

Supplementary Table 1. Test Results by center/disease entity

Disease Cohort	Center	hybrid 3D			full 3D		
		other	covid	Accuracy	other	covid	Accuracy
COVID-19	Hubei, China	23	184	0.889	24	183	0.884
	Milan, Italy	16	38	0.704	15	39	0.720
	Tokyo, Japan	3	46	0.939	6	43	0.876
	Milan, Italy	5	10	0.667	6	9	0.6
	SUNY, USA	1	0	0.0	1	0	0.0
any clinical indication	SUNY, USA	453	47	0.906	457	43	0.914
cancer diagnosis/staging	LIDC [ref]	256	15	0.945	266	5	0.982
	NIH, USA	92	8	0.920	91	9	0.910
Pneumonia	SUNY, USA	110	30	0.786	126	14	0.900
<i>All</i>		<i>959</i>	<i>378</i>	<i>0.889</i>	<i>992</i>	<i>345</i>	<i>0.908</i>

Supplementary Table 2. Clinical Indications for SUNY all-comer patient population, including all patients and test-only patients with false-positive rates by 3D classification model

Indication	All Patients	Test Set	
	N(%)	N(%)	False Positive Rate by 3D classification
oncology	292 (30.7%)	165 (32.9%)	0.055
lung nodule evaluation	188 (19.8%)	74 (14.8%)	0.027
acute respiratory	145 (15.3%)	68 (13.6%)	0.103
infectious disease	59 (6.5%)	23 (4.6%)	0.087
acute cardiac	44 (4.6%)	22 (4.4%)	0.273
trauma	43 (4.5%)	22 (4.4%)	0.273
other	178 (18.7%)	127 (25.3%)	0.087
Total	950	501	0.086

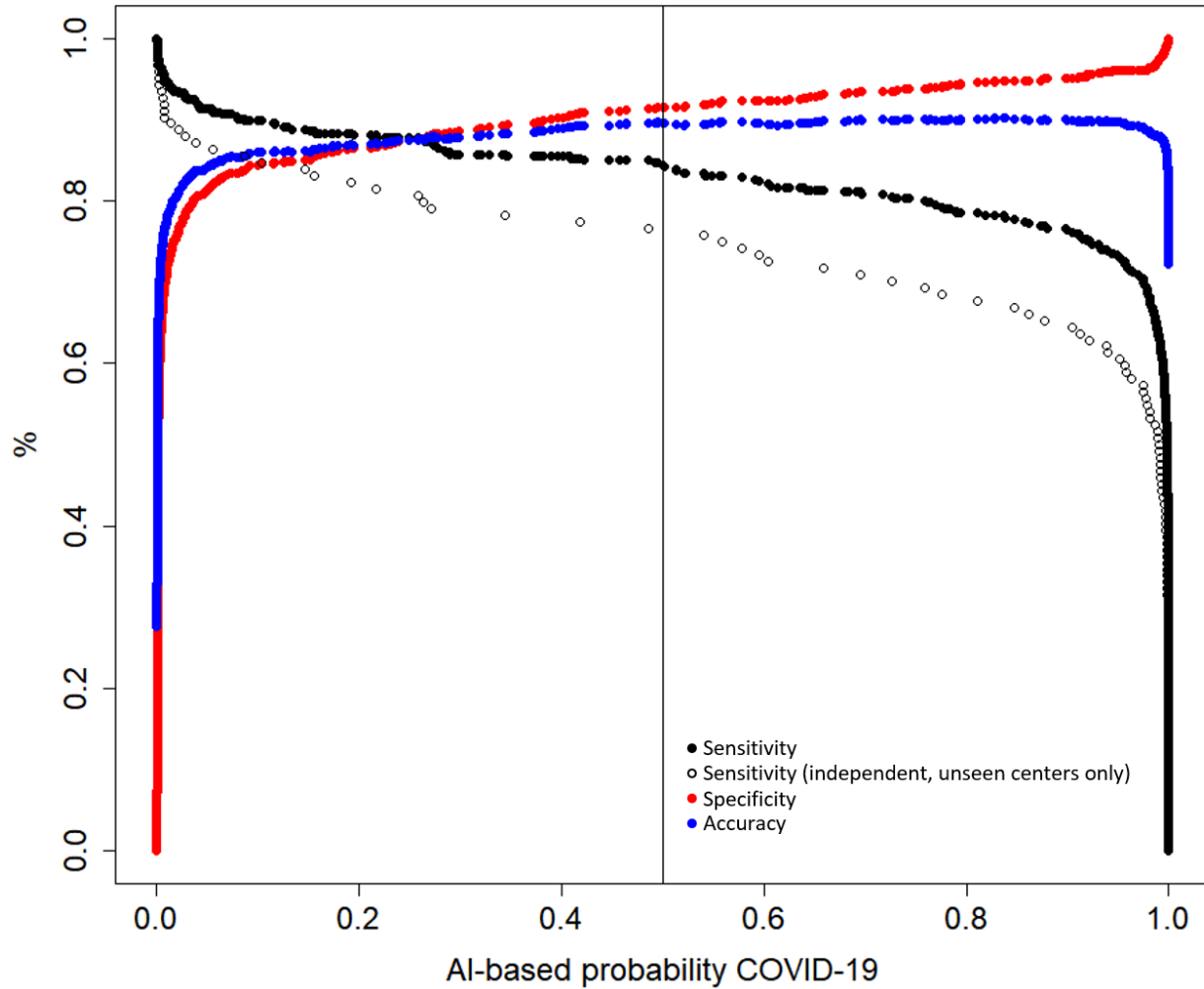
Supplementary Table 3. Image Acquisition Characteristics

Disease Cohort	Center	in-plane resolution	slice thickness							KVP	Scanner Manufacturer
			t<1	1	1<t<2	2	2<t<5	5	t>5		
COVID-19	Hubei, China	0.755 (0.30-1.11)	4	17		$\frac{2}{4}$	1	652		80-120 KVP	TOSHIBA, GE
	Milan, Italy	0.731 (0.57-0.95)			6			120	8	120-140 KVP	GE
	Tokyo, Japan	0.729 (0.53-0.89)			7	1	3	169		70-130 KVP	TOSHIBA, GE, SIEMENS, HITACHI
	Milan, Italy	0.756 (0.56-0.98)					14	1		100-120	SIEMENS
	Syracuse, NY, USA	* see footnote						1			
any clinical indication	Syracuse, NY, USA	0.714 (0.33-1.03)	69	85	107		11	677	1	80-140 KVP	TOSHIBA, GE, SIEMENS, PHILIPS
cancer diagnosis/staging	LIDC ¹⁹	0.703 (0.46-0.98)	74	49	124	$\frac{1}{8}$	203	2		110-150 KVP	TOSHIBA, GE, SIEMENS, PHILIPS
	NIH, USA	0.849 (0.67-0.98)	1	28			3	68		90-130 KVP	TOSHIBA, GE, SIEMENS
Pneumonia	SUNY, USA	0.721 (0.51-0.78)	2	4	14	1		120		80-140 KVP	TOSHIBA, GE, SIEMENS, PHILIPS
	NIH, USA	0.664 (0.47,0.93)	5	1		1	2	19	1	80/120 KVP	TOSHIBA, GE, SIEMENS, PHILIPS

Supplementary Table 4: Microbiology of Pneumonia Test Dataset

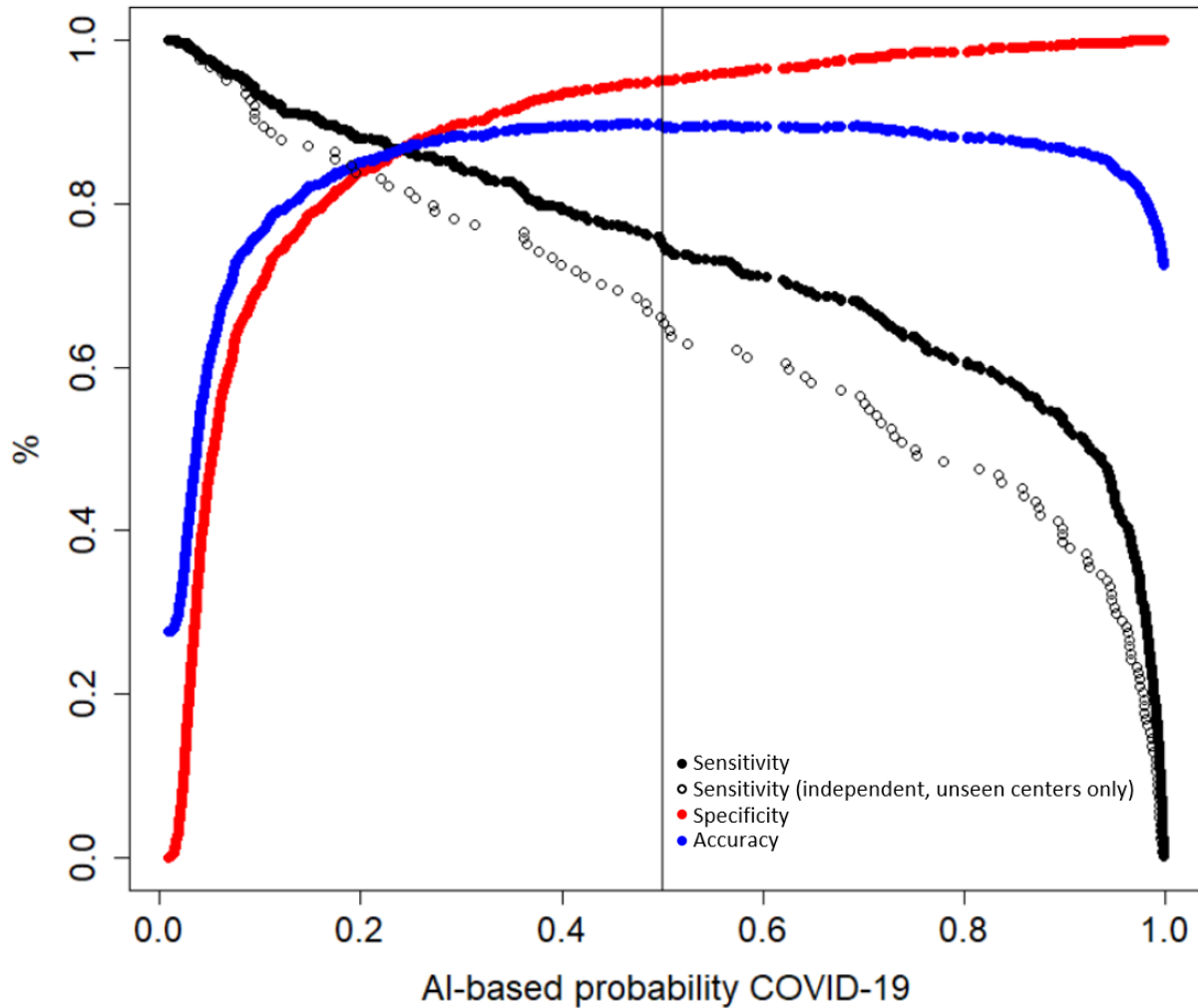
Viral Pneumonia		Bacterial Pneumonia	
Influenza A H3	22	Pseudomonas aeruginosa	8
Influenza A 2009 H1	16	MRSA	8
Influenza B	9	Staphylococcus-coagulase positive	4
Influenza A	8	Haemophilus influenzae B lactamase (-)	3
Rhinovirus/Enterovirus	5	MSSA	2
Adenovirus	2	Streptococcus pneumoniae	2
Influenza A H3 virus	2	Corynebacterium striatum	2
Parainfluenza virus 3	2	L. pneumophila serogroup 1 antigen	1
Adenovrius	1	Mycobacterium gordonae	1
CMV	1	Streptococcus Group A antigen	1
Coronavirus NL63	1	Proteus mirabilis	1
		Proteus vulgaris	1
		Mycobacterium mucogenicum	1
		Providencia rettgeri	1
		Achromobacter xylooxidans	1
		Escherichia coli	1
		Mycobacterium intracellulare	1
		Serratia marcencens	1
		Pseudomonas flurensens	1
		Streptococcus constellatus	1
		Streptococcus intermedius	1
		Actinomyces meyeri	1
Total Virus	69	Total bacterial	44

Sensitivity, Specificity, and Accuracy vs. Probability of COVID-19

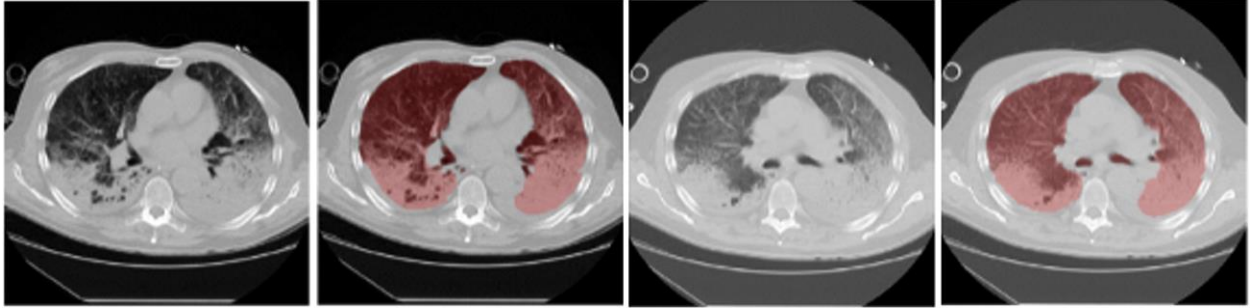


Supplementary Figure 1. Output of AI-based model for prediction of COVID-19 vs. Accuracy, Sensitivity, and Specificity from generalizability experiment with independent testing populations from Japan and Italy for 3D model. Probability refers to output of AI model, with 0.5 (horizontal line) corresponding to threshold for determination of COVID-19 classification.

Sensitivity, Specificity, and Accuracy vs. Probability of COVID-19



Supplementary Figure 2. Output of AI-based model for prediction of COVID-19 vs. Accuracy, Sensitivity, and Specificity from generalizability experiment with independent testing populations from Japan and Italy for Hybrid 3D model. Probability refers to output of AI model, with 0.5 (horizontal line) corresponding to threshold for determination of COVID-19 classification.



Supplementary Figure 3. Lung segmentation in two test cases with extensive consolidation related to COVID-19 pneumonia.