Class Material

1. Randomized control trials (RCTs) can provide the best evidence that a new cancer treatment works (or is harmful). Large studies of over five decades of RCTs have shown that new treatments are as likely to harm patients as they are to help them, though most do neither harm or good. This finding shows:
   ○ A) that it is ethical to enroll patients in RCTs
   ○ B) that new treatments must be tested in RCTs
   ○ C) why well-meaning physicians can harm patients
   ○ D) that medical science is not very good at figuring out what works
   ○ E) all of the above

Correct answer(s): E

2. Vaccination eradicated smallpox and now rinderpest from the planet. Why can’t we use vaccination now to eradicate HPV, the sexually transmitted virus that causes cervical cancers?
   ○ A) it is too expensive
   ○ B) not enough men will get vaccinated
   ○ C) the vaccine is not safe enough
   ○ D) the vaccine does not work well enough

Correct answer(s): A

3. Why do many people believe autism is caused by vaccines?
   ○ A) There is scientific evidence for a causal relationship
   ○ B) The Institute of Medicine published papers saying so
   ○ C) Every child who gets vaccinated gets autism
   ○ D) There are many powerful anecdotes of children becoming autistic after vaccination

Correct answer(s): D

4. What evidence would prove that vaccines never causes autism?
   ○ A) The cure of Jenny McCarthy’s son
   ○ B) No evidence could ever prove it
   ○ C) Large randomized control trials
   ○ D) Studies of rare genotypes
   ○ E) Rejection of the null hypothesis

Correct answer(s): B

5. Scientists have concluded that the Gardasil vaccine is safe. In reaching this conclusion, they have
   ○ A) failed to find sufficient evidence to reject the null hypothesis
6. The smallpox vaccine killed one person in every million people vaccinated, making it the most dangerous vaccine that ever went into widespread use. Smallpox itself kills about one in five people. When should a rational person ask for the smallpox vaccine?
   - A) If there was an smallpox outbreak in outer Mongolia
   - B) When Jenny McCarthy says so
   - C) When the chance of contracting smallpox is more than five in a million
   - D) Not until the chance of contracting smallpox is more than one in five

Correct answer(s): C

7. Dr Braithwaite argued that fish can suffer pain but lobsters and octopuses cannot because there is no evidence that lobsters and octopuses have which of the following?
   - A) dull and sharp localized sensations
   - B) nociception and conscious awareness
   - C) nociception and reflex action
   - D) stimulus and response

Correct answer(s): B

8. Who discovered that fish have specialized pain receptors and nerve fibers to transmit pain information?
   - A) Victoria Braithwaite and her research group, this century
   - B) Thomas Nagel, 25 years ago
   - C) Henry Gray, author of the original Gray’s Anatomy, early in the 20th century
   - D) Jeremy Bentham, at the end of the 1700’s

Correct answer(s): A

9. Which of the following is a line of evidence that fish feel pain?
   - A) drugs that humans know as ‘pain-killers’ restore fish behavior to normal after a noxious stimulus
   - B) fish have autotomy
   - C) fish have a cerebral cortex
   - D) fish have no C-fibers

Correct answer(s): A

10. Lysenko’s theories of plant genetics dominated biological science in the Soviet Union for over thirty
years, even though he was very wrong. Why did the scientific process not work in this case?
   ○ A) Lysenko’s science promised things the government and the people wanted to hear
   ○ B) Lysenko announced his results to the press rather than publishing them in the scientific
   literature
   ○ C) Scientific dissent was suppressed by politicians
   ○ D) Politicians deemed ideology more important than evidence
   ○ E) All of the above
   ○ F) In those days, Soviet scientists did not understand the scientific method

Correct answer(s): E

11. For more than two thousand years, physicians believed that removing substantial amounts of blood
from a patient helped heal them. Today we know that blood letting is almost always harmful. How
did such a dangerous idea persist for two millennia?
   ○ A) an influential Roman physician believed in blood letting
   ○ B) physicians developed a variety of theories supporting the idea – for instance, that since the
   corpses of yellow fever victims are full of blood, yellow fever victims were killed by an excess of
   blood
   ○ C) for most of the last two thousand years, doctors had little to offer but felt the need to do
   something
   ○ D) physicians saw some patients recover after blood letting and assumed the ones that died
   were anyhow unsaveable
   ○ E) the scientific method is a very recent development in medicine
   ○ F) all of the above
   ○ G) none of the above

Correct answer(s): F

12. What is the major challenge for using on-line media like Twitter to study what people think?
   ○ A) Computers need to be taught how to categorize human statements
   ○ B) Enormous amounts of computer power are needed to process millions of statements
   ○ C) People are reluctant to say what they think on social media
   ○ D) Some people use social media more than others

Correct answer(s): D

13. Which of the following are exploited by magicians?
   ○ A) The tendency of humans to see patterns where none exists
   ○ B) Irrelevant distractions
   ○ C) The tendency of humans to see cause and effect where none exists
   ○ D) The tendency of humans to attribute things they don’t understand to the supernatural
   ○ E) All of the above

Correct answer(s): E

Interpretation of science in the media
Heavy drinking tied to higher stomach cancer risk

NEW YORK | Fri Oct 28, 2011 6:21pm EDT

(Reuters Health) - Men who down more than four alcoholic drinks in a day may have a heightened risk of stomach cancer, a large European analysis suggests.

A number of studies have looked at whether people's drinking habits are related to their risk of stomach cancer, and come to mixed conclusions. These latest findings, from a study of more than 500,000 European adults, suggest that heavy-drinking men are more likely to develop the cancer than light drinkers are.

At the start of the study, 10,000-plus men said they averaged more than four drinks per day. And their odds of developing stomach cancer over the next decade were twice those of light drinkers (who had the equivalent of about half a drink per day or less). When the researchers looked more closely at the type of alcohol people consumed, they found that beer, in particular -- as opposed to wine or liquor -- seemed to be connected to stomach cancer risk. There were no similar connections seen in women, according to the researchers, led by Dr. Eric J. Duell of the Catalan Institute of Oncology in Barcelona, Spain. But there were also far fewer heavy drinkers among the female participants (just under 2,300).

The findings, reported in the American Journal of Clinical Nutrition, do not prove that alcohol itself leads to stomach cancer in some men. And the absolute risk for any one heavy drinker may be small. Of nearly 13,000 men and women who were heavy drinkers when they entered the study, just 33 developed stomach cancer over the follow-up period. Still, experts already recommend that people who drink do so only in moderation. That generally means no more than two drinks per day for men, and no more than one for
women.

Heavy drinking is linked to cancers of the mouth and throat, as well as other serious conditions like scarring of the liver. Stomach cancer is relatively uncommon in the U.S. and other Western countries, though it's much more prevalent in other parts of the world, particularly developing nations. About 21,500 Americans will be diagnosed with stomach cancer this year, according to the American Cancer Society.

Smoking is one of the risk factors for the disease. And in some past studies, it's been hard to separate the possible effects of heavy drinking on stomach cancer from those of smoking -- since the same people often have both habits. In the current study, though, Duell's team found that heavy drinking was linked to stomach cancer in men regardless of smoking habits.

The link also held when the researchers factored in people's diet habits (red and processed meats, for example, have been tied to stomach cancer) and any infection with H. pylori -- a type of bacteria that contributes to ulcers. While most people with H. pylori do not develop cancer, persistent infection is thought to raise the risk of stomach cancer in certain people.

If heavy drinking is a cause of stomach cancer, it may be related to one of the metabolic byproducts of alcohol -- called acetaldehyde. The substance is a known human carcinogen, Duell's team notes.

On top of that, beer contains compounds known as nitrosamines, which cause cancer in animals. So it's possible, the researchers speculate, that the combination of those substances and acetaldehyde could explain why beer, in particular, was tied to stomach cancer in this study.


14. What hypothesis is being tested by the study reported here?
   ○ A) bacteria predispose beer drinkers to stomach cancer
   ○ B) men get more stomach cancer than women
   ○ C) heavy drinking causes stomach cancer
   ○ D) stomach cancer causes heavy drinking
   ○ E) all of the above

   Correct answer(s): C

15. The study is
   ○ A) observational (correlational)
   ○ B) experimental
   ○ C) anecdotal
   ○ D) hard to say

   Correct answer(s): A

16. Which of the following statements is true?
17. What mechanism is being proposed to explain the link between heavy drinking and stomach cancers?  
   - A) smoking  
   - B) diet  
   - C) infection with the bacterium *H. pylori*  
   - D) acetaldehyde and nitrosamines  
   - E) no mechanisms are proposed  

Correct answer(s): D

18. The statement in the article headline is about  
   - A) relative risk  
   - B) absolute risk  

Correct answer(s): A

19. For men drinking more than four drinks a day, is the risk of getting gastric cancer high?  
   - A) Yes  
   - B) No  
   - C) Well it is about 100 times more likely than getting killed in a car crash  
   - D) Well it is about the same risk as getting killed in a car crash  
   - E) Well it is about 100 times less likely than getting killed in a car crash  

Correct answer(s): D

20. From the article, what is most likely to cause gastric ulcers?  
   - A) Red meat  
   - B) Beer  
   - C) The bacterium *H. pylori*  
   - D) Hard to say  

Correct answer(s): D

21. The article says that the findings "do not prove that alcohol itself leads to stomach cancer in some men". Why is this statement correct?  
   - A) science can never completely prove anything  
   - B) the results might be due to chance  
   - C) there are other things which might make men who are predisposed to stomach cancer be
heavy drinkers
   ○ D) the conclusion might be a type 1 error (false positive)
   ○ E) all of the above

Correct answer(s): E

22. It is well known that infections with the bacterium *H. pylori* can cause stomach cancer. Why did the researchers 'factor in' infections with *H. pylori*?
   ○ A) People infected with *H. pylori* are more likely to get stomach cancers
   ○ B) Heavy drinkers are more likely to be infected with *H. pylori*
   ○ C) In case heavy drinkers were more likely to get persistent *H. pylori* which would in turn give them stomach cancer
   ○ D) *H. pylori* infections could generate an association between heavy drinking and stomach cancer even if heavy drinking does not cause stomach cancers
   ○ E) to avoid making a type 2 error (false negative).

Correct answer(s): D

23. The study found no risk of stomach cancer for women who drink heavily. This could be because
   ○ A) heavy drinking does not increase risk of stomach cancer for women
   ○ B) there were not enough women in the study who drank heavily
   ○ C) the scientists' conclusion is a Type 2 error (false negative)
   ○ D) women lie about their beer consumption
   ○ E) all of the above

Correct answer(s): E

24. What was the probability that this study would have detected an effect of beer on risk of stomach cancer in women, if in reality beer causes stomach cancers in women?
   ○ A) 5%
   ○ B) 0%
   ○ C) 100%
   ○ D) impossible to say

Correct answer(s): D

25. What is the probability the researchers would have concluded that heavy drinking men are more likely to get stomach cancer, if in reality heavy drinking does not cause stomach cancers in men?
   ○ A) 5%
   ○ B) 0%
   ○ C) 100%
   ○ D) impossible to say

Correct answer(s): A

26. If you want to reduce your chances of stomach cancer, should you
27. Does this study suffer from the Texas sharp shooter problem?
   - A) Yes
   - B) No
   - C) Possibly

   **Correct answer(s): C**

28. Fox News says [here](#) that alcohol has health benefits, citing as one line of evidence that "The French, who drink lots of red wine and have the highest per capita alcohol consumption, actually have one of the lowest rates of coronary heart disease mortality". How compelling is this evidence?
   - A) It is strong correlational evidence that alcohol has health benefits because there are a lot of Frenchmen.
   - B) It is irrelevant: what happens to Frenchmen has no bearing on what happens to Americans.
   - C) It is barely relevant: it is only one observation.
   - D) It cannot be compelling because Fox News said it.
   - E) It must be compelling because Fox News said it.

   **Correct answer(s): C**