

ELECTROCARDIOGRAPHIC CRITERIA *

NORMAL VALUES

Age	Heart Rate	Mean Frontal Plane			Lead V ₁			Lead V ₆		
		QRS Axis	PR Interval	QRS Duration	*R Amplitude	S Amplitude	R/S Ratio	R Amplitude	S Amplitude	R/S Ratio
0-1 mo	100-180 (120)	+75 to +180 (+120)#	.08-.12 (.10)	.04-.08 (.06)	4-25 (15)	0-20 (10)	0.5 to ** (1.5)	1-21 (6)	0-12 (4)	0.1 to ** (2)
1-3 mo	110-180 (120)	+35 to +135 (+100)	.08-12 (.10)	.04-.08 (.06)	2-20 (11)	1-18 (7)	0.3 to 10.0 (1.5)	3-20 (10)	0-6 (2)	1.5 to ** (4)
3-12 mo	100-180 (150)	+30 to +135 (+60)	.09-.13 (.12)	.04-.08 (.06)	3-20 (10)	1-18 (8)	0.3 to 4.0 (1.2)	6-20 (13)	0-4 (2)	2.0 to ** (6)
1-3 yr	100-180 (130)	0 to +110 (+60)	.10-.14 (.12)	.04-.08 (.06)	1-18 (9)	1-27 (13)	0.5 to 1.5 (0.8)	3-24 (12)	0-4 (2)	3.0 to ** (20)
3-5 yr	60-150 (100)	0 to +110 (+60)	.11-.15 (.13)	.05-.09 (.07)	1-18 (7)	1-30 (14)	0.1 to 1.5 (0.7)	4-24 (13)	0-4 (1)	2.0 to ** (20)
5-9 yr	60-130 (100)	-15 to +110 (+60)	.12-.16 (.14)	.05-.09 (.07)	1-18 (7)	1-30 (14)	0.1 to 1.0 (0.7)	4-24 (13)	0-4 (1)	2.0 to ** (20)
9-12 yr	50-110 (80)	-15 to +110 (+60)	.12-.17 (.14)	.05-.09 (.07)	1-18 (6)	1-26 (16)	0 to 1.0 (0.5)	4-30 (14)	0-4 (1)	4.0 to ** (20)
12-18 yr	50-100 (75)	-15 to +110 (+60)	.12-.17 (.15)	.05-.09 (.07)	1-16 (5)	1-23 (14)	0 to 1.0 (0.3)	4-30 (14)	0-5 (1)	2.0 to ** (10)
> 18 yr	50-90 (70)	-15 to +110 (+60)	.12-.20 (.15)	.05-.10 (.08)	1-14 (3)	1-23 (10)	0 to 1.0 (0.3)	4-30 (10)	0-6 (1)	2.0 to ** (9)

*If QRS duration is normal, add R + R' and compare total (R + R') with standards.

In the presence of complete bundle branch block criteria for ventricular hypertrophy are invalid.

**R/S undefined because S can be equal to 0

#Minimum - maximum (mean)

QT INTERVAL

HR	R-R Interval	QT. Min. – Max.	Mean
40	1.5	0.38-0.50	(0.45)
50	1.2	0.36-0.48	(0.43)
60	1.0	0.34-0.46	(0.41)
70	0.86	0.32-0.43	(0.37)
80	0.75	0.29-0.40	(0.35)
90	0.67	0.27-0.37	(0.33)
100	0.60	0.26-0.35	(0.30)
120	0.50	0.24-0.32	(0.28)
150	0.40	0.21-0.28	(0.25)
180	0.33	0.19-0.27	(0.23)
200	0.30	0.18-0.25	(0.22)

T WAVES

Age	Upright	<u>+</u>	Inverted
0-5 days	I,II, V ₆	III, AVF, V ₁	AVR, V ₂ -V ₆
5 days-2 yrs	I,II,AVF, V ₆	III, V ₆	AVR, V ₃ -V ₄
2 yrs-teens	I,II,AVF V ₅ -V ₆	III	AVR, V ₁ , V ₄
Adults	I,II,III,AVF V ₁ , V ₅ , V ₆	V ₂ -V ₄	AVR
ST Segment			
Elevation-depression > 1mm = myocardial injury			
Elevation without reciprocal depression = Injury/pericarditis			
Depression without reciprocal elevation = Injury/digitalis/ "normal" premature			

CHAMBER ENLARGEMENT ("Hypertrophy")

RIGHT VENTRICULAR

1. QR pattern V₄R, V₃R or V₃ (may be ventricular inversion)
2. Upright T wave V₄R, V₃R or V₁ – 5 days to adolescence (a. If R/S > 1 b. May be reciprocal from left chest)
3. Abnormal R/S ratio V₁ or V₅ (see table)
4. Abnormal amplitude R V₁ or S V₆

LEFT VENTRICULAR

1. R V₆ + S V₁ ≥ 60 (A. Do not use transition leads b. Use V₅ if R V₆ > R V₅)
2. S V₁ > 2x R V₅
3. Abnormal R/S ratio.
4. Abnormal amplitude S V₅ or R V₆

COMBINED VENTRICULAR

1. Meets criteria for RVH and in addition S V₁ or R V₆ exceeds mean for age.
2. Meets criteria for LVH and in addition R V₁ or S V₆ exceeds mean for age.
3. Equiphasic large midprecordial voltage – weak criterion ("Katz-Wachtal") 65mm in 1 lead, 45mm in 4 leads

RIGHT ATRIAL

Peaked P wave > 3.0mm if < 6 months > 2.5 mm if > 6 months

Left Atrial

1. Lead II: > 0.09 sec duration
2. Lead V₁: late negative deflection > 0.04 sec duration and > 1 mm deflection

COMBINED ATRIAL

Early portion of P wave peaked and > 2.5 mm plus duration of P wave > 0.09 sec