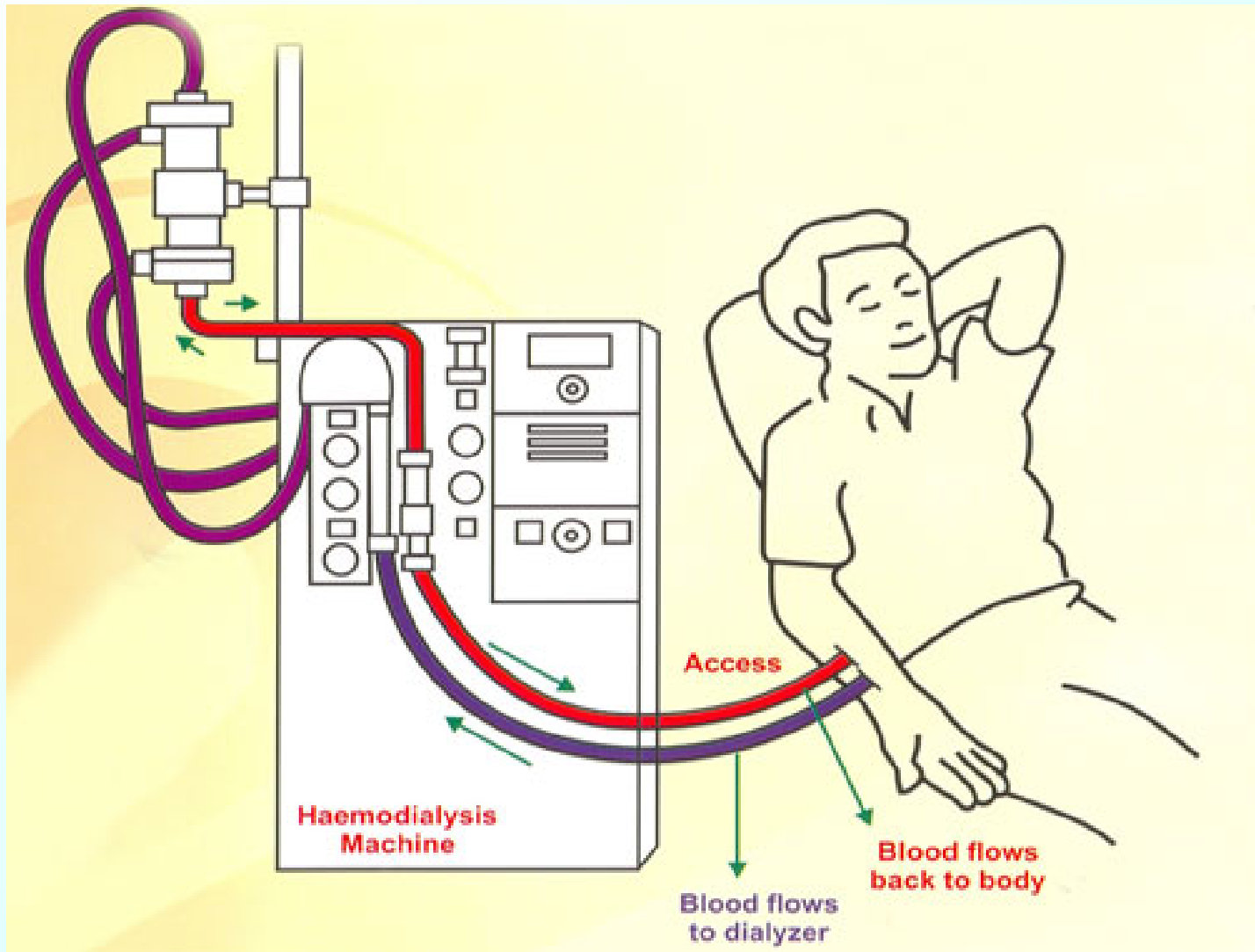


A Simple Citrate Anticoagulation Haemodialysis Protocol That Reduces Nurses' Work Hours

**Cheng YL, Wong FSY, Ng SC, Cheung LC, Chan WK,
Tsang KY, Wong SM, Lau WY, Hau LM, Yu AWY**

**Department of Medicine,
Alice Ho Miu Ling Nethersole Hospital, Hong Kong, China**



Choice of Anticoagulant

- **Standard anticoagulation**
 - Unfractionated Heparin
 - Low molecular weight heparin
- **Patient at high bleeding risk**
 - Heparin free with regular NS flushing
 - Regional citrate anticoagulation

Heparin Free with Regular NS Flushing

- **Preparation**

- Heparinized Saline-rinsed Dialyzer



- Flush away the heparin

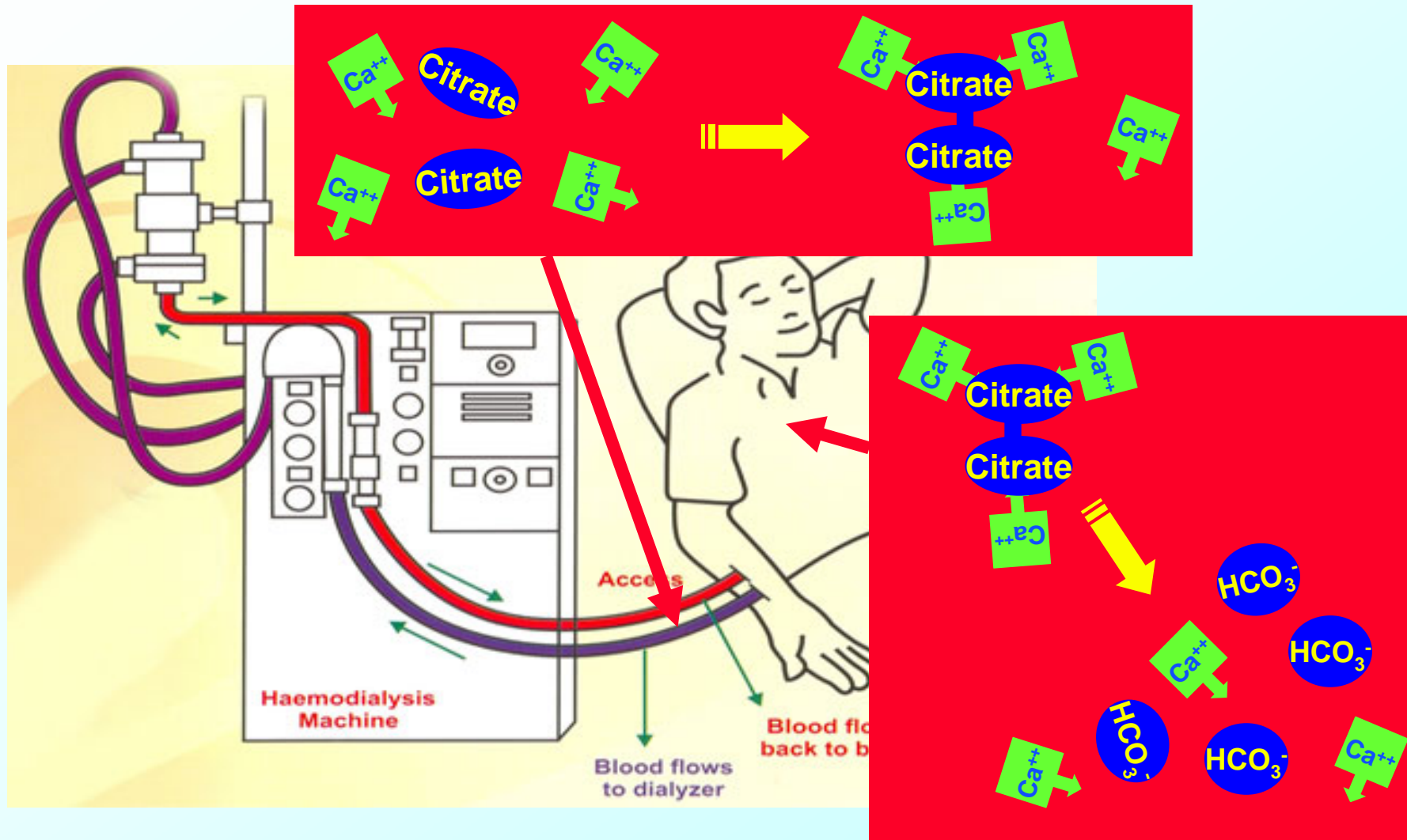
- **During Dialysis**

- Periodic saline rinse
(100-200 mL NS flush Q15-30 min)



**Nursing
Workload !!!**

Regional Citrate Anticoagulation



Problems with Citrate HD

Traditional Circuit

Complexity of Circuit

Frequent Monitoring required

Pre-dialyzer
Citrate (trisodium citrate)

Ca⁺⁺ free (± mg free)
dialysate
↓ Na⁺
↓ HCO₃⁻

Post-filter
sampling port

Electrolytes/Acid-Base Disorders

Hypernatraemia

Metabolic Alkalosis

Ionized hypocalcaemia

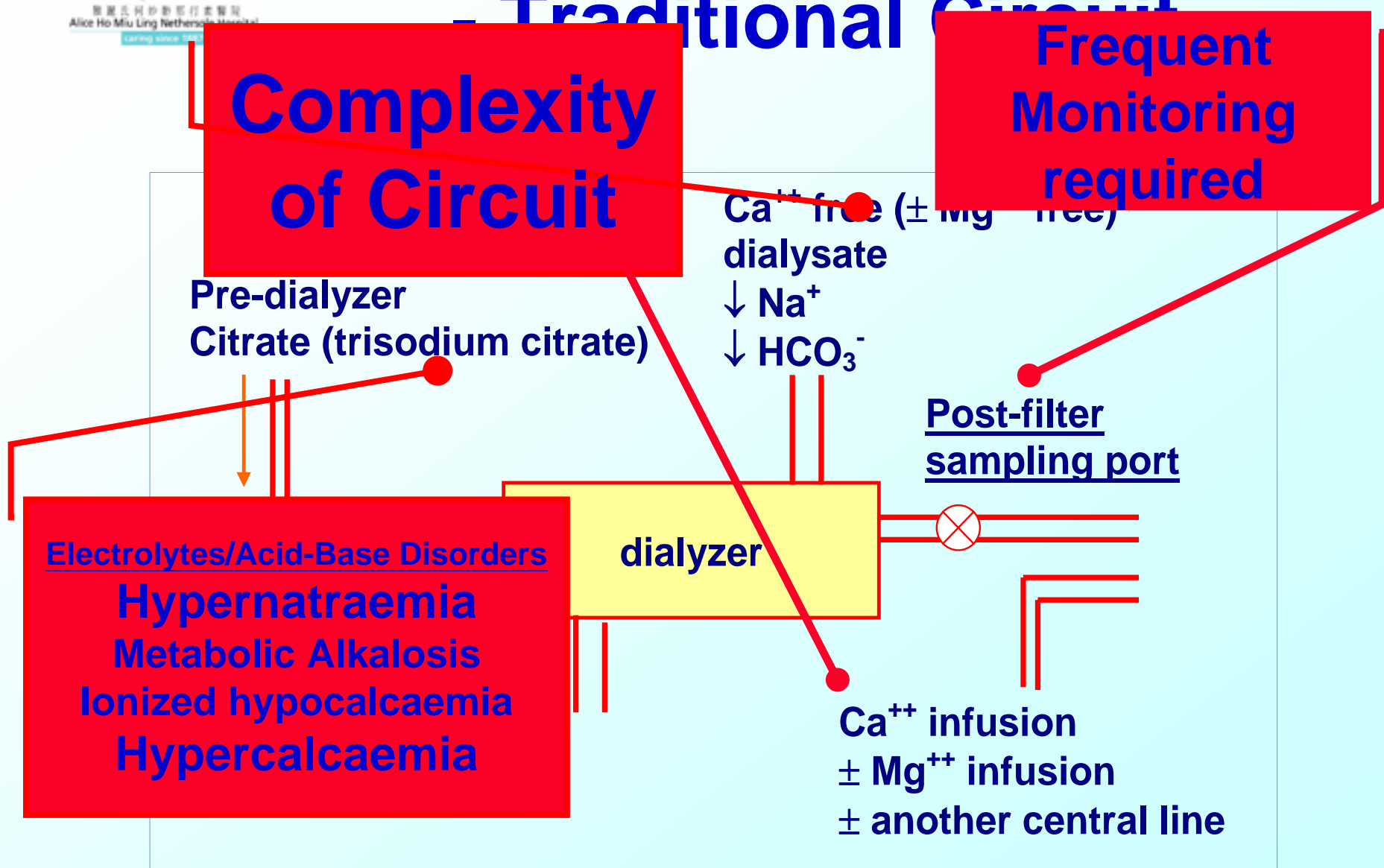
Hypercalcaemia

dialyzer

Ca⁺⁺ infusion

± Mg⁺⁺ infusion

± another central line





A Simple Citrate Anticoagulation Protocol for HD using a Commercial Calcium-containing Dialysate Phase I Study

**YL Cheng, AW Yu, HW Chan, YT Tsui, CK Wong, KY Tsang,
KY Chung, SC Ng, LC Cheung, WK Chan, FSY Wong, CU Yung.**

HKJN 2005;7

AHNNH citrate HD for High Bleeding Risk Patient

4-hour HD

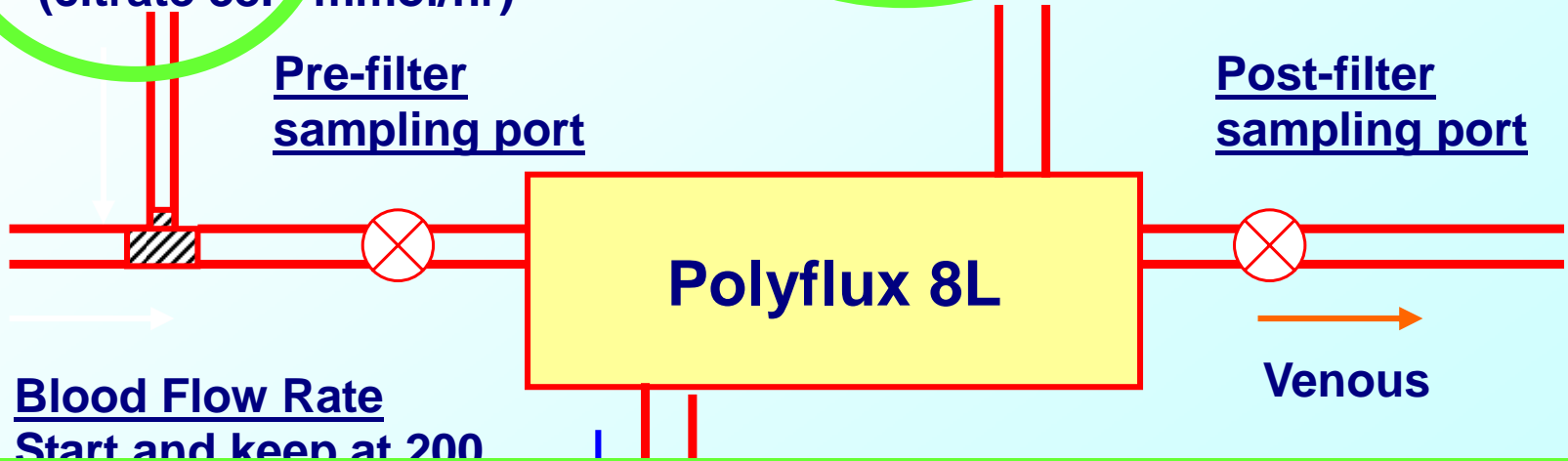
Anticoagulant Citrate
Dextrose - A
Start at 340 ml/hr
(citrate 38.4 mmol/hr)

Bicarbonate dialysate

Na⁺ 135 mmol/L
HCO₃⁻ 32 mmol/L
Ca⁺⁺ 1.25 mmol/L
Rate: 500 ml/min

Pre-filter
sampling port

Post-filter
sampling port

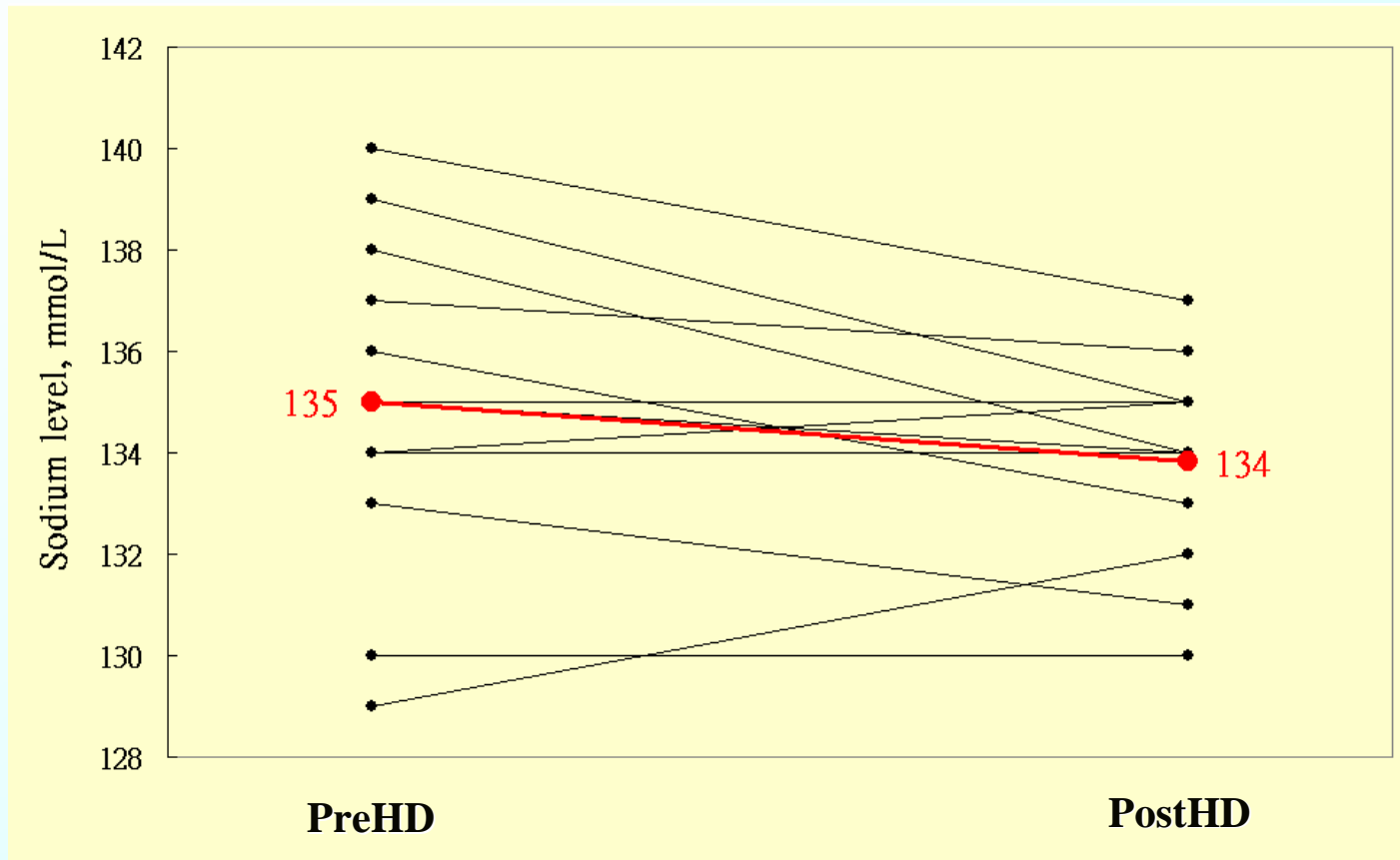


**No heparin-saline pre-rinsed for extracorporeal circuit's required.
No calcium/magnesium infusion's required.**

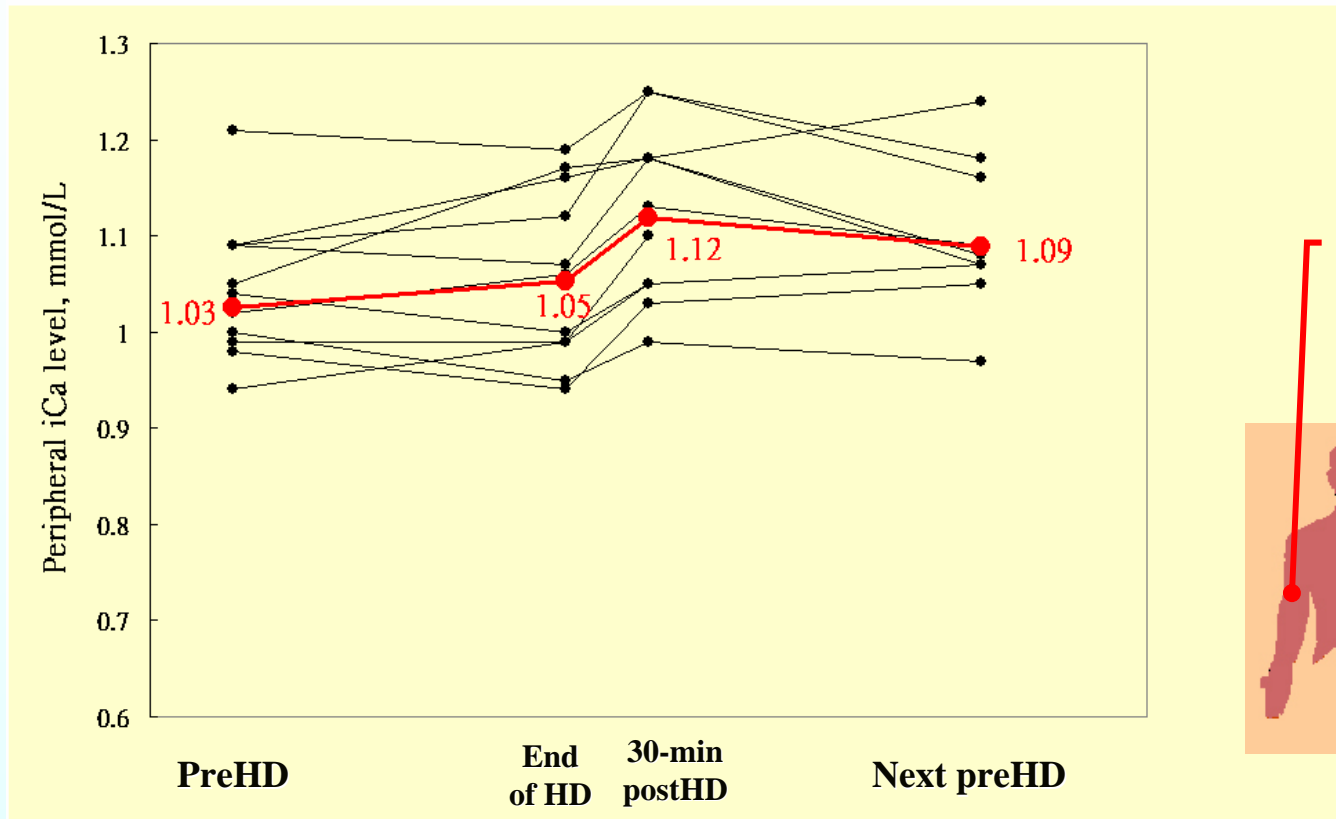
Results

- **12 patients were recruited.**
- **All the dialysis treatments were well tolerated.**
- **No symptoms of citrate toxicity or hypocalcaemia were noted.**
- **No clotting of the extracorporeal circuit.**
- **No premature termination of HD.**

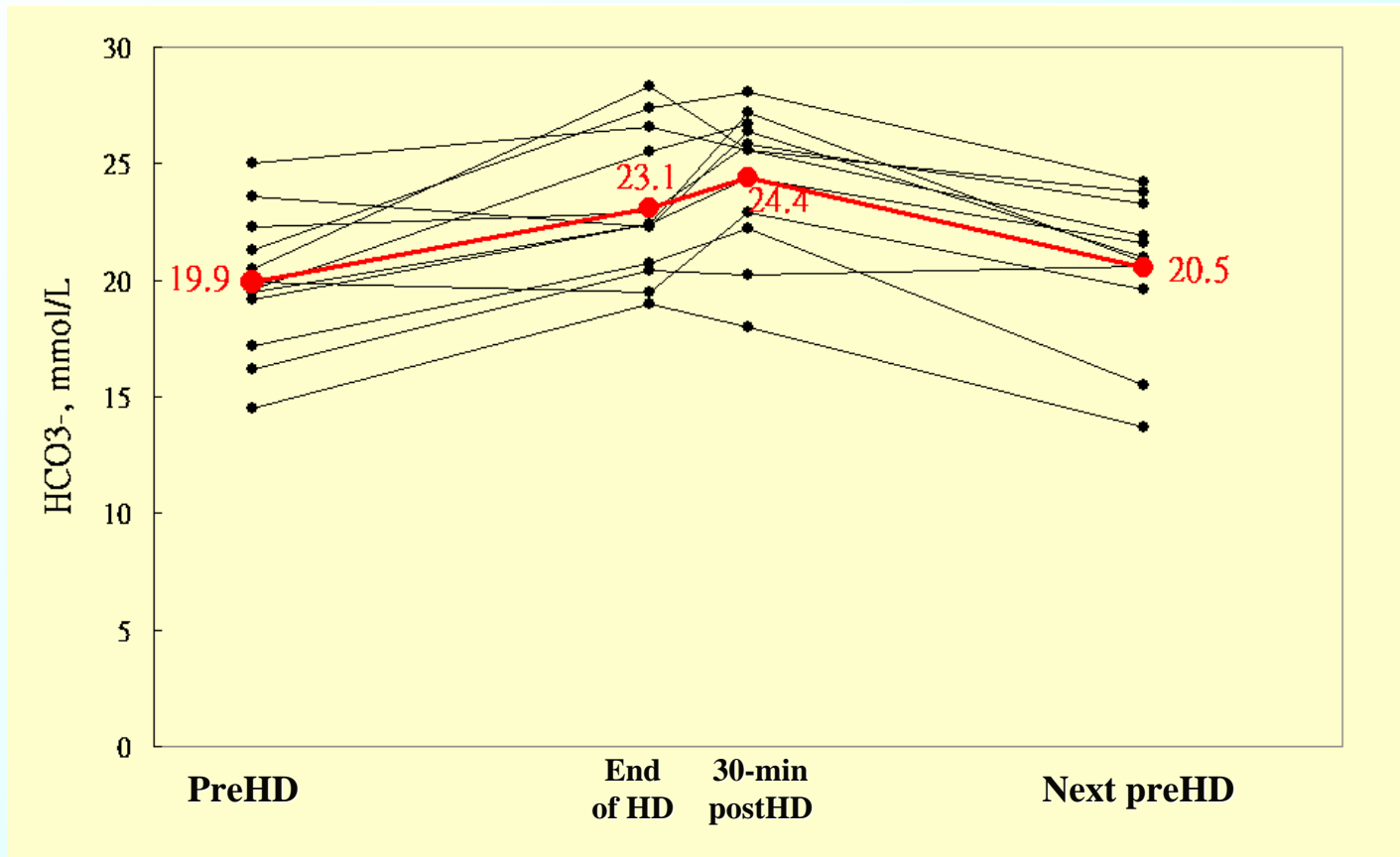
Sodium



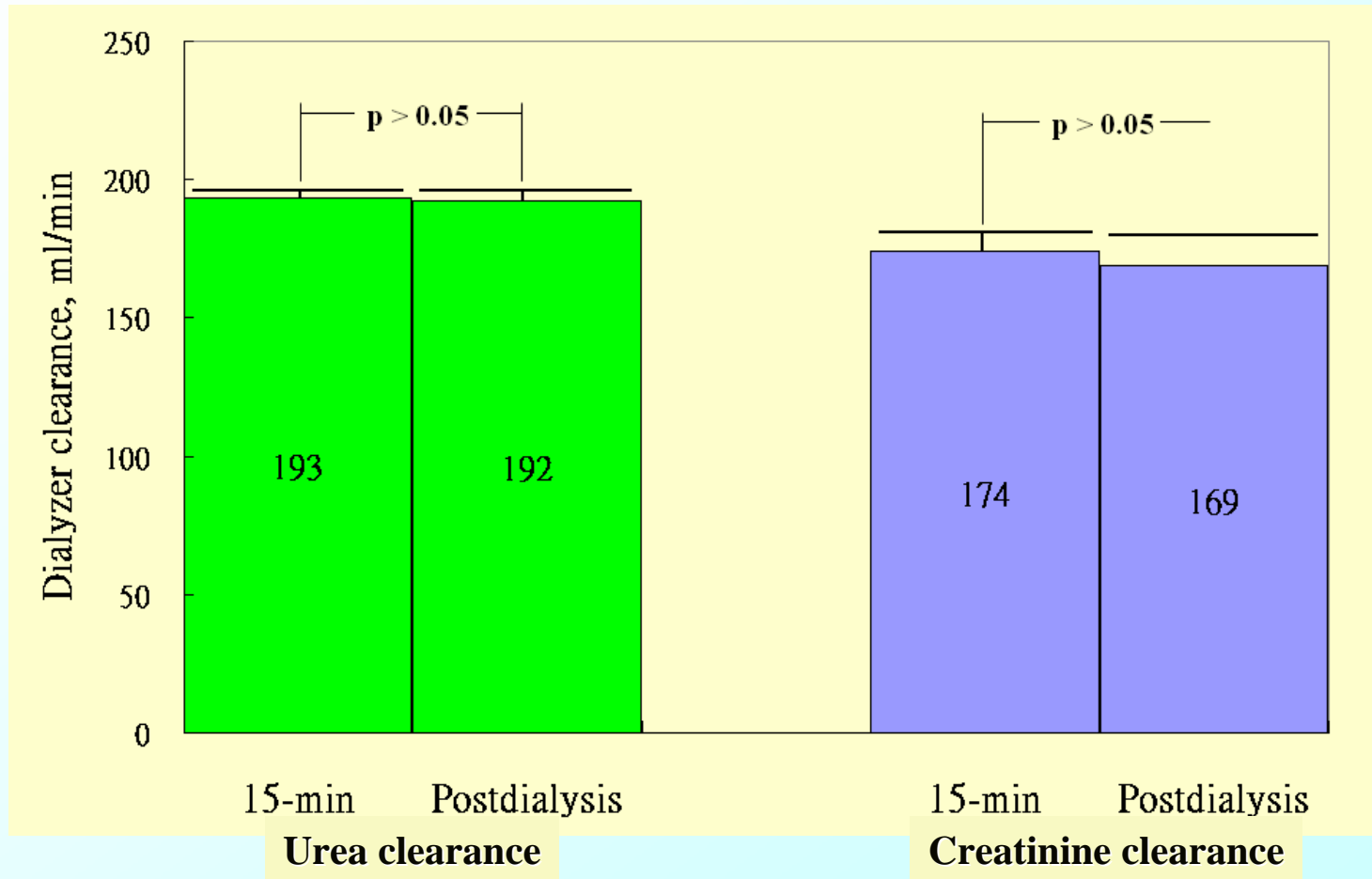
Systemic Blood iCa



Bicarbonate



Efficacy: dialyzer clearance



Cheng et al. HKJN 2005;7

AHNNH citrate HD for High Bleeding Risk Patient

4-1

Complexity of Circuit

An
 De
 Sta

(citrate 38.4 mmol/hr)

Bicarbonate
 Na⁺ 135 mmol/L
 HCO₃⁻ 32 mmol/L
 Ca⁺⁺ 1.25 mmol/L
 Rate: 500 ml/min

Frequent Monitoring required

Pre-filter sampling port

Post-filter sampling port

Polyflux 8L

→
Venous

Electrolytes/Acid-Base Disorders

Hypernatraemia
Metabolic Alkalosis
Ionized hypocalcaemia
Hypercalcaemia

↓
Ultrafiltration

*(should include the volume of citrate,
 i.e. 340 ml x dialysis time in hour)*

Phase II Study







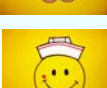
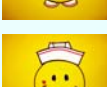
- Same protocol.
- No routine blood monitoring.

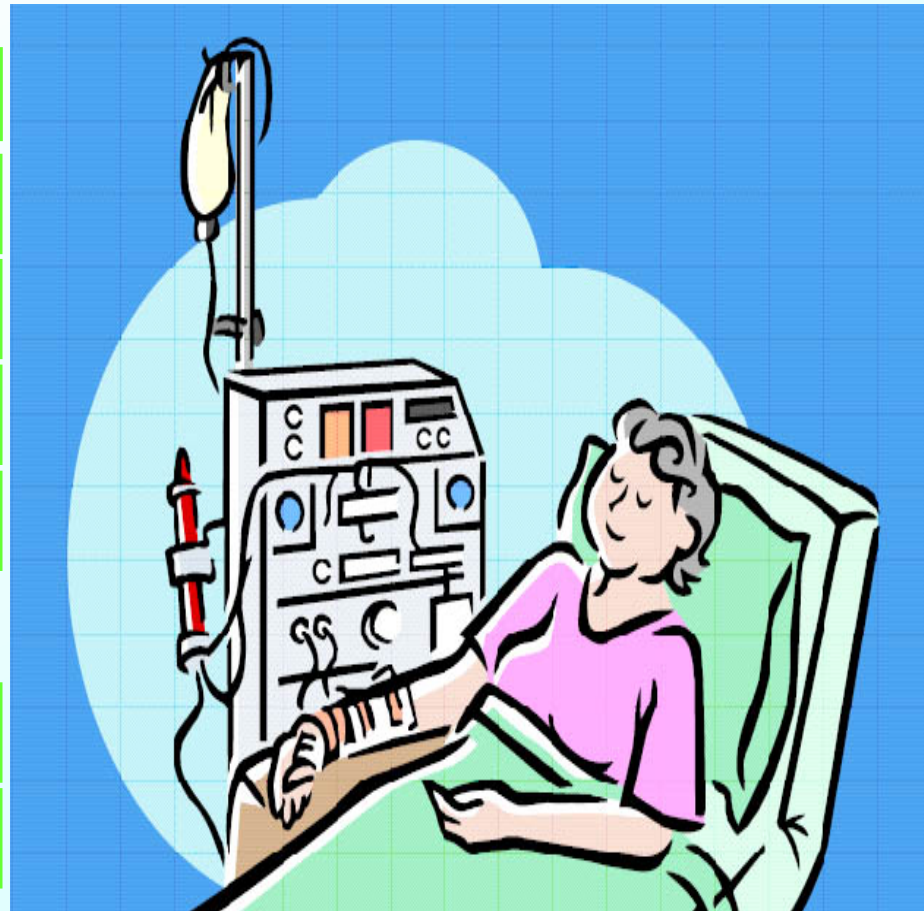
Phase II Study

- 29 HD patients with bleeding risk were studied.
- One dialyzer (3.4%) was clotted and 2 patients (6.9%) had premature termination of HD because of hypotension and fever. The iCa levels during the symptoms were unremarkable and they were non-citrate related.

Heparin free with regular NS flushing

AHNH Citrate HD

00:00		25 min
00:30		3 min
01:00		3 min
01:30		3 min
02:00		3 min
02:30		3 min
03:00		3 min
03:30		3 min



	12 min
	2 min
	2 min

↓ 30 min nurses' work hour per a 4-hour HD treatment.

Routine HD Regimen Since 2005

Conclusion

- **Simple.**
- **Safe.**
- **Effective.**
- **Not require routine monitoring.**
- **Reduce nurses' work hour.**
- **Reduce cost in the laboratory monitoring.**



Acknowledgement





Thank You!