

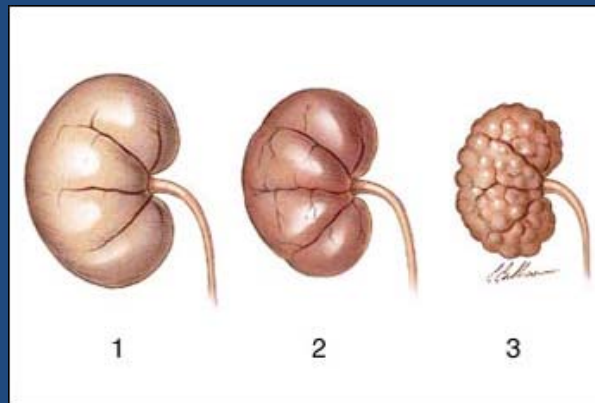
# Exercise in Patients with End-stage renal Disease



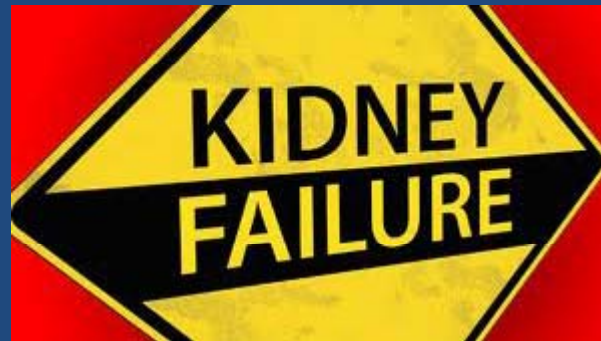
- **Chronic renal failure :**  
gradual and progressive loss  
of the ability of the kidneys  
to function
  - Structural kidney damage
  - Progressive diminished  
renal function



- **End-stage renal  
disease :**  
A complete or near  
complete failure of the  
kidneys to function



- **Causes** : long standing DM, HT, autoimmune disease, glomerulonephritis, pyelonephritis, polycystic kidney, congenital abnormalities
- Kidney function  $< 10-15\%$   $\rightarrow$  progressive renal failure  $\rightarrow$  uremic symptoms



- Loss of excretory function :  $\uparrow$  toxin in blood



- Uremic syndrome : fatigue, nausea, malaise, anorexia, neurologic symptoms



- Loss of regulatory function



- Extracellular volume  $\uparrow$ , electrolyte imbalance



- HT, peripheral edema, pulmonary edema, CHF



- Abnormal excretion of ammonia, hydrogen ion



- Metabolic acidosis

- ↓ production of erythropoietin



- Anemia of ESRD



↑ parathyroid hormone

- ↑ phosphate
- ↓ active vitamin D
- ↓ absorption calcium → ↓ circulatory calcium
- ↓ bone minerals

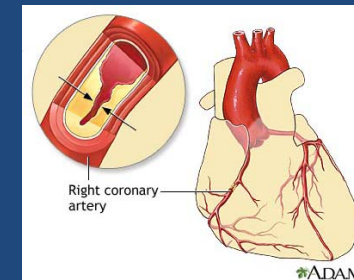


**Renal osteodystrophy**

- Insulin resistance
- Hyperglycemia
- Hyperlipidemia
- **Diagnosis : ↑ BUN, ↑ Cr, ↓ GFR**

## **Cardiovascular disease**

- Main cause of death
- Incidence > general population 5-30 times
- Transplant patients > general population 4 times



## Treatment of Chronic renal failure

- Dietary measures : protein, dietary sodium, fluid restrictions → ↓nitrogen waste products
- Very strict BP control

## Treatment of End-stage renal disease

- Hemodialysis
- Peritoneal dialysis
- Renal transplantation





# Physical performance in CKD patients

- Physically inactive
- ↓ VO<sub>2</sub> peak
- ↓ physical functioning



# Exercise and Rehabilitation

- Dialysis patients : limited exercise capacity , 39 -60% of normal age-expected levels
- Unable to perform exercise test
- Measurement of HR is not recommended for determining training intensity



# Performance physical function measures in dialysis patients

- 6-minutes walk test
- Gait speed test
- The sit to stand test
- Walking stair climbing test
- Self-report : SF-36 Health Status Questionnaire



# Exercise training response

- Aerobic and resistance training improve physical functioning , performance, quality of life
- ± Impact on survival or hospitalization, improvement of BP, lipids profile
- Dialysis patients :  $\uparrow$   $VO_2$  max  
(below age-predicted values)
- Transplant patients : marked improvement in  $VO_2$  max



# Exercise prescription

**Goal :** maintenance of function  
and independence

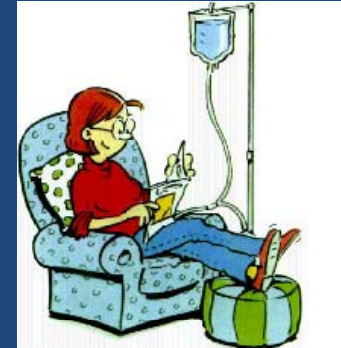


## **Type of activity**

- ROM + strengthening → non-weight bearing aerobic exercise : stationary cycling
- Concern about the access sites
- Transplant patients: non-contact sport, avoid vigorous activities

## Timing

- Best on **non-dialysis day**
- Before dialysis day : up to the patients  
: weight gain ( > 2-3 kg), shortness of breath, BP ↑ ?
- During hemodialysis : better during the **first 1-1.5 hr**
- Continuous ambulatory peritoneal dialysis : exercise  
in the **middle** of a dialysis exchange
- After dialysis : extremely fatigue



## Frequency of exercise

- Stretching exercise : during and after dialysis
- Strengthening exercise : 3 days/week
- Aerobic exercise : at least 3 days/week

## Intensity : RPE

- Initially : very short duration, no warm-up and cool down phase

Exercise  $\geq$  20 minutes :

- Warm-up and cool down : RPE = 9 to 10
- Conditioning : RPE = 12 to 15



## Progression of exercise

- Duration : start from interval training 2-3 minutes
- ROM + strengthening exercise : start from low weight + high repetition → cardiovascular activity
- Exercise during dialysis: start from 10 minutes





# Risk of exercise

- Musculoskeletal injury : fracture, tendon injury
- Cardiac complication : dysrhythmia, ischemia

## Minimize risks by

- Proper medical screening
- Appropriate warm-up and cool down
- Good environment and equipment
- Start slowly and progress exercise gradually
- Avoid high impact activity



**THANK YOU**

