Proteinuria and Hematuria

Indicators of chronic kidney disease

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Proteinuria and hematuria

- Indicators of kidney damage
- Persistent more than 3 months: CKD
- Need investigation and treatment
  - Stop kidney damage
  - Slow progression of CKD
proteinuria

- 0.5-10% of normal population
- Benign isolated proteinuria
  - Idiopathic persistent proteinuria
  - Functional proteinuria
  - Postural proteinuria
- Need investigation in persistent proteinuria
hematuria

- Gross hematuria
  - Pathology in urinary tract
  - Need immediate evaluation
- Asymptomatic microscopic hematuria
  - Transient: follow heavy exercise, infection
  - Persistent: sign of glomerulonephritis, tumor
Proteinuria

- Macroalbuminuria
  - Albuminuria > 300 mg/day
  - Detect by urine dip stick
  - Spot urine protein/Cr > 200 mg/gm

- Microalbuminuria
  - Albuminuria less than dip stick sensitivity
  - Albuminuria 30-300 mg/day
  - Albumin excretion rate 20-200 ug/min
Proteinuria as risk of ESRD after 17 years follow up

Kidney Int; 63: 2003; 1468-1474
New stage 3 CKD and albuminuria after 4.2 years follow up

Kidney Int; 92: 2004; s18-s21
Rate of GFR decline per tertile of urinary protein excretion rate

Kidney Int; 52: 1997; s54-s57
Incidence rate per 100 person-years and urinary albumin concentration

![Bar chart showing the relationship between urinary albumin concentration and incidence rate per 100 person-years for CV death and non-CV death.]

Circulation.;106:2002;1777-1782
Endothelial injury
Inflammation
Tubulointerstitial injury
fibrosis
How to detect microalbuminuria

● 24 hr. urine collection
  ● Error if inadequate collection
  ● Confirm by urine volume, urine Cr. > 1 gm
● First morning urine albumin/creatinine
  ● 20 mg/gm.
● Dip stick for microalbuminuria
  ● Convenience for screening test
  ● Recommended by K/DOQI
Who should be tested for proteinuria

- Study model
  - Cost-effectiveness of screening and treatment of proteinuria in elderly
- Study in Netherland
  - Cost-effectiveness in elderly
- Screening is not recommended in normal, healthy population
- Screening in high risk group
Screening for micro/macroalbuminuria in high risk

- Diabetes
  - microalbuminuria
  - 5 years after diagnosis in type 1, immediate at diagnosis in type 2
- Hypertension
  - After diagnosis and every year
- History of CKD
  - Every year
Evaluation of proteinuria

Not at increase risk

Standard dip stick

Trace/neg

Total protein/Cr ratio

<200 mg/g

<200 mg/g

>200 mg/g

Recheck at periodic Health evaluation

Diagnostic evaluation

At increase risk

Albumin specific dip stick

Neg

Total protein/Cr ratio

<30 mg/g

<30 mg/g

>30 mg/g

>200 mg/g

>30 mg/g

Diagnostic evaluation

Recheck at periodic Health evaluation
Management of asymptomatic proteinuria

- Proteinuria<1 gm/day: low risk for progressive renal failure
- Definite diagnosis: kidney biopsy
- Alternative:
  - Follow up BP, proteinuria
  - Management as nephrotic syndrome if proteinuria>3 gm/day
Proteinuria in hypertension, obesity, dyslipidemia

- Marker of endothelial injury
- Increase cardiovascular risk

Management:
- Decrease risk factor
- Control BP, lipid
- Keep ideal body weight
- Stop smoking
Treatment of proteinuria with ACEI, ARB

- Decrease intra-glomerular pressure
- Decrease proteinuria
- Slow progression of kidney disease in both diabetes and non-diabetes
REIN CORE

Rate of GFR decline according to base-line proteinuria
- Interim analysis on 177 patients

**STRATUM - 1**
U. Prot. < 3 g/24 h

**STRATUM - 2**
U. Prot. > 3 g/24 h

**Rate of GFR decline (ml/min/month)**

- **Conventional**: 0.89 ± 0.11
- **Ramipril**: 0.39 ± 0.10

**Kidney survival:**
- **Conventional**: 54%
- **Ramipril**: 77%

REIN: ACE-I IS MORE RENOPROTECTIVE THAN CONVENTIONAL THERAPY IN NON-DIABETIC RENAL DISEASE

% of patients without doubling of baseline creatinine or ESRF

Follow-up

Diastolic Blood Pressure (mm Hg)

% Reduction in Proteinuria

Gisen group; Lancet 1997
Microscopic hematuria

- 9-18% of normal population
- Detect by dipstick
- Microscopic examination
  - RBC >3/high power field in spun urine
  - Significant if detected 2/3 of examination
Etiology of hematuria

- Life threatening condition
  - Urologic malignancy, lymphoma

- Significant condition, need treatment
  - Stone, BPH, UTI, renal parenchymatous disease

- Significant condition, need follow up
  - BPH, cystitis, polycystic kidney disease

- Non-significant
  - Renal cyst, prostatic stone
Who should be tested for hematuria

- Screening test is not recommended in normal, healthy population
- High risk for cancer group:
  - Elderly > 40 year-old
  - Smoking
  - History of pelvic radiation
  - History of dye or chemical exposure
Asymptomatic microscopic hematuria

- Proteinuria >1+ or 1 gm/d
  - Dysmorphic red cell, cast
  - Increase Cr
  - Evaluation of glomerular disease

- No proteinuria
  - Urologic disease
  - Urologic evaluation
Urological evaluation

- IVP
  - Screening test
  - Low sensitivity for small mass
- Ultrasonography
  - High sensitivity for cystic mass
- CT scan
  - Sensitivity = MRI
  - Higher sensitivity for spiral CT in detection of stone
Course of microscopic hematuria & guideline of follow up

- No cause found in 8-10%
- Uroepithelial cancer 1-5% in 3 years
- Follow up every 6 months till 3 years
- Worsening signs: hypertension, decrease GFR, proteinuria
  - Evaluation for renal parenchymatous disease
Conclusion

- Proteinuria & hematuria: signs of kidney injury
- Proteinuria: key factor for progression of kidney disease
- Screening should be done in high risk group
- No strong recommendation for screening in normal population