

## Supplementary methods

### Myocardial texture features

Two categories of texture features were investigated in the research, namely first-order statistics features and gray level co-occurrence matrix (GLCM) features.

#### First-order statistics

First-order statistics features are a series of characteristics that describe the general distribution of pixel brightness within the region of interest (ROI) and the comparison with control areas. Seventeen features were involved in our study, as listed in *Table S1*.

Histogram entropy (EtHis) and brightness entropy (EtBrt) are two important features of this category. EtHis represents general characteristics of images. A large EtHis value suggests vagueness and uncertainty of the image. It is derived from the following equation:

$$EtHis = -\sum_{i=0}^{255} p_i \log_2(p_i) \quad [1]$$

In this equation,  $P_i$  represents the probability of level  $i$  grayscale in the specific image ( $i$  from 0 to 255). There are 256 levels of grayscale, from 0 to 255.

The equation for another feature EtBrt is as follows:

$$EtBrt = -\sum_{i=1}^N \frac{a_i \log_2 a_i}{\log_2(N)} \quad [2]$$

In this equation,

$$a_i = \frac{H_i}{\sum_{i=1}^N H_i} \quad [3]$$

$N$  is the total number of pixels within the ROI,  $H_i$  is the level of grayscale of pixel  $i$  ( $i \leq N$ ), and  $a_i$  stands for the pixel value after normalization.

### GLCM features

The second category GLCM features were initially proposed by Haralick in 1973. Unlike first-order statistics features, GLCM not only focuses on overall grayscale amplitudes of the pixels, but also their spatial correlations. GLCM means the probability of cooccurrence of two pixels with a distance of  $d$  and in the direction of  $\theta$ . An element of the GLCM  $G(i, j, d, \theta)$  represents the times of occurrence of a certain combination of two pixels. In this study, the 256 levels of grayscale were simplified to eight levels to reduce

computation, resulting in  $8 \times 8$  grayscale cooccurrence matrix  $G(i, j)$  ( $i = 1, 2, \dots, 8; j = 1, 2, \dots, 8$ ). Then the matrix of probability  $p(i, j)$  was obtained through normalization of  $G(i, j)$ . The distance ( $d$ ) was set as 1, 2, 3, ..., 15 pixels, and the direction  $\theta$  was 0, 45, 90 and 135 degrees. Finally, the texture features of distance  $d$  in four directions were averaged and regarded as the result.

There were four types of GLCM features studied in our research, namely Energy (E), Contrast (Cont), Entropy (Et) and Homogeneity (Hm). Each type contains 15 values ( $d = 1, 2, 3, \dots, 15$  pixels), making a total of 60 features, namely E1 to E15, Cont1 to Cont15, Et1 to Et15, and Hm1 to Hm15.

Energy (E) is also named as angular second moment (ASM). It is the sum of the value of each GLCM element squared:

$$E = \sum_{i=1}^8 \sum_{j=1}^8 p(i, j)^2 \quad [4]$$

Energy measures the uniformity and texture roughness of pixel intensity distribution. A larger E value indicates rough texture.

Contrast (Cont) reflects local variation of grayscale values. Greater Cont indicates greater change in pixel brightness, and higher clarity of the image. The equation to yield Cont is as follows:

$$Cont = \sum_{i=1}^8 \sum_{j=1}^8 |i - j|^2 p(i, j) \quad [5]$$

Entropy (Et) manifests the amount of information within the ROI. It reflects complexity and nonuniformity of the image. A larger Et value suggests greater heterogeneity of the image.

$$Et = -\sum_{i=1}^8 \sum_{j=1}^8 p(i, j) \log_2 p(i, j) \quad [6]$$

Homogeneity (Hm) is a feature that measures focal texture changes. It reflects similarity and uniformity of the texture within the image. Greater Hm means less change of the texture.

$$Hm = \sum_{i=1}^8 \sum_{j=1}^8 \frac{p(i, j)}{1 + |i - j|} \quad [7]$$

## Supplementary results

### Statistics of myocardial texture features

Among all the textural features, EtHis, EtBrt, Std, CoV, Skew, Cont7, E11, Hm5 and Et3 showed statistical

significance in intergroup comparisons. The threshold of classification was determined for these nine features according to Youden Index. The results and diagnostic

sensitivity, specificity, accuracy, and AUC were listed in *Tables S2,S3,S4,S5,S6,S7*.

**Table S1** First-order statistics features

Features	Features (abbreviations)	Full term/definition
ROI	IMean	Mean
	IMedia	Median
	Std	Standard deviation
	CoV	Coefficient of variation
	Skew	Skewness
	Kurt	Kurtosis
	EtHis	Histogram entropy
	EtBrt	Brightness entropy
ROI/ctrl ratio	RImedian	ROI/ctrl ratio of median brightness
	RImax	ROI/ctrl ratio of maximum brightness
	RImean	ROI/ctrl ratio of mean brightness
	RImedian_quantl90	ROI median/ctrl 90% quantile
	RImedian_quantl95	ROI median/ctrl 95% quantile
	RImean_quantl90	ROI mean/ctrl 90% quantile
	RImean_quantl95	ROI mean/ctrl 95% quantile
	RIquantl90	ROI 90% quantile/ctrl 90% quantile
RIquantl95	ROI 95% quantile/ctrl 95% quantile	

Ctrl, area of control.

**Table S2** Diagnostic accuracy of texture features in differentiating HCM from the others

Features	Cutoff	Sen	Spc	Acc	YI	AUC
EtHis	7.15	0.62	0.83	0.76	0.45	0.76
EtBrt	0.99	0.82	0.86	0.84	0.68	0.87
Std	40.75	0.76	0.71	0.73	0.47	0.78
CoV	0.30	0.78	0.88	0.84	0.66	0.87
Skew	-0.28	0.54	0.74	0.67	0.28	0.68
Cont7	4.19	0.74	0.63	0.67	0.37	0.70
E11	0.04	0.64	0.69	0.67	0.33	0.69
Hm5	0.54	0.62	0.70	0.67	0.32	0.68
Et3	4.87	0.66	0.64	0.65	0.30	0.65

HCM, hypertrophic cardiomyopathy; Sen, sensitivity; Spc, specificity; Acc, accuracy; YI, Youden index; AUC, area under the receiver operating characteristic curve.

**Table S3** Diagnostic accuracy of texture features in differentiating HHD from the others

Features	Cutoff	Sen	Spc	Acc	YI	AUC
EtHis	7.15	0.82	0.40	0.54	0.22	0.60
EtBrt	0.99	0.86	0.50	0.62	0.36	0.61
Std	40.10	0.72	0.49	0.57	0.21	0.60
CoV	0.29	0.88	0.46	0.61	0.34	0.60
Skew	-0.27	0.74	0.43	0.54	0.17	0.55
Cont7	4.19	0.68	0.60	0.63	0.28	0.60
E11	0.04	0.54	0.68	0.63	0.22	0.59
Hm5	0.52	0.62	0.66	0.65	0.28	0.60
Et3	5.04	0.50	0.72	0.65	0.22	0.59

HHD, hypertensive heart disease; Sen, sensitivity; Spc, specificity; Acc, accuracy; YI, Youden index; AUC, area under the receiver operating characteristic curve.

**Table S4** Diagnostic accuracy of texture features in differentiating UCM from the others

Features	Cutoff	Sen	Spc	Acc	YI	AUC
EtHis	7.19	0.46	0.81	0.57	0.27	0.66
EtBrt	0.99	0.82	0.62	0.76	0.44	0.77
Std	40.93	0.55	0.75	0.61	0.30	0.69
CoV	0.35	0.72	0.70	0.71	0.42	0.77
Skew	0.23	0.85	0.38	0.70	0.23	0.63
Cont7	5.26	0.86	0.32	0.69	0.18	0.60
E11	0.04	0.52	0.72	0.59	0.24	0.60
Hm5	0.50	0.85	0.36	0.69	0.21	0.58
Et3	4.87	0.53	0.68	0.58	0.21	0.57

UCM, uremic cardiomyopathy; Sen, sensitivity; Spc, specificity; Acc, accuracy; YI, Youden index; AUC, area under the receiver operating characteristic curve.

**Table S5** Diagnostic accuracy of texture features in differentiating HHD and HCM

Features	Cutoff	Sen	Spc	Acc	YI	AUC
EtHis	7.15	0.62	0.82	0.72	0.44	0.74
EtBrt	0.99	0.82	0.86	0.84	0.68	0.86
Std	41.01	0.76	0.68	0.72	0.44	0.76
CoV	0.30	0.78	0.88	0.83	0.66	0.85
Skew	-0.26	0.56	0.74	0.65	0.30	0.66
Cont7	4.22	0.74	0.68	0.71	0.42	0.70
E11	0.04	0.80	0.54	0.67	0.34	0.68
Hm5	0.52	0.76	0.62	0.69	0.38	0.69
Et3	4.99	0.74	0.56	0.65	0.30	0.65

HHD, hypertensive heart disease; HCM, hypertrophic cardiomyopathy; Sen, sensitivity; Spc, specificity; Acc, accuracy; YI, Youden index; AUC, area under the receiver operating characteristic curve.

**Table S6** Diagnostic accuracy of texture features in differentiating HCM and UCM

Features	Cutoff	Sen	Spc	Acc	YI	AUC
EtHis	7.19	0.66	0.81	0.73	0.47	0.77
EtBrt	0.99	0.82	0.85	0.84	0.67	0.88
Std	40.93	0.76	0.75	0.75	0.51	0.81
CoV	0.23	0.78	0.87	0.83	0.65	0.89
Skew	0.03	0.80	0.51	0.66	0.31	0.70
Cont7	4.19	0.74	0.57	0.66	0.31	0.69
E11	0.04	0.64	0.72	0.68	0.36	0.69
Hm5	0.54	0.62	0.70	0.66	0.32	0.66
Et3	4.87	0.66	0.68	0.67	0.34	0.66

HCM, hypertrophic cardiomyopathy; UCM, uremic cardiomyopathy; Sen, sensitivity; Spc, specificity; Acc, accuracy; YI, Youden index; AUC, area under the receiver operating characteristic curve.

**Table S7** Diagnostic accuracy of texture features in differentiating HHD and UCM

Features	Cutoff	Sen	Spc	Acc	YI	AUC
EtHis	7.46	0.88	0.26	0.58	0.14	0.55
EtBrt	0.99	0.70	0.62	0.66	0.32	0.65
Std	52.39	0.96	0.19	0.59	0.15	0.57
CoV	0.38	0.76	0.55	0.66	0.31	0.66
Skew	0.23	0.78	0.38	0.59	0.16	0.56
Cont7	4.25	0.64	0.51	0.58	0.15	0.50
E11	0.04	0.46	0.64	0.55	0.20	0.49
Hm5	0.52	0.62	0.55	0.59	0.17	0.50
Et3	5.04	0.50	0.66	0.58	0.16	0.52

HHD, hypertensive heart disease; UCM, uremic cardiomyopathy; Sen, sensitivity; Spc, specificity; Acc, accuracy; YI, Youden index; AUC, area under the receiver operating characteristic curve.