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CONTEMPORARY UPDATE OF PROSTATE CANCER STAGING NOMOGRAMS (PARTIN TABLES) FOR THE NEW MILLENNIUM

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ABSTRACT

Objectives. We previously presented nomograms combining preoperative serum prostate-specific antigen (PSA), clinical (TNM) stage, and biopsy Gleason score to provide the likelihood of various final pathologic stages at radical retropubic prostatectomy. The data for the original nomograms were collected from men treated between 1982 and 1996. During the past 10 years, the stage at presentation has shifted, with more men presenting with Stage T1c, Gleason score 5 to 6, and serum PSA levels less than 10.0 ng/mL. In this work, we update the "Partin Tables" with a more contemporary cohort of men treated since 1994 and with revised PSA and Gleason categories.

Methods. Multinomial log-linear regression analysis was used to estimate the likelihood of organ-confined disease, extraprostatic extension, seminal vesicle or lymph nodal status from the preoperative PSA stratified as 0 to 2.5, 2.6 to 4.0, 4.1 to 6.0, 6.1 to 10.0, and greater than 10 ng/mL, clinical (AJCC-TNM, 1992) stage (T1c, T2a, T2b, or T2c), and biopsy Gleason score stratified as 2 to 4, 5 to 6, 3 + 4 = 7, 4 + 3 = 7, or 8 to 10 among 5079 men treated with prostatectomy (without neoadjuvant therapy) between 1994 and 2000 at Johns Hopkins Hospital. The average age was 58 years.

Results. In this cohort, more than 60% had T1c, more than 75% had Gleason score of 6, more than 70% had PSA greater than 2.5 and less than 10.0 ng/mL, and more than 60% had organ-confined disease. Nomograms of the robust estimated likelihoods and 95% confidence intervals were developed from 1000 bootstrap analyses. The probability of organ-confined disease improved across the groups, and further stratification of the Gleason score and PSA level allowed better differentiation of individual patients.

Conclusions. These updated "Partin Tables" were generated to reflect the trends in presentation and pathologic stage for men newly diagnosed with clinically localized prostate cancer at our institution. Clinicians can use these nomograms to counsel individual patients and help them make important decisions regarding their disease. UROLOGY **58:** 843–848, 2001.

TABLE I. *Clinical Stage T1c (nonpalpable, PSA elevated)*

PSA Range (ng/mL)	Pathologic Stage	Gleason Score				
		2–4	5–6	3 + 4 = 7	4 + 3 = 7	8–10
0–2.5	Organ confined	95 (89–99)	90 (88–93)	79 (74–85)	71 (62–79)	66 (54–76)
	Extraprostatic extension	5 (1–11)	9 (7–12)	17 (13–23)	25 (18–34)	28 (20–38)
	Seminal vesicle (+)	—	0 (0–1)	2 (1–5)	2 (1–5)	4 (1–10)
	Lymph node (+)	—	—	1 (0–2)	1 (0–4)	1 (0–4)
2.6–4.0	Organ confined	92 (82–98)	84 (81–86)	68 (62–74)	58 (48–67)	52 (41–63)
	Extraprostatic extension	8 (2–18)	15 (13–18)	27 (22–33)	37 (29–46)	40 (31–50)
	Seminal vesicle (+)	—	1 (0–1)	4 (2–7)	4 (1–7)	6 (3–12)
	Lymph node (+)	—	—	1 (0–2)	1 (0–3)	1 (0–4)
4.1–6.0	Organ confined	90 (78–98)	80 (78–83)	63 (58–68)	52 (43–60)	46 (36–56)
	Extraprostatic extension	10 (2–22)	19 (16–21)	32 (27–36)	42 (35–50)	45 (36–54)
	Seminal vesicle (+)	—	1 (0–1)	3 (2–5)	3 (1–6)	5 (3–9)
	Lymph node (+)	—	0 (0–1)	2 (1–3)	3 (1–5)	3 (1–6)
6.1–10.0	Organ confined	87 (73–97)	75 (72–77)	54 (49–59)	43 (35–51)	37 (28–46)
	Extraprostatic extension	13 (3–27)	23 (21–25)	36 (32–40)	47 (40–54)	48 (39–57)
	Seminal vesicle (+)	—	2 (2–3)	8 (6–11)	8 (4–12)	13 (8–19)
	Lymph node (+)	—	0 (0–1)	2 (1–3)	2 (1–4)	3 (1–5)
>10.0	Organ confined	80 (61–95)	62 (58–64)	37 (32–42)	27 (21–34)	22 (16–30)
	Extraprostatic extension	20 (5–39)	33 (30–36)	43 (38–48)	51 (44–59)	50 (42–59)
	Seminal vesicle (+)	—	4 (3–5)	12 (9–17)	11 (6–17)	17 (10–25)
	Lymph node (+)	—	2 (1–3)	8 (5–11)	10 (5–17)	11 (5–18)

KEY: PSA = prostate-specific antigen.

TABLE II. *Clinical Stage T2a (palpable <½ of one lobe)*

PSA Range (ng/mL)	Pathologic Stage	Gleason Score				
		2–4	5–6	3 + 4 = 7	4 + 3 = 7	8–10
0–2.5	Organ confined	91 (79–98)	81 (77–85)	64 (56–71)	53 (43–63)	47 (35–59)
	Extraprostatic extension	9 (2–21)	17 (13–21)	29 (23–36)	40 (30–49)	42 (32–53)
	Seminal vesicle (+)	—	1 (0–2)	5 (1–9)	4 (1–9)	7 (2–16)
	Lymph node (+)	—	0 (0–1)	2 (0–5)	3 (0–8)	3 (0–9)
2.6–4.0	Organ confined	85 (69–96)	71 (66–75)	50 (43–57)	39 (30–48)	33 (24–44)
	Extraprostatic extension	15 (4–31)	27 (23–31)	41 (35–48)	52 (43–61)	53 (44–63)
	Seminal vesicle (+)	—	2 (1–3)	7 (3–12)	6 (2–12)	10 (4–18)
	Lymph node (+)	—	0 (0–1)	2 (0–4)	2 (0–6)	3 (0–8)
4.1–6.0	Organ confined	81 (63–95)	66 (62–70)	44 (39–50)	33 (25–41)	28 (20–37)
	Extraprostatic extension	19 (5–37)	32 (28–36)	46 (40–52)	56 (48–64)	58 (49–66)
	Seminal vesicle (+)	—	1 (1–2)	5 (3–8)	5 (2–8)	8 (4–13)
	Lymph node (+)	—	1 (0–2)	4 (2–7)	6 (3–11)	6 (2–12)
6.1–10.0	Organ confined	76 (56–94)	58 (54–61)	35 (30–40)	25 (19–32)	21 (15–28)
	Extraprostatic extension	24 (6–44)	37 (34–41)	49 (43–54)	58 (51–66)	57 (48–65)
	Seminal vesicle (+)	—	4 (3–5)	13 (9–18)	11 (6–17)	17 (11–26)
	Lymph node (+)	—	1 (0–2)	3 (2–6)	5 (2–8)	5 (2–10)
>10.0	Organ confined	65 (43–89)	42 (38–46)	20 (17–24)	14 (10–18)	11 (7–15)
	Extraprostatic extension	35 (11–57)	47 (43–52)	49 (43–55)	55 (46–64)	52 (41–62)
	Seminal vesicle (+)	—	6 (4–8)	16 (11–22)	13 (7–20)	19 (12–29)
	Lymph node (+)	—	4 (3–7)	14 (9–21)	18 (10–27)	17 (9–29)

KEY: PSA = prostate-specific antigen.

TABLE III. *Clinical Stage T2b (palpable >½ of one lobe, not on both lobes)*

PSA Range (ng/mL)	Pathologic Stage	Gleason Score				
		2–4	5–6	3+4=7	4+3=7	8–10
0–2.5	Organ confined	88 (73–97)	75 (69–81)	54 (46–63)	43 (33–54)	37 (26–49)
	Extraprostatic extension	12 (3–27)	22 (17–28)	35 (28–43)	45 (35–56)	46 (35–58)
	Seminal vesicle (+)	—	2 (0–3)	6 (2–12)	5 (1–11)	9 (2–20)
	Lymph node (+)	—	1 (0–2)	4 (0–10)	6 (0–14)	6 (0–16)
2.6–4.0	Organ confined	80 (61–95)	63 (57–69)	41 (33–48)	30 (22–39)	25 (17–34)
	Extraprostatic extension	20 (5–39)	34 (28–40)	47 (40–55)	57 (47–67)	57 (46–68)
	Seminal vesicle (+)	—	2 (1–4)	9 (4–15)	7 (3–14)	12 (5–22)
	Lymph node (+)	—	1 (0–2)	3 (0–8)	4 (0–12)	5 (0–14)
4.1–6.0	Organ confined	75 (55–93)	57 (52–63)	35 (29–40)	25 (18–32)	21 (14–29)
	Extraprostatic extension	25 (7–45)	39 (33–44)	51 (44–57)	60 (50–68)	59 (49–69)
	Seminal vesicle (+)	—	2 (1–3)	7 (4–11)	5 (3–9)	9 (4–16)
	Lymph node (+)	—	2 (1–3)	7 (4–13)	10 (5–18)	10 (4–20)
6.1–10.0	Organ confined	69 (47–91)	49 (43–54)	26 (22–31)	19 (14–25)	15 (10–21)
	Extraprostatic extension	31 (9–53)	44 (39–49)	52 (46–58)	60 (52–68)	57 (48–67)
	Seminal vesicle (+)	—	5 (3–8)	16 (10–22)	13 (7–20)	19 (11–29)
	Lymph node (+)	—	2 (1–3)	6 (4–10)	8 (5–14)	8 (4–16)
>10.0	Organ confined	57 (35–86)	33 (28–38)	14 (11–17)	9 (6–13)	7 (4–10)
	Extraprostatic extension	43 (14–65)	52 (46–56)	47 (40–53)	50 (40–60)	46 (36–59)
	Seminal vesicle (+)	—	8 (5–11)	17 (12–24)	13 (8–21)	19 (12–29)
	Lymph node (+)	—	8 (5–12)	22 (15–30)	27 (16–39)	27 (14–40)

KEY: PSA = prostate-specific antigen.

TABLE IV. *Clinical Stage T2c (palpable on both lobes)*

PSA Range (ng/mL)	Pathologic Stage	Gleason Score				
		2–4	5–6	3+4=7	4+3=7	8–10
0–2.5	Organ confined	86 (71–97)	73 (63–81)	51 (38–63)	39 (26–54)	34 (21–48)
	Extraprostatic extension	14 (3–29)	24 (17–33)	36 (26–48)	45 (32–59)	47 (33–61)
	Seminal vesicle (+)	—	1 (0–4)	5 (1–13)	5 (1–12)	8 (2–19)
	Lymph node (+)	—	1 (0–4)	6 (0–18)	9 (0–26)	10 (0–27)
2.6–4.0	Organ confined	78 (58–94)	61 (50–70)	38 (27–50)	27 (18–40)	23 (14–34)
	Extraprostatic extension	22 (6–42)	36 (27–45)	48 (37–59)	57 (44–70)	57 (44–70)
	Seminal vesicle (+)	—	2 (1–5)	8 (2–17)	6 (2–16)	10 (3–22)
	Lymph node (+)	—	1 (0–4)	5 (0–15)	7 (0–21)	8 (0–22)
4.1–6.0	Organ confined	73 (52–93)	55 (44–64)	31 (23–41)	21 (14–31)	18 (11–28)
	Extraprostatic extension	27 (7–48)	40 (32–50)	50 (40–60)	57 (43–68)	57 (43–70)
	Seminal vesicle (+)	—	2 (1–4)	6 (2–11)	4 (1–10)	7 (2–15)
	Lymph node (+)	—	3 (1–7)	12 (5–23)	16 (6–32)	16 (6–33)
6.1–10.0	Organ confined	67 (45–91)	46 (36–56)	24 (17–32)	16 (10–24)	13 (8–20)
	Extraprostatic extension	33 (9–55)	46 (37–55)	52 (42–61)	58 (46–69)	56 (43–69)
	Seminal vesicle (+)	—	5 (2–9)	13 (6–23)	11 (4–21)	16 (6–29)
	Lymph node (+)	—	3 (1–6)	10 (5–18)	13 (6–25)	13 (5–26)
>10.0	Organ confined	54 (32–85)	30 (21–38)	11 (7–17)	7 (4–12)	6 (3–10)
	Extraprostatic extension	46 (15–68)	51 (42–60)	42 (30–55)	43 (29–59)	41 (27–57)
	Seminal vesicle (+)	—	6 (2–12)	13 (6–24)	10 (3–20)	15 (5–28)
	Lymph node (+)	—	13 (6–22)	33 (18–49)	38 (20–58)	38 (20–59)

KEY: PSA = prostate-specific antigen.

PARTIN TABLES (Old)

PSA 0.0-4.0 ng/ml

Gleason Score	Pathologic Stage	Clinical Stage						
		T1a	T1b	T1c	T2a	T2b	T2c	T3a
2-4	Organ-Confined Disease	90 (84-95)	80 (72-86)	89 (86-92)	81 (75-86)	72 (65-79)	77 (69-83)	-
	Established Capsular Penetration	9 (4-15)	19 (13-26)	10 (7-14)	18 (13-23)	25 (19-32)	21 (14-28)	-
	Seminal Vesicle Involvement	0 (0-2)	1 (0-3)	1 (0-1)	1 (0-2)	2 (1-5)	2 (1-5)	-
	Lymph Node Involvement	0 (0-1)	0 (0-1)	0 (0-1)	0 (0-0)	0 (0-0)	0 (0-1)	-
5	Organ-Confined Disease	82 (73-90)	66 (57-73)	81 (76-84)	68 (63-72)	57 (50-62)	62 (55-69)	40 (26-53)
	Established Capsular Penetration	17 (9-26)	32 (24-40)	18 (15-22)	30 (26-35)	40 (34-46)	34 (27-40)	51 (38-65)
	Seminal Vesicle Involvement	1 (0-3)	2 (0-4)	1 (1-2)	2 (1-3)	3 (2-4)	3 (2-6)	7 (3-14)
	Lymph Node Involvement	0 (0-2)	1 (0-2)	0 (0-0)	1 (0-1)	1 (0-2)	1 (0-2)	2 (0-4)
6	Organ-Confined Disease	78 (68-88)	61 (52-69)	78 (74-81)	64 (59-68)	52 (46-57)	57 (51-64)	35 (22-48)
	Established Capsular Penetration	19 (11-29)	35 (27-43)	21 (18-25)	34 (30-38)	43 (38-48)	37 (31-43)	53 (41-65)
	Seminal Vesicle Involvement	1 (0-3)	2 (0-4)	1 (1-2)	2 (1-3)	3 (2-4)	4 (2-5)	7 (4-13)
	Lymph Node Involvement	1 (0-7)	2 (1-5)	0 (0-1)	1 (0-1)	2 (1-3)	2 (1-4)	5 (2-9)
7	Organ-Confined Disease	-	43 (34-53)	63 (58-68)	47 (41-52)	34 (29-39)	38 (32-45)	19 (11-29)
	Established Capsular Penetration	-	44 (35-54)	31 (26-36)	45 (40-50)	51 (46-57)	45 (38-52)	52 (40-63)
	Seminal Vesicle Involvement	-	6 (1-13)	4 (2-7)	6 (4-9)	10 (6-14)	12 (7-17)	19 (10-31)
	Lymph Node Involvement	-	6 (2-13)	1 (1-3)	2 (1-4)	5 (2-8)	5 (2-9)	9 (4-17)
8-10	Organ-Confined Disease	-	31 (20-43)	52 (41-62)	36 (27-45)	24 (17-32)	27 (18-36)	-
	Established Capsular Penetration	-	34 (27-44)	34 (27-44)	47 (38-56)	48 (40-57)	42 (33-52)	-
	Seminal Vesicle Involvement	-	9 (5-16)	9 (5-16)	12 (7-19)	17 (11-25)	21 (12-31)	-
	Lymph Node Involvement	-	4 (2-7)	4 (2-7)	5 (2-9)	10 (5-17)	10 (4-18)	-

PSA 4.1-10.0 ng/ml

Gleason Score	Pathologic Stage	Clinical Stage						
		T1a	T1b	T1c	T2a	T2b	T2c	T3a
2-4	Organ-Confined Disease	84 (75-82)	70 (60-79)	83 (78-88)	71 (64-78)	81 (52-69)	66 (57-74)	43 (27-58)
	Established Capsular Penetration	14 (7-3)	27 (18-37)	15 (11-20)	26 (19-33)	35 (26-43)	29 (21-37)	44 (30-59)
	Seminal Vesicle Involvement	1 (0-4)	2 (0-6)	1 (0-3)	2 (1-5)	4 (1-9)	5 (1-10)	10 (3-23)
	Lymph Node Involvement	0 (0-2)	1 (0-3)	0 (0-1)	0 (0-1)	1 (0-2)	1 (0-2)	1 (0-5)
5	Organ-Confined Disease	72 (60-85)	53 (44-63)	71 (67-75)	55 (51-60)	43 (38-49)	49 (42-55)	27 (17-39)
	Established Capsular Penetration	25 (14-36)	42 (32-51)	27 (23-30)	41 (36-46)	50 (45-55)	43 (37-50)	57 (46-68)
	Seminal Vesicle Involvement	2 (0-5)	3 (1-7)	2 (1-3)	3 (2-5)	5 (3-8)	6 (4-10)	12 (6-20)
	Lymph Node Involvement	1 (0-5)	2 (1-5)	0 (0-1)	1 (0-1)	2 (1-3)	2 (1-3)	3 (1-7)
6	Organ-Confined Disease	67 (55-82)	47 (38-57)	67 (64-70)	51 (47-54)	38 (34-43)	43 (38-49)	23 (14-34)
	Established Capsular Penetration	27 (15-39)	44 (35-53)	30 (27-33)	44 (41-48)	52 (48-56)	46 (40-51)	57 (47-67)
	Seminal Vesicle Involvement	2 (0-6)	3 (1-6)	2 (2-3)	3 (2-4)	5 (4-7)	6 (4-9)	11 (6-18)
	Lymph Node Involvement	3 (0-15)	5 (2-11)	1 (1-2)	2 (1-3)	4 (3-6)	4 (3-6)	9 (5-15)
7	Organ-Confined Disease	49 (34-68)	29 (21-38)	49 (45-54)	33 (29-38)	22 (18-26)	25 (20-30)	11 (6-17)
	Established Capsular Penetration	36 (20-51)	48 (38-60)	40 (35-44)	52 (48-57)	54 (49-59)	48 (42-54)	48 (37-58)
	Seminal Vesicle Involvement	6 (0-19)	9 (2-18)	8 (5-11)	10 (8-13)	15 (11-19)	18 (13-24)	26 (17-36)
	Lymph Node Involvement	8 (0-32)	12 (5-23)	3 (2-5)	4 (3-6)	9 (6-12)	9 (6-13)	15 (8-23)
8-10	Organ-Confined Disease	35 (18-62)	18 (11-28)	37 (28-46)	23 (16-31)	14 (9-19)	15 (10-22)	6 (3-10)
	Established Capsular Penetration	34 (17-58)	42 (28-57)	40 (33-49)	49 (42-57)	46 (39-53)	40 (31-48)	34 (24-46)
	Seminal Vesicle Involvement	10 (0-34)	15 (4-29)	15 (10-22)	19 (13-26)	24 (17-31)	28 (20-37)	35 (23-48)
	Lymph Node Involvement	18 (0-55)	23 (10-43)	8 (4-12)	9 (5-13)	16 (11-24)	17 (10-26)	24 (13-38)

PSA 10.1-20.0 ng/ml								
Gleason Score	**Pathologic Stage**	**Clinical Stage**						
		T1a	**T1b**	**T1c**	**T2a**	**T2b**	**T2c**	**T3a**
2-4	Organ-Confined Disease	76 (65-88)	58 (46-69)	75 (68-82)	60 (52-70)	48 (39-58)	53 (42-64)	-
	Established Capsular Penetration	20 (10-32)	36 (26-46)	22 (16-29)	35 (26-43)	43 (34-53)	37 (27-47)	-
	Seminal Vesicle Involvement	2 (0-7)	4 (1-10)	2 (1-5)	4 (1-8)	7 (2-14)	8 (2-16)	-
	Lymph Node Involvement	0 (0-7)	2 (0-8)	0 (0-2)	1 (0-2)	1 (0-5)	1 (0-6)	-
5	Organ-Confined Disease	61 (47-78)	40 (31-50)	60 (54-65)	43 (38-49)	32 (26-37)	36 (29-43)	18 (10-27)
	Established Capsular Penetration	33 (18-47)	50 (39-59)	35 (30-40)	50 (45-56)	57 (51-63)	51 (43-57)	59 (47-69)
	Seminal Vesicle Involvement	3 (0-9)	5 (1-10)	3 (2-5)	5 (3-8)	8 (5-11)	9 (6-15)	15 (8-25)
	Lymph Node Involvement	3 (0-14)	5 (2-11)	1 (0-2)	2 (1-3)	4 (1-7)	4 (1-7)	7 (3-15)
6	Organ-Confined Disease	-	33 (25-42)	55 (51-59)	38 (34-43)	26 (23-31)	31 (25-37)	14 (8-22)
	Established Capsular Penetration	-	49 (38-59)	38 (34-42)	52 (48-57)	57 (51-62)	50 (44-57)	54 (44-64)
	Seminal Vesicle Involvement	-	4 (1-8)	4 (3-5)	5 (3-7)	7 (5-10)	9 (6-13)	14 (8-21)
	Lymph Node Involvement	-	13 (6-24)	3 (2-5)	4 (3-6)	10 (7-13)	10 (6-14)	18 (10-27)
7	Organ-Confined Disease	33 (19-57)	17 (11-24)	35 (31-40)	22 (18-26)	13 (11-16)	15 (11-19)	6 (3-10)
	Established Capsular Penetration	38 (18-61)	46 (34-60)	45 (40-50)	55 (50-60)	51 (45-57)	45 (39-52)	40 (30-50)
	Seminal Vesicle Involvement	8 (0-28)	11 (3-22)	12 (8-16)	14 (10-19)	14 (10-19)	22 (16-29)	28 (18-39)
	Lymph Node Involvement	18 (0-57)	24 (10-41)	8 (5-11)	9 (6-13)	9 (6-13)	18 (12-25)	26 (16-38)
8-10	Organ-Confined Disease	-	9 (5-16)	23 (16-32)	14 (9-19)	7 (5-11)	8 (5-12)	3 (1-5)
	Established Capsular Penetration	-	33 (21-51)	40 (33-49)	46 (38-55)	38 (30-47)	33 (24-42)	26 (17-37)
	Seminal Vesicle Involvement	-	15 (4-32)	20 (13-28)	22 (15-31)	25 (18-34)	30 (21-40)	34 (21-47)
	Lymph Node Involvement	-	40 (19-60)	16 (10-24)	17 (11-25)	29 (21-38)	29 (19-40)	37 (24-52)

PSA > 20.0 ng/ml								
Gleason Score	**Pathologic Stage**	**Clinical Stage**						
		T1a	**T1b**	**T1c**	**T2a**	**T2b**	**T2c**	**T3a**
2-4	Organ-Confined Disease	-	38 (26-52)	58 (46-68)	41 (31-52)	29 (20-40)	-	-
	Established Capsular Penetration	-	47 (33-61)	34 (24-44)	48 (36-56)	52 (39-65)	-	-
	Seminal Vesicle Involvement	-	9 (1-22)	7 (2-15)	10 (3-20)	14 (4-29)	-	-
	Lymph Node Involvement	-	4 (0-17)	1 (0-4)	1 (0-5)	3 (0-11)	-	-
5	Organ-Confined Disease	-	23 (15-32)	40 (32-49)	26 (19-33)	17 (12-22)	19 (14-26)	8 (4-14)
	Established Capsular Penetration	-	57 (44-68)	48 (40-56)	60 (52-68)	61 (53-69)	55 (46-64)	54 (40-67)
	Seminal Vesicle Involvement	-	10 (2-21)	9 (5-14)	11 (6-17)	15 (9-23)	19 (11-28)	26 (14-41)
	Lymph Node Involvement	-	10 (3-21)	3 (1-6)	3 (1-7)	7 (3-13)	7 (3-13)	11 (4-22)
6	Organ-Confined Disease	-	17 (11-25)	35 (27-42)	22 (16-27)	13 (10-17)	15 (11-20)	6 (3-10)
	Established Capsular Penetration	-	51 (37-64)	49 (43-56)	60 (53-66)	57 (50-64)	51 (43-59)	46 (34-58)
	Seminal Vesicle Involvement	-	8 (2-17)	8 (6-12)	10 (7-15)	13 (9-19)	17 (11-24)	21 (13-33)
	Lymph Node Involvement	-	23 (10-40)	7 (4-11)	8 (5-13)	16 (11-23)	17 (11-25)	26 (16-38)
7	Organ-Confined Disease	-	-	18 (13-23)	10 (7-14)	5 (4-8)	6 (4-9)	2 (1-4)
	Established Capsular Penetration	-	-	46 (39-54)	51 (44-58)	43 (35-50)	37 (29-45)	29 (19-40)
	Seminal Vesicle Involvement	-	-	22 (15-28)	24 (17-32)	27 (20-34)	32 (24-42)	36 (25-49)
	Lymph Node Involvement	-	-	14 (9-21)	14 (9-22)	25 (18-33)	25 (16-34)	32 (20-45)
8-10	Organ-Confined Disease	-	3 (2-7)	10 (6-16)	5 (3-9)	3 (2-4)	3 (2-5)	1 (0-2)
	Established Capsular Penetration	-	24 (13-42)	34 (27-45)	37 (28-48)	28 (20-37)	23 (16-31)	17 (11-26)
	Seminal Vesicle Involvement	-	20 (6-43)	31 (21-42)	33 (22-45)	33 (24-45)	38 (26-51)	40 (25-55)
	Lymph Node Involvement	-	51 (25-72)	24 (15-36)	24 (15-35)	36 (25-48)	35 (23-48)	42 (27-58)

Following is the 1997 version of the Partin tables where there were 4133 patients from 3 academic institutions. Following this is a verification of this study.

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Combination of prostate-specific antigen, clinical stage, and Gleason score to predict pathological stage of localized prostate cancer. A multi-institutional update.

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OBJECTIVE: To combine the clinical data from 3 academic institutions that serve as centers of excellence for the surgical treatment of clinically localized prostate cancer and develop a multi-institutional model combining serum prostate-specific antigen (PSA) level, clinical stage, and Gleason score to predict pathological stage for men with clinically localized prostate cancer. DESIGN: In this update, we have combined clinical and pathological data for a group of 4133 men treated by several surgeons from 3 major academic urologic centers within the United States. Multinomial log-linear regression was performed for the simultaneous prediction of organ-confined disease, isolated capsular penetration, seminal vesicle involvement, or pelvic lymph node involvement. Bootstrap estimates of the predicted probabilities were used to develop nomograms to predict pathological stage. Additional bootstrap analyses were then obtained to validate the performance of the nomograms. PATIENTS AND SETTINGS: A total of 4133 men who had undergone radical retropubic prostatectomy for clinically localized prostate cancer at The Johns Hopkins Hospital (n=3116), Baylor College of Medicine (n=782), and the University of Michigan School of Medicine (n=235) were enrolled into this study. None of the patients had received preoperative hormonal or radiation therapy. OUTCOME MEASURES: Simultaneous prediction of organ-confined disease, isolated capsular penetration, seminal vesicle involvement, or pelvic lymph node involvement using updated nomograms. RESULTS: Prostate-specific antigen level, TNM clinical stage, and Gleason score contributed significantly to the prediction of pathological stage ($P<.001$). Bootstrap estimates of the median and 95% confidence interval of the predicted probabilities are presented in the nomograms. For most cells in the nomograms, there is a greater than 25% probability of qualifying for more than one of the pathological stages. In the validation analyses, 72.4% of the time the nomograms correctly predicted the probability of a pathological stage to within 10% (organ-confined disease, 67.3%; isolated capsular penetration, 59.6%; seminal vesicle involvement, 79.6%; pelvic lymph node involvement, 82.9%). CONCLUSIONS: The data represent a multi-institutional modeling and

validation of the clinical utility of combining PSA level measurement, clinical stage, and Gleason score to predict pathological stage for a group of men with localized prostate cancer. Clinicians can use these nomograms when counseling individual patients regarding the probability of their tumor being a specific pathological stage; this will enable patients and physicians to make more informed treatment decisions based on the probability of a pathological stage, as well as risk tolerance and the values they place on various potential outcomes.

VALIDATION OF PARTIN TABLES FOR PREDICTING PATHOLOGICAL STAGE OF CLINICALLY LOCALIZED PROSTATE CANCER

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ABSTRACT

Purpose: The accurate prediction of pathological stage of prostate cancer using preoperative factors is a critical aspect of treatment. In 1997 Partin et al published tables predicting pathological stage using clinical stage, Gleason score and prostate specific antigen (PSA). We tested the validity of the Partin tables.

Materials and Methods: From 1990 to 1996 inclusively 5,780 patients underwent bilateral pelvic lymphadenectomy and radical prostatectomy for prostate cancer at the Mayo Clinic. However, only 2,475 of these patients met all inclusion criteria of no preoperative treatment, known biopsy Gleason score, available preoperative PSA done either before biopsy or more than 28 days after biopsy and clinical stage T1, T2 or T3a. Among the 2,475 patients 15 had positive lymph nodes and planned prostatectomy was abandoned. The receiver operating characteristics (ROC) curve area, observed and predicted Partin rates of each pathological stage, and positive and negative predictive values were used to compare the Mayo study to the Partin tables.

Results: The distribution of pathological stage was organ confined in 67% of Mayo cases versus 48% in the Partin study, extracapsular without seminal vesicle or node involvement in 18% versus 40%, seminal vesicle involvement without nodes in 9%

versus 7% and were positive nodes in 6% versus 5%. Using the predicted probabilities of Partin et al the ROC curve area for predicted node positive disease was 0.84 for Mayo cases compared to an estimated 0.82 in the Partin series. The ROC curve area for predicting organ confined cancer was 0.76 for the Mayo Clinic compared to an estimated 0.73 for the Partin series. The observed rates of node positive disease were similar to those predicted (Partin) based on clinical stage, PSA and Gleason score. For organ confined disease Mayo rates were consistently higher than those predicted from the Partin series using a cut point of 0.50 or greater. Positive and negative predictive values were 0.83 and 0.49 versus 0.63 and 0.70 for the Mayo Clinic and Partin series.

Conclusions: Our study provides strong evidence that sensitivity and specificity of the Partin tables for external clinical sites are similar to what was reported.

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