20%. These hemodynamic influences are mediated by neuronal afferents that originate in transmural pressure receptors of the heart and large arteries and project via the vagus and glossopharyngeal nerves to the brainstem, which sends postsynaptic projections to the hypothalamus. AVP secretion also can be stimulated by nausea, acute hypoglycemia, glucocorticoid deficiency, smoking, and, possibly, hyperangiotensinemia. Emetic stimuli are extremely potent since they typically elicit immediate, 50- to 100-fold increases in plasma AVP even when the nausea is transient and is not associated with vomiting or other symptoms. They appear to act via the emetic center in the medulla and can be blocked completely by treatment with antiemetics such as fluphenazine. There is no evidence that pain or other noxious stresses have any effect on AVP unless they elicit a vasovagal reaction with its associated nausea and hypotension.

■ ACTION

The most important, if not the only, physiologic action of AVP is to reduce water excretion by promoting concentration of urine. This antidiuretic effect is achieved primarily by increasing the hydroosmotic permeability of principal cells that line the distal tubule and medullary collecting ducts of the kidney **(Fig. 381-2)**. In the absence of AVP, these cells are impermeable to water and reabsorb little, if any, of the relatively large volume of dilute filtrate that enters from the proximal nephron. In this condition, the rate of urine output can be as high as 0.2 mL/kg per min and the specific gravity and osmolarity as low as ~1.000 and 50 mosmol/L, respectively. When AVP is secreted, it binds to V_2 receptors on the basal surface of principal cells causing water channels composed of aquaporin-2 to be inserted into the apical surface of the cell. These channels allow water to flow passively from the lumen through the cell down the osmotic gradient created by the hypertonicity of the renal medulla. The magnitude of this antidiuretic effect varies in direct proportion to plasma AVP, the rate of solute excretion, and the level of hypertonicity in the renal medulla. The maximum antidiuresis achievable in healthy humans occurs at plasma AVP levels in the range of 1 to 3 pg/mL and results in a urine osmolarity as high as