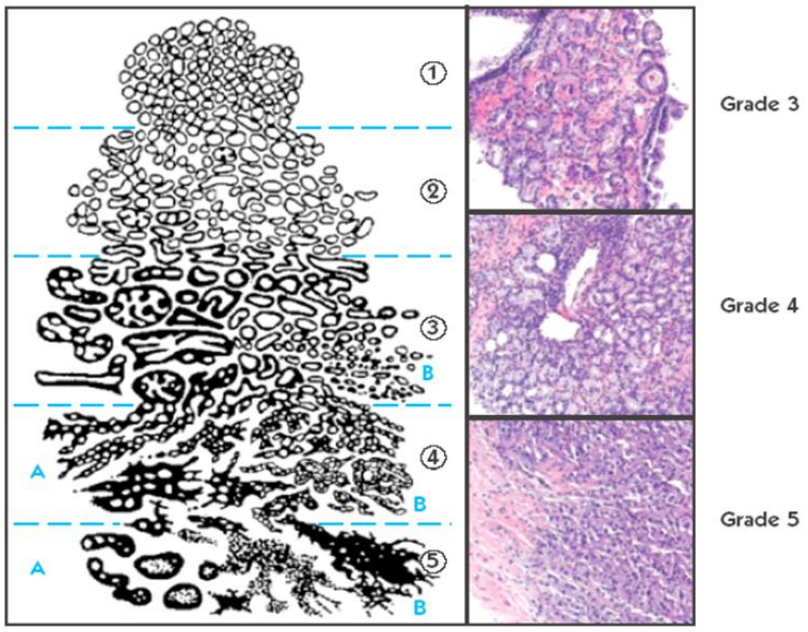
Primer for the Partin Nomograms

Prognostic factors

In addition to prostate cancer stage, urologists use other prognostic factors to help plan the best treatment and predict how successful treatment will be. Below are key 'prognostic factors' for patients with prostate cancer.

PSA test. Total PSA is a measurement of prostate-specific antigen (PSA) levels in a man's blood. PSA results are usually reported as nanograms (mass or weight) per milliliter (ng/ml) [volume]. For example a value of 4 ng/ml would mean a total PSA level of "4". Often men already diagnosed with prostate cancer by biopsy, the clinical stage determined by digital rectal examination (DRE), the PSA level and the biopsy Gleason score (described below) helps the urologist understand and predict a patient's prognosis and assists the doctor and patient to make more informed treatment decisions. Occasionally some prostate cancers do not cause an abnormal or increased PSA level; hence a normal total PSA does not always mean that there is no prostate cancer. In order to utilize the new 'Partin Nomogram' a patient or urologist must have the patient's total PSA value (number), DRE results or clinical stage, and the biopsy Gleason score.



The Gleason System for prostate cancer grading is based on how much the cancer looks like healthy (benign) tissue when viewed under a microscope by a pathologist (M.D., specialist that diagnosis diseases at the tissue level). Less dangerous prostate tumors have a appearance of healthy glandular tissue, and more aggressive tumors that are more likely to invade and spread to other parts of the body look less like healthy tissue with respect to their loss of normal glandular architecture and changes in the cell's nuclear structure (**See the Figure to the right**). The pathologist assigns a 'score' on a scale of Gleason grade 2 to 5. The Gleason grading system (tissue and cellular changes indicative of cancer) and tumor stage (pathologic extent of disease inside the gland and if it has spread outside the gland) have served as independent and clinically significant "prognostic factors" which can predict biochemical recurrence, metastasis, and overall patient survival. Prostate cancer glands and cells that appear to be healthy cells (benign) are given a low Gleason grade, and cancer cells that look less like healthy cells are given a higher Gleason grade. To assign a Gleason score, the pathologist first looks for a dominant (primary) pattern of cell growth or grade (area where the cancer is most prominent) and then looks for a less widespread pattern or grade (secondary) of growth, and gives each one a grade number. The Gleason score (GS) is the sum of the dominant or primary tissue pattern grade (representing the majority of tumor; see the embedded figure) and the less dominant or secondary tissue pattern grade (assigned to the minority of the tumor), resulting in a Gleason score or sum ranging from 2 to 10. Today, urologists tend to describe a **Gleason score** of 6 as a low-grade cancer, 7 (3+4 or 4+3) as medium-grade, and 8, 9, or 10 as high-grade cancer. A lower-grade cancer grows more slowly and is less likely to spread than a cancer with a higher grade. An experienced uropathologist should read and interpret the prostate tissue samples from either the biopsy or the radical prostatectomy specimens to assure an accurate Gleason score.

Gleason X: The Gleason score cannot be determined.
Gleason 6 or lower: The cancer cells are well-differentiated.
Gleason 7: The cancer cells are moderately differentiated. Primary Gleason grade may be 3 or 4.
Gleason 8, 9, or 10: The cancer cells are poorly differentiated or undifferentiated.

Clinical staging - The clinical stage is based on the urologist's clinical examination of the patient's prostate (via palpation or DRE) and this is combined with other results of tests done prior to definitive treatment (i.e. surgery or irradiation). The DRE involves digital palpation of the gland for size and any abnormalities. Based on these results, the urologist may suggest performance of a systematic biopsy of the gland to determine a diagnosis. Additionally, the urologist may suggest possibly X-rays, CT scans, and bone scans. X-rays, bone scans, and CT scans, but these tests may not always be needed. They are usually recommended based high levels of serum PSA as well as the biopsy Gleason score and/or volume (size) of the cancer. The clinical stage of the prostate cancer is described below:

- **T1:** The tumor cannot be felt during the DRE and is not seen during imaging (any test that produces pictures of the inside of the body, such as a CT scan). It may be found when surgery is done for another reason, usually for BPH, or abnormal growth of benign prostate cells.
- **T1c:** The tumor is found during a needle biopsy, usually because the patient has an elevated PSA level.
- **T2:** The tumor is found only within the prostate, not other areas of the body. It is large enough to be felt during the DRE.
- **T2a:** The tumor has invaded one-half of one lobe (part or side) of the prostate and may be palpated during the DRE.
- **T2b:** The tumor has spread to more than one-half of one lobe of the prostate, but not to both lobes and may be palpated during the DRE.
- **T2c:** The tumor has invaded both lobes of the prostate and may be palpated during the DRE.

Pathological Staging – Following surgery to remove the prostate gland, a pathologist will assign the Gleason score and stage (extent of the size and spread of the cancer). They utilize the standardized T, N, and M classification to define TNM combinations to describe each stage of prostate cancer. The TNM is an abbreviation for tumor (T), lymph node (N), and metastasis (M) to lymph nodes and/or bone or other organs. Urologists look at these three parameters to determine the stage (extent) of cancer:

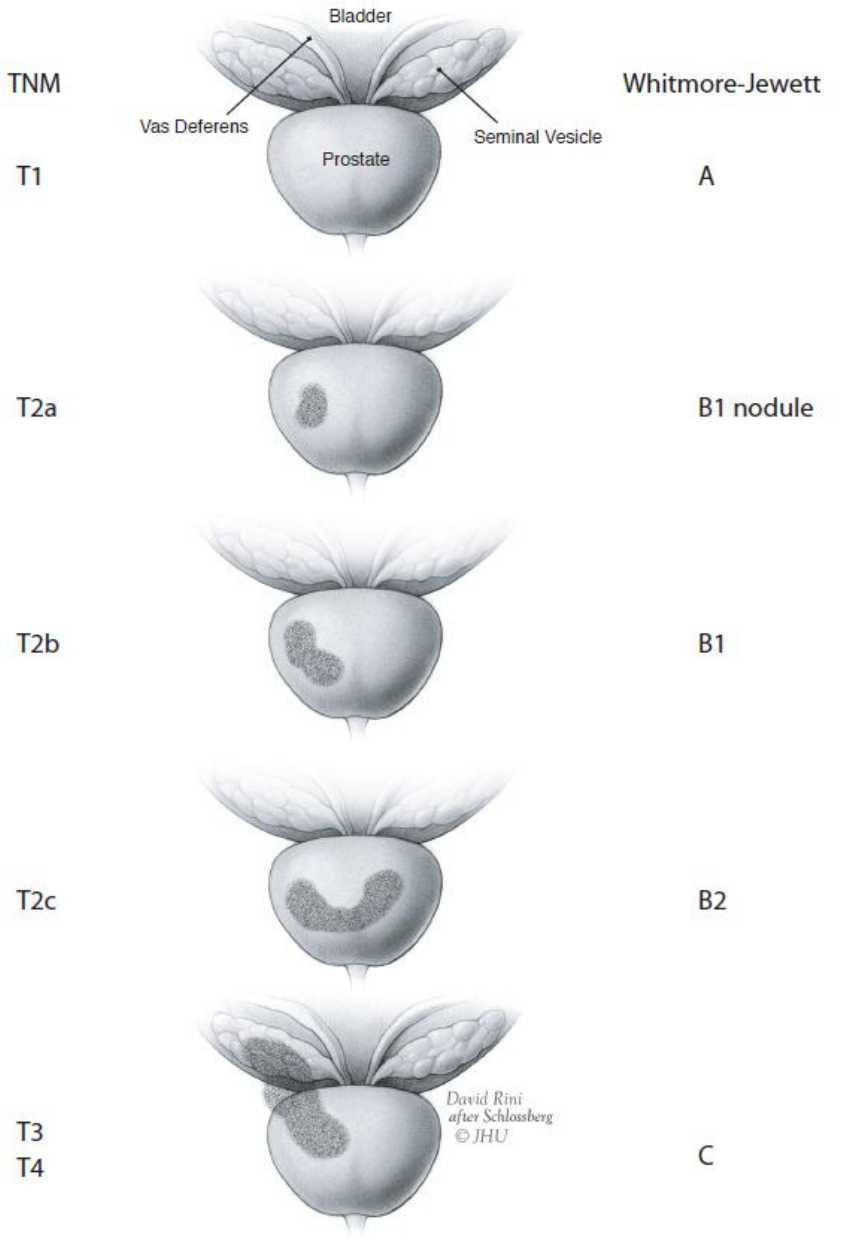
Prostate Cancer Pathologic Stage Grouping Chart (Current system)

Stage	T	N	M
I	T1a, T1b, or T1c	N0	M0
	T2a	N0	M0
	Any T1 or T2a	N0	M0
IIA	T1a, T1b, or T1c	N0	M0
	T1a, T1b, or T1c	N0	M0
	T2a	N0	M0
	T2b	N0	M0
	T2b	N0	M0
IIB	T2c	N0	M0
	Any T1 or T2	N0	M0
	Any T1 or T2	N0	M0
III	T3a or T3b	N0	M0
IV	T4	N0	M0
	Any T (lymph nodes +)	N1	M0
	Any T	Any N	M1

The new Partin Nomogram Defines Pathological Stages (Extent of Disease) as:

Organ Confined Prostate Cancer (OC) – Within the prostate gland
Extracapsular Extension (ECE) – Tumor has broken through the capsule of the prostate gland. This is not inoperable prostate cancer necessarily. Also it can be referred to as extraprostatic Extension (EPE).
Seminal Vesicle (SV) - The tumor has spread to the seminal vesicles adjacent to the prostate (see below).
Lymph Nodes (LN) - The tumor has spread to the lymph nodes near the prostate gland.

GRAPHICAL ILLUSTRATED STAGES OF PROSTATE CANCER (Two Systems)



PROGRESSIVE CANCER

Metastasis: tumor has spread beyond the capsule or outer layer and to near-by tissues.

Metastasis: tumor has spread to lymph, bone or other soft organ tissues.

From: Dr. PC Walsh, Guide to surviving prostate cancer. 2nd Ed.

Wellness Central, New York and Boston, 2007