

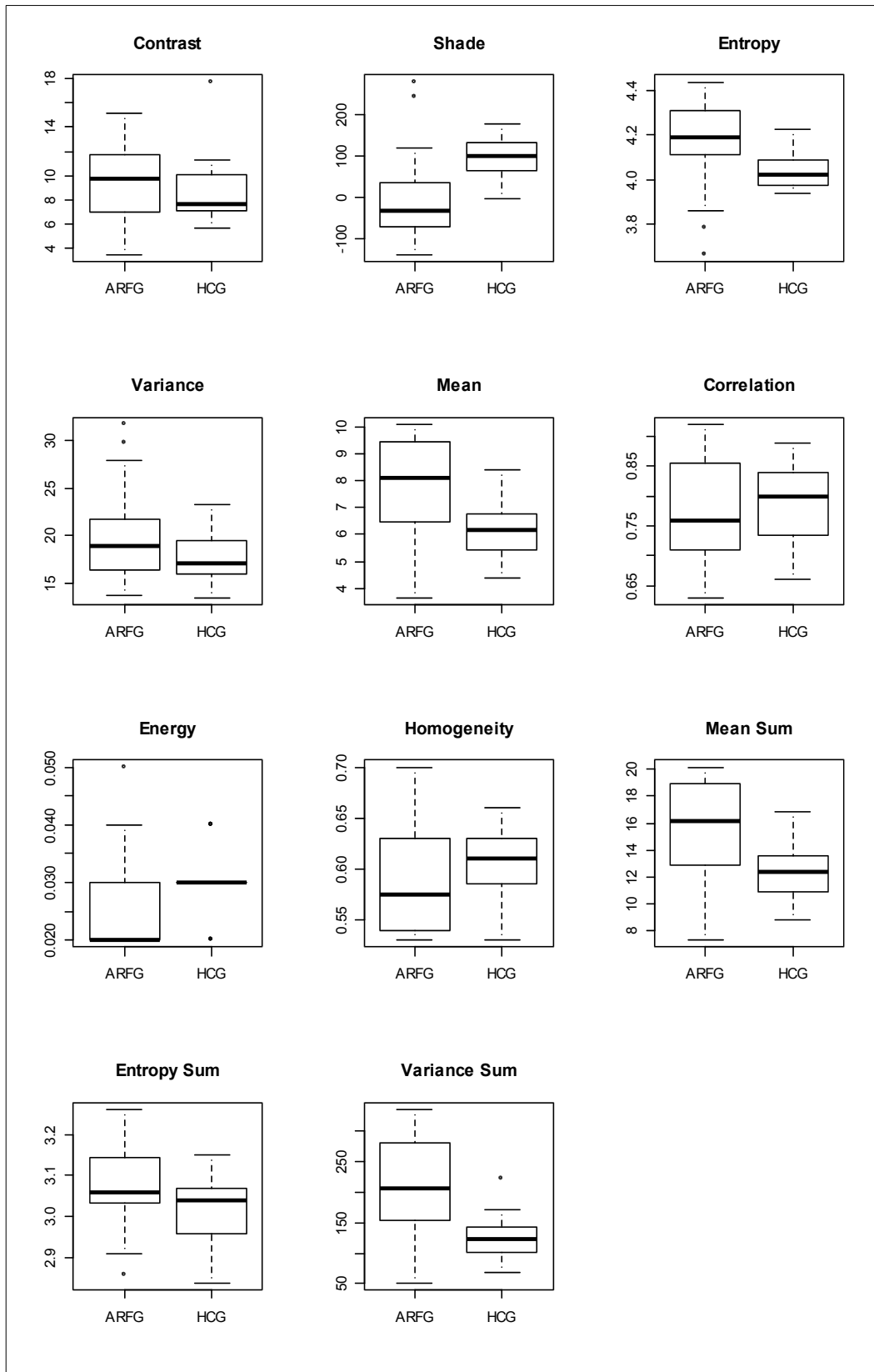
# ELECTRONIC SUPPLEMENTARY MATERIAL

## Second-order grey-scale texture analysis of pleural ultrasound images to differentiate acute respiratory distress syndrome and cardiogenic pulmonary edema

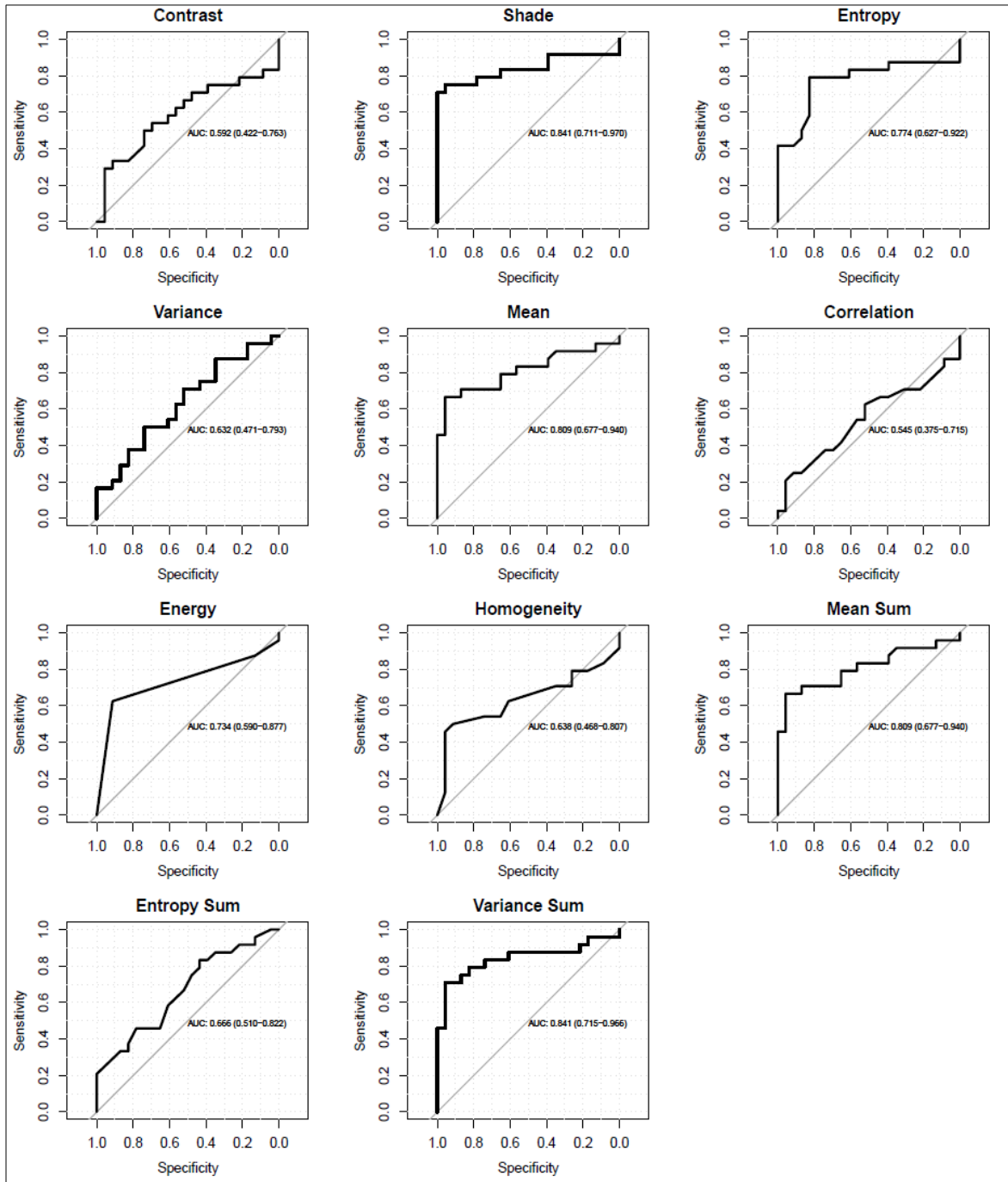
Claudia Brusasco, Gregorio Santori, Guido Tavazzi, Gabriele Via, Chiara Robba, Luna Gargani, Francesco Mojoli, Silvia Mongodi, Elisa Bruzzo, Rosella Trò, Patrizia Boccacci, Alessandro Isirdi, Francesco Forfori, Francesco Corradi and the UCARE (Ultrasound in Critical care and Anesthesia Research Group).

### Table of Contents

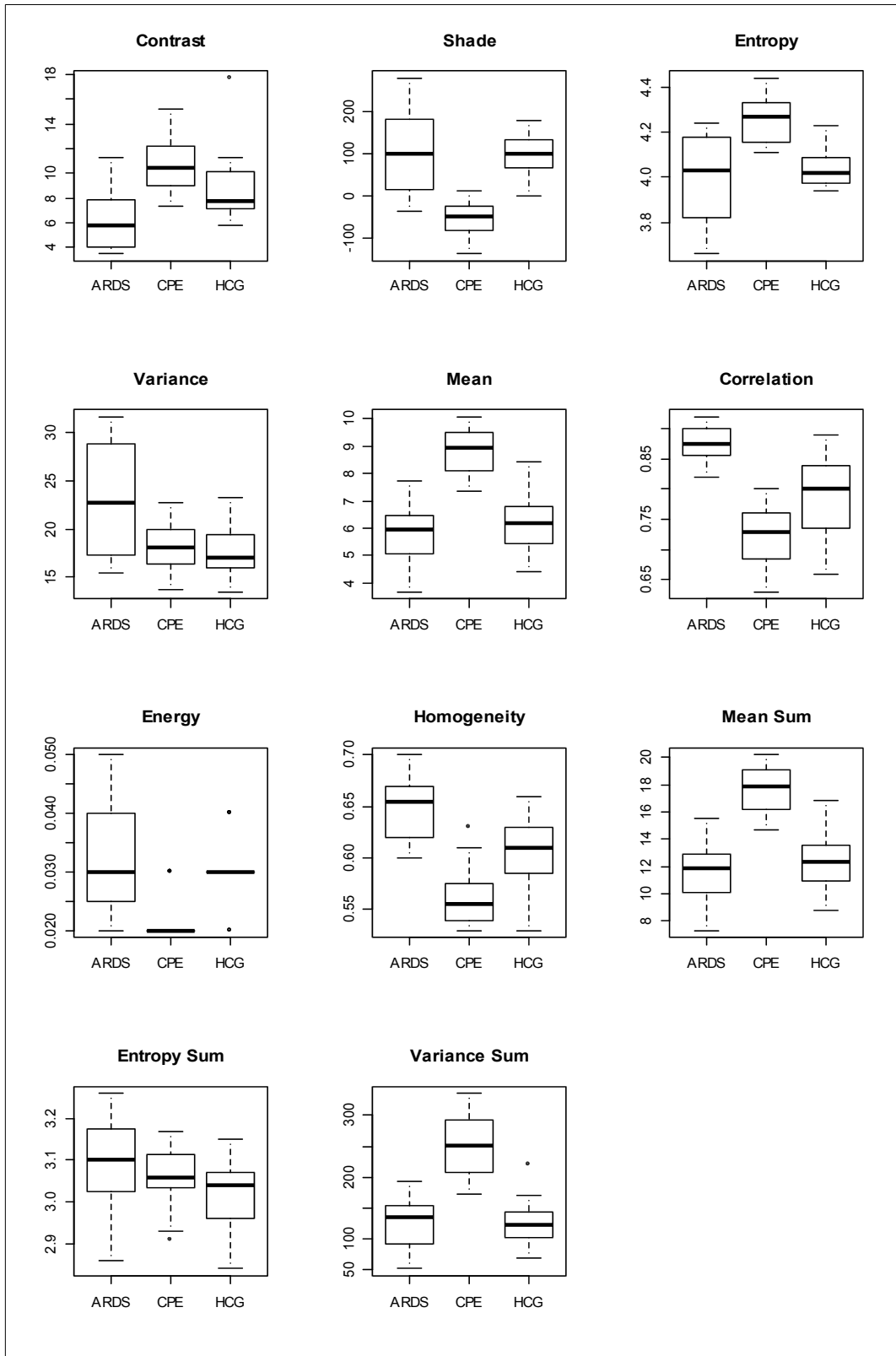
<b>ESM Figure 1</b>	Box plots for comparison of each texture feature between acute respiratory failure group (ARFG) and healthy control group (HCG). [p. 2]
<b>ESM Figure 2</b>	ROC curves of texture features in differentiating healthy controls and acute respiratory failure patients. [p. 3]
<b>ESM Figure 3</b>	Box plots for comparison of each texture feature between patients with acute respiratory distress syndrome (ARDS), cardiogenic pulmonary edema (CPE) and healthy control group (HCG). [p. 4]
<b>ESM Figure 4</b>	Box plots for comparison of each texture feature between patients with acute respiratory distress syndrome (ARDS) and cardiogenic pulmonary edema (CPE). [p. 5]
<b>ESM Table 1</b>	Comparison of texture features (mean $\pm$ SD) between healthy controls and acute respiratory failure patients. [p. 6]
<b>ESM Table 2</b>	Diagnostic accuracy of texture features in differentiating healthy controls and acute respiratory failure patients. [p. 7]
<b>ESM Table 3</b>	Comparison of texture features (mean $\pm$ SD) between acute respiratory failure patient subgroups and healthy control group. [p. 8]
<b>ESM Table 4</b>	Comparison of texture features between acute respiratory failure patient subgroups and healthy control group: <i>Post-hoc</i> test for the significant one-way ANOVA models. [p. 9]



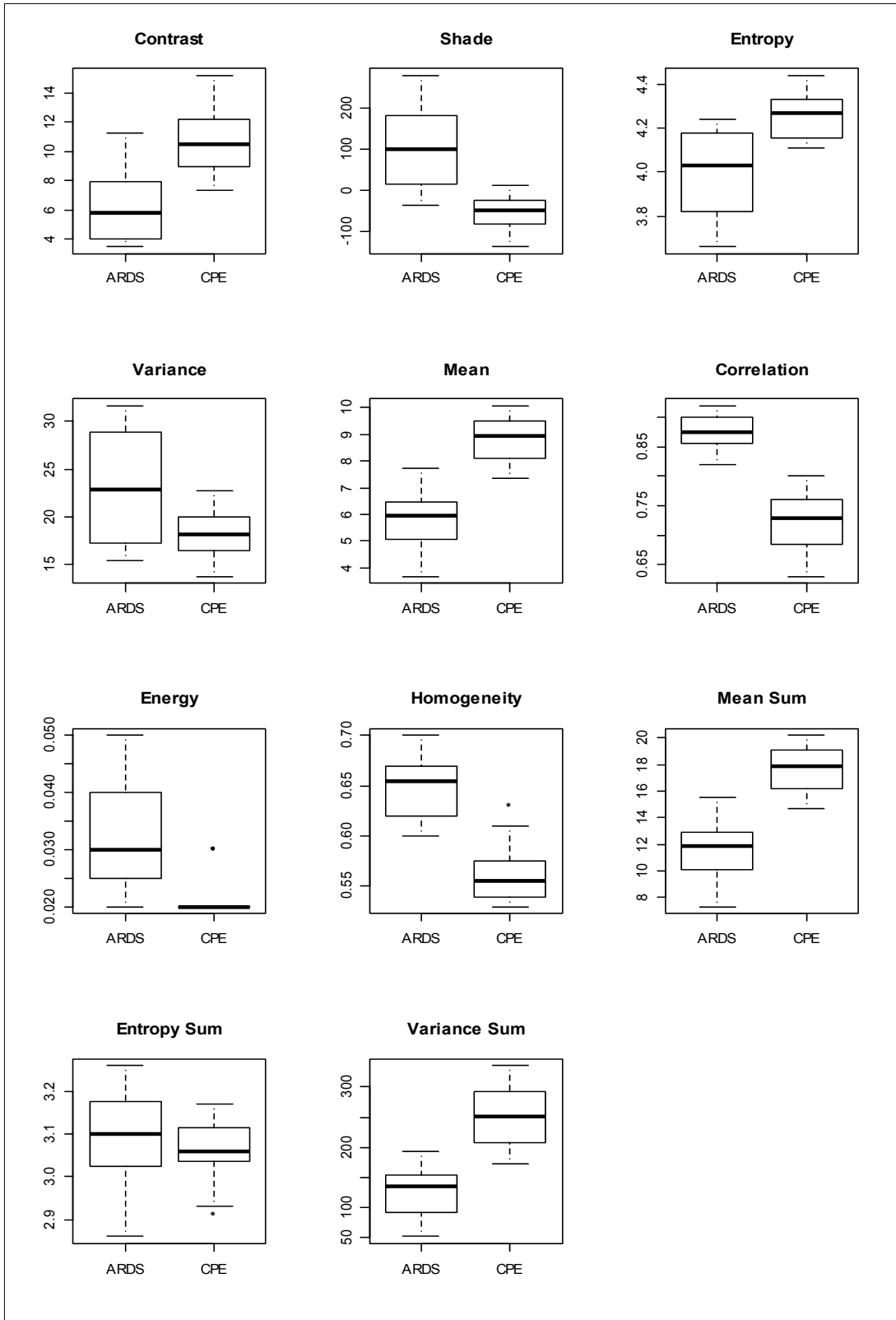
**ESM Figure 1.** Box plots for comparison of each texture feature between acute respiratory failure group (ARFG) and healthy control group (HCG).



**ESM Figure 2.** ROC curves of texture features in differentiating healthy controls and acute respiratory failure patients.



**ESM Figure 3.** Box plots for comparison of each texture feature between patients with acute respiratory distress syndrome (ARDS), cardiogenic pulmonary edema (CPE) and healthy control group (HCG).



**ESM Figure 4.** Box plots for comparison of each texture feature between patients with acute respiratory distress syndrome (ARDS) and cardiogenic pulmonary edema (CPE).

**ESM Table 1.** Comparison of texture features (mean  $\pm$  SD) between healthy controls and acute respiratory failure patients.

<b>GLCM Feature</b>	<b>ARFG (n = 24)</b>	<b>HCG (n = 23)</b>	<b><i>p</i></b>
Contrast	9.24 $\pm$ 3.20	8.72 $\pm$ 2.60	0.544
Cluster Shade	- 2.77 $\pm$ 106.40	97.41 $\pm$ 47.31	<0.001
Entropy	4.16 $\pm$ 0.19	4.05 $\pm$ 0.09	0.008
Variance	19.92 $\pm$ 4.59	17.80 $\pm$ 2.77	0.062
Mean	7.84 $\pm$ 1.79	6.05 $\pm$ 1.08	<0.001
Correlation	0.78 $\pm$ 0.08	0.79 $\pm$ 0.06	0.801
Energy	0.02 $\pm$ 0.01	0.03 $\pm$ 0.01	0.017
Homogeneity	0.59 $\pm$ 0.05	0.61 $\pm$ 0.03	0.165
Mean Sum	15.68 $\pm$ 3.57	12.10 $\pm$ 2.15	<0.001
Entropy Sum	3.07 $\pm$ 0.09	3.01 $\pm$ 0.09	0.045
Variance Sum	209.80 $\pm$ 78.43	122.75 $\pm$ 36.91	<0.001

GLCM Features: gray level co-occurrence matrices; ARFG: acute respiratory failure group; HCG: healthy control group.

**ESM Table 2.** Diagnostic accuracy of texture features in differentiating healthy controls and acute respiratory failure patients.

<b>GLCM Feature</b>	<b>AUROC</b>	<b>CI</b>	<b>Cut-off</b>	<b>Sensitivity</b>	<b>Specificity</b>	<b><i>p</i></b>
Contrast	0.592	0.422-0.763	11.270	0.957	0.292	0.278
Cluster Shade	0.841	0.711-0.970	-1.530	1.000	0.708	<0.001
Entropy	0.774	0.627-0.922	4.105	0.826	0.792	0.001
Variance	0.632	0.471-0.793	19.195	0.739	0.500	0.120
Mean	0.809	0.677-0.940	7.580	0.957	0.667	<0.001
Correlation	0.545	0.375-0.715	0.695	0.957	0.208	0.782
Energy	0.734	0.590-0.877	0.025	0.913	0.625	0.001
Homogeneity	0.638	0.468-0.807	0.565	0.957	0.458	0.097
Mean Sum	0.809	0.677-0.940	15.165	0.957	0.667	<0.001
Entropy Sum	0.666	0.510-0.822	3.015	0.435	0.833	0.050
Variance Sum	0.841	0.715-0.966	171.12	0.957	0.708	<0.001

GLCM Feature: gray level co-occurrence matrices; AUROC: area under receiver operating curve; CI: confidence intervals; *p*, statistical significance of each ROC curve.

**ESM Table 3.** Comparison of texture features (mean  $\pm$  SD) between acute respiratory failure patient subgroups and healthy control group.

<b>GLCM Feature</b>	<b>ARDS (n = 8)</b>	<b>CPE (n = 16)</b>	<b>HCG (n = 23)</b>	<b><i>p</i></b>
Contrast	6.27 $\pm$ 2.76	10.72 $\pm$ 2.26	8.72 $\pm$ 2.60	<0.001
Cluster Shade	104.13 $\pm$ 114.69	- 56.22 $\pm$ 45.58	97.41 $\pm$ 47.31	<0.001
Entropy	4.00 $\pm$ 0.21	4.26 $\pm$ 0.11	4.05 $\pm$ 0.09	<0.001
Variance	23.11 $\pm$ 6.24	18.32 $\pm$ 2.46	17.80 $\pm$ 2.77	0.092
Mean	5.79 $\pm$ 1.26	8.87 $\pm$ 0.89	6.05 $\pm$ 1.08	<0.001
Correlation	0.88 $\pm$ 0.03	0.74 $\pm$ 0.06	0.79 $\pm$ 0.06	<0.001
Energy	0.03 $\pm$ 0.01	0.02 $\pm$ 0.01	0.03 $\pm$ 0.01	<0.001
Homogeneity	0.65 $\pm$ 0.04	0.56 $\pm$ 0.03	0.61 $\pm$ 0.03	<0.001
Mean Sum	11.58 $\pm$ 2.53	17.73 $\pm$ 1.77	12.10 $\pm$ 2.15	<0.001
Entropy Sum	3.09 $\pm$ 0.13	3.06 $\pm$ 0.07	3.01 $\pm$ 0.09	0.131
Variance Sum	125.30 $\pm$ 45.16	252.05 $\pm$ 52.62	122.75 $\pm$ 36.91	<0.001

GLCM Feature: gray level co-occurrence matrix; ARDS: acute respiratory distress syndrome; CPE: cardiogenic pulmonary edema; HCG: healthy control group.



**ESM Table 4.** Comparison of texture features between acute respiratory failure patient subgroups and healthy control group: *Post-hoc* test for the significant one-way ANOVA models.

<b>GMLC Feature</b>	<b><i>p</i></b>		
		<b>ARDS</b>	<b>CPE</b>
Contrast	<b>CPE</b>	<0.001	–
	<b>HCG</b>	0.071	<0.001
Cluster Shade	<b>CPE</b>	<0.001	–
	<b>HCG</b>	0.667	<0.001
Entropy	<b>CPE</b>	<0.001	–
	<b>HCG</b>	0.976	<0.001
Mean	<b>CPE</b>	<0.001	–
	<b>HCG</b>	0.820	<0.001
Correlation	<b>CPE</b>	<0.001	–
	<b>HCG</b>	0.005	0.013
Energy	<b>CPE</b>	0.001	–
	<b>HCG</b>	0.909	<0.001
Homogeneity	<b>CPE</b>	<0.001	–
	<b>HCG</b>	0.048	<0.001
Mean Sum	<b>CPE</b>	<0.001	–
	<b>HCG</b>	0.821	<0.001
Variance Sum	<b>CPE</b>	<0.001	–
	<b>HCG</b>	0.783	<0.001

GMLC Feature: gray level co-occurrence matrices; ARDS: acute respiratory distress syndrome; CPE: cardiogenic pulmonary edema; HCG: healthy control group.