Nephrotic syndrome

Nephrotic syndrome is a collection of symptoms due to kidney damage. This includes protein in the urine, low blood albumin levels, high blood pressure, and significant swelling. Other symptoms may include weight gain, feeling tired, and foamy urine. Complications may include blood clots, infections, and high blood pressure. Causes include several kidney diseas such as focal segmental glomerulosclerosis, membranous nephropathy, and minimal change disease. It may also occur as a complication of diabetes or lupus. The underlying mechanism typically involves damage to the glomeruli of the kidney. Diagnosis is typically based on urine testing and sometimes a kidney biopsy.

Nephrotic Syndrome

Triad of:

-MASSIVE Proteinuria >3g/24hours

Or spot urine protein:creatinine ratio >300-350mg/mmol

-Hypoalbuminaema <25g/L

-Oedema

And often:

Hypercholesterolemia/dyslipidemias(totalcholesterol >10mmol/L)

Fig.Nephrotic syndrome is usually accompanied by retention of water and sodium. The degree to which this occurs can vary between slight edema in the eyelids that decreases during the day, to affecting the lower limbs, to generalized swelling, to full blown anasarca.

Pathophysiology

The kidney glomerulus filters the blood that arrives at the kidney. It is formed of capillaries with small pores that allow small molecules to pass through that have a molecular weight of less than 40,000 Daltons,[26] but not larger macromolecules such as proteins.

In nephrotic syndrome, the glomeruli are affected by an inflammation or a hyalinization (the formation of a homogenous crystalline material within cells) that allows proteins such as albumin, antithrombin or the immunoglobulins to pass through the cell membrane and appear in urine.

Albumin is the main protein in the blood that is able to maintain an oncotic pressure, which prevents the leakage of fluid into the extracellular medium and the subsequent formation of edemas.

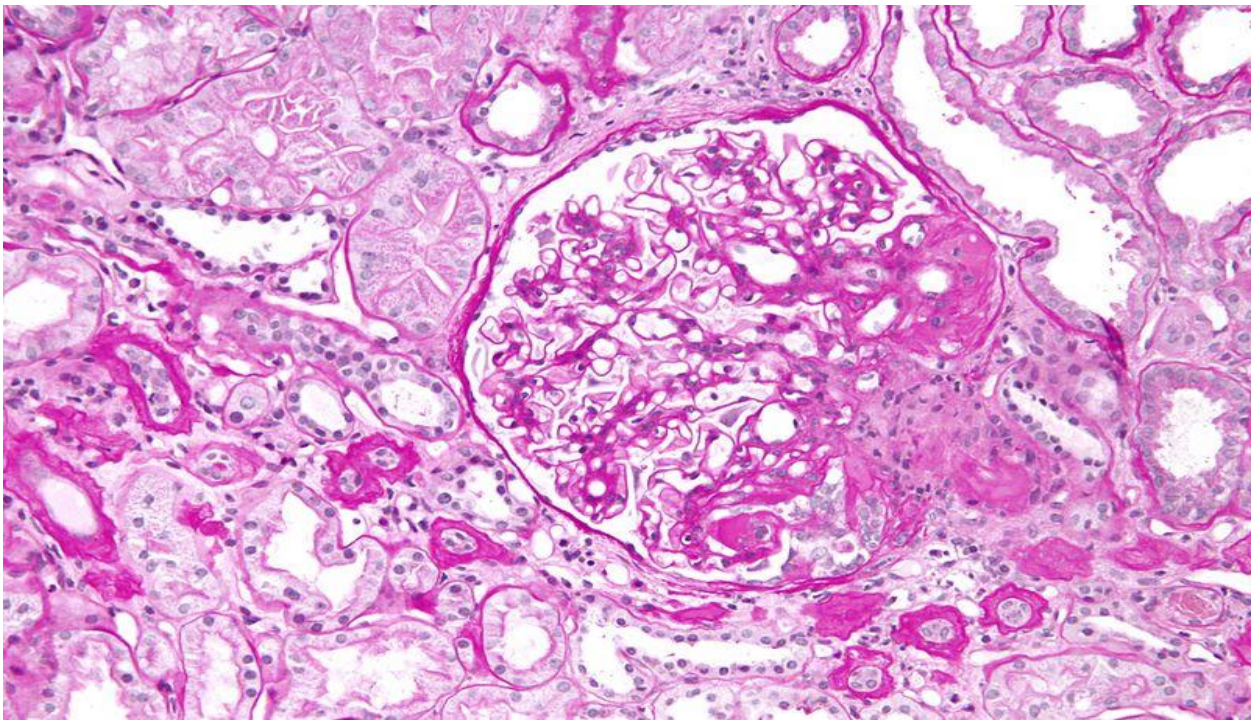
As a response to hypoproteinemia the liver commences a compensatory mechanism involving the synthesis of proteins, such as alpha-2 macroglobulin and lipoproteins. An increase in the latter can cause the hyperlipidemia associated with this syndrome.

Classification

Nephrotic syndrome is often classified histologically:

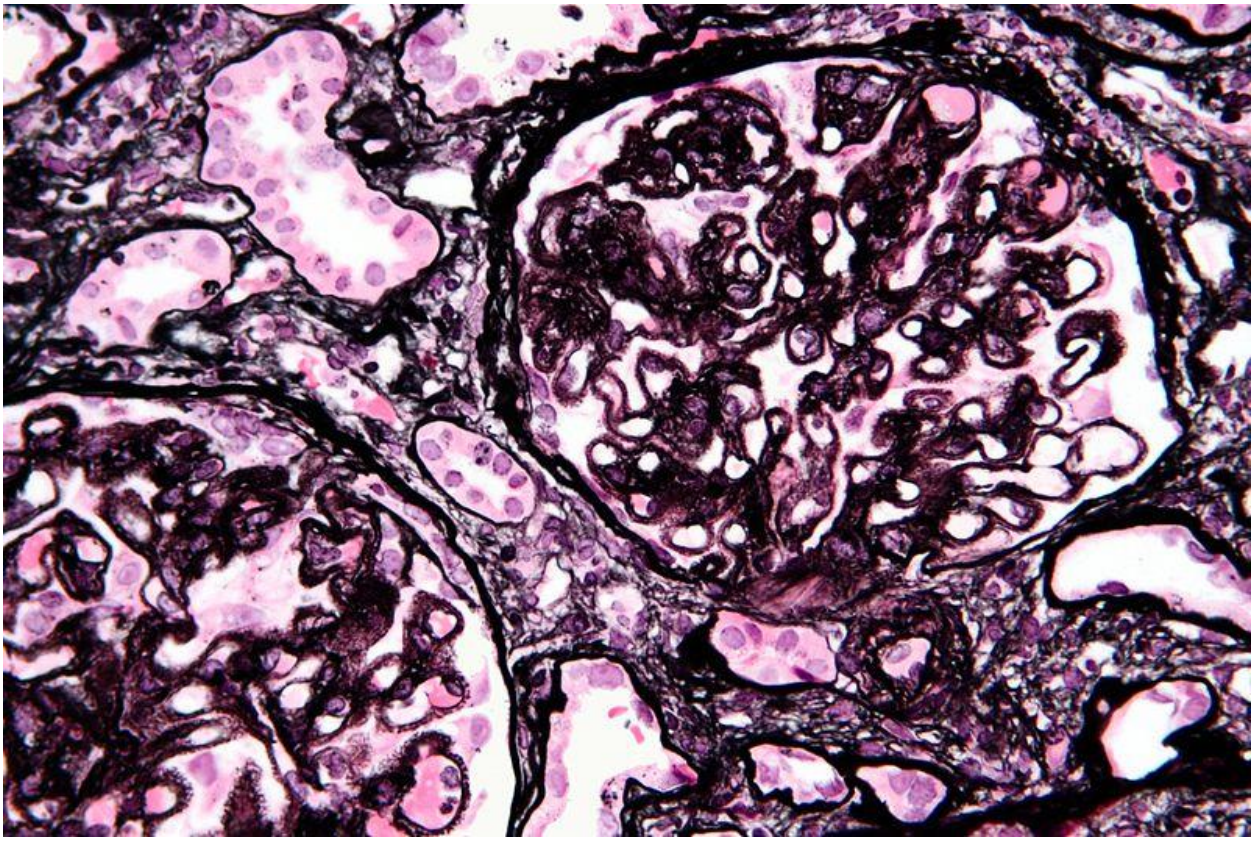
-Minimal change disease is a disease affecting the kidneys which causes a nephrotic syndrome. Nephrotic syndrome leads to the loss of significant amounts of protein in the urine, which causes the widespread edema (soft tissue swelling)

-Focal segmental glomerulosclerosis (FSGS), also known as "focal glomerular sclerosis" or "focal nodular glomerulosclerosis is a histopathologic finding of scarring (sclerosis) of glomeruli and damage to renal podocytes.[2][3] This process damages the filtration function of the kidney, resulting in protein loss in the urine



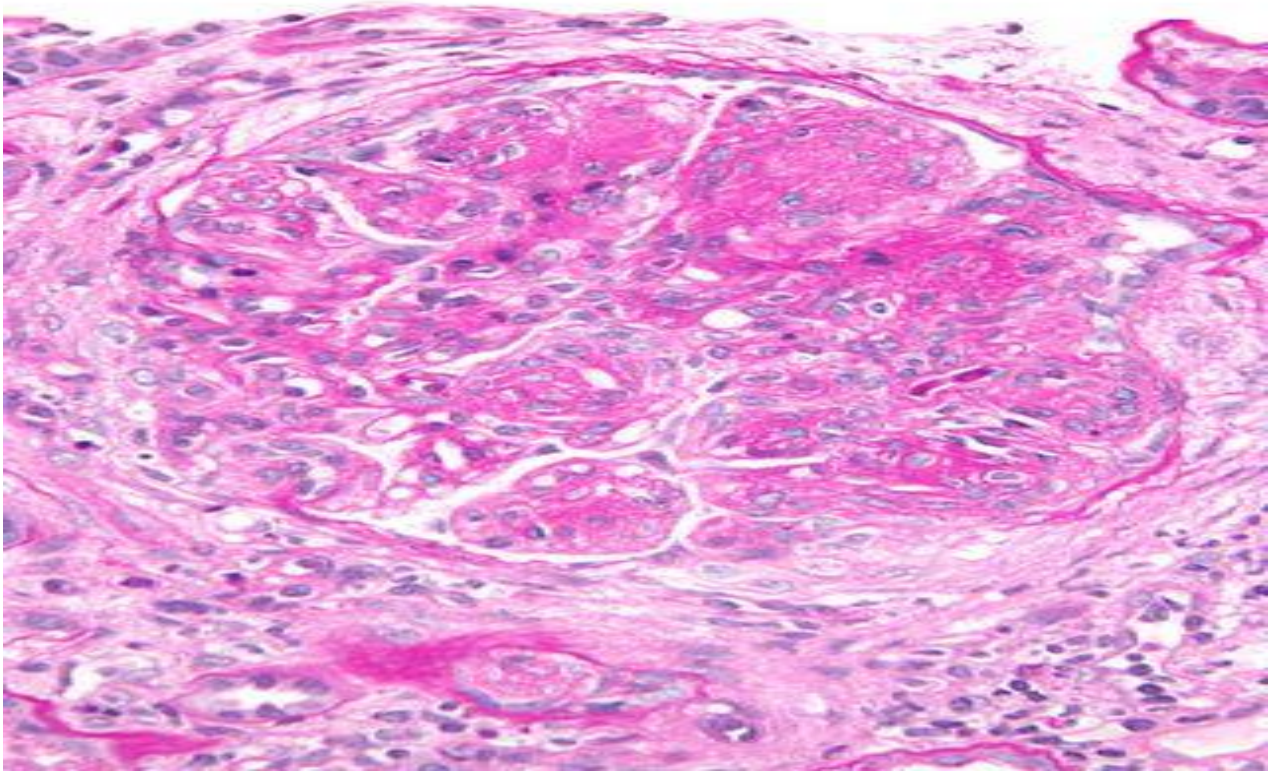
High magnification micrograph of focal segmental glomerulosclerosis, hilar variant. Focal segmental glomerulosclerosis is commonly abbreviated FSGS. PAS stain. Kidney biopsy. It presents as a nephrotic syndrome. Related images Intermed. mag. High mag. Very high mag.

-Membranous glomerulonephritis (MGN) is a slowly progressive disease of the kidney affecting mostly people between ages of 30 and 50 years, usually Caucasian.



Very high magnification micrograph of membranous nephropathy, abbreviated MN. MN may also be referred to as membranous glomerulonephritis, abbreviated MGN. Kidney biopsy. Jones stain. The characteristic feature on light microscopy is basement membrane thickening/spike formation, which is best seen with silver stains. On electron microscopy, subepithelial deposits are seen.

Membranoproliferative glomerulonephritis (MPGN) is a type of glomerulonephritis caused by deposits in the kidney glomerular mesangium and basement membrane (GBM) thickening, activating complement and damaging the glomeruli.

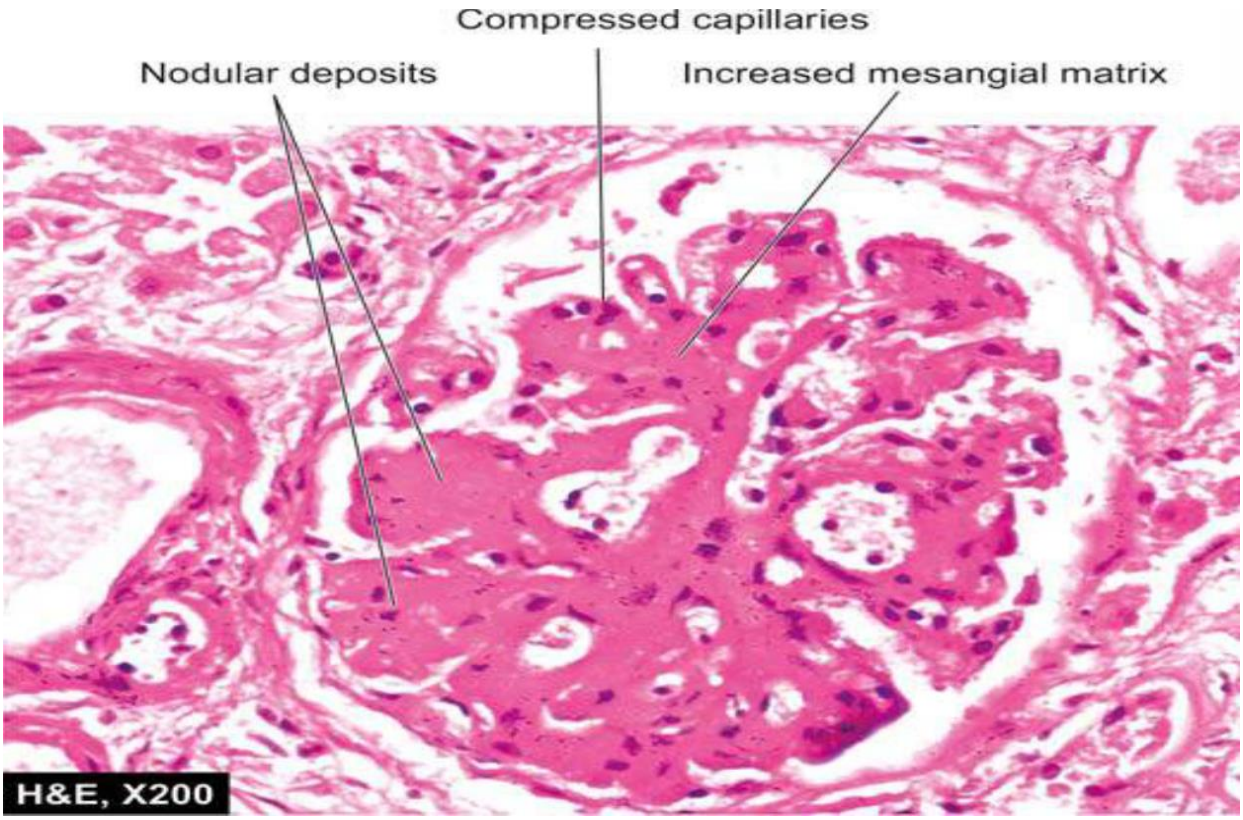


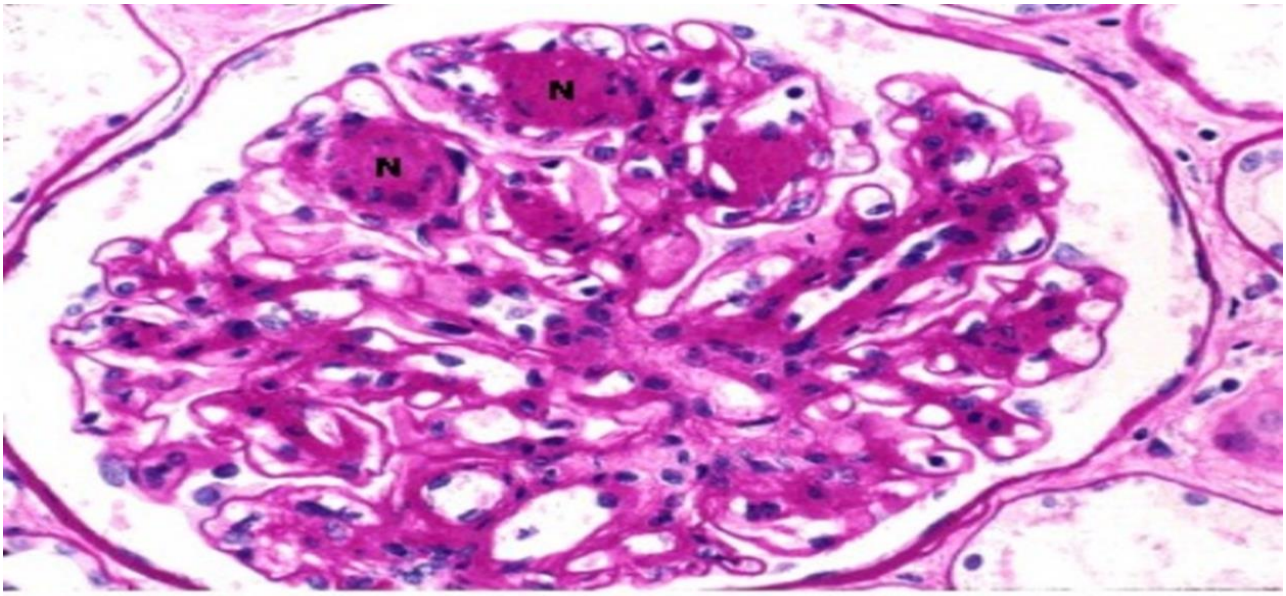
Important Note

(It should not be confused with membranous glomerulonephritis, a condition in which the basement membrane is thickened, but the mesangium is not.)

Diabetic nephropathy

also known as diabetic kidney disease, is the chronic loss of kidney function occurring in those with diabetes mellitus. Protein loss in the urine due to damage to the glomeruli may become massive and cause a low serum albumin with resulting generalized body swelling (edema) and result in the nephrotic syndrome A variety of clinical syndromes are associated with diabetic nephropathy that includes asymptomatic proteinuria, nephrotic syndrome, progressive renal failure and hypertension. Cardiovascular disease is 40 times more common in patients of chronic kidney disease in diabetes mellitus than in non-diabetics and more diabetics die from cardiovascular complications than from uremia.





Diabetic nephropathy Light micrograph showing diffuse and nodular (N) glomerulosclerosis in diabetic nephropathy. Note the dense appearance of the deposits and the rim of cells around the nodules, which distinguish this disorder on light microscopy from fibrillary glomerulonephritis or amyloidosis. Courtesy of Helmut Rennke, MD.