

Alcohol and Stroke:

Sobering thoughts from years of study

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Conflict Disclosure Information:

Presenter: Donna Gill

Title of Presentation: Alcohol and Stroke

Financial Disclosure

Grants/Research Support: none

Speakers Bureau/Honoraria: none

Consulting Fees: Centre for Addiction and Mental Health

Other: Employee of Grand River Hospital

Non-Financial Disclosure

Member of: (ie. Personal interest group) none



Objectives:

- To describe the physiological effects of alcohol as it relates to stroke and stroke prevention.
- To describe the relationship between alcohol and stroke.
- To articulate the best practice guidelines regarding alcohol consumption.
- To identify resources available to assist with the assessment and treatment of alcohol addiction.



Stroke Stats from the Heart and Stroke Foundation of Canada

- **About 80% of strokes are ischemic and 20% are hemorrhagic**
- **Third leading cause of death in Canada. 14,000 Canadians die from stroke each year.**
- **More than 50,000 strokes occur in Canada each year. That's one stroke every 10 minutes.**
- **About 300,000 Canadians are living with the effects of stroke.**
- **A stroke survivor has a 20% chance of having another stroke within 2 years.**
- **Stroke is preventable.**



*Pearl described the relationship between alcohol and stroke in a Baltimore, Maryland study in **1926**.*

“Perhaps Pearl’s major contribution was to realize the fallacy in comparing health risks of all drinkers to abstainers. As he memorably said: “one cannot judge the role of diet by starvation or excess.””

Klatsky, 2004, *Integrative and Comparative Biology*



Alcohol consumption standard measurements

- Standard drink sizes
 - Wine 5 oz
 - Spirits 1.5 oz
 - Beer 12 oz
- Binge drinking is defined as more than 72g of alcohol (6 drinks for a man) or 48g (4 drinks) for a woman during one drinking event.
- Heavy drinking is defined as more than 60g of alcohol (5 drinks) per day or 35 drinks per week.



Physiological effects of alcohol

Good


- Improves endothelial repair
- Increases HDL cholesterol

Bad

- Increases blood pressure
- Vasospasm
- Cardiac arrhythmias
- Cardiomyopathy

Good and Bad

- Decreases platelet aggregation and fibrinogen levels



What can we tell you about the relationship between alcohol and stroke?

Literature Review

Stroke, not coronary heart disease

Meta Analysis

Patra & Rehm

Best Practice Guidelines

Resources



Papers reviewed

- **Camargo** 1989, *Stroke*
- **Corrao, Bagnardi, Zambon & Arico** 1999, *Addiction*
- **Mazzaglia, Britton, Altmann & Chenet** 2001, *Addiction*
- **Reynolds et al.** 2003, *JAMA* (*meta-analysis)
- **Pinder & Sandler** 2004, *Journal of Psychopharmacology*
- **Feigin, Rinkel, Lawes, Algra, Bennett, Gijn, et al** 2005, *Stroke*
- **Emberson & Bennett** 2006, *Vascular Health and Risk Management*
- **Sundell, Salomaa, Vartiainen, Poikolainen & Laatikainen** 2008, *Stroke*.



Difficulties with studies

- No RCTs
- Biases of self-report and recall
- Non standard measurement of drink type, size and drinking pattern
- Some studies include ex-drinkers with abstainers
- Interaction of other lifestyle variables
- Failure to classify sub-types of stroke

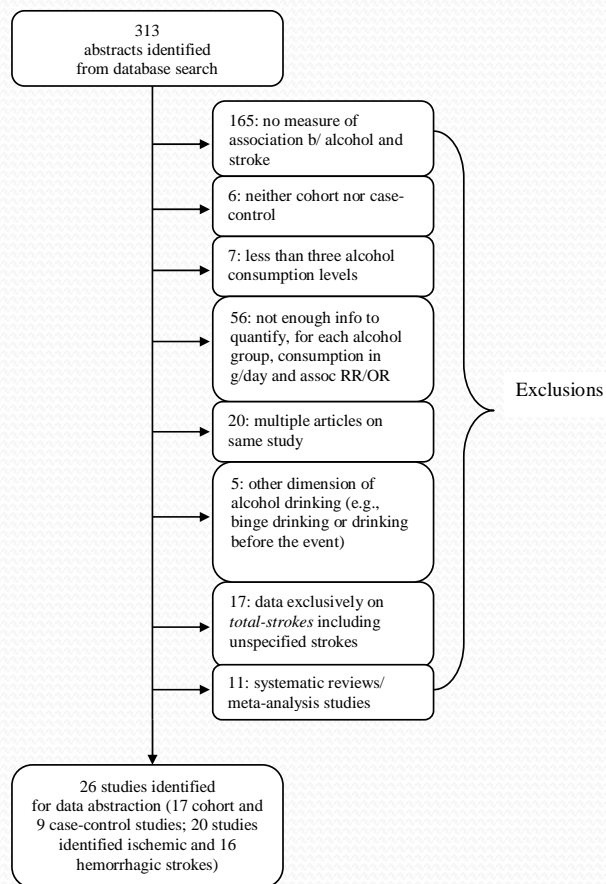


- **Meta-analysis of the relationship between alcohol and stroke, Patra & Rehm 2009, unpublished, CAMH**

- Rehm, J, Baliunas, D, Guilherme, LGB, Graham, K, Irving, H, Kehoe, T, Parry, CD, Patra, J, Popova, S, Poxnyak, V, Roerecke, M, Room, R, Samokhvalov, AV, & Taylor, B. The relation between different dimensions of alcohol consumption and burden of disease: an overview. *Addiction* 2010, 105: 817-843.

***Acknowledgements*:** This work was financially supported by a small contribution of the Global Burden of Disease (GBD) Study to the last author. We would like to thank the core group of the Comparative Risk Assessment for alcohol within the GBD 2005 Study for their support and comments on the general methodology and on an earlier version of this paper: G. Borges, G. Gmel, K. Graham, B. Grant, Ch. Parry, V. Poznyak, R. Room. No conflict of interest declared.

Results of systematic review of the relationship between alcohol and stroke subtypes.





What is the relationship between
alcohol and stroke?


Overall Relative Risk of Stroke Associated With Alcohol Consumption

Type of stroke (# of studies)	Alcohol intake (g/day)			
	<12	12-23	24-60	>60
All strokes (35)	0.83	0.91	1.10	1.64

Reference point (RR = 1.0) is abstainers

(95% Confidence Interval)

Reynolds et al, 2003, *JAMA*

- 
- Heavy drinking is associated with increased risk of sudden cardiac death
 - Heavy and binge drinking is associated with new onset atrial fibrillation is 30-60% of cases (Sundell et al, 2008)
 - Supported by large prospective studies such as the Framingham Heart Study and the Copenhagen City Heart Study.



Robert Louis Stevenson's *Treasure Island* (1883)

(the doctor speaking to the old captain at the beginning of the story)


“You, sir, have had a stroke because you drink too much rum! Keep drinking rum and you will die!”



Key Message #1


HEAVY = HARM

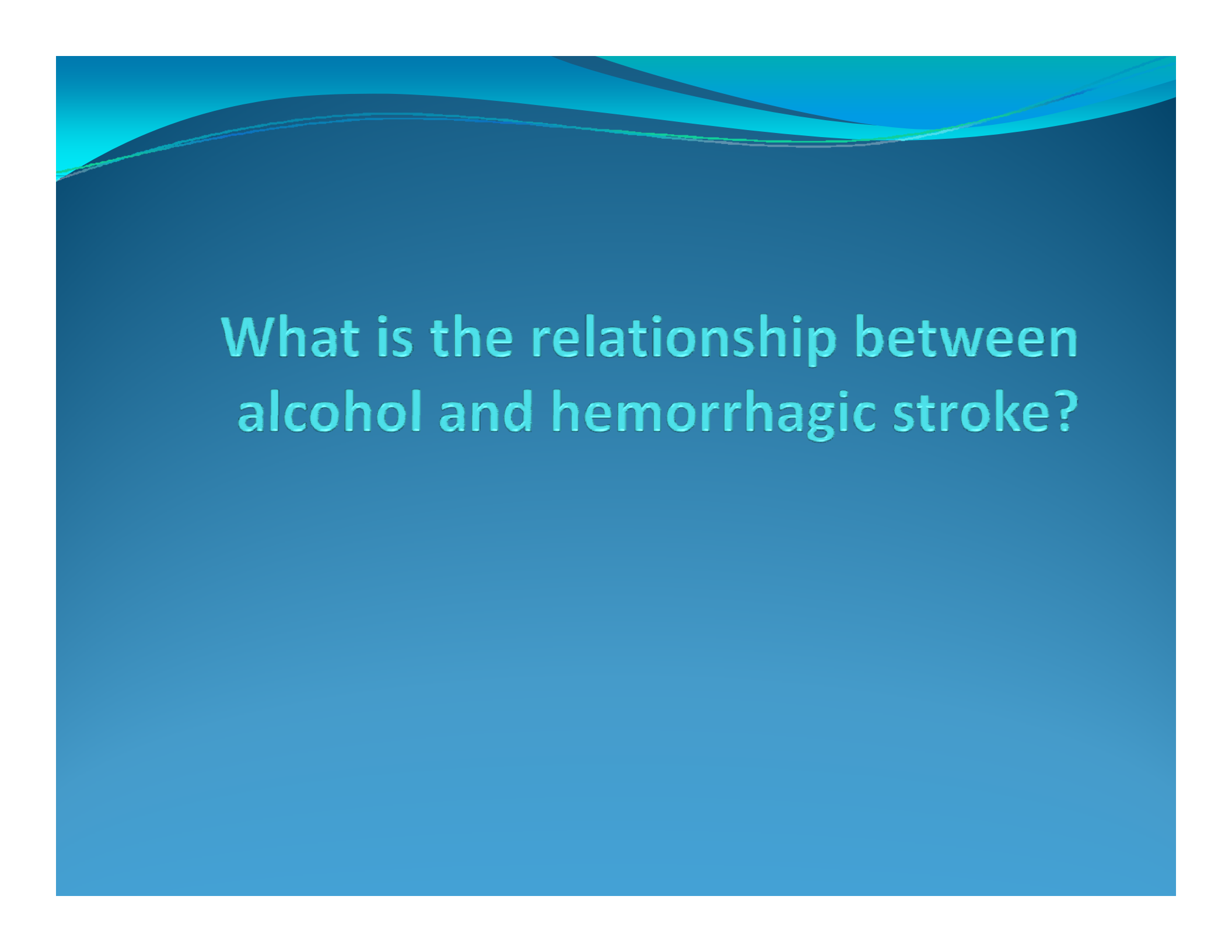
- Concluded in all reviews where heavy drinking is defined as greater than 60 g of alcohol per day (5 drinks/day)
- True of stroke and many other health conditions
- True for all types of stroke, in both sexes and across cultures



“More than 250 years ago, Sedgwick wrote that alcohol use might have a deleterious effect on cerebrovascular circulation. Carpenter noted in the 1850s that frequent intoxication increased risk of cerebral hemorrhage. The role of lesser amounts of alcohol, however, remains unclear. Since social drinking is a potentially modifiable behavior, the relation between "moderate" alcohol consumption and stroke is a subject of considerable importance.”

Camargo, 1989, *Stroke*

- 
- So what about lesser amounts of alcohol?
 - Is there a safe level?
 - Is there a recommended amount?
 - Is some better than none?



What is the relationship between alcohol and hemorrhagic stroke?

Overall Relative Risk of Stroke Associated With Alcohol Consumption

Type of stroke (# of studies)	Alcohol intake (g/day)			
	<12	12-24	24-60	>60
All strokes (35)	0.83	0.91	1.10	1.64
Hemorrhagic (12)	0.79	0.98	1.19	2.18

Reference point (RR = 1.0) is abstainers

(95% Confidence Interval)

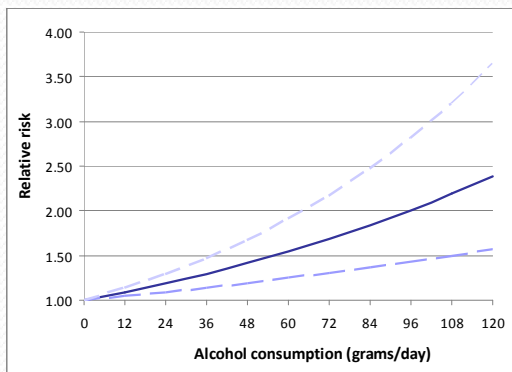
Reynolds et al, 2003, *JAMA*

RESULTS

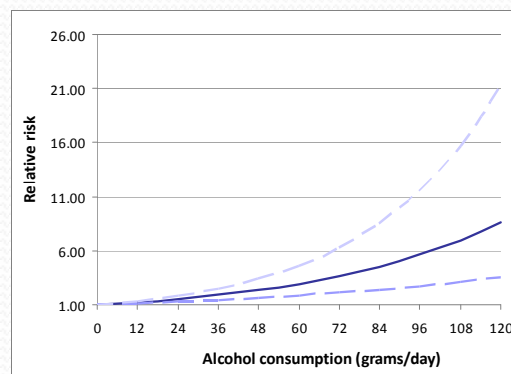
Estimated relative risks (95% CI) of hemorrhagic stroke associated with alcohol consumption derived from the random effects model by sex and endpoint

Dose*	Mortality		Morbidity	
	Men	Women	Men	Women
12g/ 1 drink	1.09 (1.05 - 1.14)	1.24 (1.13 - 1.36)	1.09 (1.05 - 1.13)	0.72 (0.56 - 0.93)
24g/ 2 drinks	1.19 (1.09 - 1.30)	1.54 (1.29 - 1.84)	1.19 (1.10 - 1.28)	0.85 (0.65 - 1.13)
36g/ 3 drinks	1.30 (1.14 - 1.47)	1.91 (1.46 - 2.50)	1.29 (1.16 - 1.44)	1.03 (0.76 - 1.39)
48g/ 4 drinks	1.42 (1.20 - 1.68)	2.37 (1.65 - 3.40)	1.41 (1.22 - 1.63)	1.24 (0.89 - 1.72)
60g/ 5 drinks	1.55 (1.25 - 1.91)	2.94 (1.87 - 4.61)	1.53 (1.28 - 1.84)	1.48 (1.03 - 2.14)
72g/ 6 drinks	1.69 (1.31 - 2.17)	3.65 (2.13 - 6.26)	1.67 (1.34 - 2.08)	1.77 (1.18 - 2.66)
84g/ 7 drinks	1.84 (1.37 - 2.47)	4.52 (2.41 - 8.49)	1.82 (1.41 - 2.35)	2.11 (1.35 - 3.30)
96g/ 8 drinks	2.01 (1.43 - 2.81)	5.61 (2.73 - 11.53)	1.98 (1.48 - 2.65)	2.50 (1.54 - 4.09)
108g/ 9 drinks	2.19 (1.50 - 3.20)	6.96 (3.10 - 15.65)	2.16 (1.56 - 3.00)	2.96 (1.73 - 5.05)
120g/ 10 drinks	2.39 (1.57 - 3.64)	8.64 (3.51 -21.24)	2.35 (1.63 - 3.39)	3.49 (1.95 - 6.23)

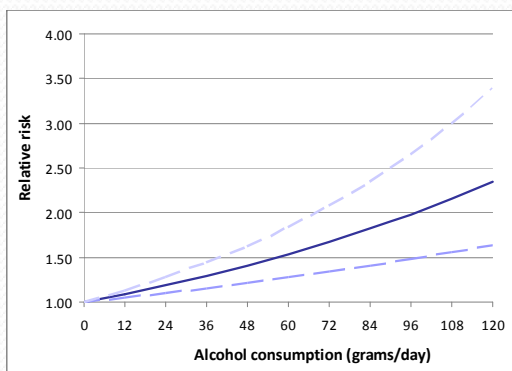
Dose-response relationship between alcohol and hemorrhagic stroke by sex, endpoint



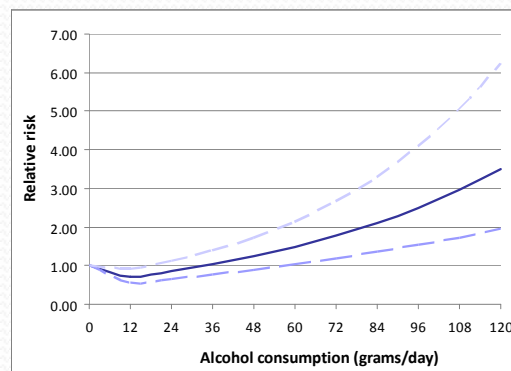
Hemorrhagic-stroke Mortality among Men (Linear dose-response relationship)



Hemorrhagic-stroke Mortality among Women (Linear dose-response relationship)



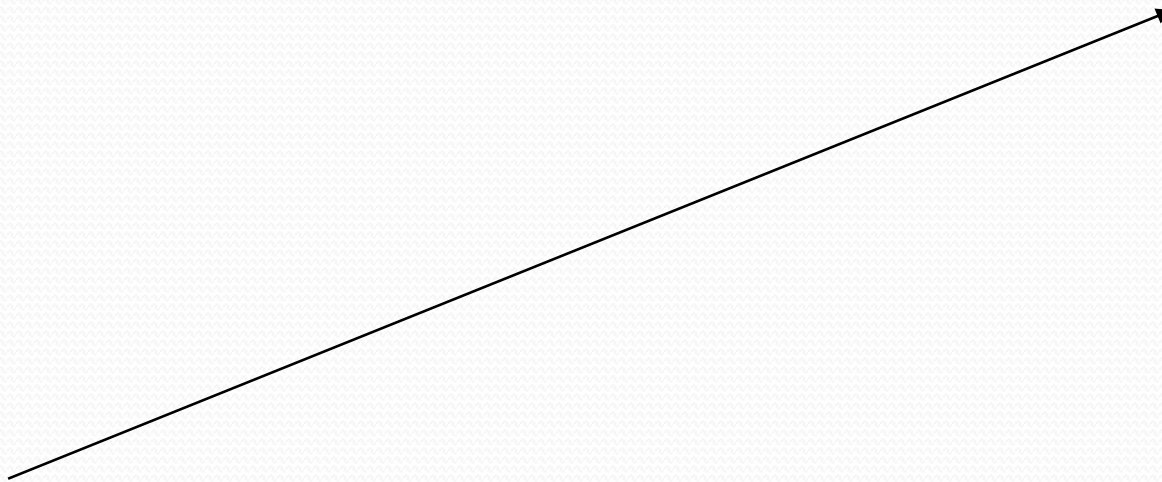
Hemorrhagic-stroke Morbidity among Men (Linear dose-response relationship)

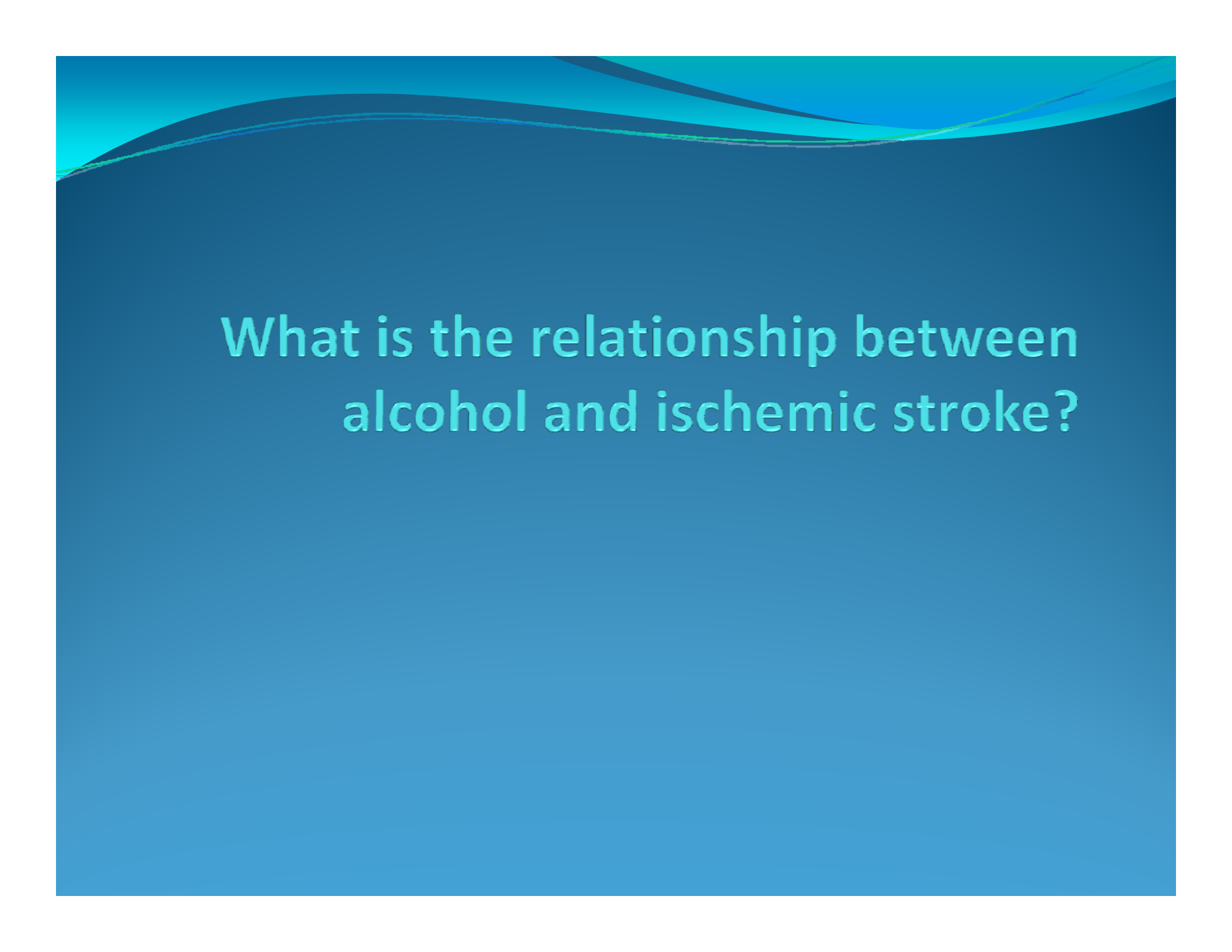


Hemorrhagic-stroke Morbidity among Women (J-shaped dose-response relationship)

Key Message #2

- The relationship between alcohol and hemorrhagic stroke is a dose response relationship.





**What is the relationship between
alcohol and ischemic stroke?**



What the reviews had to say about the relationship between alcohol and ischemic stroke:

- J shaped curve
 - Reynolds et al, 2003
 - Pinder & Sandler, 2004
- J shaped curve in Caucasians but not Asians
 - Mazzaglia, 2001
 - Camargo, 1989
- No Association
 - Corraro et al, 1999

Overall Relative Risk of Stroke Associated With Alcohol Consumption

Type of stroke (# of studies)	Alcohol intake (g/day)			
	<12	12-24	24-60	>60
All strokes (35)	0.83	0.91	1.10	1.64
Hemorrhagic (12)	0.79	0.98	1.19	2.18
Ischemic (15)	0.80	0.72	0.96	1.69

Reference point (RR = 1.0) is abstainers

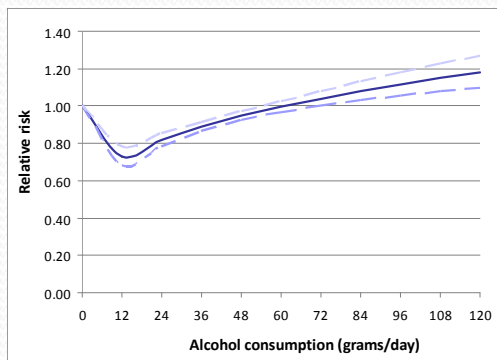
(95% Confidence Interval)

Reynolds et al, 2003, *JAMA*

Estimated relative risks (95% CI) of ischemic stroke associated with alcohol consumption derived from the random effects model by sex and endpoint

Dose*	Mortality		Morbidity	
	Men	Women	Men	Women
12g/ 1 drink	0.73 (0.68 - 0.78)	0.65 (0.54 - 0.79)	0.75 (0.70 - 0.81)	0.83 (0.66 - 1.04)
24g/ 2 drinks	0.82 (0.78 - 0.86)	0.71 (0.59 - 0.85)	0.80 (0.74 - 0.86)	0.92 (0.78 - 1.07)
36g/ 3 drinks	0.89 (0.86 - 0.91)	0.84 (0.71 - 0.99)	0.86 (0.80 - 0.93)	1.01 (0.89 - 1.16)
48g/ 4 drinks	0.95 (0.92 - 0.97)	1.04 (0.89 - 1.22)	0.93 (0.86 - 1.02)	1.11 (0.97 - 1.26)
60g/ 5 drinks	1.00 (0.97 - 1.03)	1.32 (1.09 - 1.60)	1.01 (0.92 - 1.11)	1.19 (1.04 - 1.37)
72g/ 6 drinks	1.04 (1.00 - 1.08)	1.72 (1.34 - 2.21)	1.10 (0.99 - 1.22)	1.28 (1.10 - 1.48)
84g/ 7 drinks	1.08 (1.03 - 1.13)	2.27 (1.63 - 3.15)	1.19 (1.06 - 1.34)	1.35 (1.14 - 1.60)
96g/ 8 drinks	1.12 (1.06 - 1.18)	3.02 (1.98 - 4.60)	1.29 (1.14 - 1.47)	1.43 (1.19 - 1.72)
108g/ 9 drinks	1.15 (1.08 - 1.23)	4.07 (2.42 - 6.84)	1.40 (1.21 - 1.62)	1.50 (1.22 - 1.83)
120g/ 10 drinks	1.18 (1.10 - 1.27)	5.53 (2.97 - 10.31)	1.52 (1.30 - 1.77)	1.56 (1.26 - 1.94)

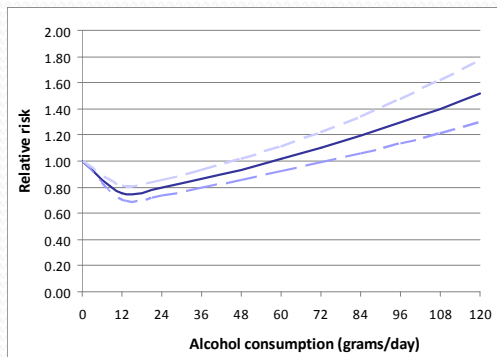
Dose-response relationship between alcohol and ischemic stroke by sex, endpoint



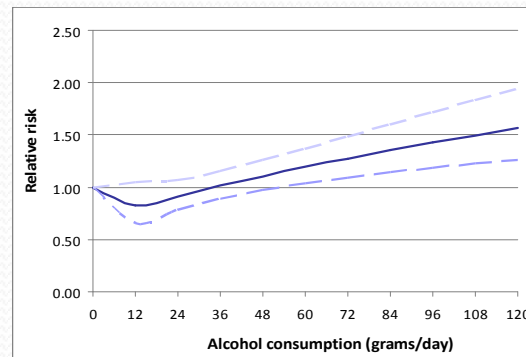
Ischemic-stroke Mortality among Men (J-shaped dose-response relationship)



Ischemic-stroke Mortality among Women (J-shaped dose-response relationship)



Ischemic-stroke Morbidity among Men (J-shaped dose-response relationship)



Ischemic-stroke Morbidity among Women (J-shaped dose-response relationship)

Key Message #3

- The relationship between alcohol and ischemic stroke is curvilinear (J shaped), with a protective effect of alcohol for low to moderate consumption, and increased risk for higher exposure

“Doctor, should he start drinking?”





Advice by health practitioners

“One size doesn’t fit all. Individualization of advice to a concerned person needs to consider his or her specific potential risks and benefits with respect to alcoholic beverages. In this important area, overgeneralized statements about health effects of alcohol and personal beliefs have little role in giving objective enlightened information.”

Klatsky, 2007, *Am J Physiol Heart Circ Physiol*

Canadian Best Practice Recommendations for Stroke Care (updated 2008)

The
Canadian
Stroke Strategy



la
Stratégie
canadienne de l'AVC

CMAJ 2008;179
(12 SUPPL):E1-E93



Canadian Stroke Network

Réseau canadien contre
les accidents cérébrovasculaires



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DU CANADA

*Finding answers. For life.
À la conquête de solutions.*



Alcohol consumption guideline

- Two or fewer standard drinks per day; and fewer than 14 drinks per week for men; and fewer than 9 drinks per week for women [Evidence Level C]

* level C indicates that there was consensus of experts with only weak or inconsistent evidence.



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Low-Risk
Drinking Guidelines
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The Low-Risk Drinking Guidelines have been developed by a team of medical and social researchers from the University of Toronto and the Centre for Addiction and Mental Health.

Low-Risk Drinking Guidelines

0
2
9
14

0	Zero drinks = lowest risk of an alcohol-related problem
2	No more than 2 standard drinks on any one day
9	Women - up to 9 standard drinks a week
14	Men - up to 14 standard drinks a week

1 standard drink = 13.6 grams of alcohol =

wine	spirits	beer
5 oz = 142 mL	1.5 oz = 43 mL	12 oz = 341 mL

Coolers and higher alcohol beers have more alcohol than one standard drink.

Endorsed by:

Alcohol Policy Network

Addictions Foundation of Manitoba

Alberta Alcohol and Drug Abuse Commission



Friends of alcohol are not friends of the brain:

- Smoking
- Drugs
- Sedentary lifestyle
- Obesity
- Accidents/injuries

Special concerns regarding the use of alcohol post stroke:

- Risk of recurrent stroke
- Risk of injuries (ie. Falls)
- Impaired function (ie. Dysphasia, dysphagia)
- Risk of dementia
- Risk of depression
- Concomitant effects of anti-platelet and/or anticoagulant medication
- Hepatic effects of cholesterol lowering medication

- 
- www.lrdg.net
 - www.camh.ca
 - www.checkyourdrinking.net
 - www.apolnet.ca



Thank-you

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