13. URINARY TRACT INFECTION IN PREGNANCY

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1. INTRODUCTION
The normal urinary tract is sterile from bladder neck to kidney. Urinary tract infection (UTI) is the presence of microorganisms in the urinary tract. Bacteriuria is the presence of bacteria in the bladder urine: this may be restricted to the bladder (cystitis) or also involve the ureteric urine and kidney (pyelonephritis). Either kind of UTI may be accompanied by symptoms and signs (overt infection), or none may be present despite the active proliferation of organisms (covert infection). The urethra also is part of the urinary tract. It may be the seat of some symptoms because of infection within itself or because infected urine is passing through it. Also, bacteria may travel from the introitus along the urethra into the bladder urine and produce UTI. The intrinsic lesions of urethritis have recently been well reviewed elsewhere [1] so here the urethra will be considered only as it is relevant to UTI.

Urinary tract infection is one of the most common complications of pregnancy, but its diagnosis frequently is difficult or imprecise. It may be mimicked by other lesions, some of which are trivial and some life-threatening. To clarify this review of the problems and significance of UTI in pregnancy, diagnosis is discussed first.

2. DIAGNOSIS OF UTI
Diagnosis depends on accurate determination of whether or not organisms are present in the urinary tract and, if any are present, on recognition of their species.
This can be done only by examination of the urine or of a renal biopsy. Interpretation of the bacterial content of a specimen of urine requires knowledge of how that urine was obtained, since it could be contaminated by organisms in the urethra or on the vulva [2, 3]. Only 2% of women who had sterile bladder urine passed a midstream specimen (MSU) that was free of all organisms, 17% of the MSUs contained 10–100 organisms/ml, 40% 100–1000/ml, 24% 1000–10,000/ml, 11% 10,000–100,000/ml, and 7% of these women with sterile urine passed an MSU containing more than 100,000 organisms/ml: half of the organisms grown from these urines were Gram-negative bacilli [4]. Some degree of contamination in midstream specimens appears to be almost inevitable. It is identification of what is contamination and what is not that makes interpretation of an MSU difficult. Kass [2] recognized this when he proposed that more than 100,000 (> 10⁵) bacteria/ml urine was a “significant” growth, indicating infection of the urine with 80% certainty. The value of > 10⁵/ml was selected because it was the bacterial count present in the urine of 95% of patients with dysuria, flank pain, and pyrexia: it was also the concentration of bacteria present in 6% of outpatients who had no symptoms of infection, but of whom more than half gave a history of urinary infection and who showed a 95% reproducibility between MSU and catheter specimens (CSU), while those with lower bacterial counts had little correlation between MSU and CSU (the organisms were usually saprophytes of skin and urethra) and only 15% gave a history of infection [2, 5]; also, urine obtained by percutaneous puncture of the bladder usually showed either no growth or > 10⁵ organisms/ml [6, 7]. This critical level of “significance” is valid only with thorough cleansing of the periurethral urea: contamination rates as high as 50% may occur, suggesting that vulval preparation was not satisfactory [8–10].

Assuming that vulval preparation was satisfactory so that a bacterial count of > 10⁵/ml had only a 1 in 5 chance of being due to contamination of a urine that was truly sterile, Kass [2] proposed that two consecutive MSUs that contained > 10⁵ organisms/ml gave a 96% probability of correctly indicating infection of the bladder urine, since the first had an 80% probability of being correct and the second would by being sterile reveal that four-fifths of the original 20% (i.e., 16%) contained > 10⁵ bacteria/ml as a consequence of contamination. This would be true if contamination were random, but it is not [9]: those who contaminate once tend to do so recurrently, and this is likely to occur with the physiologic and pathologic discharges of pregnancy and the puerperium. Thus, a single MSU in pregnancy that contains > 10⁵ organisms/ml has at least a 10%–20% chance of that bacterial growth being due to contamination, and possibly of the chance of contamination being greater, while two consecutive MSUs from that patient containing > 10⁵/ml increase the chance of accurate diagnosis, but even this is not certain. An MSU that is sterile or that contains only a few organism is likely to be accurate, when the various caveats discussed later are taken into account, and so is a reasonable indication of the absence of infection. Further research has, however, increased the uncertainty of diagnosis of UTI from midstream urines.

Of asymptomatic women with > 10⁵ Gram-negative bacteria in an MSU, 92%