Introduction

Prostate cancer, with an incidence that is correlated to age, is the most common cancer tumor diagnosed among men older than 50 years, and an even higher incidence is found among patients older than 75. It is estimated that 234,460 men will be diagnosed during 2006 and 27,350 deaths will be attributed to prostate cancer in the United States. Thus, it is the 3rd most common cause of cancer-specific death, following lung cancer, in Western men (Jemal et al. 2006). The lifetime risk for prostate cancer is estimated to be one in six among countries with active screening programs. Since 1990 there has been a decline in prostate cancer death. Of the patients diagnosed from 1995 to 2000, around 90% were diagnosed during local or regional stages. The 5-year survival rate for those patients approached 100%, while the overall survival rate for all stages increased during the past 20 years from 67% to 99%, with a 10-year survival rate of 92%. Usually, the increase in survival rate for those patients is attributed to early diagnosis (American Cancer Society 2005). Many patients newly diagnosed with prostate cancer will be evaluated for curative treatment, according to age at diagnosis and comorbidities. Following histologic diagnosis of prostate cancer, staging is used to determine the extent of the patient's cancer to predict prognosis and to evaluate and select the appropriate treatment options. Accurate staging is helpful in assessing different treatment options and defining prognostic models.

Historically the staging of prostate cancer was based on the anatomical extent of the cancer determined during physical examination. The ability to better stage patients who are currently being diagnosed with prostate cancer continues to evolve because of improvements in imaging, defining, and detection of tumor markers, and creation of prediction tools based on currently available clinical variables. Such tools are used to better define the extent of cancer at time of diagnosis, the probability that the individual patient will clinically progress following local therapy, and the likelihood of prostate-related death. They are also used to evaluate the use of neoadjuvant and adjuvant treatment prior to or following local therapy.

Classification System

Since 1975 the UICC 2002 Tumour Node, Metastasis (TNM) classification system has been used by the American Joint Committee for Cancer Staging (AJCC). The AJCC classification is based on the extent of the primary tumor (T), the presence and extent of involved lymph nodes (N), and distant metastases (M). This system has replaced the previously used staging classification of Whitmore and Jewett, which was based on digital rectal examination (DRE) only and just described the extent of the tumor. The different classifications of the tumor included: class A [normal DRE, tissue obtained by transurethral resection of the prostate (TURP)], class B (palpable disease confined to the prostate), and class C (tumor extent beyond the prostate capsule) (Jewett 1975).

The 1992 version of the TNM system (International Union Against Cancer 1992), an effort by the AJCC and the International Union Against Cancer (UICC), included DRE, prostate-specific antigen (PSA), and transrectal ultrasound (TRUS) findings, and added a new classification—T1c, those tumors detected by prostate biopsy and triggered by elevated serum PSA. The proportion of tumors classified as T1c
was initially less than 10% of all cases (Ohori et al. 1994) and has increased significantly since then, accounting for more than 70% of all newly diagnosed prostate cancer cases (Draisma et al. 2003; Stamey et al. 2004). Nonpalpable disease identified by TRUS was classified as T2, similar to patients with palpable T2 disease; despite no difference in outcome compared with T1c with no visibility on TRUS (Ohori et al. 1994). Nonpalpable tumors compared with palpable tumors but had lower preoperative PSA (9.3 ng/ml vs 11.8 ng/ml), higher percentage of Gleason score 6 tumors (71.8% vs 52.5%), and reduced tumor involvement of the submitted tissue (14.3% vs 22.4%) (Augustin et al. 2003). Recent analysis of patients operated on from 1983 to 1998 showed no differences in presence of Gleason score of 7 and above, tumor volume, and presence of organ-confined disease at the radical prostatectomy (RP) specimen for patients with nonpalpable disease and no difference regarding biochemical failure between nonpalpable tumor with and without visible tumor by TRUS (Ohori et al. 2003). TRUS findings (T2a vs T2b vs T3c) did not predict freedom from biochemical failure. Only the group of patients classified as definitely having cancer, according to TRUS (group V vs groups I–VI), experienced an increased rate of progression following RP—76% vs 85%, respectively, at 5 years. Of the last 100 cases, only 4% were classified as group V according to TRUS findings. The percentage of low-volume palpable tumor (T2a) had similar progression-free probability compared with nonpalpable tumor with and without visible tumor by TRUS, suggesting that classifying patients with visible tumor by TRUS as T2a is not justified. The correlation between the TRUS-detected hypoechoic lesions and the pathology finding of RP is low. Many clinically significant tumors are not visible by TRUS, which diminishes the importance of the classification of nonpalpable tumor by TRUS finding (Garzotto et al. 2003). Other imaging modalities, such as endorectal probe magnetic resonance imaging (erMRI), might be more useful in staging nonpalpable tumors (Mullerad et al. 2005).

The 1997 edition of the TNM system (Fleming et al. 1997) combined the previous T2a and T2b classifications into T2a (tumor occupied only one lobe) and T3a and T3b to T3a (unilateral vs bilateral extracapsular extension of tumor). However, debate exists regarding the use of the 1997 classification vs the 1992 version, since the 1992 classification demonstrated differences in outcome in T2a vs T2b. The ability to differentiate between those groups was eliminated by the 1997 classification (Han et al. 2000). The 1992 classification was reported to predict better outcome following RP compared with the 1997 classification (Cagnanos et al. 2002). In 2002, the TNM staging was revised again. T2 lesions were classified as either “lesion with abnormal DRE without extracapsular extension (ECE) or seminal vesicle invasion (SVI)” or “hypoechoic lesion by TRUS.” T3 lesions are subclassified to T3a and T3b based on the 1997 classification.

**Evaluation of Local Disease and Presence of Metastatic Disease**

The extent of local disease and biopsy variables are the most important variable used to define the natural history of prostate cancer and predict its progression, and to estimate response to definitive local therapy among patients with clinically localized prostate cancer. Treatment for locally advanced cancer in the presence of ECE, seminal vesicle invasion, and lymph node involvement definitely impact progression-free probability (measured by freedom from PSA recurrence), clinical progression, and death from prostate cancer. Patients with locally advanced cancer are not eliminated from potential curable treatments to control local disease and clinical progression. Several modalities are used to assess the local extent of the disease.

**Digital Rectal Examination (DRE)**

Used for more than 50 years, DRE represents the most accessible staging test for evaluating the local extension of prostate cancer (Jawet 1975). Staging systems and prognostic models rely on DRE for clinical staging of prostate cancer (Partin et al. 1997; D'Amico et al. 1998; Kattan et al. 1998). However, during the post-PSA period, more than 80% of tumors will be diagnosed.