Online Quiz

Test Your Knowledge:
Ten Questions about Stroke

This quiz is related to the Learning Forum article in the April issue of *PLoS Medicine* (DOI: 10.1371/journal.pmed.0020079).

Gavin Yamey

Question 1. Roughly what proportion of all strokes are ischemic (rather than hemorrhagic)?

○ 25%
○ 50%
○ 75%
○ 95%

Question 2. Roughly what proportion of ischemic strokes are due to carotid stenosis?

○ 5%
○ 20%
○ 50%
○ 75%

Question 3. Roughly how many people worldwide each year experience a stroke?

○ 15 million
○ 25 million
○ 35 million

Question 4. Roughly how many deaths worldwide are due to stroke each year?

○ 1.5 million
○ 5.5 million
○ 10.5 million

Question 5. In people who have had a stroke or transient ischemic attack, what is the subsequent risk of stroke?

○ About 30% of patients will have a stroke in the first year, and about 15% each year thereafter
○ About 10% of patients will have a stroke in the first year, and about 5% each year thereafter
○ About 2% of patients will have a stroke in the first year, and about 1% each year thereafter

Question 6. Which of the following best reflects the evidence on the value of specialist stroke units or teams compared with conventional care?

○ There is no difference between specialist and conventional care in the risk of death or dependency
○ Specialist care reduces the risk of death or dependency at one year, but not at five years
○ Specialist care reduces the risk of death or dependency at one year, and trials with the longest follow-up found that the risk was also reduced at five years

Question 7. Which of the following best reflects the evidence on the benefits of aspirin in acute stroke?

○ The beneficial effect (a reduction in the risk of death or further stroke) is similar in old versus young patients, female versus male patients, and those with or without atrial fibrillation
○ The drug is much more effective at reducing death or dependency at six months in older, male patients than in younger, female patients
○ The drug is much more effective at reducing death or dependency at six months in patients with atrial fibrillation than in those without

Gavin Yamey is a senior editor at *PLoS Medicine*. E-mail: gyamey@plos.org

Question 8. Which one of the following groups of patients who have had symptoms due to carotid stenosis is most likely to benefit from carotid endarterectomy?

○ Patients with 30% or less stenosis

○ Patients with 30%–49% stenosis

○ Patients with 50%–69% stenosis

○ Patients with 70% or more stenosis, without near occlusion

Question 9. Which one of the following neuroprotective agents has been proven in randomized controlled trials to significantly improve clinical outcome after an acute stroke?

○ Calcium channel antagonists

○ Lubeluzole

○ Gavestinel

○ Aminobutyric acid agonists

○ None of the above

Question 10. Which of the following cholesterol-lowering agents is most likely to be effective in the secondary prevention of stroke?

○ A statin

○ Gemfibrozil

○ Bezafibrate

Answer 1: 75%

About 75%–80% of all strokes are ischemic [1,2], usually resulting from thrombotic or embolic occlusion of a cerebral artery. The remainder are caused by either intracerebral or subarachnoid hemorrhage.

References
1. Bamford J, Sandercock P, Dennis M, Burn J, Warlow C (1990) A prospective study of acute cerebrovascular disease in the community: The Oxfordshire community stroke project, 1981–1986. 2. Incidence, case fatality rates and overall outcome at one year of cerebral infarction, primary intracerebral and subarachnoid haemorrhage. J Neurol Neurosurg Psychiatry 53: 16–22.
2. Kunitz SC, Gross CR, Heyman A, Kase CS, Mohr JP, et al. (1984) The pilot Stroke Data Bank: Definition, design, and data. Stroke 15: 740–746.

Answer 2: 20%

Carotid stenosis accounts for about 20% of all cases of ischemic stroke [1], and is considered the single most preventable cause of stroke. The most common risk factors for carotid stenosis are smoking, hypertension, hyperlipidemia, and diabetes mellitus.

References
1. Mohr JP, Caplan LR, Melski JW, Goldstein RJ, Duncan GW, et al. (1978). The Harvard Cooperative Stroke Registry: A prospective registry. Neurology 28: 754–762.

Answer 3: 15 million

In its recent *Atlas of Heart Disease and Stroke*, the World Health Organization estimated that in 2002, 15 million people had a stroke, of whom 5 million were left permanently disabled [1].

References
1. Mackay J, Mensah GA (2004) The atlas of heart disease and stroke. Geneva: World Health Organization. Available: http://www.who.int/cardiovascular_diseases/resources/atlas/en/. Accessed 25 March 2005.

Answer 4: 5.5 million

In its recent *Atlas of Heart Disease and Stroke*, the World Health Organization estimated that there were 5.5 million deaths worldwide from stroke in 2002 [1].

References
1. Mackay J, Mensah GA (2004) The atlas of heart disease and stroke. Geneva: World Health Organization. Available: http://www.who.int/cardiovascular_diseases/resources/atlas/en/. Accessed 25 March 2005.

Answer 5: About 10% of patients will have a stroke in the first year, and about 5% each year thereafter

People with a history of stroke or transient ischemic attack are at high risk of all vascular events, including myocardial infarction, but they are at particular risk of subsequent stroke: about 10% in the first year and about 5% each year thereafter [1,2].

References
1. Warlow CP, Dennis MS, van Gijn J, Hankey GJ, Sandercock PAG, et al. (1996) Predicting recurrent stroke and other serious vascular events. In: Stroke: A practical guide to management. Oxford: Blackwell Science. pp. 545–552.
2. Antiplatelet Trialists' Collaboration (1994) Collaborative overview of randomised trials of antiplatelet therapy—I: Prevention of death, myocardial infarction, and stroke by prolonged antiplatelet therapy in various categories of patients. BMJ 308: 81–106.

Answer 6: Specialist care reduces the risk of death or dependency at one year, and trials with the longest follow-up found that the risk was also reduced at five years

A Cochrane systematic review identified 23 randomized controlled trials, involving a total of 4,911 people with stroke, that compared specialized stroke rehabilitation against conventional care [1]. The specialized rehabilitation usually involved a stroke unit (a designated area or ward), although in some trials it involved a mobile "stroke team." The review found that specialized stroke rehabilitation significantly reduced death or dependency after a median follow up of one year compared with alternative, less specialized care (absolute risk reduction 4.7%, 95% confidence interval [CI] 1.6% to 7.8%; number needed to treat 21, 95% CI 13 to 63).

Two trials included in the review extended follow-up to five years after stroke. The review of these trials found that organized stroke unit care significantly reduced death or dependency at five years compared with alternative care (number of patients dead or dependent at five years: 223/286 patients [78%] with organized stroke unit care versus 214/249 patients [86%] with alternative care; relative risk 0.91, 95% CI 0.84 to 0.99).

References
1. Stroke Unit Trialists' Collaboration (2003) Organised inpatient (stroke unit) care for stroke. Cochrane Database Syst Rev 2003: CD000197.

Answer 7: The beneficial effect (a reduction in the risk of death or further stroke) is similar in old versus young patients, female versus male patients, and those with or without atrial fibrillation

A meta-analysis of 40,000 randomized patients from the Chinese Acute Stroke Trial and the International Stroke Trial found that the benefits of aspirin (reduced risk of death or further stroke) was similar across subgroups (older versus younger; male versus female; impaired consciousness or not; atrial fibrillation or not; blood pressure; stroke subtype; timing of computerized tomography scanning) [1].

References

1. Chen Z, Sandercock P, Pan H, Counsell C, Collins R, et al. (2000) Indications for early aspirin use in acute ischemic stroke: A combined analysis of 40 000 randomized patients from the Chinese Acute Stroke Trial and the International Stroke Trial. Stroke 31: 1240–1249.

Answer 8: Patients with 70% or more stenosis, without near occulation

A pooled analysis [1] of individual patient data from three large randomized controlled trials (four publications; [2–5]) that examined the effects of endarectomy in people with symptomatic carotid stenosis (a total of 6,092 patients) found that surgery increased the five-year risk of stroke or surgical death in people with 30% or less stenosis, had no significant effect in patients with 30%–49% stenosis, was of some benefit in patients with 50%–69% stenosis, and was highly beneficial in patients with 70% or more stenosis without near occlusion (<30% stenosis, 1,746 people, relative risk [RR] 1.17, 95% CI 0.90 to 1.43; 30%–49% stenosis, 1,429 people, RR 0.90, 95% CI 0.75 to 1.04; 50%–69% stenosis, 1,549 people, RR 0.72, 95% CI 0.58 to 0.86; ≥70% stenosis without near occlusion, 1,095 people, RR: 0.52, 95% CI 0.40 to 0.64).

References

1. Rothwell PM, Eliasziw M, Gutnikov SA, Fox AJ, Taylor DW, et al. (2003) Analysis of pooled data from the randomised controlled trials of endarterectomy for symptomatic carotid stenosis. Lancet 361: 107–116.
2. European Carotid Surgery Trialists' Collaborative Group (1998) Randomised trial of endarterectomy for recently symptomatic carotid stenosis: Final results of the MRC European carotid surgery trial. Lancet 351: 1379–1387.
3. North American Symptomatic Carotid Endarterectomy Trial Collaborators (1991) Beneficial effect of carotid endarterectomy in symptomatic patients with high-grade carotid stenosis. N Engl J Med 325: 445–453.
4. Barnett HJ, Taylor DW, Eliasziw M, Fox AJ, Ferguson GG, et al. (1998) Benefit of carotid endarterectomy in patients with symptomatic moderate or severe stenosis. North American Symptomatic Carotid Endarterectomy Trial Collaborators. N Engl J Med 339: 1415–1425.
5. Mayberg MR, Wilson SE, Yatsu F, Weiss DG, Messina L (1991) Carotid endarterectomy and prevention of cerebral ischemia in symptomatic carotid stenosis. Veterans Affairs Cooperative Studies Program 309 Trialist Group. JAMA 266: 3289–3294.

Answer 9: None of the above

Systematic reviews of randomized controlled trials found no evidence that channel antagonists, lubeluzole, gavestinel, or aminobutyric acid antagonists significantly improved clinical outcomes compared with placebo [1].

References

1. Warburton E (2004) Stroke management. Clin Evid 11: 240–256.

Answer 10: A statin

Three systematic reviews and a meta-analysis of large randomized controlled trials found that statins reduced major vascular events, including stroke, compared with placebo in people with prior stroke or transient ischaemic attack [1–4]. For example, one of these reviews (of 14 randomized controlled trials) found that reducing mean total cholesterol with a statin by 21% over an average of four years reduced the relative odds of stroke by 24% [1].

Randomized controlled trials have found no evidence that non-statin treatments reduce stroke compared with placebo or no treatment [5].

References

1. Hebert PR, Gaziano JM, Chan KS, Hennekens CH (1997) Cholesterol lowering with statin drugs, risk of stroke, and total mortality: An overview of randomized trials. JAMA 278: 313–321.
2. Di Maschio R, Marchioli R, Tognoni G (2000) Cholesterol reduction and stroke occurrence: An overview of randomized clinical trials. Cerebrovasc Dis 10: 85–92.
3. Law MR, Wald NJ, Rudnicka AR (2003) Quantifying effect of statins on low density lipoprotein cholesterol, ischaemic heart disease, and stroke: Systematic review and meta-analysis. BMJ 326: 1423–1427.
4. Armitage J (2003) Cholesterol lowering for the prevention of stroke. Pract Neurol 3: 224–233.
5. Hebert PR, Gaziano M, Hennekens CH (1995) An overview of trials of cholesterol lowering and risk of stroke. Arch Intern Med 155: 50–55.

References

Antiplatelet Trialists' Collaboration (1994) Collaborative overview of randomised trials of antiplatelet therapy—I: Prevention of death, myocardial infarction, and stroke by prolonged antiplatelet therapy in various categories of patients. BMJ 308: 81–106.

Armitage J (2003) Cholesterol lowering for the prevention of stroke. Pract Neurol 3: 224–233.

Bamford J, Sandercock P, Dennis M, Burn J, Warlow C (1990) A prospective study of acute cerebrovascular disease in the community: The Oxfordshire community stroke project, 1981–1986. 2. Incidence, case fatality rates and overall outcome at one year of cerebral infarction, primary intracerebral and subarachnoid haemorrhage. J Neurol Neurosurg Psychiatry 53: 16–22.

Barnett HJ, Taylor DW, Eliasziw M, Fox AJ, Ferguson GG, et al. (1998) Benefit of carotid endarterectomy in patients with symptomatic moderate or severe stenosis. North American Symptomatic Carotid Endarterectomy Trial Collaborators. N Engl J Med 339: 1415–1425.

Chen Z, Sandercock P, Pan H, Counsell C, Collins R, et al. (2000) Indications for early aspirin use in acute ischemic stroke: A combined analysis of 40 000 randomized patients from the Chinese Acute Stroke Trial and the International Stroke Trial. Stroke 31: 1240–1249.

Di Maschio R, Marchioli R, Tognoni G (2000) Cholesterol reduction and stroke occurrence: An overview of randomized clinical trials. Cerebrovasc Dis 10: 85–92.

European Carotid Surgery Trialists' Collaborative Group (1998) Randomised trial of endarterectomy for recently symptomatic carotid stenosis: Final results of the MRC European carotid surgery trial. Lancet 351: 1379–1387.

Hebert PR, Gaziano JM, Chan KS, Hennekens CH (1997) Cholesterol lowering with statin drugs, risk of stroke, and total mortality: An overview of randomized trials. JAMA 278: 313–321.

Hebert PR, Gaziano M, Hennekens CH (1995) An overview of trials of cholesterol lowering and risk of stroke. Arch Intern Med 155: 50–55.

Kunitz SC, Gross CR, Heyman A, Kase CS, Mohr JP, et al. (1984) The pilot Stroke Data Bank: Definition, design, and data. Stroke 15: 740–746.

Law MR, Wald NJ, Rudnicka AR (2003) Quantifying effect of statins on low density lipoprotein cholesterol, ischaemic heart disease, and stroke: Systematic review and meta-analysis. BMJ 326: 1423–1427.

Mackay J, Mensah GA (2004) The atlas of heart disease and stroke. Geneva: World Health Organization. Available: http://www.who.int/cardiovascular_diseases/resources/atlas/en/. Accessed 25 March 2005.

Mayberg MR, Wilson SE, Yatsu F, Weiss DG, Messina L (1991) Carotid endarterectomy and prevention of cerebral ischemia in symptomatic carotid stenosis. Veterans Affairs Cooperative Studies Program 309 Trialist Group. JAMA 266: 3289–3294.

Mohr JP, Caplan LR, Melski JW, Goldstein RJ, Duncan GW, et al. (1978). The Harvard Cooperative Stroke Registry: A prospective registry. Neurology 28: 754–762.

North American Symptomatic Carotid Endarterectomy Trial Collaborators (1991) Beneficial effect of carotid endarterectomy in symptomatic patients with high-grade carotid stenosis. N Engl J Med 325: 445–453.

Rothwell PM, Eliasziw M, Gutnikov SA, Fox AJ, Taylor DW, et al. (2003) Analysis of pooled data from the randomised controlled trials of endarterectomy for symptomatic carotid stenosis. Lancet 361: 107–116.

Stroke Unit Trialists' Collaboration (2003) Organised inpatient (stroke unit) care for stroke. Cochrane Database Syst Rev 2003: CD000197.

Warburton E (2004) Stroke management. Clin Evid 11: 240–256.

Warlow CP, Dennis MS, van Gijn J, Hankey GJ, Sandercock PAG, et al. (1996) Predicting recurrent stroke and other serious vascular events. In: Stroke: A practical guide to management. Oxford: Blackwell Science. pp. 545–552.