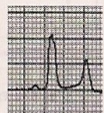
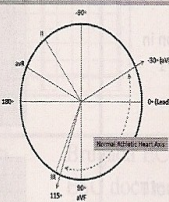
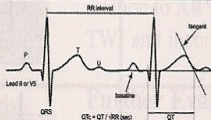
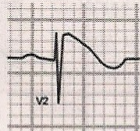



# QRS Axis Deviation

The axis of the QRS complex is greatly dependent on age: it begins rightward at birth and shifts leftward with age. As most screened athletes are at an age when the axis is still in transition, right-axis deviation is a common finding. Left-axis deviation occurs 8% of the time and is the most common abnormal ECG finding in the 30 to 40s age group. Further evaluation should include a more detailed history, physical examination, and a full resting echocardiogram. This study should include standard measurement of chamber size, wall thickness, and vascular function. In addition, it is valuable to estimate left and right ventricular as well as left atrial volumes using the Simpson rule measurement of diastolic function including the tissue Doppler of the lateral or medial mitral annulus can be particularly valuable for detecting subclinical cardiomyopathy.

Cardiopulmonary exercise testing, although not necessary, may provide additional value in the differentiation of cardiomyopathy from athlete's heart if this is still not clear from imaging studies and ECG. In particularly borderline cases, a full 4-generation family pedigree and genetic testing may be able to rule in cardiomyopathy or channelopathy.

LBBB RBBB IVCD	Any QRS >120 ms	
QRS axis deviation	More leftward than -30° More rightward than 115°	
QTc interval	>470 ms in males >480 ms in females <340 ms in any athlete	
Brugada pattern	Presence of Type 1 pattern: coved ST segment in V1 and V2 gradually descending into inverted T wave	
Pre-Excitation	Delta wave and PR interval <120 ms	
Ventricular extrasystoles, heart block, and supraventricular arrhythmia	Atrial fibrillation/flutter, supraventricular tachycardia, complete heart block or ≥2 PVCs in one 12 lead ECG	