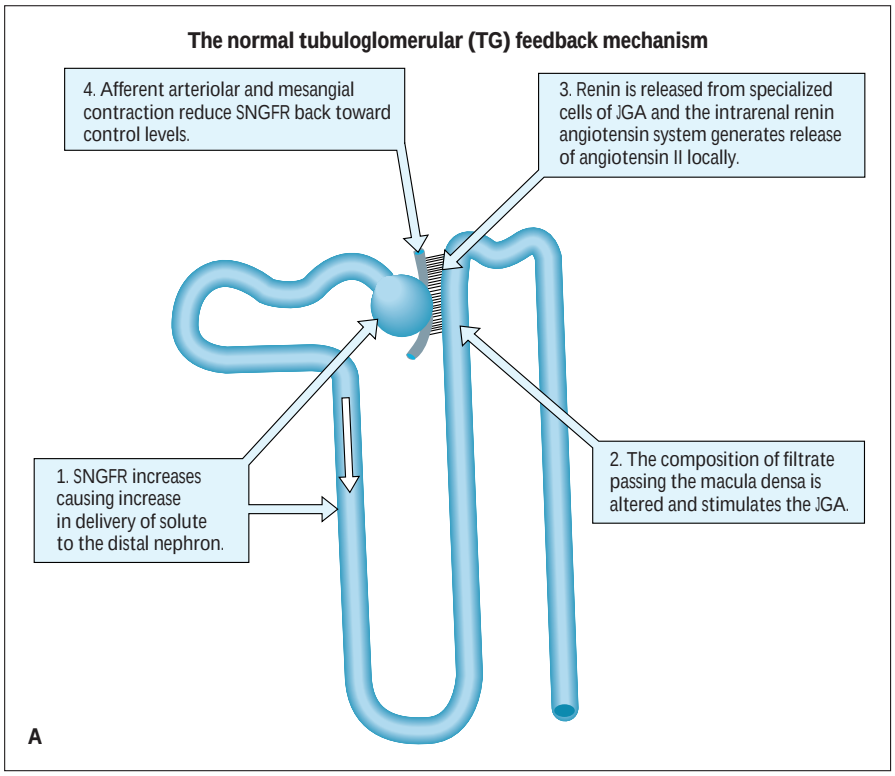


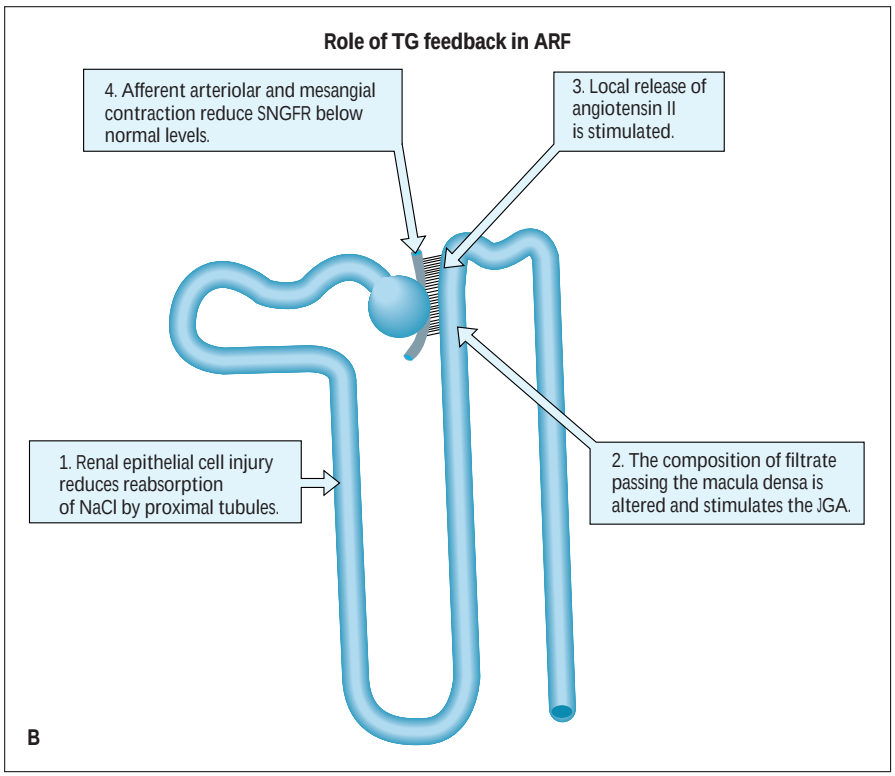
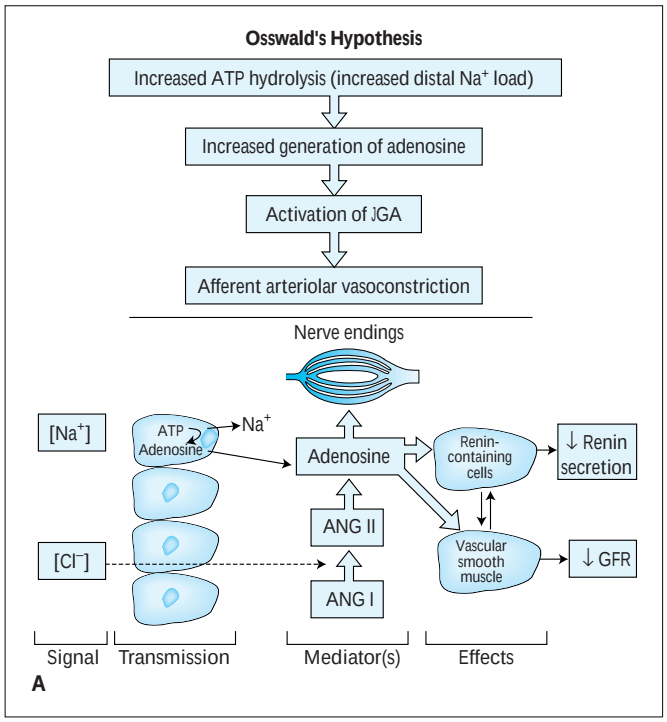




**FIGURE 14-5**

The tubuloglomerular (TG) feedback mechanism. **A**, Normal TG feedback. In the normal kidney, the TG feedback mechanism is a sensitive device for the regulation of the single nephron glomerular filtration rate (SNGFR). *Step 1*: An increase in SNGFR increases the amount of sodium chloride (NaCl) delivered to the juxtaglomerular apparatus (JGA) of the nephron. *Step 2*: The resultant change in the composition of the filtrate is sensed by the macula densa cells and initiates activation of the JGA. *Step 3*: The JGA releases renin, which results in the local and systemic generation of angiotensin II. *Step 4*: Angiotensin II induces vasocontriction of the glomerular arterioles and contraction of the mesangial cells. These events return SNGFR back toward basal levels. **B**, TG feedback in ARF. *Step 1*: Ischemic or toxic injury to renal tubules leads to impaired reabsorption of NaCl by injured tubular segments proximal to the JGA. *Step 2*: The composition of the filtrate passing the macula densa is altered and activates the JGA. *Step 3*: Angiotensin II is released locally. *Step 4*: SNGFR is reduced below normal levels. It is likely that vasoconstrictors other than angiotensin II, as well as vasodilator hormones (such as $PGI_2$ and nitric oxide) are also involved in modulating TG feedback. Abnormalities in these vasoactive hormones in ARF may contribute to alterations in TG feedback in ARF.



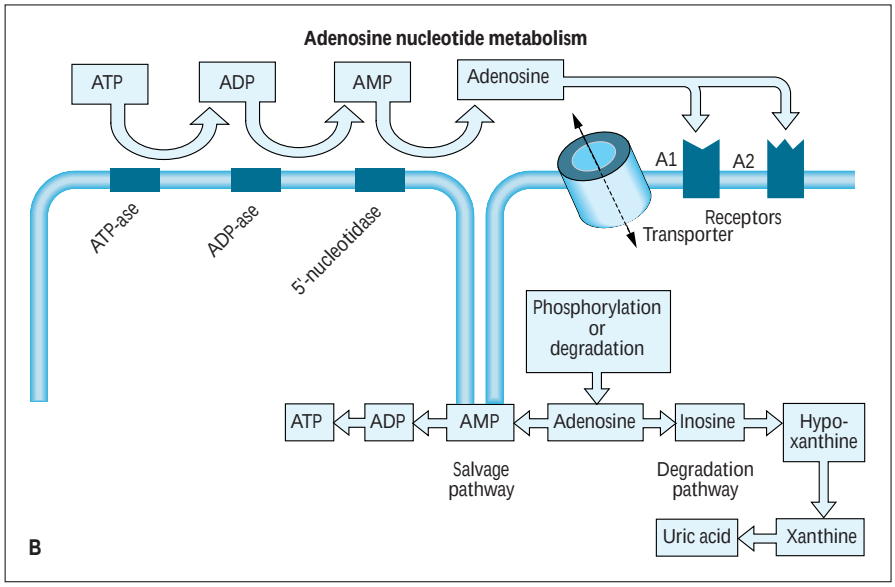




**FIGURE 14-6**

Metabolic basis for the adenosine hypothesis. **A**, Osswald's hypothesis on the role of adenosine in tubuloglomerular feedback. **B**, Adenosine metabolism: production and disposal via the salvage and degradation pathways. (**A**, *Modified from* Osswald *et al.* [2]; with permission.)

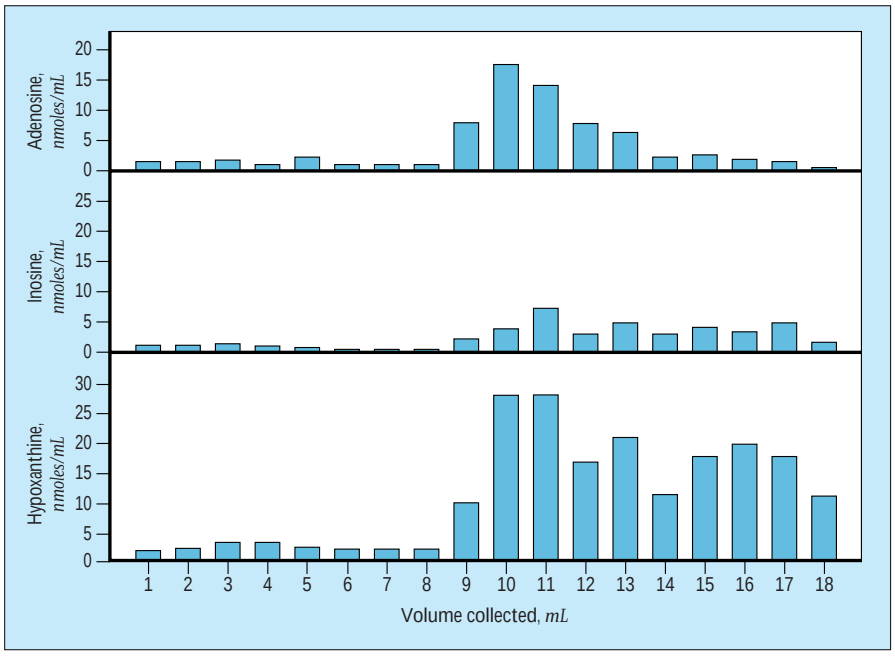
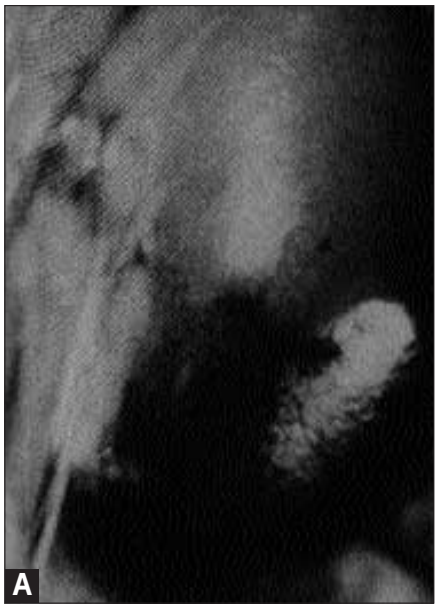



**FIGURE 14-7**
Elevated concentration of adenosine, inosine, and hypoxanthine in the dog kidney and urine after renal artery occlusion. (*Modified from* Miller *et al.* [3]; with permission.)



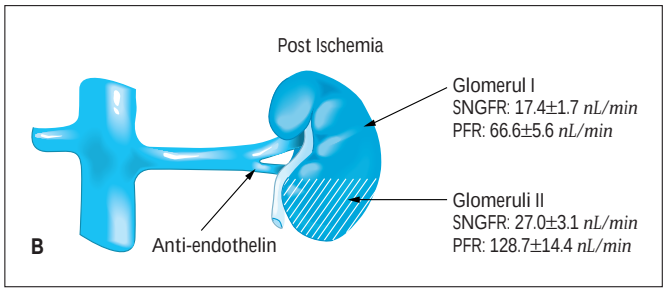




**FIGURE 14-8**
Endothelin (ET) is a potent renal vasoconstrictor. Endothelin (ET) is a 21 amino acid peptide of which three isoforms—ET-1, ET-2 and ET-3—have been described, all of which have been shown to be present in renal tissue. However, only the effects of ET-1 on the kidney have been clearly elucidated. ET-1 is the most potent vasoconstrictor known. Infusion of ET-1 into the kidney induces profound and long lasting vasoconstriction of the renal circulation. **A**, The appearance of the rat kidney during the infusion of ET-1 into the inferior branch of the main renal artery. The lower pole of the kidney perfused by this vessel is profoundly vasoconstricted and hypoperfused. **B**, Schematic illustration of function in separate populations of glomeruli within the same kidney. The entire kidney underwent 25 minutes of ischemia 48 hours before micropuncture. Glomeruli I are nephrons not exposed to endothelin antibody; Glomeruli II are nephrons that received infusion with antibody through the inferior branch of the main renal artery. SNGFR—single nephron glomerular filtration rate; PFR—glomerular renal plasma flow rate. (*From* Kon *et al.* [4]; with permission.)