

by *Grant Innes, MD*

## Cost-effectiveness of **BEER** versus **RED WINE** for the prevention of symptomatic coronary artery disease

### Abstract

**Background:** Until now, red wine has been the cardioprotective beverage of choice, but the convenience and lack of adverse effects make beer a more cost-effective, safe and widely available choice. A paucity of evidence in support of this led to our study.

**Methods:** During a 6-month period, 11 780 consecutive patrons at 18 randomly selected urban and community liquor distributors were recruited. Participants were randomly assigned to receive either beer or wine daily for 5 years. Of the 10 078 people who met the inclusion criteria, 5033 were assigned to receive red wine and 5039 to receive beer every day.

**Results:** Effectiveness and adverse effects were equal in the 2 groups. However, costs for beer were substantially lower.

**Interpretation:** In view of its effectiveness, low cost, acceptable adverse-event profile and the fact that it is available in convenient single-dose dispensers, beer should replace red wine as the cardioprotective beverage of choice.



**Fig. 1:** The double-blind nature of the study was maintained throughout the trial. Dr. Innes is shown sitting.

Physicians have long known that a nip of brandy at bedtime is good for the heart. Recent surveys have suggested that red wine is protective against coronary artery disease (CAD). Intense industry marketing campaigns, based mainly on flawed retrospective data, have made red wine the cardioprotective beverage of choice, and most experts recommend 1 to 2 glasses per day.

However, there are problems with this agent. Relatively small volumes cause intoxication, giving it a low therapeutic index, and up to 30% of patients treated with red wine experience disabling migraine headaches. As well, when spilled, red wine leaves unsightly, tenacious stains. Although it is acceptable in some circles, red wine is esthetically displeasing to many, and several authors<sup>1,2</sup> have suggested that long-term red wine ingestion is associated with multiple negative personality traits, including priggishness and pretentiousness. Red

wine is distributed in large multi-dose containers that are inconvenient for individual dosing, and many types have awkward cork stoppers — difficult to remove in emergency situations. Worst of all, red wine is expensive — the median cost per bottle is \$17.00.

Beer is unlikely to cause intoxication in small volumes, it is widely available in convenient single-dose dispensers and, when spilled, its stains are almost invisible. It rarely causes headaches and it is accepted in widely diverse social and cultural settings. Beer is less costly than red wine, making it accessible to a broader spectrum of patients.

Given the potential advantages of beer, its effectiveness in preventing CAD needed to be studied. To date there have been no randomized clinical trials comparing these 2 therapeutic agents. The primary objective of this study was to compare the rates of symptomatic cardiac ischemic episodes during a 5-year interventional study of beer v. red wine. Our hypothesis was that beer would be as effective (equivalence trial) as red wine in preventing the combined clinical endpoint of acute myocardial infarction, all-cause mortality and progression of coronary atherosclerosis. We also believed that beer would cause fewer adverse effects.

## Methods

Our randomized, double-blind effectiveness trial was approved by our investigational review board and by the BC and Alberta Liquor Control Boards.

## Subjects

During the 6-month recruitment phase, consecutive subjects aged 25 to 70 who presented to 18 randomly selected urban and community liquor distributors were recruited for study participation. Exclusion criteria included unstable angina, personality disorder, no fixed address, inability to swallow liquids, and history of substance abuse or alcoholism. Patients were prognostically stratified on the basis of age and known CAD at the time of study enrollment.

## Interventions

A computer-generated randomization schedule was used to assign participants to 1 of 2 groups: one received red wine (Cabernet sauvignon '92, Glazer Wineries, Vernon, BC) and the other, beer (Stud-Man Lager, 5.5% alcohol, Stud Brewery, Ponoka, Alta.). Double blinding was maintained throughout the study (Fig. 1). During the 5-year study period, doses were self-administered on a daily basis and patients maintained a study log to ensure compliance.

## Data collection

After informed consent was obtained, an initial history was taken and a physical examination performed. During the intervention phase, patients were followed on a monthly basis by a study nurse who was blind to the study intervention. Using a standard data form, nurses inquired about cardiac symptoms, evaluated physiologic parameters (pulse, blood pressure, IQ, EEG tracings, annual income), documented the occurrence of outcome

events and adverse effects, assessed predefined quality-of-life measures and looked for evidence of contamination or protocol deviation.

## Outcomes

Our primary outcome measure was a combined clinical endpoint of acute myocardial infarction, all-cause mortality and progression of coronary atherosclerosis, as determined by coronary angiography or auscultation of heart sounds.

## Statistics

The statistical significance of observed differences in the primary outcome of the 2 groups was determined using some incomprehensible method that no one understood. Sample size determination was based on the primary combined outcome measure. We estimated the proportion of control group subjects experiencing adverse events during the 5-year study period to be 15%. Standard deviations were derived from previous studies,<sup>3,4</sup> and  $\Delta$  (the clinically important effect size) was set at 5%. Based on an  $\alpha$  of 0.05 and  $\beta$  of 0.2, sample size were established at 300 mL per day for the red wine and 682 mL per day for the beer.

## Results

Of the 11 780 people recruited, 1099 were excluded because of substance abuse or alcoholism, 143 because of unstable angina, 17 because of beer allergy, 6 because of inability to swallow liquids and 4 because they continually hit on the study nurses. Another 439 were eligible but refused to participate: 231 on religious grounds, 126 because their spouses refused to allow them to participate, 75 because they demanded to receive both study drugs and 7 because they believed "wine is for dorks." Overall, 10 072 patients were randomized, 5033 to red wine and 5039 to beer. Of these, 205 beer recipients and 187 wine recipients were lost to follow-up (27 in the beer group were later found grovelling in a ditch near Camrose after attending the Ponoka Stampede, but the wine drinkers were never seen again). There were 7 instances of contamination: 5 cases involving ethylene glycol in the wine and 2 cases in which small rodents were found in the beer bottles. Table 1 shows the baseline characteristics of the 2 groups.

At 5 years, there were 73 deaths, 322 myocardial infarctions and 504 patients with progression of CAD in the beer group, versus 70 deaths, 337 myocardial infarctions and 491 patients with progression of CAD in the red wine group ( $p = \text{NS}$ ). Beer drinkers had a total of 899

**Table 1: Baseline characteristics of the 2 groups of study participants\***

Characteristics	Beer <i>n</i> = 5039	Red wine <i>n</i> = 5033
Mean no. of cardiac risk factors	1.6	1.6
Mean age at enrolment	49.2	49.4
Mean weight, kg	75.7	75.1
Median income, \$	69 000	68 000
Mean IQ	99	98
Married, %	87	87
Median no. of medications taken	1.7	1.7
Mean daily alcohol intake (mL)	68	69

\*Difference is nonsignificant for all baseline characteristics.

outcome events (18.6%) and wine drinkers had 898 outcome events (18.5%), with no differences achieving statistical significance. Although effectiveness appeared equal in the 2 groups, costs were substantially different (Table 2). Adverse events were common in both groups and are summarized in Table 3.

### Interpretation

This study proves that beer is as effective as red wine, is more cost-effective for the prevention of symptomatic CAD and is a more efficient preventive strategy than renal dialysis, coronary artery bypass grafting, hypertension management, screening mammography and childhood immunization. We believe that beer should be adopted as a primary preventive strategy for all Canadians, and that beer should be added to the list of medications covered by provincial health care plans. These results will evoke a collective sigh of relief from Western Canadians and Reform Party members, who have long believed that beer is the cardioprotective beverage of choice and that red wine is for wusses and dweebs.

There is sound physiologic evidence supporting beer as the superior agent. Beer is a vasodilator; it decreases afterload and reduces myocardial oxygen consumption. In addition to its “relaxing” effects, beer decreases left ventricular wall tension and improves diastolic compliance. In a recent landmark article, Labatt and others<sup>5</sup> speculated that the primary mechanism of action of beer lies in its ability to transform people with type A personalities into people with type B, C or even D personalities, thereby reducing cardiac risk.

The animal data are compelling. In one study,<sup>6</sup> lab rats treated with beer exhibited a 20% reduction in blood pressure, a marked decrease in anxiety and a 14% increase in libido. Handlers noted that beer-treated rats were no longer intimidated by humans, refused to run the maze and suffered an increased incidence of minor injuries associated with falling off the wheel. Chimpanzees treated with a beer-enriched diet began exhibiting sexually provocative behaviour and displayed peculiar, species-inappropriate activities (e.g., farting

competitions). One of the chimps who was part of an intensive language training project gave his trainers the finger, and then told them, using sign language, to “fetch me a cold one.”

Anecdotal human evidence has also suggested that beer is protective.<sup>7</sup> While examining a regular beer-drinker in 1995, Deady<sup>8</sup> noted: “Damn! These beer-guzzling gutter alcoholics are indestructible.” In a large case-control study, Madonald<sup>9</sup> compared fitness and vocation in beer and red wine drinkers, and found that beer drinkers were more likely to be hockey players, rodeo cowboys or street punks, whereas red wine drinkers tended to be art critics, interior decorators or lawyers. These data suggest that beer enhances cognitive, athletic and cardiovascular performance. A recent Nevada study<sup>10</sup> of 140 000 drinkers suggested that beer is as cardioprotective as wine, but this study was limited by its unrandomized nature and its lack of appropriate blinding. Our study provides the first hard scientific evidence of the superiority of beer as a therapeutic agent.

Critics suggest that our study participants were too drunk to recognize or report symptomatic ischemic episodes and didn’t live long enough to develop coronary atherosclerosis. Our response: rubbish! Critics also contend that the high rate of adverse effects makes the routine use of either agent inadvisable; however, we feel these are minor problems given the fact that study sub-

**Table 2: Cost-effectiveness of beer v. red wine**

Measure of cost-effectiveness	Beer	Red wine
Primary outcome events, no. (%)	899 (18.6)	898 (18.5)
Cost per dose, \$	2.50	17.00
Cost per course of therapy, \$	9 125	69 350
No. needed to treat	12	12
Cost per outcome prevented, \$	109 000	832 000
Cost per QALY,* \$	22 000	166 000

Note: QALY = Quality-adjusted life year gained.  
\*Cost per QALY for renal dialysis = \$50 000.

**Table 3: Number of adverse events experienced by study participants**

Adverse event	Therapy; no. (and%) of participants		p
	Beer n = 4832	Red wine n = 4841	
Gastrointestinal bleeding	257 (5.0)	408 (10.0)	0.03
Cirrhosis	22 (0.5)	31 (0.6)	0.19
Depression	517 (11.0)	840 (17.0)	0.03
Job loss	88 (2.0)	69 (1.4)	0.04
Vomited on a friend	1966 (41.0)	1457 (30.0)	0.04
Made a pass at best friend’s spouse	2987 (62.0)	3617 (75.0)	0.07
Made a pass at best friend’s poodle	177 (4.0)	49 (1.0)	0.01
Unwanted pregnancy	77 (1.6)	75 (1.5)	0.78
Involved in MVA with injury	17 (0.4)	25 (0.5)	0.24
Involved in altercation	417 (9.0)	11 (0.2)	0.0001
Fractured fifth metacarpal	77 (1.6)	10 (0.2)	0.01
Was arrested	144 (3.0)	58 (1.2)	0.03
Got a tattoo	917 (19.0)	4 (0.08)	0.00001
Bought a pick-up truck	1677 (35.0)	11 (0.2)	0.005
Joined a lawn bowling club	0 (0.0)	1203 (25.0)	0.000001
Developed a “beer belly”	246 (5.0)	354 (7.0)	0.04

Note: MVA = motor vehicle accident.

jects liked the taste of their medication and had more fun during the study period.

### **Limitations of the study**

Because this test was limited to specific brands of beer and red wine, our results may not be generalizable to all brands. Moreover, we did not evaluate lower-cost generic beer or home brew, nor did we test other alcoholic beverages. It may be that vodka, rye or tequila (taken with ASA) will ultimately prove the most effective preventive strategy for CAD. Our study paves the way for future trials that compare different types and brands of alcohol.

### **Conclusions**

Given its effectiveness, low cost and acceptable adverse-event profile, beer should replace red wine as the agent of choice for the prevention of symptomatic CAD. Future studies should be conducted to determine the role beer plays in stroke prevention, cancer treatment, pain management, hypertension, anorexia and bulimia, sexual dysfunction, ectopic pregnancy, pneumonia, anxiety con-

trol, work addiction, personality disorders, Alzheimer's disease and compulsive-shopping disorder.

### **References**

Unfortunately these were left in a bar.

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**Dr. Innes is an emergency physician from St. Paul's Hospital in Vancouver. In addition to medical research, his main interests include athletics and literature. He was drafted second by the Buffalo Sabres in the 1977 NHL draft but was sidelined by an ankle injury before the season began. After this disappointment, he turned his attention to tennis, narrowly losing the 1981 Wimbledon quarter final to John McEnroe. Many of you will remember the dramatic, game-winning touchdown catch he made for the Los Angeles Raiders in the 1984 Super Bowl. Currently, in addition to practising emergency medicine, he dabbles in watercolours, writes scientific articles for the prestigious journal *Nature* and teaches creative dance at the University of British Columbia.**

**LECTURE** — *Process by which the notes of a teacher become the notes of a student without passing through the minds of either. According to the Medical Monitor, in a group of people attending a lecture 57% will be fantasizing about sex, 33% will be musing about a domestic incident, 7% of minds will be blank and 3% will be paying attention.*

— *From A Sceptic's Medical Dictionary by Michael O'Donnell, BMJ Publishing Group, London (available through the CMA Member Service Centre, 888 855-2555).*