



University of  
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# Stroke

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International Centre for  
**Allied Health Evidence**

# How common is stroke?

**Stroke is the second greatest killer in Australia and one of the most common causes of disability**

- 60, 000 people a year will have a stroke
- One stroke every 10 minutes
- Stroke kills more women than breast cancer and more men than prostate cancer
- The National Stroke Foundation  
<http://www.strokefoundation.com.au/>

# What is a stroke

**A stroke is a blockage to the blood supply of the brain**

- <http://www.strokefoundation.com.au/what-is-a-stroke>
- Key messages
  - 15% of strokes are 'haemorrhagic' – caused by a burst blood vessel
  - 85% of strokes are 'ischaemic' – caused by a blood clot



# What does a stroke do to the brain?

The loss of blood supply from a stroke causes an area of the brain to die

- <http://www.strokefoundation.com.au/what-is-a-stroke>
- Key messages
  - Symptoms of stroke will depend on the area of the brain affected and the size of the stroke
  - The 'core' area will die quickly
  - Surrounding areas can survive ***for a short period***
  - If untreated, the damage will spread outwards



# What to do if you suspect a stroke

## National Stroke Foundation strokesafe campaign

- <http://www.signsofstroke.com.au/>
- <http://www.strokefoundation.com.au/what-is-a-stroke>
- Key messages
  - The signs of stroke will depend on which part of the brain is affected
  - Think F.A.S.T.

# Act FAST

## Stroke is a medical emergency

- <http://www.strokefoundation.com.au/what-is-a-stroke>
- Key messages
  - Call 000
  - Time is brain
  - ‘clot busting’ medicine needs to be given within a few hours of stroke to be effective



# What is a 'mini-stroke'?

## A transient ischaemic attack - TIA

- When symptoms of stroke disappear within 24 hours or less
- ***Warning sign of stroke and should not be ignored***
- 1 in 5 people who have a TIA will have a major stroke within 3 months, and are at most risk in the first few days after
- ***Seek immediate medical attention, even if your symptoms are temporary***

# Risk factors for stroke

Take the strokesafe™ test and consider your risk of stroke.

- I am over 50 years of age
- I have a family history of stroke, have heart disease or have had a stroke or TIA
- I have high blood pressure (consistently greater than 140/90) or do not know my blood pressure numbers
- I am a smoker
- I have high cholesterol (total cholesterol greater than 4.0mmol/L) or do not know my cholesterol level
- I have more than two standard alcoholic drinks per day
- I am overweight (waist over 94cm for males or 80cm for females)
- I don't exercise regularly (30 minutes of moderate activity on most days of the week, includes brisk walk, domestic duties or leisure time)
- I don't maintain a diet high in fruit and vegetables and low in fat, sugar and salt
- I have diabetes
- I have atrial fibrillation (irregular heart beat)

If you ticked one or more boxes, talk to your doctor and find out how you can lower your risk of stroke.





# Risk factors for stroke

## **Some risk factors you cannot change**

- Age
- gender (men are more likely to have a stroke)
- Family history

## **Many risk factors you can change**

- Good management of any medical conditions
- Stop smoking reduce drinking
- Exercise and eating well



# Prevention of stroke – move more

## Physical Activity and Risk of Stroke in Women

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**P**ERSUASIVE EVIDENCE HAS DEMONSTRATED that increased physical activity is associated with substantial reduction in risk of coronary heart disease.<sup>1</sup> However, the role of physical activity in the prevention of stroke is less well studied, and results from epidemiological studies have been inconsistent. A significant inverse association between increasing physical activity and risk of stroke has been observed in some studies<sup>2-6</sup> but not in others.<sup>7-10</sup> Also, the dose-response relationship between physical activity and stroke has not been well characterized. Some studies have demonstrated a monotonic decreasing risk with increasing physical activity,<sup>2-4</sup> while others have indicated a U-shaped relationship.<sup>8,11</sup> In addition, few studies have examined the effects of physical activity on subtypes of stroke.<sup>1,2,8</sup> Furthermore, most previous studies have focused on men<sup>2,3,5-8,11</sup>; data on women are sparse.<sup>1,12</sup> In the Framingham Heart Study,<sup>12</sup> high levels of physical activity were protective against total stroke risk in men but not in women.

Current guidelines from the Centers for Disease Control and Prevention<sup>13</sup> and the National Institutes of Health<sup>14</sup> rec-

**Context** Persuasive evidence has demonstrated that increased physical activity is associated with substantial reduction in risk of coronary heart disease. However, the role of physical activity in the prevention of stroke is less well established.

**Objective** To examine the association between physical activity and risk of total stroke and stroke subtypes in women.

**Design and Setting** The Nurses' Health Study, a prospective cohort study of subjects residing in 11 US states.

**Subjects** A total of 72 488 female nurses aged 40 to 65 years who did not have diagnosed cardiovascular disease or cancer at baseline in 1986 and who completed detailed physical activity questionnaires in 1986, 1988, and 1992.

**Main Outcome Measure** Incident stroke occurring between baseline and June 1, 1994, compared among quintiles of physical activity level as measured by metabolic equivalent tasks (METs) in hours per week.

**Results** During 8 years (560 087 person-years) of follow-up, we documented 407 incident cases of stroke (258 ischemic strokes, 67 subarachnoid hemorrhages, 42 intracerebral hemorrhages, and 40 strokes of unknown type). In multivariate analyses controlling for age, body mass index, history of hypertension, and other covariates, increasing physical activity was strongly inversely associated with risk of total stroke. Relative risks (RRs) in the lowest to highest MET quintiles were 1.00, 0.98, 0.82, 0.74, and 0.66 (*P* for trend = .005). The inverse gradient was seen primarily for ischemic stroke (RRs across increasing MET quintiles, 1.00, 0.87, 0.83, 0.76, and 0.52; *P* for trend = .003). Physical activity was not significantly associated with subarachnoid hemorrhage or intracerebral hemorrhage. After multivariate adjustment, walking was associated with reduced risk of total stroke (RRs across increasing walking MET quintiles, 1.00, 0.76, 0.78, 0.70, and 0.66; *P* for trend = .01) and ischemic stroke (RRs across increasing walking MET quintiles, 1.00, 0.77, 0.75, 0.69, and 0.60; *P* for trend = .02). Brisk or striding walking pace was associated with lower risk of total and ischemic stroke compared with average or casual pace.

**Conclusion** These data indicate that physical activity, including moderate-intensity exercise such as walking, is associated with substantial reduction in risk of total and ischemic stroke in a dose-response manner.

JAMA. 2000;283:2961-2967

www.jama.com

ommend that Americans should accumulate at least 30 minutes of moderate-intensity physical activity on most, preferably all, days of the week. However, the role of low- and moderate-intensity activities such as walking, compared with vigorous exercise, in the prevention of cardiovascular disease remains controversial. If walking is confirmed to provide the same benefits as more vigorous forms of physical activity, it will have important public health implications because walking is the most

popular form of physical activity, especially among middle-aged and older women.<sup>15</sup>

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See also Patient Page.

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“physical activity... including walking... is associated with a substantial reduction in risk of stroke”

“brisk or striding walking pace was associated with lower risk... compared with casual pace”

# Prevention of stroke – sit less



## Sitting less for adults

The arrival of the 'electronic age' has fundamentally changed how much time we spend sitting (also called being 'sedentary') at home, during travel and at work. This change has been directly linked to an increase in health problems, such as poor nutrition, obesity and insulin resistance, which can lead to diabetes. These health problems also increase your risk of developing coronary heart disease.

There are many ways in which adults can sit for long periods throughout the day. A typical day might include sitting:

- to eat breakfast
- to drive to work
- at your desk at work
- to drive home
- to eat dinner
- during the evening to do things such as watch television, use a computer and socialise.

It's very easy to sit too much – adults spend more than half of their waking hours sitting.<sup>1-3</sup> Therefore, to reduce your risk of health problems, it's important to be aware of how much you sit and try to move more throughout the day.

## Why is sitting less better for your health?

Adults who sit less throughout the day have a lower risk of early death – particularly from cardiovascular disease (CVD).<sup>4,5</sup>

Most research so far has been on how watching television affects health, because watching television is the most common leisure activity among adults. Adults who watch less than two hours of television a day are less likely to have type 2 diabetes or be obese, and have a lower risk of developing CVD.<sup>6</sup> The reverse is also true – the more time an adult spends watching television, the higher their risk of health problems.

Adults who do regular planned exercise, such as going to the gym or running, can still sit for long periods of time every day. Figure 1 (see page two) shows how easy it is for an adult to spend a large amount of time sitting during a typical working day. In this example, the adult gets 60 minutes of physical activity that day through a brisk walk in the morning and strength training in the evening. However, they also spend 15 hours (over 90% of total waking hours) sitting.

If an adult meets the Australian Government's physical activity recommendations of 30 minutes or more moderate-intensity physical activity on most, if not all, days of the week, they are classified as 'physically active'. However, adults may increase their health benefits if they also sit less during the day. In fact, new evidence suggests that, no matter what your total sitting time is, regular interruptions from sitting (even as little as standing up) may help to reduce your risk factors for developing coronary heart disease and diabetes.<sup>2,7</sup>

“Adults who sit less throughout the day have a lower risk of early death particularly from cardiovascular disease”

“Adults may increase their health...if they sit less during the day.....

regular interruptions from sitting (even as little as standing up) may help reduce your risk factors ...”

<http://www.heartfoundation.org.au/active-living/active-ideas/Pages/default.aspx>

# Rehabilitation after stroke

## Rehabilitation after stroke is important

- 50% of people who have a stroke need rehabilitation
- 88% of stroke survivors live at home and most have a disability
- What sort of therapy you might need depends on the type of stroke you have had. Includes:
  - Physiotherapy
  - Occupational Therapy
  - Speech Therapy

# Stroke and Rehabilitation Research group

## Over 60 publications between us

- Optimal physiotherapy interventions after stroke
- Keeping people healthy and active after stroke
- Retraining sensory function after stroke
- Improving quality of life after stroke
- Effect of stroke on falls
- Effect of exercise on cognitive function
- Making sure everyone receives the best care after stroke



# Optimising physiotherapy services

ORIGINAL ARTICLE

## Circuit Class Therapy Versus Individual Physiotherapy Sessions During Inpatient Stroke Rehabilitation: A Controlled Trial

*Coralie K. English, PhD, Susan L. Hillier, PhD, Kathy R. Stiller, PhD, Andrea Warden-Flood, PhD<sup>†</sup>*

ABSTRACT. English CK, Hillier SL, Stiller KR, Warden-Flood A. Circuit class therapy versus individual physiotherapy sessions during inpatient stroke rehabilitation: a controlled trial. *Arch Phys Med Rehabil* 2007;88:955-63.

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Research

How much physical activity do people recovering from stroke do during physiotherapy sessions?

*Tony Elson, Coralie English, Susan Hillier*

# Optimising physiotherapy services



Circuit class therapy trial  
for increasing intensity of  
rehabilitation after stroke



<http://images.google.com>

# Optimising physiotherapy services



Circuit class therapy trial  
for increasing intensity of  
rehabilitation after stroke

5 days week usual care



7 days week usual care



5 days week group





# Keeping people healthy after stroke

## Exploring patterns of activity and sitting time of stroke survivors



- Using new technologies to explore in detail what sort of activities people are able to do at home after stroke
- Aim to improve health and well-being by encouraging stroke survivors to sit less each day, or at least break up their sitting time with short bursts of light activity



# Improving sensation after stroke

*Clinical Rehabilitation* 2009; 23: 27-39

## Evidence for the retraining of sensation after stroke: a systematic review

SM Schabrun Research Centre for Human Movement Control, Discipline of Physiology, School of Molecular and Biomedical Science, The University of Adelaide and S Hillier Centre for Allied Health Evidence, School of Health Sciences, The University of South Australia, Adelaide, Australia

Received 5th July 2009; returned for revisions 19th August 2008; revised manuscript accepted 27th August 2008.

*ORIGINAL ARTICLE*

## Sensory Retraining of the Lower Limb After Acute Stroke: A Randomized Controlled Pilot Trial

*Elizabeth A. Lynch, BAppSc, Susan L. Hillier, PhD, Kathy Stiller, PhD, Rachel R. Campanella, BAppSc, Penny H. Fisher, BPhysio*

# Improving quality of life after stroke

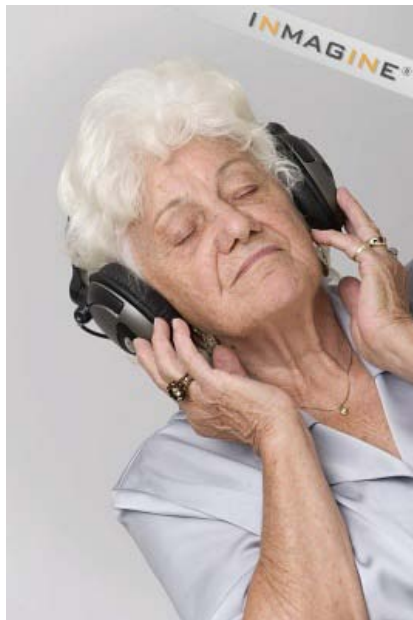
## Becoming connected: the lived experience of yoga participation after stroke

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<http://legacy.decatordaily.com/decatordaily/religion/050924/yoga.shtml>



## Music therapy for stroke

<http://www.inmagine.com/imb014/imb0141331-photo>

# Improving cognitive function

*JOURNAL-BASED CME ARTICLE*

## **Aerobic Exercise to Improve Cognitive Function in Adults With Neurological Disorders: A Systematic Review**

*Michelle N. McDonnell, PhD, Ashleigh E. Smith, BSc, Shylie F. Mackintosh, PhD*

### **Journal of Clinical and Experimental Neuropsychology**

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/ncen20>

### **Assessing cognitive impairment following stroke**

Michelle N. McDonnell <sup>a</sup>, Janet Bryan <sup>a c</sup>, Ashleigh E. Smith <sup>a b</sup> & Adrian J. Esterman <sup>a</sup>

# Improving cognitive function

## Exercise to improve cognition following stroke



Can exercise improve the thinking abilities of stroke survivors?

## Plasticity and Exercise



Can exercise help the brain to learn better after stroke?

# Stroke and falls

## Balance Score and a History of Falls in Hospital Predict Recurrent Falls in the 6 Months Following Stroke Rehabilitation

*Shylie F. Mackintosh, PhD, Keith D. Hill, PhD, Karen J. Dodd, PhD, Patricia A. Goldie, PhD, Elsie G. Culham, PhD*



Study protocol

**Open Access**

### **The FLASSH study: protocol for a randomised controlled trial evaluating falls prevention after stroke and two sub-studies**

Frances A Batchelor\*<sup>1,2</sup>, Keith D Hill<sup>1,3</sup>, Shylie F Mackintosh<sup>4</sup>, Catherine M Said<sup>5,6</sup> and Craig H Whitehead<sup>7</sup>

# Providing the best care for people after stroke

Journal of Multidisciplinary Healthcare

Dovepress

open access to scientific and medical research

 Open Access Full Text Article

ORIGINAL RESEARCH

Demographic and stroke-related factors  
as predictors of quality of acute stroke care  
provided by allied health professionals

## Research Letter

The effect of limited English proficiency on  
falls risk and falls prevention after stroke

**RESEARCH ARTICLE**

**Open Access**

## Patients' age as a determinant of care received following acute stroke: A systematic review

Julie A Luker<sup>1\*</sup>, Kylie Wall<sup>2</sup>, Julie Bernhardt<sup>3,4</sup>, Ian Edwards<sup>5</sup> and Karen A Grimmer-Somers<sup>1</sup>

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- members of the Stroke and Rehabilitation Research group
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We are currently looking for volunteers (stroke survivors) for our research. Please contact:

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