

Diabetic nephropathy: A devastating complication of diabetes mellitus

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Description

A serious complication of both type 1 and type 2 diabetes is diabetic nephropathy. Diabetic kidney disease is another name for it. About one in three Americans who have diabetes also have diabetic nephropathy. The kidneys' ability to perform their typical function of eliminating waste materials and surplus fluid from body is impacted by diabetic nephropathy. By leading a healthy lifestyle and effectively managing diabetes and high blood pressure, it can stop or delay diabetic nephropathy. The condition gradually weakens the sensitive filtering system in kidneys over many years. Early diagnosis and treatment can lessen the likelihood of complications and stop or slow the disease's progression.

Renal failure, also known as end-stage kidney disease, can result from kidney disease. Diabetes mellitus is a chronic metabolic disorder that affects millions of people worldwide. It is characterized by hyperglycemia, which results from the body's inability to produce or use insulin effectively. Diabetes is a major cause of morbidity and mortality, and its complications can affect various organs, including the kidneys. Diabetic Nephropathy (DN) is a serious and common complication of diabetes that can lead to End Stage Renal Disease (ESRD). This study will discuss the pathophysiology, diagnosis, treatment, and prevention of DN.

DN is a progressive kidney disease that occurs in individuals with diabetes, especially those with poorly controlled blood glucose levels.

It is the leading cause of ESRD worldwide, accounting for about one-third of all cases. The pathophysiology of DN is complex and involves multiple factors, including metabolic, hemodynamic, and inflammatory mechanisms. Hyperglycemia is the primary factor responsible for the development and progression of DN. High glucose levels can damage the glomerular filtration barrier, leading to increased permeability and proteinuria. This, in turn, can trigger a cascade of events that culminate in glomerulosclerosis, tubulointerstitial fibrosis, and eventually, ESRD.

Diagnosis of DN is based on several criteria, including persistent albuminuria, decreased Glomerular Filtration Rate (GFR), and the presence of diabetic retinopathy. Microalbuminuria, defined as urine albumin excretion of 30-300 mg/24 hours, is an early sign of DN and a predictor of progression to overt proteinuria. GFR, which reflects the kidney's ability to filter blood, is estimated using equations that take into account serum creatinine, age, gender, and race. The presence of diabetic retinopathy, a complication of diabetes that affects the blood vessels in the retina, is a strong predictor of DN and should prompt further evaluation of kidney function.

The treatment of DN involves strict glycemic and blood pressure control, as well as the use of renin-angiotensin-aldosterone system inhibitors. Tight glycemic control has been shown to reduce the risk of microvascular complications, including DN. Targeting a hemoglobin A1c



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level of less than 7% is recommended in most patients with diabetes. Blood pressure control is also crucial in patients with DN, as hypertension can accelerate the progression of kidney disease. RAAS inhibitors, such as angiotensin-converting enzyme inhibitors and angiotensin receptor blockers, are the first-line therapy for DN. These agents can reduce proteinuria, slow the decline in GFR, and improve cardiovascular outcomes in patients with DN.

Prevention of DN is essential, given the devastating consequences of this complication. Strategies to prevent DN include early detection and treatment of diabetes, tight glycemic

and blood pressure control, and lifestyle modifications. Screening for diabetes should be performed in high-risk individuals, such as those with a family history of diabetes, obesity, or hypertension. Early treatment of diabetes with lifestyle modifications, such as weight loss, physical activity, and dietary changes, can delay or prevent the onset of DN. Blood pressure control, with a target goal of less than 130/80 mmHg, is recommended in all patients with diabetes, regardless of the presence of kidney disease. Finally, smoking cessation, which has been shown to reduce the risk of microvascular complications in diabetes, is strongly encouraged.