

# Different measurements of cardiac shadow in HRCT can differentiate COPD from 'normal' patients

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## Background

Dimensions of different heart chambers and great vessels may be influenced by lung diseases. Understanding those changes in CT scan may appear useful.

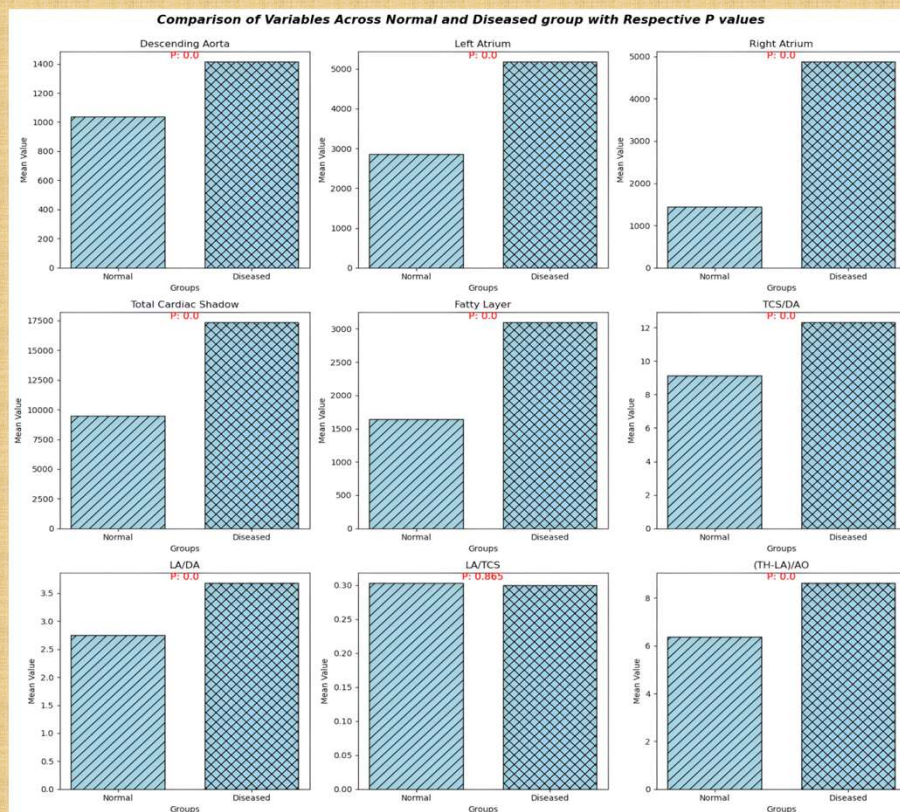
## Methods

Cardiac structures including total cardiac shadow (TCS), area of fat (FL), Left Atrium (LA), Right Atrium (RA), Descending Aorta (DA) were measured by 'ImageJ' at three levels in the transverse sections of the mediastinal lung window (hila, right pulmonary artery and at the maximum dimension of RA). The average of the measurements was noted for calculation. CT scan of COPD and normal 'surrogates' (clinically having no active lung diseases) are taken. The different areas and their ratios were captured between two groups.

## Results

We included normal 'surrogates' (n = 19) & COPD patients (n = 30) having increased dimension of DA ( $1040.105 \pm 27.213$  vs.  $1412 \pm 88.374$ ;  $P = 0.0000...292$ ), LA ( $2874.053 \pm 222.737$  vs.  $5173.133 \pm 531.412$ ;  $P = 0.0000...299$ ), RA ( $1428.684 \pm 164.305$  vs.  $4870.267 \pm 1007.289$ ;  $P = 0.0000...299$ ), TCS ( $9402.737 \pm 751.386$  vs.  $17329.533 \pm 1360.238$ ;  $P = 0.0000...299$ ), FL ( $1661.421 \pm 201.874$  vs.  $3092.667 \pm 685.181$ ;  $P = 0.0000...542$ ), TCS/DA ( $9.041 \pm 0.712$  vs.  $12.294 \pm 0.922$ ;  $P = 0$ ), LA/DA ( $2.761 \pm 0.174$  vs.  $3.677 \pm 0.435$ ;  $P = 0.0000...892$ ), (TCS-LA)/DA ( $6.28 \pm 0.735$  vs.  $8.617 \pm 0.837$ ;  $P = 0.0000...664$ )

Normal Patient									
	DA	LA	RA	TCS	FL	TCS/DA	LA/DA	LA/TCS	(TCS-LA)/DA
Mean	1040.105	2874.053	1428.684	9402.737	1661.421	9.041	2.761	0.307	6.28
Std	27.213	222.737	164.305	751.386	201.874	0.712	0.174	0.032	0.735
Diseased Patient									
	DA	LA	RA	TCS	FL	TCS/DA	LA/DA	LA/TCS	(TCS-LA)/DA
Mean	1412	5173.133	4870.267	17329.533	3092.667	12.294	3.677	0.299	8.617
Std	88.374	531.412	1007.289	1360.238	685.181	0.922	0.435	0.032	0.837
Dimensions of different heart chambers and their different ratios									



Comparison of different heart chamber dimensions and their ratios across normal and diseased group with respective P values

DA = Descending Aorta; RA = Right Atrium; LA = Left Atrium; TCS = Total Cardiac Shadow; FL = Fatty Layer surrounding heart

## Conclusion

Cardiovascular measurements in CT chest vary in normal 'surrogates' and COPD. This area needs more research to identify COPD specific morphological characteristics.

## References

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- Johnson, R., et al. (2017). "Changes in the Hila and Left Pulmonary Artery in COPD and COPD PH."
- Doe, A., et al. (2018). "The significance of heart chamber sizes in COPD".