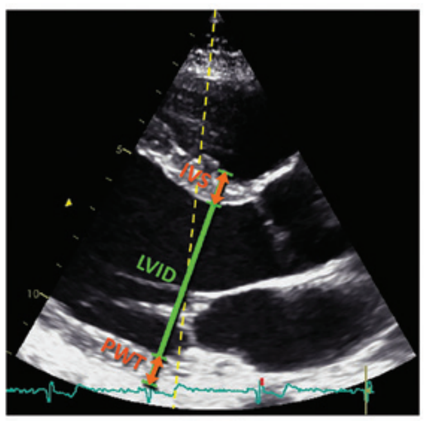
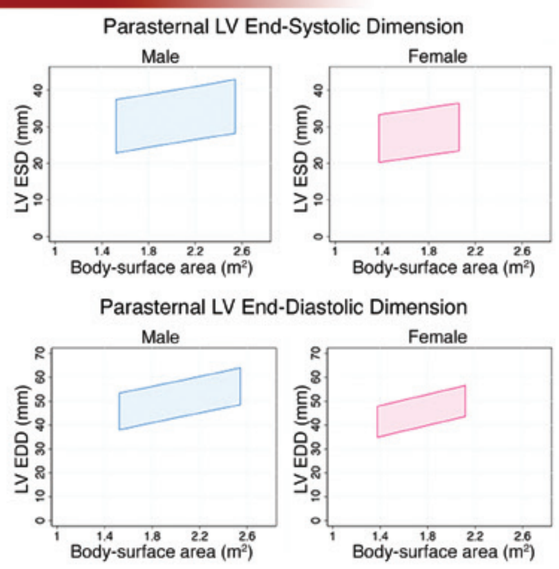
Guidelines for Chamber Quantification of the Left Heart

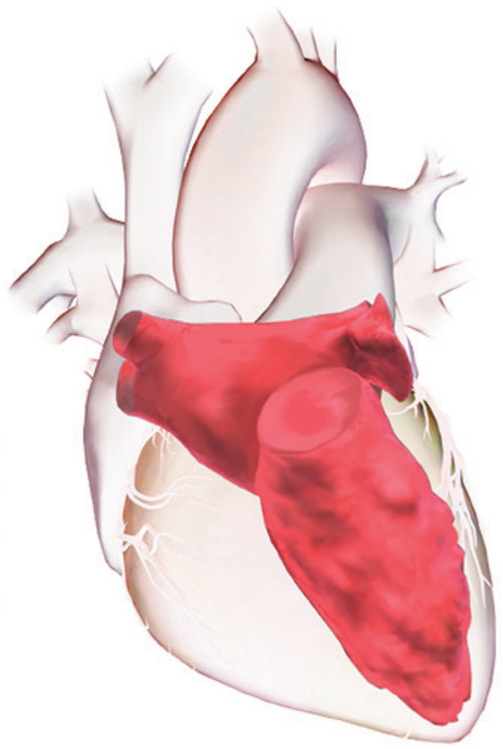
ASE American Society of Echocardiography

LV Dimensions



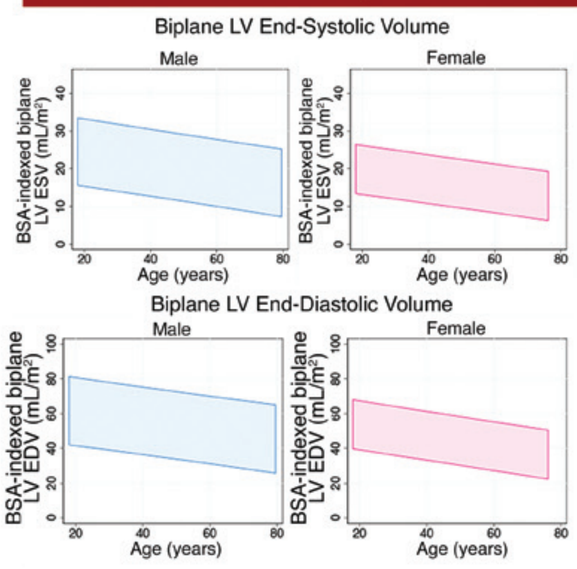
2D-guided linear measurements

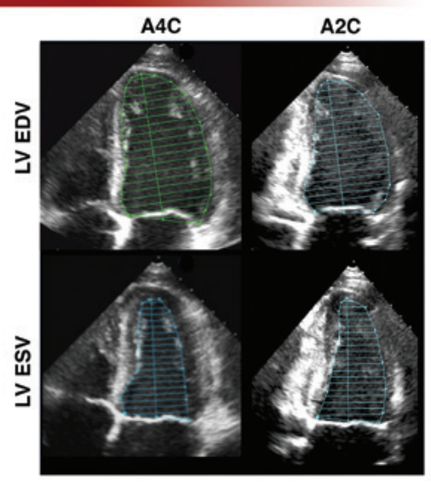




LV internal dimension	Male Mean ± SD	Male 2-SD Range	Female Mean ± SD	Female 2-SD Range
Diastolic dimension (mm)	50.2 ± 4.1	42.0 - 58.4	45.0 ± 3.6	37.8 - 52.2
Systolic dimension (mm)	32.4 ± 3.7	25.0 - 39.8	28.2 ± 3.3	21.6 - 34.8

LV Volumes by 2D

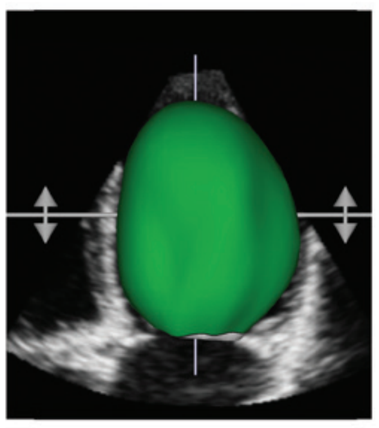




Biplane method of disks

LV volumes normalized by BSA	Male Mean ± SD	Male 2-SD Range	Female Mean ± SD	Female 2-SD Range
LV end-diastolic volume (mL/m²)	54 ± 10	34 - 74	45 ± 8	29 - 61
LV end-systolic volume (mL/m²)	21 ± 5	11 - 31	16 ± 4	8 - 24

LV Volumes by 3D



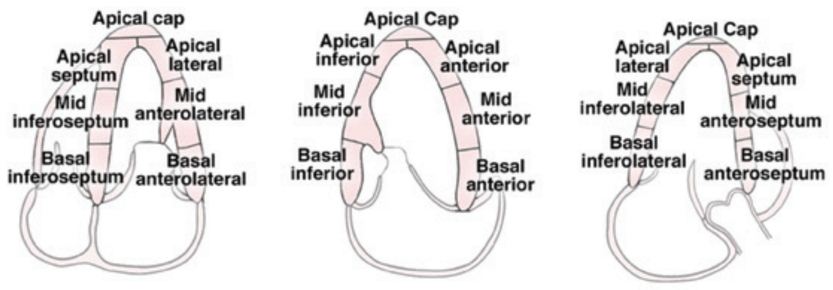
Volumetric measurements

Upper limits of normal

End-diastolic volume:
79 mL/m² for men
71 mL/m² for women

End-systolic volume:
32 mL/m² for men
28 mL/m² for women

LV Segmentation



4-chamber view | 2-chamber view | Long-axis view

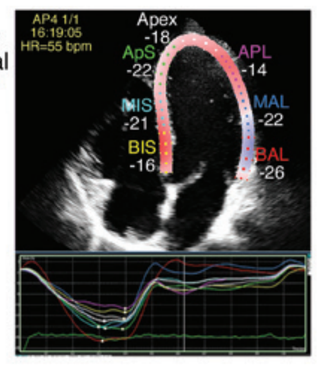
LV Function

Ejection fraction

	Normal range	Mildly abnormal	Moderately abnormal	Severly abnormal
Male	52 - 72	41 - 51	30 - 40	< 30
Female	54 - 74	41 - 53	30 - 40	< 30

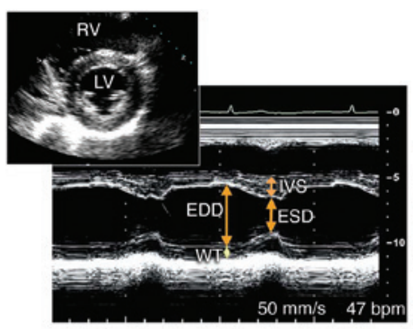
Global longitudinal strain

Peak GLS in the range of -20% can be expected in a healthy person, and the lower the absolute value of strain is, the more likely it is to be abnormal.



LV Mass

Linear method

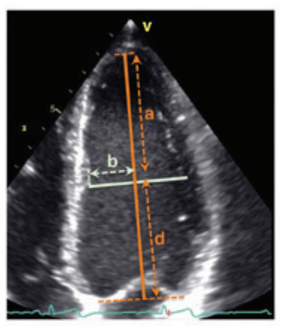


Cube formula
LV mass = 0.8 x 1.04 x
[(IVS+LVID+PWT)³-LVID³] + 0.6 g

	Women	Men
LV mass/BSA (g/m²)	***43-95***	***49-115***
Relative wall thickness (cm)	0.22-0.42	0.24-0.42
Septal thickness (cm)	***0.6-0.9***	***0.6-1.0***
Posterior wall thickness (cm)	***0.6-0.9***	***0.6-1.0***

Bold italic values: recommended and best validated.

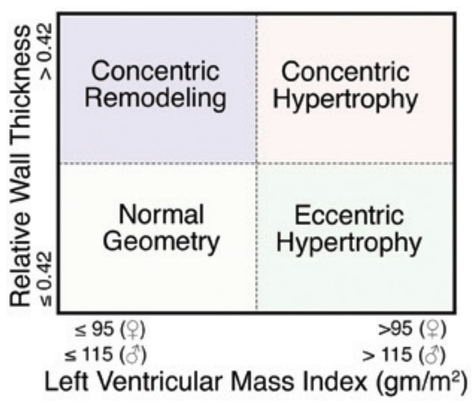
2D Methods



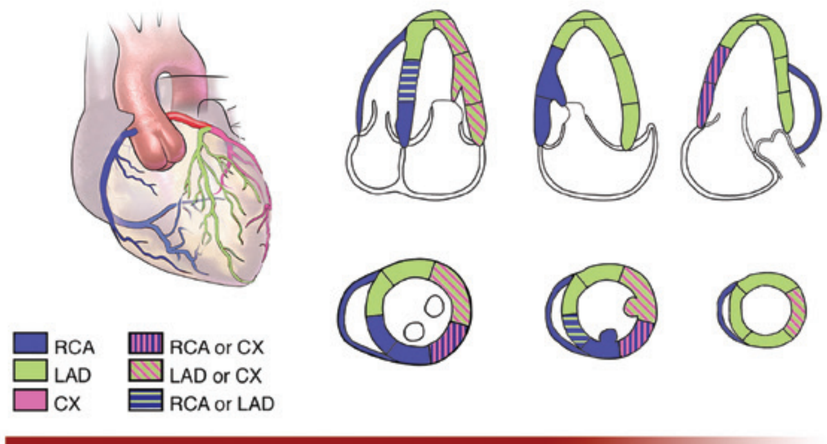
Two methods for estimating LV mass based on area-length formula and the truncated ellipsoid formula, from short axis (top) and apical four-chamber (bottom) 2D echo views.

	Women	Men
LV mass/BSA (g/m²)	***44-88***	***50-102***

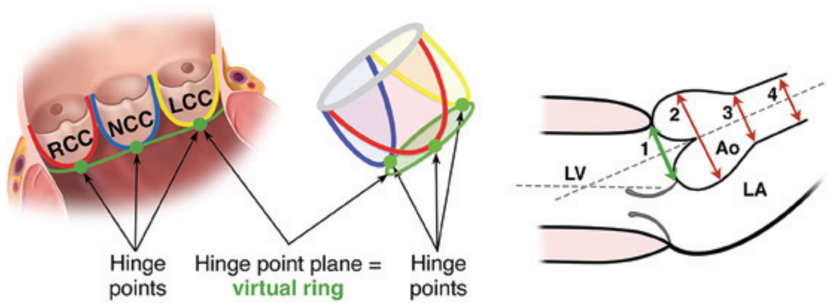
Bold italic values: recommended and best validated.



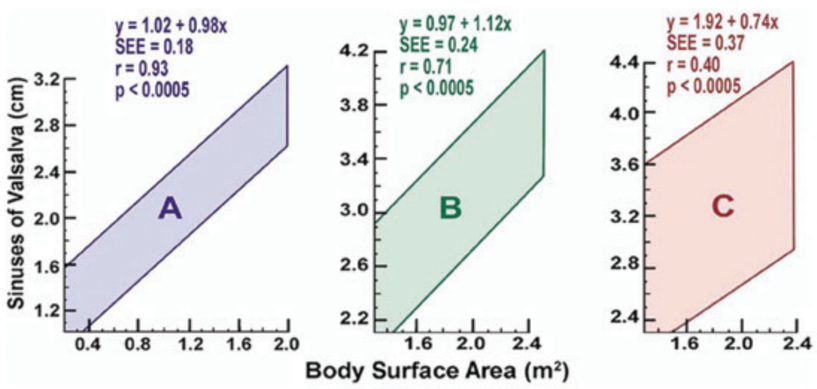
Perfusion Territories



Aortic Root



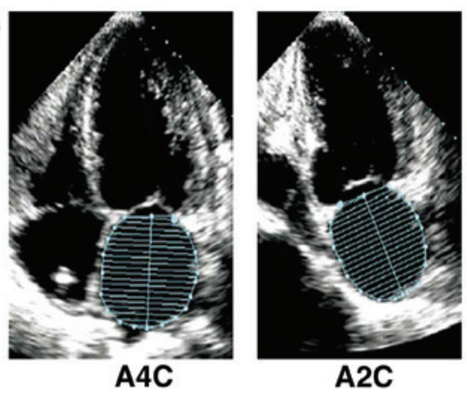
Children and adolescents | Adults 20-39 years | Adults >40 years



LA Volume

Biplane method of disks

Biplane method of disks, using the apical four-chamber (A4C) and apical two-chamber (A2C) views at ventricular end-systole (maximum LA size).

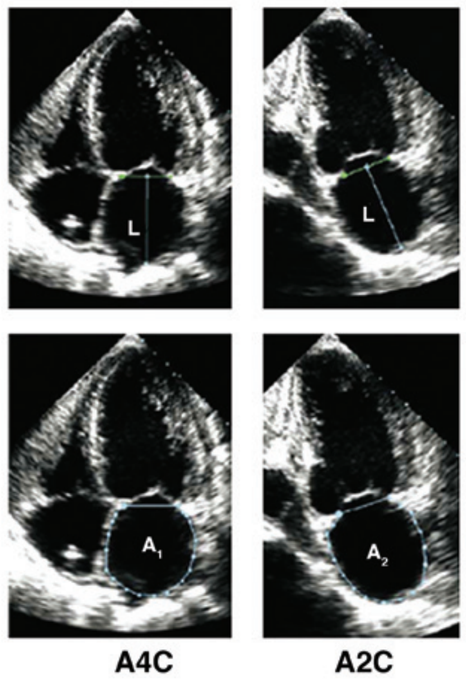


A4C | A2C

Area-length technique

$$\frac{8}{3\pi}\left[\frac{(A_1 - A_2)}{L}\right]$$

Area-length method using the apical four-chamber and apical two-chamber views at ventricular end-systole (maximum LA size). The length (L) is measured from the back wall to the line across the hinge points of the mitral valve. The shorter L from either the A4C or the A2C is used in the equation.



A4C | A2C

	Normal range	Mildly abnormal	Moderately abnormal	Severly abnormal
Maximum LA volume / BSA (mL/m²)	16 - 34	35 - 41	42 - 48	> 48

Lang RM, Badano LP, Mor-Avi V, Afilalo J, Armstrong A, Ernande L, Flachskampf FA, Foster E, Goldstein SA, Kuznetsova T, Lancellotti P, Muraru D, Picard MH, Rietzschel ER, Rudski L, Spencer KT, Tsang W, and Voigt JU; Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging. J Am Soc Echocardiogr 2015; 28:1-39

Poster ordering information and full text of ASE guideline documents available at: www.asecho.org