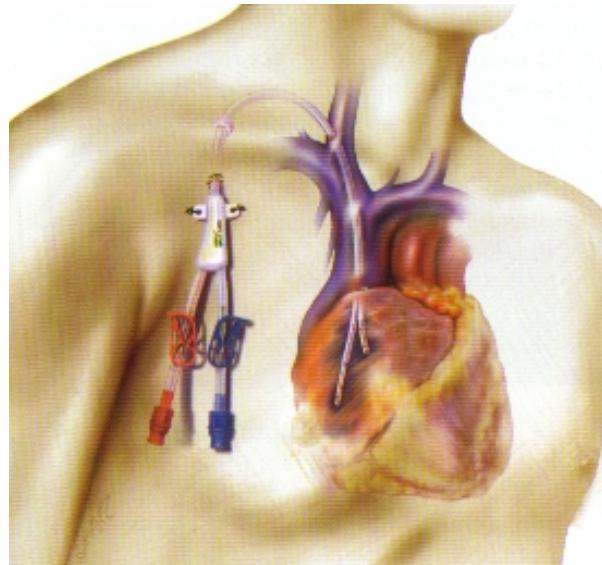
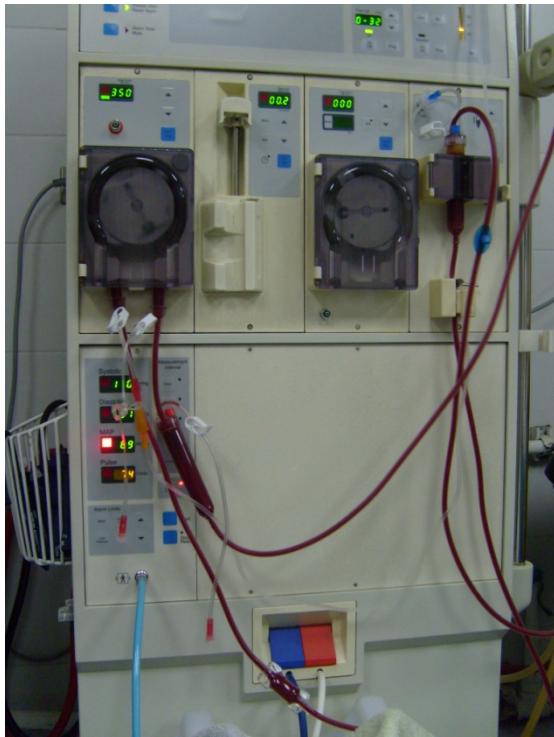


# PEDIATRIC HEMODIALYSIS: CONCEPT & MANAGEMENT



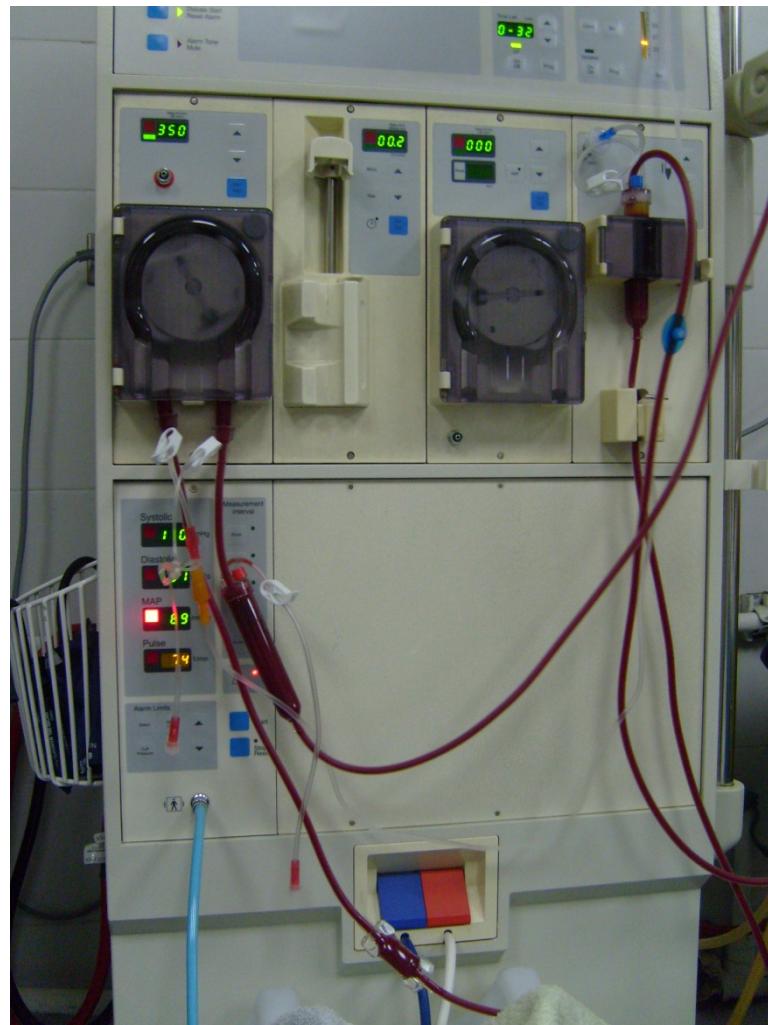
**Adisorn Lampaopong, M.D.**

Pediatric Nephrology Division , Department of Pediatrics  
Phramongkutklao hospital , Bangkok 10400, Thailand

# **ACUTE HEMODIALYSIS**

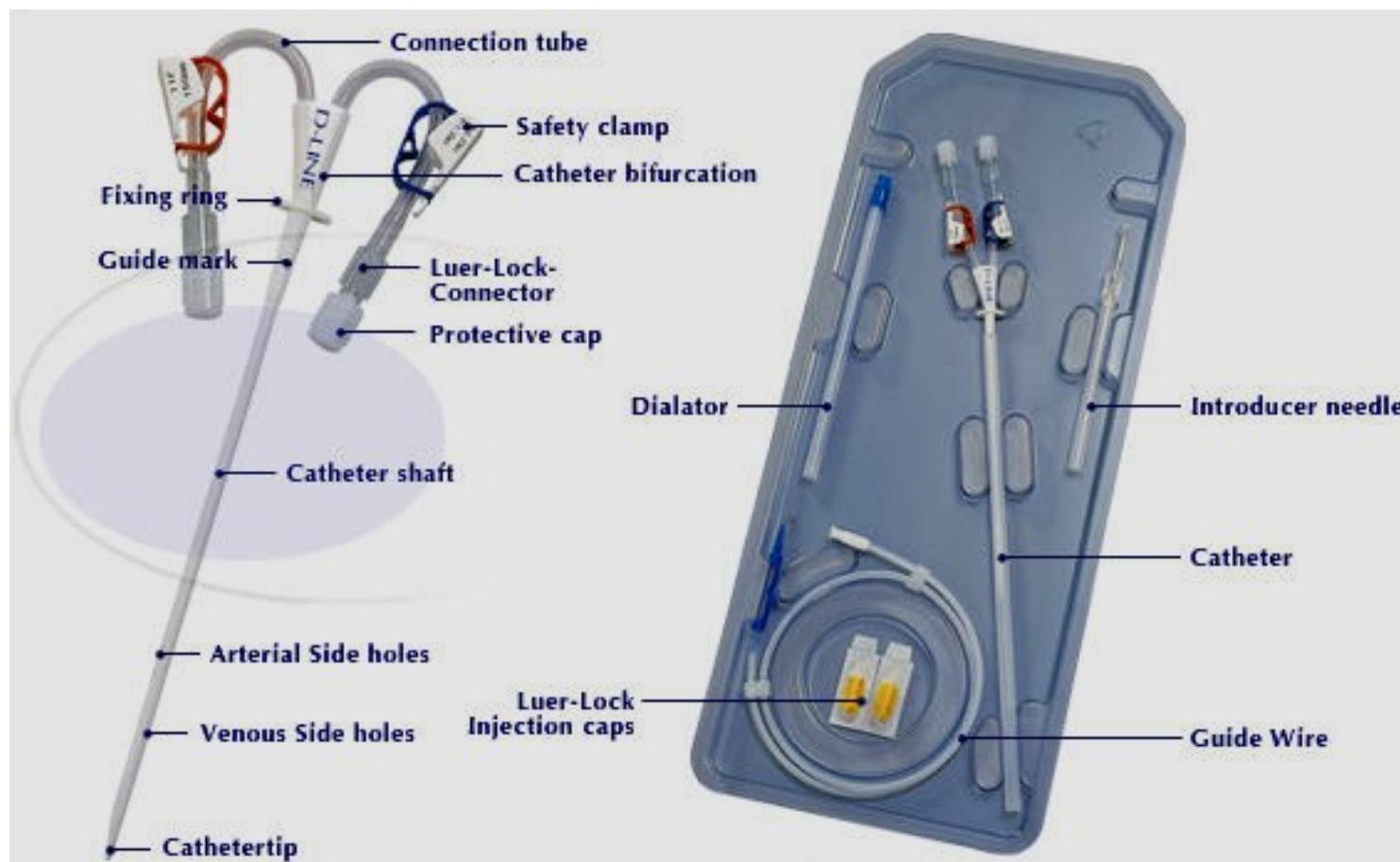
# HEMODILYSIS TECHNIQUE

- Access
- Machine
- Blood line
- Dialyzer
- Priming volume
- Blood-dialysate flow
- Dialysate solution
- Anticoagulant
- UF-Dry weight
- Sodium profile



# HEMODILAYSIS TECHNIQUE: *Vascular access*

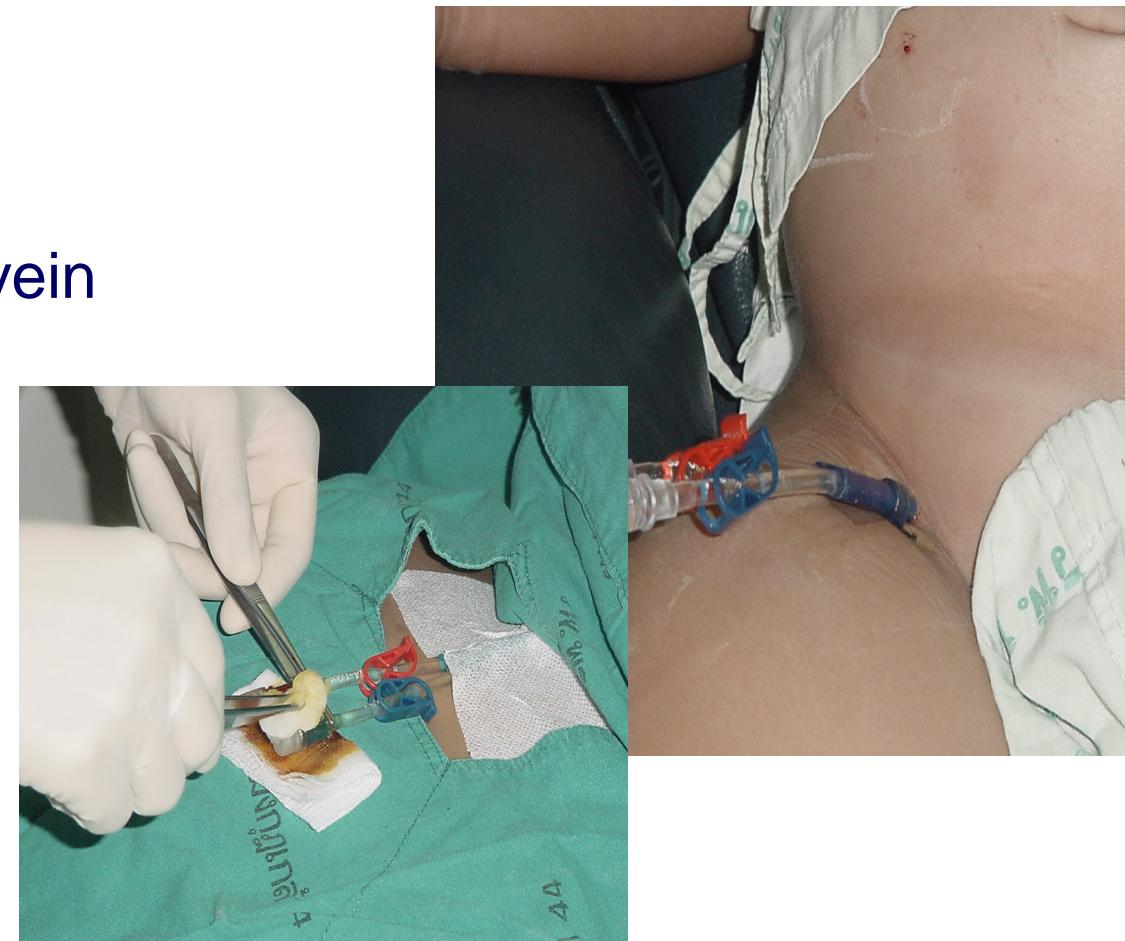
- Acute dialysis: double lumen catheter



# HEMODIALYSIS TECHNIQUE: *Vascular access*

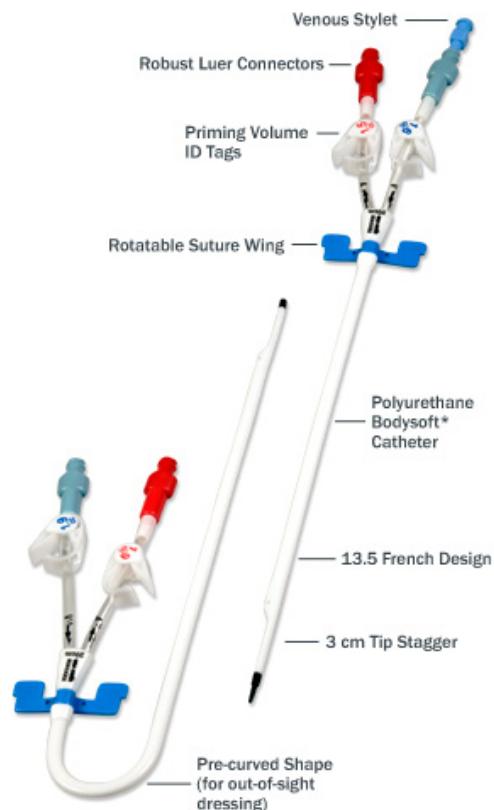
- **Acute dialysis:** double lumen catheter

- Femoral vein
- Internal jugular vein
- Subclavian vein



# HEMODIALYSIS TECHNIQUE: *Vascular access*

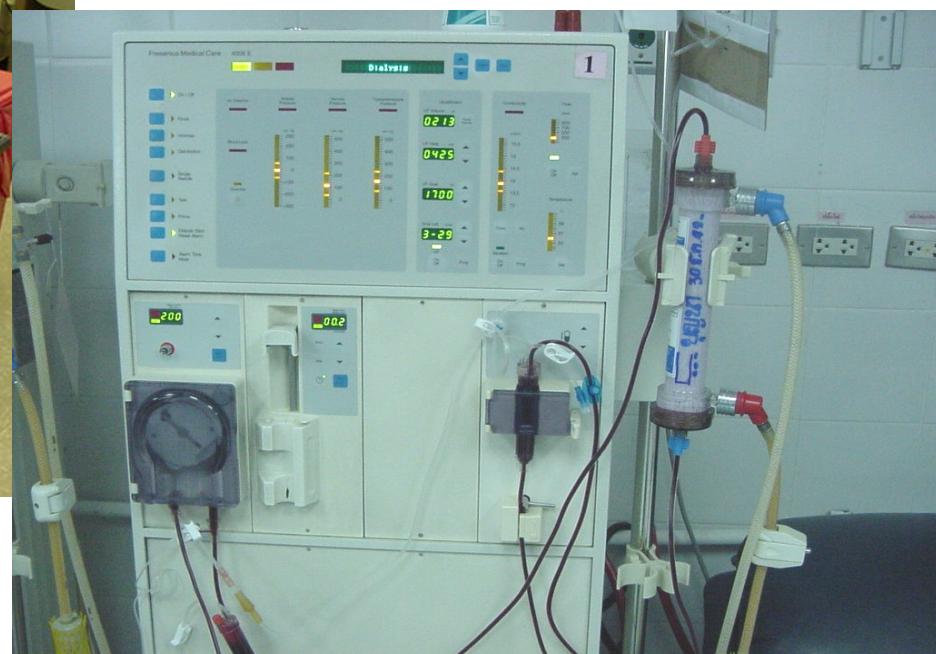
- Acute dialysis: double lumen catheter



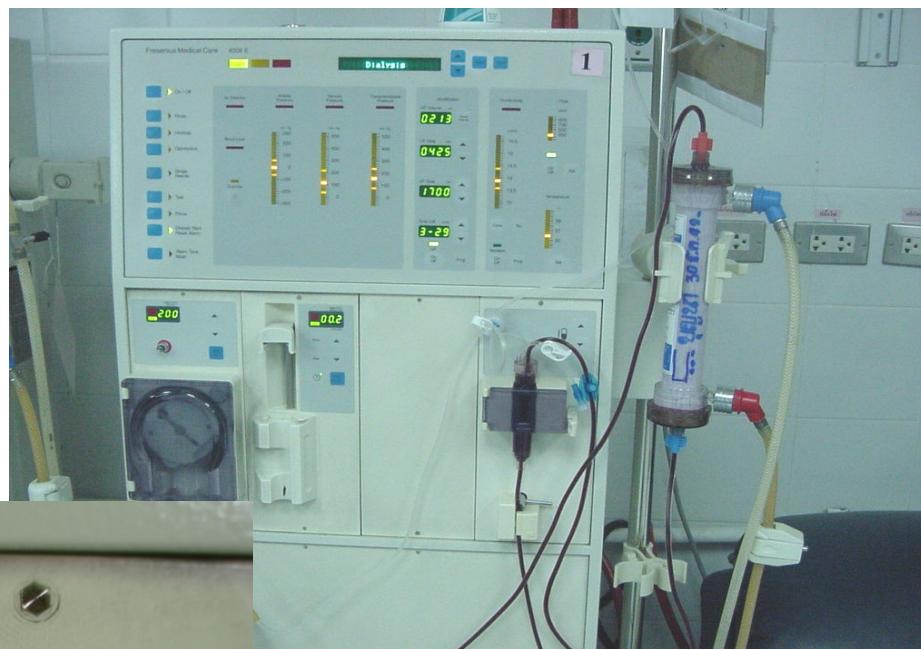
CATHETER SIZE	LENGTH (cm)	PATIENT WEIGHT (kg)
7 Fr	8-12	10-15
8 Fr	9-12	15-20
9 Fr	12-15	20-30
10,11.5,12 Fr	12-18	> 30

Trays include: Maximal Barrier Precautions kit that comes with gown, cap, body drape and safety components

# HEMODILAYSIS TECHNIQUE: *Machine*

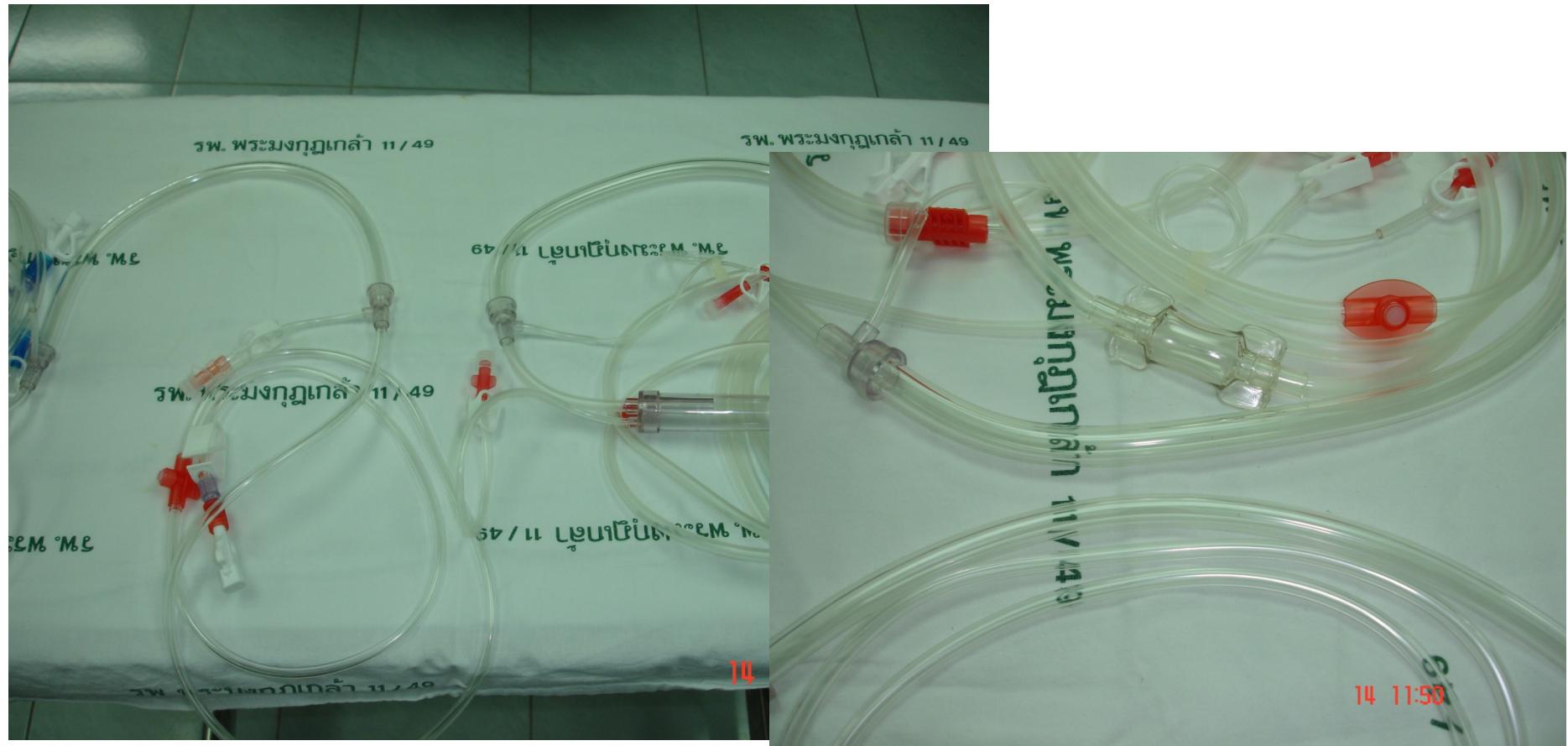


# HEMODILYSIS TECHNIQUE: *Machine*



# HEMODILAYSIS TECHNIQUE: *Blood line*

- **Blood line:** prefer 6 mm for weight <20- 30 kg



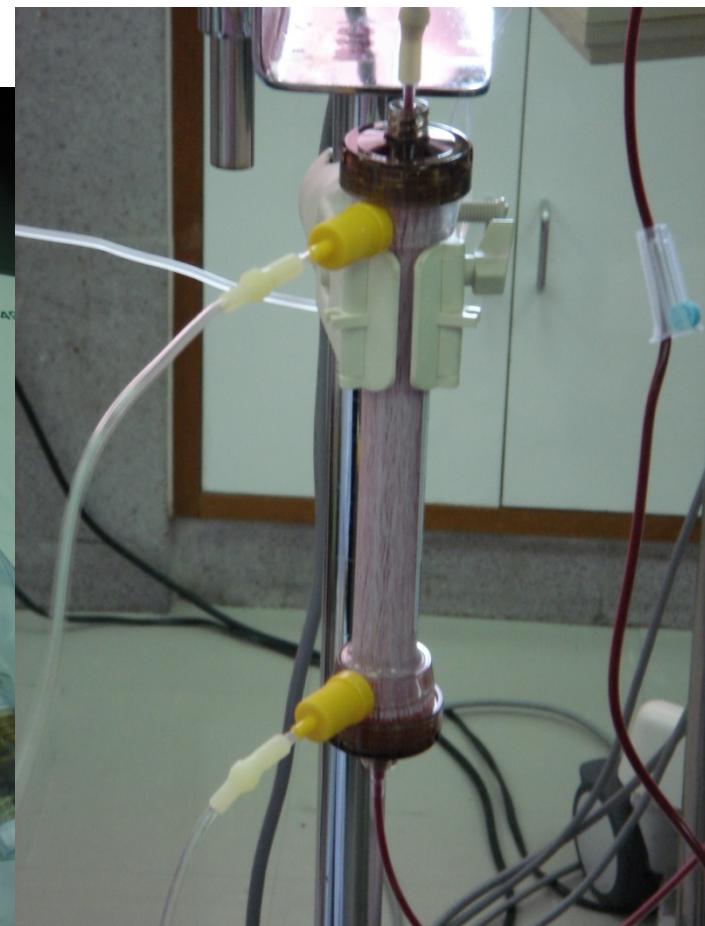
# HEMODIALYSIS TECHNIQUE: *Blood line*

- **Blood line:** prefer 6 mm for weight <20- 30 kg

Type of blood lines	Priming volume
Pediatric (Nipro)	64 ml
Pediatric (Kawasumi)	80 ml

# HEMODILAYSIS TECHNIQUE: *Dialyzer*

- Dialyzer: low flux ( $C_{UF} < 10 \text{ cc/min/hr}$ )



# DIALYZER

Dialyzer	Surface area (m <sup>2</sup> )	Priming vol (mL)	Kuf (mL/hr/mmHg)	Urea Cl BFR at 200 mL/min
<b><i>Polysulfone</i></b>				
F3	0.4	28	1.7	125
F4	0.7	42	2.8	155
F5	1.0	63	4.0	170
F6	1.3	82	5.5	180

Surface area of dialyzer approximate to BSA

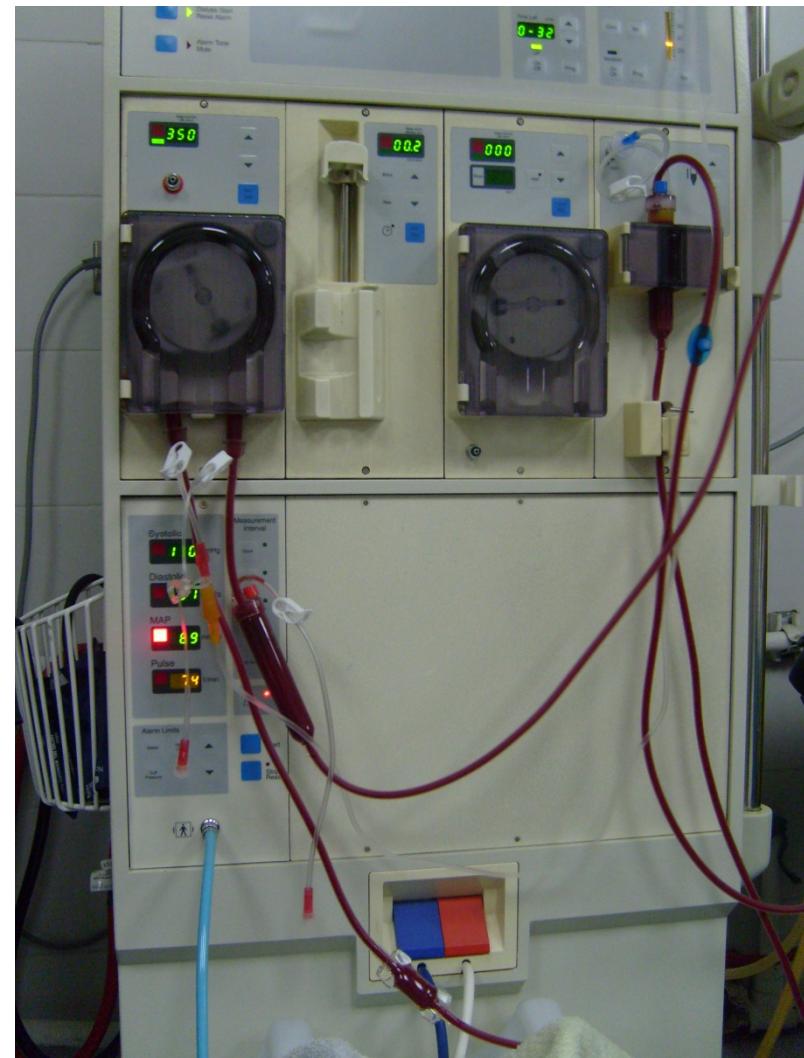
# HEMODILAYSIS TECHNIQUE: *Priming volume*

- **Priming volume (blood line + dialyzer):** not more than 10% of blood volume  
( 80 cc/kg → blood volume, not more than 8 cc/kg)



# HEMODILAYSIS TECHNIQUE:*Blood-dialysate flow*

- **Blood flow:**
  - 3-5 cc/min
  - $(\text{BW} + 10) \times 2.5 \text{ cc/min}$
  - $90 \text{ cc/min/m}^2$
- **Dialysate flow:** at least  $1.5 \times$  blood flow

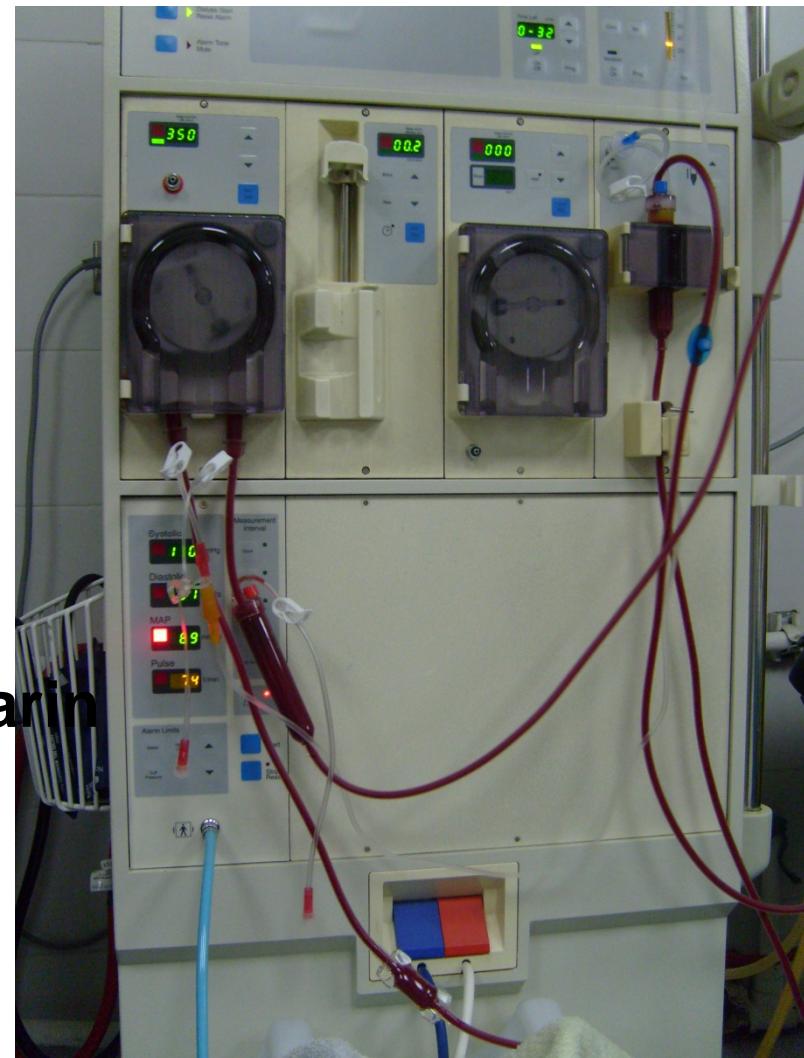


# HEMODILAYSIS TECHNIQUE: *Dialysate*

- Na: 138-140 mmol/L
- K: 2-3 mmol/L
- Ca: 1.25-1.5 mmol/L
- Bicarbonate = 30-35 mmol/L
- Glucose: standard 200 mg/dL
- Temp: standard (keep 38-39 °C in small children)

# HEMODILYSIS TECHNIQUE: *Anticoagulant*

- No anticoagulant
- Heparin
  - Loading dose: 10-30 U/kg/hr
  - Continuous drip: 10-20 U/kg/hr  
(keep aPTT 1.5-3 x baseline)
- Low molecular weight heparin
  - 0.5-1.0 mg/kg



## **HEMODILYSIS TECHNIQUE: *Ultrafiltration***

- Not more than 1.5-2.0% of BW/hour
- Not more than 5% of BW

**If UF > 5% BW: Mannitol and sodium 138-148 mEq/L**

# **COMPLICATION**

## **COMPLICATION: Dialysis disequilibrium syndrome**

- Neurologic symptoms of varying severity due primarily to cerebral edema
- **Predisposing factors**
  - New patient with high BUN
  - Pediatrics
  - Metabolic acidosis
  - Underlying of seizure

# **COMPLICATION: Dialysis disequilibrium syndrome**

## **Prevention**

- Gradual reduction in BUN
- Initiated with two hours of dialysis
- Low blood flow rate
- Small surface area dialyzer

## **COMPLICATION: Dialysis disequilibrium syndrome**

### **Prevention**

- Mannitol 0.5-1 g/kg
- 50% glucose

## **COMPLICATION: Intradialytic hypotension**

- **Predisposing factors**
  - Rapid reduction in plasma osmolality
  - Rapid fluid removal
  - Autonomic neuropathy
  - Diminished cardiac reserve

# **COMPLICATION: Intradialytic hypotension**

- **Predisposing factors**

- Intake of antihypertensive medications
- Use of a lower sodium concentration
- Sudden release of adenosine during organ ischemia
- Ingestion of a meal immediately before or during dialysis
- Reactions to the dialyzer membrane

# **COMPLICATION: Intradialytic hypotension**

- **Prevention**
  - Accurate setting of the "dry weight"
  - Steady, constant ultrafiltration
  - Increased dialysate sodium concentration and sodium modeling
  - Bicarbonate dialysate buffer

# **COMPLICATION: Intradialytic hypotension**

- **Prevention**
  - **Improvement in cardiovascular performance**
    - Increasing the dialysate calcium concentration
    - Using cool temperature
    - Correction of anemia with erythropoietin

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