

morning specimens of urine were tested. The results were confirmed by quantitative urine culture.

Combined nitrite test, colony counting, and gram-negative reaction. More recently, a unique diagnostic test strip has been introduced which incorporates a "nitrite-sensitive" pad for immediate identification of a gram-negative infection plus two culture pads: one identifies the *total* bacterial colony count and the other, gram-negative pathogens. The test strip is presented in a sterile plastic envelope. After the strip is inoculated with urine, the nitrite reaction is read and the strip is replaced and sealed in its container, then incubated for 24 hours. Bacterial density is interpreted according to a chart provided by the manufacturer. Advantages provided by this test medium are a) an *immediate* result that is accurate in about 60% of significant gram-negative infections, and b) it distinguishes gram-negative from gram-positive pathogens. In a survey of 500 unselected female hospital attendants,³² the author detected a 2.0% incidence of asymptomatic bacteriuria using this method, as compared to the 2.8% detected by a standard laboratory pour-plate culture.

Microscopic examination. Direct microscopic examination of the urine is frequently used as a test for bacteriuria. Its advantage is that smears of uncentrifuged urine can be stained and examined within minutes. Comparing the Gram-stained urine smear with bacterial counts in urine, Norden and Kass³³ reported a 20% error by the Gram-stain technique.

Pyuria, which is defined as two or more white blood cells per microscopic field (centrifuged urine examined by high-power microscopy), is usually associated with urinary infection. There are many other causes of pyuria besides infection, so that as compared to bacterial colony counts, this criterion yields an unacceptably high rate of false-negative results.² Furthermore, the absence of pyuria is not a reliable criterion for excluding the presence of bacteriuria.

COLLECTING URINE SPECIMENS

Accuracy of any one of the diagnostic methods described is directly related to the manner of urine sampling. For example, urine retained in the bladder for approximately 4-6 hours before collection enables any bacteria present to multiply, and thus greatly enhances test sensitivity. This is noticeable with the nitrite test in particular.³⁰ An early-morning urinary specimen is therefore ideal, provided that the test reagent can be inoculated immediately or within one hour of collection. Alternatively, the specimen should be refrigerated at 4-6°C until cultured.

The "casual" collection of urine or inadequate cleansing may produce contamination and unreliable results. While transabdominal bladder aspiration is possibly the ideal method of urine collection, it is clearly impractical for screening purposes. A clean-catch specimen is usually obtained easily: All that is required is that the patient wash her hands thoroughly, cleanse the introitus front to back using four sterile gauze swabs soaked in a 10% green-soap solution² and separate the labia widely while micturating. Edwards et al³ obtained excellent results among schoolgirls by requesting them to void upon awakening directly on both sides of a dip slide—the so-called "dip stream."

PREDICTING RENAL INVOLVEMENT

Care must be exercised when assessing the significance of bacteriuria and deciding on the need for treatment, considering that the rate of spontaneous disappearance of bacteriuria in nonpregnant women is about 20-25% per annum.² Recurrence of bacteriuria, appearance of symptomatic disease, or demonstration of renal-tissue invasion (especially if the patient is asymptomatic) will require careful assessment, treatment, and follow-up. With regard to diagnosing renal involvement, it is known that patients with pyelonephritis are unable to concentrate the urine maximally. This also has been noted in bacteriuric patients who are asymptomatic.^{2,34} Patients unable to concentrate their urine above 700-