

Online Quiz

Test Your Knowledge: Ten Questions on Primary Prevention of Cardiovascular Disease

This quiz is related to the Policy Forum in the March issue of *PLoS Medicine* (DOI: 10.1371/journal.pmed.0030050).

Gavin Yamey

Question 1. What percentage of the global burden of coronary heart disease occurs in developing countries?

- 20%–30%
- 40%–50%
- Over 60%

Question 2. Where does ischemic heart disease rank in the leading causes of death in people aged 15–59 years?

- It ranks first, followed by HIV/AIDS and then tuberculosis (TB)
- It ranks second after HIV/AIDS, and TB is third
- It ranks third after HIV/AIDS (first) and TB (second)

Question 3. By 2010, how many annual deaths from coronary heart disease are expected to occur in India?

- 1 million
- 2 million
- 3 million

Question 4. Which of the following best reflects the evidence on giving statins for the primary prevention of coronary heart disease?

- There is good evidence that statins reduce both coronary events and all-cause mortality in people at low annual coronary heart disease risk (less than 0.6%)
- There is good evidence that statins reduce both coronary events and all-cause mortality in people at an annual coronary heart disease risk over 0.6%
- There is good evidence that statins reduce coronary events in people at an annual coronary heart disease risk over 0.6%, but five systematic reviews found no clear evidence of a beneficial effect on all-cause mortality

Question 5. Which of the following best reflects the evidence on eating a reduced or modified fat diet for primary prevention of cardiovascular disease?

- There is no evidence at all that such a diet is associated with a reduction in cardiovascular events
- There is some evidence that such a diet is associated with a reduction in cardiovascular events but not with a reduction in all-cause mortality
- There is good evidence that such a diet is associated with a reduction in cardiovascular events and a reduction in all-cause mortality

Question 6. Which of the following best reflects the evidence on physical activity for primary prevention of cardiovascular disease?

- People who are physically active experience about a 30%–50% reduction in relative risk of coronary heart disease compared with people who are sedentary after adjustment for other risk factors
- Physical activity is associated with reduced risk of coronary heart disease but not of stroke
- There is a high absolute risk of sudden death after strenuous activity

Question 7. Which of the following best reflects the evidence on the effects of eating more fruit and vegetables for primary prevention of cardiovascular disease?

- Multiple RCTs have found good evidence that eating more fruit and vegetables reduces the risk of myocardial infarction and stroke
- Observational cohort studies have found good evidence that eating more fruit and vegetables reduces the risk of myocardial infarction and stroke
- There is no evidence that eating more fruit and vegetables reduces the risk of myocardial infarction and stroke

Question 8. Which of the following best reflects the evidence on the effects of the antioxidants vitamin E and beta-carotene on primary prevention of cardiovascular disease?

- There is evidence that both these antioxidants may cause more harm than good
- Trials have found that vitamin E, but not beta-carotene, reduces cardiovascular risk
- Trials have found that beta-carotene, but not vitamin E, reduces cardiovascular risk

Citation: Yamey G (2006) Test your knowledge: Ten questions on primary prevention of cardiovascular disease. *PLoS Med* 3(3): e214.

Copyright: © 2006 Gavin Yamey. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Gavin Yamey is Magazine Editor at *PLoS Medicine*. E-mail: gyamey@plos.org

DOI: 10.1371/journal.pmed.0030214

Question 9. Which of the following best reflects the evidence on the effects of aspirin for primary prevention of cardiovascular disease?

- The evidence is very good that the benefits outweigh the risks in all people at risk of cardiovascular disease (even those at low risk)
- The evidence is very good that the risks outweigh the benefits in people at low, medium, and high risk of cardiovascular disease
- There is insufficient evidence to determine exactly which individuals would benefit overall and which would be harmed

Question 10. According to the best available evidence, which one of the following lifestyle interventions for reducing primary hypertension is not likely to be effective?

- Dietary salt restriction
- Fish oil supplementation
- Magnesium supplementation
- Physical activity
- Weight loss

Answer 1. Over 60%

Over 60% of the global burden of coronary heart disease occurs in developing countries [1].

Reference

1. World Health Organization (2004) Global burden of coronary heart disease. Geneva: World Health Organization. Available: http://www.who.int/cardiovascular_diseases/en/cvd_atlas_13_coronaryHD.pdf. Accessed 9 March 2006.

Answer 2. It ranks second after HIV/AIDS, and TB is third

The *World Health Report* 2003 found that in the year 2002, the leading causes of death in people aged 15–59 years were HIV/AIDS (2,279,000 deaths), ischemic heart disease (1,332,000 deaths), and TB (1,036,000 deaths) [1].

Reference

1. World Health Organization (2003) The world health report 2003: Shaping the future. Geneva: World Health Organization. Available: http://www.who.int/whr/2003/en/Facts_and_Figures-en.pdf. Accessed 9 March 2006.

Answer 3. 2 million

Deaths from coronary heart disease in India rose from 1.17 million in 1990 to 1.59 million in 2000, and are expected to rise to 2.03 million in 2010 [1].

Reference

1. Ghaffar A, Reddy KS, Singhi M (2004) Burden of non-communicable diseases in South Asia. *BMJ* 328: 807–810. DOI: 10.1136/bmj.328.7443.807

Answer 4. There is good evidence that statins reduce coronary events in people at an annual coronary heart disease risk over 0.6%, but five systematic reviews found no clear evidence of a beneficial effect on all-cause mortality

There is good evidence from multiple randomized controlled trials (RCTs) that statins reduce coronary events in people at an annual coronary heart disease risk over 0.6% [1–5]. There is no good evidence that statins reduce coronary events and all-cause mortality in people at low annual coronary heart disease risk (less than 0.6%) [6]. Five

systematic reviews found that statins were no better than placebo at reducing all-cause mortality [6].

References

1. Shepherd J, Cobbe SM, Ford I, Isles CG, Lorimer AR, et al. (1995) Prevention of coronary heart disease with pravastatin in men with hypercholesterolemia. *N Engl J Med* 333: 1301–1307.
2. Downs JR, Clearfield M, Weis S, Whitney E, Shapiro DR, et al. (1998) Primary prevention of acute coronary events with lovastatin in men and women with average cholesterol levels: Results of AFCAPS/TexCAPS. *JAMA* 279: 1615–1622.
3. Shepherd S, Blauw GJ, Murphy MB, Bollen EL, Buckley BM, et al. (2002) Pravastatin in elderly individuals at risk of vascular disease (PROSPER): A randomized controlled trial. *Lancet* 360: 1623–1630.
4. ALLHAT Officers and Coordinators for the ALLHAT Cooperative Research Group (2002) Major outcomes in moderately hypercholesterolemic, hypertensive patients randomized to pravastatin vs usual care: The Antihypertensive and Lipid Lowering Treatment to Prevent Heart Attack Trial (ALLHAT-LLT). *JAMA* 288: 2998–3007.
5. Sever PS, Dahlof B, Poulter NR, Wedel H, Beevers G, et al. (2003) Prevention of coronary and stroke events with atorvastatin in hypertensive patients who have average or lower-than-average cholesterol concentrations, in the Anglo-Scandinavian Cardiac Outcomes Trial-Lipid Lowering Arm (ASCOT-LLA): A multicentre randomized controlled trial. *Lancet* 361: 1149–1158.
6. Pignone M (2005) Primary prevention: Dyslipidaemia. *Clin Evid* 14: 1–2.

Answer 5. There is some evidence that such a diet is associated with a reduction in cardiovascular events but not with a reduction in all-cause mortality

A Cochrane systematic review identified 27 RCTs of reducing or modifying fat intake [1]. There was no significant effect on total mortality (rate ratio, 0.98; 95% confidence interval (CI): 0.86–1.12), a trend toward protection from cardiovascular mortality (rate ratio, 0.91; 95% CI: 0.77–1.07), and significant protection from cardiovascular events (rate ratio, 0.84; 95% CI: 0.72–0.99).

Reference

1. Hooper L, Summerbell CD, Higgins JPT, Thompson RL, Clements G, et al. (2006) Reduced or modified dietary fat for preventing cardiovascular disease. *Cochrane Database Syst Rev*. Available: <http://www.cochrane.org/reviews/en/ab002137.html>. Accessed 9 March 2006.

Answer 6. People who are physically active experience about a 30%–50% reduction in relative risk of coronary heart disease compared with people who are sedentary after adjustment for other risk factors

A systematic review of the evidence on the effects of physical activity found that people who exercise (those who undertake moderate levels of activity daily or almost daily, e.g., walking) typically experience 30%–50% reductions in relative risk of coronary heart disease compared with people who are sedentary after adjustment for other risk factors [1]. Moderate-to-high levels of physical activity are associated with reduced risk of coronary heart disease and stroke. The absolute risk of sudden death after strenuous activity is small (it is greatest in people who are usually sedentary).

Reference

1. Foster C, Murphy M, Nicholas JJ, Pignone M, Bazian Ltd. (2005) Primary prevention. *Clin Evid* 14: 1–5.

Answer 7. Observational cohort studies have found good evidence that eating more fruit and vegetables reduces the risk of myocardial infarction and stroke

In their systematic review of the evidence on the effects of eating more fruit and vegetables for primary prevention of cardiovascular disease, Foster and colleagues found no RCTs [1]. They found three systematic reviews of observational cohort studies, all of which found a protective effect against ischemic heart disease.

Reference

1. Foster C, Murphy M, Nicholas JJ, Pignone M, Bazian Ltd. (2005) Primary prevention. *Clin Evid* 14: 1–5.

Answer 8. There is evidence that both these antioxidants may cause more harm than good

A systematic review of antioxidants for primary prevention of cardiovascular disease identified four RCTs of vitamin E; the review found no benefits for vitamin E [1]. One of the RCTs identified in the review found that vitamin E may increase death from subarachnoid hemorrhage [2]. The review also identified six RCTs of beta-carotene; the review found no benefit for beta-carotene. Pooled analysis of four of these six RCTs found that beta-carotene may increase cardiovascular mortality [3–5].

References

1. Asplund K (2002) Antioxidant vitamins in the prevention of cardiovascular disease: A systematic review. *J Intern Med* 251: 372–392.
2. Leppälä JM, Virtamo J, Fogelholm R, Huttunen JK, Albanes D, et al. (2000) Controlled trial of alpha-tocopherol and beta-carotene supplements on stroke incidence and mortality in male smokers. *Arterioscler Thromb Vasc Biol* 20: 230–235.
3. Egger M, Schneider M, Davey Smith G (1998) Spurious precision? Meta-analysis of observational studies. *BMJ* 316: 140–144.
4. Doering WV (1996) Antioxidant vitamins, cancer, and cardiovascular disease. *N Engl J Med* 335: 1065.
5. Pietrzik K (1996) Antioxidant vitamins, cancer, and cardiovascular disease. *N Engl J Med* 335: 1065–1066.

Answer 9. There is insufficient evidence to determine exactly which individuals would benefit overall and which would be harmed

The role of aspirin in primary prevention remains uncertain. In a meta-analysis of five RCTs, Foster and colleagues found that aspirin slightly reduced the risk of a serious vascular event (odds ratio, 0.86; 95% CI: 0.80–0.90) and reduced the relative risk of myocardial infarction by about a third (OR, 0.71; 95% CI: 0.60–0.80), but had an uncertain effect on stroke (OR, 1.05; 95% CI: 0.90–1.20) [1]. The meta-analysis found that there were 0.1 excess intracranial bleeds per 1,000 patients treated per year with aspirin, and 0.7 major extracranial bleeds per 1,000 patients treated per year with aspirin. The authors found “insufficient evidence from RCTs to identify which individuals would benefit overall and which would be harmed by regular treatment with aspirin, although those at high and intermediate rather than low risk would be more likely to gain benefit.”

Reference

1. Foster C, Murphy M, Nicholas JJ, Pignone M, Bazian Ltd. (2005) Primary prevention. *Clin Evid* 14: 1–5.

Answer 10. Magnesium supplementation

A systematic review of the evidence found that dietary salt restriction, fish oil supplementation, physical activity, and weight loss were all likely to be beneficial at lowering primary hypertension [1]. The authors found “limited and conflicting evidence on the effect of magnesium supplementation on blood pressure in people with hypertension and normal magnesium concentrations.”

Reference

1. Foster C, Murphy M, Nicholas JJ, Pignone M, Bazian Ltd. (2005) Primary prevention. *Clin Evid* 14: 1–5.

References

- ALLHAT Officers and Coordinators for the ALLHAT Cooperative Research Group (2002) Major outcomes in moderately hypercholesterolemic, hypertensive patients randomized to pravastatin vs usual care: The Antihypertensive and Lipid Lowering Treatment to Prevent Heart Attack Trial (ALLHAT-LLT). *JAMA* 288: 2998–3007.
- Asplund K (2002) Antioxidant vitamins in the prevention of cardiovascular disease: A systematic review. *J Intern Med* 251: 372–392.
- Doering WV (1996) Antioxidant vitamins, cancer, and cardiovascular disease. *N Engl J Med* 335: 1065.
- Downs JR, Clearfield M, Weis S, Whitney E, Shapiro DR, et al. (1998) Primary prevention of acute coronary events with lovastatin in men and women with average cholesterol levels: Results of AFCAPS/TexCAPS. *JAMA* 279: 1615–1622.
- Egger M, Schneider M, Davey Smith G (1998) Spurious precision? Meta-analysis of observational studies. *BMJ* 316: 140–144.
- Foster C, Murphy M, Nicholas JJ, Pignone M, Bazian Ltd. (2005) Primary prevention. *Clin Evid* 14: 1–5.
- Ghaffar A, Reddy KS, Singhi M (2004) Burden of non-communicable diseases in South Asia. *BMJ* 328: 807–810. DOI: 10.1136/bmj.328.7443.807
- Hooper L, Summerbell CD, Higgins JPT, Thompson RL, Clements G, et al. (2006) Reduced or modified dietary fat for preventing cardiovascular disease. *Cochrane Database Syst Rev*. Available: <http://www.cochrane.org/reviews/en/ab002137.html>. Accessed 9 March 2006.
- Leppälä JM, Virtamo J, Fogelholm R, Huttunen JK, Albanes D, et al. (2000) Controlled trial of alpha-tocopherol and beta-carotene supplements on stroke incidence and mortality in male smokers. *Arterioscler Thromb Vasc Biol* 20: 230–235.
- Pietrzik K (1996) Antioxidant vitamins, cancer, and cardiovascular disease. *N Engl J Med* 335: 1065–1066.
- Pignone M (2005) Primary prevention: Dyslipidaemia. *Clin Evid* 14: 1–2.
- Sever PS, Dahlof B, Poulter NR, Wedel H, Beevers G, et al. (2003) Prevention of coronary and stroke events with atorvastatin in hypertensive patients who have average or lower-than-average cholesterol concentrations, in the Anglo-Scandinavian Cardiac Outcomes Trial-Lipid Lowering Arm (ASCOT-LLA): A multicentre randomized controlled trial. *Lancet* 361: 1149–1158.
- Shepherd J, Cobbe SM, Ford I, Isles CG, Lorimer AR, et al. (1995) Prevention of coronary heart disease with pravastatin in men with hypercholesterolemia. *N Engl J Med* 333: 1301–1307.
- Shepherd S, Blauw GJ, Murphy MB, Bollen EL, Buckley BM, et al. (2002) Pravastatin in elderly individuals at risk of vascular disease (PROSPER): A randomized controlled trial. *Lancet* 360: 1623–1630.
- World Health Organization (2004) Global burden of coronary heart disease. Geneva: World Health Organization. Available: http://www.who.int/cardiovascular_diseases/en/cvd_atlas_13_coronaryHD.pdf. Accessed 9 March 2006.
- World Health Organization (2003) The world health report 2003: Shaping the future. Geneva: World Health Organization. Available: http://www.who.int/whr/2003/en/Facts_and_Figures-en.pdf. Accessed 9 March 2006.