Diabetic Nephropathy

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Outline

- Definition
- Importance/Epidemiology
- Pathogenesis
- Natural History
- Risk factors and prevention
- Treatment strategies

Definition

- ***Diabetic nephropathy:***

- Functional and structural renal changes that happen in the context of Diabetes mellitus.

- ***Functional:***

- Albuminuria
- Progressive loss of renal function

- ***Strucural:***

- Mesangial expansion, GBM thickening and glomerulosclerosis

Definition

- Microalbuminuria = 30-300 mg/d
  - ACR > 30 mg/g creatinine
- Albuminuria = > 300 mg/d

Importance

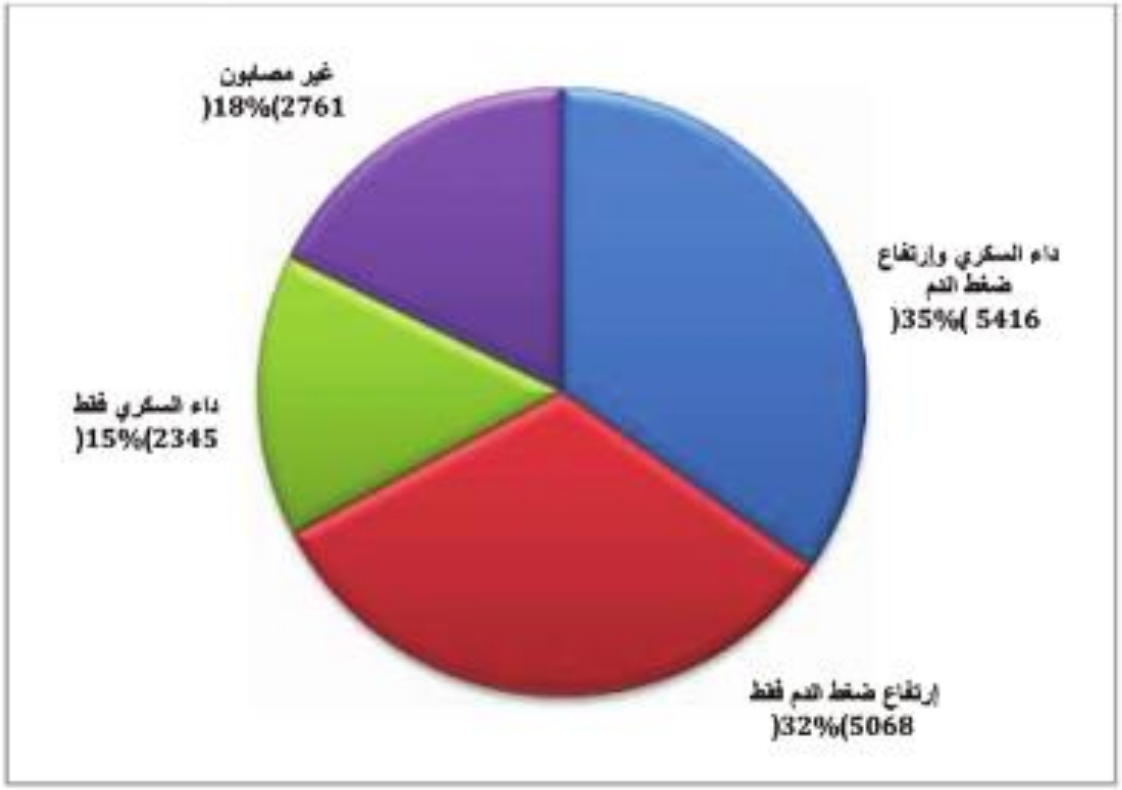
- The leading cause of ESRD in our society

SCOT 2015

أسباب الفشل الكلوي النهائي عند مرضى التنقية الدموية
بيانات نهاية عام 2015م

سبب الفشل الكلوي	العدد	النسبة المئوية%
إعتلال كلوي بإرتفاع ضغط الدم	6081	39%
إعتلال كلوي بداء السكري	6055	38.8%
مجهول السبب	1158	7.4%
إعتلال كبيبات الكلى البدئي	570	3.7%
إعتلال كلوي إنسدادي	364	2%
إلتهاب الأوعية	259	2%
الآفات الكلوية الوراثية	270	1.7%
تشوهات خلقية	214	1.4%
إعتلال أنبوبي خلالي مزمن	129	1%
عواقب الحمل	74	0.5%
أخرى	416	2.5%
المجموع	15590	100%

إنتشار داء السكري وإرتفاع ضغط الدم عند مرضى التنقية الدموية
بيانات نهاية عام 2015



Importance

- Diabetic nephropathy is a risk factor for cardiovascular disease

Importance

- Prevalence of Diabetes in Saudi Arabia:

- 23.7% DM

- 14.1 % impaired fasting glucose

- In total 37.8% have abnormal glucose metabolism (age 30-70 year)

Epidemic

Alnozha et al, Saudi Med J 2004, 25(11): 1603–10.

Prevalence of Diabetic Nephropathy in Type II

- 11.5% in UK
- 42.9% in Thailand

- ***Saudi Arabia:***

- **10.8%**

the Saudi National Diabetes Registry (SNDR), Al-Rubeaan et al 2014.

- **31.8%**

Alwakeel et al, Ann Saudi Med 2011; 31(3): 236–242.

- ESRD in DM II:
- **- 1.5% of type II DM**

the Saudi National Diabetes Registry (SNDR), Al-Rubeaan et al 2014.

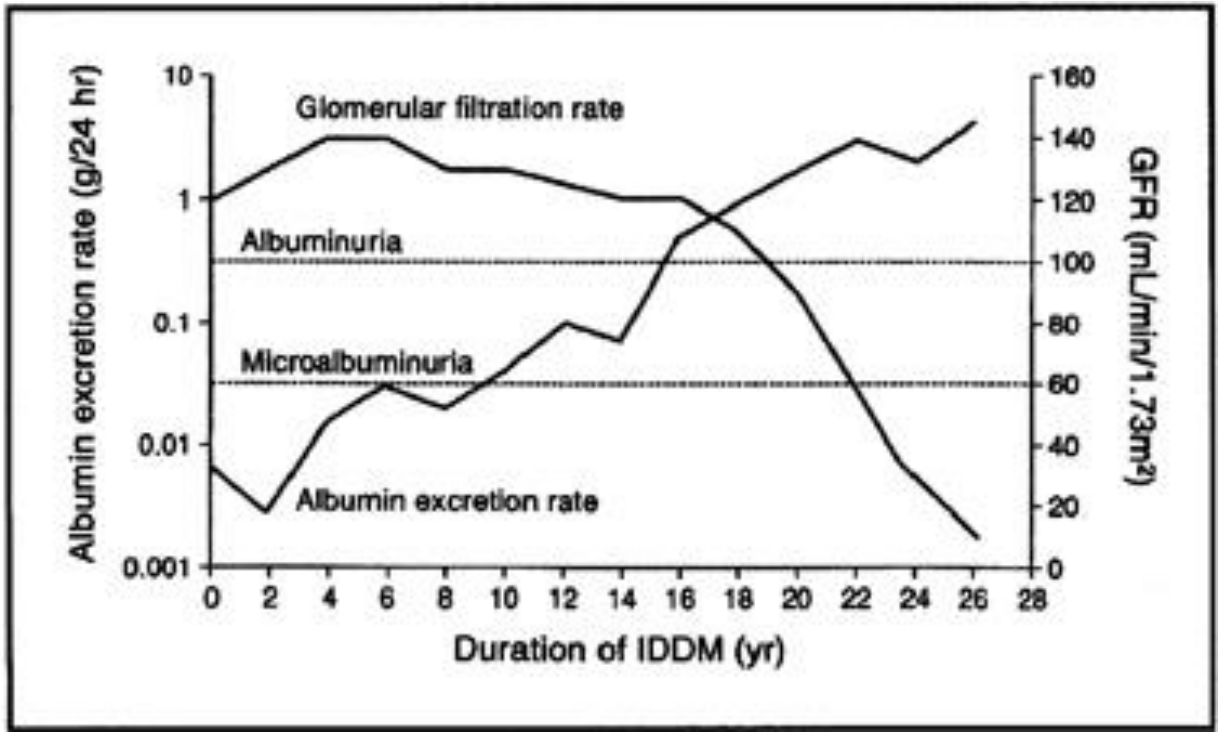
- **5% of type II DM**

Alwakeel et al, Ann Saudi Med 2011; 31(3): 236–242.

- Type 2
  - 10 years: 25% MA, 5% proteinuria and 0.8% Cr≥175 or renal replacement therapy
- Adler AI, et al. Kidney Int 2003; 63:225.

- Type 1
  - 7-10% $\rightarrow$ ESRD after 20-30 year

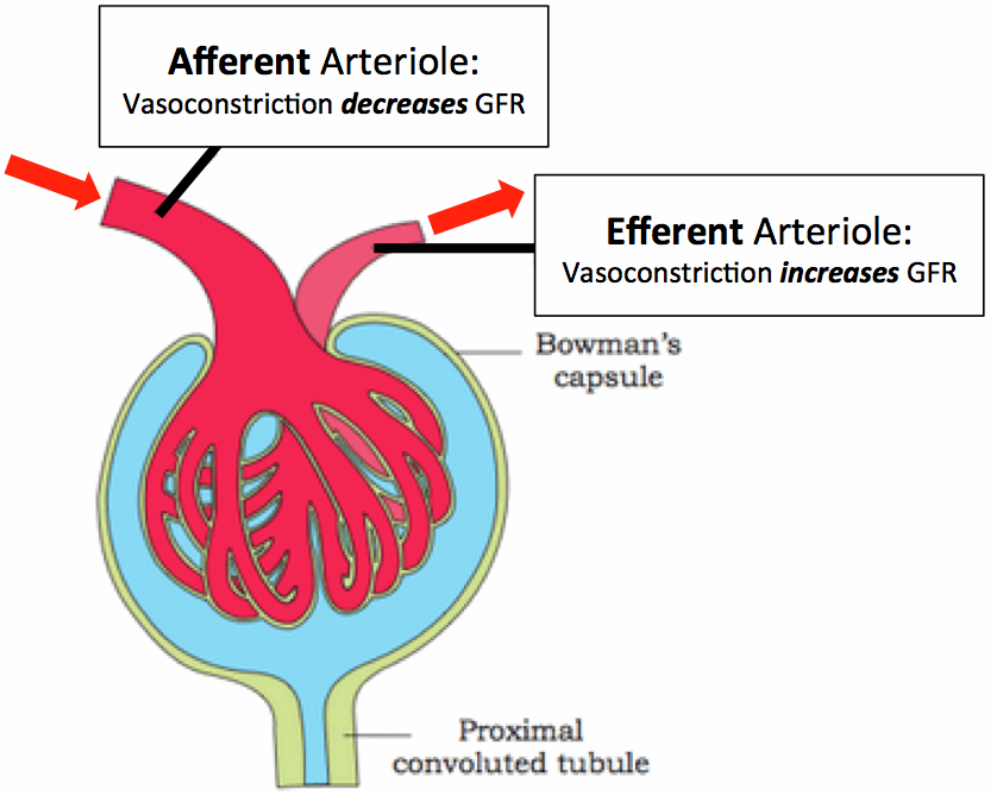
Natural Hx inType I DM



Stengal et al, Mayo Clin Proc, 2000

Pathophysiology

- Hyperfiltration

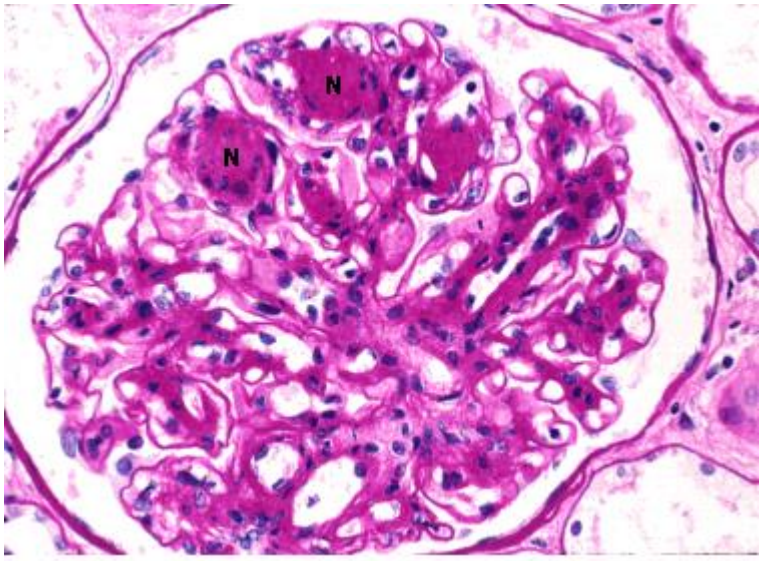


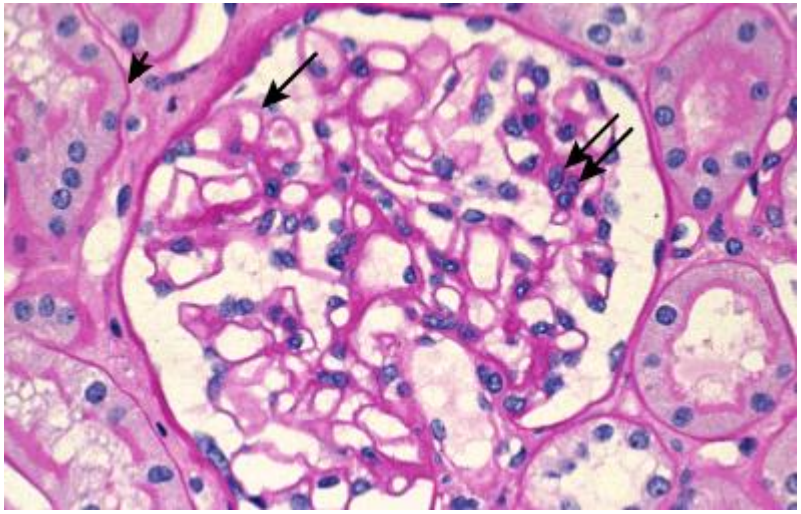
Microvascular modulation of glomerular filtration rate (GFR)

http://emcrit.org/pulmcrit/renal-microvascularhemodynamics-in-sepsis-a-new-paradigm/
December 2, 2014 by Josh Farkas

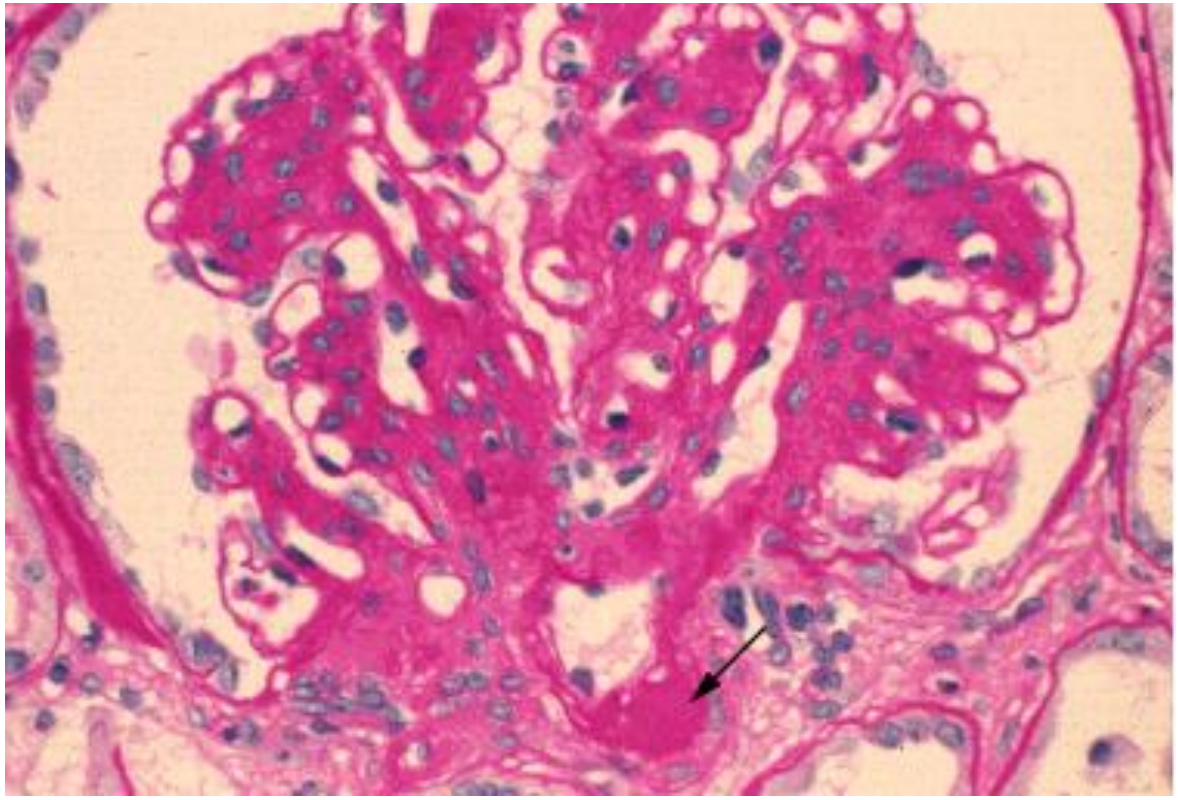
Pathophysiology

- Hyperglycemia increases the expression of transforming growth factor-beta (TGF-beta)
- Hyperglycemia and AGEs (advanced glycation end products)
- Hyperglycemia Increases VEGF expression (vascular endothelial growth factor)
- HTN





Uptodate 2016



Risk Factors

- Duration of DM
- Age
- HTN
- Race
- Genetic factor
- Retinopathy
- Smoking, Hyperlipidemia
- Poor Glycemic control

Diabetic Nephropathy and Retinopathy

- In Type I DM

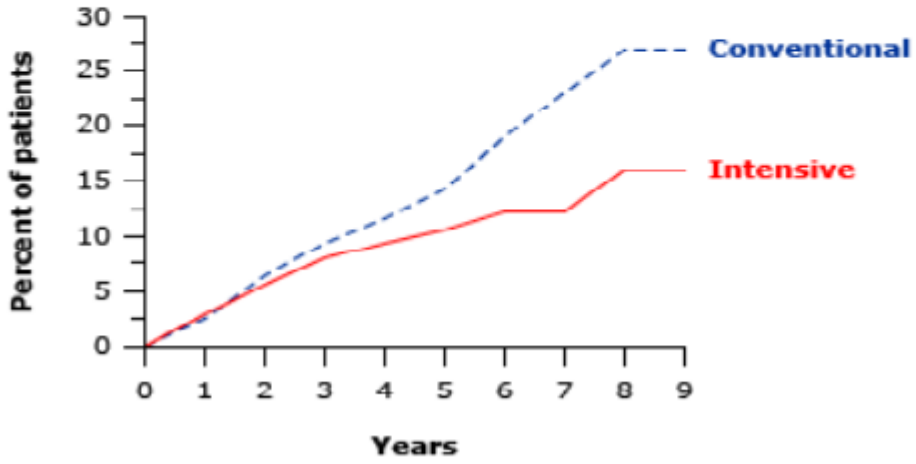
- In Type II DM

Treatment Strategies

- Good BP control
  - BP <130/80
- RAS blockade, independent of BP
- Good glycemic control
  - $HgbA_1C$ <7 %
- Lipid lowering agent
  - LDL-C <2.0 mmol/L
- Diet (protein, sodium)

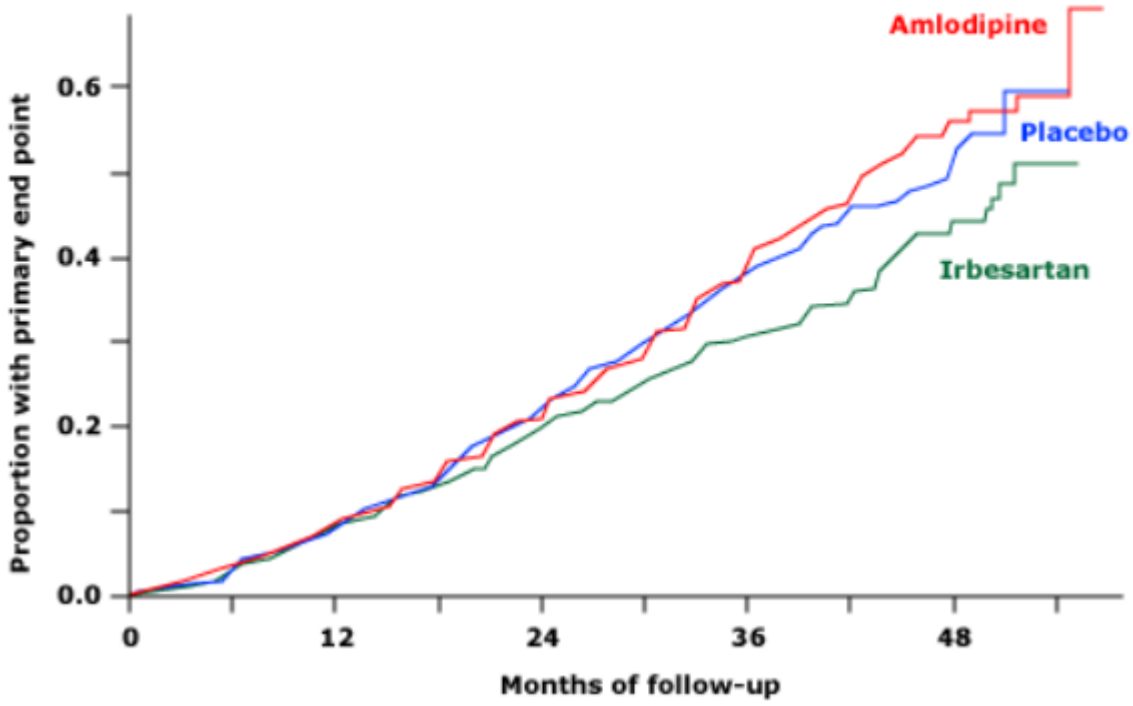
GRAPHICS

Strict glycemic control prevents moderately increased albuminuria (formerly called microalbuminuria) in patients with type 1 diabetes mellitus



The Diabetes Control and Complications Trial Research Group. N Engl J Med 1993

Irbesartan slows progression of nephropathy in type 2 diabetes



Adapted from data published in: Lewis EJ, Hunsicker LG, Clarke WR, et al. N Engl J Med 2001; 345:851.

Summery

- Prevalence of Diabetic Nephropathy is underestimated.
- Microalbuminuria is a risk of further renal progression.
- DN is a risk for cardiovascular events.
- Half of the Microalbuminuric patient will progress to overt nephropathy.
- DN is a leading cause of ESRD in our society and worldwide.

Treatment Strategies

- Good BP control
  - BP <130/80
- RAS blockade, independent of BP
- Good glycemic control
  - $HgbA_1C$ <7 %
- Lipid lowering agent
  - LDL-C 2.0 mmol/L
- Diet (protein, sodium)

Thank you

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