common in interstitial nephritis.

Nephrotic Syndrome Nephrotic syndrome (NS) has three defining features: edema, hypoalbuminemia (<3.5 g/dL), and proteinuria >3.5 g/day. The syndrome is often associated with lipid abnormalities such as a high LDL, low HDL, and lipiduria. The urine may contain large tubular epithelial cells that are engulfed with the lipid in a recognizable shape under polarized light. These oval fat bodies may also contain cholesterol monohydrate crystals, which appear as Maltese crosses. Under low light, the refractile lipid may be seen as fatty casts.

Clinically, patients present with generalized edema and, in contrast to heart failure with orthopnea, facial, eyelid and periorbital swelling is observed in NS. Penile and scrotal edema can be severe enough to obstruct urethral urine flow in men. In some cases, edema may form large bullae that may rupture, predisposing to ulceration and cellulitis. The skin becomes smooth and may appear to “weep.” Patients may have hoarseness caused by vocal cord edema. On occasion, nephrotic range proteinuria is not associated with edema, for example in the case of human immunodeficiency virus-associated nephropathy (HIVAN), which is more common in blacks with HIV. In these cases, rapid loss of renal function may occur due to implosion of the glomerular capillary by proliferation of visceral epithelial cells that crush the glomerular loops, decreasing capillary flow and filtering surface area (collapsing glomerulopathy). This glomerulopathy is a severe, treatment-resistant form of FSGS. Other secondary forms of FSGS, more often not associated with NS, include remnant kidney after partial surgical removal, adaptive injury, chronic hypoxemia, sickle cell diseases, recurrent vasculitis with healing of some glomeruli, obesity, and congenital urogenital anomalies. Very heavy proteinuria is often noted in this syndrome. Secondary forms of FSGS are shown in **Fig. 308-3**. Other secondary forms of FSGS, more often not associated with NS, include remnant kidney after partial surgical removal, adaptive injury, chronic hypoxemia from chronic lung or congenital heart disease, sickle cell diseases, recurrent vasculitis with healing of some glomeruli, obesity, and congenital urogenital anomalies.