glomerular capillaries due to glomerular hyperperfusion. With progressive renal injury, there is a loss of autoregulation of renal blood flow, resulting in a lower blood pressure threshold for renal damage and a steeper slope between blood pressure and renal damage. The result may be a vicious cycle of renal damage and nephron loss leading to more severe hypertension, glomerular hyperfiltration, and further renal damage. Glomerular pathology progresses to glomerulosclerosis, and eventually the renal tubules may also become ischemic and gradually atrophic. The renal lesion associated with malignant hypertension consists of fibrinoid necrosis of the afferent arterioles, sometimes extending into the glomerulus, and may result in focal necrosis of the glomerular tuft.

Clinically, macroalbuminuria (a random urine albumin/creatinine ratio >300 mg/g) and microalbuminuria (a random urine albumin/creatinine ratio 30–300 mg/g) are early markers of renal injury. They are also risk factors for renal disease progression and cardiovascular disease.

PERIPHERAL ARTERIES

Blood vessels are a target organ atherosclerotic disease secondary to long-standing elevated blood pressure. Independent of blood pressure, arterial stiffness (measured as carotid-femoral pulse wave velocity or carotid pulse pressure) is associated with target organ disease, including stroke, heart disease, and renal failure. Hypertensive patients with arterial disease of the lower extremities are also at increased risk of future cardiovascular disease. Clinically, PAD may be recognized by the symptom of claudication. The ankle-brachial index (ratio of ankle to brachial systolic blood pressure) is a useful approach for evaluating peripheral arterial disease. An ankle-brachial index <0.90 is considered diagnostic of PAD and is associated with >50% stenosis in at least one major lower limb vessel. An ankle-brachial index <0.80 is associated with elevated blood pressure, particularly systolic blood pressure.

Whether arterial stiffness and vascular remodeling are primary alterations or secondary consequences of elevated arterial pressure remains to be established. Limited evidence suggests that vascular compliance and endothelium-dependent vasodilation may be