


In the format provided by the authors and unedited.

Clinical-grade computational pathology using weakly supervised deep learning on whole slide images

Gabriele Campanella^{1,2}, Matthew G. Hanna¹, Luke Geneslaw¹, Allen Miraflor¹, Vitor Werneck Krauss Silva¹, Klaus J. Busam¹, Edi Brogi¹, Victor E. Reuter¹, David S. Klimstra¹ and Thomas J. Fuchs^{1,2*} 

¹Department of Pathology, Memorial Sloan Kettering Cancer Center, New York, NY, USA. ²Weill Cornell Graduate School of Medical Sciences, New York, NY, USA. *e-mail: fuchst@mskcc.org

Source	Split	Metric	Total Slides	FNR	TPR	FPR	TNR
In-house	Train	Cancer	1,712	0.0058	0.9942	-	-
		Grade 6	870	0.0092	0.9908	-	-
		Grade 7	662	0.0030	0.9970	-	-
		Grade 8	95	0.0000	1.0000	-	-
		Grade 9	83	0.0000	1.0000	-	-
		Grade 10	0	-	-	-	-
		Tumor Size: 0.1-1.2	401	0.0175	0.9825	-	-
		Tumor Size: 1.2-3.3	425	0.0047	0.9953	-	-
		Tumor Size: 3.3-6.5	434	0.0023	0.9977	-	-
		Tumor Size: 6.5-70	428	0.0000	1.0000	-	-
	Validation	Benign	6,809	-	-	0.0117	0.9883
		Atrophy/Hyperplasia	88	-	-	0.0114	0.9886
		Cancer	345	0.0087	0.9913	-	-
		Grade 6	202	0.0099	0.9901	-	-
		Grade 7	114	0.0088	0.9912	-	-
		Grade 8	17	0.0000	1.0000	-	-
		Grade 9	12	0.0000	1.0000	-	-
		Grade 10	0	-	-	-	-
		Tumor size: 0.1-1.2	97	0.0309	0.9691	-	-
		Tumor size: 1.2-3.3	75	0.0000	1.0000	-	-
		Tumor size: 3.3-6.5	83	0.0000	1.0000	-	-
		Tumor size: 6.5-70	88	0.0000	1.0000	-	-
		Test	Benign	1,482	-	-	0.0533
	Atrophy/Hyperplasia		28	-	-	0.0357	0.9643
	Cancer		345	0.0174	0.9826	-	-
	Grade 6		169	0.0178	0.9822	-	-
	Grade 7		145	0.0138	0.9862	-	-
	Grade 8		19	0.0526	0.9474	-	-
	Grade 9		12	0.0000	1.0000	-	-
	Grade 10		0	-	-	-	-
	Tumor size: 0.1-1.2		83	0.0723	0.9277	-	-
	Tumor size: 1.2-3.3		92	0.0000	1.0000	-	-
	External	Tumor size: 3.3-6.5	79	0.0000	1.0000	-	-
Tumor size: 6.5-70		87	0.0000	1.0000	-	-	
Benign		1,439	-	-	0.0500	0.9500	
Atrophy/Hyperplasia		31	-	-	0.0000	1.0000	
Cancer		12,413	0.0411	0.9589	-	-	
Grade 6		3,432	0.0280	0.9720	-	-	
Grade 7		6,085	0.0251	0.9749	-	-	
Grade 8		1,333	0.0765	0.9235	-	-	
Grade 9		1,445	0.0381	0.9619	-	-	
Grade 10		18	0.2222	0.7778	-	-	
Tumor size: 0.1-1.2		3,345	0.0984	0.9016	-	-	
Tumor size: 1.2-3.3		3,103	0.0248	0.9752	-	-	
Tumor size: 3.3-6.5		2,939	0.0160	0.9840	-	-	
Tumor size: 6.5-70	2,992	0.0177	0.9823	-	-		
Benign	314	-	-	0.1433	0.8567		

Supplementary Table 1: **Stratified prediction performance of the prostate cancer MIL-RNN model.** Abbreviations: FNR=false negative rate; TPR=true positive rate; FPR=false positive rate; TNR=true negative rate. Relevant categories for positive slides are Gleason grades and tumor sizes and for negative slides they are the presence of atrophy or hyperplasia. The dataset was divided into in-house and external consultation cases. The in-house data was sub-divided into training, validation and test sets.