

# Routine ECG screening in asymptomatic patients

## Introduction

- Coronary artery disease (CAD) is the leading cause of death in both men and women.
- Some resting ECG abnormalities are associated with an increased risk for CAD events, but whether adding ECG to conventional risk factors leads to improved stratification of individuals is unknown.
- ECG are ineffective screening tests for CAD due to their poor sensitivity and specificity (Ann Intern Med. 2015;162(6):438.)
  - 30-50% of individuals with a normal coronary arteriogram have ECG abnormalities.
  - 30% of individuals with angiographically proven CAD have a normal resting ECG.
- “Screening” refers to testing for a disease or condition in asymptomatic persons to identify the condition before it manifests clinically.
- This short-note does not cover use of ambulatory ECG monitoring (i.e. holter) or exercise ECG.

## Recommendation in healthy individual (to screening for coronary artery disease)

(USPSTF 2012 - Ann Intern Med.2012;157:512-518.)

- Recommends against screening in asymptomatic adults at low risk for CAD.
- Insufficient evidence to recommend against or for in asymptomatic adults at intermediate or high risk for CAD

## ECG screening in individual with hypertension

- ECG is recommended in all new diagnosed HT patients to search for organ damage. (ESC 2013)
- LVH is found in 1 in 4 of patients with HT and associated with increase of CV risk morbidity and mortality. (Circ. 1994;90:1786-1793.)
- Other findings may include LAE, ventricular overload ‘strain’ pattern, atrial fibrillation

An ECG is recommended in all hypertensive patients to detect LVH, left atrial dilatation, arrhythmias, or concomitant heart disease.

## ECG screening in individual with DM

- Routine screening for CAD in asymptomatic patients with DM is not recommended (ADA 2016)
- May consider perform in > 40 yo, DM > 15 y, end organ damage (microvascular, macrovascular), or other cardiac risk factors
- A recommendation suggests that a repeat resting electrocardiogram (ECG) should be performed every 2 years in patients with type 2 diabetes rather than just in individuals at high risk for cardiovascular (CV) events.

## ECG screening for preop evaluation

- Recommend a preoperative 12-lead ECG in patients with known CAD, significant arrhythmia, PAD, CVA or other structural heart disease, except for those undergoing low-risk surgery (risk of major adverse cardiac event <1 percent). (ACC/AHA 2014 Guidelines on Perioperative CV Evaluation)
- ECG is not useful in asymptomatic patients undergoing low-risk procedures
- The usefulness of postoperative screening of high-risk patients using ECG (and troponin) is uncertain (2014 AHA/ACC guideline on the perioperative evaluation)

## ECG screening in individual with FH of sudden death

- Recommend routine ECG screening in 1<sup>st</sup>-degree relatives (parents, siblings and children) of anyone who has died under 40 years of age from an inherited cardiac condition or unexplained cardiac death (NHS –UK 2005)
- This may include condition such as HCM, Brugada, LQT, ARVD, etc.

## ECG screening in individual with FH of HCM

- Recommend routine ECG screening in first-degree
  - < 10 yo q 3-5 years
  - 10-20 yo q 6-12 months
  - > 20 yo q 5 yrs or stop screening

## EKG screening in athletes

- Principle is supported by AHA but does not support national mandatory screening in athletes, (Circ 2007;115:1643–55.)
- ESC and International Olympic Committee recommends systematic preparticipation screening for young competitive athletes, including a FH, SH, physical examination, and 12-lead ECG. (Eur Heart J. 2005;26:516–24.)
- Mass screening of young athletes (aged <40 years) with ECGs is still controversial.
- AHA/ACC recommend 14-element check point (see table).

## EKG screening in high risk occupations (e.g. pilot, bus driver, heavy equipment operator, etc.)

- Insufficient evidence to recommend (USPSTF 2012 - Ann Intern Med.2012;157:512-518.)
- Sometime are required by regulatory agencies or governing bodies such as International Olympic Committee (IOC) (Uptodate)

## Other

- Class IIa recommended for screening ECGs in children before administration of stimulant medications (to Rx ADHD) to avoid heart rhythm disturbances. Circ. 2014;130:1303-1334
- Other special population that may subject to ECG screening in some country include Military Personnel, Sickle cell, etc.

## Potential Harms of Detection

- Unnecessary invasive procedures, overtreatment, and labeling.

## Summary

- ECG is ineffective screening tests for the presence of CHD due to their poor sensitivity and specificity.
- The ECG should always be evaluated in clinical context.
- For cardiovascular disease screening, one may consider screening for high blood pressure, lipid disorder, peripheral artery (carotid, aorta), hypertension, and obesity.

## Recommend reading

- Assessment of the 12-Lead ECG as a Screening Test for Detection of Cardiovascular Disease in Healthy General Populations of Young People (12–25 Years of Age). A Scientific Statement From AHA/ACC. Circulation. 2014;130:1303-1334.

Medical history*
Personal history
1. Chest pain/discomfort/tightness/pressure related to exertion
2. Unexplained syncope/near-syncope†
3. Excessive and unexplained dyspnea/fatigue or palpitations, associated with exercise
4. Prior recognition of a heart murmur
5. Elevated systemic blood pressure
6. Prior restriction from participation in sports
7. Prior testing for the heart, ordered by a physician
Family history
8. Premature death (sudden and unexpected, or otherwise) before 50 y of age attributable to heart disease in ≥1 relative
9. Disability from heart disease in close relative <50 y of age
10. Hypertrophic or dilated cardiomyopathy, long-QT syndrome, or other ion channelopathies, Marfan syndrome, or clinically significant arrhythmias; specific knowledge of genetic cardiac conditions in family members
Physical examination
11. Heart murmur‡
12. Femoral pulses to exclude aortic coarctation
13. Physical stigmata of Marfan syndrome
14. Brachial artery blood pressure (sitting position)§