

APPENDIX III

Lexicon

ABNORMALITY

Focal abnormality	Localized at a focus, central point or locus
Focus	Localized finding distinct from neighboring tissues, not a three-dimensional space occupying structure
Index Lesion	Lesion identified on MRI with the highest PIRADS Assessment Category. If the highest PIRADS Assessment Category is assigned to two or more lesions, the index lesion should be one that shows EPE or is largest. Also known as dominant lesion
Lesion	A localized pathological or traumatic structural change, damage, deformity, or discontinuity of tissue, organ, or body part
Mass	A three-dimensional space occupying structure resulting from an accumulation of neoplastic cells, inflammatory cells, or cystic changes
Nodule	A small lump, swelling or collection of tissue
Non-focal abnormality	Not localized to a single focus
Diffuse	Widely spread; not localized or confined; distributed over multiple areas, may or may not extend in contiguity, does not conform to anatomical boundaries
Multifocal	Multiple foci distinct from neighboring tissues
Regional	Conforming to prostate sector, sextant, zone, or lobe; abnormal signal other than a mass involving a large volume of prostatic tissue

SHAPE

Round	The shape of a circle or sphere
Oval	The shape of either an oval or an ellipse
Lenticular	Having the shape of a double-convex lens, crescentic
Lobulated	Composed of lobules with undulating contour
Water-drop-shaped Tear-shaped	Having the shape of a tear or drop of water; it differs from an oval because one end is clearly larger than the other
Wedge-shaped	Having the shape of a wedge, pie, or V-shaped

Linear	In a line or band-like in shape
Irregular	Lacking symmetry or evenness
MARGINS	
Circumscribed	Well defined
Non-circumscribed	Ill-defined
Indistinct	Blurred
Obscured	Not clearly seen or easily distinguished
Irregular	Uneven
Spiculated	Radiating lines extending from the margin of a mass
Encapsulated	Bounded by a distinct, uniform, smooth low-signal line (BPH nodule)
Organized chaos	Heterogeneous mass in transition zone with circumscribed margins, encapsulated (BPH nodule)
Erased charcoal sign	Blurred margins as if smudged, smeared with a finger; refers to appearance of a homogeneously T2 low-signal lesion in the transition zone of the prostate with indistinct margins (prostate cancer)
Hyperintense	Having higher signal intensity (more intense, brighter) on MRI than background prostate tissue or reference tissue/structure
T2 Hyperintensity	Having higher signal intensity (more intense, brighter) on T2-weighted imaging
Isointense	Having the same intensity as a reference tissue/structure to which it is compared; intensity at MRI that is identical or nearly identical to that of background prostate
Hypointense	Having less intensity (darker) than background prostate tissue or reference tissue/structure
Markedly hypointense	Signal intensity lower than expected for normal or abnormal tissue of the reference type, e.g., when involved with calcification or blood or gas
T2 hypointensity	Having lower signal intensity (less intense, darker) on T2-weighted imaging

MR IMAGING SIGNAL CHARACTERISTICS

Restricted diffusion	Limited, primarily by cell membrane boundaries, random Brownian motion of water molecules within the voxel; having higher signal intensity than peripheral zone or transition zone prostate on DW images acquired or calculated at b values >1400 accompanied by lowered ADC values. Synonymous with “impeded” diffusion
Diffusion-weighted hyperintensity	Having higher signal intensity, not attributable to T2 shine-through, than background prostate on DW images
Apparent Diffusion Coefficient (ADC)	A measure of the degree of motion of water molecules in tissues. It is determined by calculating the signal loss in data obtained with different b-values and is expressed in units of mm ² /sec or μm ² /sec
ADC Map	A display of ADC values for each voxel in an image
ADC Hyperintense	Having higher signal intensity (more intense, brighter) than background tissue on ADC map
ADC Isointense	Intensity that is identical or nearly identical to that of background tissue on ADC map
ADC Hypointense	Having lower intensity (darker) than a reference background tissue on ADC map
b-value	A measure of the strength and duration of the diffusion gradients that determines the sensitivity of a DWI sequence to diffusion
Dynamic contrast enhanced DCE Wash-in	Early arterial phase of enhancement; a period of time to allow contrast agent to arrive in the tissue
DCE Wash-out	Later venous phase, de-enhancement, reduction of signal following enhancement; a period of time to allow contrast agent to clear the tissue
Pharmacodynamic analysis PD curves	Method of quantifying tissue contrast media concentration changes to calculate time constants for the rate of wash-in and wash-out
Time vs. signal intensity curve Enhancement kinetic curve	Graph plotting tissue intensity change (y axis) over time (x axis); enhancement kinetic curve is a graphical representation of tissue enhancement where signal intensity of tissue is plotted as a function of time

ENHANCEMENT PATTERNS

Early phase wash-in	Signal intensity characteristic early after contrast agent administration; wash-in phase corresponding to contrast arrival in the prostate
Delayed phase	Signal intensity characteristic following its initial (early) rise after contrast material administration

Persistent delayed phase Type 1 curve	Continued increase of signal intensity over time
Plateau delayed phase Type 2 curve	Signal intensity does not change over time after its initial rise, flat; plateau refers to signal that varies <10% from the peak signal over the duration of the DCE MRI
Washout delayed phase Type 3 curve	Signal intensity decreases after its highest point after its initial rise
Positive DCE	Focal, early enhancement corresponding to a focal peripheral zone or transition zone lesion on T2 and/or DWI MRI
Negative DCE	Lack of early enhancement Diffuse enhancement not corresponding to a focal lesion on T2 and/or DWI MRI Focal enhancement corresponding to a BPH lesion

ANATOMICAL TERMS

Prostate: Regional Parts	The prostate is divided from superior to inferior into three regional parts: the base, the midgland, and the apex
Base of prostate	The upper 1/3 of the prostate just below the urinary bladder
Mid prostate	The middle 1/3 of the prostate that includes verumontanum in the mid prostatic urethra; midgland
Apex of prostate	The lower 1/3 of the prostate
Peripheral zone	Covers the outer posterior, lateral, and apex regions of the prostate; makes up most of the apex of the prostate
Transition zone	Tissue around the urethra that is separated from the peripheral zone by the "surgical capsule" delineated as a low signal line on T2-weighted MRI; it is the site of most BPH
Central zone	Tissue surrounding the ejaculatory ducts posterior and superior, from the base of the prostate to the verumontanum; it has the shape of an inverted cone with its base oriented towards the base of the gland; contains more stroma than glandular tissue
Anterior fibromuscular stroma	Located anteriorly and contains smooth muscle, which mixes with periurethral muscle fibers at the bladder neck; contains no glandular tissue
Prostate: Sectors	Anatomical regions defined for the purpose of prostate targeting during interventions, may include multiple constitutional and regional parts of the prostate. Thirty-six sectors for standardized MRI prostate localization reporting are identified, with addition of seminal vesicles and membranous urethra. Each traditional prostate sextant is subdivided into six sectors, to include: the anterior fibromuscular stroma,

the transition zone anterior and posterior sectors, the peripheral zone anterior, lateral, and medial sectors. The anterior and posterior sectors are defined by a line bisecting the prostate into the anterior and posterior halves. *See Diagram*

Prostate “capsule”	Histologically, there is no distinct capsule that surrounds the prostate, however historically the “capsule” has been defined as an outer band of the prostatic fibromuscular stroma blending with endopelvic fascia that may be visible on imaging as a distinct thin layer of tissue surrounding or partially surrounding the peripheral zone
Prostate pseudocapsule	Imaging appearance of a thin “capsule” around transition zone when no true capsule is present at histological evaluation. The junction of the transition and peripheral zones marked by a visible hypointense linear boundary, which is often referred to as the prostate “pseudocapsule” or “surgical capsule”
Seminal vesicle	One of the two paired glands in the male genitourinary system, posterior to the bladder and superior to the prostate gland, that produces fructose-rich seminal fluid which is a component of semen. These glands join the ipsilateral ductus (vas) deferens to form the ejaculatory duct at the base of the prostate
Neurovascular bundle of prostate NVB	Nerve fibers from the lumbar sympathetic chain extend inferiorly to the pelvis along the iliac arteries and intermix with parasympathetic nerve fibers branching off S2 to S4. The mixed nerve bundles run posterior to the bladder, seminal vesicles, and prostate as the “pelvic plexus”. The cavernous nerve arises from the pelvic plexus and runs along the posterolateral aspect of the prostate on each side. Arterial and venous vessels accompany the cavernous nerve, and together these structures form the neurovascular bundles which are best visualized on MR imaging at 5 and 7 o’clock position. At the apex and the base of the prostate, the bundles send penetrating branches through the “capsule”, providing a potential route for extraprostatic tumor spread
Right neurovascular bundle	Located at 7 o’clock posterolateral position
Left neurovascular bundle	Located at 5 o’clock posterolateral position
Vas deferens	The excretory duct of the testes that carries spermatozoa; it rises from the scrotum and joins the seminal vesicles to form the ejaculatory duct, which opens into the mid prostatic urethra at the level of the verumontanum

Verumontanum	The verumontanum (urethral crest formed by an elevation of the mucous membrane and its subjacent tissue) is an elongated ridge on the posterior wall of the mid prostatic urethra at the site of ejaculatory ducts opening into the prostatic urethra
Neck of urinary bladder	The inferior portion of the urinary bladder which is formed as the walls of the bladder converge and become contiguous with the proximal urethra
Urethra: Prostatic	The proximal prostatic urethra extends from the bladder neck at the base of the prostate to verumontanum in the mid prostate. The distal prostatic urethra extends from the verumontanum to the membranous urethra and contains striated muscle of the urethral sphincter
Urethra: Membranous	The membranous segment of the urethra is located between the apex of the prostate and the bulb of the corpus spongiosum, extending through the urogenital diaphragm
External urethral sphincter	Surrounds the whole length of the membranous portion of the urethra and is enclosed in the fascia of the urogenital diaphragm
Periprostatic compartment	Space surrounding the prostate
Rectoprostatic compartment Rectoprostatic angle	Space between the prostate and the rectum
Extraprostatic	Pertaining to an area outside the prostate
Prostate–seminal vesicle angle	The plane or space between the prostate base and the seminal vesicle, normally filled with fatty tissue and neurovascular bundle of prostate

STAGING TERMS

Abuts “capsule” of prostate	Tumor touches the “capsule”
Bulges “capsule” of prostate	Convex contour of the “capsule” Bulging prostatic contour over a suspicious lesion: Focal, spiculated (extraprostatic tumor) Broad-base of contact (at least 25% of tumor contact with the capsule) Tumor-capsule abutment of greater than 1 cm Lenticular tumor at prostate apex extending along the urethra below the apex
Mass effect on surrounding tissue	Compression of the tissue around the mass, or displacement of adjacent tissues or structures, or obliteration of the tissue planes by an infiltrating mass

Invasion	Tumor extension across anatomical boundary; may relate to tumor extension within the gland, i.e. across regional parts of the prostate, or outside the gland, across the “capsule” (extracapsular extension of tumor, extraprostatic extension of tumor, extraglandular extension of tumor)
Invasion: “Capsule” Extra-capsular extension ECE	Tumor involvement of the “capsule” or extension across the “capsule” with indistinct, blurred or irregular margin
Extraprostatic extension EPE	Retraction of the capsule
Extraglandular extension	Breach of the capsule Direct tumor extension through the “capsule” Obliteration of the rectoprostatic angle
Invasion: Pseudocapsule	Tumor involvement of pseudocapsule with indistinct margin
Invasion: Anterior fibromuscular stroma	Tumor involvement of anterior fibromuscular stroma with indistinct margin
Invasion: Prostate –seminal vesicle angle	Tumor extends into the space between the prostate base and the seminal vesicle
Invasion: Seminal vesicle Seminal vesicle invasion SVI	Tumor extension into seminal vesicle There are 3 types: 1. Tumor extension along the ejaculatory ducts into the seminal vesicle above the base of the prostate; focal T2 hypointense signal within and/or along the seminal vesicle; enlargement and T2 hypointensity within the lumen of seminal vesicle; Restricted diffusion within the lumen of seminal vesicle; Enhancement along or within the lumen of seminal vesicle; Obliteration of the prostate-seminal vesicle angle 2. Direct extra-glandular tumor extension from the base of the prostate into and around the seminal vesicle 3. Metachronous tumor deposit –separate focal T2 hypointense signal, enhancing mass in distal seminal vesicle
Invasion: Neck of urinary bladder	Tumor extension along the prostatic urethra to involve the bladder neck
Invasion: Membranous urethra	Tumor extension along the prostatic urethra to involve the membranous urethra
Invasion: Periprostatic, extraprostatic	Tumor extension outside the prostate

Invasion: Neurovascular bundle of prostate	Tumor extension into the neurovascular bundle of the prostate Asymmetry, enlargement or direct tumor involvement of the neurovascular bundles Assess the recto-prostatic angles (right and left): 1. Asymmetry – abnormal one is either obliterated or flattened 2. Fat in the angle – infiltrated (individual elements cannot be identified or separated); clean (individual elements are visible) 3. Direct tumor extension
Invasion: External urethral sphincter	Tumor extension into the external urethral sphincter Loss of the normal low signal of the sphincter, discontinuity of the circular contour of the sphincter

MRI CHARACTERISTICS OF ADDITIONAL PATHOLOGIC STATES

BPH nodule	A round/oval mass with a well-defined T2 hypointense margin; encapsulated mass or “organized chaos” found in the transition zone or extruded from the transition zone into the peripheral zone
Hypertrophy of median lobe of prostate	Increase in the volume of the median lobe of the prostate with mass-effect or protrusion into the bladder and stretching the urethra
Cyst	A circumscribed T2 hyperintense fluid containing sac-like structure
Hematoma - Hemorrhage	T1 hyperintense collection or focus
Calcification	Focus of markedly hypointense signal on all MRI sequences