THIS WEEK’S RESEARCH QUESTIONS

1284 What should you drink with a cheese fondue—white wine or black tea, and is a shot of schnapps good for the digestion?

1286 Is the Danish belief that submerging your feet in alcohol can make you drunk merely an urban myth—or is there some truth in it?

1287 Can you tell just by looking at someone that they’re sleep deprived?

1289 Which popular children’s toy provides symptomatic relief for ocular neuromyotonia, and why?
Effect on gastric function and symptoms of drinking wine, black tea, or schnapps with a Swiss cheese fondue: randomised controlled crossover trial

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OBJECTIVE To compare the effects of drinking white wine or black tea with Swiss cheese fondue followed by a shot of cherry schnapps on gastric emptying, appetite, and abdominal symptoms.

DESIGN Randomised controlled crossover study.

PARTICIPANTS 20 healthy adults (14 men) aged 23-58.

INTERVENTIONS Cheese fondue (3260 kJ, 32% fat) labelled with 150 mg sodium 13C-carbon-octanoate was consumed with 300 ml of white wine (13%, 40 g alcohol) or black tea in randomised order, followed by 20 ml cherry schnapps (40%, 8 g alcohol) or water in randomised order.

MAIN OUTCOME MEASURES Cumulative percentage dose of 13C substrate recovered over four hours (higher values indicate faster gastric emptying), and appetite and dyspeptic symptoms (visual analogue scales).

RESULTS Gastric emptying was significantly faster when fondue was consumed with tea or water than with wine or schnapps (cumulative percentage dose of 13C recovered 18.1%, 95% confidence interval 15.2% to 20.9% v 7.4%, 4.6% to 10.3%; P<0.001). An inverse dose-response relation between alcohol intake and gastric emptying was evident. Appetite was similar with consumption of wine or tea, but reduced if both wine and schnapps were consumed (difference −0.40, 95% confidence interval −0.01 to −0.79; P=0.046). No difference in dyspeptic symptoms was present.

CONCLUSIONS Gastric emptying after a Swiss cheese fondue is noticeably slower and appetite suppressed if consumed with higher doses of alcohol. This effect was not associated with dyspeptic symptoms.

TRIAL REGISTRATION ClinicalTrials.gov NCT00943696

Introduction

The benefits of drinking alcohol with food, especially high fat and high energy meals such as cheese fondue, are conflicting. In Switzerland, some traditionalists demand that white wine is drunk with this classic dish, whereas others insist on only black tea. The debate after dinner turns to whether a shot of “spirits” will promote digestive comfort.

In studies using a variety of meals and drinks the evidence for the effects of alcohol on gastric emptying was inconsistent.1,5 Similarly, alcohol has complex effects on appetite and the likelihood of abdominal discomfort after a meal.4 Critically, only one study has assessed both gastric function and symptoms after alcohol ingestion6 and none considered the effects of alcohol consumed with a high energy, high fat meal. We compared the effects of white wine, black tea, and cherry schnapps on gastric emptying and abdominal symptoms after ingestion of a Swiss cheese fondue in healthy volunteers.

Methods

We tested 20 healthy volunteers (14 men, aged 23 to 58) on two days, at least one week apart. None had a history of alcohol misuse or gastrointestinal disease. None was taking prescription drugs.

After fasting for at least six hours, the participants ingested 200 g of Swiss cheese fondue (3260 kJ, 64 g fat, 2 g carbohydrate, 52 g protein); 50 g Gruyere, 50 g Fribourgeois (Moite-Moite Fondue, Coop, Basel, Switzerland) labelled with 150 mg sodium 13C-octanoate. The cheese, heated using individual rechauds, was consumed with 100 g of bread (418 kJ). During the meal the participants drank 300 ml of either white wine (Fendant de Valais (Coop, Basel), 40 g of alcohol, 13% by volume) or black tea according to randomisation. At 90 minutes according to a second randomisation the participants drank 20 ml of either cherry schnapps (Etter Kirsch, Zug, Switzerland, 8 g of alcohol, 40% by volume) or water.

Before the meal and every 10-15 minutes for four hours we collected samples for breath testing. We measured the ratio of 13C to 12C in the samples using a spectroscopic method (see bmj.com). The proportion of substrate metabolised and exhaled was expressed as the maximal percentage dose of 13C recovered per hour and the cumulative percentage dose recovered for each time interval.2 4 Additionally, we used the reversed retention curve to estimate the half times for gastric emptying.7 Alcohol in breath was assessed before the meal and every 15 minutes for four hours using a standard breath test device (Draeger, Luebeck, Germany).

We used a 100 mm visual analogue scale to assess appetite (hunger, satiety, desire to eat, quantity to eat) before the meal and every 15 minutes for four hours. Similarly, we used a visual analogue scale to assess dyspeptic symptoms, nausea, bloating, and abdominal discomfort.

Statistical analysis

Gastric emptying was evaluated by the cumulative percentage dose of 13C recovered after each time interval.1 To normalise the scores for appetite we subtracted the group mean score and then divided by the group standard deviations. A correction was applied for multiple pairwise comparisons.

Results

From early during the meal and throughout the study the recovery curves for 13C were lower for wine than for tea, indicating slower gastric emptying. In addition, the recovery rate decreased immediately after ingestion of schnapps, which was most evident in association with tea (figure).

Gastric emptying was significantly faster when fondue was consumed with tea or water than with wine or schnapps (18.1%, 95% confidence interval 15.2% to 20.9% v 7.4%, 4.6% to 10.3%; P<0.001); gastric emptying half times 361 minutes (95% confidence interval 314 to 408 minutes) and 560 minutes (514 to 607 minutes), respectively. Gastric emptying was faster if fondue was consumed with tea rather than with wine, whether schnapps was consumed (increased cumulative recovery 95% confidence interval 2.9% to 11.0%);
Discussion

The debate about what to drink with a cheese fondue is one about which everyone at the Swiss dinner table has an opinion. Our results show that drinking white wine with this high fat, high energy meal decreases the rate of gastric emptying compared with black tea. Taking a shot of spirits after the meal has additional gastrointestinal effects. At the highest doses studied, alcohol seemed to suppress appetite after the meal; irrespective of beverage, dyspeptic symptoms were reported only occasionally.

We observed an important decrease in gastric emptying rate when a moderate amount of white wine (300 ml; 14% alcohol) was consumed with a Swiss cheese fondue compared with the same volume of black tea. The decrease was rapid and prolonged, with the recovery of $^{13}$C reduced from the first breath sample and never attaining the level of the control arm (figure). This finding is consistent with reports that ethanol and a variety of alcoholic beverages slow gastric emptying when taken before a meal $^{11};$ although, this effect was not always observed if the total energy content of food and drink consumed during the meal was controlled. $^{1, 2}$

A shot of schnapps (20 ml; 40%) also reduced the rate of gastric emptying. The effect was rapid, with an immediate decrease in $^{13}$C recovery after intake (figure). It is conceivable that a small volume of spirits could “bypass” the meal in the distal stomach quickly enough to exert such rapid effects through feedback from nutrient receptors in the small bowel. Although a trend relating alcohol concentration and gastric emptying was evident (see bmj.com), we found no correlation between the concentration of alcohol in the breath and the effects on gastric emptying. Together these findings indicate that alcohol has direct, rather than indirect or systemic, effects, on stomach function.

The effects of alcohol on appetite and abdominal symptoms are complex, depending on the timing, quantity, and other characteristics of the drink and the meal. $^{6} - ^{11}$ In this study alcohol suppressed appetite, but this was apparent only at the highest concentration (48 g alcohol consumed as wine and schnapps). Although the energy density of alcohol is second only to that of fat, its effect on satiation seems to be less than that of other macronutrients. $^{6}$

We found no association between beverage consumed during the meal and dyspepsia after the meal. Alcohol promotes gastric relaxation but delays gastric emptying. As a consequence, drinking white wine and schnapps with a Swiss cheese fondue may provide short term relief of postprandial dyspepsia; however, this may come at the cost of more prolonged fullness and reflux.

Connoisseurs might point out that wine or schnapps is often added to fondue; this would not confound the results because, as noted by a cookbook writer, alcohol boiled at 78°C will have evaporated after 20-30 seconds. $^{12}$ Healthy readers should be reassured that they can continue to enjoy fondue with the beverage of their choice without concerns about postprandial digestive comfort.

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**Data sharing:** Full study data including statistical analysis and technical appendix are available from the corresponding author at dr.mark.fox@gmail.com.


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Testing the validity of the Danish urban myth that alcohol can be absorbed through feet: open labelled self experimental study

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OBJECTIVE To determine the validity of the Danish urban myth that it is possible to get drunk by submerging feet in alcohol.

DESIGN Open labelled, self experimental study.

SETTING Office of a Danish hospital.

PARTICIPANTS Three adults, median age 32 (range 31-35).

MAIN OUTCOME MEASURES Primary end point was concentration of plasma ethanol (detection limit 2.2 mmol/L (10 mg/100 mL)), measured every 30 minutes for three hours with feet submerged in 2100 mL of vodka. The secondary outcome was self assessment of intoxication related symptoms: self confidence, urge to speak, and number of spontaneous hugs.

RESULTS Plasma ethanol concentrations were below the detection limit of 2.2 mmol/L (10 mg/100 mL). No significant changes were observed in intoxication related symptoms, although self confidence and urge to speak increased slightly at the start of the study.

CONCLUSION Our results suggest that feet are impenetrable to the alcohol component of vodka. We therefore conclude that the Danish urban myth of being able to get drunk by submerging feet in alcoholic beverages is just that; a myth.

Discussion

Our results suggest that the transcutaneous uptake of alcohol (vodka, 37.5% by volume) through feet is not possible. We therefore conclude that the Danish urban myth about being able to get drunk by submerging feet in alcohol is just that; a myth.

The limited number of participants is a weakness of this study. However, the frequent measurements of alcohol concentrations, a three hour study period (corresponding to a medium length visit to the pub), and clear data make the results credible. Moreover, the results are in accordance with a study in which no transcutaneous absorption of alcohol was observed after multiple use of an ethanol based hand sanitiser.

As the implications of the study are many, we will mention a few. Driving with boots full of vodka seems to be safe. Brewery workers cannot become intoxicated by “falling” into a vat. Importantly, students experimenting with transcutaneous alcohol absorption should move on to more relevant activities.

Many questions are still to be answered in the research specialty of alcohol transport across non-gastrointestinal barriers. This study has shown that feet are impenetrable to the alcohol component of Karloff vodka. Other stronger beverages, beetroot juice, or combinations of juices and alcoholic beverages may, however, cross the epithelial barrier of the skin. Moreover, new pastimes, such as “eyeball drinking,” have emerged. The significance of this activity is unknown. Rumour has it that it makes you drunk quickly... and may damage your eyes.
Beauty sleep: experimental study on the perceived health and attractiveness of sleep deprived people

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OBJECTIVE To investigate whether sleep deprived people are perceived as less healthy, less attractive, and more tired than after a normal night's sleep.

DESIGN Experimental study.

SETTING Sleep laboratory in Stockholm, Sweden.

PARTICIPANTS 23 healthy, sleep deprived adults (age 18-31) who were photographed and 65 untrained observers (age 18-61) who rated the photographs.

INTERVENTION Participants were photographed after a normal night’s sleep (eight hours) and after sleep deprivation (31 hours of wakefulness after a night of reduced sleep). The photographs were presented in a randomised order and rated by untrained observers.

MAIN OUTCOME MEASURES Difference in observer ratings of perceived health, attractiveness, and tiredness between sleep deprived and well rested participants using a visual analogue scale (100 mm).

RESULTS Sleep deprived people were rated as less healthy (visual analogue scale scores, mean 63 (SE 2), P<0.001), more tired (53 (SE 3), P<0.001), and less attractive (38 (SE 2), P<0.001) than after a normal night’s sleep. The decrease in rated health was associated with ratings of increased tiredness and decreased attractiveness.

CONCLUSION Our findings show that sleep deprived people appear less healthy, less attractive, and more tired compared with when they are well rested. This suggests that humans are sensitive to sleep related facial cues, with potential implications for social and clinical judgments and behaviour. Studies are warranted for understanding how these effects may affect clinical decision making and can add knowledge with direct implications in a medical context.

Introduction
Sleep has well established effects on physiological, cognitive, and behavioural functionality and long term health, but its role in social perception, such as that underlying judgments of attractiveness and health, is only anecdotal. To describe the relation between sleep deprivation and perceived health and attractiveness we asked untrained observers to rate the photographed faces of people after a normal night’s sleep and after sleep deprivation.

Methods
We photographed the faces of 23 adults between 14.00 and 15.00 after a normal night’s sleep (23.00-07.00 and seven hours of wakefulness) and after sleep deprivation (02.00-07.00 and 31 hours of wakefulness).

Sleep times were confirmed with diaries, and by text messages sent at bedtime and on awakening (mean time in bed for the normal sleep condition 8.45 (SE 0.20) hours). The sleep deprivation condition started with a restriction of sleep to five hours in bed; the participants texted the time that they fell asleep and awoke (mean 5.06 (SE 0.04) hours). For the next night of sleep deprivation, the participants arrived at the sleep laboratory at 22.00 (after 15 hours of wakefulness) and stayed awake for a further 16 hours. For the sleep condition, participants came to the laboratory at 12.00 (after five hours of wakefulness).

For the photo shoot, participants were asked to look into the camera with a neutral, relaxed expression. A series of five or six photographs were taken (see bmj.com). The photographer was not blinded to the sleep conditions, but followed a standardised procedure, including minimal interaction with the participants. A blinded rater chose the most typical photograph from each series.

A month later the photographs were presented at intervals of six seconds in a randomised order to 65 observers (mean age 30 (range 18-61) years), who were unaware of the study.

WHAT IS ALREADY KNOWN ON THIS TOPIC
• Short or disturbed sleep and fatigue constitute major risk factors for health and safety
• Complaints of short or disturbed sleep are common among patients seeking healthcare
• The human face is the main source of information for social signalling

WHAT THIS STUDY ADDS
• The facial cues of sleep deprived people are sufficient for others to judge them as more tired, less healthy, and less attractive, lending the first scientific support to the concept of “beauty sleep”
• By affecting doctors’ general perception of apparent health, the sleep history of a patient may affect clinical decisions and diagnostic precision
conditions. They rated the faces in three sessions, for attractiveness, health, and tiredness on a 100 mm visual analogue scale. To avoid the influence of possible order effects we presented the photographs in a balanced order between conditions for each session and allowed a brief intermission after every 23 photographs, including a working memory task for 23 seconds to prevent the faces being memorised.

Statistical analyses

Data were analysed using multilevel mixed effects linear regression, with two crossed independent random effects accounting for random variation between observers and participants using xtmixed in Stata 9.2. We also present the effect of condition as the percentage change from baseline condition (reference) using the absolute value in millimetres (rated on the visual analogue scale).

Results

When sleep deprived, people were rated as less healthy (visual analogue scale scores, mean 63 (SE 2) v 68 (SE 2)), more tired (53 (SE 3) v 44 (SE 3)), and less attractive (38 (SE 2) v 40 (SE 2); P<0.001 for all) than after a normal night’s sleep (see bmj.com). Compared with the normal sleep condition, perceptions of health and attractiveness in the sleep deprived condition decreased on average by 6% and 4% and tiredness increased by 19%.

Discussion

Sleep deprived people are perceived as less attractive, less healthy, and more tired compared with when they are well rested. Apparent tiredness was strongly related to looking less healthy and less attractive. That the untrained observers detected the effects of sleep loss in others provides evidence for a perceptual ability not previously subjected to experimental control, and supports the notion that sleep history gives rise to socially relevant signals that provide information about the bearer.

The results are related to photographs taken in an artificial setting and presented to the observers for only six seconds. It is likely that the effects reported here would be larger in real life situations, when overt behaviour and interactions add further information. Blink interval and blink duration are known to be indicators of sleepiness, and trained observers are able to evaluate reliably the drowsiness of drivers by watching their videotaped faces. In addition, a few of the people were perceived as healthier, less tired, and more attractive in the sleep deprived condition.

Our findings suggest a prominent role of sleep history in several domains of interpersonal perception and judgment, such as clinical judgment. In addition, because attractiveness motivates sexual behaviour, collaboration, and superior treatment, sleep loss may have consequences in other social contexts. That good sleep supports a healthy look and poor sleep the reverse may be of particular relevance in the medical setting, where estimates of health are essential. It is possible that people with sleep disturbances, clinical or otherwise, would be judged as more unhealthy, whereas those who have had an unusually good night’s sleep may be perceived as rather healthy.
Conclusions
People are capable of detecting sleep loss related facial cues, and these modify judgments of another’s health and attractiveness. These conclusions agree well with existing models describing a link between sleep and good health, and attractiveness and health.

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Participant consent: Participant’s consent obtained.

Data sharing: Statistical code and dataset of ratings are available from the corresponding author at john.axelsson@ki.se.

Can he fix it? Yes, he can!

We present a case in which a novel treatment was instigated by the patient to control symptoms of ocular neuromyotonia

Case report
A 68 year old woman presented with intermittent diplopia lasting a few minutes precipitated by left gaze. Best corrected visual acuities were 6/9 right and 6/36 left. Initial examination showed only a dense left cataract, which was removed, improving vision to 6/9. Unfortunately her symptoms continued. Her diplopia was elicited during orthoptic review, showing a left exotropia, with updrift, measuring 40 prism dioptries. There was limitation of adduction and depression of the left eye. Imaging showed no structural lesion. The episodes increased in frequency to 50-100 times per day. However, she found one day, while playing with her grandson, that wearing a pair of his tight “Bob the Builder” goggles prevented the episodes from occurring (figure).

As a result she took to wearing the goggles daily around the house, particularly to watch the television. She also tried other types of goggles, including swimming goggles, but these were not as effective. She was diagnosed with idiopathic ocular neuromyotonia affecting left lateral rectus and left superior rectus muscles. Symptom control was achieved with carbamazepine after a trial of gabapentin failed.

Discussion
Ocular neuromyotonia, first described in 1970, is characterised by transient diplopia and strabismus that occurs spontaneously or with maintenance of eccentric gaze, resulting in tonic contraction or spasm of ocular muscles. It is a rare paroxysmal involuntary contraction that may affect one or more of the ocular motor muscles.

Sixth nerve myotonia is triggered by sustained action of the lateral rectus muscle, leading to intermittent exotropia with restriction of adduction.

In our patient the episodes of involuntary strabismus were triggered by lateral gaze. By wearing restricted field goggles that eliminated the stimulus for lateral gaze, the patient prevented these episodes.

Ocular neuromyotonia is thought to result from spontaneous neural firing from a single neurone or group of neurones, with interneural transmission resulting in a self perpetuating circuit. Eliminating this mechanism with membrane stabilising agents can lead to resolution of symptoms.

Our patient has identified a new mechanism for preventing episodes of ocular neuromyotonia, but carbamazepine has now stabilised her condition.

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