

# 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
- ***Structural:***
  - 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

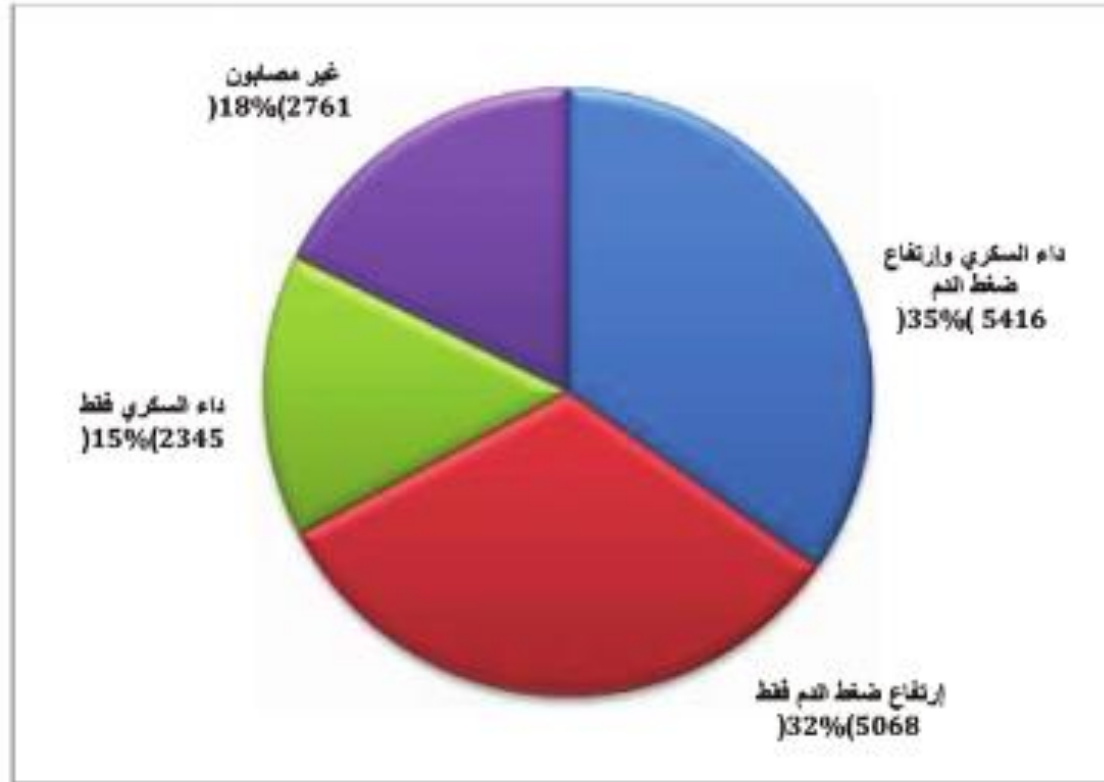
أسباب الفشل الكلوي النهائي عند مرضى التنقية الدموية  
بيانات نهاية عام 2015م

SCOT 2015

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



## انتشار داء السكري وارتفاع 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



# 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**

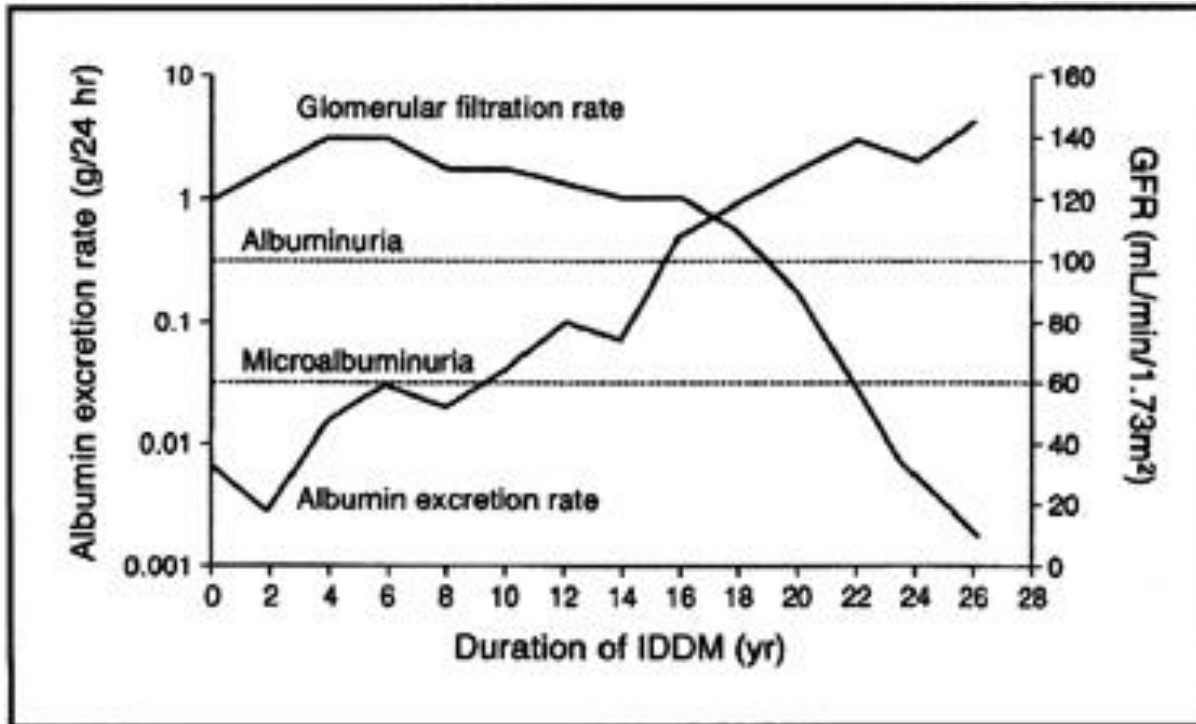
the Saudi National Diabetes Registry (SNDR), Al-Rubeaan et al 2014.

- **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 $\geq$ 175 or renal replacement therapy
- Adler AI, et al. Kidney Int 2003; 63:225.
- Type 1
  - 7-10% → ESRD after 20-30 year

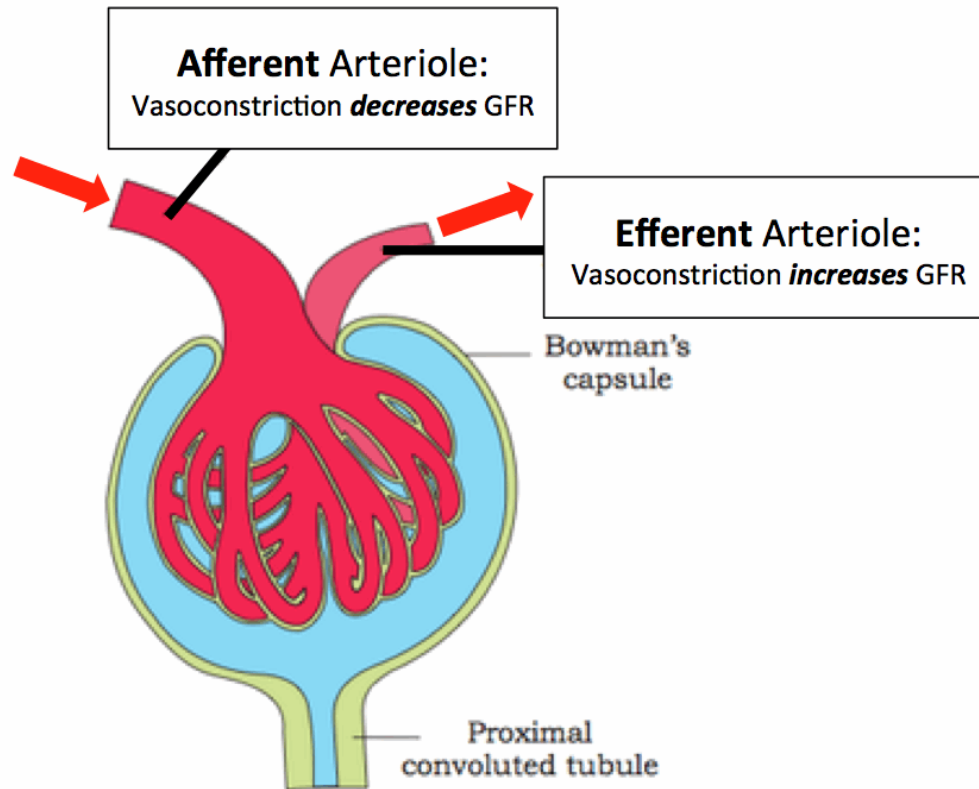
# Natural Hx in Type I DM



Stengal et al, Mayo Clin Proc, 2000

# Pathophysiology

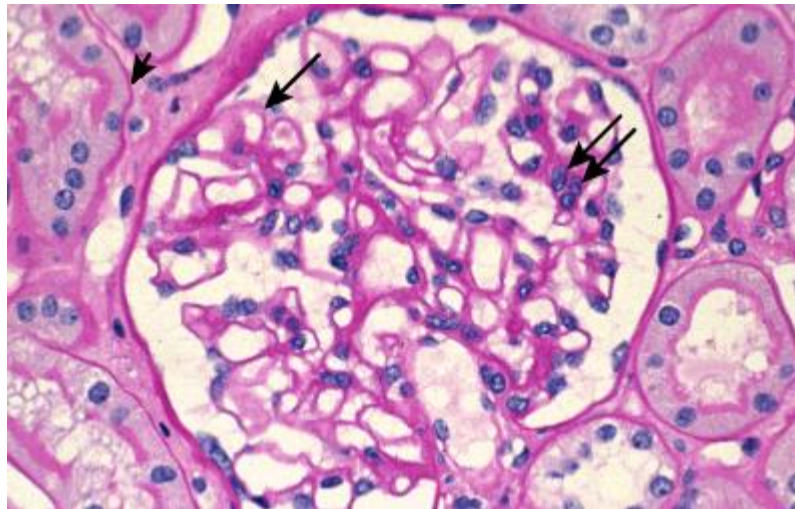
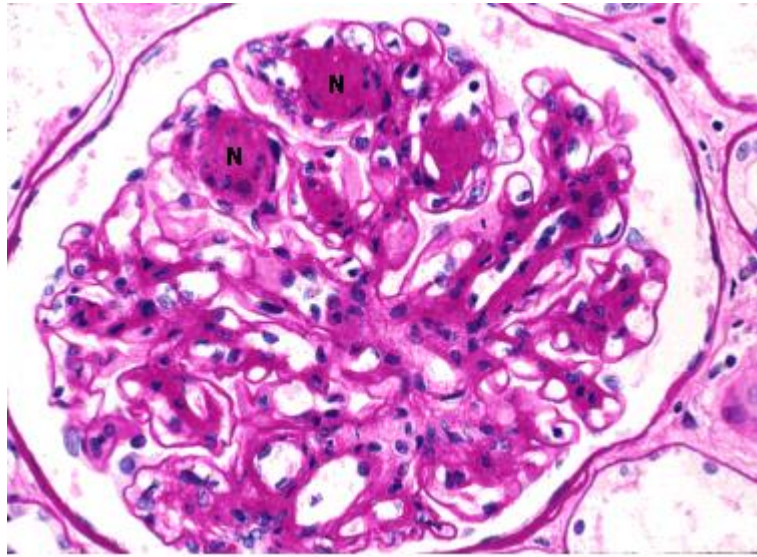
- Hyperfiltration



Microvascular modulation of glomerular filtration rate (GFR)

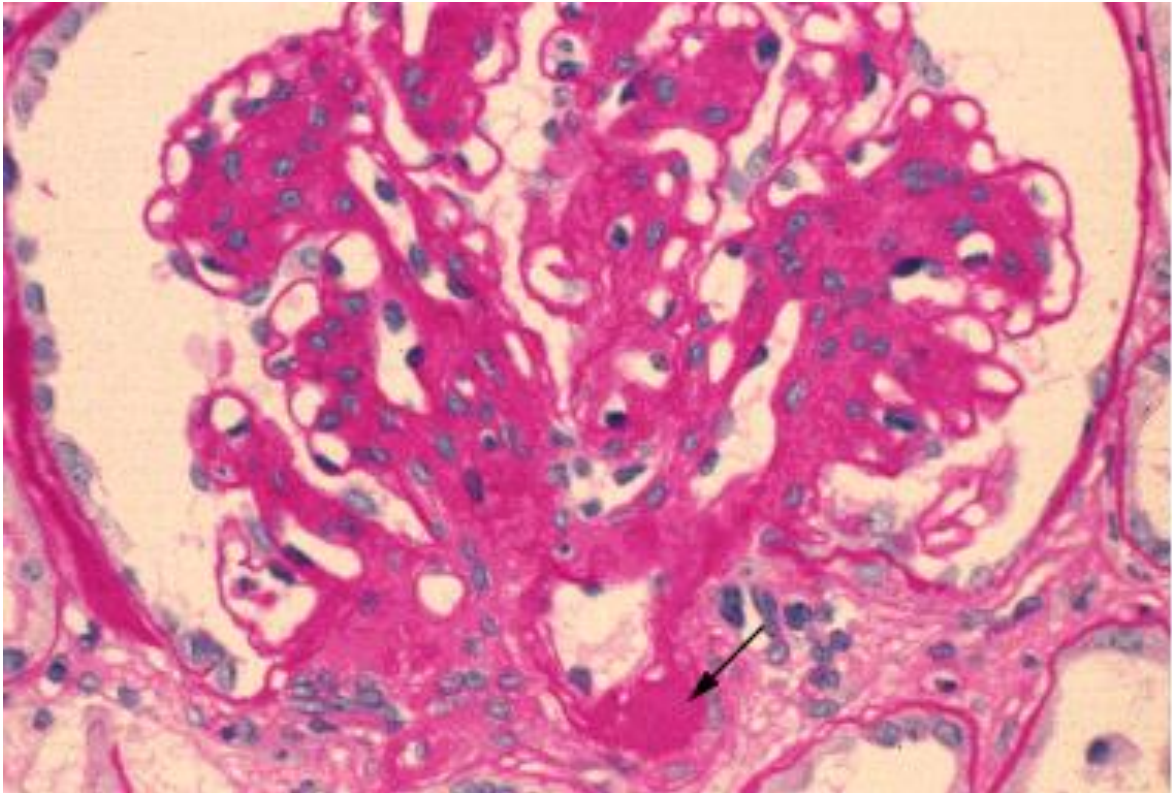
# Pathophysiology

- 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



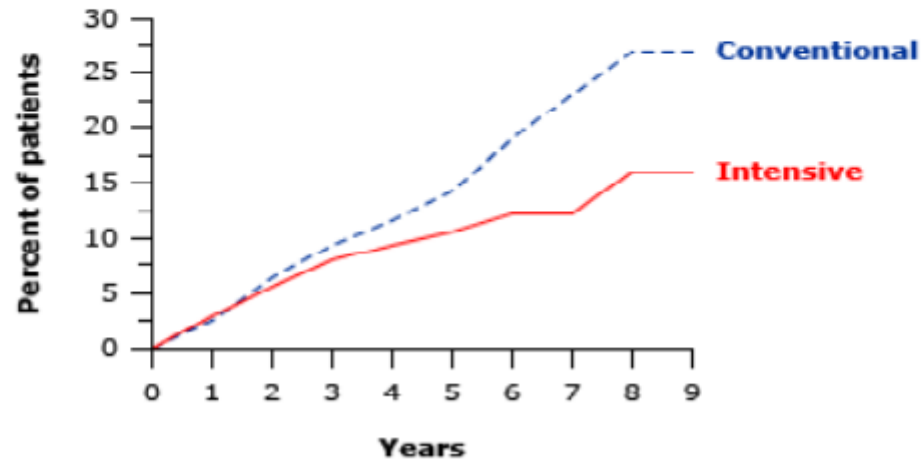
# Treatment Strategies

- Good BP control
  - BP <130/80
- RAS blockade, independent of BP
- Good glycemetic control
  - HgbA<sub>1</sub>C <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**

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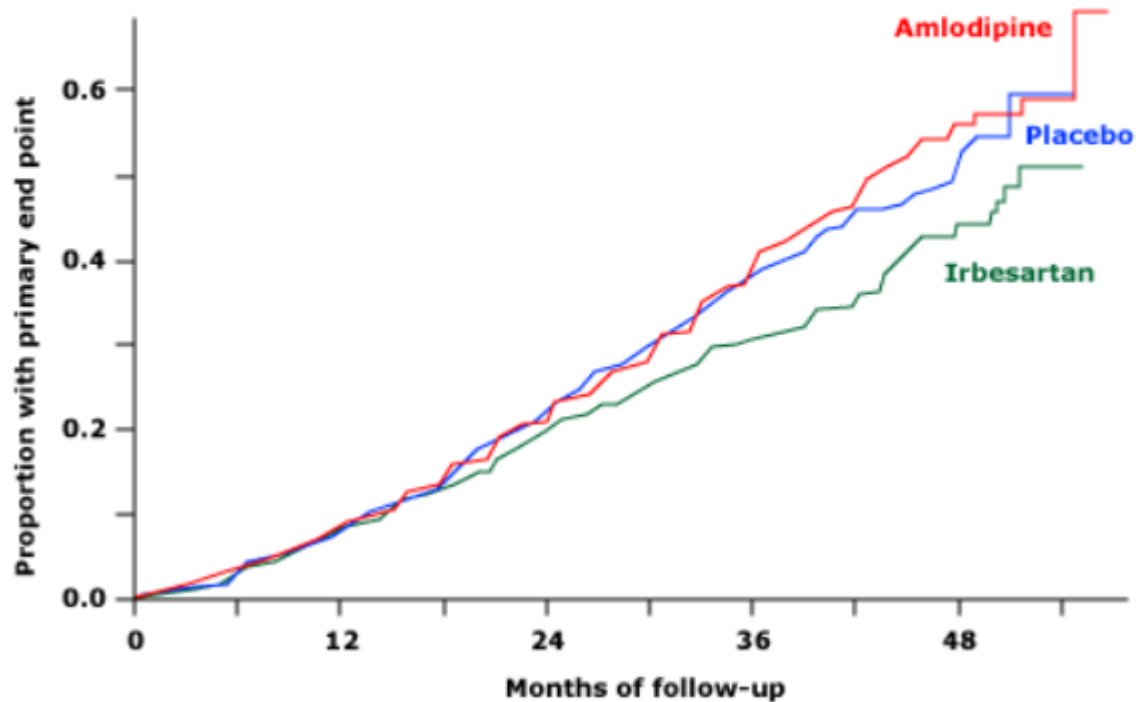


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The Diabetes Control and Complications Trial  
Research Group. N Engl J Med 1993

## Irbesartan slows progression of nephropathy in type 2 diabetes

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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

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- RAS blockade, independent of BP
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- Lipid lowering agent
  - LDL-C 2.0 mmol/L
- Diet (protein, sodium)



# Thank you

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