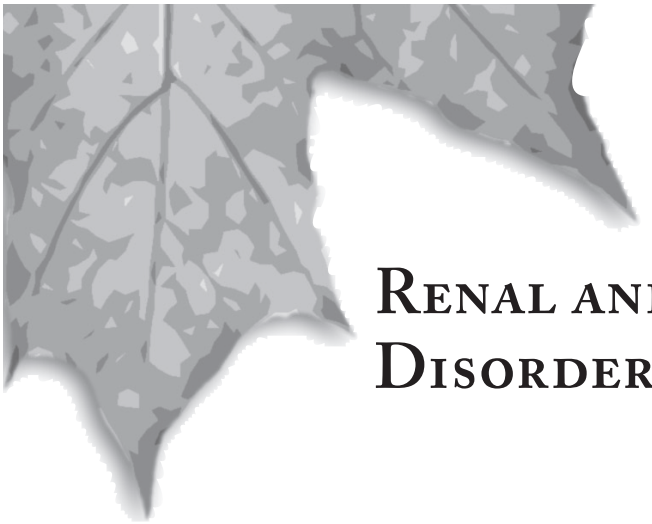

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Renal and Urologic Disorders

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Learning Objectives

1. Evaluate the changes in renal function that occur with age and determine how these changes result in an increased risk for older patients with chronic illnesses.
2. In a patient with chronic kidney disease (CKD) and diabetes, develop a treatment plan to help preserve renal function.
3. Assess a pharmacotherapy regimen for recent onset drug-induced incontinence in an older person.
4. Distinguish between older men with benign prostatic hyperplasia (BPH) who would benefit from single-agent versus combined therapy with alpha reductase inhibition and alpha blockade.

Key Terms and Definitions

ARGININE VASOPRESSIN (AVP): A hormone secreted from the posterior pituitary gland that helps to retain water by increasing water absorption in the collecting ducts of the nephron. Vasopressin is also frequently referred to as anti-diuretic hormone (ADH).

DETRUSOR MUSCLE: The muscular coat of the urinary bladder that contracts to empty urine.

KEGEL EXERCISES: Pelvic muscle exercises intended to strengthen the muscles of the pelvic floor to improve urethral and rectal sphincter function.

MICTURITION: Urination or voiding.

NEUROGENIC BLADDER: Dysfunction of the bladder caused by neurologic damage. Potential causes include brain or spinal cord injuries, diabetes, acute infection, or genetic nerve complications.

Renal Disorders

Changes in the Kidney with Age

The aging kidney gradually develops anatomic and physiologic changes that are usually not perceptible until an illness alters the body's compensatory balance. The vascular system changes in the aging kidney, leading to hypertrophy of arteries, with the most significant impact occurring in the cortex of the kidney.[1] Most of the size changes in the aging kidney occur in the cortex with a loss of about 35% of the number of glomeruli as well as a decrease in the surface area and a thickening of the basement membrane of the glomeruli. Glomerular atrophy in the aging kidney results in a decrease of the glomerular filtration rate (GFR) of about 0.75–1.0 mL/min/1.73 m^2 each year beginning by about 40 years of age.[2] These changes in the structure and function of the kidney in an older person also affect his or her ability to maintain a normal fluid and electrolyte balance, especially when challenged with drugs and illness. Older people experience a delay in compensation to a very low sodium diet as well as an exaggerated increase in blood pressure in response to an increase in sodium intake. Older people also have a decreased response to the diuretic and natriuretic effects of loop diuretics. The regulation of water balance changes with age due to the decreased ability of the aging kidney to concentrate, as well as a decreased ability to excrete a water load. Older people increase their body proportion of fat and lose a similar proportion of water, which leads to greater changes in solutes (such as sodium) and in the clinical consequence of dehydration or fluid overload. These changes in kidney size and physiology result in significant alterations to kidney function with age, resulting in a decrease in GFR and a decreased ability to respond to changes in fluid and electrolyte balance.[1,2]

Epidemiology and Risk Factors of Chronic Kidney Disease

CKD is a common and important disorder in older persons and is associated with serious adverse outcomes such as kidney failure, cardiovascular disease, anemia, functional decline, and death. In 2002, The National Kidney Foundation defined CKD as the presence of protein (albumin) in the urine for at least 3 months, or an estimated glomerular filtration rate (GFR) of <60 mL/min/1.73 m^2. This group also created a five-stage system to categorize the severity of renal dysfunction.[3] A national data system collects and analyzes information about chronic and end-stage kidney disease, and this information shows that the prevalence of CKD is estimated to be between 14% and 18% of the general population and to be more than 35% in people who are over the age of 60 years.[4] In addition, of those individuals who have progressed to end-stage renal disease, 20% are between the ages of 65 and 74 and 16% are 75 years of age or older.[4] As the prevalence of kidney disease continues to be collected by the National Kidney Foundation, rates of end-stage renal disease have stabilized for middle-aged individuals but have increased for those in the older age groups.[4]

The National Kidney Foundation recommends evaluation of patients on the basis of their risk factors, initiation factors, and progression factors.[3] One of the most important risk factors that contributes to the development of CKD is advanced age. Initiation factors are diseases that cause renal damage and include diabetes and hypertension, two diseases that are strongly associated with age. Progression factors accelerate the damage to the kidney and include hyperglycemia, hypertension, and proteinuria. Other progression factors that can be modified include smoking, hyperlipidemia, and obesity. Progression factors occur commonly in older individuals and are potentially modifiable by medication therapy management.[3]

Disease Progression in the Elderly

The natural course or progression of CKD to end-stage renal disease is different between younger and older people. CKD progresses in association with factors such as proteinuria, hypertension, diabetes, smoking cigarettes, hyperlipidemia, and obesity. The effect of age