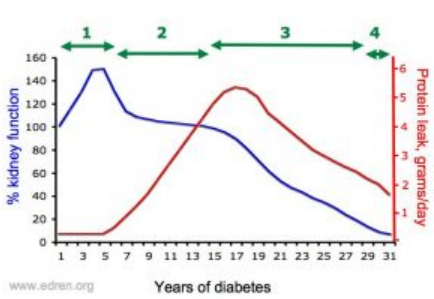
Diabetic kidney disease

What is diabetic nephropathy?

Diabetic nephropathy is the kidney disease that occurs as a result of diabetes. It is a leading cause of kidney failure in Europe and the USA. After many years of diabetes the delicate filtering system in the kidney becomes destroyed, initially becoming leaky to large blood proteins such as albumin which are then lost in urine. This is more likely to occur if the blood sugar is poorly controlled.



The diagram shows how kidney function reduces and the amount of protein in the urine increases in diabetic nephropathy.

1. It begins with a tiny amount of protein appearing in the urine – this is called microalbuminuria. The kidney function may well be normal at this point.

2. Over 10-15 years proteinuria increases, and nephrotic syndrome may develop

3. With the development of proteinuria, the kidneys' ability to remove poisons from the blood deteriorates such that 5-10 years later the kidneys are almost completely unable to remove these poisons from the blood.

4. This is called "end-stage renal **d**isease" (**ESRD**), and, unless treated, the poisons can build up to fatal levels.

Do all diabetics develop nephropathy?

The overall risk of developing diabetic nephropathy varies between about 10% of type II diabetics (diabetes of late onset) to about 30% of type I diabetics (diabetes of early onset). There are many factors, some known and others not, that affect the individual risk of developing diabetic nephropathy. Some of the factors that are known to increase the likelihood of getting diabetic nephropathy include:

- Blood sugar control is poor
- High blood pressure
- Smoking
- Relatives have had kidney disease or high blood pressure
- Diabetes began in teens
- Male
- Indo-Asian or Afro-Carribean background

Will I need a kidney biopsy?

Given the relatively predictable nature of diabetic nephropathy, a kidney biopsy is usually not needed. You will be evaluated by history, examination, as well as blood and urine tests and a kidney ultrasound examination. If there are unusual features, then further investigations may be needed to define the kidney condition, and this may well involve a biopsy.

Does diabetic nephropathy have any other effects?

High blood pressure almost always develops or worsens in diabetic nephropathy, and can be the first abnormality to develop.
Diabetic nephropathy is also a sign of worsening blood vessel disease throughout the body. Diabetic eye disease is usually present by this stage indicating damage to smaller blood vessels. Larger blood vessels (arteries) are almost always affected leading to heart attacks, strokes, and circulatory disease occurring more often and at a younger age than usual.
Commonly diabetes will have also resulted in damage to small nerves causing “diabetic peripheral nephropathy” and “autonomic neuropathy”.

What can be done to reduce the risk of problems?

Blood glucose control: Good blood glucose control can prevent the development and slow the progression of diabetic nephropathy, as well as preventing the other

complications of diabetes, even if kidney failure has developed. This can not be achieved by tablets and/or insulin alone, but requires a good diet too. Achieving these things will involve discussion with doctors, nurses and dieticians. Ideally HbAk levels (a measure of avaerage blood sugar control over 3 months) should be less than 7%.

Blood pressure control: The recommended target blood pressure is **125/75**mmHg in diabetic patients however, the lower the blood pressure the lower the risk of problems. This usually requires more than one type of tablet to achieve. If you are overweight, losing weight will help too. Weight loss may help in many cases.

Using ACE inhibitors and AT II antagonists: Two classes of drug used to control blood pressure deserve special mention. These are the **A**ngiotensin-**C**onverting **E**nzyme (**ACE**) inhibitors and **a**ngio**t**ensin **II** receptor blockers (ARB). These drugs not only reduce blood pressure in the large blood vessels, but also directly in the kidneys' filtering system (called glomeruli). Many studies have documented the beneficial effects of these agents beyond simply blood pressure control to reducing kidney protein leak. Although these drugs are useful, they need to be monitored as they may have a detrimental effect on some people.

Diet: Above and beyond the diabetic diet, not adding any salt and reducing alcohol intake will have beneficial effects on blood pressure. Other aspects of diet (including energy, calcium and phosphate) are important in renal failure and the assistance of a renal dietitian is normally required if CKD is severe (e.g. stage 4+).

Controlling blood fat and cholesterol: Controlling blood fat and cholesterol levels helps prevent heart disease and possibly strokes, and may slow the progression of diabetic kidney disease. The current data points towards a target total cholesterol of <3.5mmol/l if you have microalbuminuria.

Smoking: You really shouldn't smoke, not only for the sake of your kidneys, but also for the sake of your heart and brain blood vessels. Smokers die earlier than non-smokers, but diabetic smokers die much earlier and often develop serious circulation problems at a young age.

What is the treatment?

Stage	Assessment	Treatment
No proteinuria	Monitor blood pressure (BP) Monitor blood glucose Screen for microalbuminuria if type I diabetic for over 5yrs, or type II diabetic	Aim under 130/80mmHg (120/70mmHg in type I diabetes). Aim HbA1c under 7% Dietary advice for sugar and fat **STOP SMOKING**
Microalbuminuria	Close monitoring of blood pressure, blood glucose, and blood lipids. Monitor urinary protein	Aim BP <125/75mmHg Add further blood pressure lowering drugs if needed. Add ACEi/ARBif possible. Aim total cholesterol under 3.5mmol/l Add ACE inhibitor if possible
Proteinuria	Close monitoring of blood pressure, blood glucose, and blood lipids. Monitor urinary protein	As for microalbuminuria
Declining kidney function		Prepare for dialysis and/or transplantation

Further information

>Elsewhere onEdREN you can find information on the following:

- High blood pressure and kidney disease.
- Chronic renal failure and its progression.
- Or you can SEARCH our website.
- Further information can be found through our which includes links to kidney.org and NIDDK.
- The American Diabetic Association homepage. This has a good search facility for cross-referencing diabetic matters.
- Another specific site on diabetes and kidney disease.
- This is an excellent American diabetic information pagewith good links to kidney disease and diabetes.
- National Institute of Diabetes and Digestive and Kidney disease. This is yet another good American site with useful links and information.
- The UK Diabetes Association website has good general information.
- The NKF (UK) provides general and specific kidney disease information.

Key Points

- Diabetic nephropathy does not occur in all diabetics.
- The risk of diabetic nephropathy is greater when the control of blood glucose is poor, as well as in those diabetic patients who have high blood pressure and are smoker.
- Diabetic nephropathy is a sign of worsening blood vessel disease throughout the body, and is associated with an increased risk of heart attack, stroke and circulatory problems.
- The risk and effect of diabetic nephropathy can be reduced by controlling blood sugar, blood pressure and cholestrol levels. This can be achieved with a combination of good dietary control as well as medication.
- Smoking shortens life it is vital to stop!

Acknowledgements: The author of this page was Walaa Saweirs, it was last updated in July 2006. The date is was last modified is shown in the footer.