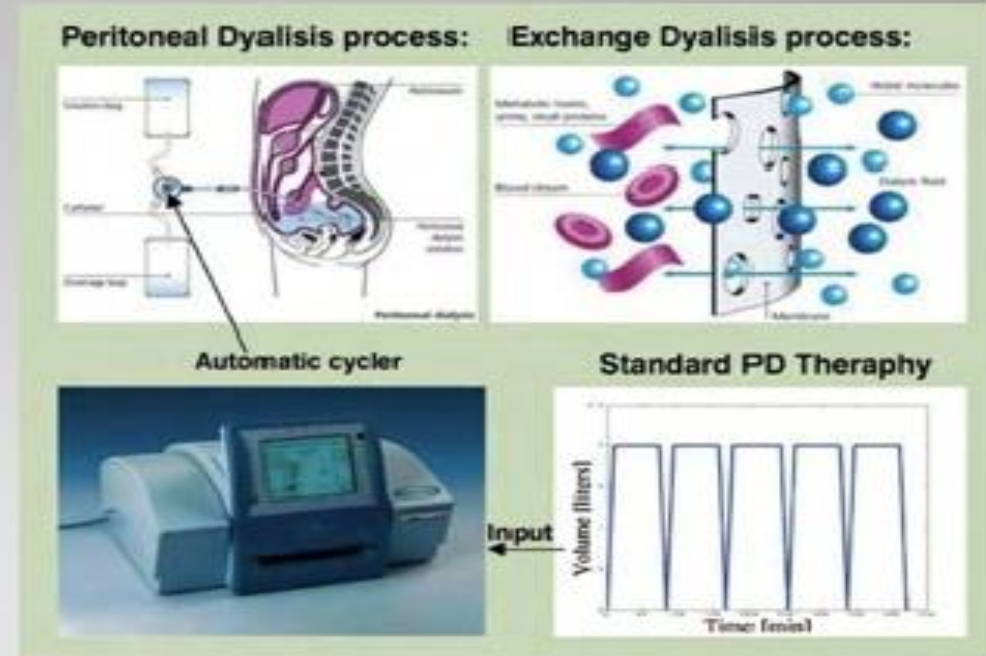
1. CCPD -

Continuous **C**ycler **P**eritoneal **D**ialysis (or APD - Automated PD). Cycler is used during the night to perform up to 8 exchanges. Long dwell during the day

2. CAPD -

Continuous **A**mbulatory **P**eritoneal **D**ialysis
4 or 5 exchanges per day

- Whatever method is used it is of the highest importance that the treatment is performed with great **hygienic care** as the introduction of **bacteria** in to the abdomen can lead to **peritonitis**.
- Continuous Ambulatory Peritoneal Dialysis, **CAPD** is most widely used; know as the manual method where each exchange is taken care of by the patient.
- Typically **regime** 4 bags x 2L/ day. This means that the patient performs 4 bags during the day.



Treatment Modes CAPD/APD

D. Dialysate

1. Definition: Fluid containing dextrose and electrolytes

2. Concentrations:

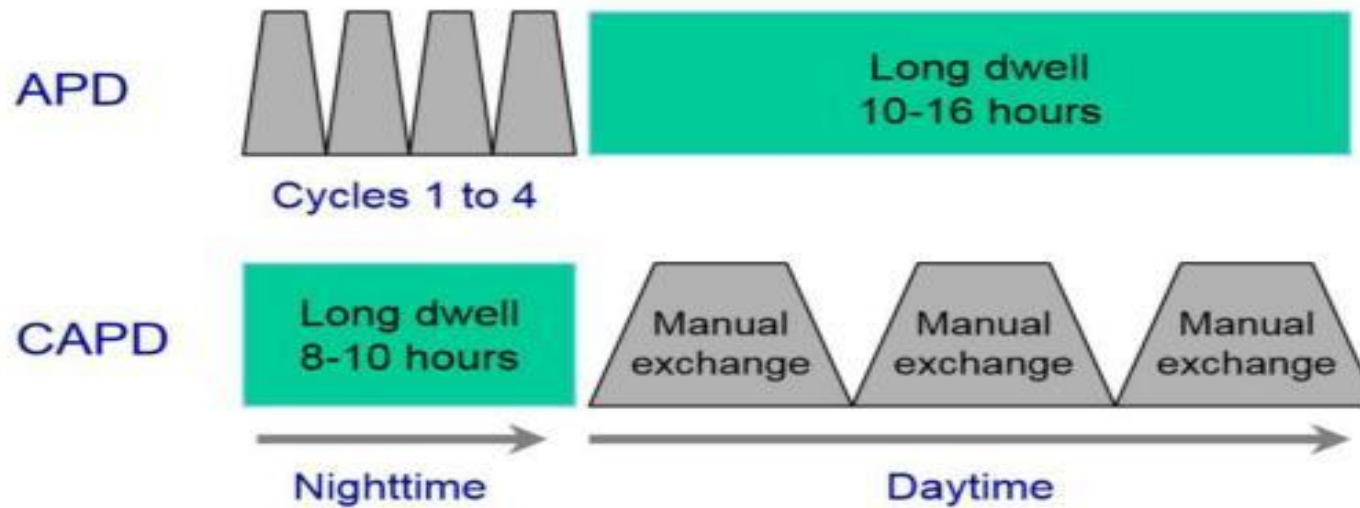
Higher concentrations
of glucose pull more fluid

- a) 1.5%
- b) 2.5%
- c) 4.25%



Baxter **PD**

The Long Dwell of Peritoneal Dialysis



3. Possible Additives

a) heparin

b) insulin (added by pharmacy)

c) antibiotics (added by pharmacy)

d) potassium (added by pharmacy)



Advantages

1. flexible schedule
2. less expensive than Hemodialysis
3. fairly easy to learn
4. fewer dietary restrictions
5. no needles required
6. dialysis can be done at home, on vacation or wherever you are
7. no blood loss
8. continue daily activities

Disadvantages

1. burn out, no days off
2. procedure must be followed exactly to prevent peritonitis
3. altered body image
4. risk of infection
5. permanent catheter access
6. larger clothing size because of fluid in the peritoneal cavity
7. some protein loss
8. storage space (supplies)

Peritoneal Dialysis

Nursing Responsibilities

IV Nursing responsibilities

A. room environment - during bag connection, tubing change, adding meds, exit-site care for recent post ops

1. prefer a private room
(roommate approved by MD)
2. air vent covered
3. door closed (sign on door)

Procedure in Progress
Do Not Enter

4. curtain pulled
5. mask on patient, roommate, staff



B. accurate I&O

C. daily weights abdomen must be empty,
weigh after first AM drain

D. exit site care (daily)

immediately post-op - **do not disturb**

recent post-op - **ExSept**

long standing - **soap & water**



E. phosphate binders must be given immediately before or after meals, otherwise they are calcium supplements Examples: PhosLo, Renagel, Ca+ carbonate (Tums)



F. sorbitol standing order.

No fleets enema or MOM.
(Mg⁺ not removed by dialysis)

G. tubing clamps

soak in hibiclens / betasept (in open position)
rinse off prior to use change solution every
24hrs.

K. heparin should be added to the bag prior to the infusion during the current exchange. Does not cross the peritoneal membrane so does not cause systemic anticoagulation

L. Specimens

C & S – aerobic & anaerobic culture bottles, 30ml extra in sterile specimen cup

Cell Count – lavender top tube

(must hand deliver specimens to the lab!)





**Peritoneal
Equilibration Test
(PET)**

- Introduced by ***Twardowski et al.*** in 1987.
- It is a ***semiquantitative assessment*** of peritoneal membrane transport function in patients on peritoneal dialysis.
- The solute transport rates are assessed by the rates of their equilibration between the peritoneal capillary blood and dialysate.

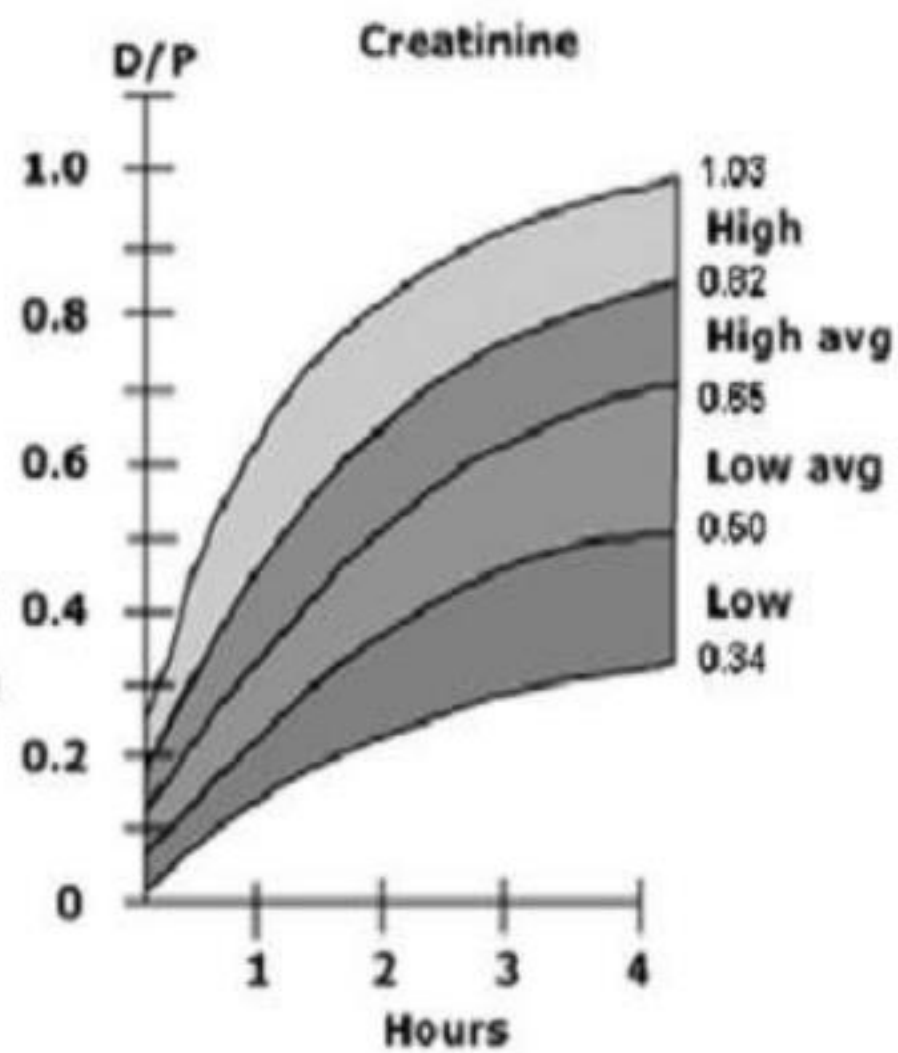
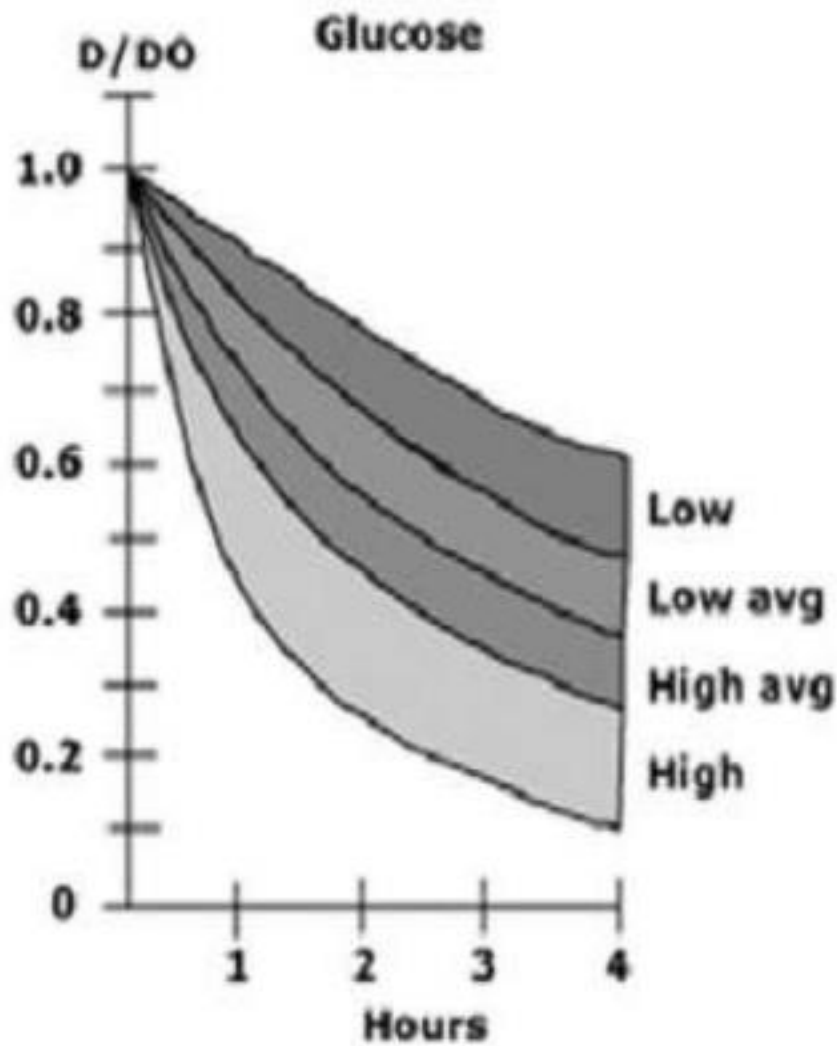
Uses of PET

1. Defining the baseline membrane characteristics of the patient to determine the best PD regimen.
2. Assessment of inadequate dialysis and make necessary changes in regimen.
3. Detecting Ultrafiltration Failure (UFF).

The standardized PET test

- An overnight 8 to 12 hour **pre-exchange** is performed.
- While the patient is in an **upright position**, the overnight exchange is drained (drain time not to exceed 25 minutes).
- **Two liters** of **2.5%** dialysis solution are infused over 10 minutes with the patient in the **supine position**. The patient is **rolled** from side to side after every 400 mL infusion.
- After the completion of infusion (0 time) and at 120 minutes dwell time, 200 mL of dialysate is drained. A **10 mL sample** is taken and the remaining 190 mL is infused back into the peritoneal cavity.

- A **serum sample** is obtained at **120 minutes**.
- At the end of the dwell (240 minutes), the dialysate is drained in the upright position (drain time not to exceed 20 minutes). The drain volume is measured and a 10 mL sample is taken from the drain.
- All the samples are sent for solute measurement (creatinine, urea, and glucose).
- The serum and dialysate creatinine concentrations are **corrected** for a high glucose level, which contributes to non-creatinine chromogens during the creatinine assay.
- The ***Dt/D0 glucose***, and the ***D/P ratios*** for creatinine, urea, and others, are calculated.



Timing of PET

- First PET is done after 4-8 weeks of PD.
- If there is peritonitis, PET should be done 1 month after the resolution of peritonitis as there is a increased small solute transport and reduced UF during peritonitis.
- KDOQI does not recommend repeating PET.
- However, it may be useful to repeat the 4.25% modified PET annually to anticipate problems.

Transporter types

High(Fast) transporters have

- Highest D/P ratios for Creat, Urea & Na
- Low net UF & D/Do values.
- Lower serum albumin values.
- Thus they do better with shorter dwells/APD

Low(slow) transporters have

- Low D/P ratios for Creat, urea & Na.
- Good net UF and high D/Do values.
- Albumin losses are lower.
- They do better with longer dwells.

The image features a light gray background with a subtle gradient. In the top-left and bottom-right corners, there are several realistic water droplets of varying sizes, rendered with soft shadows and highlights to give them a three-dimensional appearance. The text "THANK YOU" is centered in the middle of the page.

THANK YOU