

MESA Exam 6

Echocardiography

Data Dictionary and Codebook

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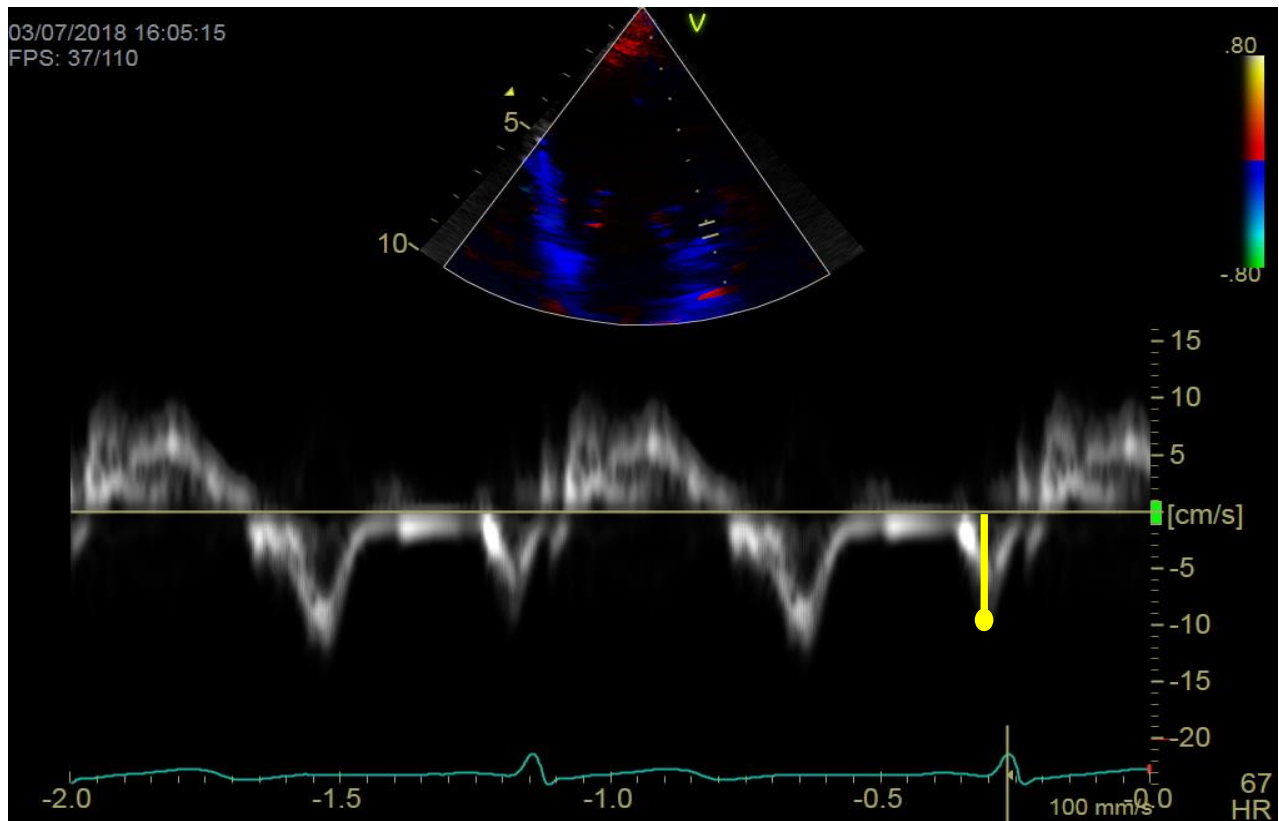
Stone Professor of Medicine
Director, Northwestern University Echocardiography Core Laboratory

Version 5.0, Date: June 7, 2021

Variable name: a_lateral

Definition: Lateral a prime peak velocity

Units: cm/s



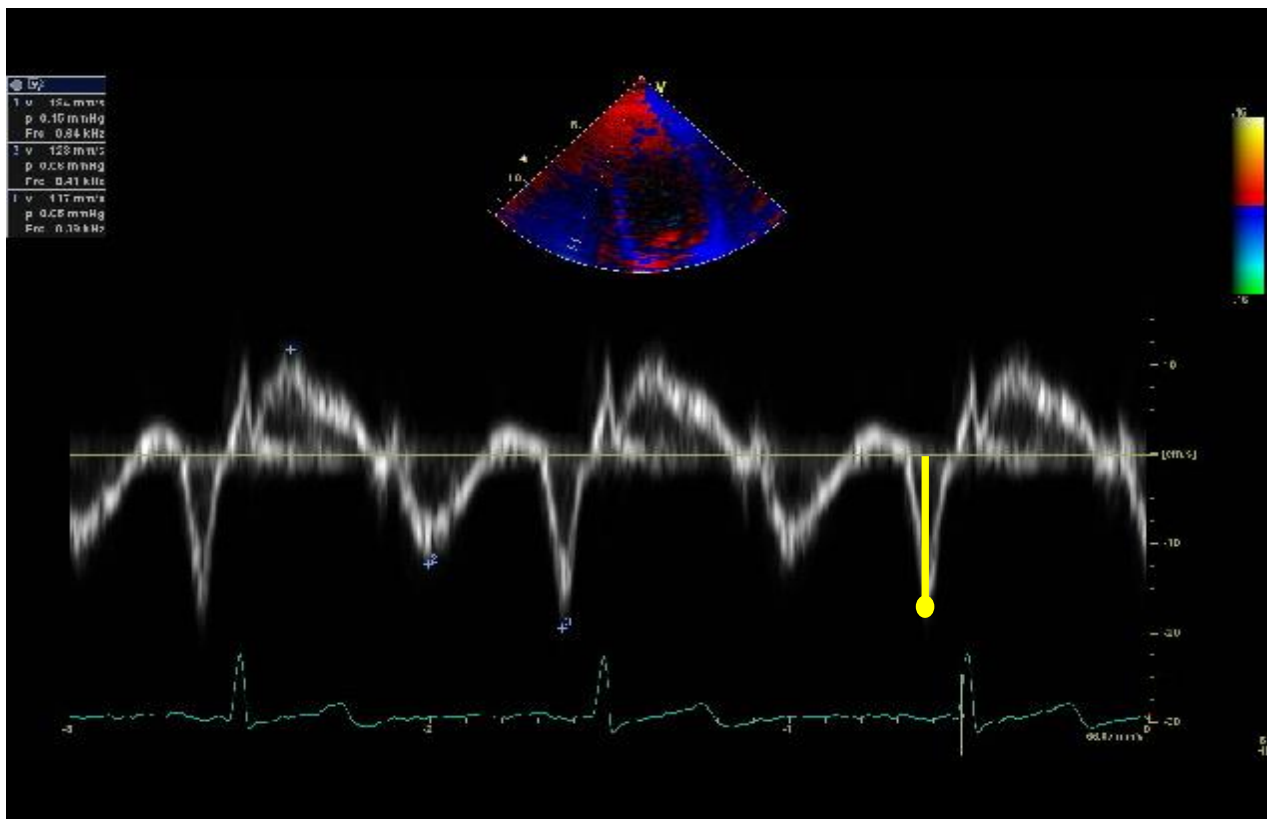
a'_lateral

Percentiles		Smallest		
1%	4.5	2		
5%	7	2.3		
10%	8.1	2.5	Obs	2,933
25%	9.7	2.7	Sum of Wgt.	2,933
50%	11.4	Largest	Mean	11.50453
			Std. Dev.	2.872861
75%	13.3	22.3	Variance	8.253332
90%	15	23	Skewness	.2793437
95%	16.3	23.2	Kurtosis	3.87885
99%	19.2	25		

Variable name: a'_rv

Definition: Right ventricular free wall a prime peak velocity

Units: cm/s



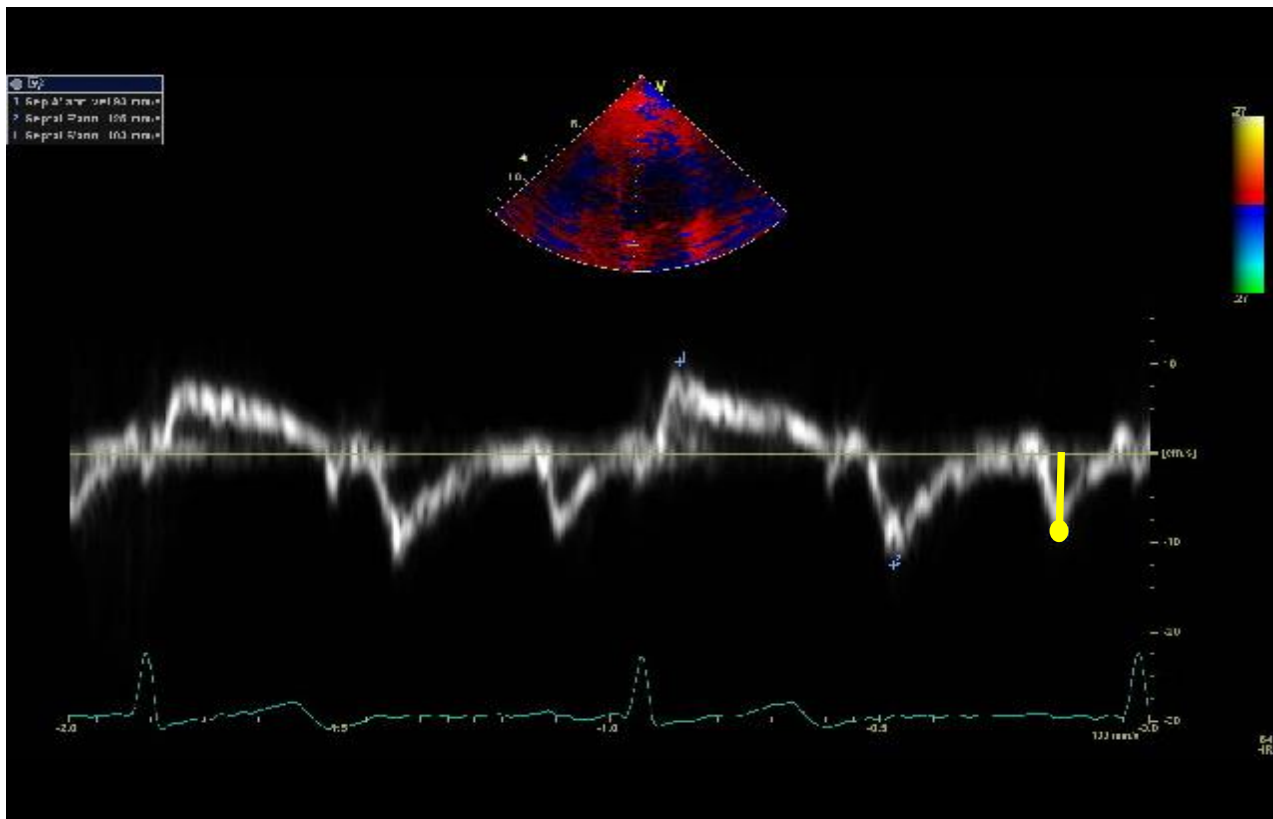
a'_rv

Percentiles			Smallest		
1%	7.1		2.6		
5%	10.1		3.5		
10%	11.5		3.6	Obs	2,824
25%	13.7		4.1	Sum of Wgt.	2,824
50%	16.2			Mean	16.44975
			Largest	Std. Dev.	4.265393
75%	19		38.3		
90%	21.7		39.5	Variance	18.19358
95%	23.7		41.3	Skewness	.6594234
99%	28.2		47.3	Kurtosis	5.29414

Variable name: a_septal

Definition: Septal a prime peak velocity

Units: cm/s



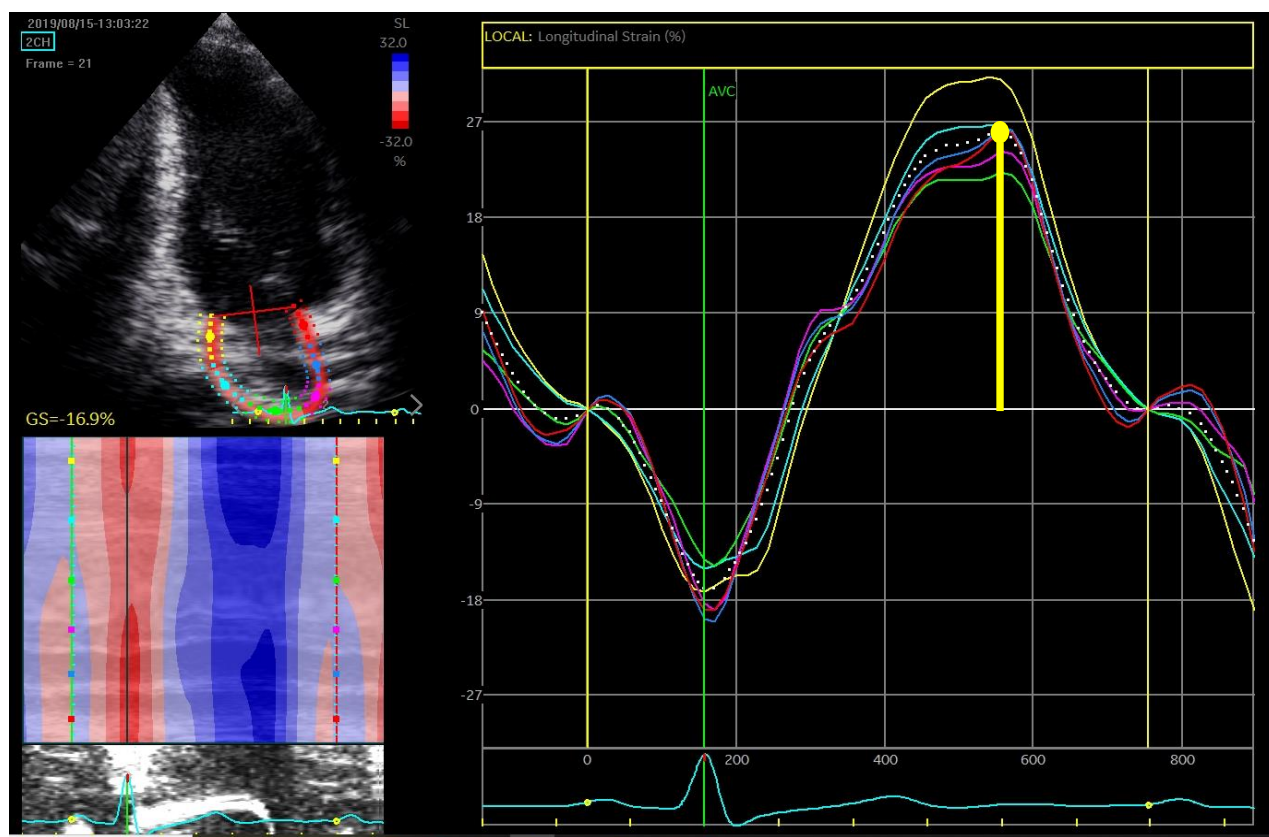
a'_septal

Percentiles		Smallest		
1%	4.6	2.1		
5%	7	2.7		
10%	7.8	2.7	Obs	2,922
25%	9.2	2.7	Sum of Wgt.	2,922
50%	10.6	Largest	Mean	10.56715
			Std. Dev.	2.254264
75%	12	17.9		
90%	13.3	18.6	Variance	5.081707
95%	14.1	18.7	Skewness	-.0425209
99%	16.2	21.3	Kurtosis	3.79904

Variable name: a2c_la_strain_peak_pos_c

Definition: Global left atrial conduit strain, A2C view

Units: %



a2c_la_strain_peak_pos_c

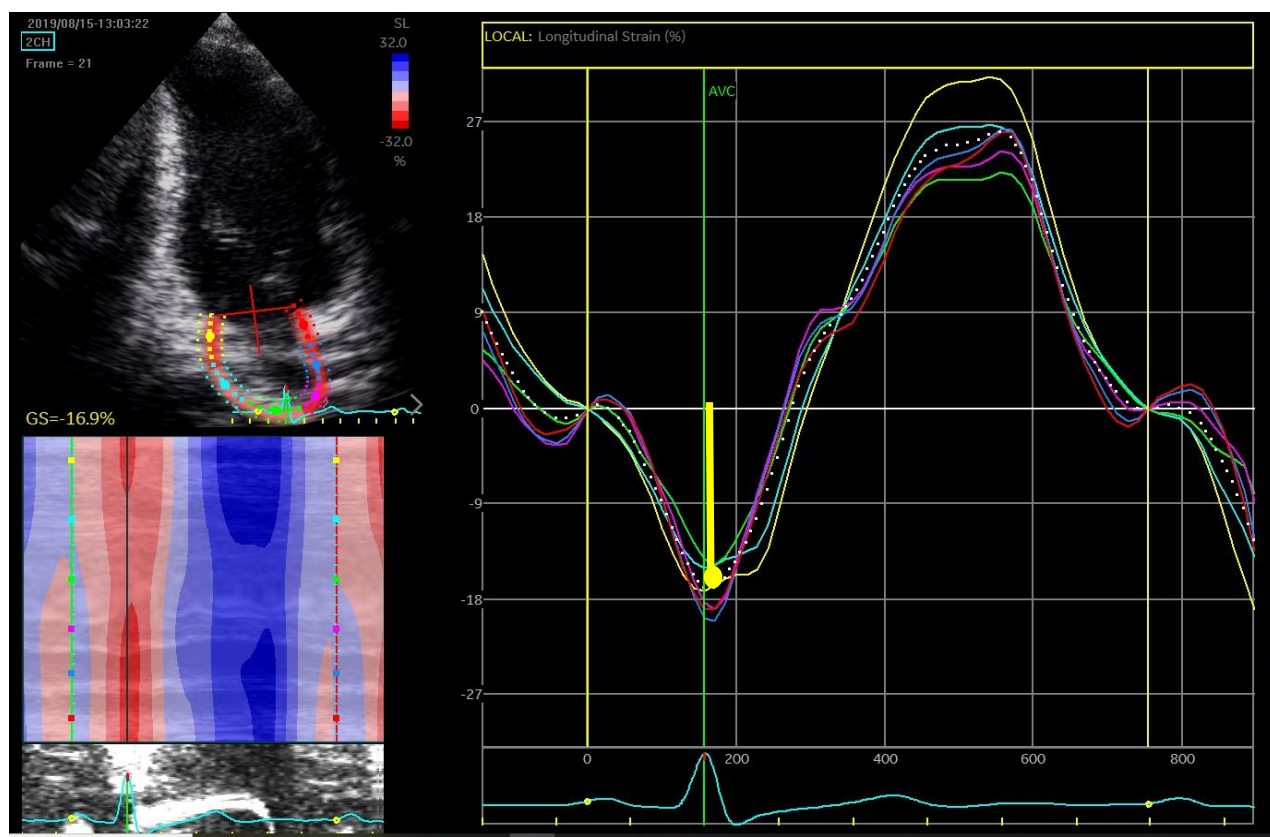
Percentiles		Smallest		
1%	3.934138	2.099708		
5%	5.6555	2.339994		
10%	6.672999	2.483549	Obs	2,794
25%	8.80955	2.520718	Sum of Wgt.	2,794
50%	11.91949		Mean	12.13664
		Largest	Std. Dev.	4.412687
75%	14.94864	28.65961		
90%	17.90058	30.14975	Variance	19.4718
95%	19.85345	30.46649	Skewness	.5443235
99%	24.33664	31.30194	Kurtosis	3.393523

*All conduit strain values obtained using P-P wave gating were converted to R-R wave values

Variable name: a2c_la_strain_peak_neg_c

Definition: Global left atrial booster strain, A2C view

Units: % (absolute value recorded)



a2c_la_strain_peak_neg_c

Percentiles		Smallest		
1%	4.580632	1.265823		
5%	7.561579	1.584722		
10%	9.217999	1.905635	Obs	2,794
25%	11.89437	2.072063	Sum of Wgt.	2,794
			Mean	14.83729
50%	14.69205		Std. Dev.	4.502274
		Largest		
75%	17.64706	34.01233		
90%	20.75836	34.01233	Variance	20.27047
95%	22.60912	34.39054	Skewness	.3045276
99%	25.99219	35.18994	Kurtosis	3.615329

*All booster strain values obtained using P-P wave gating were converted to R-R wave values

Variable name: a2c_res_final

Definition: Global left atrial reservoir strain, A2C view

Units: %

Formula:

Sinus: a2c_la_strain_peak_pos_c +
a2c_la_strain_peak_neg_c

A-fib: a2c_la_reservoir_strain

a2c_res_final

Percentiles		Smallest		
1%	7.66	4.06		
5%	15.59068	4.22		
10%	18.68808	4.22	Obs	2,909
25%	22.6142	4.53	Sum of Wgt.	2,909
50%	26.47059		Mean	26.41772
		Largest	Std. Dev.	6.581974
75%	30.54827	48.06037		
90%	34.32261	48.70732	Variance	43.32238
95%	36.89928	48.89555	Skewness	-.2041205
99%	42.52359	49.96299	Kurtosis	3.917757

*All reservoir strain values obtained using P-P wave gating were converted to R-R wave values

Source: Standardization of left atrial, right ventricular, and right atrial deformation imaging using two-dimensional speckle tracking echocardiography: a consensus document of the EACVI/ASE/Industry Task Force to standardize deformation imaging (EHJ – Cardiovascular Imaging, 2018)

Variable name: a2c_la_foreshortened

Definition: Designates whether the LA is foreshortened in the A2C view

Recorded for internal use

Units: 0=no, 1=yes

Variable name: a4c_res_final

Definition: Global left atrial reservoir strain, A4C view

Units: %

Formula:

Sinus: pos_a4c_la_strain_c + neg_a4c_la_strain_c

A-fib: reservoir_a4c_la_strain

a4c_res_final				
	Percentiles	Smallest		
1%	7.19	3.44		
5%	14.91129	4.4		
10%	18.32329	4.69	Obs	3,005
25%	22.16328	4.8	Sum of Wgt.	3,005
50%	26.94085		Mean	27.08036
		Largest	Std. Dev.	7.676866
75%	31.74025	54.05743		
90%	36.49862	54.74722	Variance	58.93427
95%	39.84031	59.72222	Skewness	.1124702
99%	46.89329	63.12336	Kurtosis	3.792599

*All reservoir strain values obtained using P-P wave gating were converted to R-R wave values

Source: Standardization of left atrial, right ventricular, and right atrial deformation imaging using two-dimensional speckle tracking echocardiography: a consensus document of the EACVI/ASE/Industry Task Force to standardize deformation imaging (EHJ – Cardiovascular Imaging, 2018)

Variable name: `acrostic`

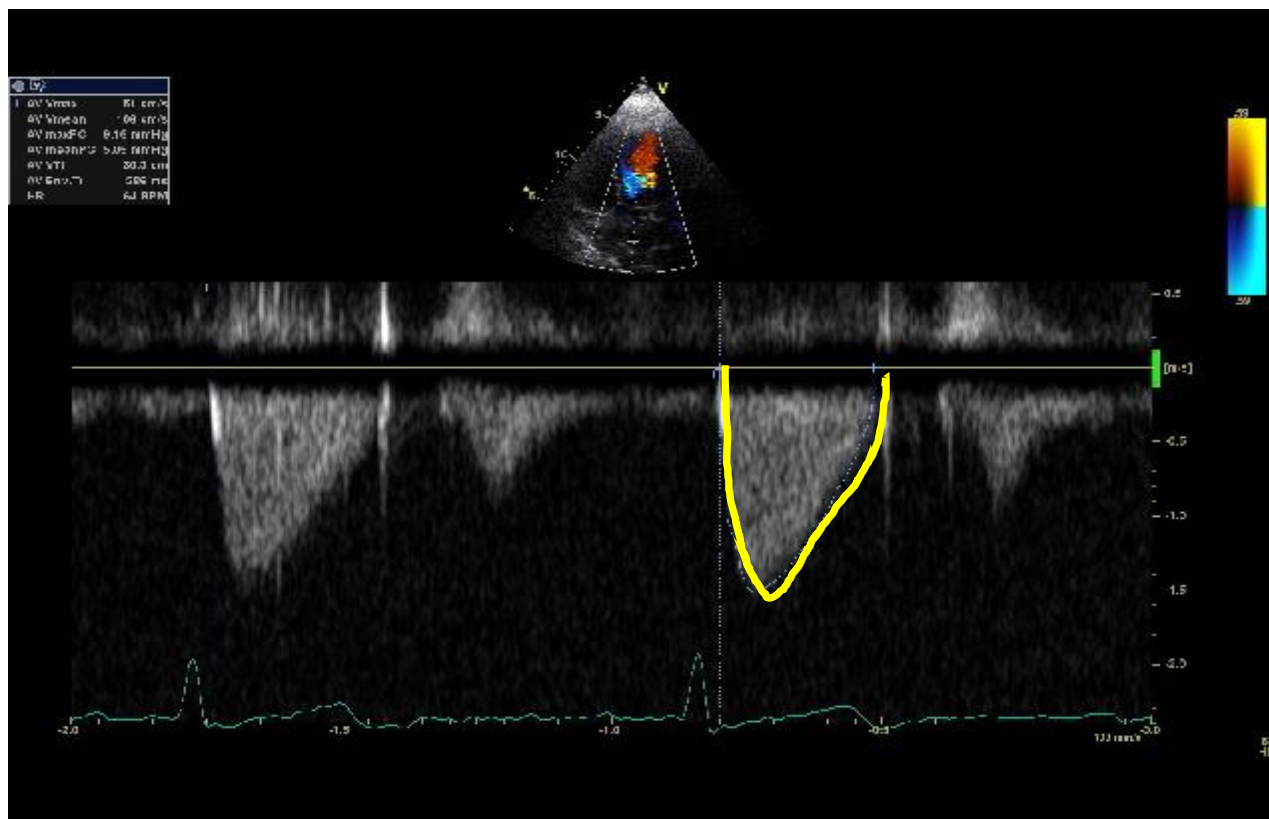
Definition: MESA acrostic ID

Units: N/A

Variable name: ao_cw_vti

Definition: Aortic valve velocity-time integral

Units: cm



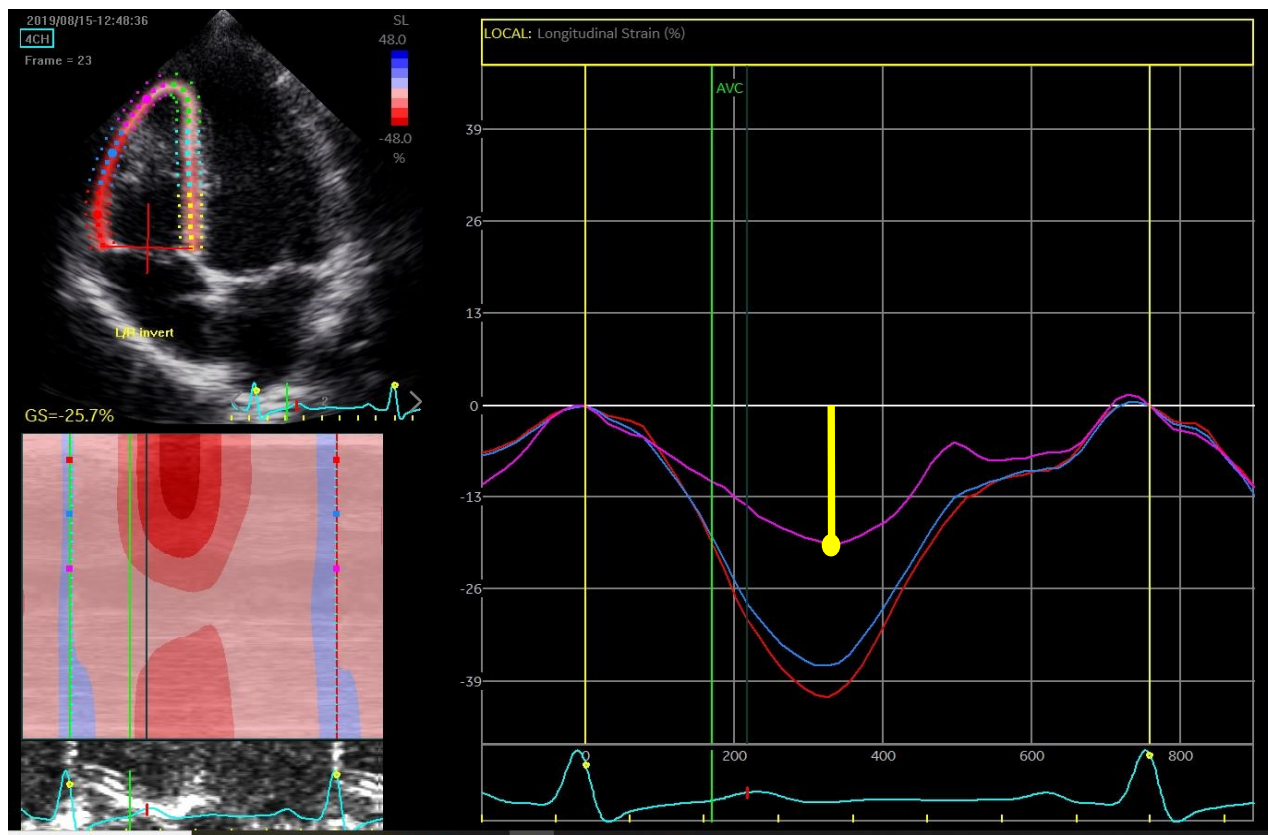
ao_cw_vti

Percentiles		Smallest		
1%	16	11.4		
5%	18.9	11.8		
10%	20.4	13.6	Obs	2,991
25%	23.3	13.8	Sum of Wgt.	2,991
50%	26.9	Largest	Mean	28.58442
75%	31.3		Std. Dev.	9.241794
90%	37.2		Variance	85.41076
95%	43.1	108.9	Skewness	3.035938
99%	68.7	116.4	Kurtosis	18.87753

Variable name: ap_rv_strain

Definition: Right ventricular longitudinal systolic strain, apical free wall

Units: %



ap_rv_strain

Percentiles		Smallest		
1%	5.94	2.34		
5%	8.91	3.13		
10%	10.94	3.75	Obs	2,904
25%	14.84	4.22	Sum of Wgt.	2,904
50%	20.31	Largest	Mean	20.43476
75%	25.81		Std. Dev.	7.211817
90%	30.06		Variance	52.0103
95%	32.06	41.94	Skewness	.0816862
99%	36.25	42.28	Kurtosis	2.357987

Variable name: ava

Definition: Aortic valve area

Units: cm²

Formula:

$$(3.14 * ((lvot/2)^2) * lvot_vti) / ao_cw_vti$$

ava				
	Percentiles	Smallest		
1%	1.196222	.6545078		
5%	1.719714	.6953796		
10%	1.990548	.7156754	Obs	2,953
25%	2.366682	.7751428	Sum of Wgt.	2,953
50%	2.834195		Mean	2.894122
		Largest	Std. Dev.	.7783996
75%	3.364277	5.706223		
90%	3.919098	5.770264	Variance	.6059059
95%	4.295322	5.874357	Skewness	.4201214
99%	4.975254	6.429232	Kurtosis	3.506075

Variable name: `ava`

Normal values:

Table 3 Recommendations for grading of AS severity

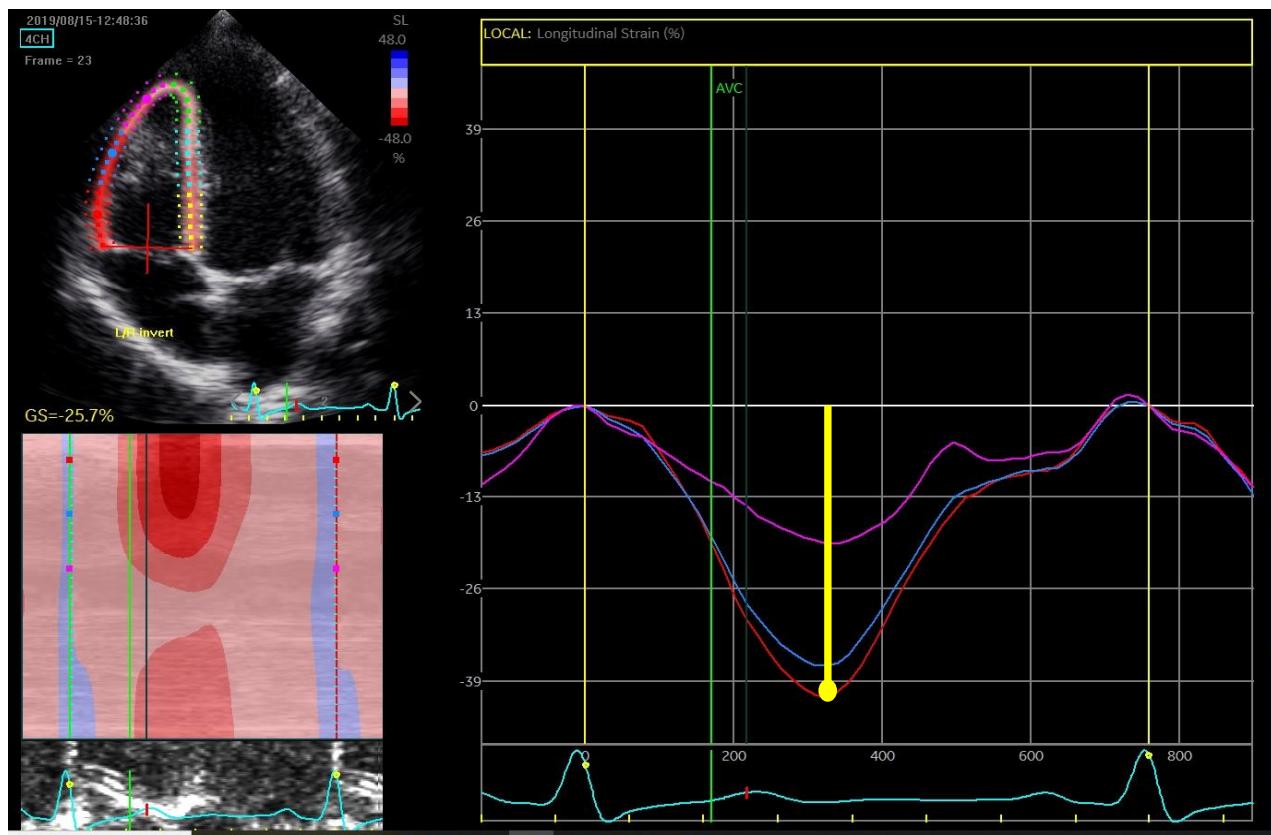
	Aortic sclerosis	Mild	Moderate	Severe
Peak velocity (m/s)	≤ 2.5 m/s	2.6–2.9	3.0–4.0	≥ 4.0
Mean gradient (mmHg)	–	< 20	20–40	≥ 40
AVA (cm^2)	–	> 1.5	1.0–1.5	< 1.0
Indexed AVA (cm^2/m^2)	–	> 0.85	0.60–0.85	< 0.6
Velocity ratio	–	> 0.50	0.25–0.50	< 0.25

Source: Recommendations for Recommendations on the Echocardiographic Assessment of Aortic Valve Stenosis: A Focused Update from the European Association of Cardiovascular Imaging and the American Society of Echocardiography (JASE, April 2017)

Variable name: bas_rv_strain

Definition: Right ventricular longitudinal systolic strain, basal free wall

Units: %



bas_rv_strain

Percentiles			Smallest		
1%	13.44		5.63		
5%	17.19		5.94		
10%	19.22		7.34	Obs	2,904
25%	22.69		8.09	Sum of Wgt.	2,904
50%	26.91			Mean	26.93903
			Largest	Std. Dev.	6.105535
75%	30.94		46.75		
90%	34.88		46.88	Variance	37.27755
95%	37.19		47.25	Skewness	.1343913
99%	41.94		47.53	Kurtosis	3.044925

Variable name: bsa

Definition: Body surface area

Units: m²

Formula:

$$\sqrt{((\text{weight}/2.2) * \text{height}) / 3600}$$

bsa				

	Percentiles	Smallest		
1%	1.372327	1.143184		
5%	1.487138	1.186756		
10%	1.565279	1.206802	Obs	3,033
25%	1.700301	1.234524	Sum of Wgt.	3,033
50%	1.864105		Mean	1.877909
		Largest	Std. Dev.	.2491922
75%	2.046657	2.622821		
90%	2.212269	2.693293	Variance	.0620967
95%	2.301067	2.701111	Skewness	.2454955
99%	2.477218	2.899901	Kurtosis	2.778486

Variable name: bullseye_acquired

Definition: Designates whether LV strain bullseye was acquired

Recorded for internal use

Units: 0=no, 1=yes

Variable name: ci

Definition: Cardiac index

Units: L/min/m²

Formula: co/bsa

Normal values: 2.4-4.2 L/min/m²

ci				

	Percentiles	Smallest		
1%	1.530995	1.243309		
5%	1.780447	1.28003		
10%	1.92409	1.331957	Obs	2,981
25%	2.197814	1.339895	Sum of Wgt.	2,981
50%	2.542166		Mean	2.643402
		Largest	Std. Dev.	.656471
75%	2.988179	6.383898		
90%	3.460546	6.666913	Variance	.4309542
95%	3.802421	6.994403	Skewness	1.322032
99%	4.709437	7.044689	Kurtosis	7.052186

Variable name: CO

Definition: Cardiac output

Units: L/min

Formula: $(sv \times lvot_hr) / 1000$

Normal values: 4-8 L/min

CO				

	Percentiles	Smallest		
1%	2.713404	2.189829		
5%	3.187061	2.350568		
10%	3.437185	2.354351	Obs	2,982
25%	3.994176	2.362678	Sum of Wgt.	2,982
50%	4.759284		Mean	4.94546
		Largest	Std. Dev.	1.315614
75%	5.71148	10.91259		
90%	6.655264	11.10203	Variance	1.730839
95%	7.292143	11.14553	Skewness	.9817882
99%	8.861347	14.64125	Kurtosis	4.998831

Variable name:

comments_abnormal_findings

Definition: NUECL comments on wall motion, valvular disease, pericardial effusion, alert/referral findings

Recorded for internal use

Units: N/A

Variable name: `comments_doppler_tdi`

Definition: NUECL comments on Doppler, TDI quality

Recorded for internal use

Units: N/A

Variable name: `comments_strain`

Definition: NUECL comments on strain, limited
Doppler variables

Recorded for internal use

Units: N/A

Variable name: date_read

Definition: Date echo was quantified by NUECL

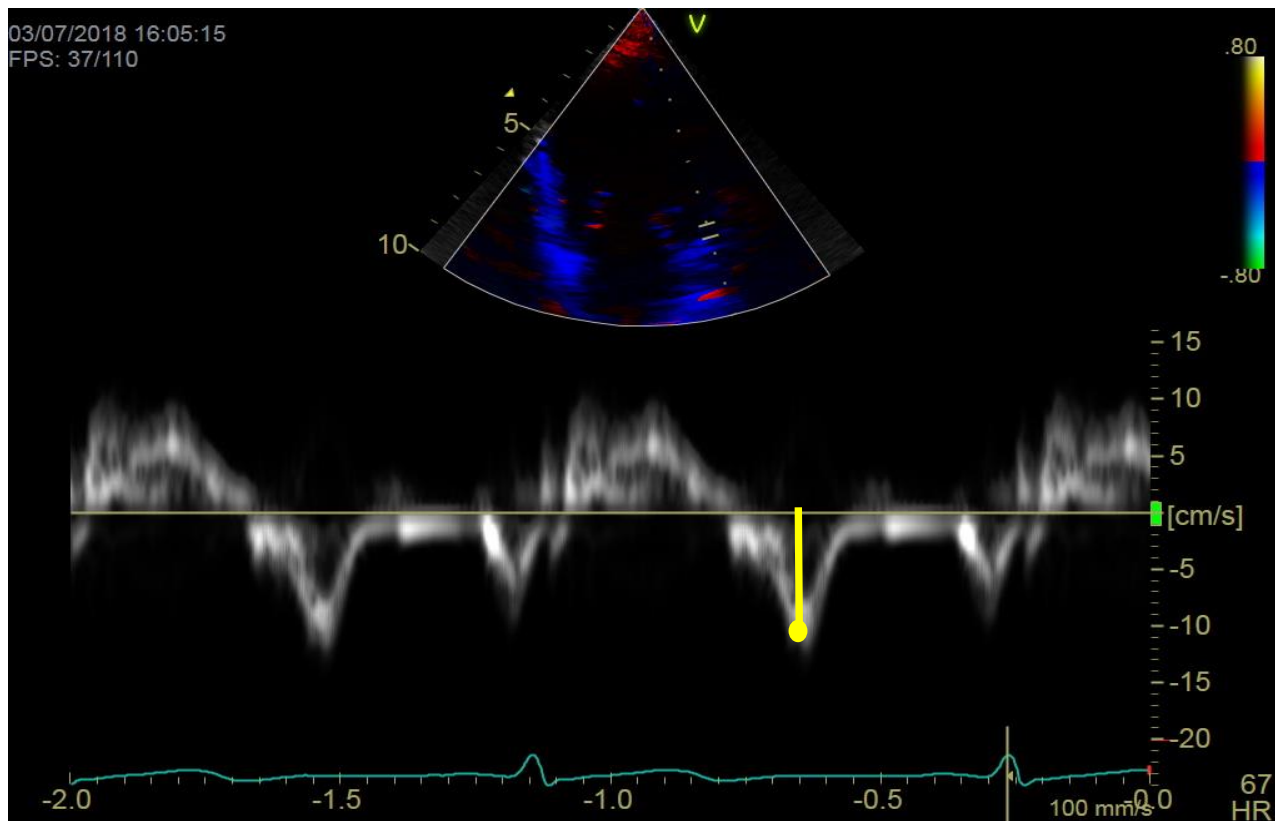
Units: mm/dd/yyyy

Variable name: e'_lateral

Definition: Lateral e prime peak velocity

Units: cm/s

Normal values: >10 cm/s



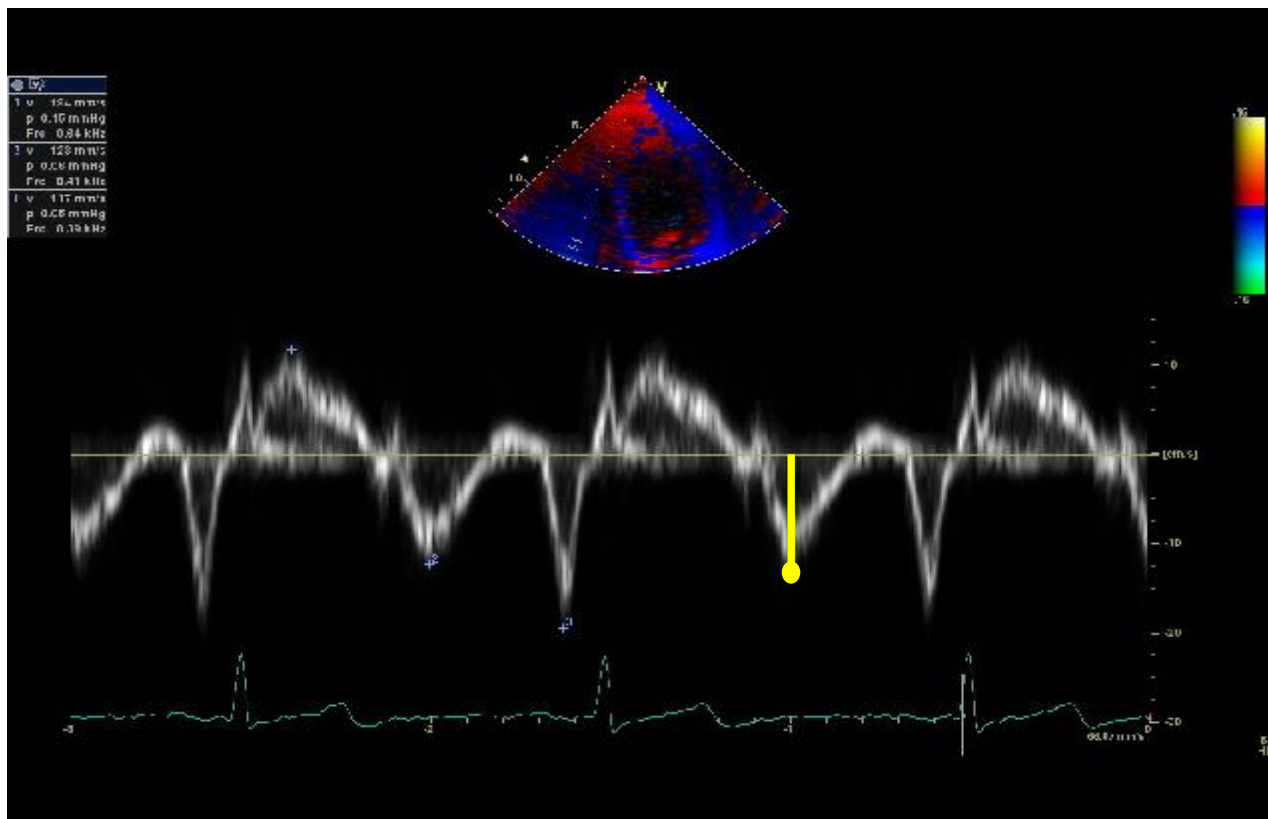
e'_lateral

Percentiles		Smallest		
1%	3.7	2.4		
5%	5.2	2.5		
10%	6	2.5	Obs	3,013
25%	7.2	2.5	Sum of Wgt.	3,013
50%	8.7	Largest	Mean	8.830402
			Std. Dev.	2.348492
75%	10.3	18.3	Variance	5.515417
90%	11.9	19.1	Skewness	.4407414
95%	12.8	21.4	Kurtosis	3.947104
99%	15.1	23.4		

Variable name: e'_rv

Definition: Right ventricular free wall e prime peak velocity

Units: cm/s



e'_rv

Percentiles			Smallest		
1%	5.4		2.3		
5%	7		2.8		
10%	7.8		3	Obs	2,901
25%	9.3		4	Sum of Wgt.	2,901
50%	11.4			Mean	11.66925
			Largest	Std. Dev.	3.315084
75%	13.5		27.4		
90%	15.9		27.5	Variance	10.98979
95%	17.5		30.6	Skewness	.8460255
99%	21.6		32.2	Kurtosis	4.990821

Variable name: e_{rv}

Normal values:

Table 10 Normal values for parameters of RV function

Parameter	Mean \pm SD	Abnormality threshold
TAPSE (mm)	24 \pm 3.5	<17
Pulsed Doppler S wave (cm/sec)	14.1 \pm 2.3	<9.5
Color Doppler S wave (cm/sec)	9.7 \pm 1.85	<6.0
RV fractional area change (%)	49 \pm 7	<35
RV free wall 2D strain* (%)	-29 \pm 4.5	>-20 (<20 in magnitude with the negative sign)
RV 3D EF (%)	58 \pm 6.5	<45
Pulsed Doppler MPI	0.26 \pm 0.085	>0.43
Tissue Doppler MPI	0.38 \pm 0.08	>0.54
E wave deceleration time (msec)	180 \pm 31	<119 or >242
E/A	1.4 \pm 0.3	<0.8 or >2.0
e'/a'	1.18 \pm 0.33	<0.52
e'	14.0 \pm 3.1	<7.8
E/e'	4.0 \pm 1.0	>6.0

MPI, Myocardial performance index.

*Limited data; values may vary depending on vendor and software version.

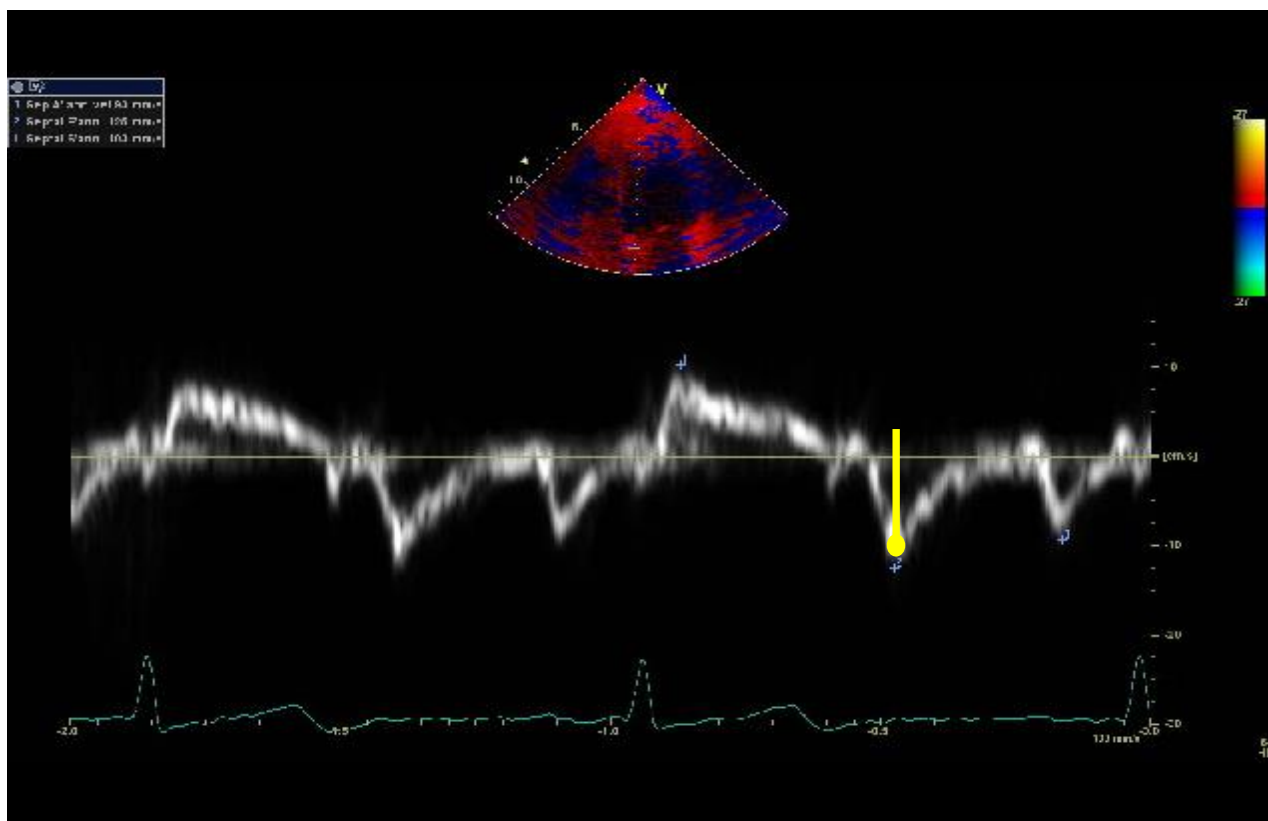
Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: e'_septal

Definition: Septal e prime peak velocity

Units: cm/s

Normal values: > 7 cm/s



e'_septal

Percentiles			Smallest		
1%	3.3		2.5		
5%	4.2		2.5		
10%	4.8		2.5	Obs	3,001
25%	5.9		2.7	Sum of Wgt.	3,001
50%	7.1			Mean	7.323925
			Largest	Std. Dev.	2.022736
75%	8.6		14.4		
90%	9.9		16.3	Variance	4.091461
95%	10.8		17.3	Skewness	.5128838
99%	12.5		21.1	Kurtosis	3.89016

Variable name: ea

Definition: Arterial elastance

Units: mmHg/ml

Formula: $0.9 * \text{echo_sbp} / \text{sv}$

ea				

	Percentiles	Smallest		
1%	.825579	.5061981		
5%	1.008513	.5888613		
10%	1.110848	.6147208	Obs	2,977
25%	1.295114	.6343684	Sum of Wgt.	2,977
50%	1.546506		Mean	1.618203
		Largest	Std. Dev.	.4534743
75%	1.869259	3.346632		
90%	2.214135	3.482886	Variance	.2056389
95%	2.469632	3.525079	Skewness	.8958419
99%	3.035213	3.527643	Kurtosis	4.099173

Variable name: ea_ratio

Definition: Mitral E/A ratio

Units: N/A

Formula: mitral_e/mitral_a

ea_ratio				

	Percentiles	Smallest		
1%	.5140187	.3204063		
5%	.5886991	.3484848		
10%	.63875	.4005602	Obs	2,888
25%	.7333702	.4065728	Sum of Wgt.	2,888
50%	.8523269		Mean	.9254624
		Largest	Std. Dev.	.307703
75%	1.061811	3.203279		
90%	1.274956	3.254579	Variance	.0946811
95%	1.460598	3.255079	Skewness	2.307091
99%	2.125265	3.263844	Kurtosis	12.58268

Variable name: echo_date

Definition: Date echo was performed

Units: mm/dd/yyyy

Variable name: echo_dbp

Definition: Diastolic blood pressure at time of echo

Units: mmHg

echo_dbp				

	Percentiles	Smallest		
1%	50	39		
5%	57	40		
10%	61	42	Obs	3,029
25%	68	42	Sum of Wgt.	3,029
50%	75		Mean	75.5586
		Largest	Std. Dev.	11.38295
75%	83	116		
90%	90	117	Variance	129.5716
95%	94	122	Skewness	.1740543
99%	105	139	Kurtosis	3.496995

Variable name: echo_height_m

Definition: Participant height

Units: m

echo_height_m				

	Percentiles	Smallest		
1%	1.44	1.15		
5%	1.49	1.16		
10%	1.52	1.17	Obs	3,033
25%	1.57	1.29	Sum of Wgt.	3,033
50%	1.65		Mean	1.648652
		Largest	Std. Dev.	.1013829
75%	1.72	1.97		
90%	1.78	1.98	Variance	.0102785
95%	1.82	1.99	Skewness	.0876779
99%	1.88	2	Kurtosis	3.120956

Variable name: echo_hr

Definition: Heart rate recorded at time of echo

Units: bpm

echo_hr				

	Percentiles	Smallest		
1%	45	33		
5%	50	36		
10%	53	37	Obs	3,034
25%	58	38	Sum of Wgt.	3,034
50%	63		Mean	64.61338
		Largest	Std. Dev.	10.21095
75%	71	106		
90%	78	107	Variance	104.2636
95%	83	107	Skewness	.6390774
99%	91	138	Kurtosis	4.17689

Variable name: echo_map

Definition: Mean arterial pressure at time of echo

Units: mmHg

Formula: $(\text{echo_sbp} + (2 * \text{echo_dbp})) / 3$

echo_map				

	Percentiles	Smallest		
1%	67	56.66667		
5%	75	59.33333		
10%	79.33334	60	Obs	3,029
25%	86.66666	61.33333	Sum of Wgt.	3,029
50%	95		Mean	94.97491
		Largest	Std. Dev.	12.52789
75%	102.6667	144.3333		
90%	110.3333	149	Variance	156.948
95%	115.3333	156	Skewness	.3497807
99%	128.6667	178.3333	Kurtosis	4.093276

Variable name: echo_pp

Definition: Pulse pressure at time of echo

Units: mmHg

Formula: echo_sbp-echo_dbp

echo_pp				

	Percentiles	Smallest		
1%	29	17		
5%	36	21		
10%	40	22	Obs	3,029
25%	47	24	Sum of Wgt.	3,029
50%	57		Mean	58.24893
		Largest	Std. Dev.	15.46535
75%	67	125		
90%	79	130	Variance	239.1771
95%	86	135	Skewness	.7441108
99%	103	143	Kurtosis	4.082466

Variable name: echo_sbp

Definition: Systolic blood pressure at time of echo

Units: mmHg

echo_sbp				

	Percentiles	Smallest		
1%	95	82		
5%	105	84		
10%	110	85	Obs	3,029
25%	120	85	Sum of Wgt.	3,029
50%	133		Mean	133.8075
		Largest	Std. Dev.	19.26531
75%	145	223		
90%	158	227	Variance	371.1522
95%	168	246	Skewness	.6058558
99%	187	257	Kurtosis	4.482548

Variable name: `echo_time`

Definition: Length of echo

Units: min

Variable name: echo_weight_kg

Definition: Participant weight

Units: kg

echo_weight_kg				

	Percentiles	Smallest		
1%	45	34.09091		
5%	51.81818	35.45454		
10%	55.90909	35.90909	Obs	3,033
25%	65	38.63636	Sum of Wgt.	3,033
50%	75.90909		Mean	77.80498
		Largest	Std. Dev.	17.88413
75%	89.09091	143.6364		
90%	101.8182	151.8182	Variance	319.842
95%	110	151.8182	Skewness	.5562846
99%	125.9091	163.6364	Kurtosis	3.275908

Variable name: echopasp

Definition: Estimated pulmonary artery systolic pressure

Units: mmHg

Formula: rvsp+echorap

echopasp				

	Percentiles	Smallest		
1%	21.3216	17.5316		
5%	23.1476	18.1044		
10%	24.8916	18.3956	Obs	2,384
25%	28.4256	18.8384	Sum of Wgt.	2,384
50%	32.2484		Mean	33.3201
		Largest	Std. Dev.	7.654908
75%	37.0356	73.3696		
90%	42.4544	74.2224	Variance	58.59762
95%	46.9904	89.64	Skewness	1.598983
99%	60.1584	91.11839	Kurtosis	8.670692

Variable name: echopasp

Normal values:

Normal	18-25 mmHg
Mild pulmonary hypertension	30-40 mmmHg
Moderate pulmonary hypertension	40-70 mmHg
Severe pulmonary hypertension	>70 mmHg

Variable name: echopcpwp

Definition: Estimated pulmonary capillary wedge pressure

Units: mmHg

Formula: $11.96 + (ee_lateral * 0.596)$

echopcpwp				

	Percentiles	Smallest		
1%	14.48424	13.7654		
5%	15.02313	13.99917		
10%	15.34144	14.00527	Obs	2,960
25%	16.06291	14.02235	Sum of Wgt.	2,960
50%	17.05949		Mean	17.46119
		Largest	Std. Dev.	2.108978
75%	18.3083	30.33235		
90%	19.97433	31.76916	Variance	4.447787
95%	21.30509	33.9709	Skewness	1.940993
99%	25.41515	35.49538	Kurtosis	10.27159

Variable name: echorap

Definition: Estimated right atrial pressure

Units: mmHg

Normal values: ≤ 5 mmHg

Estimation method:

5 mmHg: `ivc_max<2 & ivc_collapsibility>50`

10 mmHg: `ivc_max>2 & ivc_collapsibility>50`

15 mmHg: `ivc_max>2 & ivc_collapsibility<50`

echorap				

	Percentiles	Smallest		
1%	5	5		
5%	5	5		
10%	5	5	Obs	3,034
25%	5	5	Sum of Wgt.	3,034
50%	5		Mean	5.339486
		Largest	Std. Dev.	1.382898
75%	5	15		
90%	5	15	Variance	1.912407
95%	10	15	Skewness	4.329695
99%	10	15	Kurtosis	22.77457

Variable name: edv20

Definition: End-diastolic volume at an idealized LV end-diastolic pressure of 20 mmHg

Units: ml

Formula:

edv20				

	Percentiles	Smallest		
1%	43.32057	28.4507		
5%	50.44786	33.11121		
10%	54.97015	33.69391	Obs	2,935
25%	63.87384	36.03786	Sum of Wgt.	2,935
50%	75.92036		Mean	79.7121
		Largest	Std. Dev.	22.53991
75%	92.06843	188.819		
90%	109.5097	189.9439	Variance	508.0473
95%	119.3522	264.371	Skewness	1.244523
99%	147.3342	275.0213	Kurtosis	7.266179

Variable name: edv40

Definition: End-diastolic volume at an idealized LV end-diastolic pressure of 40 mmHg

Units: ml

Formula:

edv40				

	Percentiles	Smallest		
1%	48.41232	31.90441		
5%	56.44831	37.13118		
10%	61.43692	37.72852	Obs	2,935
25%	71.51463	40.19448	Sum of Wgt.	2,935
50%	85.07919		Mean	89.32368
		Largest	Std. Dev.	25.27338
75%	103.2232	211.2453		
90%	122.9991	213.2676	Variance	638.7436
95%	133.6411	301.0642	Skewness	1.24915
99%	165.1535	305.8487	Kurtosis	7.313484

Variable name: ee_avg

Definition: Average E/e' ratio

Units: N/A

Formula: (ee_septal+ee_lateral)/2

ee_avg				

	Percentiles	Smallest		
1%	4.966265	3.991667		
5%	5.911292	4.106506		
10%	6.587224	4.149501	Obs	2,946
25%	7.798851	4.174855	Sum of Wgt.	2,946
50%	9.465732		Mean	10.19422
		Largest	Std. Dev.	3.715776
75%	11.70034	39.88552		
90%	14.45368	40.7728	Variance	13.80699
95%	16.90865	41.02841	Skewness	2.218867
99%	22.97866	43.75796	Kurtosis	13.15483

Variable name: ee_lateral

Definition: Lateral E/e' ratio

Units: N/A

Formula: mitral_e/ee_lateral

Normal values: < 8

ee_lateral				

	Percentiles	Smallest		
1%	4.235294	3.029197		
5%	5.139479	3.421429		
10%	5.673558	3.431655	Obs	2,960
25%	6.88407	3.460317	Sum of Wgt.	2,960
50%	8.556187		Mean	9.230186
		Largest	Std. Dev.	3.538553
75%	10.65151	30.82609		
90%	13.44686	33.23684	Variance	12.52136
95%	15.67968	36.93103	Skewness	1.940993
99%	22.57576	39.48889	Kurtosis	10.27159

Mitter, S. S., Shah, S. J. & Thomas, J. D. A test in context. E/A and E/e' to assess diastolic dysfunction and LV filling pressure. *J. Am. Coll. Cardiol.* 69, 1451–1464 (2017).

Variable name: ee_septal

Definition: Septal E/e' ratio

Units: N/A

Formula: mitral_e/e_septal

Normal values: < 8

ee_septal				

	Percentiles	Smallest		
1%	5.214876	4.096385		
5%	6.252747	4.25		
10%	7	4.316832	Obs	2,949
25%	8.369565	4.336842	Sum of Wgt.	2,949
50%	10.23729		Mean	11.15785
		Largest	Std. Dev.	4.392899
75%	12.72973	42.84		
90%	16.09091	48.02703	Variance	19.29756
95%	19.11905	51.875	Skewness	2.491187
99%	26.8	58.46666	Kurtosis	16.27689

Mitter, S. S., Shah, S. J. & Thomas, J. D. A test in context. E/A and E/e' to assess diastolic dysfunction and LV filling pressure. *J. Am. Coll. Cardiol.* 69, 1451–1464 (2017).

Variable name: ees

Definition: End systolic elastance

Units: mmHg/ml

ees

<hr/>				
	Percentiles	Smallest		
1%	1.221235	.5428526		
5%	1.583216	.6573994		
10%	1.764088	.7309504	Obs	2,969
25%	2.10676	.7422755	Sum of Wgt.	2,969
50%	2.582918		Mean	2.682878
		Largest	Std. Dev.	.8183122
75%	3.118485	6.640449		
90%	3.758478	6.782059	Variance	.6696348
95%	4.162812	6.842252	Skewness	.9556508
99%	5.099454	6.992738	Kurtosis	4.832652

Chen, C. H., et al. (2001). "Noninvasive single-beat determination of left ventricular end-systolic elastance in humans." J Am Coll Cardiol **38**(7): 2028-2034.

Variable name: ef_a2c

Definition: Left ventricular ejection fraction, A2C view

Units: %

Formula:

$$((lvedv_a2c - lvesv_a2c) / lvedv_a2c) * 100$$

ef_a2c				

	Percentiles	Smallest		
1%	43.95604	21.71428		
5%	53.94737	27.03704		
10%	56.33803	27.30627	Obs	3,003
25%	59.30233	28.69565	Sum of Wgt.	3,003
50%	62.7451		Mean	62.2184
		Largest	Std. Dev.	5.422387
75%	65.85366	75.80645		
90%	68.18182	75.90362	Variance	29.40228
95%	69.49152	76.47059	Skewness	-1.412616
99%	72.4138	76.78571	Kurtosis	8.650491

Variable name: ef_a4c

Definition: Left ventricular ejection fraction, A4C view

Units: %

Formula:

$$((lvedv_a4c - lvesv_a4c) / lvedv_a4c) * 100$$

ef_a4c				

	Percentiles	Smallest		
1%	41.89189	26.83824		
5%	53.42466	27.16049		
10%	55.6962	27.17391	Obs	3,032
25%	59.03614	27.56184	Sum of Wgt.	3,032
50%	62.5		Mean	62.02868
		Largest	Std. Dev.	5.715373
75%	65.78947	75.5102		
90%	68.33334	75.5814	Variance	32.66549
95%	70.09346	76.19048	Skewness	-1.355059
99%	72.91666	76.27119	Kurtosis	8.021735

Variable name: ef_biplane

Definition: Biplane Simpson's ejection fraction,
calculated by EchoPAC software

Units: %

ef_biplane					

	Percentiles	Smallest			
1%	43	26			
5%	54	26			
10%	56	27	Obs		3,034
25%	60	29	Sum of Wgt.		3,034
50%	63		Mean		62.16645
		Largest	Std. Dev.		5.330394
75%	66	75			
90%	68	75	Variance		28.4131
95%	69	76	Skewness		-1.527222
99%	72	76	Kurtosis		9.08561

Variable name: ef_biplane

Normal values:

Table 2 Normal values for 2D echocardiographic parameters of LV size and function according to gender

Parameter	Male		Female	
	Mean \pm SD	2-SD range	Mean \pm SD	2-SD range
LV internal dimension				
Diastolic dimension (mm)	50.2 \pm 4.1	42.0–58.4	45.0 \pm 3.6	37.8–52.2
Systolic dimension (mm)	32.4 \pm 3.7	25.0–39.8	28.2 \pm 3.3	21.6–34.8
LV volumes (biplane)				
LV EDV (mL)	106 \pm 22	62–150	76 \pm 15	46–106
LV ESV (mL)	41 \pm 10	21–61	28 \pm 7	14–42
LV volumes normalized by BSA				
LV EDV (mL/m ²)	54 \pm 10	34–74	45 \pm 8	29–61
LV ESV (mL/m ²)	21 \pm 5	11–31	16 \pm 4	8–24
LV EF (biplane)	62 \pm 5	52–72	64 \pm 5	54–74

BSA, body surface area; EDV, end-diastolic volume; EF, ejection fraction; ESV, end-systolic volume; LV, left ventricular; SD, standard deviation.

Table 4 Normal ranges and severity partition cutoff values for 2DE-derived LV EF and LA volume

	Male				Female			
	Normal range	Mildly abnormal	Moderately abnormal	Severely abnormal	Normal range	Mildly abnormal	Moderately abnormal	Severely abnormal
LV EF (%)	52–72	41–51	30–40	<30	54–74	41–53	30–40	<30
Maximum LA volume/BSA (mL/m ²)	16–34	35–41	42–48	>48	16–34	35–41	42–48	>48

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: ef_calc

Definition: Manually calculated biplane EF

Units: %

Formula: $(ef_a4c + ef_a2c) / 2$

ef_calc				

	Percentiles	Smallest		
1%	42.99549	25.70089		
5%	54.0522	26.93764		
10%	56.32803	27.43406	Obs	3,003
25%	59.52724	30.25362	Sum of Wgt.	3,003
50%	62.58801		Mean	62.13055
		Largest	Std. Dev.	5.321677
75%	65.61426	75		
90%	67.86079	75.2551	Variance	28.32025
95%	69.30642	75.42989	Skewness	-1.509199
99%	71.8475	75.48019	Kurtosis	8.871641

Variable name: fac

Definition: Right ventricular fractional area change

Units: %

Formula: $((rveda - rvesa) / rveda) * 100$

fac				

	Percentiles	Smallest		
1%	29.47977	18.93204		
5%	33.18777	19.60784		
10%	35.12397	20.95238	Obs	3,029
25%	37.17472	21.12676	Sum of Wgt.	3,029
50%	39.89361		Mean	40.05271
		Largest	Std. Dev.	4.322042
75%	42.94118	52.71739		
90%	45.51724	53.33334	Variance	18.68005
95%	47.05883	53.45912	Skewness	-.1276089
99%	50.24876	54.33071	Kurtosis	3.720822

Variable name: `fac`

Normal values:

Table 10 Normal values for parameters of RV function

Parameter	Mean \pm SD	Abnormality threshold
TAPSE (mm)	24 \pm 3.5	<17
Pulsed Doppler S wave (cm/sec)	14.1 \pm 2.3	<9.5
Color Doppler S wave (cm/sec)	9.7 \pm 1.85	<6.0
RV fractional area change (%)	49 \pm 7	<35
RV free wall 2D strain* (%)	-29 \pm 4.5	>-20 (<20 in magnitude with the negative sign)
RV 3D EF (%)	58 \pm 6.5	<45
Pulsed Doppler MPI	0.26 \pm 0.085	>0.43
Tissue Doppler MPI	0.38 \pm 0.08	>0.54
E wave deceleration time (msec)	180 \pm 31	<119 or >242
E/A	1.4 \pm 0.3	<0.8 or >2.0
e'/a'	1.18 \pm 0.33	<0.52
e'	14.0 \pm 3.1	<7.8
E/e'	4.0 \pm 1.0	>6.0

MPI, Myocardial performance index.

*Limited data; values may vary depending on vendor and software version.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: f_s

Definition: Fractional shortening

Units: %

Formula: $((l_{vedd} - l_{vesd}) / l_{vedd}) * 100$

Normal values: >25%

f_s				

	Percentiles	Smallest		
1%	18.91386	8.080801		
5%	25.96401	8.22943		
10%	28.10945	11.36802	Obs	3,032
25%	30.2324	12.73345	Sum of Wgt.	3,032
50%	32.80423		Mean	32.79086
		Largest	Std. Dev.	4.418662
75%	35.69587	46.37003		
90%	37.9397	46.46681	Variance	19.52457
95%	39.3736	47.12042	Skewness	-.6618683
99%	42.99517	48.60465	Kurtosis	5.534078

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: gls

Definition: Global longitudinal strain

Units: %

Formula: $(lv4c_global_strain + lv2c_global_strain + lv3c_global_strain) / 3$

gls

	Percentiles	Smallest		
1%	10.56667	4.7		
5%	14.76667	5.033333		
10%	16.2	5.466667	Obs	2,765
25%	18.2	6.766667	Sum of Wgt.	2,765
50%	20		Mean	19.81241
		Largest	Std. Dev.	2.946841
75%	21.73333	28.06667		
90%	23.3	28.33333	Variance	8.683874
95%	24.13333	28.46667	Skewness	-.679117
99%	26.1	28.66667	Kurtosis	4.689299

Variable name: `id`

Definition: MESA study id number

Units: N/A

Variable name: `ivc_collapsibility`

Definition: IVC collapsibility, measured before and after sniff

Units: %

Formula: $((ivc_max - ivc_min) / ivc_max) * 100$

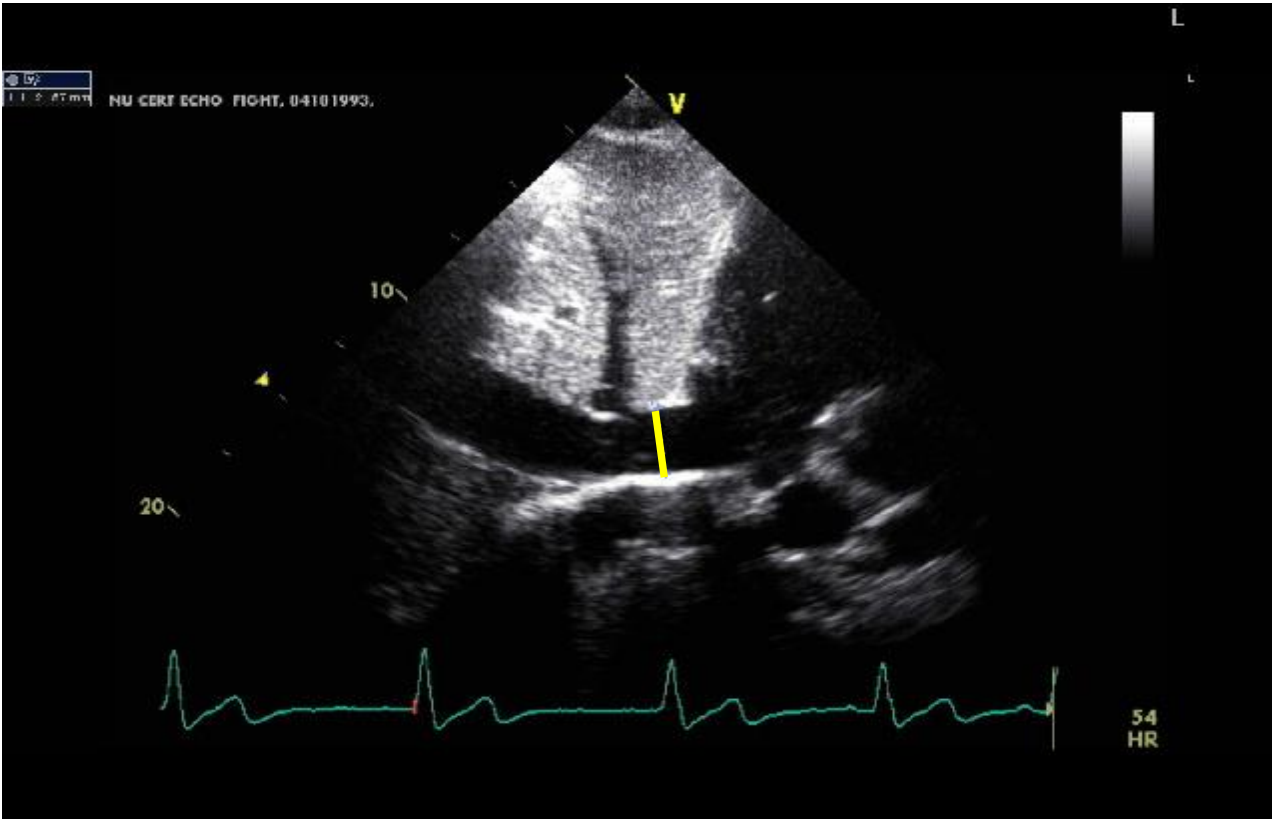
<code>ivc_collapsibility</code>				

	Percentiles	Smallest		
1%	42.13198	14.61538		
5%	52.15054	18.66197		
10%	54.6875	22.17574	Obs	2,851
25%	59.68992	23.95833	Sum of Wgt.	2,851
50%	65.51724		Mean	65.49669
		Largest	Std. Dev.	8.671286
75%	71.91011	86.22222		
90%	76.25	86.40777	Variance	75.19121
95%	78.94737	86.91589	Skewness	-.4799859
99%	83.23354	88.78505	Kurtosis	4.28521

Variable name: `ivc_max`

Definition: Maximum inferior vena cava diameter

Units: cm



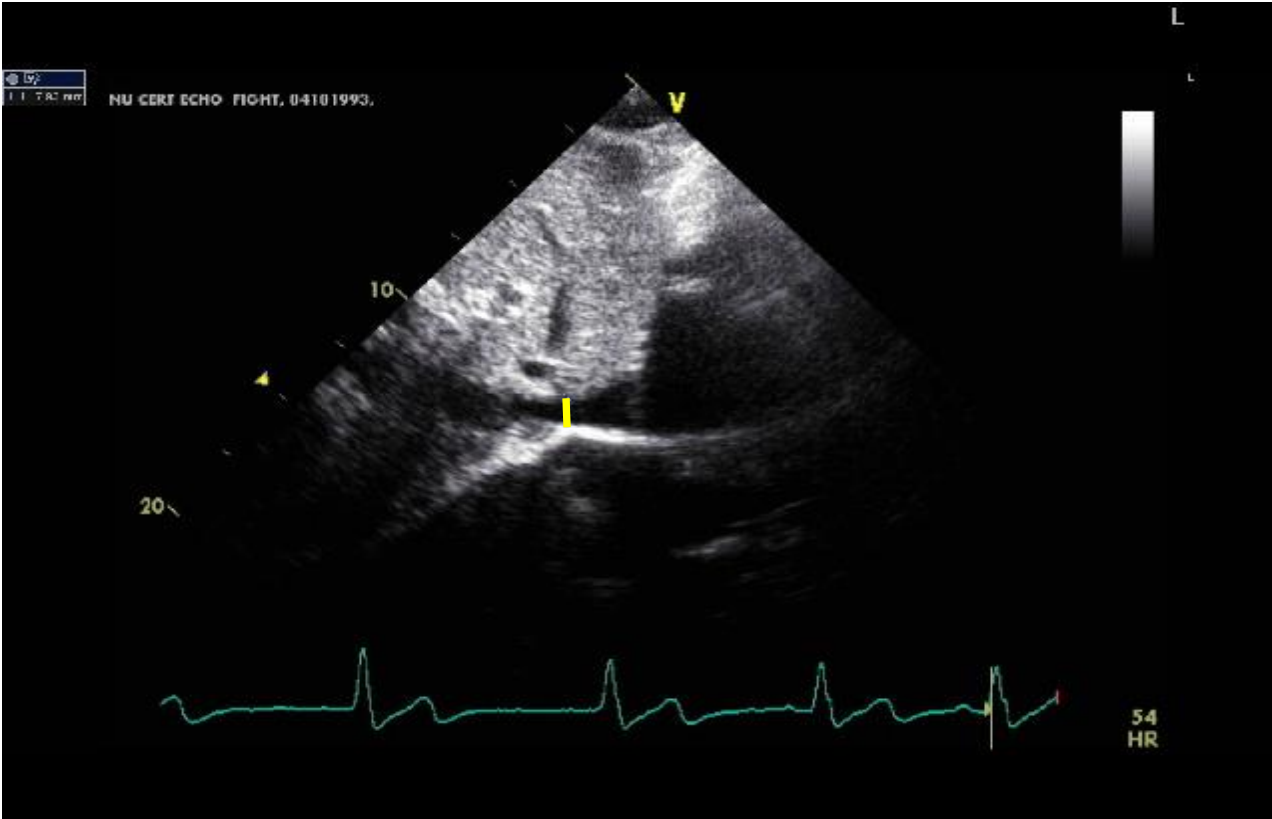
`ivc_max`

Percentiles		Smallest		
1%	.88	.71		
5%	1.04	.72		
10%	1.11	.74	Obs	2,875
25%	1.26	.74	Sum of Wgt.	2,875
			Mean	1.502226
50%	1.47	Largest	Std. Dev.	.3254154
75%	1.71			
90%	1.93	2.78	Variance	.1058952
95%	2.07	2.84	Skewness	.5643129
99%	2.41	2.91	Kurtosis	3.411279

Variable name: `ivc_min`

Definition: Minimum inferior vena cava diameter

Units: cm



`ivc_min`

Percentiles		Smallest		
1%	.21	.13		
5%	.27	.14		
10%	.31	.14	Obs	2,851
25%	.39	.16	Sum of Wgt.	2,851
			Mean	.5227078
50%	.49		Std. Dev.	.1984886
		Largest		
75%	.62	1.86		
90%	.76	1.87	Variance	.0393977
95%	.86	2.22	Skewness	1.838014
99%	1.14	2.31	Kurtosis	11.59844

Variable name: la_foreshortening_rest

Definition: Designates whether the LA is foreshortened in the A4C view at baseline

Recorded for internal use

Units: 0=no, 1=yes

Variable name: la_foreshortening_lu

Definition: Designates whether the LA is foreshortened in the A4C view during the leg raise maneuver

Recorded for internal use

Units: 0=no, 1=yes

Variable name: la_reservoir_final

Definition: Global left atrial reservoir strain

Units: %

Formula:

$$(a4c_res_final + a2c_res_final) / 2$$

la_reservoir_final

Percentiles		Smallest		
1%	7.655	4.22		
5%	15.85756	4.51		
10%	19.15619	4.765	Obs	2,905
25%	22.97614	4.925	Sum of Wgt.	2,905
50%	26.97075		Mean	26.76535
		Largest	Std. Dev.	6.525036
75%	30.85122	48.0063		
90%	34.48494	48.09442	Variance	42.57609
95%	36.91567	49.30686	Skewness	-.3437452
99%	42.10156	50.14805	Kurtosis	3.996661

Variable name: lav

Definition: Biplane left atrial volume

Units: ml

Formula: (lav_a4c+lav_a2c) /2

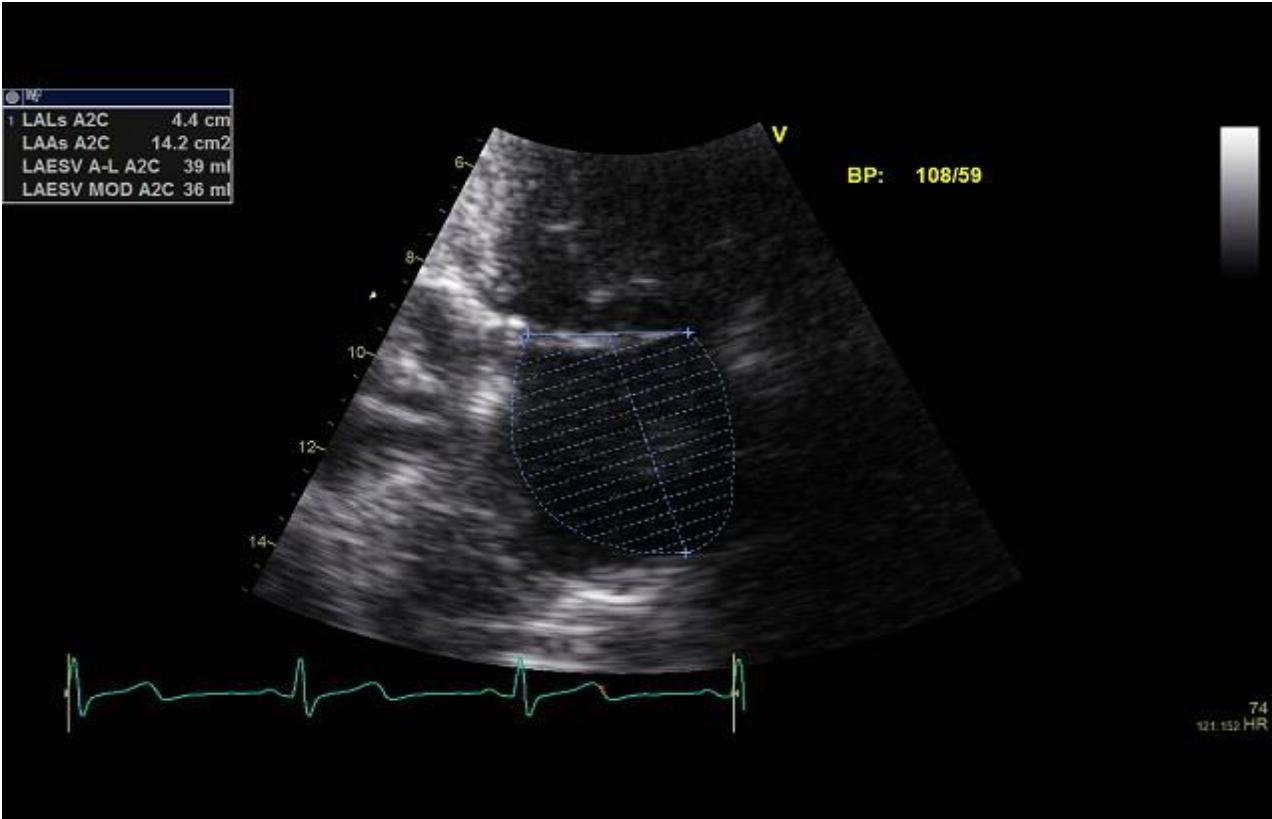
lav				

	Percentiles	Smallest		
1%	24.5	15		
5%	30.5	18.5		
10%	34	18.5	Obs	2,996
25%	41	19.5	Sum of Wgt.	2,996
50%	50		Mean	53.33445
		Largest	Std. Dev.	18.28294
75%	62	150		
90%	75.5	158	Variance	334.2659
95%	85	205	Skewness	1.675418
99%	118	218	Kurtosis	9.515673

Variable name: lav_a2c

Definition: Left atrial end systolic volume, A2C view

Units: ml



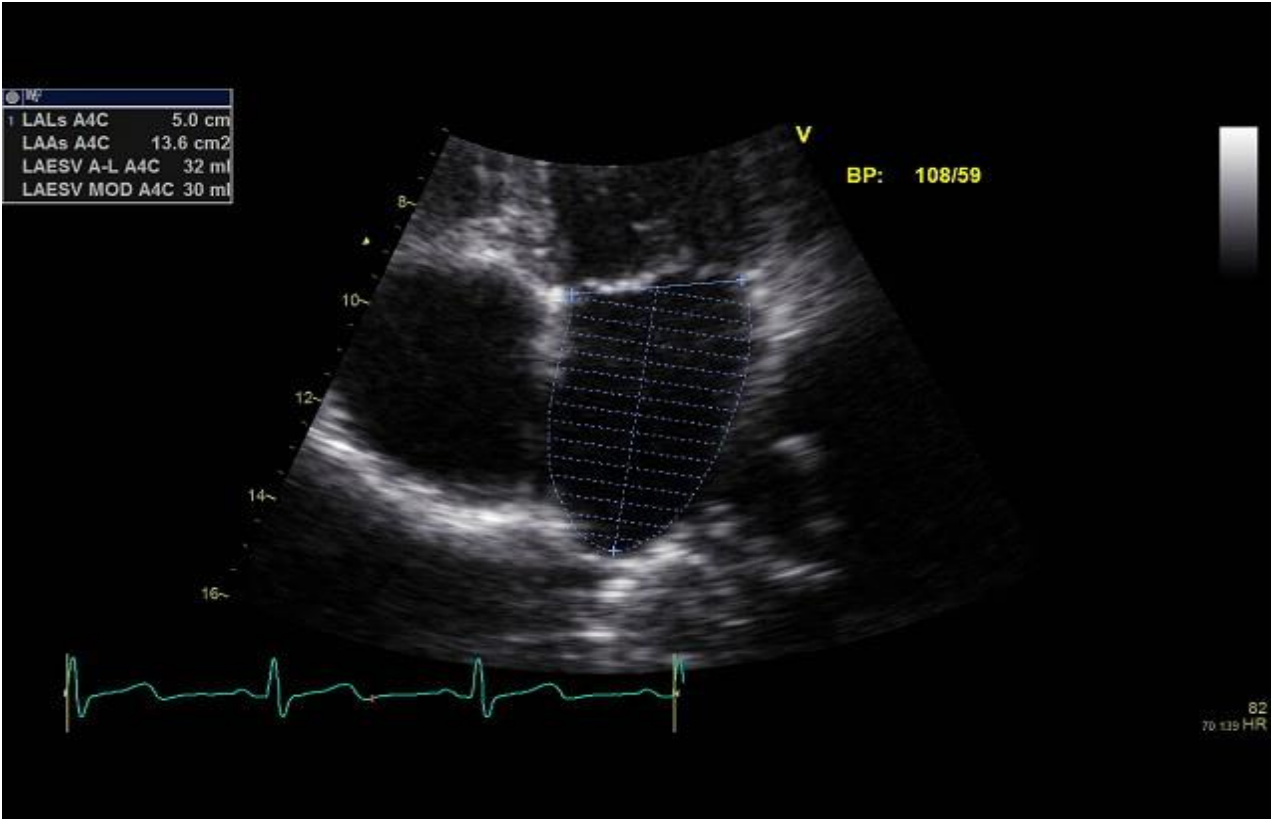
lav_a2c

Percentiles			Smallest		
1%	24		12		
5%	30		17		
10%	34		18	Obs	2,996
25%	41		19	Sum of Wgt.	2,996
50%	50			Mean	53.16522
			Largest		
75%	62		148	Std. Dev.	18.16373
90%	76		165	Variance	329.9209
95%	85		198	Skewness	1.549646
99%	115		212	Kurtosis	8.750444

Variable name: lav_a4c

Definition: Left atrial end systolic volume, A4C view

Units: ml



lav_a4c

Percentiles		Smallest		
1%	24	16		
5%	29	17		
10%	33	18	Obs	3,032
25%	41	18	Sum of Wgt.	3,032
50%	51	Largest	Mean	53.48021
			Std. Dev.	19.15054
75%	63	166		
90%	77	168	Variance	366.7433
95%	86	212	Skewness	1.661209
99%	118	224	Kurtosis	9.51427

Variable name: lavi

Definition: Biplane left atrial volume index

Units: ml/m²

Formula: lav/bsa

lavi				

	Percentiles	Smallest		
1%	14.4596	9.806352		
5%	17.51074	10.01403		
10%	19.25155	11.24905	Obs	2,995
25%	22.41319	11.62422	Sum of Wgt.	2,995
50%	26.89878		Mean	28.41912
		Largest	Std. Dev.	9.045935
75%	32.43671	82.24286		
90%	38.86857	86.09355	Variance	81.82895
95%	44.56461	107.8915	Skewness	1.929461
99%	58.86493	120.0645	Kurtosis	11.85196

Variable name: lavi

Normal values:

Table 4 Normal ranges and severity partition cutoff values for 2DE-derived LV EF and LA volume

	Male				Female			
	Normal range	Mildly abnormal	Moderately abnormal	Severely abnormal	Normal range	Mildly abnormal	Moderately abnormal	Severely abnormal
LV EF (%)	52–72	41–51	30–40	<30	54–74	41–53	30–40	<30
Maximum LA volume/BSA (mL/m ²)	16–34	35–41	42–48	>48	16–34	35–41	42–48	>48

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: letter_completed

Definition: Indicates if participant result letter was sent
Recorded for internal use

Units: N/A

Variable name: lu_a4c_res_final

Definition: Global left atrial reservoir strain, A4C view, recorded during leg raise maneuver

Units: %

Formula:

Sinus: lu_la_strain_peak_pos_c +
lu_la_strain_peak_neg_c

A-fib: lu_la_strain_reservoir

lu_a4c_res_final

Percentiles		Smallest		
1%	8.91	4.63		
5%	17.0418	5.31		
10%	20.59573	5.62	Obs	2,847
25%	25.08641	5.792683	Sum of Wgt.	2,847
50%	29.89653		Mean	30.15071
		Largest	Std. Dev.	8.199875
75%	35.04243	60.6469		
90%	40.25559	62.19654	Variance	67.23794
95%	43.70084	64.78679	Skewness	.1183407
99%	51.29061	68.76489	Kurtosis	3.852768

*All reservoir strain values obtained using P-P wave gating were converted to R-R wave values

Source: Standardization of left atrial, right ventricular, and right atrial deformation imaging using two-dimensional speckle tracking echocardiography: a consensus document of the EACVI/ASE/Industry Task Force to standardize deformation imaging (EHJ – Cardiovascular Imaging, 2018)

Variable name: lu_co

Definition: Cardiac output, recorded during leg raise maneuver

Units: L/min

Formula: $(lu_{sv} * lu_{hr}) / 1000$

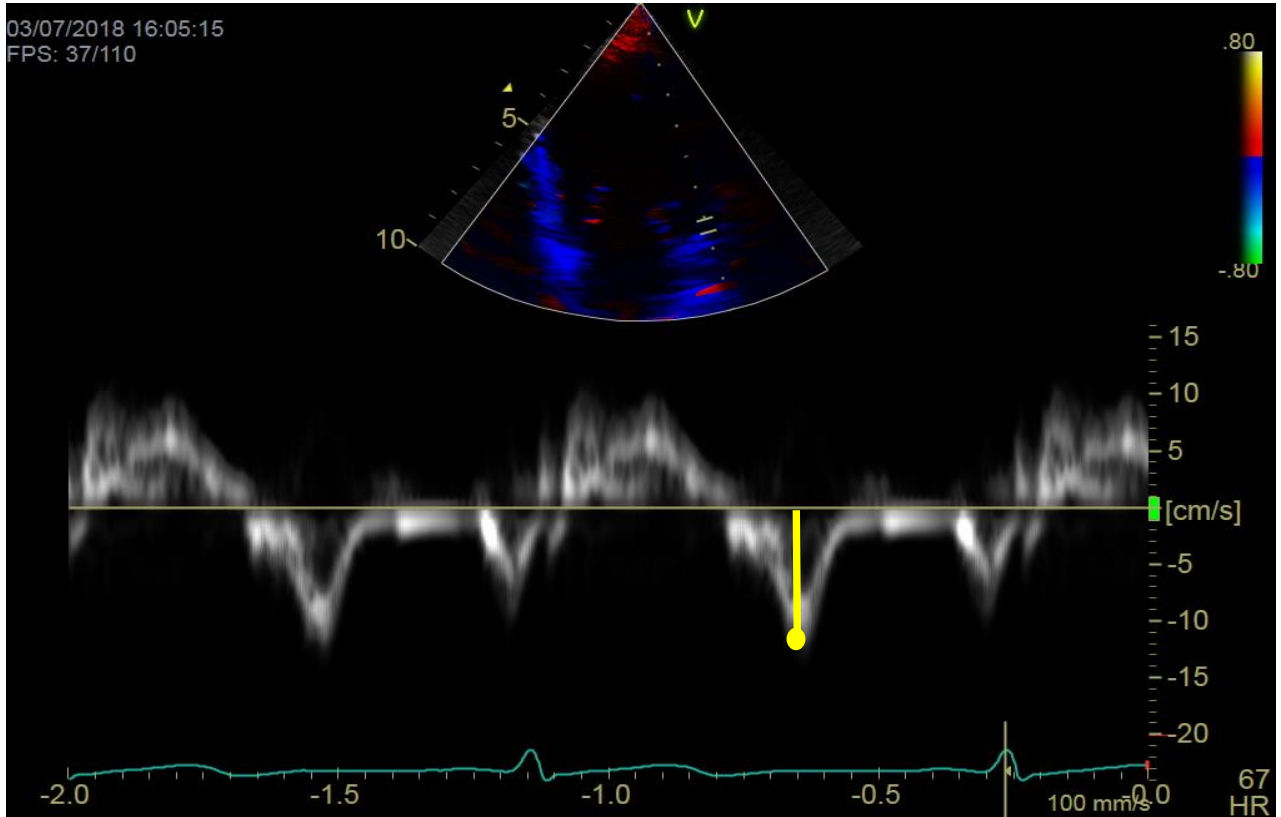
lu_co				

	Percentiles	Smallest		
1%	2.685423	2.105313		
5%	3.173396	2.129186		
10%	3.444185	2.14156	Obs	2,903
25%	4.023217	2.276088	Sum of Wgt.	2,903
50%	4.758316		Mean	4.960672
		Largest	Std. Dev.	1.332007
75%	5.697968	11.5525		
90%	6.640261	11.74795	Variance	1.774244
95%	7.326022	14.28087	Skewness	1.15858
99%	8.933669	14.73363	Kurtosis	6.279018

Variable name: lu_e_lateral

Definition: Lateral e prime peak velocity, recorded during leg raise maneuver

Units: cm/s



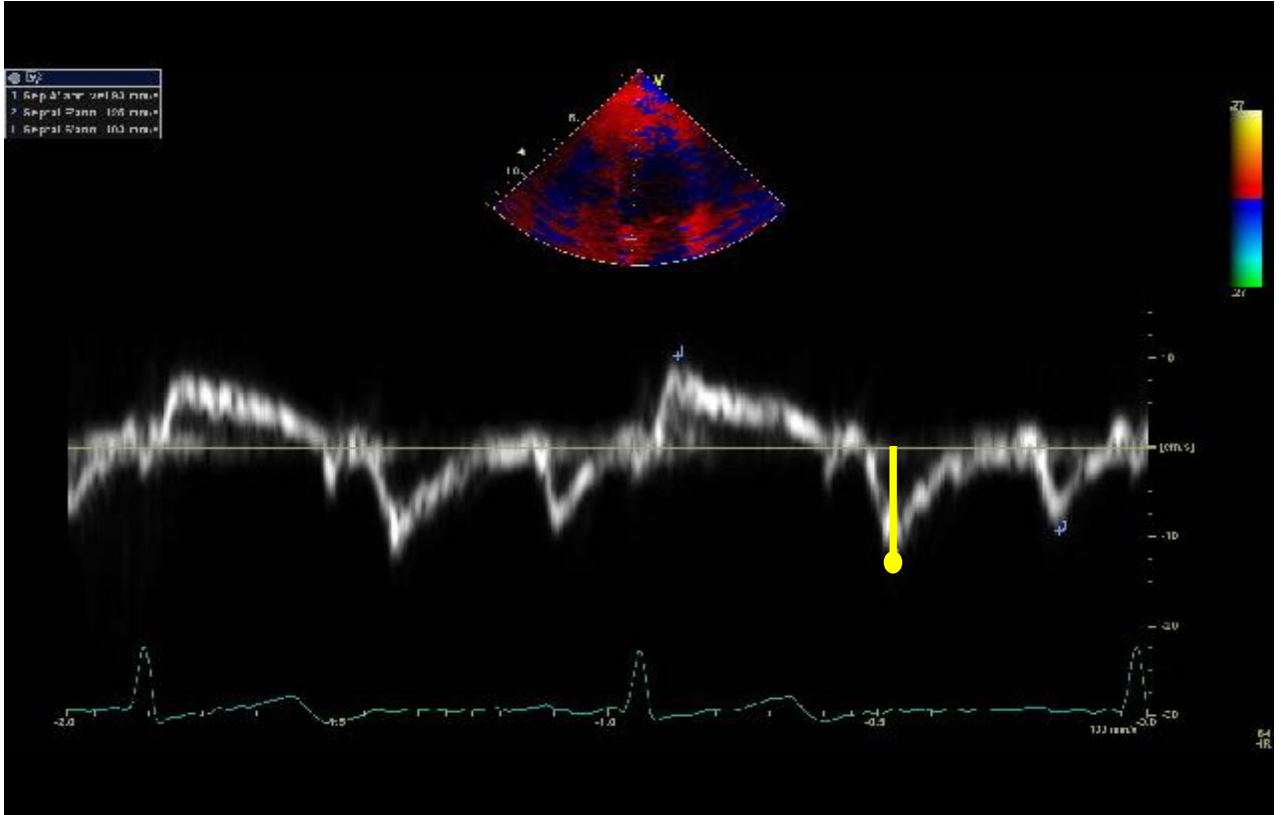
lu_e_lateral

Percentiles		Smallest		
1%	4.7	3.1		
5%	6.3	3.4		
10%	7.2	3.4	Obs	2,962
25%	8.4	3.4	Sum of Wgt.	2,962
50%	10.1	Largest	Mean	10.14088
75%	11.7		Std. Dev.	2.45227
90%	13.3		Variance	6.01363
95%	14.3		Skewness	.3503849
99%	16.3		Kurtosis	3.534793

Variable name: lu_e_septal

Definition: Septal e prime peak velocity, recorded during leg raise maneuver

Units: cm/s



lu_e_septal

Percentiles		Smallest		
1%	3.7	2.2		
5%	5.1	2.4		
10%	5.7	2.5	Obs	2,958
25%	6.9	2.6	Sum of Wgt.	2,958
50%	8.2		Mean	8.335227
		Largest	Std. Dev.	2.088205
75%	9.7	16.6		
90%	11	16.8	Variance	4.360598
95%	11.8	17.7	Skewness	.336212
99%	13.7	21.3	Kurtosis	3.73714

Variable name: lu_ea_ratio

Definition: Mitral E/A ratio, recorded during leg raise maneuver

Units: N/A

Formula: lu_mitral_e/lu_mitral_a

lu_ea_ratio				

	Percentiles	Smallest		
1%	.5384616	.383549		
5%	.6366366	.3975207		
10%	.6903821	.4100974	Obs	2,879
25%	.7760652	.4664723	Sum of Wgt.	2,879
50%	.8953068		Mean	.9903642
		Largest	Std. Dev.	.3321194
75%	1.1421	3.543974		
90%	1.36832	3.686207	Variance	.1103033
95%	1.561364	3.988	Skewness	2.491468
99%	2.147196	4.019512	Kurtosis	15.64603

Variable name: lu_ee_avg

Definition: Average E/e' ratio, recorded during leg raise maneuver

Units: N/A

Formula: (lu_ee_septal+lu_ee_lateral)/2

lu_ee_avg				

	Percentiles	Smallest		
1%	4.438848	3.450051		
5%	5.333333	3.623869		
10%	5.871739	3.798981	Obs	2,925
25%	6.9125	3.800704	Sum of Wgt.	2,925
50%	8.407877		Mean	9.124204
		Largest	Std. Dev.	3.447161
75%	10.3562	32.76191		
90%	13.10048	33.53823	Variance	11.88292
95%	15.12292	34.30108	Skewness	2.280331
99%	22.31016	35.40742	Kurtosis	12.2029

Variable name: lu_ee_lateral

Definition: Lateral E/e' ratio, recorded during leg raise maneuver

Units: N/A

Formula: lu_mitral_e/lu_e_lateral

lu_ee_lateral				

	Percentiles	Smallest		
1%	3.727891	2.865385		
5%	4.476191	3.079755		
10%	5.129412	3.132867	Obs	2,937
25%	6.159091	3.178571	Sum of Wgt.	2,937
50%	7.632911		Mean	8.210021
		Largest	Std. Dev.	3.145403
75%	9.499999	28.66667		
90%	11.85185	28.82192	Variance	9.893561
95%	13.92424	29.93549	Skewness	2.015516
99%	19.40351	35.34091	Kurtosis	10.89643

Variable name: lu_ee_septal

Definition: Septal E/e' ratio, recorded during leg raise maneuver

Units: N/A

Formula: lu_mitral_e/lu_e_septal

lu_ee_septal				

	Percentiles	Smallest		
1%	4.687943	2.751879		
5%	5.763158	3.564103		
10%	6.327869	3.723684	Obs	2,932
25%	7.520673	3.955357	Sum of Wgt.	2,932
50%	9.142183		Mean	10.0366
		Largest	Std. Dev.	4.098673
75%	11.39292	38.68		
90%	14.50794	40.37143	Variance	16.79912
95%	17.41072	45.47059	Skewness	2.593077
99%	25.725	46.2	Kurtosis	14.93189

Variable name: lu_hr

Definition: Heart rate measured from the LVOT VTI waveform, recorded during leg raise maneuver

Units: bpm

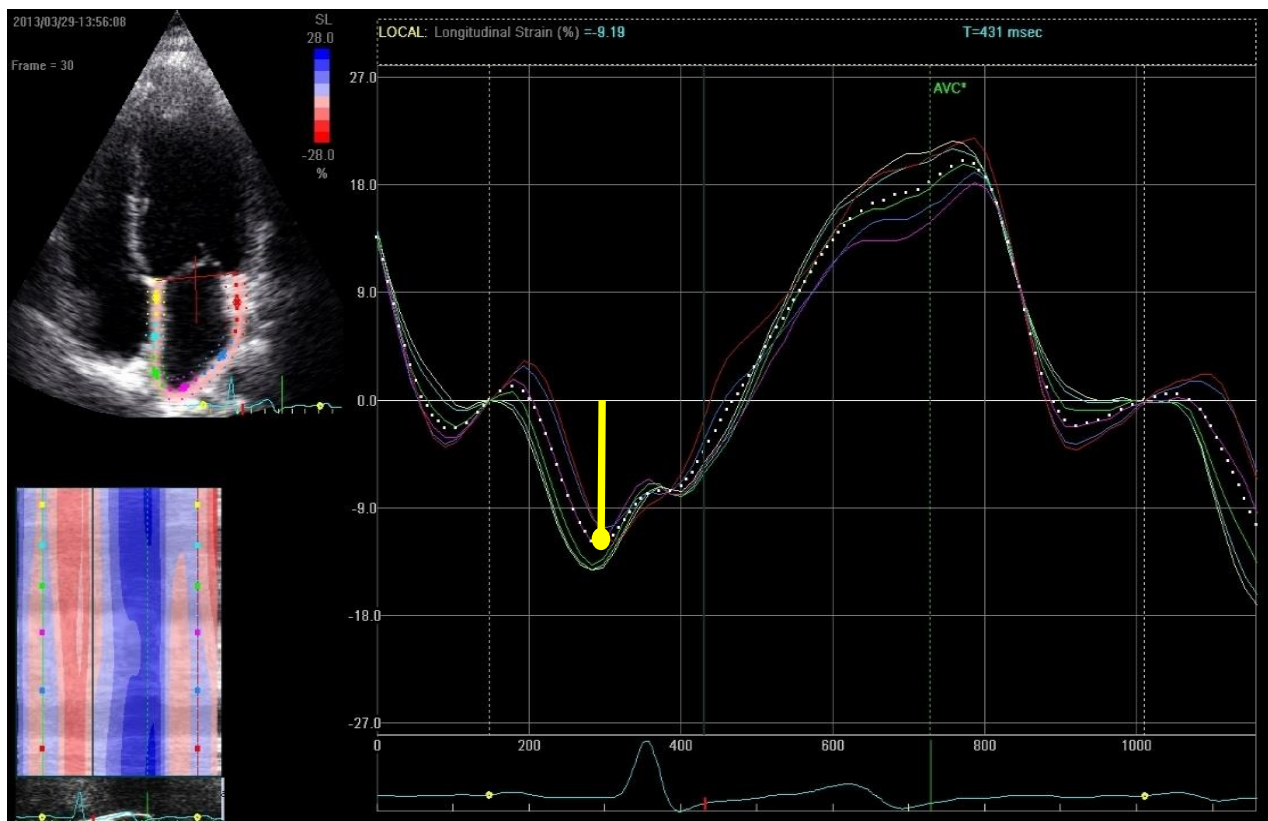
lu_hr				

	Percentiles	Smallest		
1%	44	34		
5%	49	35		
10%	52	36	Obs	2,991
25%	56	39	Sum of Wgt.	2,991
50%	62		Mean	63.03678
		Largest	Std. Dev.	9.86121
75%	69	100		
90%	76	102	Variance	97.24346
95%	81	106	Skewness	.7314678
99%	91	135	Kurtosis	4.448931

Variable name: lu_la_strain_peak_neg_c

Definition: Global left atrial booster strain, A4C view, recorded during leg raise maneuver

Units: % (absolute value recorded)



lu_la_strain_peak_neg_c

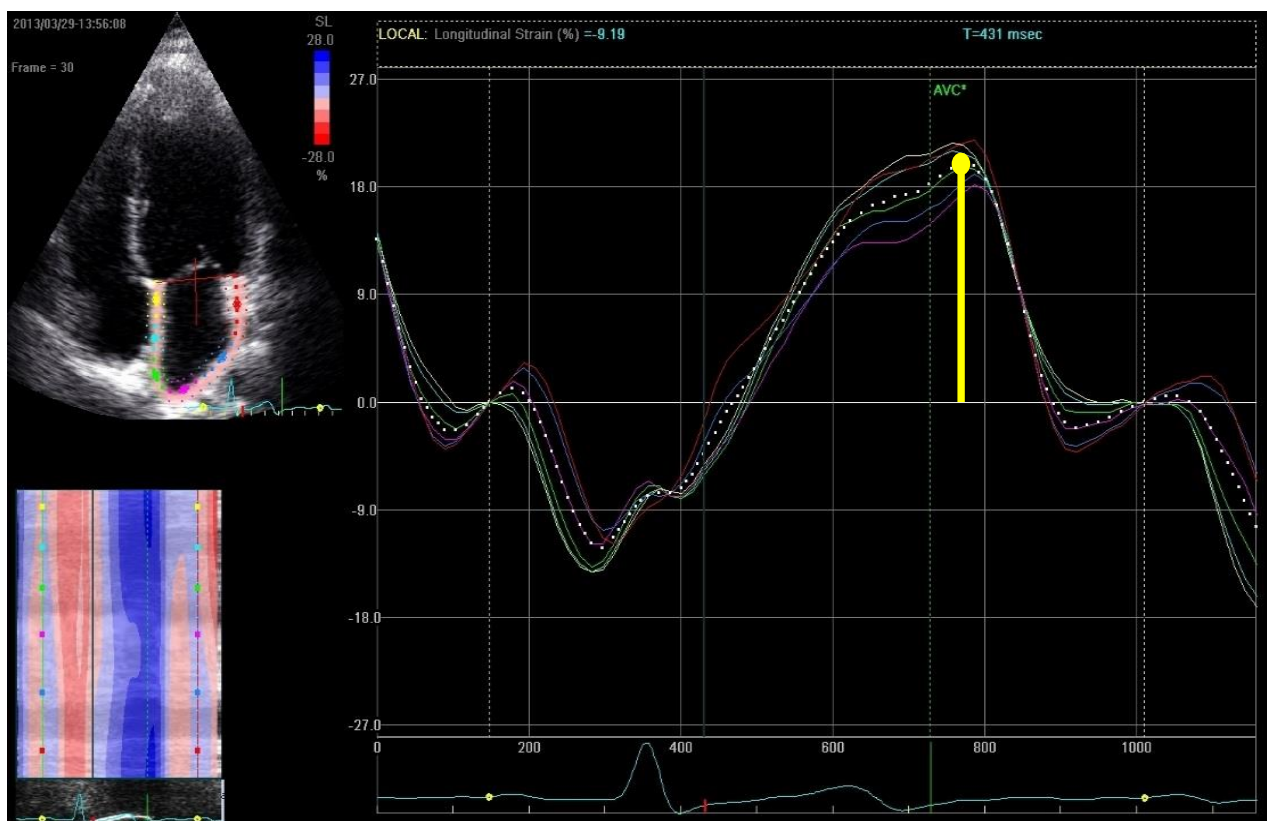
Percentiles		Smallest		
1%	4.40593	1.317123		
5%	7.296137	1.626016		
10%	8.813929	1.626016	Obs	2,737
25%	11.30899	2.249489	Sum of Wgt.	2,737
			Mean	14.76908
50%	14.28571		Std. Dev.	5.126056
		Largest		
75%	17.64706	37.23068		
90%	21.6693	37.55158	Variance	26.27645
95%	23.93109	41.34275	Skewness	.669728
99%	29.08223	41.64306	Kurtosis	4.113503

*All booster strain values obtained using P-P wave gating were converted to R-R wave values

Variable name: lu_la_strain_peak_pos_c

Definition: Global left atrial conduit strain, A4C view, recorded during leg raise maneuver

Units: %



lu_la_strain_peak_pos_c

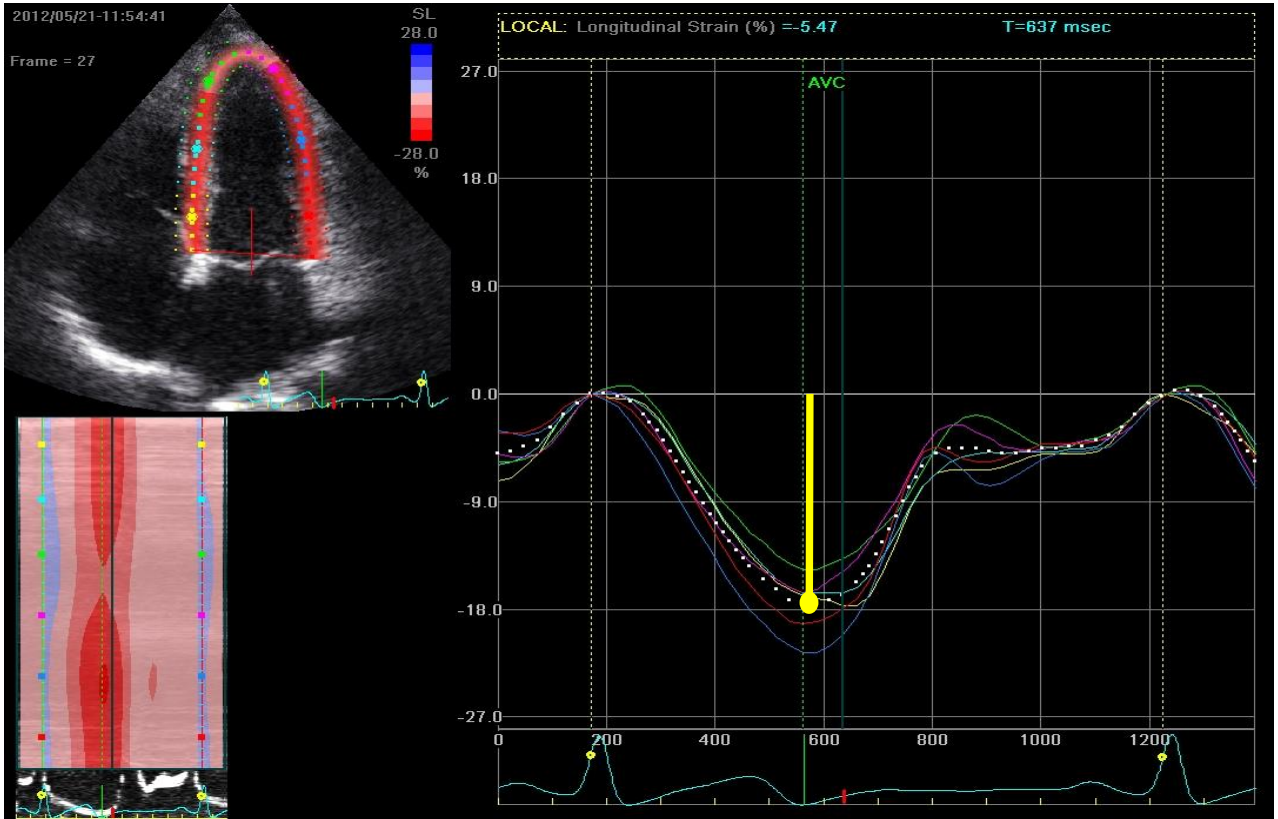
Percentiles		Smallest		
1%	5.204094	2.444988		
5%	7.843857	2.623295		
10%	9.496502	3.530752	Obs	2,737
25%	12.23527	3.554502	Sum of Wgt.	2,737
			Mean	16.02021
50%	15.60372		Std. Dev.	5.39037
		Largest		
75%	19.40994	35.73159		
90%	22.99436	35.83333	Variance	29.05609
95%	25.37764	37.37259	Skewness	.4901085
99%	30.79585	43.37304	Kurtosis	3.475383

*All conduit strain values obtained using P-P wave gating were converted to R-R wave values

Variable name: lu_lv4c_global_strain

Definition: Global longitudinal systolic strain, A4C view, recorded during leg raise maneuver

Units: %



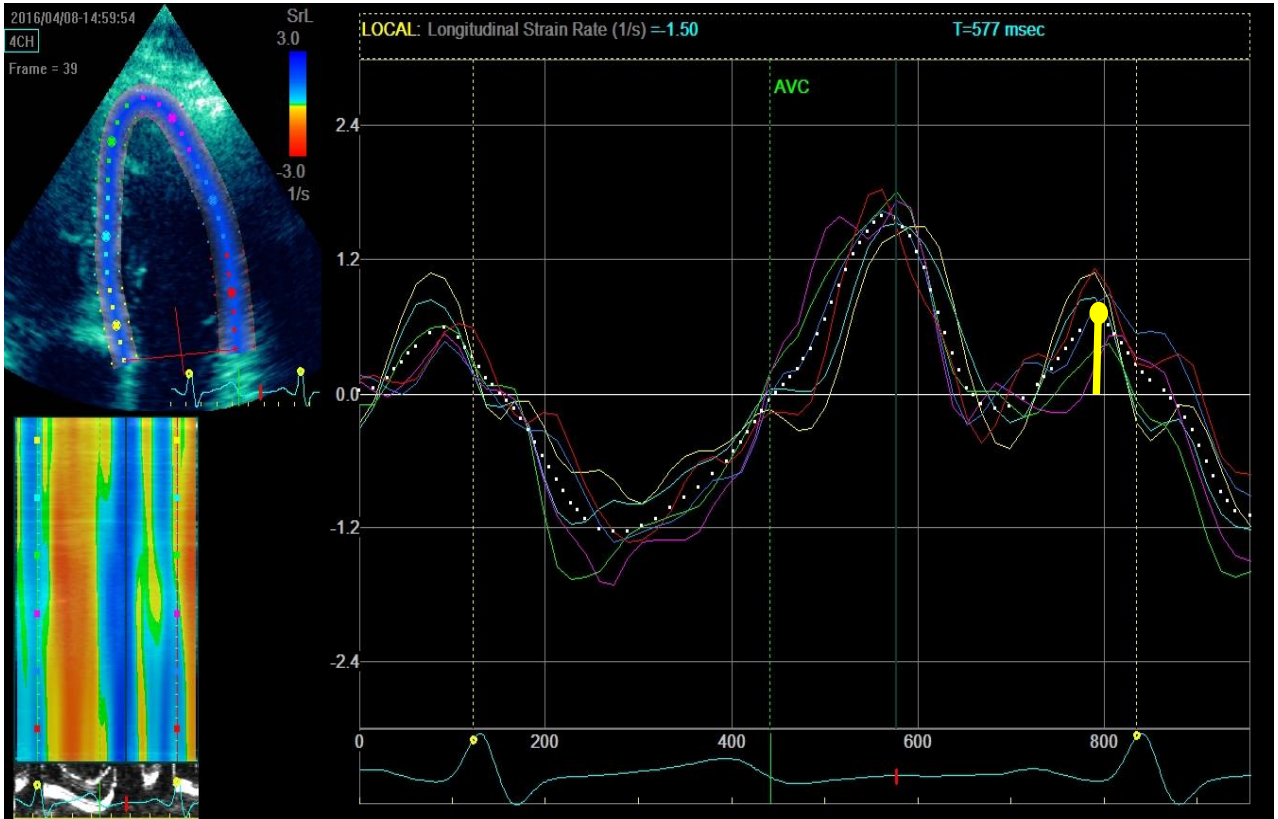
lu_lv4c_global_strain

Percentiles		Smallest		
1%	11.1	4.9		
5%	15.3	4.9		
10%	16.9	6.3	Obs	2,628
25%	18.9	6.4	Sum of Wgt.	2,628
50%	20.8		Mean	20.66914
		Largest	Std. Dev.	3.195135
75%	22.7	28.9		
90%	24.6	29.3	Variance	10.20889
95%	25.6	29.7	Skewness	-.5576651
99%	27.5	30.1	Kurtosis	4.444867

Variable name: lu_lv4c_sr_a

Definition: Left ventricular late diastolic strain rate, A4C view, recorded during leg raise maneuver

Units: 1/s



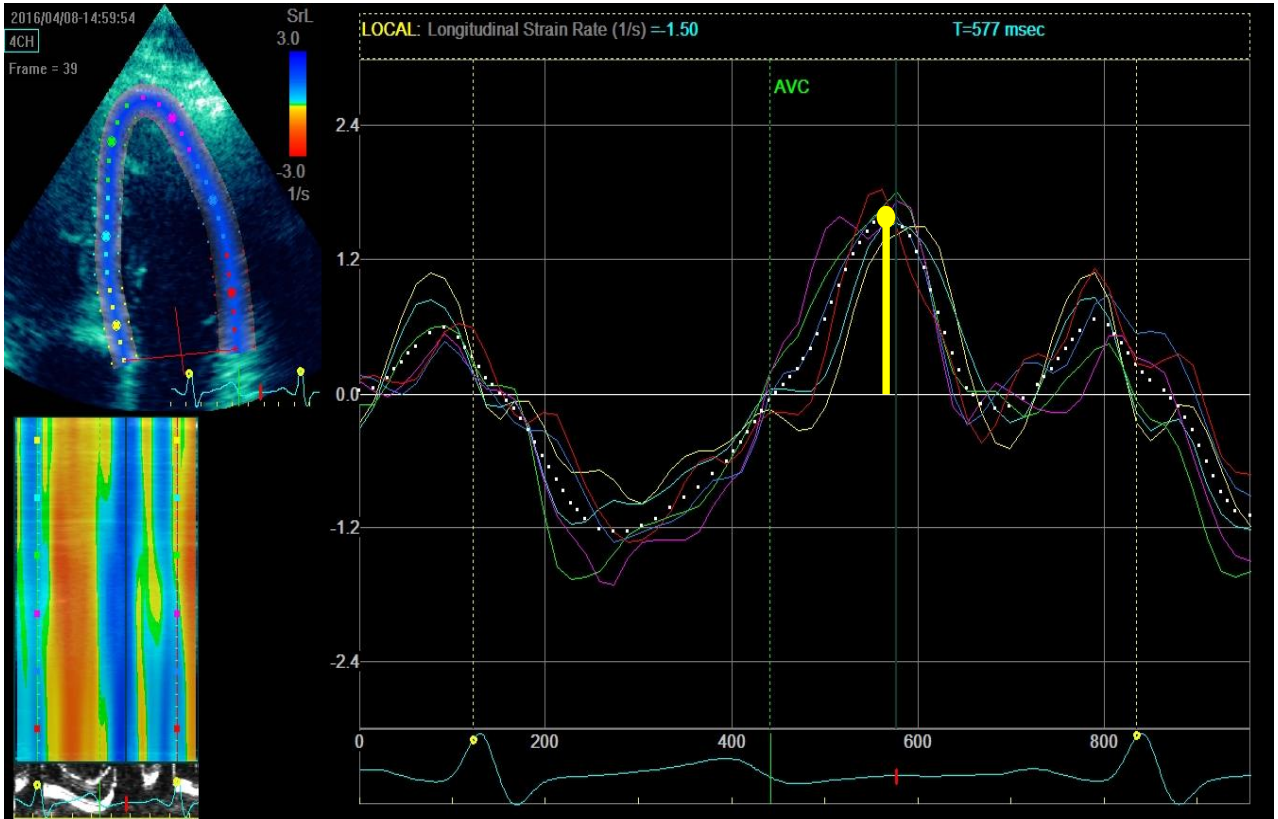
lu_lv4c_sr_a

Percentiles		Smallest		
1%	.3	.1		
5%	.6	.1		
10%	.7	.1	Obs	2,564
25%	.8	.1	Sum of Wgt.	2,564
50%	1		Mean	1.001131
		Largest	Std. Dev.	.302691
75%	1.2	2.3	Variance	.0916218
90%	1.4	2.4	Skewness	.4449408
95%	1.5	2.6	Kurtosis	4.488811
99%	1.8	2.8		

Variable name: lu_lv4c_sr_e

Definition: Left ventricular early diastolic strain rate, A4C view, recorded during leg raise maneuver

Units: 1/s



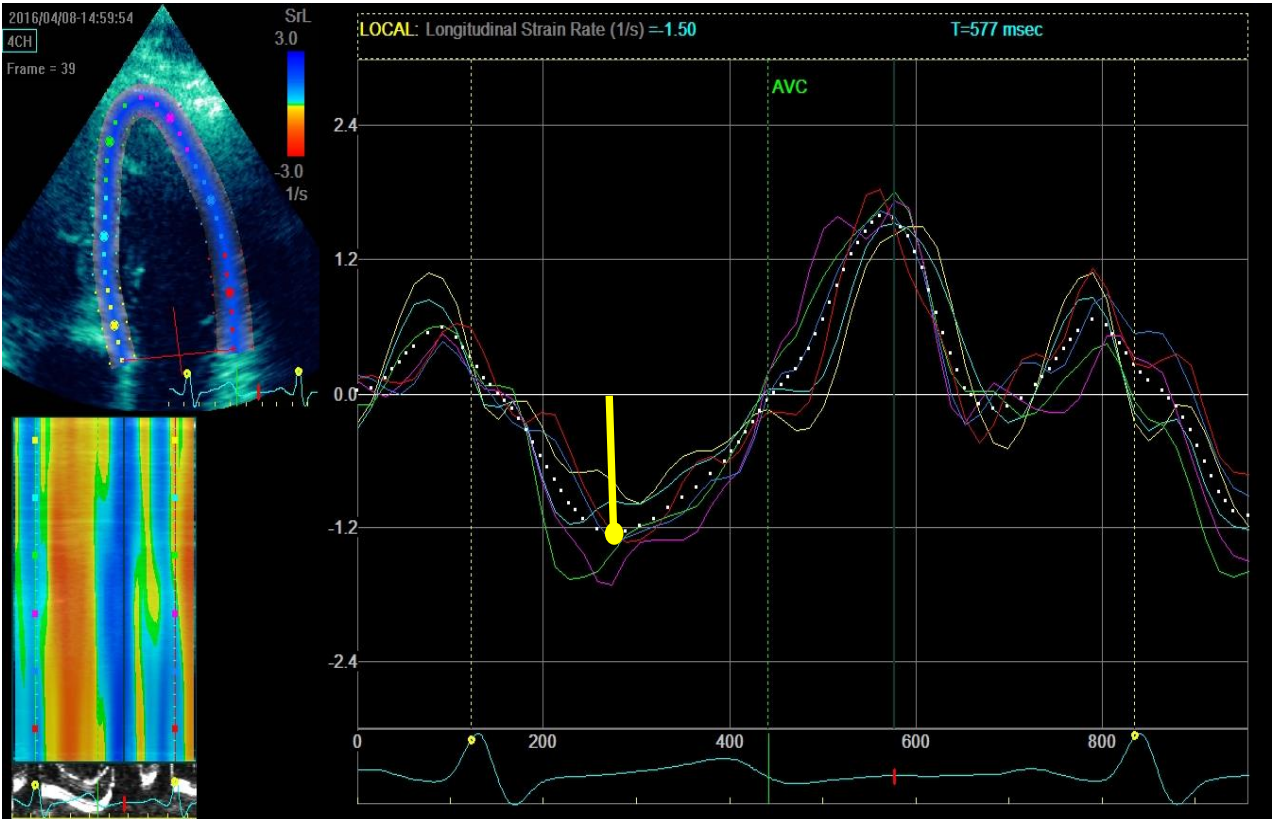
lu_lv4c_sr_e

Percentiles		Smallest		
1%	.5	.3		
5%	.7	.3		
10%	.8	.3	Obs	2,627
25%	1	.3	Sum of Wgt.	2,627
50%	1.2		Mean	1.243776
		Largest	Std. Dev.	.382851
75%	1.5	2.7		
90%	1.7	2.7	Variance	.1465749
95%	1.9	2.9	Skewness	.5321432
99%	2.2	3.2	Kurtosis	3.491007

Variable name: lu_lv4c_sr_s

Definition: Left ventricular systolic strain rate, A4C view, recorded during leg raise maneuver

Units: 1/s



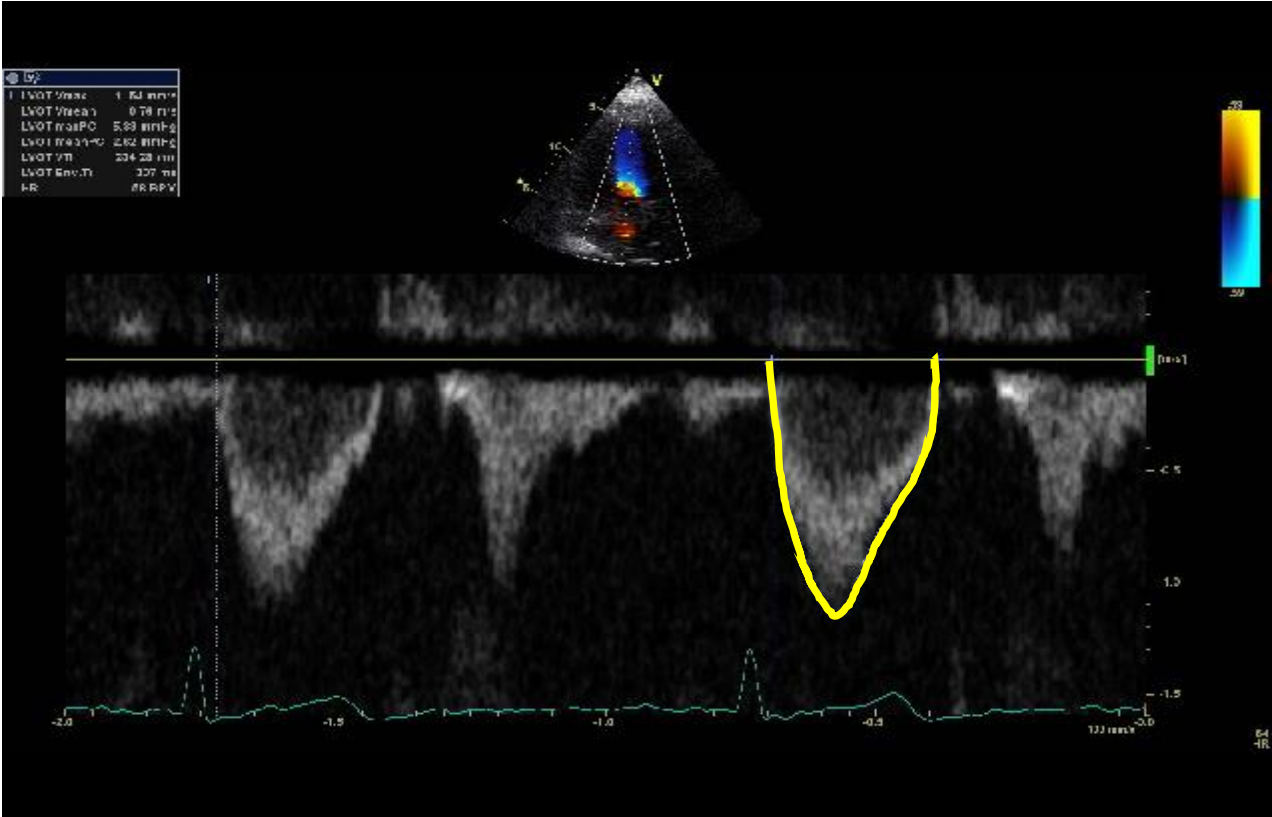
lu_lv4c_sr_s

Percentiles		Smallest		
1%	.6	.3		
5%	.7	.3		
10%	.8	.3	Obs	2,628
25%	.9	.4	Sum of Wgt.	2,628
50%	1	Largest	Mean	1.040183
			Std. Dev.	.2002822
75%	1.2	1.8	Variance	.0401129
90%	1.3	1.8	Skewness	.2210574
95%	1.4	1.8	Kurtosis	3.706555
99%	1.6	2		

Variable name: lu_lvot_vti

Definition: Left ventricular outflow tract velocity-time integral, recorded during leg raise maneuver

Units: cm



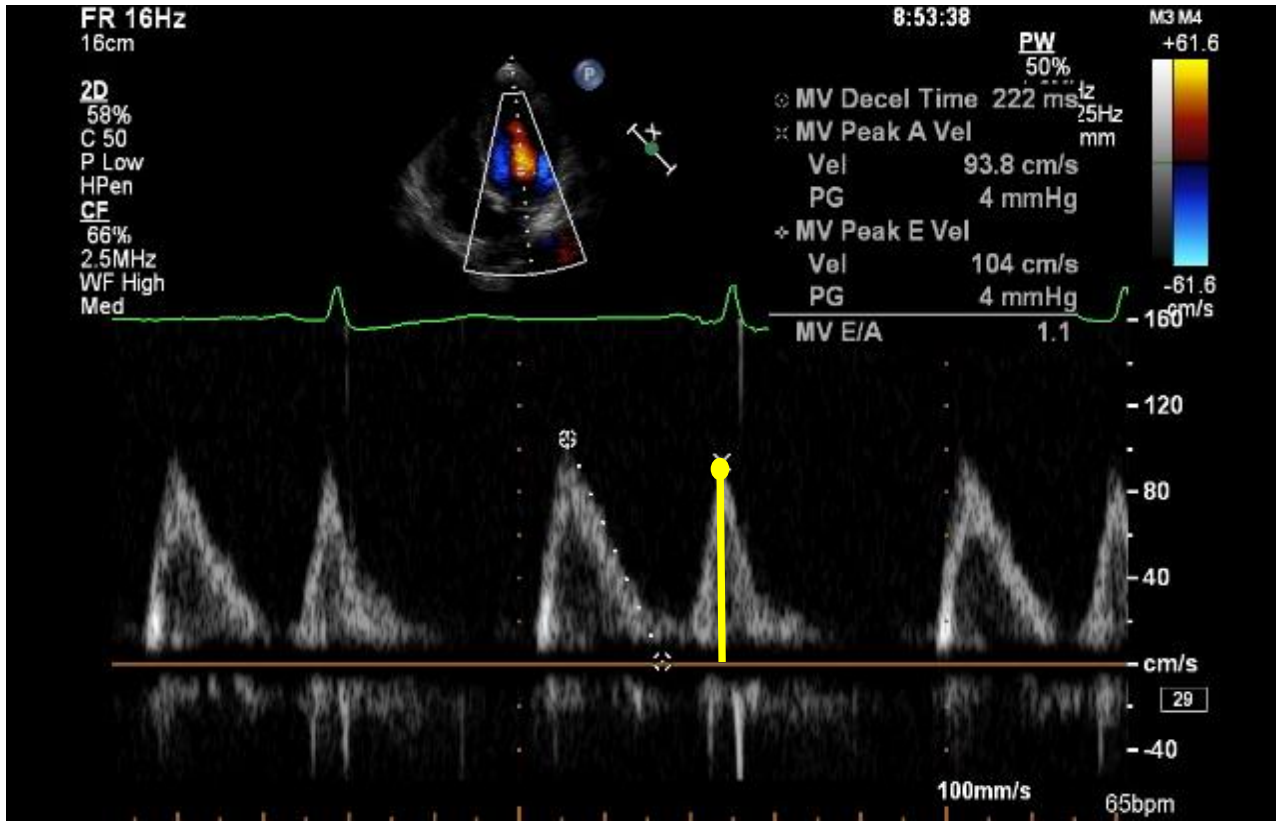
lu_lvot_vti

Percentiles		Smallest		
1%	14	11.2		
5%	16.3	11.3		
10%	17.7	11.3	Obs	2,908
25%	19.8	11.4	Sum of Wgt.	2,908
			Mean	23.21138
50%	22.7	Largest	Std. Dev.	5.115717
75%	25.7			
90%	29.5	56.8	Variance	26.17057
95%	31.8	60.1	Skewness	1.744252
99%	37.6	87.5	Kurtosis	14.83291

Variable name: lu_mitral_a

Definition: Mitral A wave peak velocity, recorded during leg raise maneuver

Units: cm/s



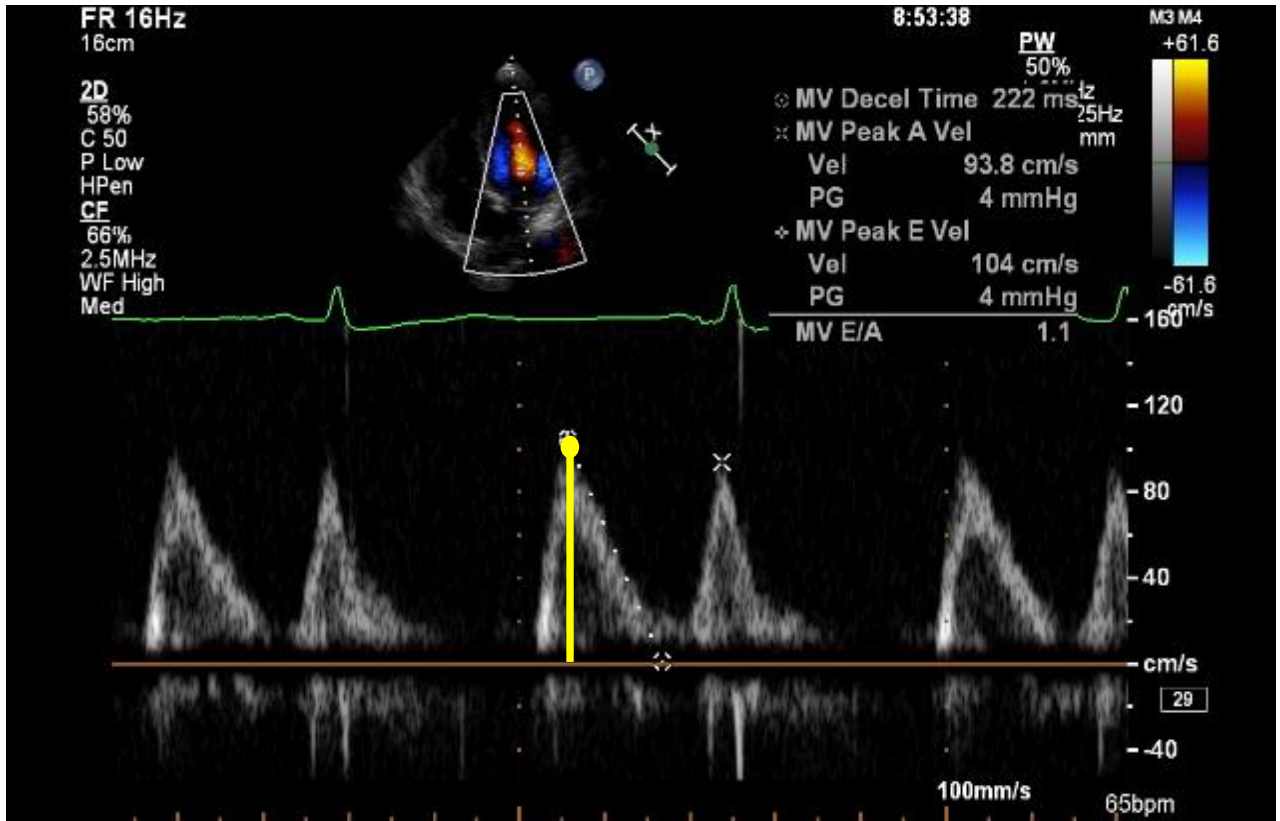
lu_mitral_a

Percentiles		Smallest		
1%	37.9	20.5		
5%	49.1	24		
10%	56.1	25	Obs	2,879
25%	67.2	28.3	Sum of Wgt.	2,879
50%	81.7		Mean	82.49302
		Largest	Std. Dev.	21.43434
75%	95.9	157.5		
90%	110.4	167.3	Variance	459.4308
95%	119	168	Skewness	.365017
99%	139.6	182.6	Kurtosis	3.363104

Variable name: lu_mitral_e

Definition: Mitral E wave peak velocity, recorded during leg raise maneuver

Units: cm/s



lu_mitral_e

Percentiles		Smallest		
1%	41.5	31.3		
5%	50.3	31.8		
10%	55.3	33.4	Obs	2,956
25%	64.9	34.8	Sum of Wgt.	2,956
50%	76.5		Mean	78.28133
		Largest	Std. Dev.	19.26848
75%	89.6	163.8		
90%	102	164.7	Variance	371.2743
95%	111.1	183.2	Skewness	.7848808
99%	135.5	210.4	Kurtosis	4.918198

Variable name: lu_sv

Definition: Stroke volume, recorded during leg raise maneuver

Units: ml

Formula: $3.14 * ((lvot/2)^2) * lu_lvot_vti$

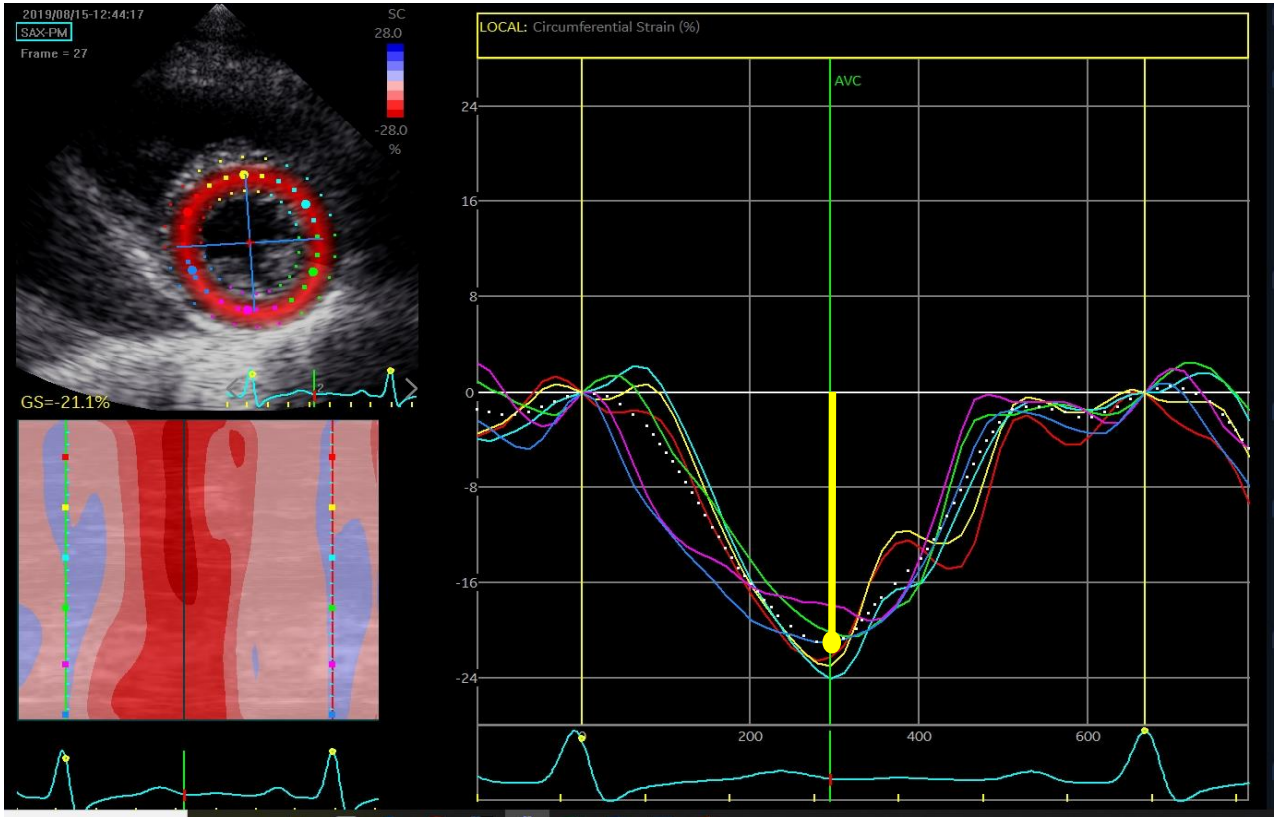
lu_sv				

	Percentiles	Smallest		
1%	43.46439	31.96358		
5%	51.48596	32.91825		
10%	56.21366	36.46218	Obs	2,905
25%	65.18989	37.65573	Sum of Wgt.	2,905
50%	76.92769		Mean	79.35806
		Largest	Std. Dev.	19.81805
75%	90.67918	172.7369		
90%	104.8469	183.373	Variance	392.7552
95%	114.7211	193.8636	Skewness	.8739805
99%	136.604	210.0434	Kurtosis	4.874278

Variable name: lv_circ_strain

Definition: Global circumferential systolic strain, PSAX view

Units: %



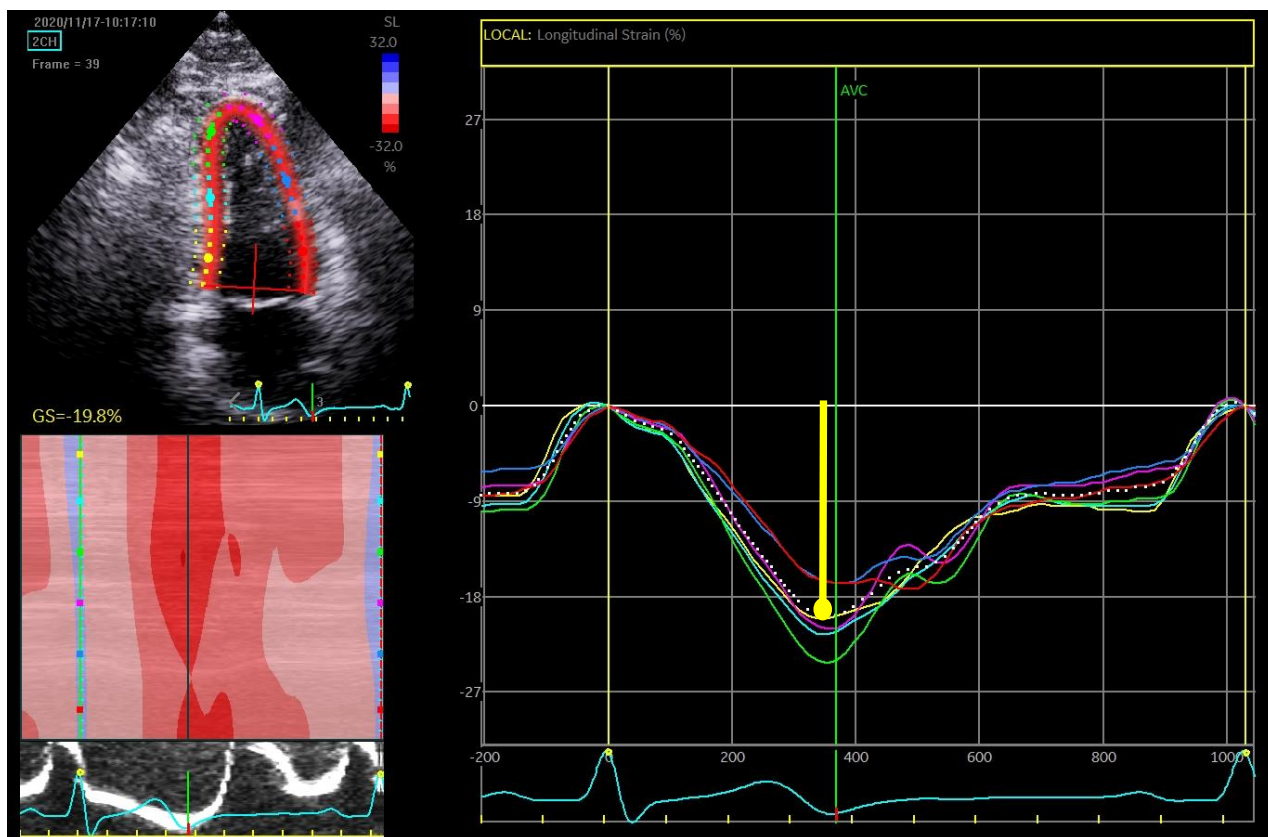
lv_circ_strain

Percentiles		Smallest		
1%	9.7	4.7		
5%	12.8	5.3		
10%	14.2	5.6	Obs	2,630
25%	15.9	5.6	Sum of Wgt.	2,630
50%	18.1		Mean	18.33205
		Largest	Std. Dev.	3.583958
75%	20.7	29.2		
90%	23	29.6	Variance	12.84476
95%	24.5	30.2	Skewness	.0648018
99%	27	30.3	Kurtosis	3.417789

Variable name: lv2c_global_strain

Definition: Global longitudinal systolic strain, A2C view

Units: %



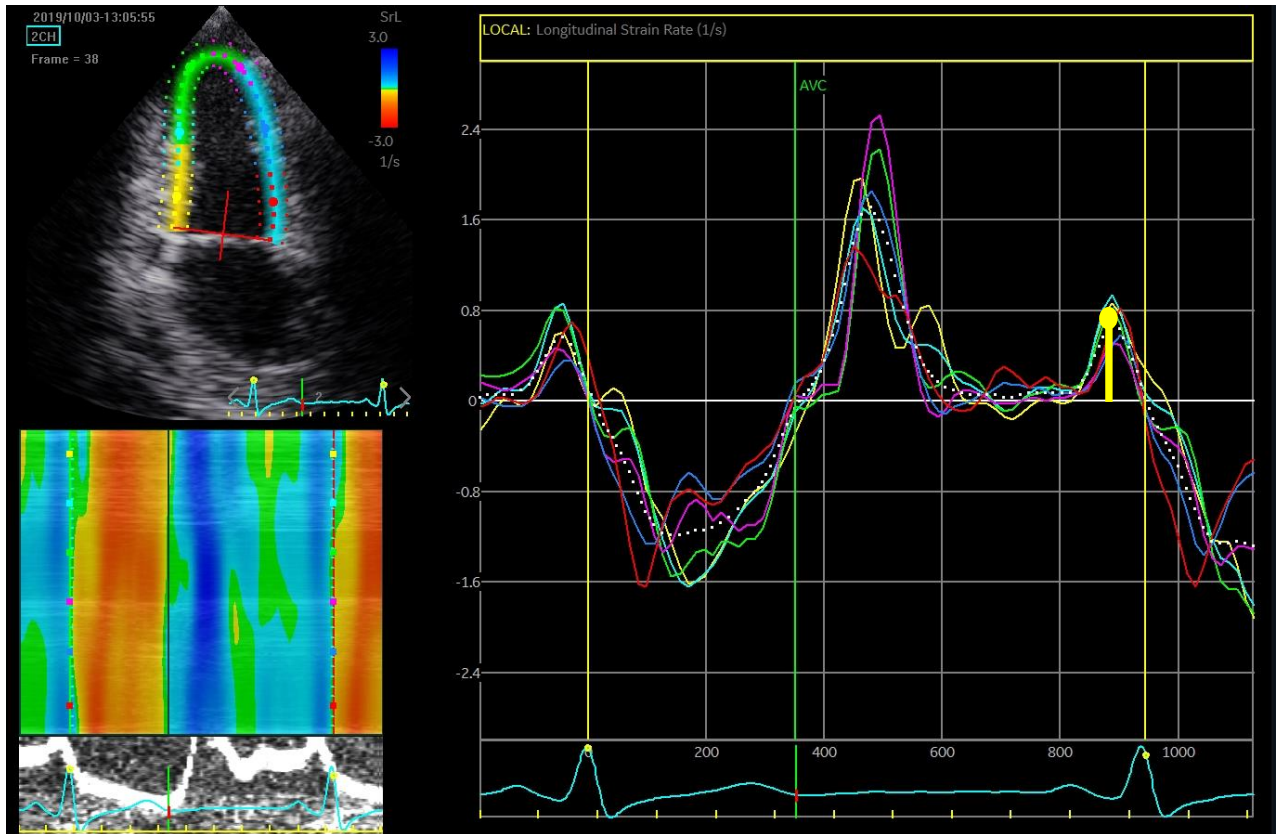
lv2c_global_strain

Percentiles		Smallest		
1%	10.6	4.8		
5%	14.2	5.4		
10%	15.8	5.8	Obs	2,854
25%	17.9	6	Sum of Wgt.	2,854
50%	20.1	Largest	Mean	19.9898
			Std. Dev.	3.40916
75%	22.4	29.4	Variance	11.62237
90%	24.2	29.5	Skewness	-.3834431
95%	25.2	29.7	Kurtosis	3.665651
99%	27.2	31.9		

Variable name: lv2c_sr_a

Definition: Left ventricular late diastolic strain rate, A2C view

Units: 1/s



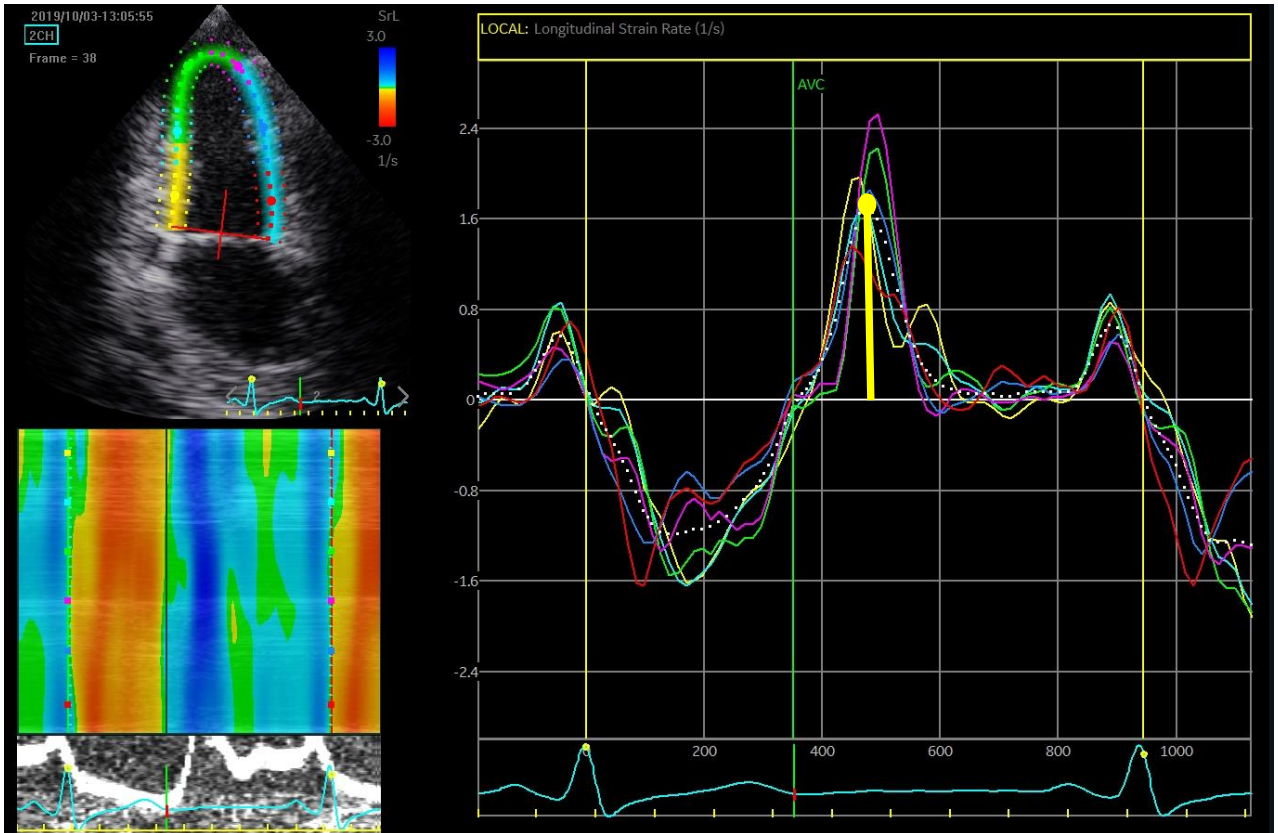
lv2c_sr_a

Percentiles		Smallest		
1%	.3	.1		
5%	.6	.1		
10%	.7	.1	Obs	2,781
25%	.8	.1	Sum of Wgt.	2,781
50%	1		Mean	.9911183
		Largest	Std. Dev.	.280089
75%	1.2	2.2	Variance	.0784499
90%	1.3	2.2	Skewness	.4337046
95%	1.5	2.3	Kurtosis	4.337366
99%	1.8	2.6		

Variable name: lv2c_sr_e

Definition: Left ventricular early diastolic strain rate, A2C view

Units: 1/s



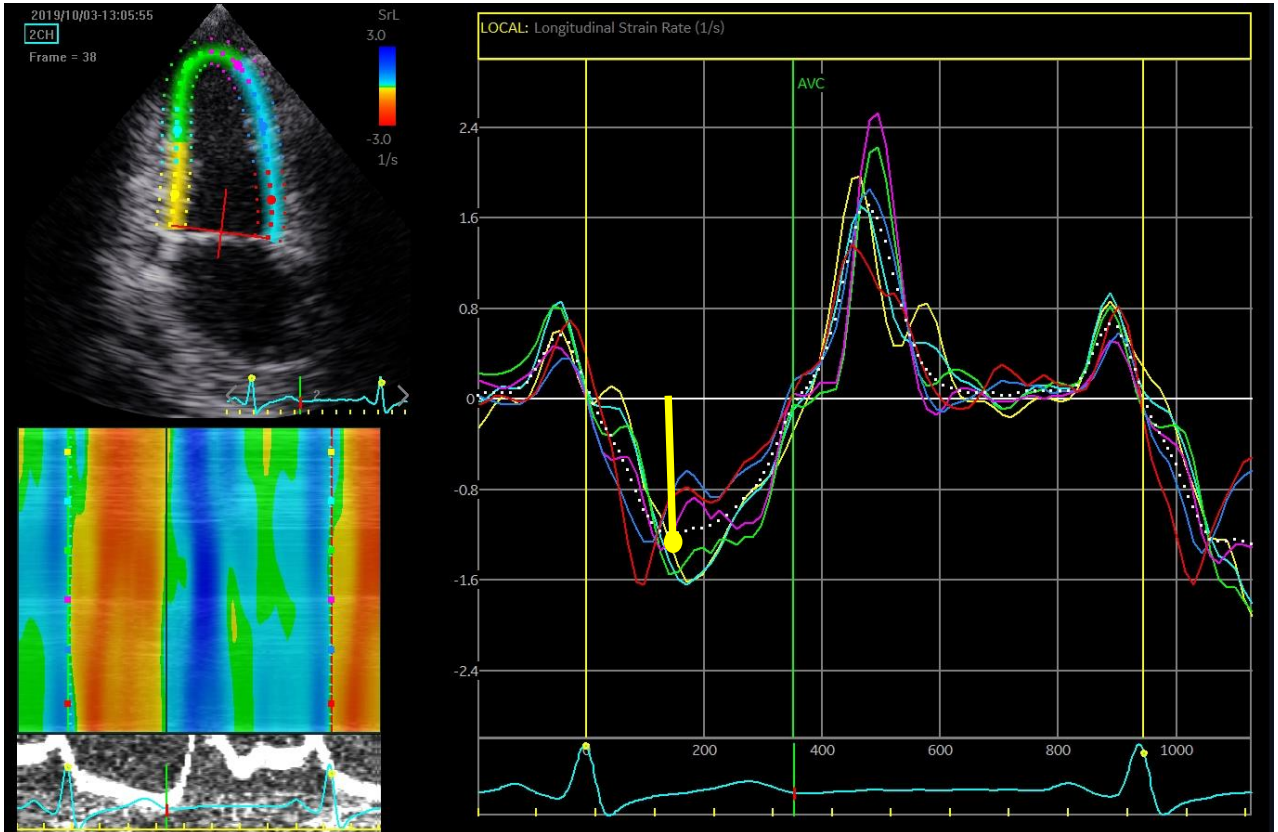
lv2c_sr_e

Percentiles			Smallest	
1%	.4	.1		
5%	.5	.2		
10%	.6	.2	Obs	2,854
25%	.8	.2	Sum of Wgt.	2,854
50%	1		Mean	1.045235
			Std. Dev.	.3494376
75%	1.3	2.3	Variance	.1221066
90%	1.5	2.3	Skewness	.6174849
95%	1.7	2.3	Kurtosis	3.776297
99%	2	3.3		

Variable name: lv2c_sr_s

Definition: Left ventricular systolic strain rate, A2C view

Units: 1/s



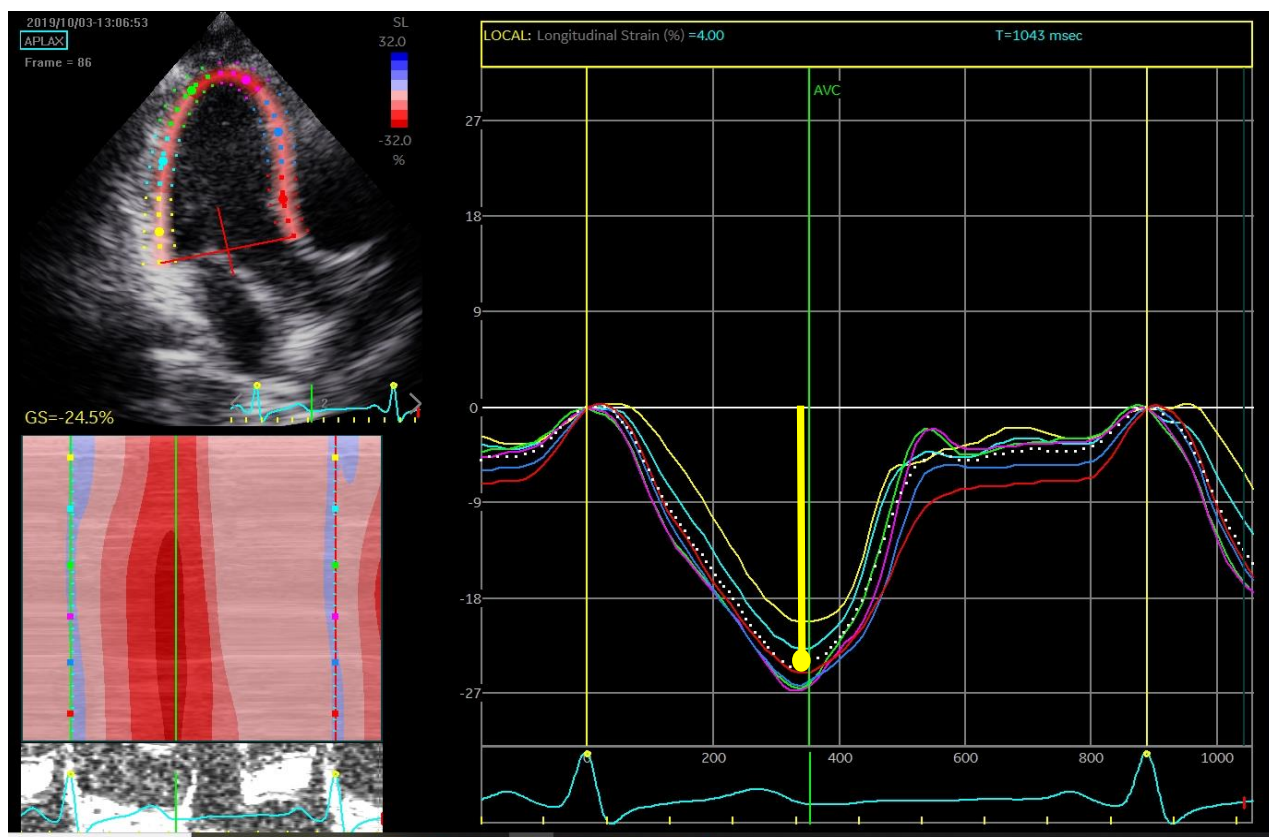
lv2c_sr_s

Percentiles		Smallest		
1%	.5	.1		
5%	.7	.1		
10%	.8	.3	Obs	2,854
25%	.9	.3	Sum of Wgt.	2,854
50%	1		Mean	1.030589
		Largest	Std. Dev.	.2072804
75%	1.2	1.8	Variance	.0429652
90%	1.3	1.8	Skewness	.0999327
95%	1.4	1.8	Kurtosis	3.906547
99%	1.6	1.9		

Variable name: lv3c_global_strain

Definition: Global longitudinal systolic strain, A3C view

Units: %



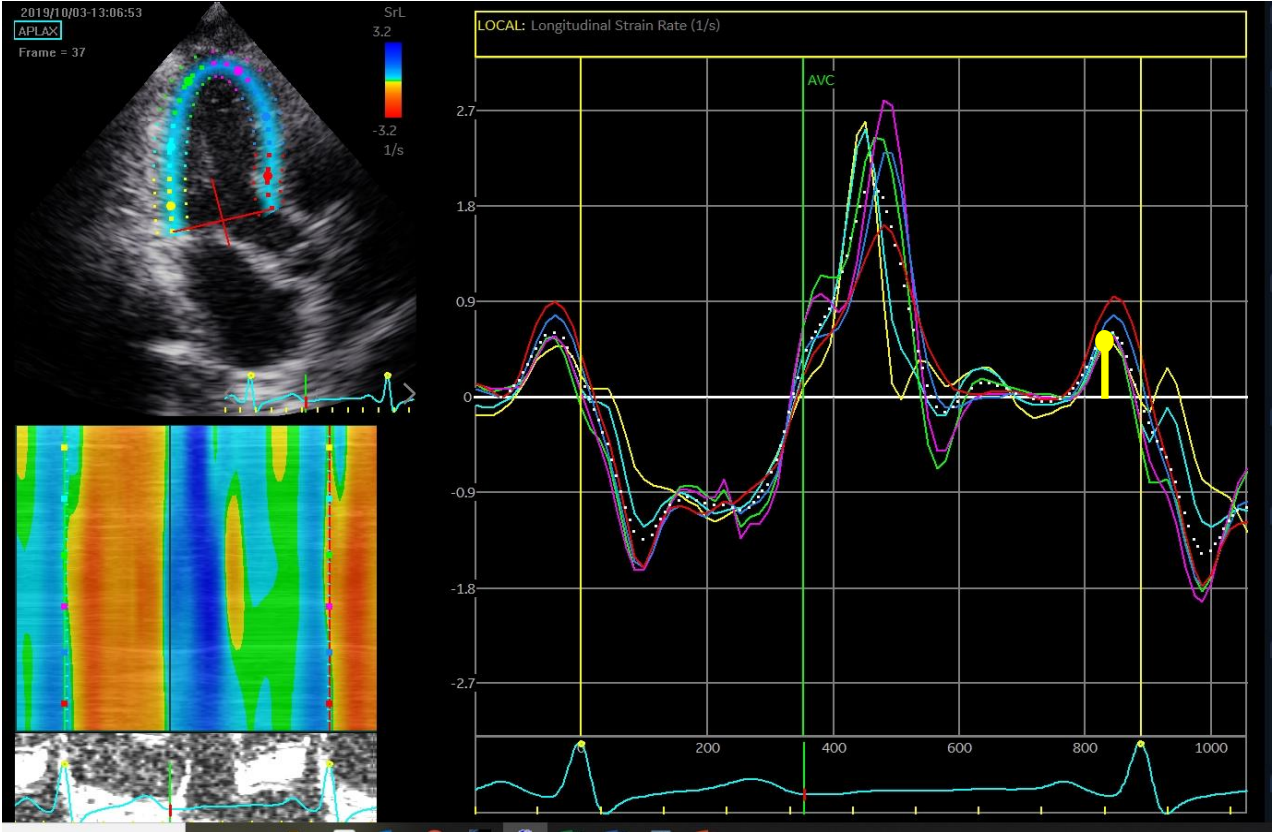
lv3c_global_strain

Percentiles		Smallest		
1%	10.2	4.6		
5%	14.4	4.6		
10%	15.6	5	Obs	2,854
25%	17.6	6.5	Sum of Wgt.	2,854
50%	19.7		Mean	19.67544
		Largest	Std. Dev.	3.357459
75%	21.9	29.1	Variance	11.27253
90%	23.8	29.6	Skewness	-.3101574
95%	25.1	29.7	Kurtosis	3.866532
99%	27.4	30.4		

Variable name: lv3c_sr_a

Definition: Left ventricular late diastolic strain rate, A3C view

Units: 1/s



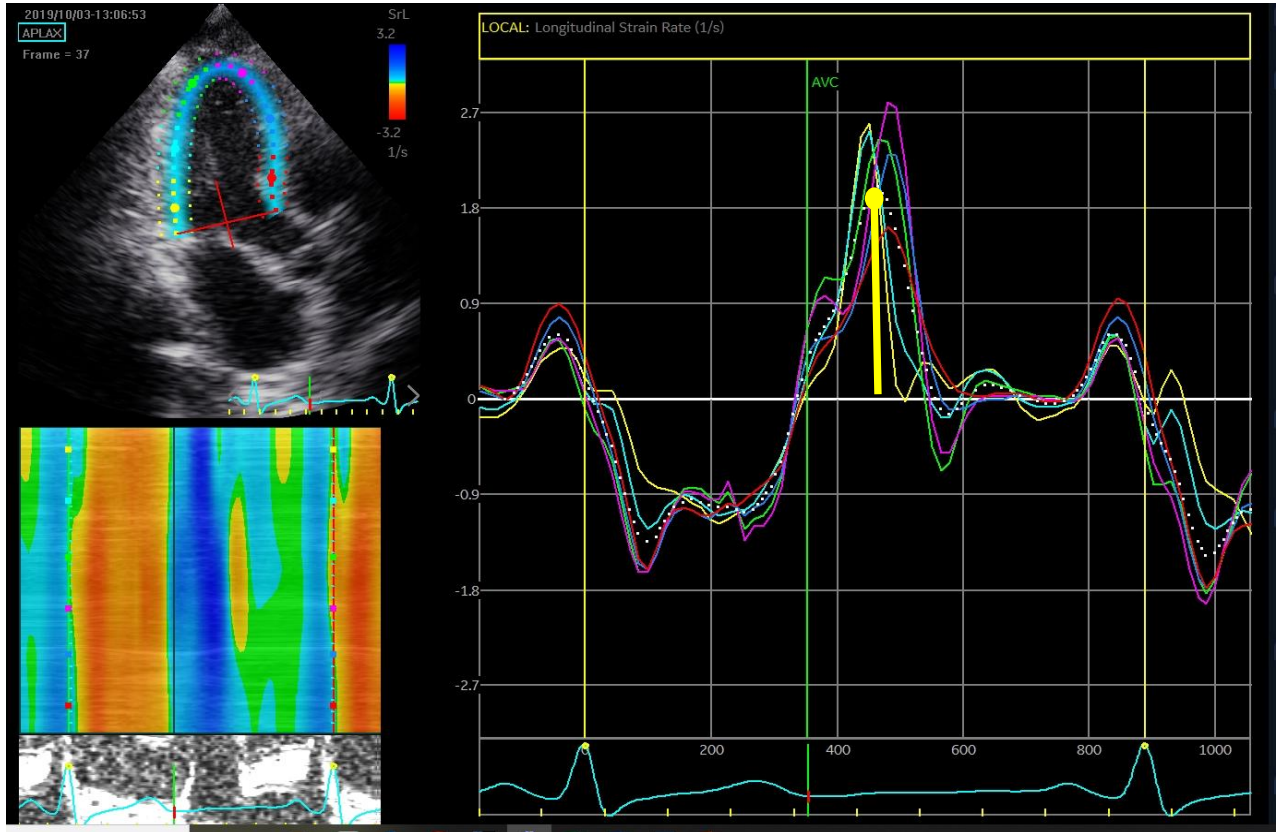
lv3c_sr_a

Percentiles		Smallest		
1%	.3	.1		
5%	.5	.1		
10%	.7	.1	Obs	2,783
25%	.9	.1	Sum of Wgt.	2,783
		Largest	Mean	1.077758
50%	1.1		Std. Dev.	.3476082
75%	1.3	2.4	Variance	.1208315
90%	1.5	2.5	Skewness	.3302955
95%	1.7	2.5	Kurtosis	3.609006
99%	2	2.6		

Variable name: lv3c_sr_e

Definition: Left ventricular early diastolic strain rate, A3C view

Units: 1/s



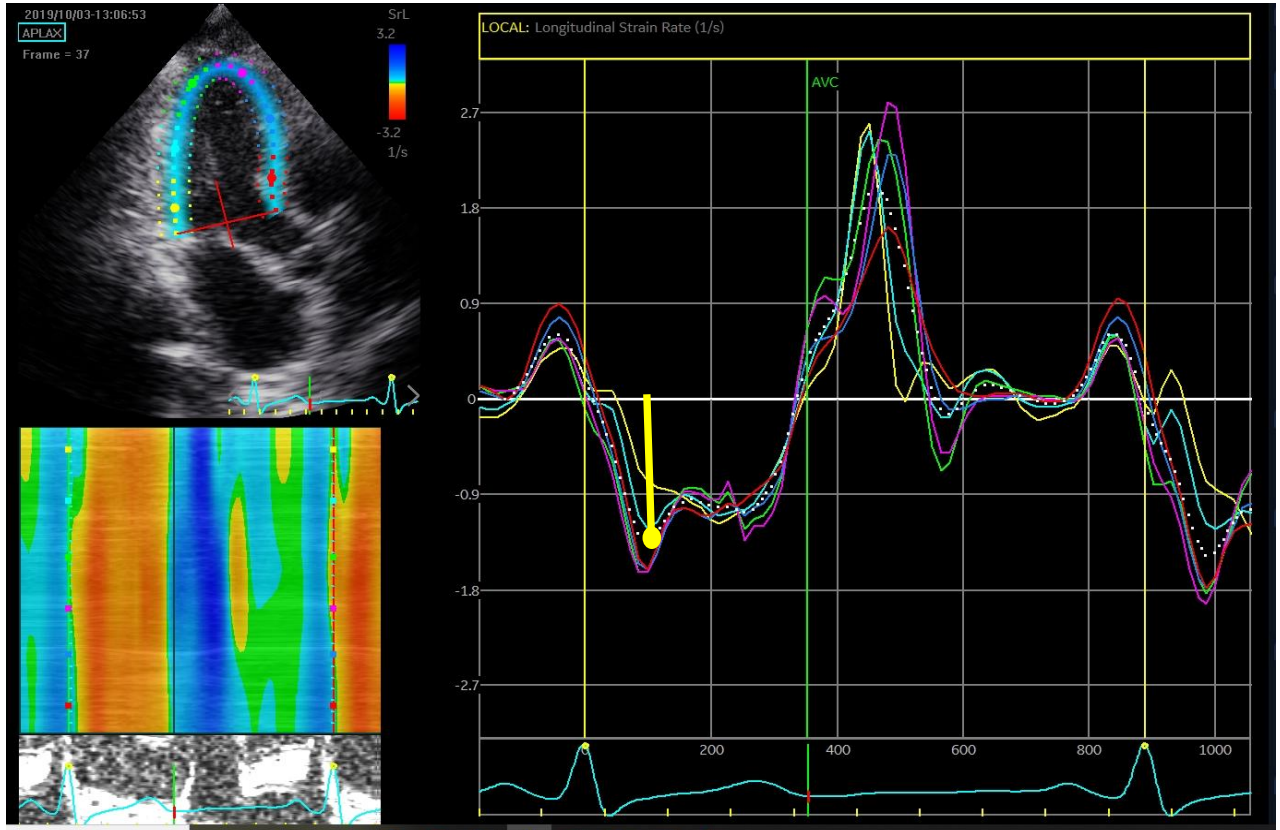
lv3c_sr_e

Percentiles		Smallest		
1%	.4	.2		
5%	.5	.2		
10%	.6	.2	Obs	2,854
25%	.8	.2	Sum of Wgt.	2,854
50%	1		Mean	1.055466
		Largest	Std. Dev.	.3715664
75%	1.3	2.5	Variance	.1380616
90%	1.5	2.5	Skewness	.7115637
95%	1.7	2.6	Kurtosis	3.879815
99%	2.1	3.2		

Variable name: lv3c_sr_s

Definition: Left ventricular systolic strain rate, A3C view

Units: 1/s



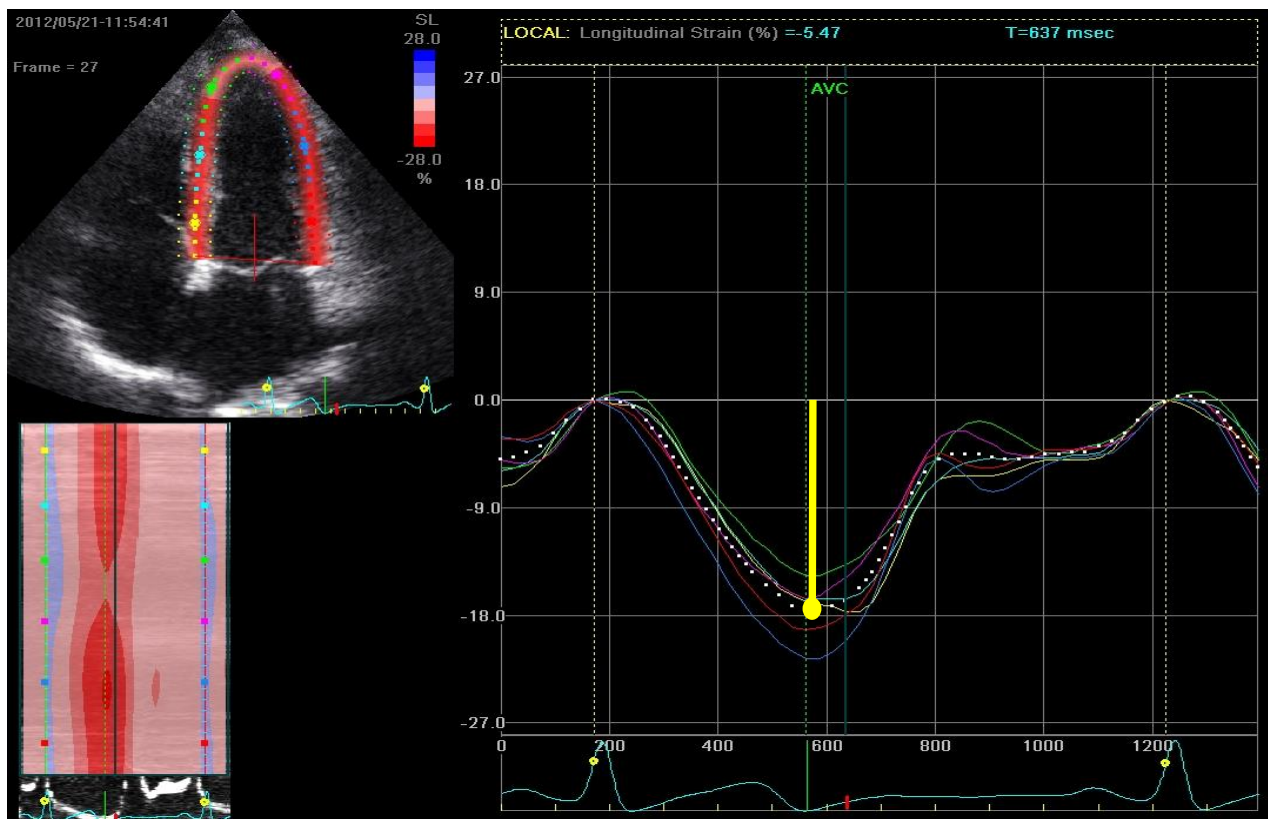
lv3c_sr_s

Percentiles		Smallest		
1%	.6	.2		
5%	.7	.3		
10%	.8	.3	Obs	2,854
25%	.9	.3	Sum of Wgt.	2,854
50%	1		Mean	1.029643
		Largest	Std. Dev.	.212105
75%	1.2	1.8	Variance	.0449885
90%	1.3	1.8	Skewness	.2936723
95%	1.4	1.9	Kurtosis	3.696431
99%	1.6	2		

Variable name: lv4c_global_strain

Definition: Global longitudinal systolic strain, A4C view

Units: %



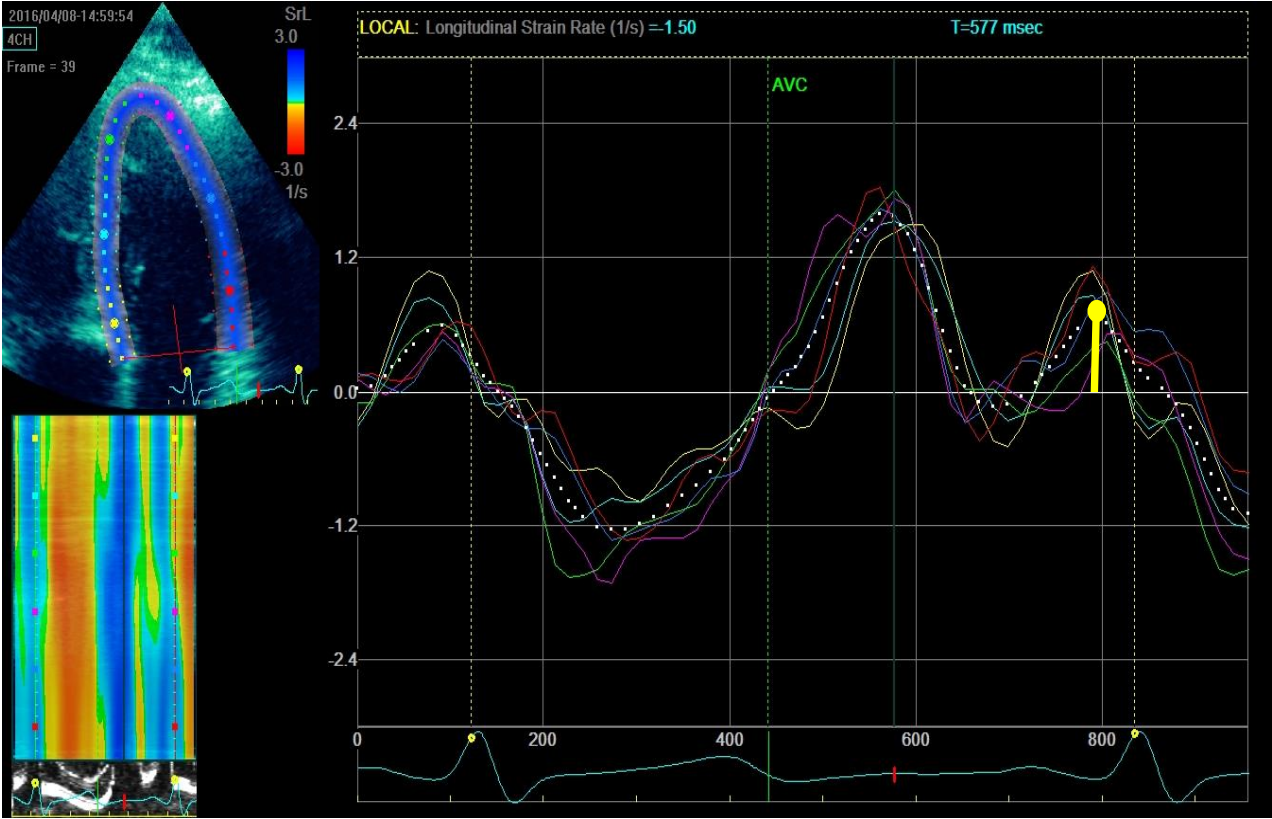
lv4c_global_strain

Percentiles		Smallest		
1%	10.2	4.1		
5%	14.5	4.6		
10%	15.8	5.6	Obs	2,989
25%	17.6	5.7	Sum of Wgt.	2,989
50%	19.6		Mean	19.57668
		Largest	Std. Dev.	3.2134
75%	21.7	29.3		
90%	23.5	29.5	Variance	10.32594
95%	24.7	29.6	Skewness	-.3943064
99%	26.5	29.8	Kurtosis	4.123373

Variable name: lv4c_sr_a

Definition: Left ventricular late diastolic strain rate, A4C view

Units: 1/s



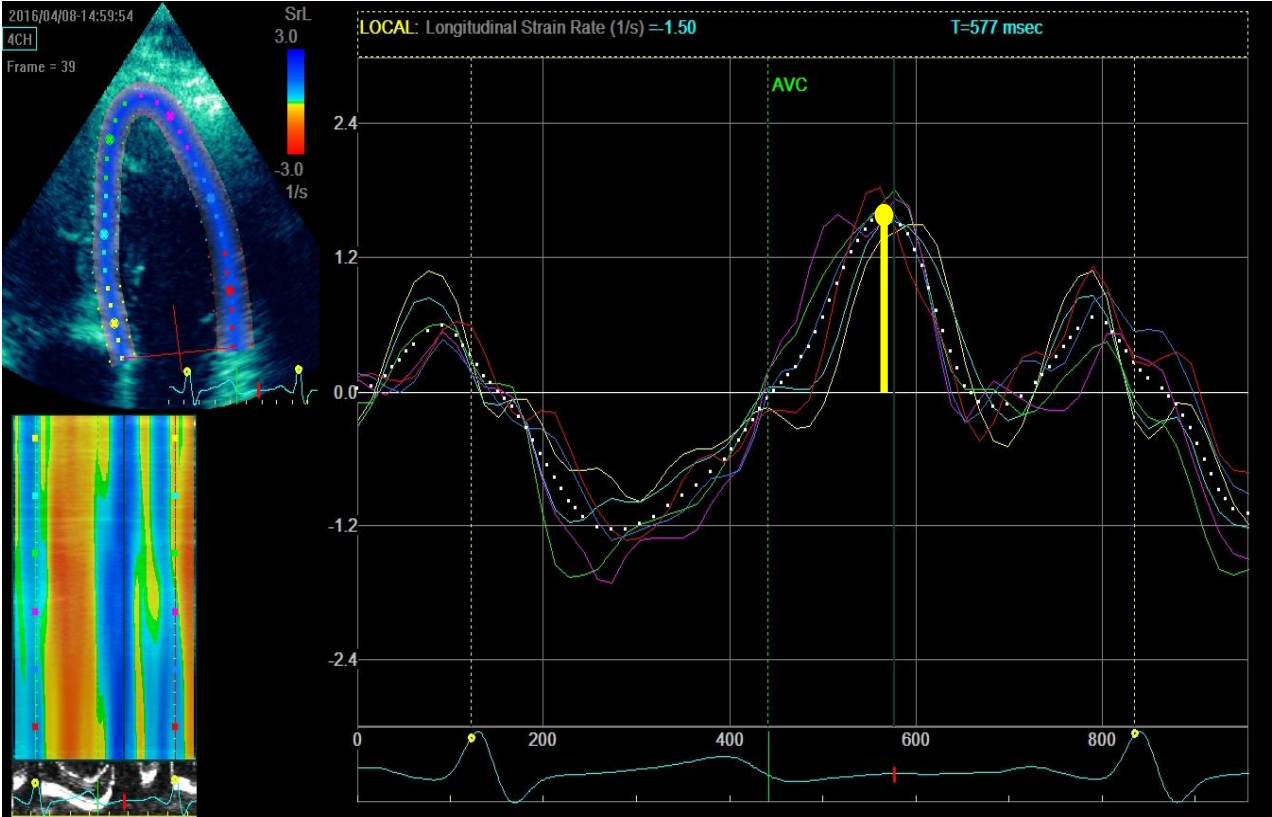
lv4c_sr_a

Percentiles		Smallest		
1%	.3	.1		
5%	.6	.1		
10%	.7	.1	Obs	2,915
25%	.8	.1	Sum of Wgt.	2,915
50%	1		Mean	1.049914
		Largest	Std. Dev.	.3020335
75%	1.2	2.3		
90%	1.4	2.4	Variance	.0912243
95%	1.6	2.7	Skewness	.3591249
99%	1.8	2.7	Kurtosis	4.175451

Variable name: lv4c_sr_e

Definition: Left ventricular early diastolic strain rate, A4C view

Units: 1/s



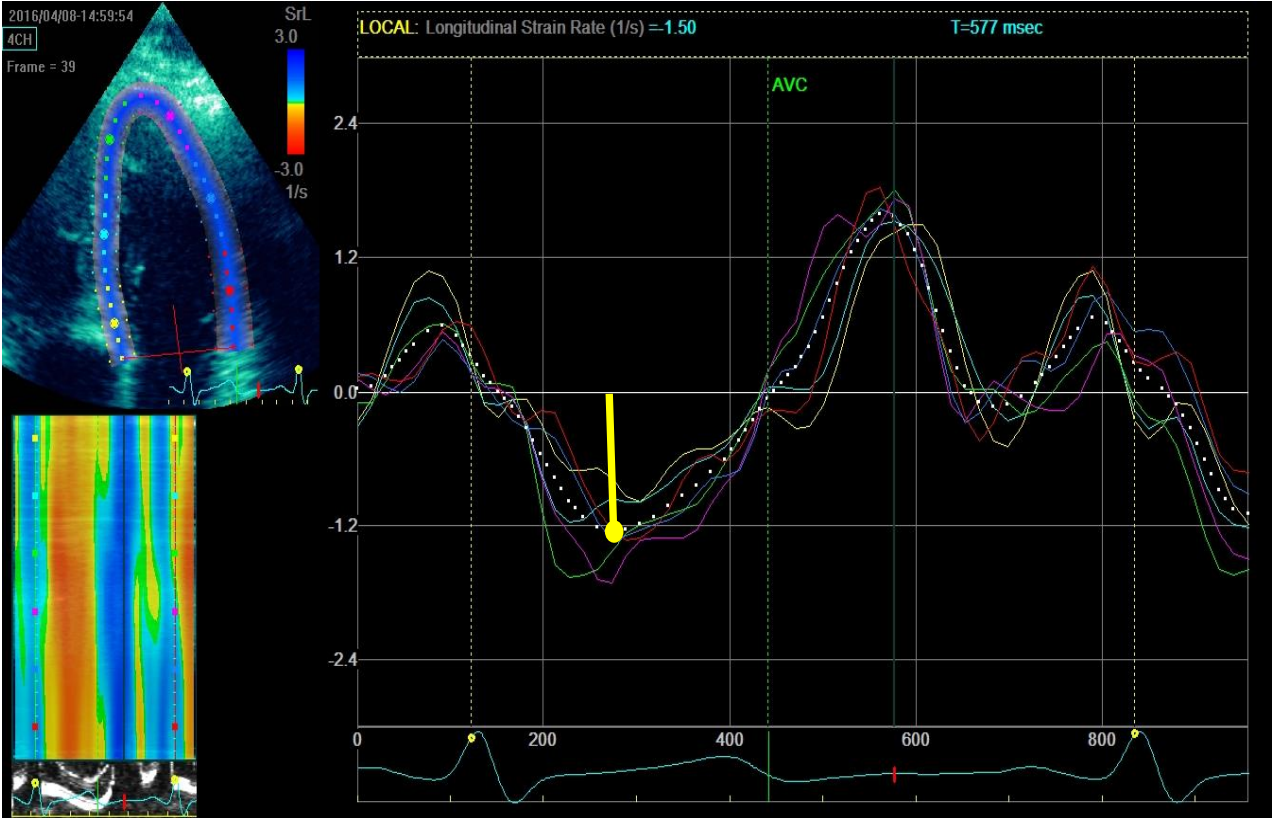
lv4c_sr_e

Percentiles		Smallest		
1%	.4	.2		
5%	.6	.2		
10%	.7	.3	Obs	2,989
25%	.8	.3	Sum of Wgt.	2,989
50%	1.1		Mean	1.122817
		Largest	Std. Dev.	.3828065
75%	1.4	2.7		
90%	1.6	2.7	Variance	.1465408
95%	1.8	2.9	Skewness	.6344941
99%	2.2	3.1	Kurtosis	3.541922

Variable name: lv4c_sr_s

Definition: Left ventricular systolic strain rate, A4C view

Units: 1/s



lv4c_sr_s

Percentiles		Smallest		
1%	.5	.2		
5%	.7	.2		
10%	.8	.3	Obs	2,988
25%	.9	.3	Sum of Wgt.	2,988
50%			Mean	1.015395
		Largest	Std. Dev.	.2134982
75%	1.1	1.9	Variance	.0455815
90%	1.3	1.9	Skewness	.3779667
95%	1.4	2	Kurtosis	4.069162
99%	1.6	2.1		

Variable name: lv_rv_ratio

Definition: Ratio of left ventricular and right ventricular end diastolic areas

Units: N/A

Formula: lveda_a4c/rveda

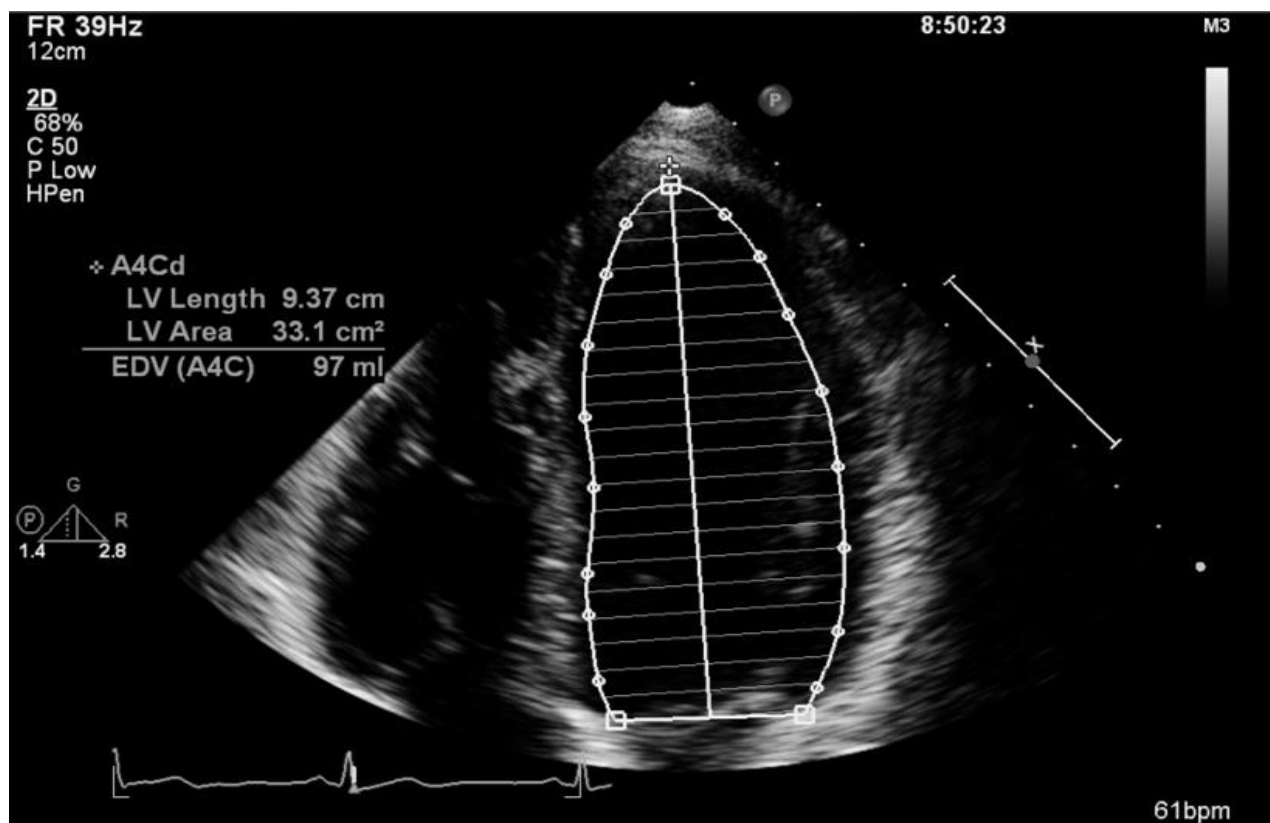
lv_rv_ratio				

	Percentiles	Smallest		
1%	.9609375	.6911765		
5%	1.110577	.7550201		
10%	1.177034	.8308458	Obs	3,029
25%	1.311628	.8509804	Sum of Wgt.	3,029
50%	1.468085		Mean	1.485882
		Largest	Std. Dev.	.2556278
75%	1.6375	2.885321		
90%	1.808511	2.928	Variance	.0653456
95%	1.920732	2.952	Skewness	.6409188
99%	2.184049	2.955414	Kurtosis	4.592633

Variable name: lveda_a4c

Definition: Left ventricular end diastolic area, A4C view

Units: cm²



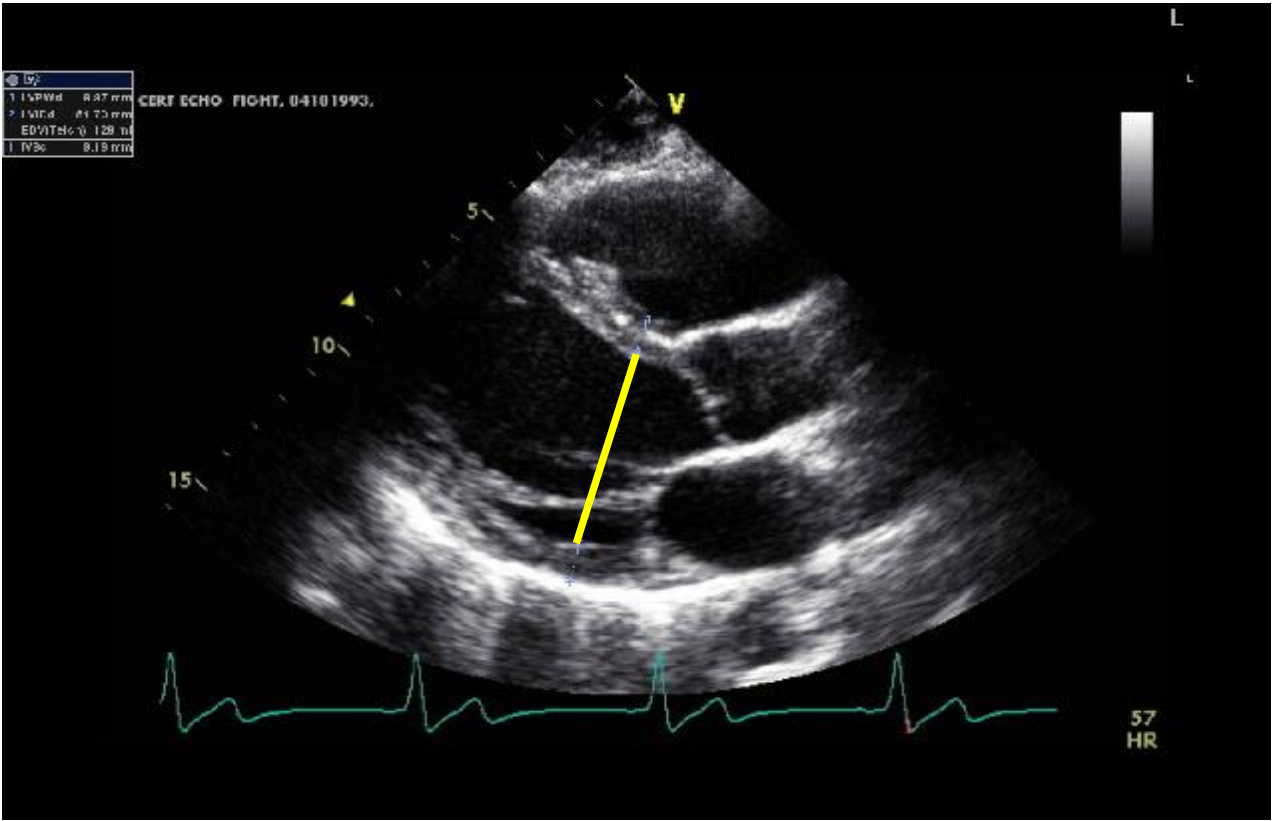
lveda_a4c

Percentiles		Smallest		
1%	18.1	14.1		
5%	20	16.1		
10%	21.2	16.2	Obs	3,032
25%	23.5	16.2	Sum of Wgt.	3,032
50%	26.5	Largest	Mean	27.09439
75%	30.3		Std. Dev.	4.95412
90%	33.4	51.3	Variance	24.54331
95%	35.8	57.9	Skewness	.7440593
99%	40.6	62.9	Kurtosis	4.583254

Variable name: lvedd

Definition: Left ventricular end diastolic dimension

Units: cm



lvedd

Percentiles		Smallest		
1%	3.14	2.47		
5%	3.43	2.62		
10%	3.6	2.77	Obs	3,032
25%	3.9	2.85	Sum of Wgt.	3,032
			Mean	4.289947
50%	4.26	Largest	Std. Dev.	.5577927
75%	4.64			
90%	5.04	6.67	Variance	.3111327
95%	5.24	6.79	Skewness	.3459634
99%	5.71	7.3	Kurtosis	3.379034

Variable name: lvedd

Normal values:

Table 2 Normal values for 2D echocardiographic parameters of LV size and function according to gender

Parameter	Male		Female	
	Mean \pm SD	2-SD range	Mean \pm SD	2-SD range
LV internal dimension				
Diastolic dimension (mm)	50.2 \pm 4.1	42.0–58.4	45.0 \pm 3.6	37.8–52.2
Systolic dimension (mm)	32.4 \pm 3.7	25.0–39.8	28.2 \pm 3.3	21.6–34.8
LV volumes (biplane)				
LV EDV (mL)	106 \pm 22	62–150	76 \pm 15	46–106
LV ESV (mL)	41 \pm 10	21–61	28 \pm 7	14–42
LV volumes normalized by BSA				
LV EDV (mL/m ²)	54 \pm 10	34–74	45 \pm 8	29–61
LV ESV (mL/m ²)	21 \pm 5	11–31	16 \pm 4	8–24
LV EF (biplane)	62 \pm 5	52–72	64 \pm 5	54–74

BSA, body surface area; EDV, end-diastolic volume; EF, ejection fraction; ESV, end-systolic volume; LV, left ventricular; SD, standard deviation.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: lvedv

Definition: Biplane left ventricular end diastolic volume

Units: ml

Formula: (lvedv_a4c+lvedv_a2c)/2

lvedv				

	Percentiles	Smallest		
1%	42.5	27.5		
5%	49.5	32		
10%	54	33	Obs	3,003
25%	62.5	35.5	Sum of Wgt.	3,003
50%	74		Mean	77.93873
		Largest	Std. Dev.	21.95968
75%	90	183.5		
90%	107	186	Variance	482.2276
95%	118	271	Skewness	1.317156
99%	143.5	277	Kurtosis	8.042945

Variable name: lvedv

Normal values:

Table 2 Normal values for 2D echocardiographic parameters of LV size and function according to gender

Parameter	Male		Female	
	Mean \pm SD	2-SD range	Mean \pm SD	2-SD range
LV internal dimension				
Diastolic dimension (mm)	50.2 \pm 4.1	42.0–58.4	45.0 \pm 3.6	37.8–52.2
Systolic dimension (mm)	32.4 \pm 3.7	25.0–39.8	28.2 \pm 3.3	21.6–34.8
LV volumes (biplane)				
LV EDV (mL)	106 \pm 22	62–150	76 \pm 15	46–106
LV ESV (mL)	41 \pm 10	21–61	28 \pm 7	14–42
LV volumes normalized by BSA				
LV EDV (mL/m ²)	54 \pm 10	34–74	45 \pm 8	29–61
LV ESV (mL/m ²)	21 \pm 5	11–31	16 \pm 4	8–24
LV EF (biplane)	62 \pm 5	52–72	64 \pm 5	54–74

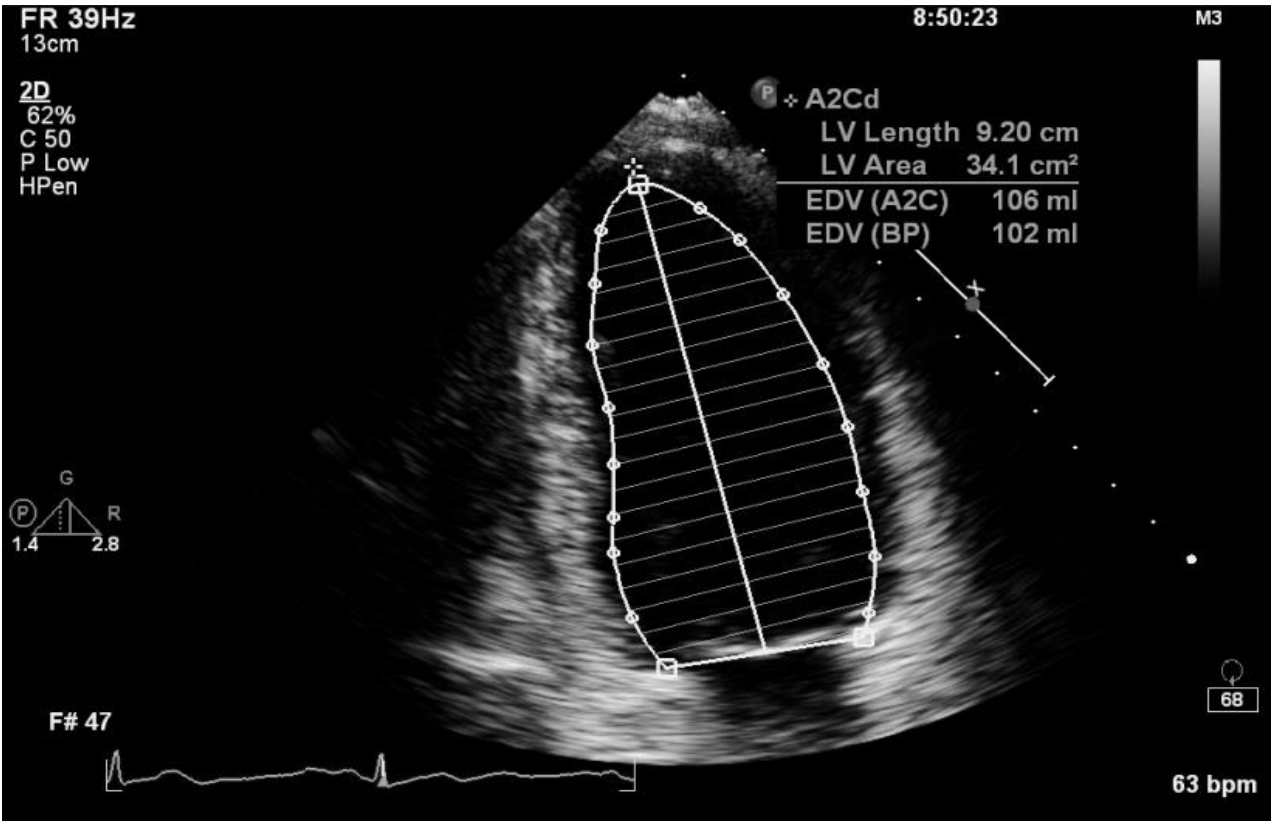
BSA, body surface area; EDV, end-diastolic volume; EF, ejection fraction; ESV, end-systolic volume; LV, left ventricular; SD, standard deviation.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: lvedv_a2c

Definition: Left ventricular end diastolic volume, A2C view

Units: ml



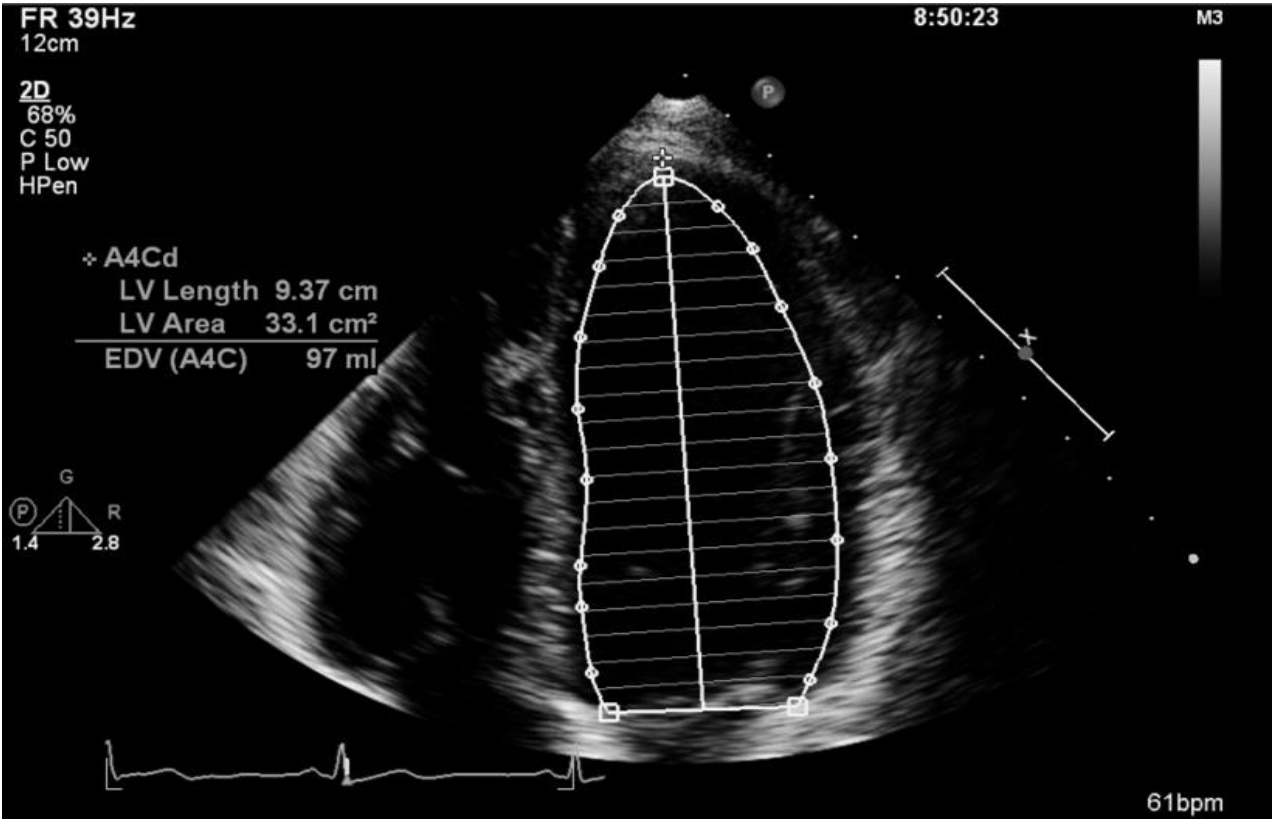
lvedv_a2c

Percentiles		Smallest	
1%	42	27	
5%	50	32	
10%	54	32	Obs 3,003
25%	63	33	Sum of Wgt. 3,003
50%	75		Mean 78.35298
		Largest	Std. Dev. 22.11229
75%	91	187	
90%	107	188	Variance 488.9533
95%	119	270	Skewness 1.287158
99%	144	271	Kurtosis 7.638864

Variable name: lvedv_a4c

Definition: Left ventricular end diastolic volume, A4C view

Units: ml



lvedv_a4c

Percentiles		Smallest		
1%	42	28		
5%	48	32		
10%	53	34	Obs	3,032
25%	61	34	Sum of Wgt.	3,032
			Mean	77.56431
50%	74	Largest	Std. Dev.	22.64273
75%	90			
90%	107	192	Variance	512.6933
95%	118	272	Skewness	1.310254
99%	146	283	Kurtosis	7.966443

Variable name: lvedvi

Definition: Biplane left ventricular end diastolic volume index

Units: ml/m²

Formula: lvedv/bsa

lvedvi				

	Percentiles	Smallest		
1%	26.18693	20.11326		
5%	29.43648	20.22178		
10%	31.41124	22.25801	Obs	3,002
25%	34.99203	23.85206	Sum of Wgt.	3,002
50%	39.81701		Mean	41.27563
		Largest	Std. Dev.	9.182816
75%	46.29706	87.50289		
90%	52.31372	115.6104	Variance	84.32412
95%	57.39791	122.419	Skewness	1.684192
99%	68.93315	140.3005	Kurtosis	11.99256

Variable name: lvedvi

Normal values:

Table 2 Normal values for 2D echocardiographic parameters of LV size and function according to gender

Parameter	Male		Female	
	Mean \pm SD	2-SD range	Mean \pm SD	2-SD range
LV internal dimension				
Diastolic dimension (mm)	50.2 \pm 4.1	42.0–58.4	45.0 \pm 3.6	37.8–52.2
Systolic dimension (mm)	32.4 \pm 3.7	25.0–39.8	28.2 \pm 3.3	21.6–34.8
LV volumes (biplane)				
LV EDV (mL)	106 \pm 22	62–150	76 \pm 15	46–106
LV ESV (mL)	41 \pm 10	21–61	28 \pm 7	14–42
LV volumes normalized by BSA				
LV EDV (mL/m ²)	54 \pm 10	34–74	45 \pm 8	29–61
LV ESV (mL/m ²)	21 \pm 5	11–31	16 \pm 4	8–24
LV EF (biplane)	62 \pm 5	52–72	64 \pm 5	54–74

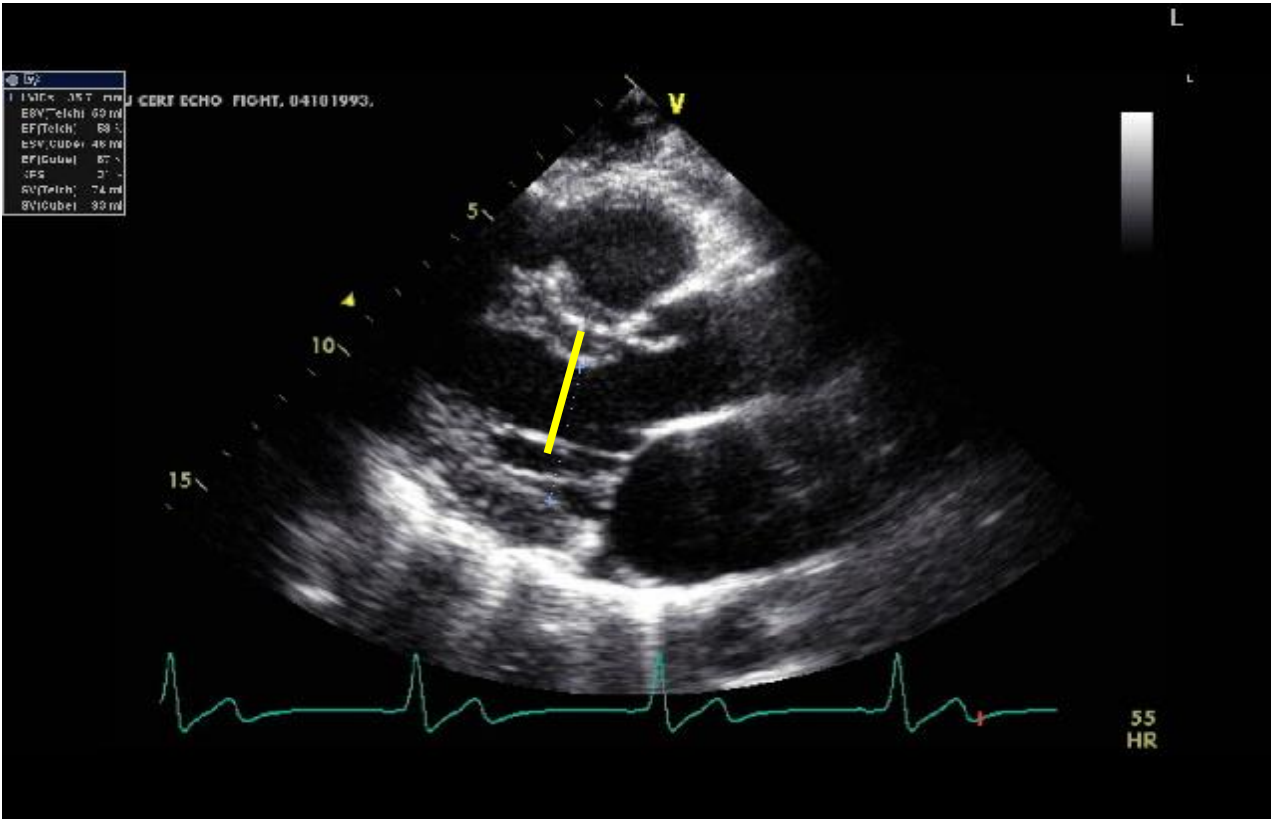
BSA, body surface area; EDV, end-diastolic volume; EF, ejection fraction; ESV, end-systolic volume; LV, left ventricular; SD, standard deviation.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: lvesd

Definition: Left ventricular end systolic dimension

Units: cm



lvesd

Percentiles		Smallest		
1%	2.03	1.66		
5%	2.23	1.74		
10%	2.36	1.75	Obs	3,032
25%	2.58	1.86	Sum of Wgt.	3,032
			Mean	2.887655
50%	2.84	Largest	Std. Dev.	.4611828
75%	3.13			
90%	3.47	5.14	Variance	.2126896
95%	3.69	5.78	Skewness	1.009818
99%	4.28	6.31	Kurtosis	5.815319

Variable name: lvesd

Normal values:

Table 2 Normal values for 2D echocardiographic parameters of LV size and function according to gender

Parameter	Male		Female	
	Mean \pm SD	2-SD range	Mean \pm SD	2-SD range
LV internal dimension				
Diastolic dimension (mm)	50.2 \pm 4.1	42.0–58.4	45.0 \pm 3.6	37.8–52.2
Systolic dimension (mm)	32.4 \pm 3.7	25.0–39.8	28.2 \pm 3.3	21.6–34.8
LV volumes (biplane)				
LV EDV (mL)	106 \pm 22	62–150	76 \pm 15	46–106
LV ESV (mL)	41 \pm 10	21–61	28 \pm 7	14–42
LV volumes normalized by BSA				
LV EDV (mL/m ²)	54 \pm 10	34–74	45 \pm 8	29–61
LV ESV (mL/m ²)	21 \pm 5	11–31	16 \pm 4	8–24
LV EF (biplane)	62 \pm 5	52–72	64 \pm 5	54–74

BSA, body surface area; EDV, end-diastolic volume; EF, ejection fraction; ESV, end-systolic volume; LV, left ventricular; SD, standard deviation.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: lvesv

Definition: Biplane left ventricular end systolic volume

Units: ml

Formula: (lvesv_a4c+lvesv_a2c)/2

lvesv				

	Percentiles	Smallest		
1%	13.5	8.5		
5%	17	9.5		
10%	18.5	10	Obs	3,003
25%	22	10.5	Sum of Wgt.	3,003
50%	27.5		Mean	30.0328
		Largest	Std. Dev.	12.11842
75%	35	107.5		
90%	43	136	Variance	146.8561
95%	50	198	Skewness	3.347676
99%	72.5	201	Kurtosis	33.51311

Variable name: lvesv

Normal values:

Table 2 Normal values for 2D echocardiographic parameters of LV size and function according to gender

Parameter	Male		Female	
	Mean \pm SD	2-SD range	Mean \pm SD	2-SD range
LV internal dimension				
Diastolic dimension (mm)	50.2 \pm 4.1	42.0–58.4	45.0 \pm 3.6	37.8–52.2
Systolic dimension (mm)	32.4 \pm 3.7	25.0–39.8	28.2 \pm 3.3	21.6–34.8
LV volumes (biplane)				
LV EDV (mL)	106 \pm 22	62–150	76 \pm 15	46–106
LV ESV (mL)	41 \pm 10	21–61	28 \pm 7	14–42
LV volumes normalized by BSA				
LV EDV (mL/m ²)	54 \pm 10	34–74	45 \pm 8	29–61
LV ESV (mL/m ²)	21 \pm 5	11–31	16 \pm 4	8–24
LV EF (biplane)	62 \pm 5	52–72	64 \pm 5	54–74

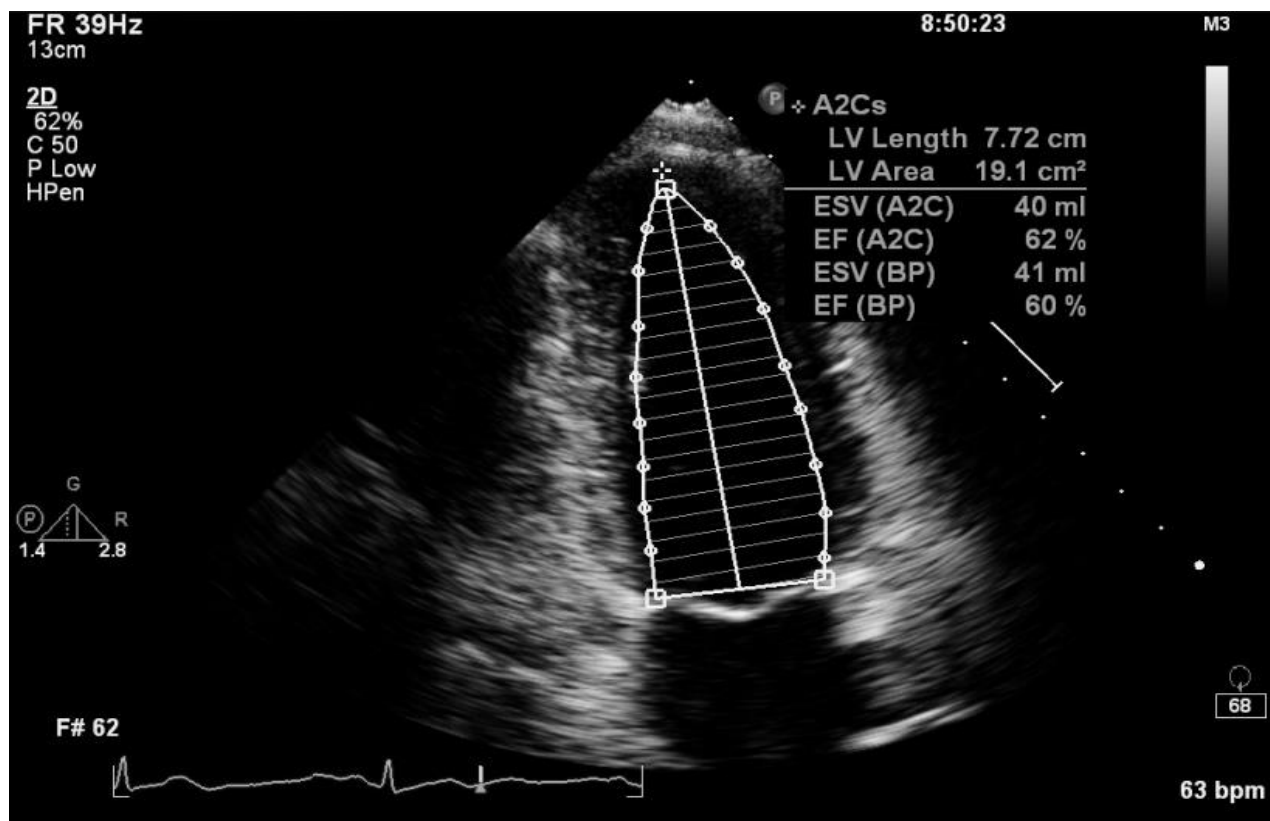
BSA, body surface area; EDV, end-diastolic volume; EF, ejection fraction; ESV, end-systolic volume; LV, left ventricular; SD, standard deviation.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: lvesv_a2c

Definition: Left ventricular end systolic volume, A2C view

Units: ml



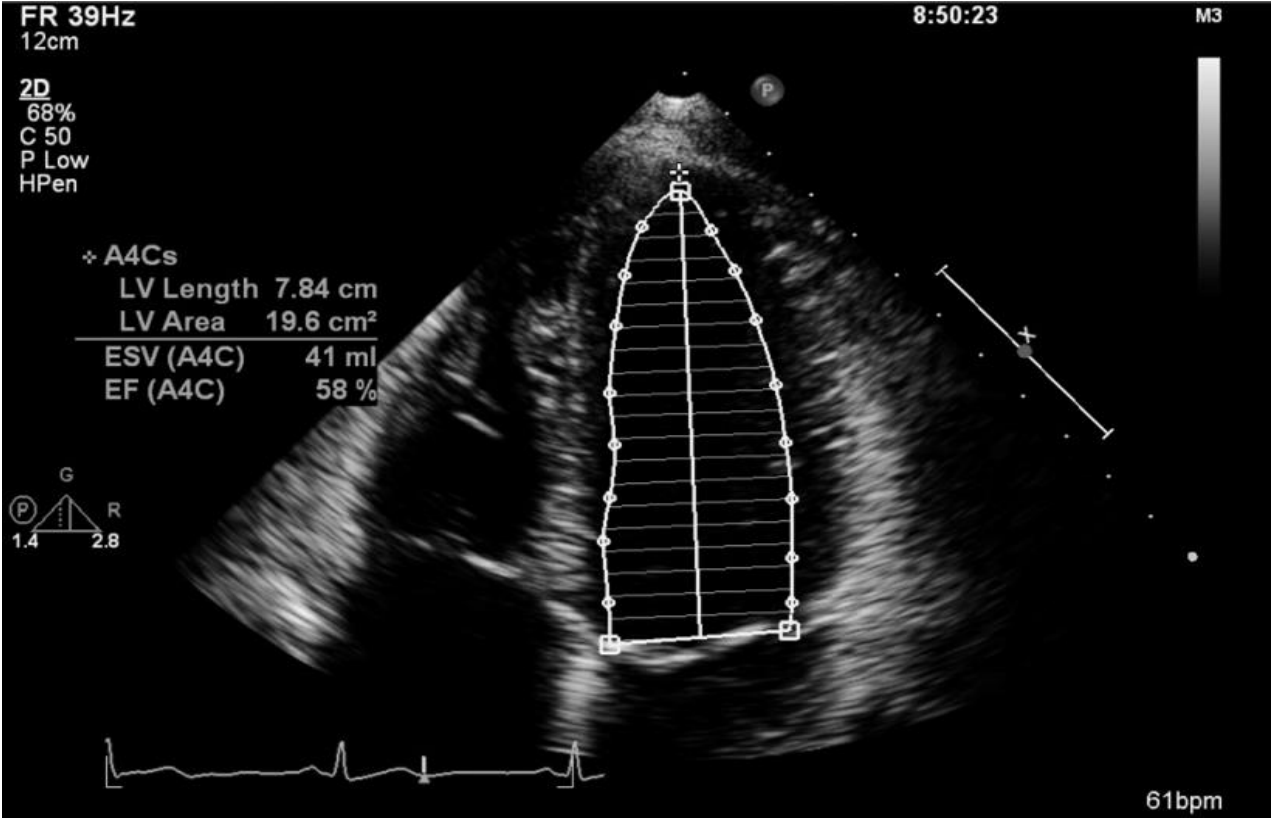
lvesv_a2c

Percentiles		Smallest		
1%	14	9		
5%	17	9		
10%	19	11	Obs	3,003
25%	22	11	Sum of Wgt.	3,003
50%	28		Mean	30.0969
		Largest	Std. Dev.	12.08284
75%	35	119		
90%	43	137	Variance	145.9949
95%	51	197	Skewness	3.275212
99%	71	197	Kurtosis	32.38699

Variable name: lvesv_a4c

Definition: Left ventricular end systolic volume, A4C view

Units: ml



lvesv_a4c

Percentiles		Smallest		
1%	13	8		
5%	16	9		
10%	18	10	Obs	3,032
25%	22	10	Sum of Wgt.	3,032
50%	28	Largest	Mean	30
75%	35		Std. Dev.	12.5856
90%	44	135	Variance	158.3972
95%	50	199	Skewness	3.273714
99%	73	205	Kurtosis	31.4379

Variable name: lvesvi

Definition: Biplane left ventricular end systolic volume index

Units: ml/m²

Formula: lvesv/bsa

lvesvi				

	Percentiles	Smallest		
1%	8.392206	5.564503		
5%	9.927747	6.216825		
10%	10.77768	6.806955	Obs	3,002
25%	12.4548	6.988038	Sum of Wgt.	3,002
50%	14.86811		Mean	15.84888
		Largest	Std. Dev.	5.578464
75%	18.01826	52.79048		
90%	21.41951	85.68398	Variance	31.11926
95%	24.19094	88.83114	Skewness	4.141292
99%	35.93362	102.5074	Kurtosis	44.82173

Variable name: lvesvi

Normal values:

Table 2 Normal values for 2D echocardiographic parameters of LV size and function according to gender

Parameter	Male		Female	
	Mean \pm SD	2-SD range	Mean \pm SD	2-SD range
LV internal dimension				
Diastolic dimension (mm)	50.2 \pm 4.1	42.0–58.4	45.0 \pm 3.6	37.8–52.2
Systolic dimension (mm)	32.4 \pm 3.7	25.0–39.8	28.2 \pm 3.3	21.6–34.8
LV volumes (biplane)				
LV EDV (mL)	106 \pm 22	62–150	76 \pm 15	46–106
LV ESV (mL)	41 \pm 10	21–61	28 \pm 7	14–42
LV volumes normalized by BSA				
LV EDV (mL/m ²)	54 \pm 10	34–74	45 \pm 8	29–61
LV ESV (mL/m ²)	21 \pm 5	11–31	16 \pm 4	8–24
LV EF (biplane)	62 \pm 5	52–72	64 \pm 5	54–74

BSA, body surface area; EDV, end-diastolic volume; EF, ejection fraction; ESV, end-systolic volume; LV, left ventricular; SD, standard deviation.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: lvmass

Definition: LV mass

Units: grams

Formula:

$$(0.8 * (1.04 * ((lv\text{eddd} + swt + pwt)^3 - lv\text{eddd}^3))) + 0.6$$

lvmass				

	Percentiles	Smallest		
1%	74.70705	44.15514		
5%	92.31635	55.50507		
10%	102.4516	57.34357	Obs	3,032
25%	122.9598	58.89417	Sum of Wgt.	3,032
50%	151.2037		Mean	158.7332
		Largest	Std. Dev.	50.18639
75%	185.5666	377.1851		
90%	224.6387	397.3639	Variance	2518.674
95%	254.5228	443.9174	Skewness	.9885072
99%	308.0801	448.5822	Kurtosis	4.61338

Variable name: `lvmass`

Normal values:

Table 6 Normal ranges for LV mass indices

	Women	Men
Linear method		
LV mass (g)	67–162	88–224
<i>LV mass/BSA (g/m²)</i>	<i>43–95</i>	<i>49–115</i>
Relative wall thickness (cm)	0.22–0.42	0.24–0.42
<i>Septal thickness (cm)</i>	<i>0.6–0.9</i>	<i>0.6–1.0</i>
<i>Posterior wall thickness (cm)</i>	<i>0.6–0.9</i>	<i>0.6–1.0</i>
2D method		
LV mass (g)	66–150	96–200
<i>LV mass/BSA (g/m²)</i>	<i>44–88</i>	<i>50–102</i>

Bold italic values: recommended and best validated.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: lvmi

Definition: Left ventricular mass index

Units: grams/m²

Formula: lvmass/bsa

lvmi				

	Percentiles	Smallest		
1%	45.42613	26.92056		
5%	54.21366	35.15837		
10%	59.12806	35.58127	Obs	3,031
25%	68.61105	35.9319	Sum of Wgt.	3,031
50%	80.2629		Mean	84.09238
		Largest	Std. Dev.	22.63066
75%	95.76163	197.4033		
90%	111.8252	205.1487	Variance	512.1468
95%	125.3726	227.579	Skewness	1.172316
99%	156.0385	242.3824	Kurtosis	5.925119

Variable name: `lvmi`

Normal values:

Table 6 Normal ranges for LV mass indices

	Women	Men
Linear method		
LV mass (g)	67–162	88–224
<i>LV mass/BSA (g/m^2)</i>	<i>43–95</i>	<i>49–115</i>
Relative wall thickness (cm)	0.22–0.42	0.24–0.42
<i>Septal thickness (cm)</i>	<i>0.6–0.9</i>	<i>0.6–1.0</i>
<i>Posterior wall thickness (cm)</i>	<i>0.6–0.9</i>	<i>0.6–1.0</i>
2D method		
LV mass (g)	66–150	96–200
<i>LV mass/BSA (g/m^2)</i>	<i>44–88</i>	<i>50–102</i>

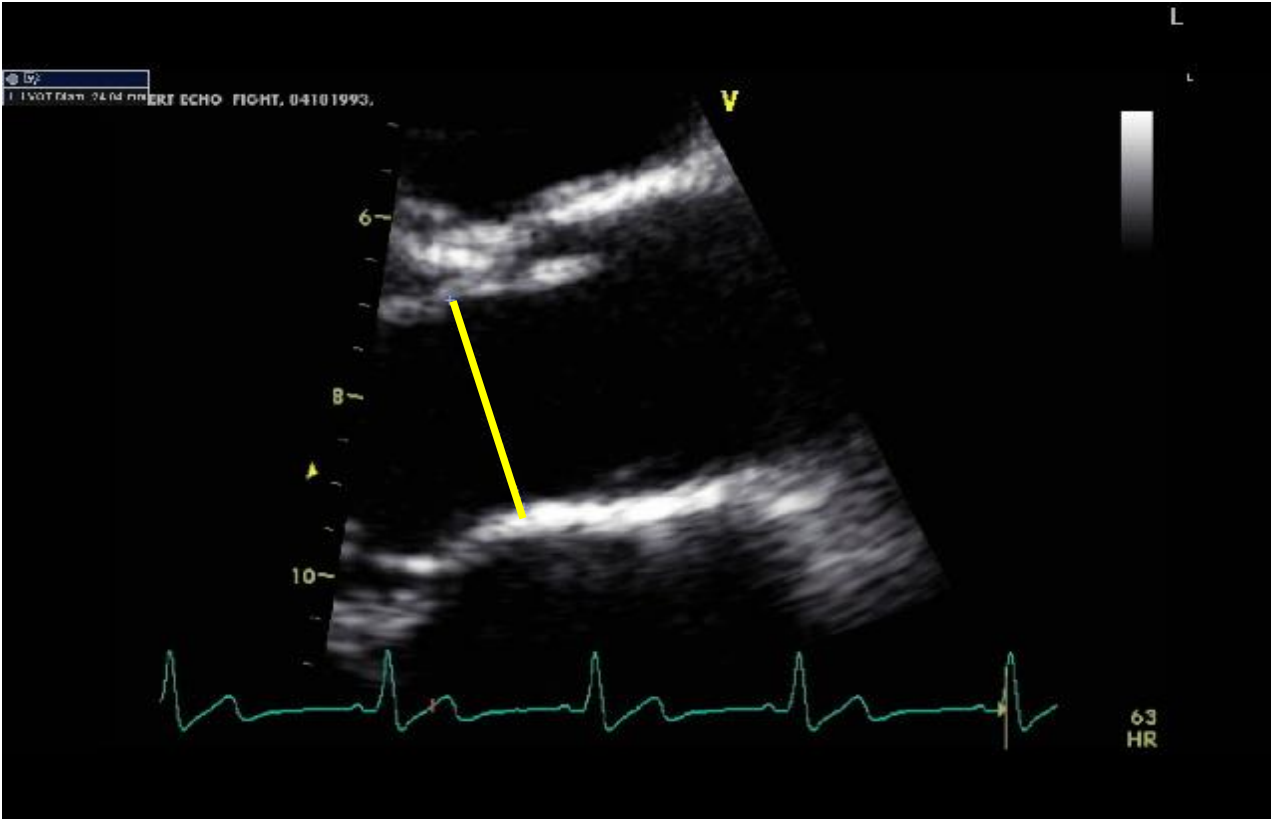
Bold italic values: recommended and best validated.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: lvot

Definition: Left ventricular outflow tract diameter

Units: cm



lvot

Percentiles		Smallest		
1%	1.68	1.51		
5%	1.79	1.54		
10%	1.84	1.58	Obs	3,030
25%	1.95	1.59	Sum of Wgt.	3,030
			Mean	2.088908
50%	2.08	Largest	Std. Dev.	.1961261
75%	2.22			
90%	2.34	2.73	Variance	.0384655
95%	2.42	2.74	Skewness	.2041968
99%	2.56	2.81	Kurtosis	2.835787

Variable name: `lvot`

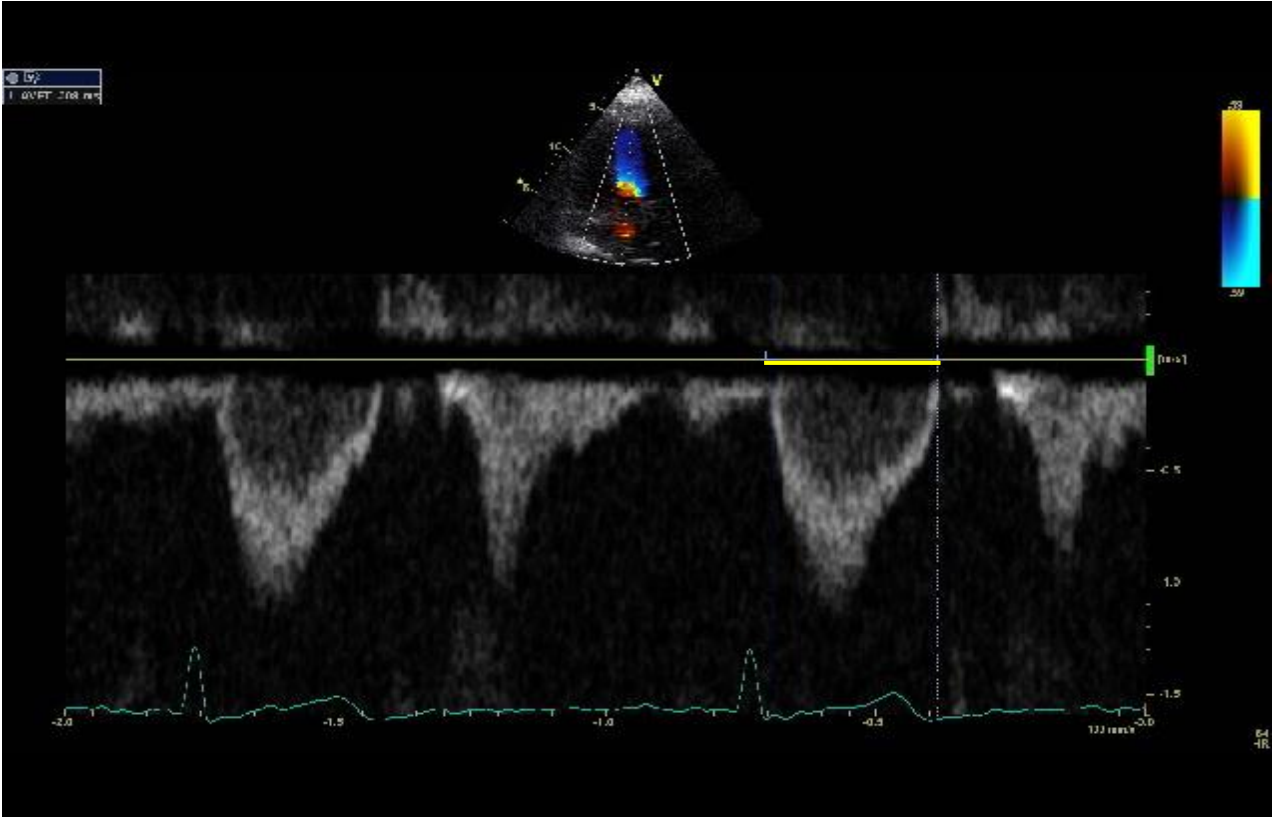
Normal values:

Normal	1.8 to 2.4 cm
Male (mean)	2.1 cm
Female (mean)	1.9 cm

Variable name: lvot_et

Definition: Left ventricular ejection time

Units: ms



lvot_et

Percentiles		Smallest		
1%	247	195		
5%	268	205		
10%	280	216	Obs	3,008
25%	299	219	Sum of Wgt.	3,008
50%	318	Largest	Mean	318.1769
			Std. Dev.	29.50132
75%	337	408	Variance	870.3279
90%	356	412	Skewness	-.072762
95%	366	420	Kurtosis	3.233245
99%	384	445		

Variable name: lvot_hr

Definition: Heart rate measured from the LVOT VTI waveform

Units: bpm

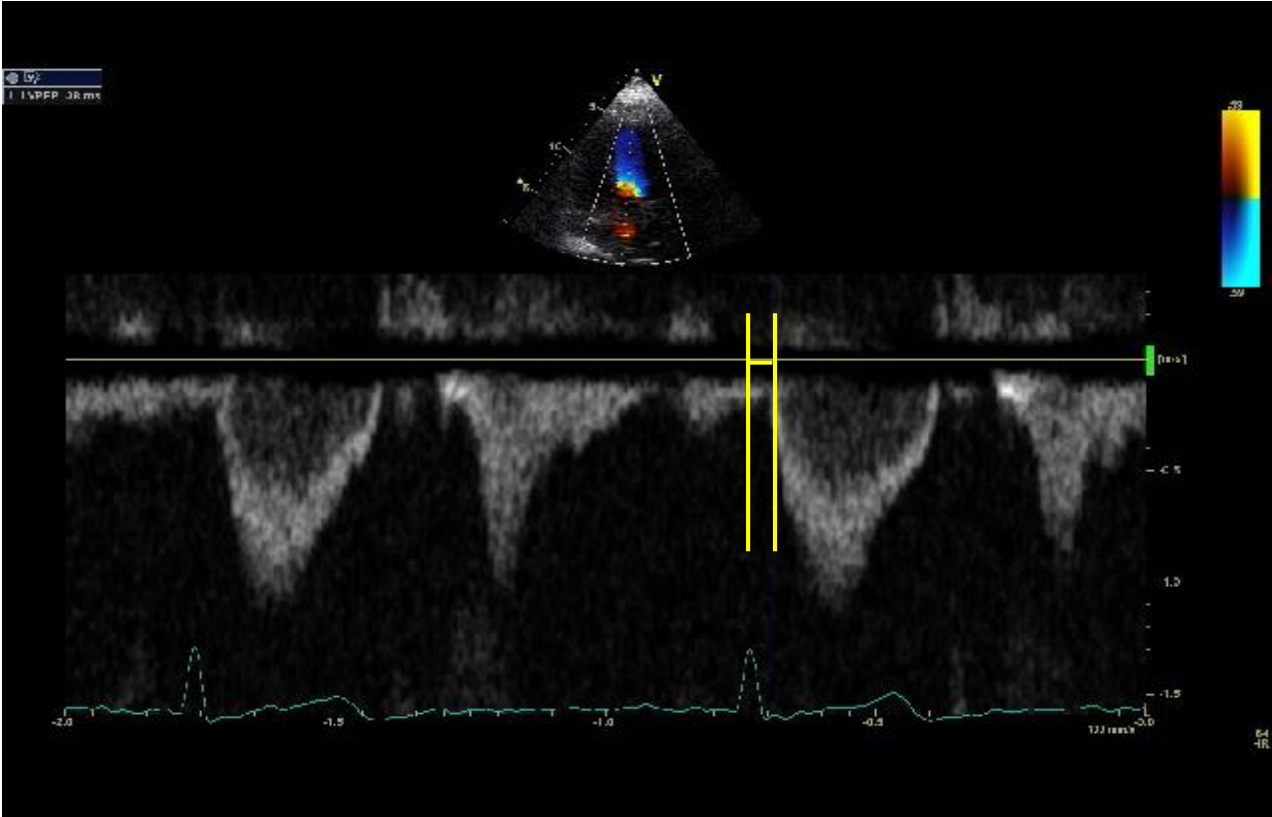
lvot_hr				

	Percentiles	Smallest		
1%	44	38		
5%	49	40		
10%	52	40	Obs	3,017
25%	56	40	Sum of Wgt.	3,017
50%	62		Mean	63.27411
		Largest	Std. Dev.	9.965496
75%	69	100		
90%	76	100	Variance	99.31111
95%	82	105	Skewness	.6892856
99%	90	133	Kurtosis	4.142055

Variable name: lvot_pep

Definition: Left ventricular pre-ejection time, measured from the R wave to onset of systolic flow

Units: ms



lvot_pep

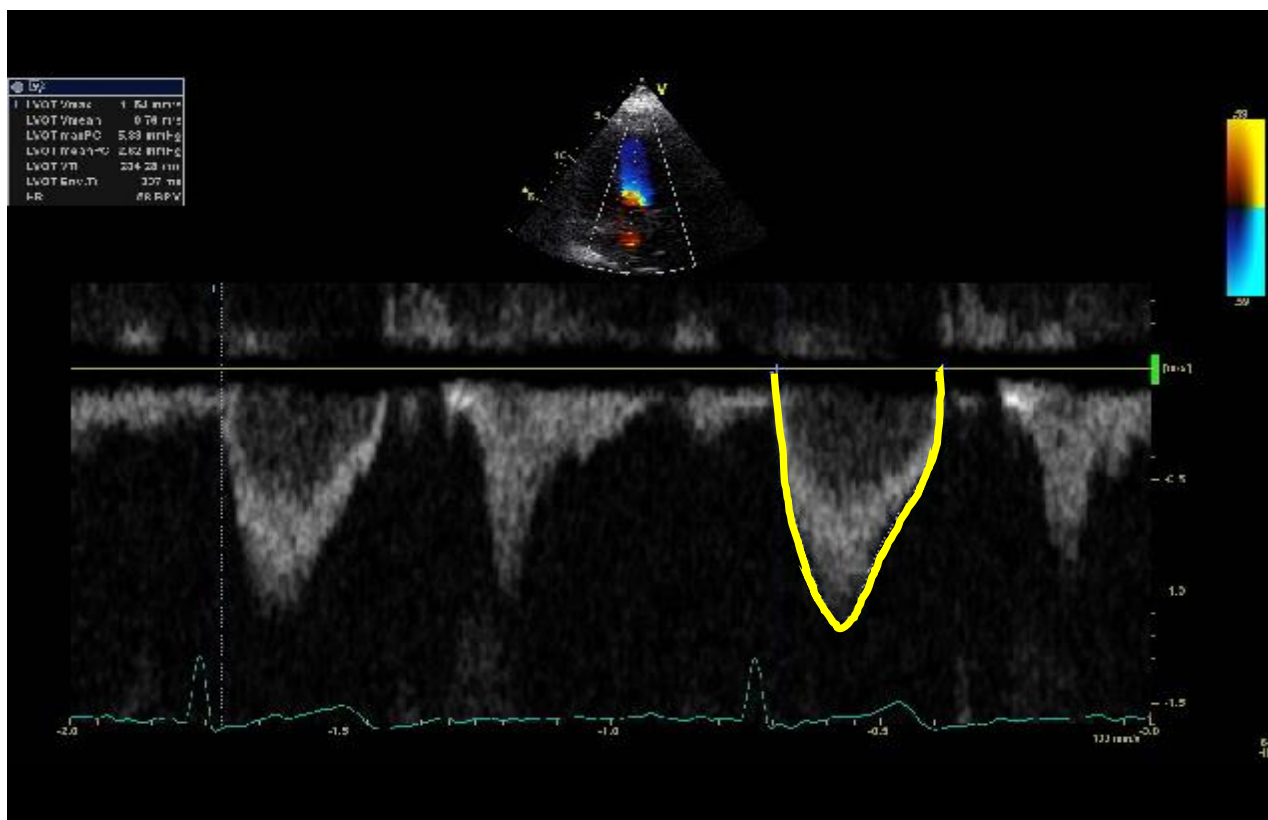
Percentiles		Smallest		
1%	21	16		
5%	26	16		
10%	29	16	Obs	3,002
25%	35	16	Sum of Wgt.	3,002
50%	43		Mean	44.61792
		Largest	Std. Dev.	14.01433
75%	52	116		
90%	62	124	Variance	196.4015
95%	69	142	Skewness	1.225995
99%	88	147	Kurtosis	6.611909

Variable name: lvot_vti

Definition: Left ventricular outflow tract velocity-time integral

Units: cm

Normal values: 18-24 cm



lvot_vti

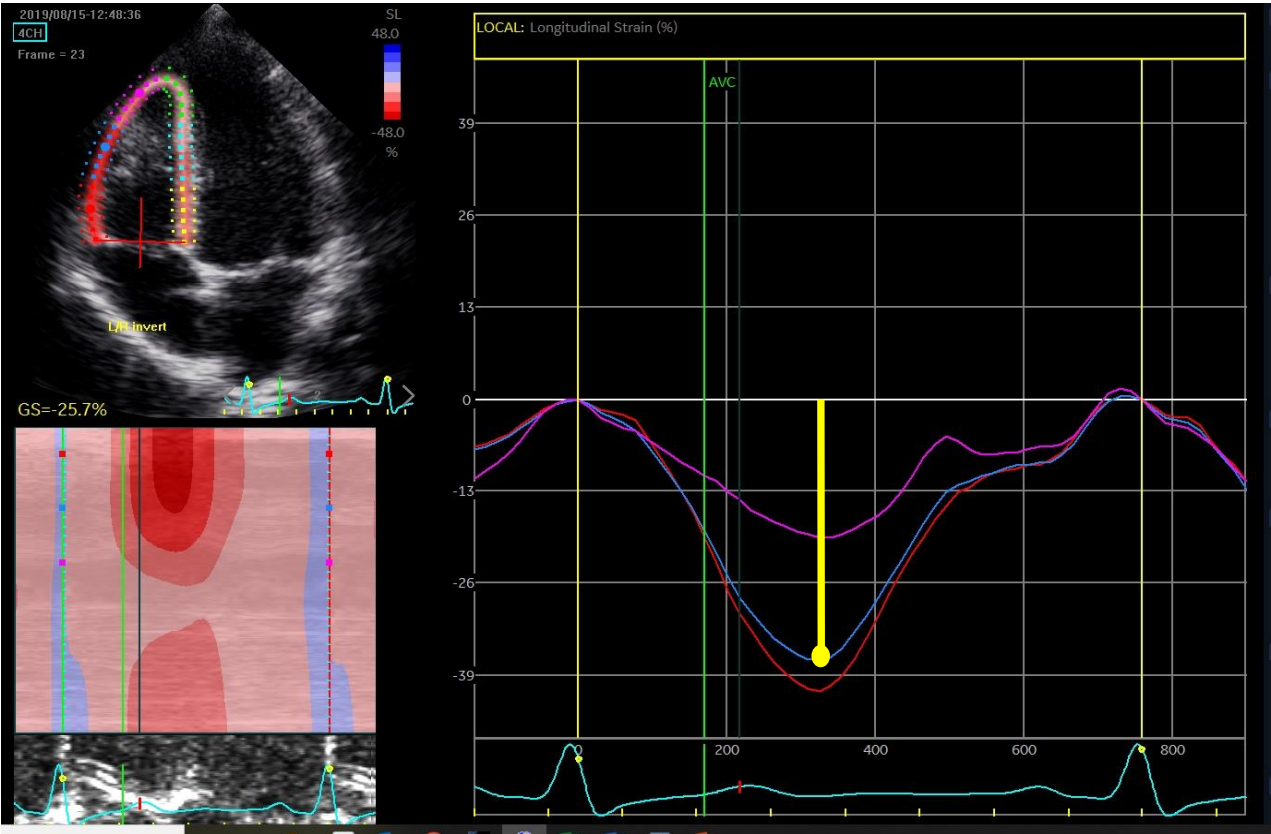
Percentiles		Smallest		
1%	13.5	10.8		
5%	16	11.1		
10%	17.3	11.6	Obs	2,985
25%	19.7	11.8	Sum of Wgt.	2,985
50%	22.5	Largest	Mean	23.04874
			Std. Dev.	4.959693
75%	25.9	48.8	Variance	24.59856
90%	29.2	59.7	Skewness	1.06691
95%	31.6	63.1	Kurtosis	7.462919
99%	36.5	64.1		

Source: The Echocardiographer's Pocket Reference, Third Edition

Variable name: mid_rv_strain

Definition: Right ventricular longitudinal systolic strain, mid free wall

Units: %



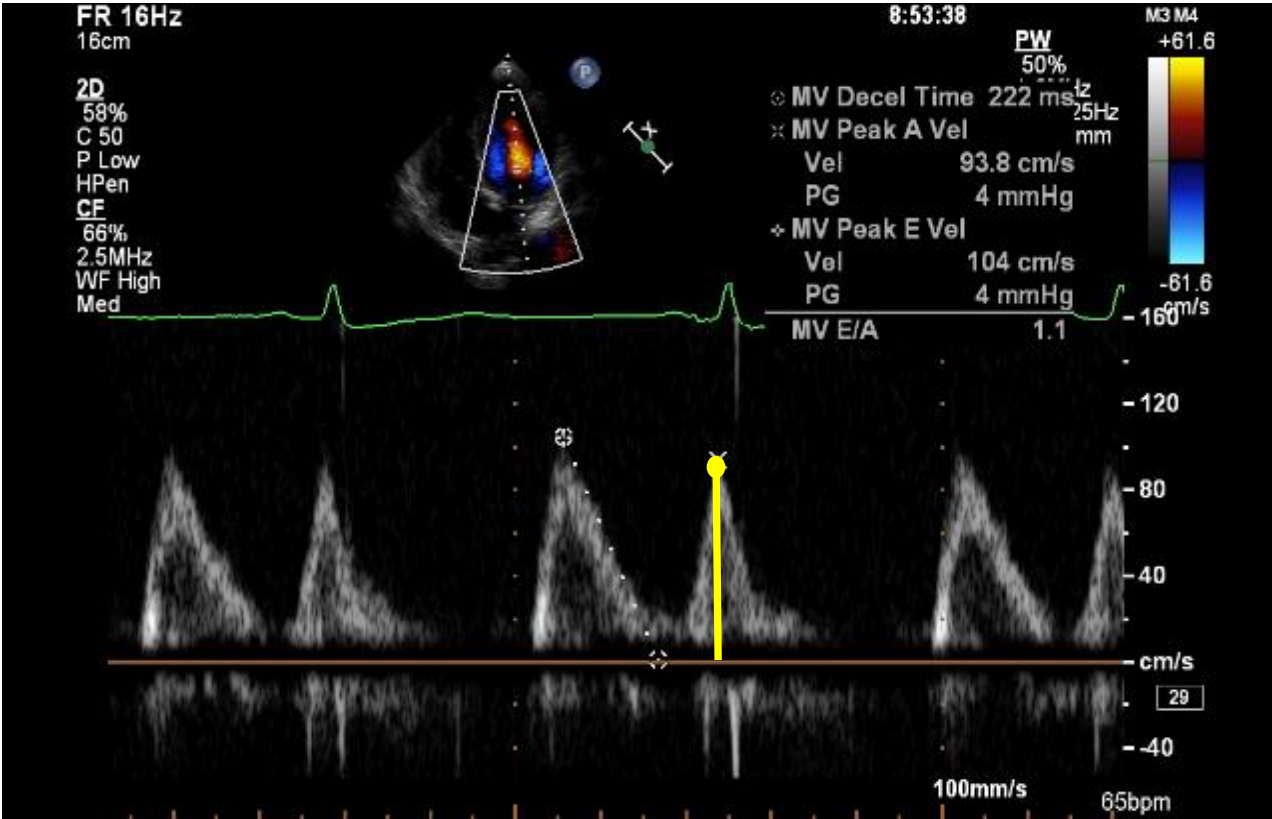
mid_rv_strain

Percentiles			Smallest	
1%	14.06		7.34	
5%	17.81		7.81	
10%	20.06	10.31	Obs	2,904
25%	23.47	10.47	Sum of Wgt.	2,904
50%	27.25		Mean	27.23439
		Largest	Std. Dev.	5.552982
75%	31.06	42.75	Variance	30.83561
90%	34.34	43.31	Skewness	-.0944175
95%	35.94	44	Kurtosis	2.920793
99%	39.88	46.12		

Variable name: mitral_a

Definition: Mitral A wave peak velocity

Units: cm/s



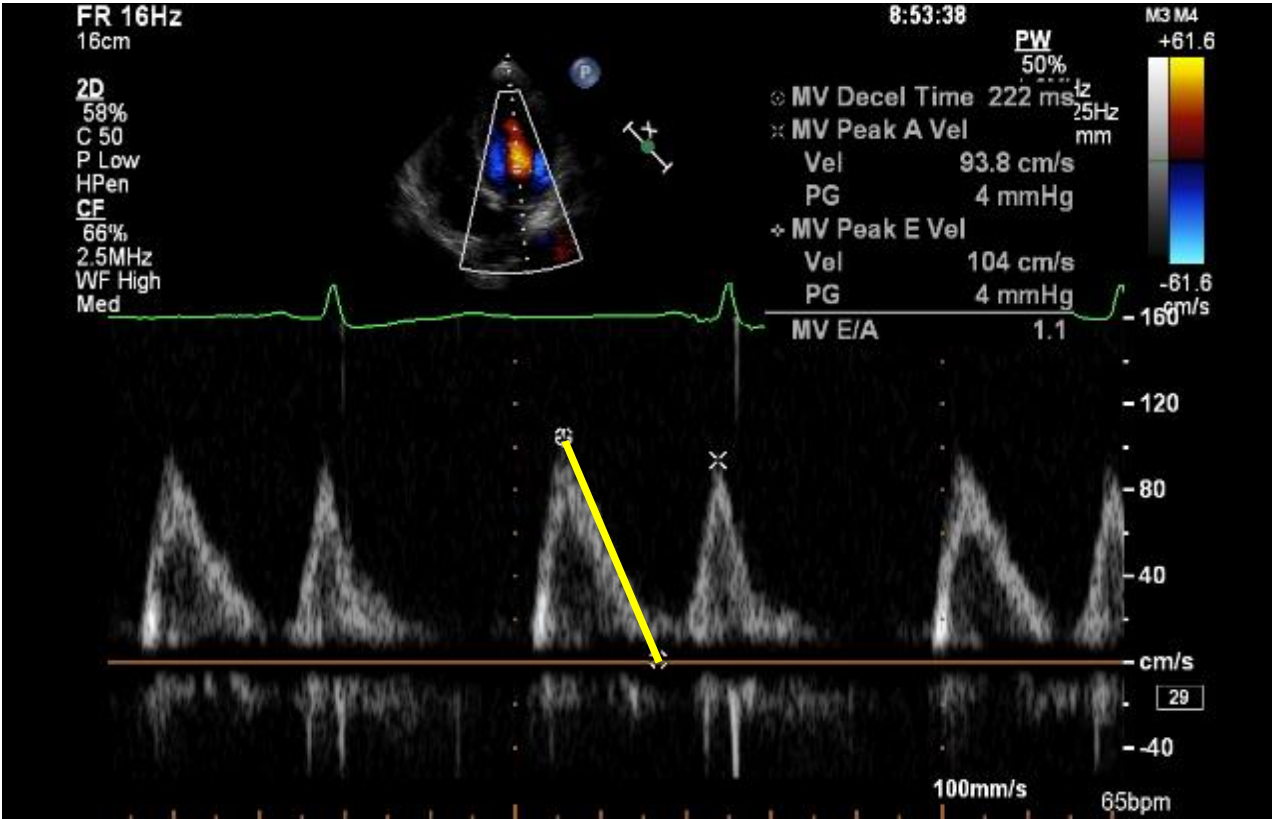
mitral_a

Percentiles			Smallest		
1%	40.6		25.3		
5%	51.6		27.9		
10%	58.1		29.1	Obs	2,888
25%	71.05		30.5	Sum of Wgt.	2,888
50%	84.5			Mean	85.35582
			Largest	Std. Dev.	21.21354
75%	98.6		164.3		
90%	112		169.4	Variance	450.0142
95%	121.4		172.1	Skewness	.3112455
99%	141.8		176.6	Kurtosis	3.37856

Variable name: mitral_decelt

Definition: Mitral E wave deceleration time

Units: ms



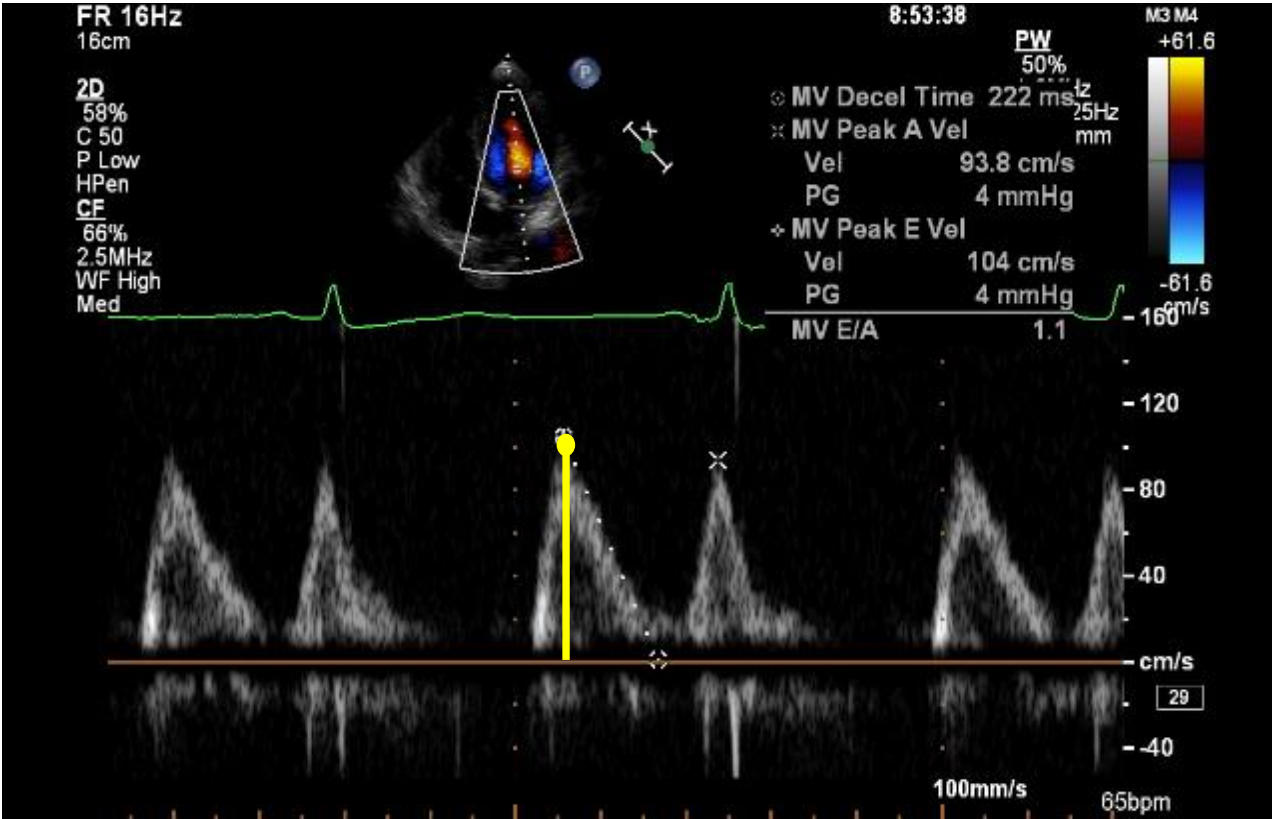
mitral_decel t

Percentiles		Smallest		
1%	114	94		
5%	135	96		
10%	147	98	Obs	2,968
25%	170	99	Sum of Wgt.	2,968
50%	194	Largest	Mean	199.4485
75%	225		Std. Dev.	44.60596
90%	258	395	Variance	1989.692
95%	278	441	Skewness	.7861581
99%	326	475	Kurtosis	4.531248

Variable name: mitral_e

Definition: Mitral E wave peak velocity

Units: cm/s



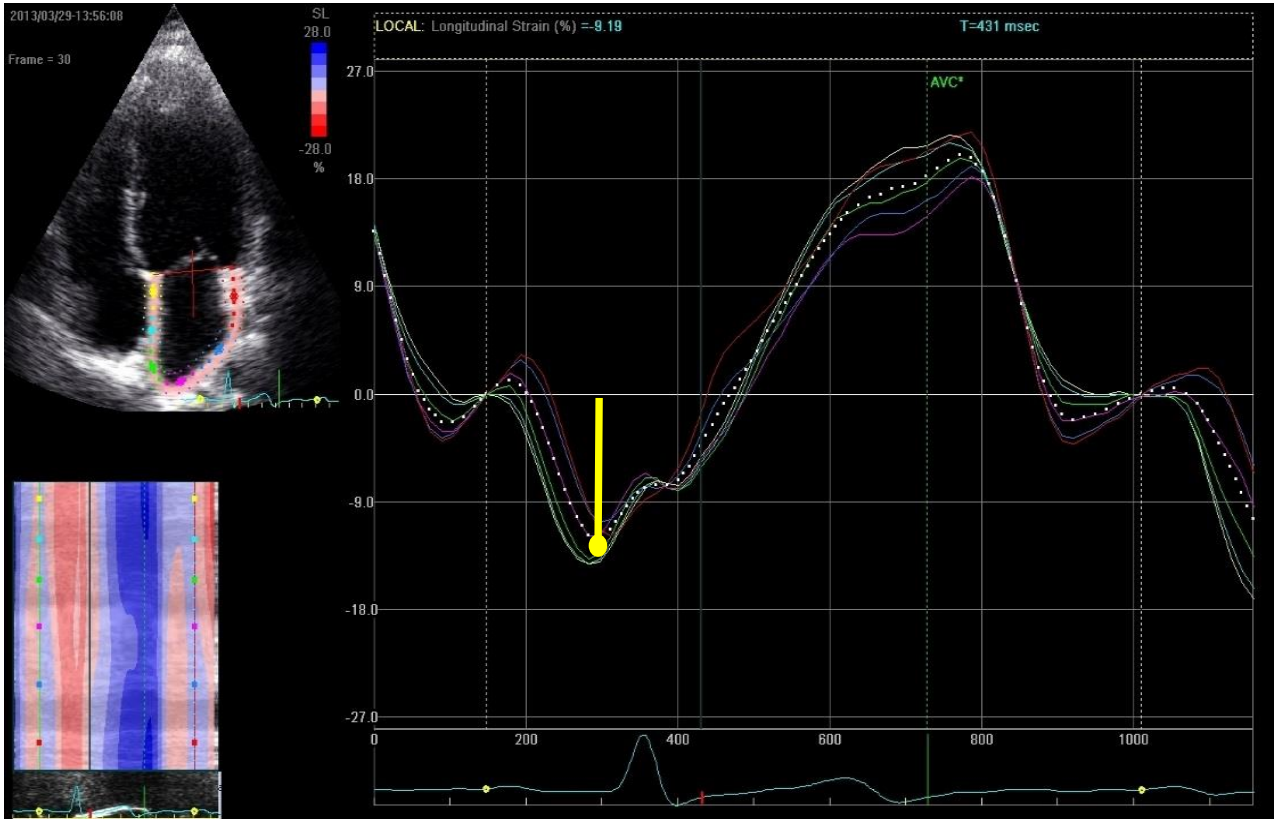
mitral_e

Percentiles			Smallest		
1%	41.9		26.5		
5%	49.1		32		
10%	53.9		33.4	Obs	2,969
25%	63		34	Sum of Wgt.	2,969
50%	74.1			Mean	76.11869
			Largest	Std. Dev.	19.13694
75%	86.9		173		
90%	100		175.4	Variance	366.2224
95%	108.7		177.7	Skewness	.994821
99%	135.5		203.4	Kurtosis	5.60751

Variable name: neg_a4c_la_strain_c

Definition: Global left atrial booster strain, A4C view

Units: % (absolute value recorded)



neg_a4c_la_strain_c

Percentiles		Smallest		
1%	4.810817	.8064516		
5%	7.561579	1.626016		
10%	9.217999	1.936799	Obs	2,886
25%	11.73184	2.040816	Sum of Wgt.	2,886
			Mean	15.14026
50%	14.86331		Std. Dev.	4.906427
75%	18.0777	35.18994	Variance	24.07303
90%	21.44766	35.99891	Skewness	.4369312
95%	23.31977	36.05442	Kurtosis	3.76367
99%	28.70013	41.34275		

*All booster strain values obtained using P-P wave gating were converted to R-R wave values

Variable name: pep_limited

Definition: Limited assessment of LVOT PEP due to poor ECG quality

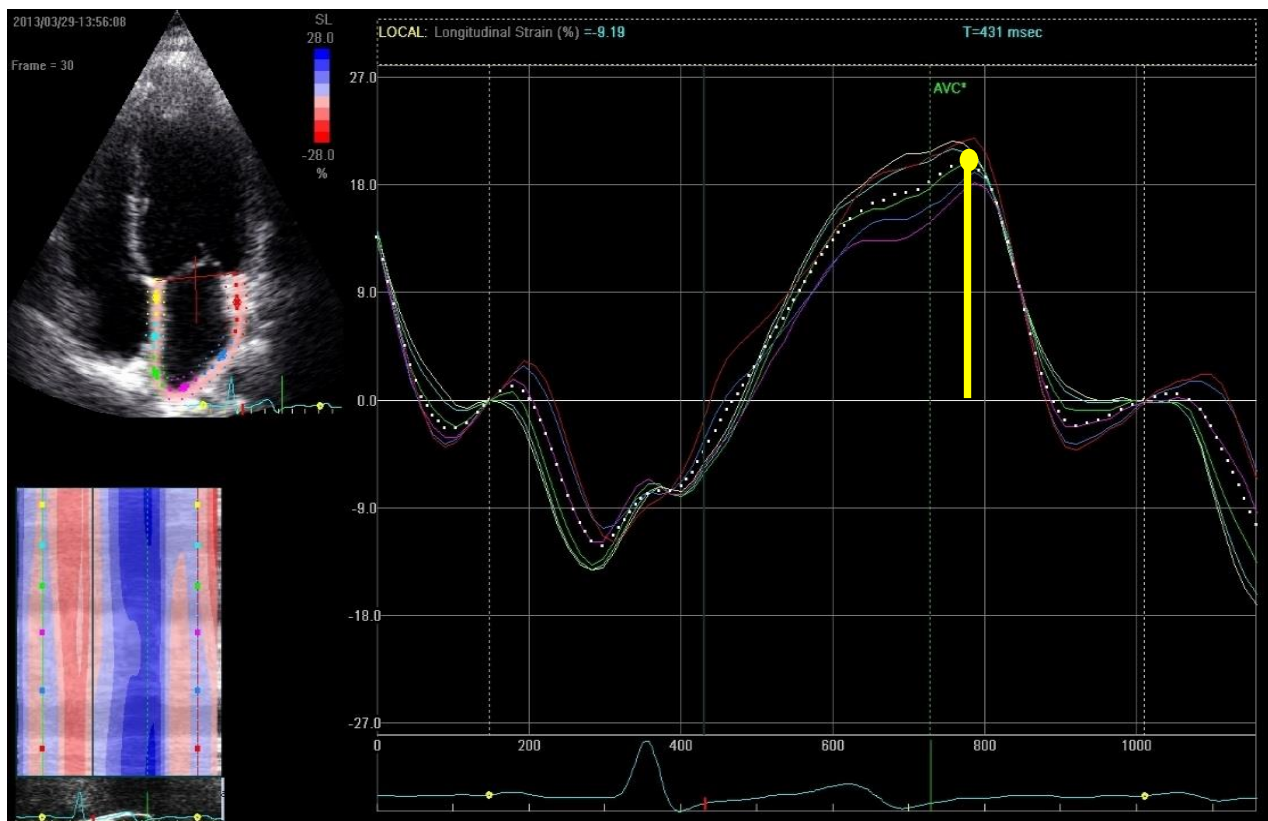
Recorded for internal use

Units: 0=no, 1=yes

Variable name: pos_a4c_la_strain_c

Definition: Global left atrial conduit strain, A4C view

Units: %



pos_a4c_la_strain_c

Percentiles		Smallest		
1%	4.008909	1.907669		
5%	5.75315	2.627442		
10%	6.78662	2.68442	Obs	2,886
25%	8.877928	2.724047	Sum of Wgt.	2,886
50%	11.87366		Mean	12.56358
		Largest	Std. Dev.	4.965909
75%	15.52795	33.45959		
90%	19.38609	33.82187	Variance	24.66026
95%	21.58788	33.92484	Skewness	.7652501
99%	26.47762	33.92857	Kurtosis	3.738002

*All conduit strain values obtained using P-P wave gating were converted to R-R wave values

Variable name: prsw

Definition: Preload-recruitable stroke work

Units: g/cm²

Formula:

$$(sw / (lvedv - (0.7 * lvedv) + (0.3 * (lvmass / 1.05)))) / 0.0136$$

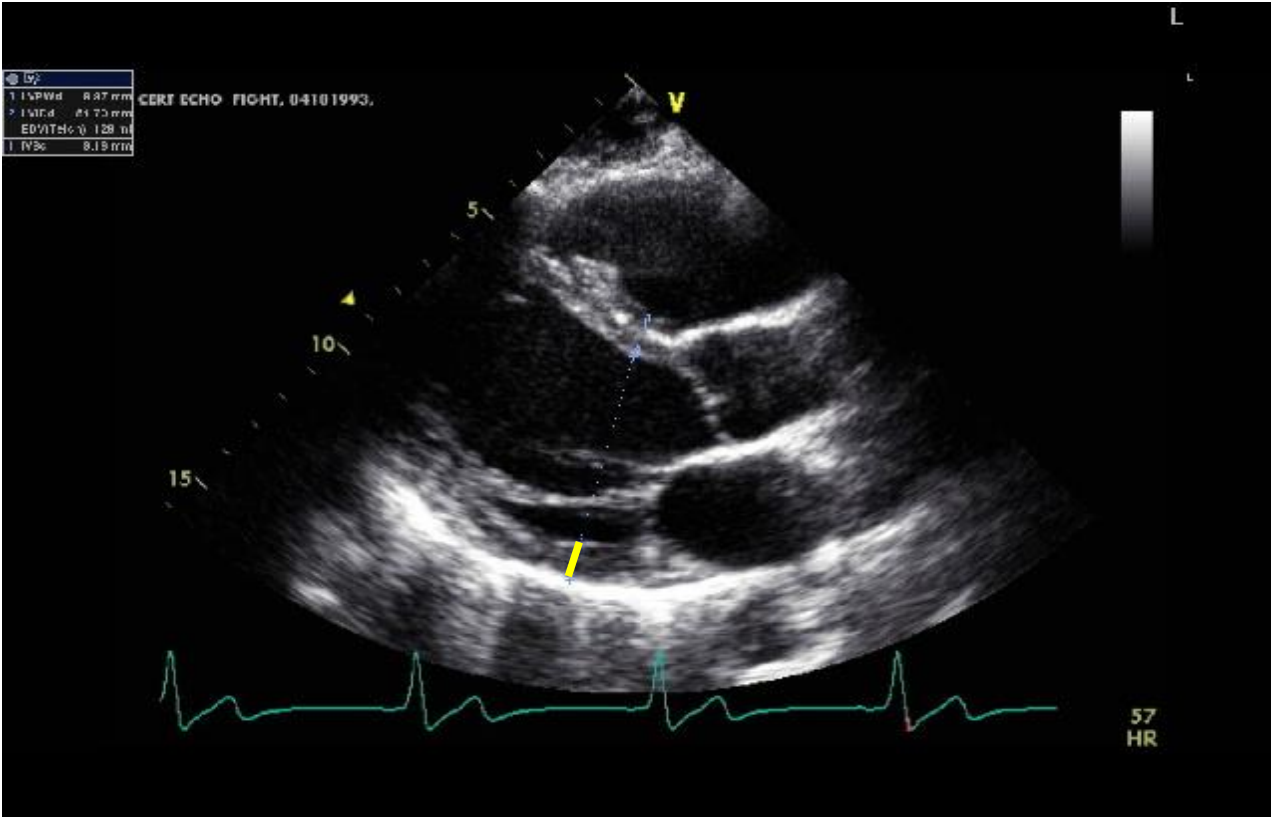
prsw				

	Percentiles	Smallest		
1%	39.31165	18.14931		
5%	55.0606	21.86817		
10%	61.76502	30.01589	Obs	2,884
25%	74.51749	31.21138	Sum of Wgt.	2,884
50%	89.85238		Mean	92.5992
		Largest	Std. Dev.	26.7461
75%	107.7117	224.7312		
90%	127.4296	237.3221	Variance	715.3536
95%	139.3909	243.7613	Skewness	.903401
99%	167.1264	316.9145	Kurtosis	5.971695

Variable name: pwt

Definition: Posterior wall thickness at end diastole

Units: cm



pwt				

Percentiles		Smallest		
1%	.67	.56		
5%	.73	.61		
10%	.77	.62	Obs	3,032
25%	.85	.62	Sum of Wgt.	3,032
50%	.94	Largest	Mean	.9545053
75%	1.04		Std. Dev.	.1514298
90%	1.15		Variance	.022931
95%	1.22		Skewness	.7464065
99%	1.41		Kurtosis	4.48877

Variable name: pwt

Normal values:

Table 6 Normal ranges for LV mass indices

	Women	Men
Linear method		
LV mass (g)	67–162	88–224
<i>LV mass/BSA (g/m^2)</i>	<i>43–95</i>	<i>49–115</i>
Relative wall thickness (cm)	0.22–0.42	0.24–0.42
<i>Septal thickness (cm)</i>	<i>0.6–0.9</i>	<i>0.6–1.0</i>
<i>Posterior wall thickness (cm)</i>	<i>0.6–0.9</i>	<i>0.6–1.0</i>
2D method		
LV mass (g)	66–150	96–200
<i>LV mass/BSA (g/m^2)</i>	<i>44–88</i>	<i>50–102</i>

Bold italic values: recommended and best validated.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: ra_res_final

Definition: Global right atrial reservoir strain, A4C view

Units: %

Formula:

Sinus: ra_strain_peak_pos_c + ra_strain_peak_neg_c

A-fib: ra_reservoir_strain

ra_res_final

Percentiles		Smallest		
1%	10.31	4.06		
5%	18.76229	4.53		
10%	21.71957	5.62	Obs	2,940
25%	26.68138	5.94	Sum of Wgt.	2,940
50%	32.12976		Mean	32.24915
		Largest	Std. Dev.	8.53733
75%	37.96398	59.29674		
90%	43.27547	59.90266	Variance	72.88601
95%	46.32224	60.59612	Skewness	-.0745772
99%	51.12734	61.73463	Kurtosis	3.162263

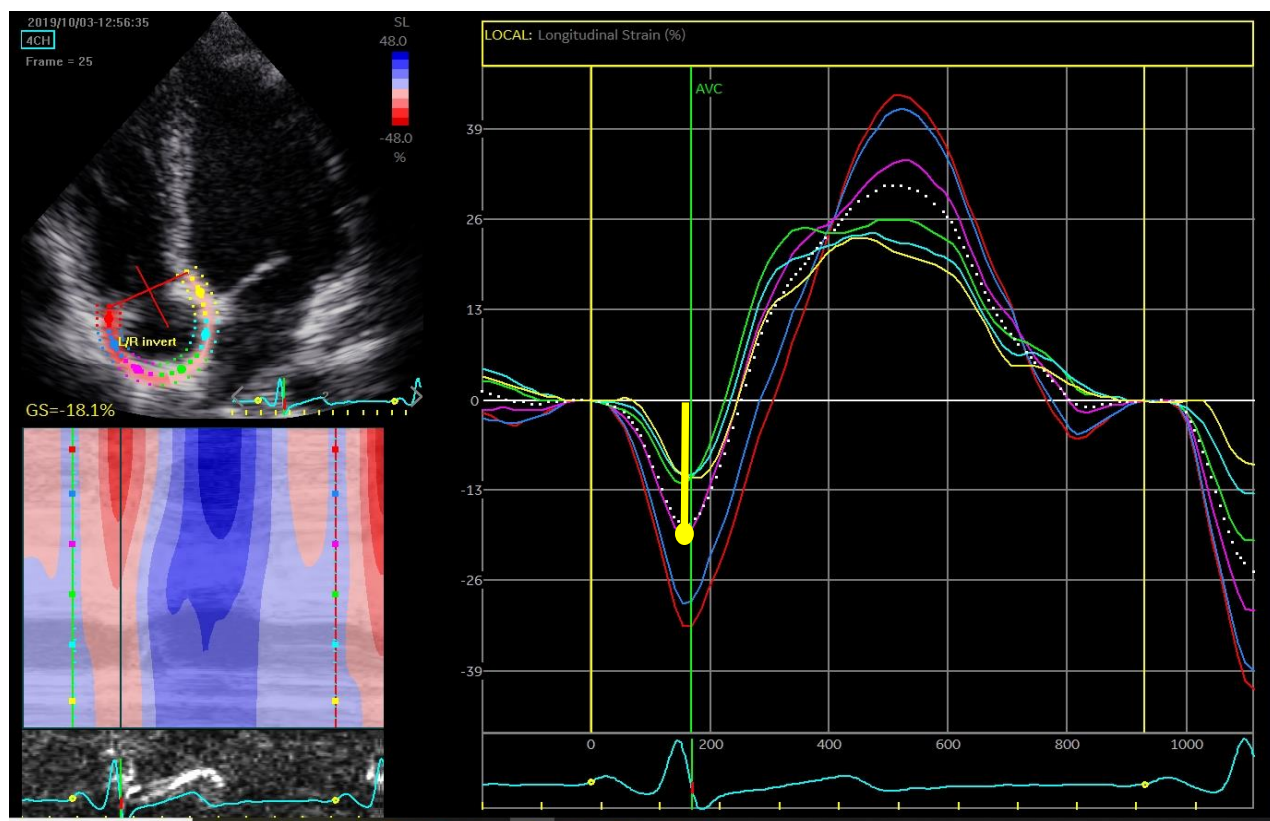
*All reservoir strain values obtained using P-P wave gating were converted to R-R wave values

Source: Standardization of left atrial, right ventricular, and right atrial deformation imaging using two-dimensional speckle tracking echocardiography: a consensus document of the EACVI/ASE/Industry Task Force to standardize deformation imaging (EHJ – Cardiovascular Imaging, 2018)

Variable name: ra_strain_peak_neg_c

Definition: Global right atrial booster strain, A4C view

Units: % (absolute value recorded)



ra_strain_peak_neg_c

Percentiles		Smallest		
1%	6.666667	1.750102		
5%	9.217999	2.564103		
10%	10.72971	4.40593	Obs	2,826
25%	13.67512	4.40593	Sum of Wgt.	2,826
50%			Mean	17.24377
		Largest	Std. Dev.	5.116448
75%	20.52549	36.81762		
90%	23.79302	38.40831	Variance	26.17804
95%	25.99219	39.37282	Skewness	.3335987
99%	30.08976	39.86014	Kurtosis	3.347341

*All booster strain values obtained using P-P wave gating were converted to R-R wave values

Variable name: ra_strain_peak_pos_c

Definition: Global right atrial conduit strain, A4C view

Units: %



ra_strain_peak_pos_c

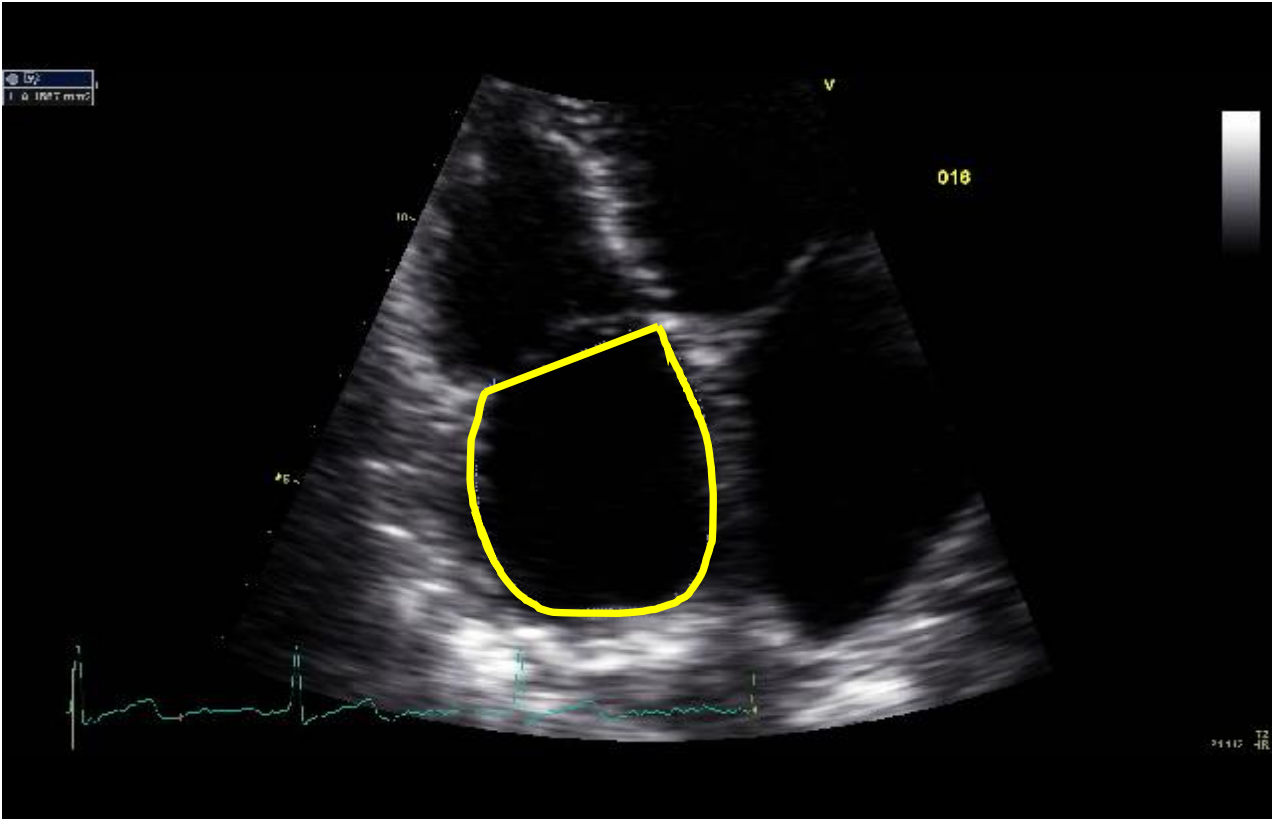
Percentiles		Smallest		
1%	4.677593	1.658516		
5%	7.013815	2.595386		
10%	8.370848	2.826775	Obs	2,826
25%	11.26761	2.95753	Sum of Wgt.	2,826
50%	15.28178		Mean	15.69127
		Largest	Std. Dev.	5.811995
75%	19.60439	33.42776		
90%	23.67598	33.8104	Variance	33.77928
95%	26.05202	34.05573	Skewness	.357497
99%	29.96812	35.23544	Kurtosis	2.660754

*All conduit strain values obtained using P-P wave gating were converted to R-R wave values

Variable name: raa

Definition: Right atrial end systolic area

Units: cm²



raa				

Percentiles		Smallest		
1%	9.3	7.2		
5%	11.1	7.4		
10%	12.1	7.8	Obs	3,029
25%	13.8	8	Sum of Wgt.	3,029
			Mean	16.79409
50%	16.3	Largest	Std. Dev.	4.21809
75%	19			
90%	22.3	38.2	Variance	17.79229
95%	24.7	38.6	Skewness	.9700132
99%	29.4	41.1	Kurtosis	4.832368

Variable name: `raa`

Normal values:

Table 1 Summary of reference limits for recommended measures of right heart structure and function

Variable	Unit	Abnormal	Illustration
Chamber dimensions			
RV basal diameter	cm	>4.2	Figure 7
RV subcostal wall thickness	cm	>0.5	Figure 5
RVOT PSAX distal diameter	cm	>2.7	Figure 8
RVOT PLAX proximal diameter	cm	>3.3	Figure 8
RA major dimension	cm	>5.3	Figure 3
RA minor dimension	cm	>4.4	Figure 3
RA end-systolic area	cm ²	>18	Figure 3
Systolic function			
TAPSE	cm	<1.6	Figure 17
Pulsed Doppler peak velocity at the annulus	cm/s	<10	Figure 16
Pulsed Doppler MPI	—	>0.40	Figure 16
Tissue Doppler MPI	—	>0.55	Figures 16 and 18
FAC (%)	%	<35	Figure 9
Diastolic function			
E/A ratio	—	<0.8 or >2.1	
E/E' ratio	—	>6	
Deceleration time (ms)	ms	<120	

FAC, Fractional area change; MPI, myocardial performance index; PLAX, parasternal long-axis; PSAX, parasternal short-axis; RA, right atrium; RV, right ventricle; RVD, right ventricular diameter; RVOT, right ventricular outflow tract; TAPSE, tricuspid annular plane systolic excursion.

Source: Guidelines for the Echocardiographic Assessment of the Right Heart in Adults (JASE, July 2010)

Variable name: `rhythm`

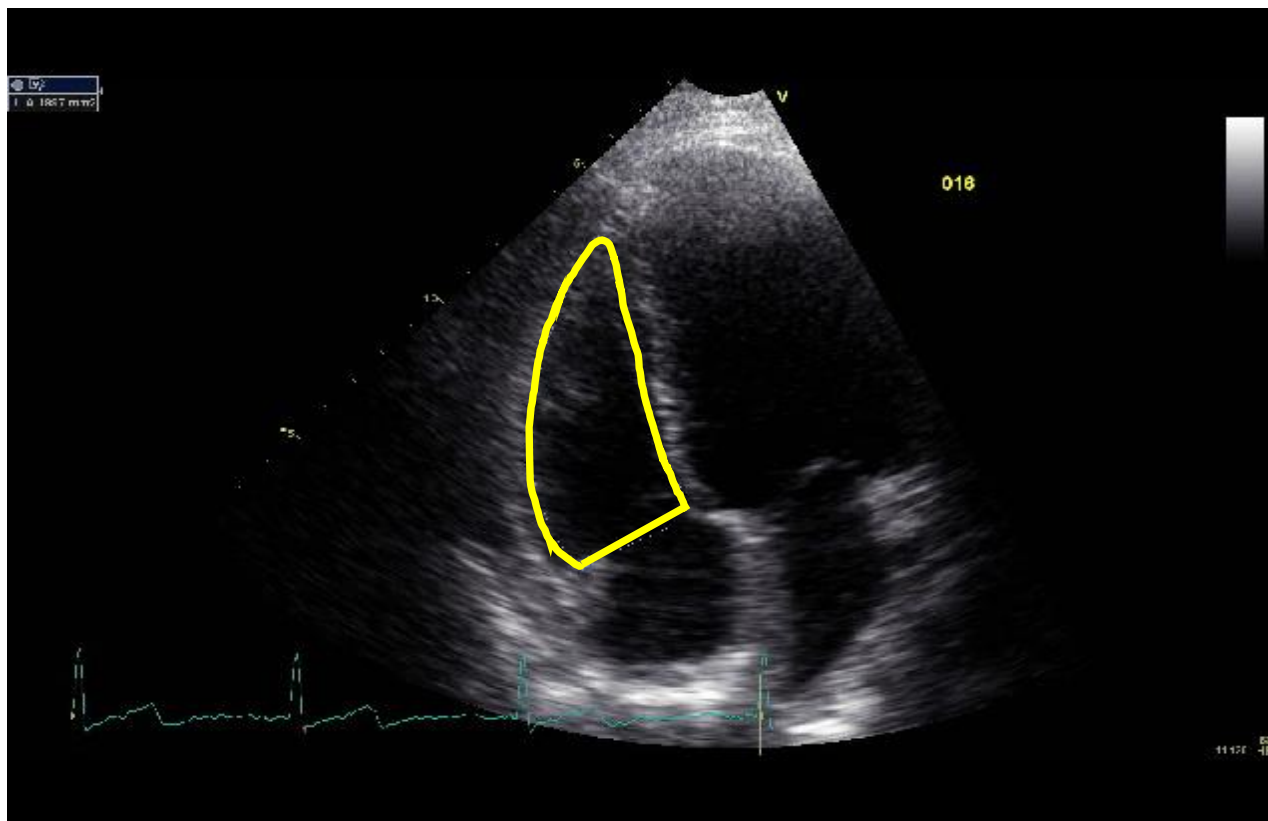
Definition: Heart rhythm at time of echo

Units: 0 = sinus rhythm, 1 = atrial fibrillation, 2 = other abnormal rhythm

Variable name: rveda

Definition: Right ventricular end diastolic area

Units: cm²



rveda

	Percentiles	Smallest		
1%	11.3	9.3		
5%	12.8	9.4		
10%	13.9	9.9	Obs	3,029
25%	15.7	10	Sum of Wgt.	3,029
50%	18.2		Mean	18.63658
		Largest	Std. Dev.	4.097997
75%	21.1	40.2		
90%	24.1	42	Variance	16.79358
95%	25.9	44.8	Skewness	.8188364
99%	29.7	45.4	Kurtosis	4.773394

Variable name: `rv_eda`

Normal values:

Table 8 Normal values for RV chamber size		
Parameter	Mean \pm SD	Normal range
RV basal diameter (mm)	33 \pm 4	25-41
RV mid diameter (mm)	27 \pm 4	19-35
RV longitudinal diameter (mm)	71 \pm 6	59-83
RVOT PLAX diameter (mm)	25 \pm 2.5	20-30
RVOT proximal diameter (mm)	28 \pm 3.5	21-35
RVOT distal diameter (mm)	22 \pm 2.5	17-27
RV wall thickness (mm)	3 \pm 1	1-5
RV EDA (cm ²)		
Men	17 \pm 3.5	10-24
Women	14 \pm 3	8-20
RV EDA indexed to BSA (cm ² /m ²)		
Men	8.8 \pm 1.9	5-12.6
Women	8.0 \pm 1.75	4.5-11.5
RV ESA (cm ²)		
Men	9 \pm 3	3-15
Women	7 \pm 2	3-11
RV ESA indexed to BSA (cm ² /m ²)		
Men	4.7 \pm 1.35	2.0-7.4
Women	4.0 \pm 1.2	1.6-6.4
RV EDV indexed to BSA (mL/m ²)		
Men	61 \pm 13	35-87
Women	53 \pm 10.5	32-74
RV ESV indexed to BSA (mL/m ²)		
Men	27 \pm 8.5	10-44
Women	22 \pm 7	8-36

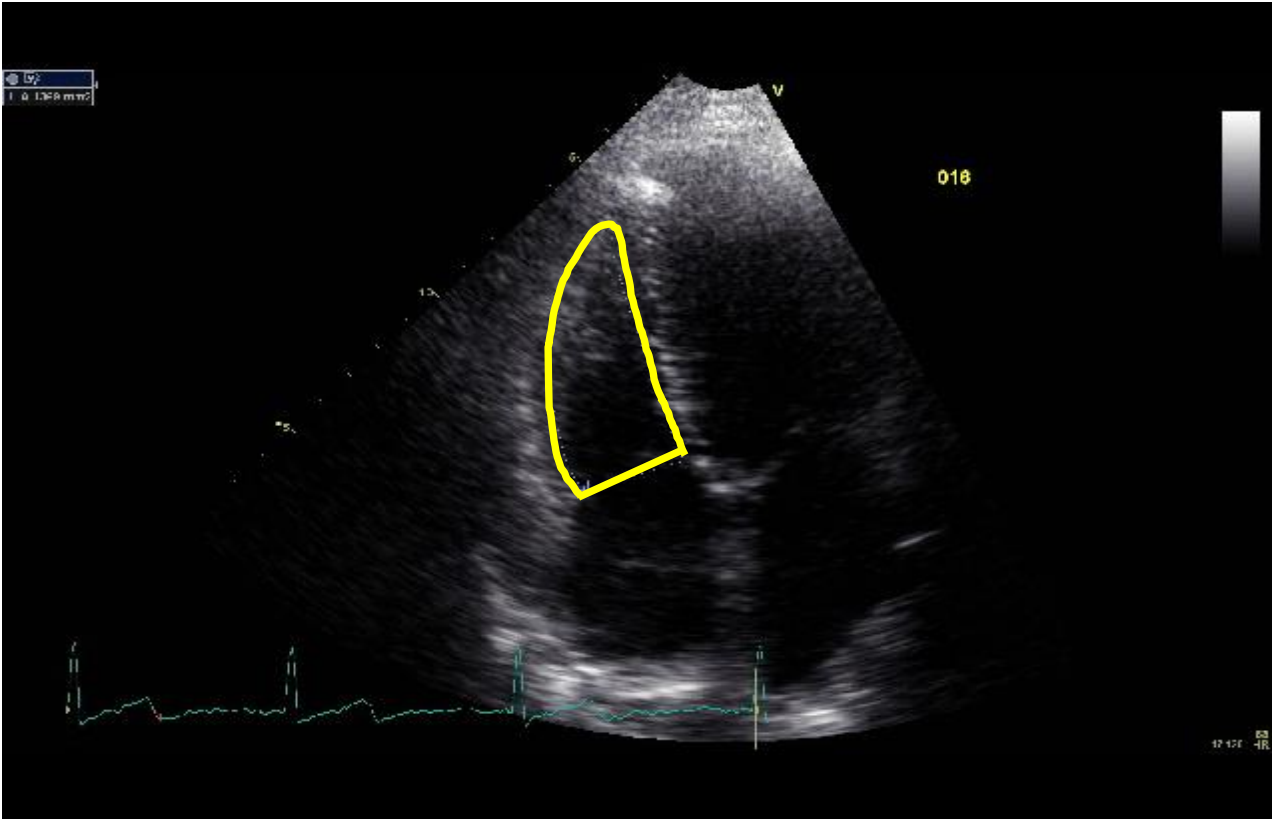
EDA, end-diastolic area; *ESA*, end-systolic area; *PLAX*, parasternal long-axis view; *RVOT*, RV outflow tract.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: rvesa

Definition: Right ventricular end systolic area

Units: cm²



rvesa

Percentiles			Smallest		
1%	6.5		5.5		
5%	7.5		5.6		
10%	8		5.8	Obs	3,029
25%	9.2		5.8	Sum of Wgt.	3,029
50%	10.9			Mean	11.19947
				Std. Dev.	2.758376
75%	12.8		Largest		
			30.2		
90%	14.7		30.7	Variance	7.608639
95%	16		33.2	Skewness	1.183552
99%	19		33.2	Kurtosis	7.386735

Variable name: `rvesa`

Normal values:

Table 8 Normal values for RV chamber size		
Parameter	Mean \pm SD	Normal range
RV basal diameter (mm)	33 \pm 4	25-41
RV mid diameter (mm)	27 \pm 4	19-35
RV longitudinal diameter (mm)	71 \pm 6	59-83
RVOT PLAX diameter (mm)	25 \pm 2.5	20-30
RVOT proximal diameter (mm)	28 \pm 3.5	21-35
RVOT distal diameter (mm)	22 \pm 2.5	17-27
RV wall thickness (mm)	3 \pm 1	1-5
RV EDA (cm ²)		
Men	17 \pm 3.5	10-24
Women	14 \pm 3	8-20
RV EDA indexed to BSA (cm ² /m ²)		
Men	8.8 \pm 1.9	5-12.6
Women	8.0 \pm 1.75	4.5-11.5
RV ESA (cm ²)		
Men	9 \pm 3	3-15
Women	7 \pm 2	3-11
RV ESA indexed to BSA (cm ² /m ²)		
Men	4.7 \pm 1.35	2.0-7.4
Women	4.0 \pm 1.2	1.6-6.4
RV EDV indexed to BSA (mL/m ²)		
Men	61 \pm 13	35-87
Women	53 \pm 10.5	32-74
RV ESV indexed to BSA (mL/m ²)		
Men	27 \pm 8.5	10-44
Women	22 \pm 7	8-36

EDA, end-diastolic area; *ESA*, end-systolic area; *PLAX*, parasternal long-axis view; *RVOT*, RV outflow tract.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: `rvfw`

Definition: Right ventricular free wall strain

Units: %

Formula:

$(ap_rv_strain + mid_rv_strain + bas_rv_strain) / 3$

rvfw				
	Percentiles	Smallest		
1%	13.64667	8.436666		
5%	16.58333	9.530001		
10%	18.39667	9.79	Obs	2,904
25%	21.37667	10.10333	Sum of Wgt.	2,904
50%	24.745		Mean	24.86939
		Largest	Std. Dev.	5.056342
75%	28.33333	39.72		
90%	31.5	40.25	Variance	25.5666
95%	33.23	41.12667	Skewness	.0399323
99%	36.68	41.25	Kurtosis	2.853352

Variable name: rvsp

Definition: Right ventricular systolic pressure

Units: mmHg

Formula: $4 * ((tr_peak) ^2)$

rvsp				

	Percentiles	Smallest		
1%	16.3216	12.5316		
5%	18.1476	13.1044		
10%	19.8916	13.3956	Obs	2,384
25%	23.2324	13.3956	Sum of Wgt.	2,384
50%	27.04		Mean	27.95307
		Largest	Std. Dev.	7.314376
75%	31.5844	67.8976		
90%	36.4816	69.2224	Variance	53.5001
95%	40.7044	84.64	Skewness	1.55268
99%	53.8756	86.11839	Kurtosis	8.888163

Variable name: `rw`

Definition: Relative wall thickness

Units: N/A

Formula: $(2 * pwt) / lvedd$

rw				

	Percentiles	Smallest		
1%	.287703	.2244489		
5%	.3311547	.2456814		
10%	.3516949	.2504288	Obs	3,032
25%	.3913043	.2513863	Sum of Wgt.	3,032
50%	.4421052		Mean	.4508713
		Largest	Std. Dev.	.0840205
75%	.5	.8129675		
90%	.5586854	.8215159	Variance	.0070594
95%	.6050955	.8507937	Skewness	.6925056
99%	.6925208	.8602151	Kurtosis	3.961876

Variable name: r_{wt}

Normal values:

Table 6 Normal ranges for LV mass indices

	Women	Men
Linear method		
LV mass (g)	67–162	88–224
<i>LV mass/BSA (g/m^2)</i>	<i>43–95</i>	<i>49–115</i>
Relative wall thickness (cm)	0.22–0.42	0.24–0.42
<i>Septal thickness (cm)</i>	<i>0.6–0.9</i>	<i>0.6–1.0</i>
<i>Posterior wall thickness (cm)</i>	<i>0.6–0.9</i>	<i>0.6–1.0</i>
2D method		
LV mass (g)	66–150	96–200
<i>LV mass/BSA (g/m^2)</i>	<i>44–88</i>	<i>50–102</i>

Bold italic values: recommended and best validated.

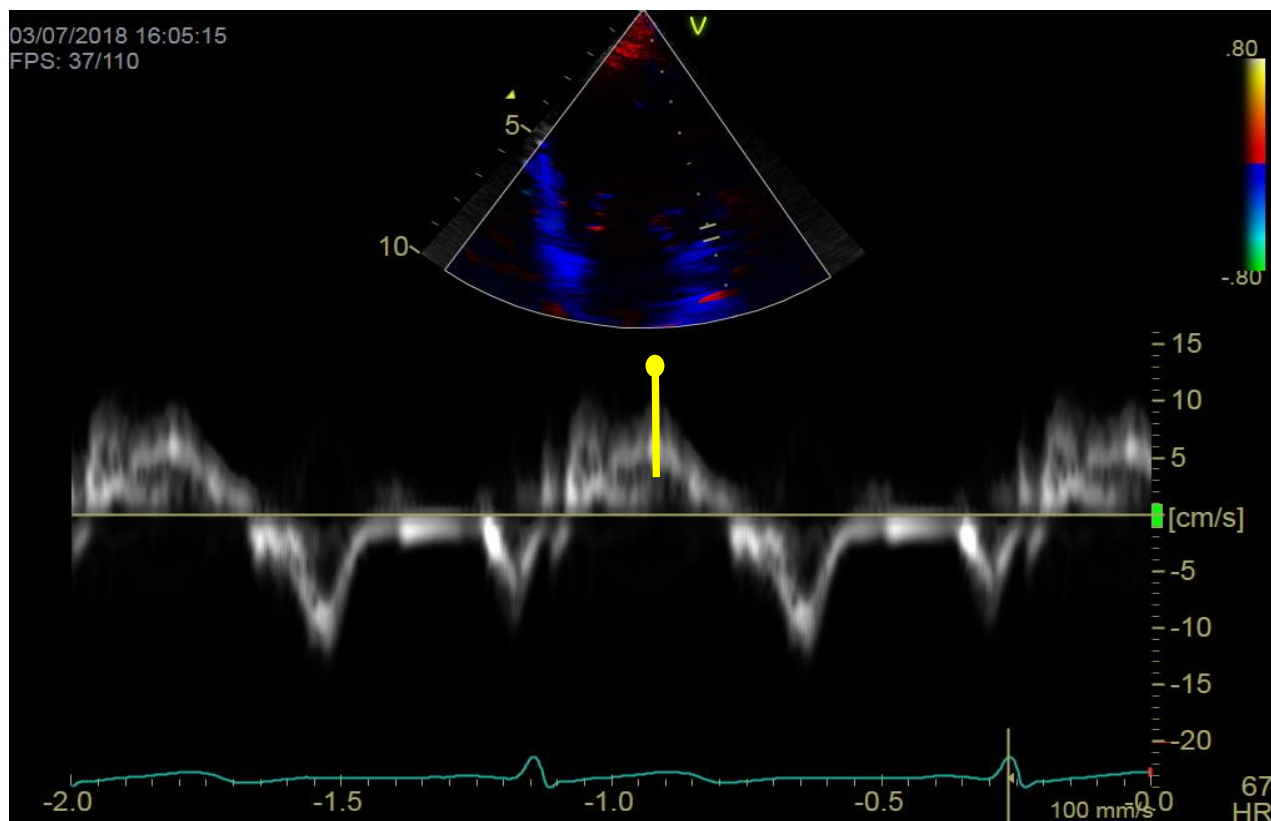
Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: s'_lateral

Definition: Lateral s' prime peak velocity

Units: cm/s

Normal values: 10.6 ± 2.3 cm/s (cm/s \pm 1 SD)



s'_lateral

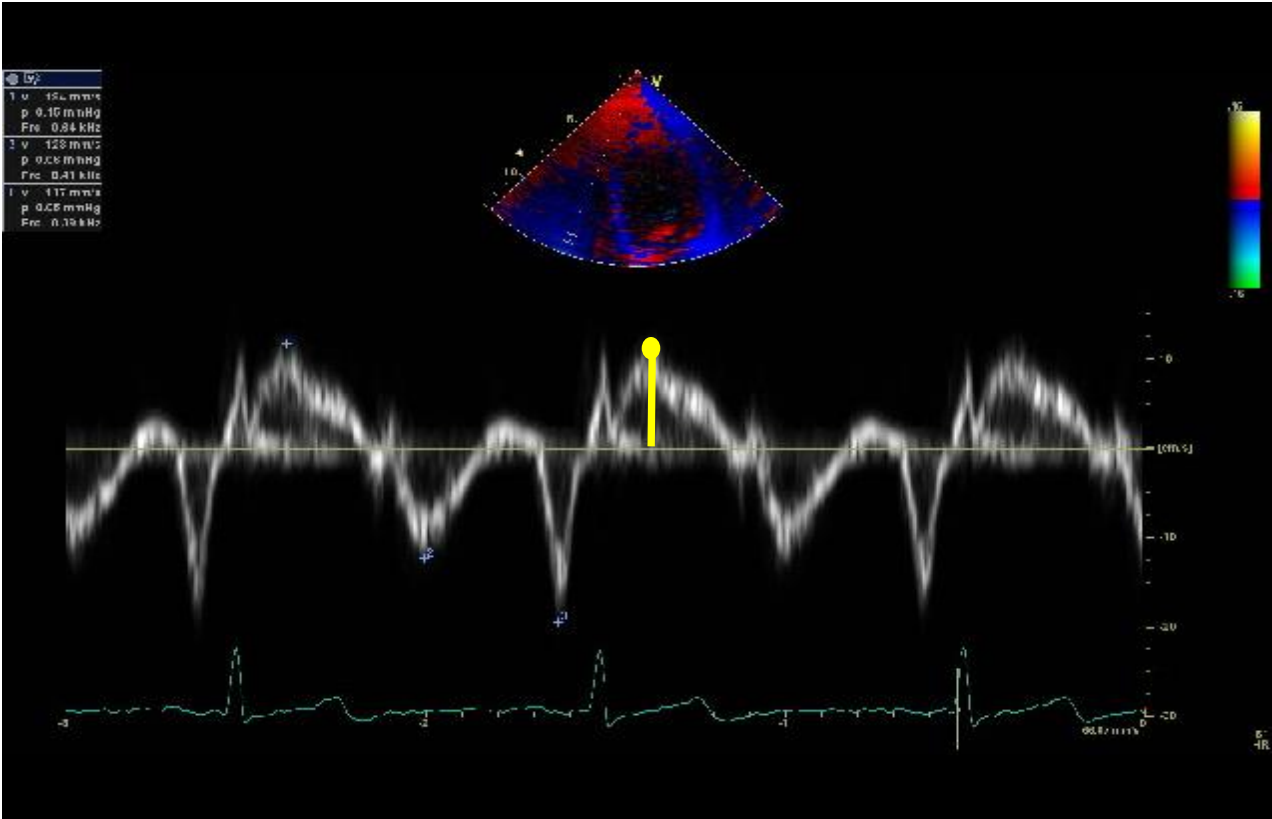
Percentiles		Smallest		
1%	5	2.64		
5%	6	2.8		
10%	6.6	3.2	Obs	3,023
25%	7.5	3.3	Sum of Wgt.	3,023
50%	8.8		Mean	9.076494
		Largest	Std. Dev.	2.223204
75%	10.3	19.8	Variance	4.942634
90%	12	21.2	Skewness	.9666111
95%	13	24.4	Kurtosis	5.706232
99%	15.5	25.4		

Source: The Echocardiographer's Pocket Reference, Third Edition

Variable name: s'_rv

Definition: Right ventricular free wall s prime peak velocity

Units: cm/s



s'_rv

Percentiles		Smallest		
1%	7.8	2.9		
5%	9.6	3		
10%	10.5	4.3	Obs	2,918
25%	11.9	4.8	Sum of Wgt.	2,918
50%	13.7	Largest	Mean	14.03526
75%	15.8		Std. Dev.	3.143232
90%	18.1	27.9	Variance	9.879904
95%	19.6	29.3	Skewness	.7046974
99%	23.2	31.5	Kurtosis	4.432011

Variable name: s_{rv}

Normal values:

Table 10 Normal values for parameters of RV function

Parameter	Mean \pm SD	Abnormality threshold
TAPSE (mm)	24 ± 3.5	<17
Pulsed Doppler S wave (cm/sec)	14.1 ± 2.3	<9.5
Color Doppler S wave (cm/sec)	9.7 ± 1.85	<6.0
RV fractional area change (%)	49 ± 7	<35
RV free wall 2D strain* (%)	-29 ± 4.5	>-20 (<20 in magnitude with the negative sign)
RV 3D EF (%)	58 ± 6.5	<45
Pulsed Doppler MPI	0.26 ± 0.085	>0.43
Tissue Doppler MPI	0.38 ± 0.08	>0.54
E wave deceleration time (msec)	180 ± 31	<119 or >242
E/A	1.4 ± 0.3	<0.8 or >2.0
e'/a'	1.18 ± 0.33	<0.52
e'	14.0 ± 3.1	<7.8
E/e'	4.0 ± 1.0	>6.0

MPI, Myocardial performance index.

*Limited data; values may vary depending on vendor and software version.

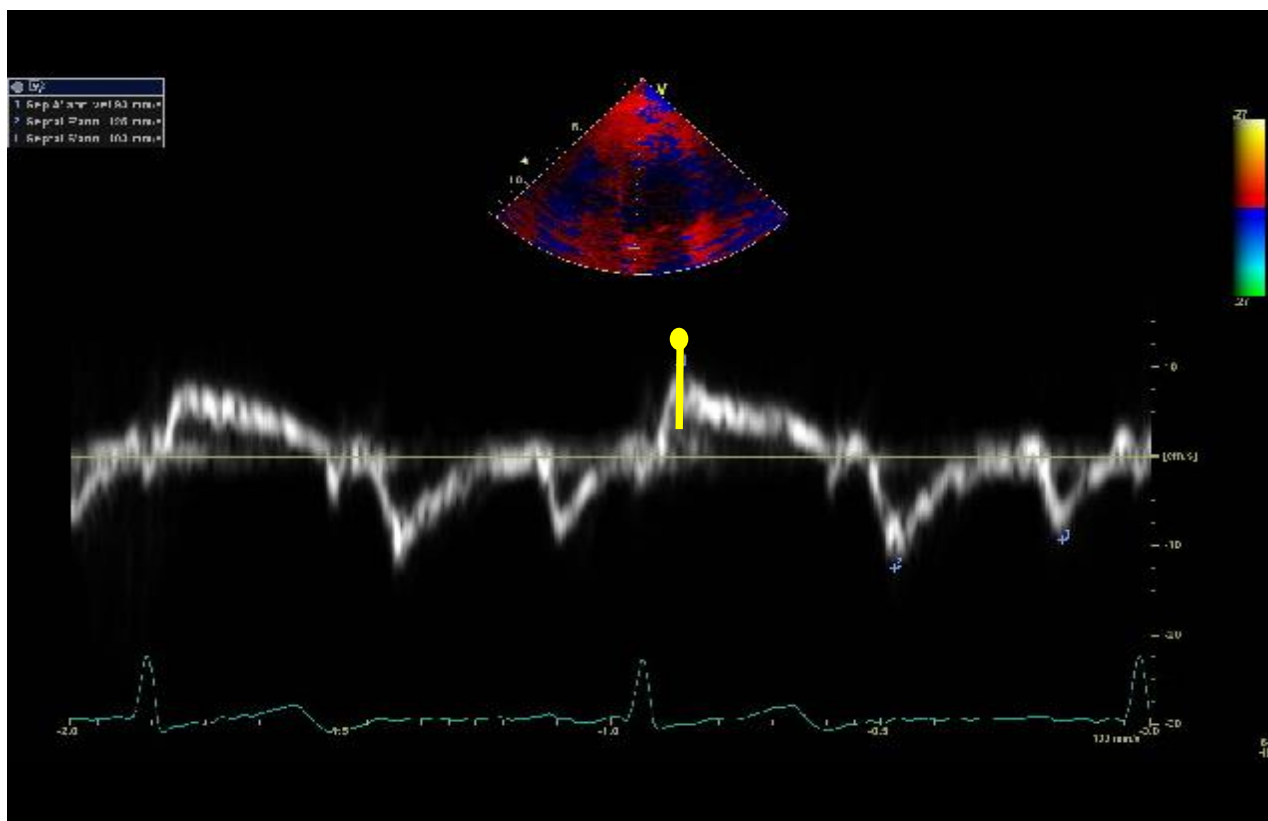
Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: s_septal

Definition: Septal s prime peak velocity

Units: cm/s

Normal values: 9.9 ± 1.7 cm/s (cm/s \pm 1 SD)



s'_septal

Percentiles			Smallest		
1%	4.7		2.8		
5%	5.7		3.3		
10%	6.1		3.8	Obs	3,015
25%	7.1		3.9	Sum of Wgt.	3,015
50%	8.1			Mean	8.164046
			Largest	Std. Dev.	1.645509
75%	9.1		14.7		
90%	10.3		14.9	Variance	2.707698
95%	11		15	Skewness	.4227688
99%	12.6		16.8	Kurtosis	3.706307

Source: The Echocardiographer's Pocket Reference, Third Edition

Variable name: sbp_esv

Definition: Ratio of systolic blood pressure to end systolic volume

Units: mmHg/ml

Formula: $(0.9 * \text{echo_sbp}) / \text{lvesv}$

sbp_esv				

	Percentiles	Smallest		
1%	1.647458	.5865672		
5%	2.292308	.5954546		
10%	2.65	.8205882	Obs	2,999
25%	3.335294	1.135514	Sum of Wgt.	2,999
50%	4.245283		Mean	4.511186
		Largest	Std. Dev.	1.647872
75%	5.45	12.06667		
90%	6.66	13.34118	Variance	2.715481
95%	7.576744	13.64211	Skewness	.9855661
99%	9.533334	14.74286	Kurtosis	4.898865

Variable name: sr_a

Definition: Global left ventricular late diastolic strain rate

Units: 1/s

Formula:

$$(lv4c_sr_a + lv2c_sr_a + lv3c_sr_a) / 3$$

sr_a				
<hr/>				
	Percentiles	Smallest		
1%	.3666667	.1		
5%	.6333333	.1		
10%	.7333333	.1333333	Obs	2,694
25%	.8666667	.1666667	Sum of Wgt.	2,694
50%	1.033333		Mean	1.044655
		Largest	Std. Dev.	.2663417
75%	1.2	2.1		
90%	1.366667	2.2	Variance	.0709379
95%	1.466667	2.266667	Skewness	.177118
99%	1.766667	2.333333	Kurtosis	4.124771

Variable name: sr_e

Definition: Global left ventricular early diastolic strain rate

Units: 1/s

Formula:

$$(lv4c_sr_e + lv2c_sr_e + lv3c_sr_e) / 3$$

sr_e				
<hr/>				
	Percentiles	Smallest		
1%	.4666667	.2		
5%	.6333333	.2		
10%	.7	.3	Obs	2,765
25%	.8333334	.3	Sum of Wgt.	2,765
50%	1.033333		Mean	1.078553
		Largest	Std. Dev.	.3184752
75%	1.266667	2.2		
90%	1.5	2.2	Variance	.1014264
95%	1.666667	2.233333	Skewness	.5914327
99%	1.933333	3.2	Kurtosis	3.830892

Variable name: sr_s

Definition: Global left ventricular systolic strain rate

Units: 1/s

Formula:

$$(lv4c_sr_s + lv2c_sr_s + lv3c_sr_s) / 3$$

sr_s				
	Percentiles	Smallest		
1%	.5666667	.2666667		
5%	.7333333	.3		
10%	.8	.3	Obs	2,765
25%	.9	.3	Sum of Wgt.	2,765
50%	1.033333		Mean	1.027185
		Largest	Std. Dev.	.1791759
75%	1.133333	1.7		
90%	1.266667	1.7	Variance	.032104
95%	1.3	1.766667	Skewness	.0278204
99%	1.466667	1.9	Kurtosis	4.10631

Variable name: `strain_reader`

Definition: NUECL staff member that performed LV strain

Recorded for internal use

Units: N/A

Variable name: SV

Definition: Stroke volume

Units: ml

Formula: $3.14 * ((lvot/2)^2) * lvot_vti$

Normal values: 70-100 ml

SV				

	Percentiles	Smallest		
1%	42.90386	33.27715		
5%	50.44454	35.30465		
10%	55.63147	36.66311	Obs	2,982
25%	64.97138	36.94248	Sum of Wgt.	2,982
50%	76.88692		Mean	78.92501
		Largest	Std. Dev.	19.8486
75%	89.99993	172.5201		
90%	105.2434	176.6127	Variance	393.9669
95%	114.9566	181.8764	Skewness	.8142101
99%	133.5259	224.023	Kurtosis	4.711758

Variable name: svpp

Definition: Stroke volume-pulse pressure ratio

Units: ml/mmHg

Formula: $sv/echo_pp$

svpp				

	Percentiles	Smallest		
1%	.5943556	.4300016		
5%	.7706677	.4590837		
10%	.8744643	.4731627	Obs	2,977
25%	1.063366	.4794874	Sum of Wgt.	2,977
50%	1.36048		Mean	1.444085
		Largest	Std. Dev.	.5148647
75%	1.73543	4.133556		
90%	2.109382	4.24583	Variance	.2650857
95%	2.388787	4.51836	Skewness	1.074958
99%	2.968649	4.870064	Kurtosis	5.29599

Variable name: svr

Definition: Systemic vascular resistance

Units: dynes*s/cm⁻⁵

Formula: (echo_map-echorap) / co

svr				

	Percentiles	Smallest		
1%	9.400732	5.990174		
5%	11.82758	6.381098		
10%	13.08056	6.534051	Obs	2,977
25%	15.32683	7.758624	Sum of Wgt.	2,977
50%	18.54692		Mean	19.30293
		Largest	Std. Dev.	5.418671
75%	22.64997	40.36378		
90%	26.43807	41.82511	Variance	29.362
95%	29.18824	43.61609	Skewness	.7523945
99%	34.87011	51.90998	Kurtosis	3.959142

Variable name: SW

Definition: Stroke work

Units: g*m

Formula: (echo_map-Pm) *sv*0.0136

SW				

	Percentiles	Smallest		
1%	37.04157	25.5487		
5%	47.12834	27.56212		
10%	53.72813	27.71559	Obs	2,908
25%	64.76434	28.28118	Sum of Wgt.	2,908
50%	80.34143		Mean	83.59549
		Largest	Std. Dev.	25.64404
75%	98.97866	186.3263		
90%	117.4821	189.139	Variance	657.6169
95%	130.2629	203.3724	Skewness	.7149791
99%	154.8212	225.9258	Kurtosis	3.798054

Variable name: swedv

Definition: Ratio of stroke work to end diastolic volume

Units: g*m/ml

Formula: sw/lvedv

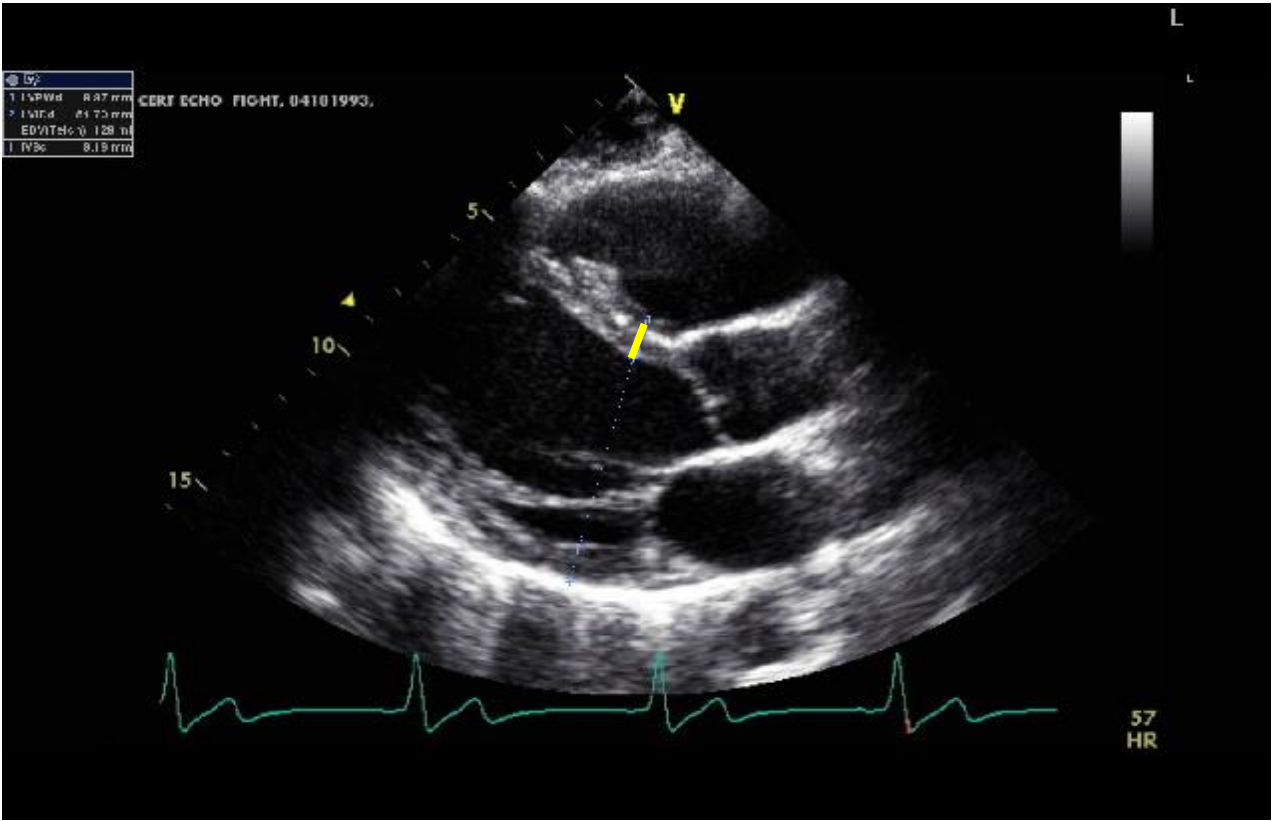
swedv				

	Percentiles	Smallest		
1%	.5077353	.2317725		
5%	.6560376	.2528944		
10%	.7357959	.2877322	Obs	2,885
25%	.8818033	.3334861	Sum of Wgt.	2,885
50%	1.06465		Mean	1.112719
		Largest	Std. Dev.	.3392174
75%	1.285087	2.950382		
90%	1.549733	2.980731	Variance	.1150684
95%	1.724218	3.012924	Skewness	1.11615
99%	2.099631	3.619135	Kurtosis	6.015146

Variable name: swt

Definition: Septal wall thickness at end diastole

Units: cm



swt

Percentiles		Smallest		
1%	.73	.61		
5%	.82	.63		
10%	.89	.64	Obs	3,032
25%	1.01	.64	Sum of Wgt.	3,032
50%	1.15	Largest	Mean	1.176234
			Std. Dev.	.2450089
75%	1.32	2.18	Variance	.0600294
90%	1.52	2.24	Skewness	.7106987
95%	1.64	2.25	Kurtosis	3.735959
99%	1.86	2.48		

Variable name: swt

Normal values:

Table 6 Normal ranges for LV mass indices

	Women	Men
Linear method		
LV mass (g)	67–162	88–224
<i>LV mass/BSA (g/m²)</i>	<i>43–95</i>	<i>49–115</i>
Relative wall thickness (cm)	0.22–0.42	0.24–0.42
<i>Septal thickness (cm)</i>	<i>0.6–0.9</i>	<i>0.6–1.0</i>
<i>Posterior wall thickness (cm)</i>	<i>0.6–0.9</i>	<i>0.6–1.0</i>
2D method		
LV mass (g)	66–150	96–200
<i>LV mass/BSA (g/m²)</i>	<i>44–88</i>	<i>50–102</i>

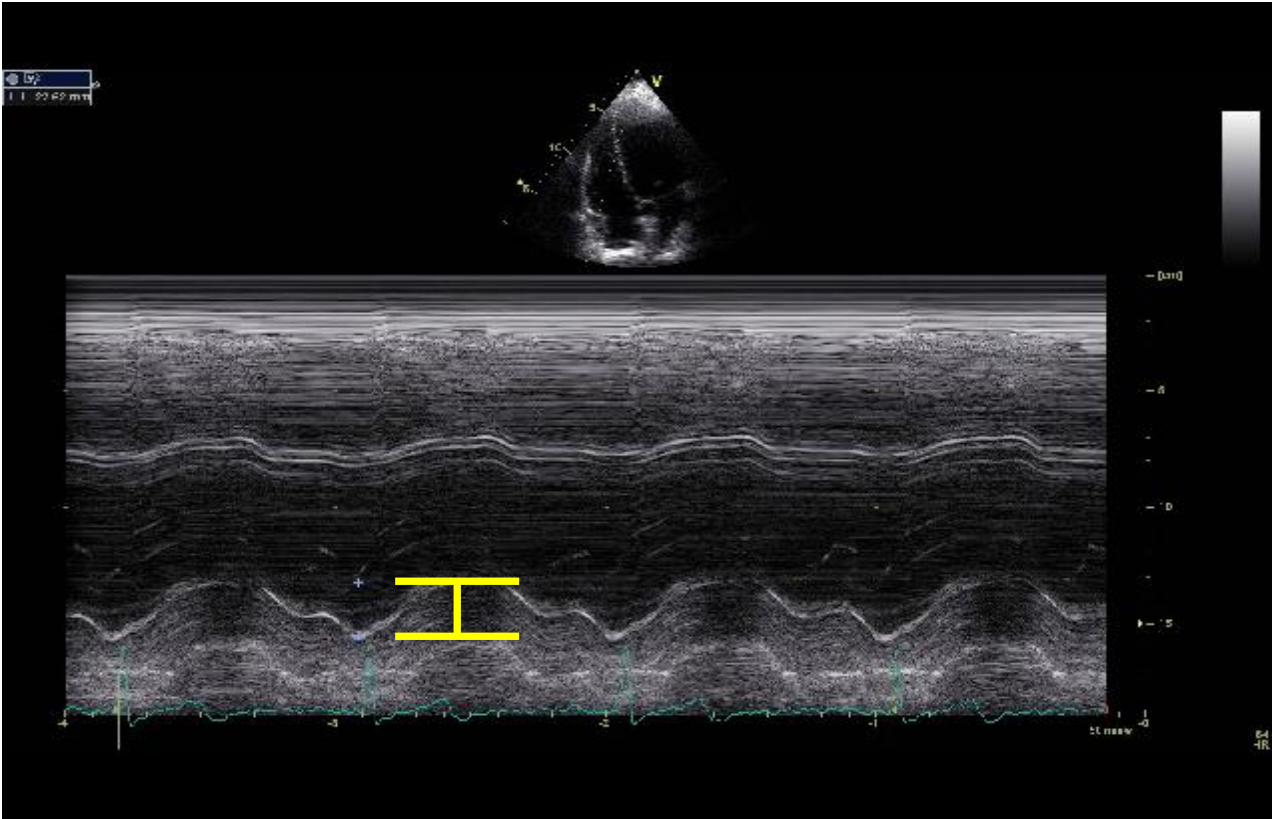
Bold italic values: recommended and best validated.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: tapse

Definition: Tricuspid annular plane systolic excursion

Units: cm



tapse

Percentiles		Smallest		
1%	1.34	.89		
5%	1.69	1.02		
10%	1.74	1.03	Obs	3,028
25%	1.86	1.04	Sum of Wgt.	3,028
			Mean	2.121955
50%	2.08	Largest	Std. Dev.	.3512636
75%	2.35			
90%	2.6	3.45	Variance	.1233861
95%	2.77	3.6	Skewness	.4507256
99%	3.02	3.66	Kurtosis	3.378853

Variable name: `tapse`

Normal values:

Table 10 Normal values for parameters of RV function

Parameter	Mean \pm SD	Abnormality threshold
TAPSE (mm)	24 \pm 3.5	<17
Pulsed Doppler S wave (cm/sec)	14.1 \pm 2.3	<9.5
Color Doppler S wave (cm/sec)	9.7 \pm 1.85	<6.0
RV fractional area change (%)	49 \pm 7	<35
RV free wall 2D strain* (%)	-29 \pm 4.5	>-20 (<20 in magnitude with the negative sign)
RV 3D EF (%)	58 \pm 6.5	<45
Pulsed Doppler MPI	0.26 \pm 0.085	>0.43
Tissue Doppler MPI	0.38 \pm 0.08	>0.54
E wave deceleration time (msec)	180 \pm 31	<119 or >242
E/A	1.4 \pm 0.3	<0.8 or >2.0
e'/a'	1.18 \pm 0.33	<0.52
e'	14.0 \pm 3.1	<7.8
E/e'	4.0 \pm 1.0	>6.0

MPI, Myocardial performance index.

*Limited data; values may vary depending on vendor and software version.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: tapsepasp

Definition: Ratio of TAPSE to Pulmonary artery systolic pressure

Units: cm/mmHg

Formula: tapse/echopasp

tapsepasp				

	Percentiles	Smallest		
1%	.161306	.0726384		
5%	.2349114	.0889518		
10%	.3218853	.0953046	Obs	2,384
25%	.3637282	.1026452	Sum of Wgt.	2,384
50%	.4097234		Mean	.4097957
		Largest	Std. Dev.	.0876345
75%	.4637434	.6835651		
90%	.5137573	.6895828	Variance	.0076798
95%	.5516759	.7196256	Skewness	-.4341767
99%	.6036785	.7314521	Kurtosis	4.17051

Variable name: tech_id

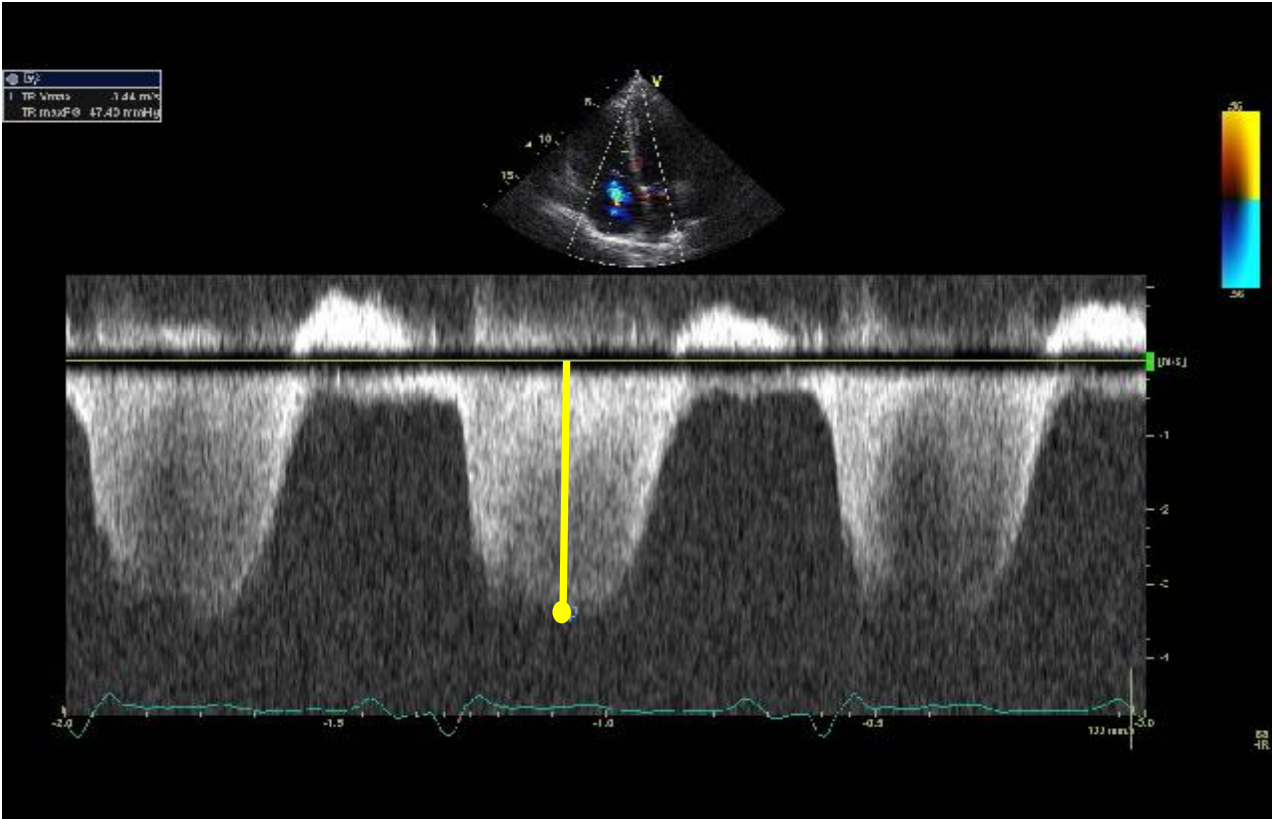
Definition: Identifies sonographer that performed the study

Units: N/A

Variable name: tr_peak

Definition: Peak tricuspid regurgitation velocity

Units: m/s



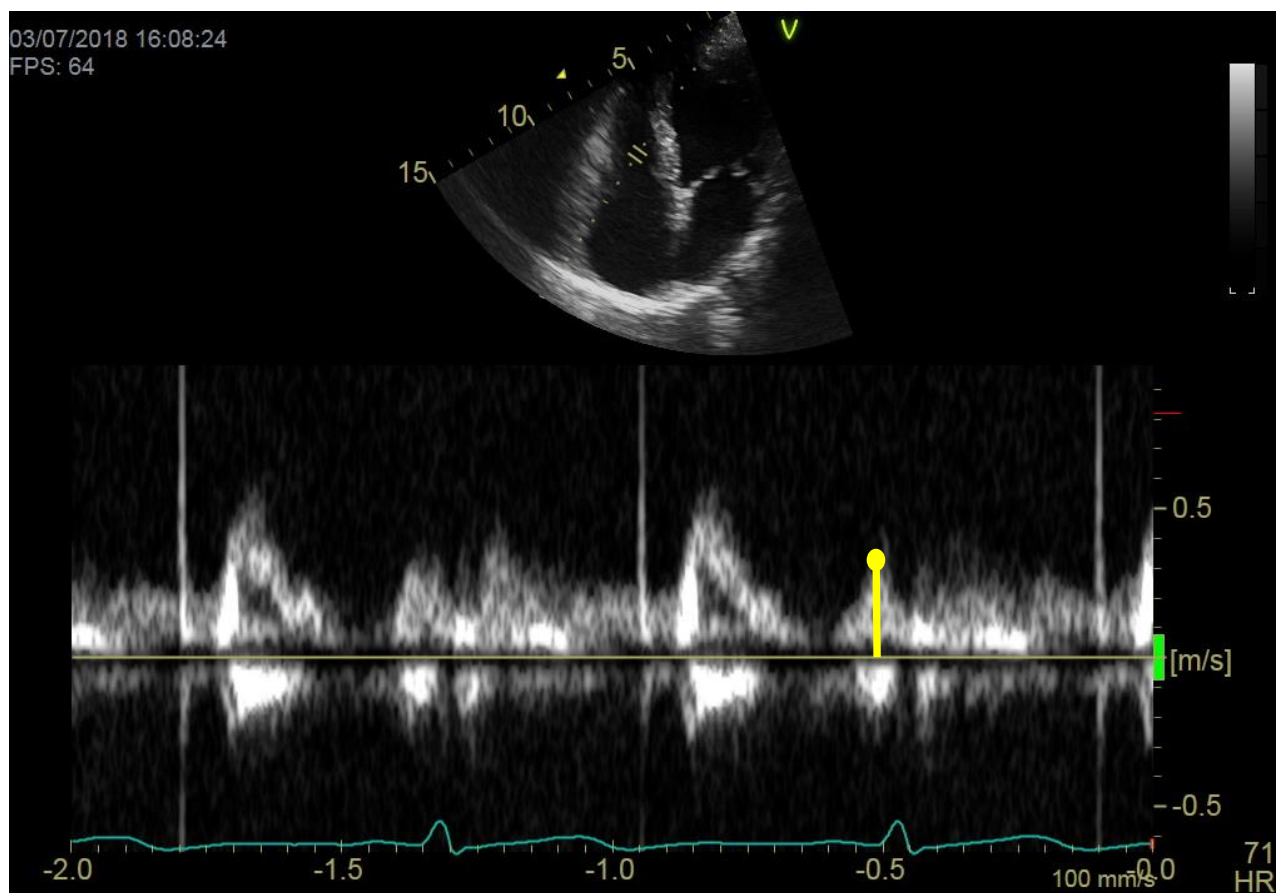
tr_peak

Percentiles		Smallest		
1%	2.02	1.77		
5%	2.13	1.81		
10%	2.23	1.83	Obs	2,384
25%	2.41	1.83	Sum of Wgt.	2,384
50%	2.6	Largest	Mean	2.623024
			Std. Dev.	.3287204
75%	2.81	4.12	Variance	.1080571
90%	3.02	4.16	Skewness	.858893
95%	3.19	4.6	Kurtosis	5.274024
99%	3.67	4.64		

Variable name: tricuspid_a

Definition: Tricuspid A wave peak velocity

Units: cm/s



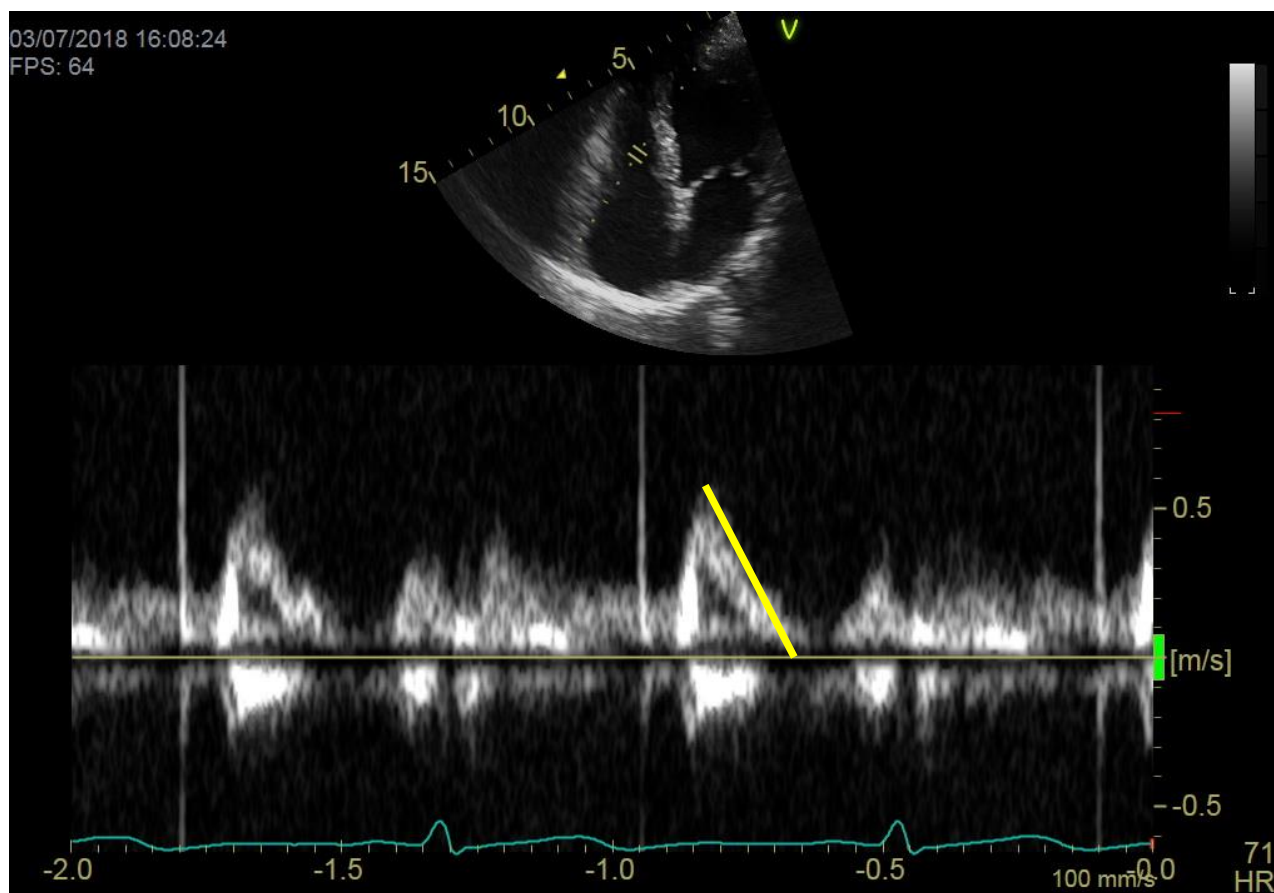
tricuspid_a

Percentiles		Smallest		
1%	22.5	17.8		
5%	26.1	18.2		
10%	28.05	18.8	Obs	2,850
25%	32.3	19	Sum of Wgt.	2,850
50%	37.7		Mean	39.35351
		Largest	Std. Dev.	10.02216
75%	45	89.4		
90%	52.6	91.7	Variance	100.4437
95%	57.3	92.1	Skewness	1.031101
99%	69.3	105.7	Kurtosis	5.106826

Variable name: tricuspid_decel time

Definition: Tricuspid E wave deceleration time

Units: ms



tricuspid_decel time

Percentiles		Smallest		
1%	104	76		
5%	121	80		
10%	133	83	Obs	2,923
25%	158	90	Sum of Wgt.	2,923
50%	189		Mean	194.4742
		Largest	Std. Dev.	51.6429
75%	225	399		
90%	263	406	Variance	2666.989
95%	287	414	Skewness	.735592
99%	350	434	Kurtosis	3.845949

Variable name: tricuspid_decel time

Normal values:

Table 10 Normal values for parameters of RV function

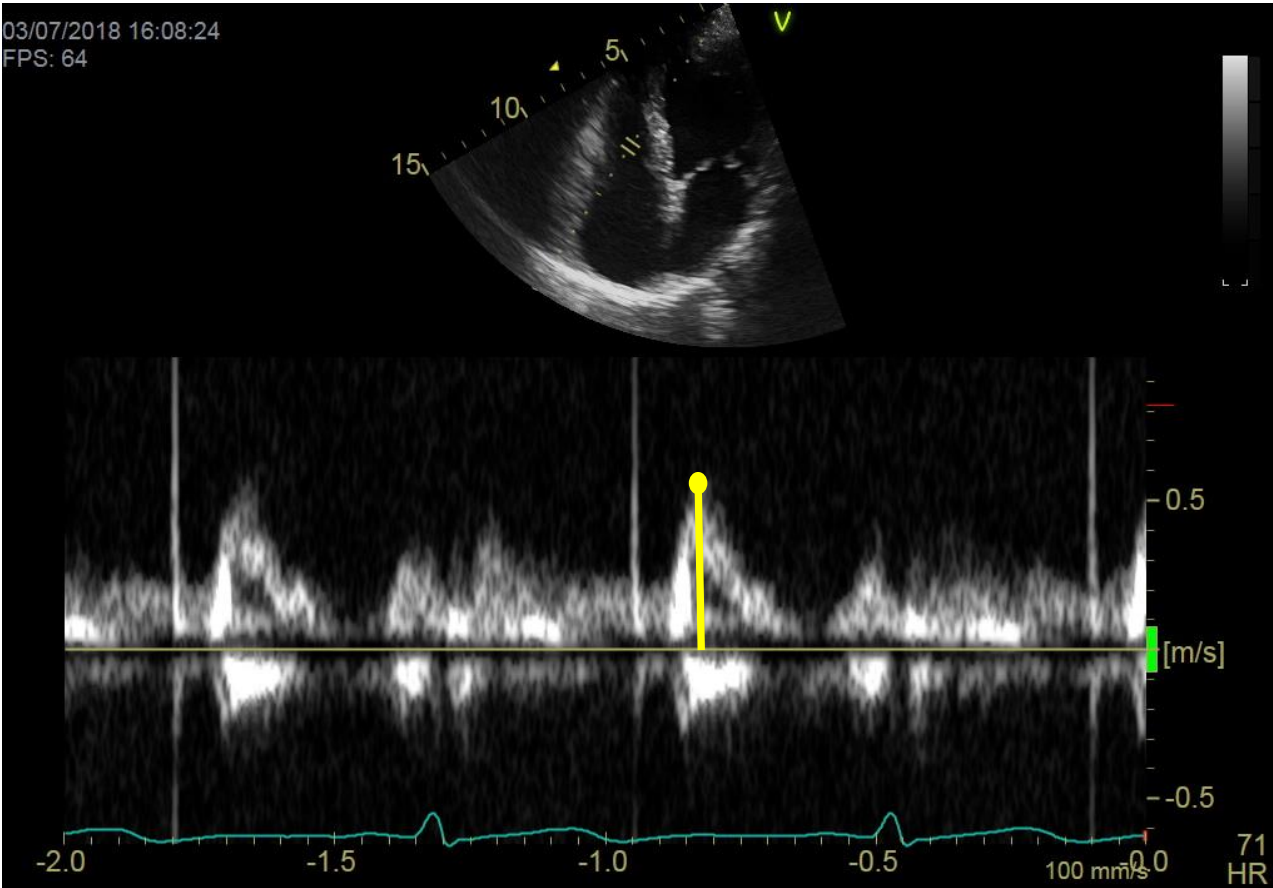
Parameter	Mean \pm SD	Abnormality threshold
TAPSE (mm)	24 \pm 3.5	<17
Pulsed Doppler S wave (cm/sec)	14.1 \pm 2.3	<9.5
Color Doppler S wave (cm/sec)	9.7 \pm 1.85	<6.0
RV fractional area change (%)	49 \pm 7	<35
RV free wall 2D strain* (%)	-29 \pm 4.5	>-20 (<20 in magnitude with the negative sign)
RV 3D EF (%)	58 \pm 6.5	<45
Pulsed Doppler MPI	0.26 \pm 0.085	>0.43
Tissue Doppler MPI	0.38 \pm 0.08	>0.54
E wave deceleration time (msec)	180 \pm 31	<119 or >242
E/A	1.4 \pm 0.3	<0.8 or >2.0
e'/a'	1.18 \pm 0.33	<0.52
e'	14.0 \pm 3.1	<7.8
E/e'	4.0 \pm 1.0	>6.0

MPI, Myocardial performance index.

*Limited data; values may vary depending on vendor and software version.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: tricuspid_e
Definition: Tricuspid E wave peak velocity
Units: cm/s



tricuspid_e

Percentiles			Smallest		
1%	26.1	22.1			
5%	31.6	22.5			
10%	34.1	23.3		Obs	2,924
25%	38.7	23.4		Sum of Wgt.	2,924
50%	45.1			Mean	46.02076
			Largest	Std. Dev.	10.17687
75%	51.9	93.2			
90%	59	94		Variance	103.5688
95%	64.4	95.9		Skewness	.7181398
99%	75.3	99.3		Kurtosis	4.146786

Variable name: tricuspid_ea_ratio

Definition: Tricuspid E/A ratio

Units: N/A

Formula: tricuspid_e/tricuspid_a

tricuspid_ea_ratio				

	Percentiles	Smallest		
1%	.6744605	.5345622		
5%	.7574335	.5498108		
10%	.8187738	.5813559	Obs	2,850
25%	.972431	.5956874	Sum of Wgt.	2,850
50%	1.201853		Mean	1.207946
		Largest	Std. Dev.	.3045208
75%	1.383372	2.47022		
90%	1.599401	2.505747	Variance	.0927329
95%	1.732852	2.52549	Skewness	.6001977
99%	2.08642	2.703971	Kurtosis	3.785609

Variable name: tricuspid_ea_ratio

Normal values:

Table 10 Normal values for parameters of RV function

Parameter	Mean \pm SD	Abnormality threshold
TAPSE (mm)	24 \pm 3.5	<17
Pulsed Doppler S wave (cm/sec)	14.1 \pm 2.3	<9.5
Color Doppler S wave (cm/sec)	9.7 \pm 1.85	<6.0
RV fractional area change (%)	49 \pm 7	<35
RV free wall 2D strain* (%)	-29 \pm 4.5	>-20 (<20 in magnitude with the negative sign)
RV 3D EF (%)	58 \pm 6.5	<45
Pulsed Doppler MPI	0.26 \pm 0.085	>0.43
Tissue Doppler MPI	0.38 \pm 0.08	>0.54
E wave deceleration time (msec)	180 \pm 31	<119 or >242
E/A	1.4 \pm 0.3	<0.8 or >2.0
e'/a'	1.18 \pm 0.33	<0.52
e'	14.0 \pm 3.1	<7.8
E/e'	4.0 \pm 1.0	>6.0

MPI, Myocardial performance index.

*Limited data; values may vary depending on vendor and software version.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Variable name: tricuspid_ee_ratio

Definition: Tricuspid E/e' ratio

Units: N/A

Formula: tricuspid_e/e_rv

tricuspid_ee_ratio				

	Percentiles	Smallest		
1%	1.89071	1.331492		
5%	2.386503	1.350394		
10%	2.712766	1.479263	Obs	2,817
25%	3.277778	1.553922	Sum of Wgt.	2,817
50%	3.982759		Mean	4.230245
		Largest	Std. Dev.	1.48975
75%	4.916667	13.07547		
90%	5.980198	13.46429	Variance	2.219355
95%	6.786408	13.625	Skewness	2.202612
99%	9.283019	23.95652	Kurtosis	17.69115

Variable name: tricuspid_ee_ratio

Normal values:

Table 10 Normal values for parameters of RV function

Parameter	Mean \pm SD	Abnormality threshold
TAPSE (mm)	24 \pm 3.5	<17
Pulsed Doppler S wave (cm/sec)	14.1 \pm 2.3	<9.5
Color Doppler S wave (cm/sec)	9.7 \pm 1.85	<6.0
RV fractional area change (%)	49 \pm 7	<35
RV free wall 2D strain* (%)	-29 \pm 4.5	>-20 (<20 in magnitude with the negative sign)
RV 3D EF (%)	58 \pm 6.5	<45
Pulsed Doppler MPI	0.26 \pm 0.085	>0.43
Tissue Doppler MPI	0.38 \pm 0.08	>0.54
E wave deceleration time (msec)	180 \pm 31	<119 or >242
E/A	1.4 \pm 0.3	<0.8 or >2.0
e'/a'	1.18 \pm 0.33	<0.52
e'	14.0 \pm 3.1	<7.8
E/e'	4.0 \pm 1.0	>6.0

MPI, Myocardial performance index.

*Limited data; values may vary depending on vendor and software version.

Source: Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Society of Echocardiography (JASE, January 2015)

Quality Control Metrics

Intra-observer variability (n=100)

Parameter	Mean \pm SD	ICC (95% CI)	Mean bias (95% CI)
Septal wall thickness (cm)	1.15 \pm 0.20	0.96 (0.94, 0.98)	0.02 (0.01, 0.04)
LV end-diastolic dimension (cm)	4.37 \pm 0.50	0.97 (0.95, 0.98)	-0.01 (-0.04, 0.03)
Posterior wall thickness (cm)	0.96 \pm 0.13	0.83 (0.73, 0.89)	0.02 (0.00, 0.04)
LV end-systolic dimension (cm)	2.85 \pm 0.41	0.97 (0.96, 0.98)	0.02 (-0.01, 0.04)
LA volume (ml)	55.9 \pm 17.2	0.97 (0.95, 0.98)	-0.48 (-1.64, 0.67)
LV end-diastolic volume (ml)	80.2 \pm 19.9	0.98 (0.96, 0.99)	0.72 (-0.48, 1.91)
LV end-systolic volume (ml)	29.7 \pm 10.9	0.98 (0.96, 0.99)	-0.30 (-0.93, 0.33)
LA strain peak positive (A4c, %)	12.2 \pm 5.2	0.96 (0.94, 0.98)	0.30 (-0.07, 0.67)
LA strain peak negative (A4c, %)	13.2 \pm 3.2	0.91 (0.85, 0.94)	-0.12 (-0.45, 0.20)
Legs up LA strain peak+ (A4c, %)	15.1 \pm 4.8	0.94 (0.90, 0.96)	0.16 (-0.29, 0.62)
Legs up LA strain peak- (A4c, %)	12.1 \pm 3.5	0.90 (0.84, 0.94)	-0.10 (-0.52, 0.32)
LV longitudinal strain (A4c, %)	20.8 \pm 3.1	0.93 (0.89, 0.96)	0.06 (-0.22, 0.34)
LV early diastolic strain rate (A4c, 1/s)	1.2 \pm 0.4	0.94 (0.90, 0.96)	0.02 (-0.02, 0.06)
Early mitral inflow (E) velocity (cm/s)	78.6 \pm 18.8	0.98 (0.96, 0.99)	0.87 (-0.43, 2.17)
Late mitral inflow (A) velocity (cm/s)	83.9 \pm 21.1	0.97 (0.94, 0.99)	0.30 (-1.24, 1.84)
Septal e' velocity (cm/s)	7.3 \pm 1.8	0.91 (0.82, 0.95)	0.07 (-0.16, 0.31)
Lateral e' velocity (cm/s)	9.0 \pm 2.1	0.90 (0.81, 0.95)	-0.24 (-0.58, 0.10)

Inter-observer variability (n=100)

Parameter	Mean \pm SD	ICC (95% CI)	Mean bias (95% CI)
Septal wall thickness (cm)	1.15 \pm 0.20	0.96 (0.94, 0.98)	0.02 (0.01, 0.04)
LV end-diastolic dimension (cm)	4.37 \pm 0.50	0.97 (0.95, 0.98)	-0.01 (-0.04, 0.03)
Posterior wall thickness (cm)	0.96 \pm 0.13	0.83 (0.73, 0.89)	0.02 (0.00, 0.04)
LV end-systolic dimension (cm)	2.85 \pm 0.41	0.97 (0.96, 0.98)	0.02 (-0.01, 0.04)
LA volume (ml)	55.9 \pm 17.2	0.97 (0.95, 0.98)	-0.48 (-1.64, 0.67)
LV end-diastolic volume (ml)	80.2 \pm 19.9	0.98 (0.96, 0.99)	0.72 (-0.48, 1.91)
LV end-systolic volume (ml)	29.7 \pm 10.9	0.98 (0.96, 0.99)	-0.30 (-0.93, 0.33)
LA strain peak positive (A4c, %)	12.2 \pm 5.2	0.96 (0.94, 0.98)	0.30 (-0.07, 0.67)
LA strain peak negative (A4c, %)	13.2 \pm 3.2	0.91 (0.85, 0.94)	-0.12 (-0.45, 0.20)
Legs up LA strain peak+ (A4c, %)	15.1 \pm 4.8	0.94 (0.90, 0.96)	0.16 (-0.29, 0.62)
Legs up LA strain peak- (A4c, %)	12.1 \pm 3.5	0.90 (0.84, 0.94)	-0.10 (-0.52, 0.32)
LV longitudinal strain (A4c, %)	20.8 \pm 3.1	0.93 (0.89, 0.96)	0.06 (-0.22, 0.34)
LV early diastolic strain rate (A4c, 1/s)	1.2 \pm 0.4	0.94 (0.90, 0.96)	0.02 (-0.02, 0.06)
Early mitral inflow (E) velocity (cm/s)	78.6 \pm 18.8	0.98 (0.96, 0.99)	0.87 (-0.43, 2.17)
Late mitral inflow (A) velocity (cm/s)	83.9 \pm 21.1	0.97 (0.94, 0.99)	0.30 (-1.24, 1.84)
Septal e' velocity (cm/s)	7.3 \pm 1.8	0.91 (0.82, 0.95)	0.07 (-0.16, 0.31)
Lateral e' velocity (cm/s)	9.0 \pm 2.1	0.90 (0.81, 0.95)	-0.24 (-0.58, 0.10)

Temporal Drift

N=10, measured q6mo x 5

Parameter	Mean \pm SD	ICC (95% CI)	Beta-coefficient	P-value
Septal wall thickness (cm)	1.25 \pm 0.22	0.97 (0.92, 0.99)	0.000 (-0.008, 0.007)	0.92
Posterior wall thickness (cm)	0.93 \pm 0.11	0.70 (0.36, 0.90)	0.000 (-0.004, 0.003)	0.84
LV end-diastolic dimension (cm)	3.90 \pm 0.49	0.95 (0.87, 0.99)	-0.002 (-0.019, 0.014)	0.79
LV end-systolic dimension (cm)	2.57 \pm 0.33	0.94 (0.83, 0.98)	0.002 (-0.009, 0.014)	0.66
LV end-diastolic volume (ml)	63.3 \pm 10.82	0.97 (0.90, 0.99)	-0.032 (-0.398, 0.334)	0.86
LV end-systolic volume (ml)	23.5 \pm 5.59	0.95 (0.86, 0.99)	0.007 (-0.183, 0.196)	0.94
LV ejection fraction (%)	63.4 \pm 3.47	0.77 (0.48, 0.93)	-0.007 (-0.124, 0.111)	0.91
LA volume (ml)	40.5 \pm 9.25	0.92 (0.79, 0.98)	0.102 (-0.210, 0.413)	0.52
Mitral E velocity (cm/s)	67.5 \pm 15.24	0.97 (0.92, 0.99)	0.080 (-0.435, 0.595)	0.76
Mitral A velocity (cm/s)	81.6 \pm 18.35	0.98 (0.95, 1.00)	-0.020 (-0.641, 0.602)	0.95
Septal e' velocity (cm/s)	7.3 \pm 2.40	0.87 (0.67, 0.96)	-0.019 (-0.100, 0.063)	0.65
Lateral e' velocity (cm/s)	9.3 \pm 2.00	0.98 (0.95, 1.00)	-0.010 (-0.078, 0.058)	0.77
LA strain peak positive (A4c, %)	15.2 \pm 2.64	0.69 (0.36, 0.90)	-0.016 (-0.106, 0.073)	0.72
LA strain peak negative (A4c, %)	8.8 \pm 3.08	0.88 (0.70, 0.97)	-0.054 (-0.157, 0.050)	0.30