

Supplemental Table 1: Study Population Characteristics

	Result
Age (years)	64.1 ± 5.6 (64; 60 – 67.8)
PSA at time of imaging (ng/mL)	11.3 ± 20.1 (7.3; 4.7 – 10.8)
Prior biopsy (number) per subject	1.5 ± 1.3 (1; 1 - 2)
Time interval from last biopsy to imaging (months) in n = 47	26.1 ± 27.8 (14; 8 - 33)
Prior known pathology per subject	20 Gleason 3+3 3 Gleason 3+4 24 negative 9 without prior biopsy
Time interval between MRI and PET (days)	16.4 ± 21.0 (0; 0 - 31.8)
Time interval between PET/MRI to biopsy (days)	17.8 ± 14.9 (14; 8 - 22)
Further clinical management	20 prostatectomy 6 definitive radiation treatment 1 system treatment 25 surveillance 4 lost in follow-up

Mean ± SD (median; 25% - 75% quartiles)

Supplemental Table 2A. Target characteristics stratified by mpMRI Likert results (reader 1).

MRI Risk Classification (Likert)	N	Target Volume (cm ³)	SUV _{mean}	SUV _{mean} TBR
Low (Likert 3)	40	0.31 ± 0.31	3.42 ± 1.92	1.16 ± 0.42
Intermediate (Likert 4)	30	0.41 ± 0.35	3.59 ± 1.85	1.53 ± 0.82
High (Likert 5)	20	0.89 ± 0.85 (*p=0.002)	4.78 ± 2.14	2.03 ± 1.20

N = 90

Mean ± SD.

* Significant compared to Likert 3-4

Note: "target volume" refers to the segmentation volume pre-biopsy and not the actual tumor volume at histopathology.

Supplemental Table 2B. Target characteristics stratified by mpMRI PI-RADS v2 results (reader 1).

MRI Risk Classification (PI-RADS v2)	N	Target Volume (cm ³)	SUV _{mean}	SUV _{mean} TBR
Very Low (PI-RADS 2)	38	0.43 ± 0.39	3.74 ± 1.99	1.18 ± 0.48
Low (PI-RADS 3)	14	0.25 ± 0.35	2.90 ± 1.26	1.23 ± 0.38
Intermediate (PI-RADS 4)	23	0.30 ± 0.23	3.36 ± 1.81	1.66 ± 0.85
High (PI-RADS 5)	15	1.04 ± 0.88 (*p=0.001)	5.34 ± 2.18	2.19 ± 1.34

N = 90

Mean ± SD.

* Significant compared to PI-RADS 2-4

Note: “target volume” refers to the segmentation volume pre-biopsy and not the actual tumor volume at histopathology.

Supplemental Table 2C. Target characteristics stratified by pre-imaging histopathology results.

Pathology	N	Target Volume (cm ³)	SUV _{mean}	SUV _{mean} TBR
Benign	52	0.36 ± 0.36	3.46 ± 1.83	1.15 ± 0.40
Gleason 3+3	9	0.21 ± 0.19	2.70 ± 1.23	0.99 ± 0.29
Gleason ≥ 3+4	29	0.75 ± 0.74 (*p=0.001)	4.66 ± 2.15	2.20 ± 1.09

N = 90

Mean ± SD. * Significant compared to benign and Gleason 3+3

Note: "target volume" refers to the segmentation volume pre-biopsy and not the actual tumor volume at histopathology.

Supplemental Table 3A: Lesion-level results for detection of Gleason \geq 3+4 cancer based on mpMRI Likert scores

	True Positive (TP)	True Negative (TN)	False Positive (FP)	False Negative (FN)	Sensitivity %	Specificity %	Positive Predictive Value (PPV) %	Negative Predictive Value (NPV) %	Accuracy %	AUC
mpMRI Base Case Reader 1	25	36	25	4	86.21 (CI 68.34 - 96.11)	59.02 (CI 45.68 - 71.45)	50.00 (CI 41.71 - 58.29)	90.00 (CI 77.96 - 95.81)	67.78 (CI 57.1 - 77.25)	0.73 (CI 0.64-0.82)
Model L1 Reader 1	27	53	8	2	93.10 (CI 77.23-99.15)	86.89 (CI 75.78-94.16)	77.14 (CI 59.86-89.58) (*p<0.001)	96.36 (CI 87.47-99.56)	88.89 (CI 80.51-94.54)	0.90 (CI 0.84-0.96) *(p<0.001)
Model L2 Reader 1	22	59	2	7	75.86 (CI 56.46 - 89.7)	96.72 (CI 88.65 - 99.6)	91.67 (CI 73.00 - 98.97) (*p<0.001)	89.39 (CI 79.36 - 95.63)	90.00 (CI 81.86 - 95.32)	0.86 (CI 0.78-0.95) (*p<0.001)
Model L3 Reader 1	24	56	5	5	82.76 (CI 64.23 - 94.15)	91.80 (CI 81.90-97.28)	82.76 (CI 64.23 - 94.15) (*p<0.001)	91.80 (CI 81.90-97.28)	88.89 (CI 80.51-94.54)	0.87 (CI 0.80-0.95) (*p= 0.003)
Model L4 Reader 1	25	56	5	4	86.21 (CI 68.34 - 96.11)	91.80 (CI 81.90-97.28)	83.33 (CI 65.28-94.36) (*p<0.001)	93.33 (CI 83.80 - 98.15)	90.00 (CI 81.86 - 95.32)	0.89 (CI 0.82-0.96) (*p< 0.001)
mpMRI Base Case Reader 2	23	43	18	6	79.31 (CI 60.28 - 92.01)	70.49 (CI 57.43 - 81.48)	56.1 (CI 45.39 - 66.27)	87.76 (CI 77.53 - 93.7)	73.33 (CI 62.97 - 82.11)	0.75 (CI 0.65-0.84)
Model L1	26	54	7	3	89.66 (CI 72.65-97.81)	88.52 (CI 77.78-95.26)	78.79 (CI 61.09-91.02)	94.74 (CI 85.38-98.90)	88.89	0.89 (CI 0.82-0.96)

Reader 2							(*p=0.002)		(CI 80.51-94.54)	(*p=0.008)
Model L2 Reader 2	22	57	4	7	75.86 (CI 56.46-89.70)	93.44 (CI 84.05-98.18)	84.62 (CI 65.13-95.64) (*p<0.001)	89.06 (CI 78.75-95.49)	87.78 (CI 79.18-93.74)	0.85 (CI 0.76-0.93) (*p=0.001)
Model L3 Reader 2	24	56	5	5	82.76 (CI 64.23-94.15)	91.80 (CI 81.90-97.28)	82.76 (CI 64.23-94.15) (*p<0.001)	91.80 (CI 81.90-97.28)	88.89 (CI 80.51-94.54)	0.87 (CI 0.79-0.95) (*p= 0.015)
Model L4 Reader 2	20	59	2	9	68.97 (CI 49.17-84.72)	86.21 (CI 68.34 – 96.11)	90.91 (CI 70.84-98.88) (*p<0.001)	86.76 (CI 76.36-93.77)	87.78 (CI 79.18-93.74)	0.83 (CI 0.74-0.92) (*p=0.025)

N = 90

* Significant compared to mpMRI base case (Likert 4-5)

CI: 95% confidence interval; TP: true positive; TN: true negative; FP: false-positive; FN: false-negative; PPV: positive predictive value; NPV: negative predictive value; AUC: area under the receiver operator characteristic curve

Supplemental Table 3B: Lesion-level results for detection of Gleason \geq 3+4 cancer based on mpMRI PI-RADS v2 scores

	True Positive (TP)	True Negative (TN)	False Positive (FP)	False Negative (FN)	Sensitivity %	Specificity %	Positive Predictive Value (PPV) %	Negative Predictive Value (NPV) %	Accuracy %	AUC
mpMRI Base Case Reader 1	27	36	25	2	93.10 (CI 77.23-99.15)	59.02 (CI 45.68-71.45)	51.92 (CI 37.63-65.99)	94.74 (CI 82.25-99.36)	70.00 (CI 59.43 – 79.21)	0.76 (CI 0.68-0.84)
Model P1	27	55	6	2	93.10 (CI 77.23-99.15)	90.16 (CI 79.81-96.30)	81.82 (CI 64.54-93.02) (*p<0.001)	96.49 (CI 87.89-99.57)	91.11 (CI 83.23 – 96.08)	0.92 (CI 0.86-0.98) (*p<0.001)
Model P2	20	61	0	9	68.97 (CI 49.17 – 84.72)	100.00 (CI 94.13-100.00)	100.00 (CI 83.16 – 100.00) (*p<0.001)	87.14 (CI 79.76 – 92.10)	90.00 (CI 81.86 – 95.32)	0.84 (CI 0.76-0.93) (*p=0.050)
Model P3	24	56	5	5	82.76 (CI 64.23-94.15)	91.80 (CI 81.90-97.28)	82.76 (CI 64.23-94.15) (*p<0.001)	91.80 (CI 81.90-97.28)	88.89 (CI 80.51-94.54)	0.87 (CI 0.79-0.95) (*p=0.021)
Model P4	22	59	2	7	75.86 (CI 56.46-89.70) (*p<0.001)	96.72 (CI 88.65 – 99.60)	91.67 (CI 73.00 – 98.97) (*p<0.001)	89.39 (CI 79.36 – 95.63)	90.00 (CI 81.86 – 95.32)	0.86 (CI 0.78-0.95) (*p=0.034)
mpMRI Base Case Reader 2	29	20	41	0	100.00 (CI 88.06-100.00)	32.79 (CI 21.31-46.00)	41.43 (CI 29.77-53.83)	100.00 (CI 83.16-100.00)	54.44 (CI 43.6 – 64.98)	0.66 (CI 0.60-0.72)

Model P1 Reader2	24	54	7	5	82.76 (CI 64.23- 94.15)	88.52 (CI 77.78- 95.26)	77.42 (CI 58.90- 90.41) (*p<0.001)	91.53 (CI 81.32- 97.19)	86.67 (CI 77.87- 92.92)	0.86 (CI 0.78-0.94) (*p<0.0001)
Model P2 Reader2	21	57	4	8	72.41 (CI 52.76- 87.27)	93.44 (CI 84.05- 98.18)	84.00 (CI 63.92- 95.46) (*p<0.001)	87.69 (CI 77.18- 94.53)	86.67 (CI 77.87- 92.92)	0.83 (CI 0.74-0.92) (*p< 0.001)
Model P3 Reader2	24	56	5	5	82.76 (CI 64.23- 94.15)	91.80 (CI 81.90- 97.28)	82.76 (CI 64.23- 94.15) (*p<0.001)	91.80 (CI 81.90- 97.28)	88.89 (CI 80.51- 94.54)	0.87 (CI 0.79-0.95) (*p<0.001)
Model P4 Reader2	21	59	2	8	72.41 (CI 52.76- 87.27)	96.72 (CI 88.65- 99.60)	91.30 (CI 71.96- 98.93) (*p<0.001)	88.06 (CI 77.82- 94.70)	88.89 (CI 80.51- 94.54)	0.85 (CI 0.76-0.93) (*p<0.001)

N = 90

* Significant compared to mpMRI base case (PI-RADS 3-5)

CI: 95% confidence interval; TP: true positive; TN: true negative; FP: false-positive; FN: false-negative; PPV: positive predictive value; NPV: negative predictive value; AUC: area under the receiver operator characteristic curve

Supplemental Table 4A: Subject-Level Results for Detection of Gleason \geq 3+4 Cancer Based on mpMRI Likert Scores

	True Positive (TP)	True Negative (TN)	False Positive (FP)	False Negative (FN)	Sensitivity %	Specificity %	Positive Predictive Value (PPV) %	Negative Predictive Value (NPV) %	Accuracy %	AUC
mpMRI Base Case Reader 1	23	16	13	4	85.19 (CI 66.27 – 95.81)	55.17 (CI 35.69 – 73.55)	63.89 (CI 53.42 – 73.18)	80.00 (CI 60.45 – 91.28)	69.64 (CI 55.90 – 81.22)	0.70 (CI 0.59-0.82)
Model L1	25	27	2	2	92.59 (CI 75.71 – 99.09)	93.10 (CI 77.23 – 99.15)	92.59 (CI 76.57 – 97.95) (*p=0.002)	93.10 (CI 78.00 – 98.09)	92.86 (CI 82.71 – 98.02)	0.93 (CI 0.86-1.00) (*p< 0.001)
Model L2	20	29	0	7	74.07 (CI 57.44 – 90.60)	100.00	100.00 (*p<0.001)	80.56 (CI 63.98 – 91.81)	87.50 (CI 75.93 – 94.82)	0.87 (CI 0.79-0.95) (*p=0.004)
Model L3	21	27	2	6	77.78 (CI 57.74 – 91.38)	93.10 (CI 77.23 – 99.15)	91.30 (CI 71.96 – 98.93) (*p=0.003)	81.82 (CI 64.54 – 93.02)	85.71 (CI 73.78 – 93.62)	0.85 (CI 0.76-0.95) (*p=0.019)
Model L4	24	29	0	3	88.89 (CI 70.84 – 97.65)	100.00 (CI 88.06 – 100.00)	100.00 (*p<0.001)	90.62 (CI 76.88 – 96.56)	94.64 (CI 85.13 – 98.88)	0.94 (CI 0.88-1.00) (*p<0.001)
mpMRI Base Case Reader 2	22	19	10	5	81.48 (CI 61.92-93.70)	65.52 (CI 45.67-82.06)	68.75 (CI 49.99-83.88)	79.17 (CI 57.85-92.87)	73.21 (CI 59.70-84.17)	0.74 (CI 0.62-0.85)
Model L1 Reader2	23	26	3	4	85.19 (CI 66.27-95.81)	89.66 (CI 72.65-97.81)	88.46 (CI 69.85-97.55) (*p=0.010)	86.67 (CI 69.28-96.24)	87.50 (CI 75.93-94.82)	0.87 (CI 0.79-0.96) (*p=0.014)
Model L2 Reader2	20	27	2	7	74.07 (CI 53.72-88.89)	93.10 (CI 77.23-99.15)	90.91 (CI 70.84-98.88) (*p=0.003)	79.41 (CI 62.10-91.30)	83.93 (CI 71.67-92.38)	0.84 (CI 0.74-0.93) (*p=0.020)

Model L3 Reader2	21	27	2	6	77.78 (CI 57.74- 91.38)	93.10 (CI 77.23 – 99.15)	91.30 (CI 71.96 – 98.93) (*p=0.007)	81.82 (CI 64.54 - 93.02)	85.71 (CI 73.78 – 93.62)	0.85 (CI 0.76-0.95) (*p=0.043)
Model L4 Reader2	18	28	1	9	66.67 (CI 46.04- 83.48)	96.55 (CI 82.24- 99.91)	94.74 (CI 73.97- 99.87) (*p=0.002)	75.68 (CI 58.80- 88.23)	82.14 (CI 69.60- 91.09)	0.82 (CI 0.72-0.91) (*p=0.073)

N = 56

* Significant compared to mpMRI base case (Likert 4-5)

CI: 95% confidence interval; TP: true positive; TN: true negative; FP: false-positive; FN: false-negative; PPV: positive predictive value; NPV: negative predictive value; AUC: area under the receiver operator characteristic curve

Supplemental Table 4B: Subject-Level Results for Detection of Gleason \geq 3+4 Cancer Based on mpMRI PI-RADS v2 Scores

	True Positive (TP)	True Negative (TN)	False Positive (FP)	False Negative (FN)	Sensitivity %	Specificity %	Positive Predictive Value (PPV) %	Negative Predictive Value (NPV) %	Accuracy %	AUC
mpMRI Base Case Reader1	25	17	12	2	92.59 (CI 75.71 – 99.09)	58.62 (CI 38.94 – 76.48)	67.57 (CI 57.15 – 76.50)	89.47 (CI 68.39 – 97.09)	75.00 (CI 61.63 – 85.61)	0.76 (CI 0.65-0.86)
Model P1	24	27	2	3	88.89 (CI 70.84 – 97.65)	93.10 (CI 77.23 – 99.15)	92.31 (CI 75.79 – 97.87) (*p=0.004)	90.00 (CI 75.51 – 96.33)	91.07 (CI 80.38 – 97.04)	0.91 (CI 0.83-0.99) (*p=0.009)
Model P2	17	29	0	10	62.96 (CI 42.37 – 80.60)	100.00 (CI 88.06 – 100.00)	100.00 (*p<0.001)	74.36 (CI 63.94 – 82.59)	82.14 (CI 69.60 – 91.09)	0.81 (CI 0.72-0.92) (p=0.182)
Model P3	21	27	2	6	77.78 (CI 57.74-91.38)	93.10 (CI 77.23-99.15)	91.30 (CI 71.96-98.93) (*p=0.007)	81.82 (CI 64.54-93.02)	85.71 (CI 73.78-93.62)	0.85 (CI 0.76-0.95) (p=0.086)
Model P4	19	29	0	8	70.37 (CI 49.82 – 86.25)	100.00 (CI 88.06 – 100.00)	100.00 (*p<0.001)	78.38 (CI 66.96 – 86.64)	85.71 (CI 73.78 – 93.62)	0.85 (CI 0.76-0.94) (p=0.078)
mpMRI Base Case Reader2	25	8	21	2	92.59 (CI 75.71-99.09)	27.59 (CI 12.73 – 47.24)	54.35 (CI 39.01-69.10)	80.00 (CI 44.39-97.48)	58.93 (CI 44.98-71.90)	0.60 (CI 0.50-0.70)
Model P1 Reader2	21	25	4	6	77.78 (CI 57.74-91.38)	86.21 (CI 68.34-96.11)	84.00 (CI 63.92-95.46) (*p<0.001)	80.65 (CI 62.53-92.55)	82.14 (CI 69.60-91.09)	0.82 (CI 0.72-0.92) (*p<0.001)
Model P2 Reader2	19	26	3	8	70.37	89.66	86.36 (CI 65.09-97.09)	76.47	80.36	0.80 (CI 0.70-0.90)

					(CI 49.82-86.25)	(CI 72.65-97.81)	(*p<0.001)	(CI 58.83-89.25)	(CI 67.57-89.77)	(*p<0.001)
Model P3 Reader2	21	27	2	6	77.78 (CI 57.74-91.38)	93.10 (CI 77.23-99.15)	91.30 (CI 71.96-98.93) (*p<0.001)	81.82 (CI 64.54 - 93.02)	85.71 (CI 73.78-93.62)	0.85 (CI 0.76-0.95) (*p<0.001)
Model P4 Reader2	19	28	1	8	70.37 (CI 49.82 - 86.25)	96.55 (CI 82.24-99.91)	95.00 (CI 75.13-99.87) (*p<0.001)	77.78 (CI 60.85-89.88)	83.93 (CI 71.67-92.38)	0.83 (CI 0.74-0.93) (*p<0.001)

N = 56

* Significant compared to mpMRI base case (PI-RADS v2 3-5)

CI: 95% confidence interval; TP: true positive; TN: true negative; FP: false-positive; FN: false-negative; PPV: positive predictive value; NPV: negative predictive value; AUC: area under the receiver operator characteristic curve

Supplemental Table 5A: Distributions of lesion-based Likert scores

	Likert 3		Likert 4		Likert 5	
	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.
Reader 1	4	37	8	21	17	3
Reader 2	6	43	9	16	14	2

N = 90

Pos.: positive; Neg.: negative for Gleason \geq 3+4

Supplemental Table 5B: Distributions of lesion-based PI-RADS v2 scores

	PI-RADS 2		PI-RADS 3		PI-RADS 4		PI-RADS 5	
	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.
Reader 1	2	36	4	10	9	14	14	1
Reader 2	0	20	5	23	17	16	7	2

N = 90

Pos.: positive; Neg.: negative for Gleason \geq 3+4

Supplemental Table 5C: Distributions of subject-based Likert scores

	Likert 3		Likert 4		Likert 5	
	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.
Reader 1	4	36	8	22	17	3
Reader 2	6	43	9	16	14	2

N = 56

Pos.: positive; Neg.: negative for Gleason \geq 3+4

Supplemental Table 5D: Distributions of subject-based PI-RADS v2 scores

	PI-RADS 2		PI-RADS 3		PI-RADS 4		PI-RADS 5	
	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.
Reader 1	2	36	4	10	9	14	14	1
Reader 2	0	20	5	23	17	16	7	2

N = 56

Pos.: positive; Neg.: negative for Gleason \geq 3+4