

Participant Names: _____ & _____

INSTRUCTIONS: Welcome disease detectives! We hope you enjoy this test. You will find a significant amount of data in the disease descriptions below. Some of it will be useful in answering questions and some of it will be extraneous. Select the one answer that is most correct for each question and mark it on the answer sheet.

SCENARIO A: CIGARETTE SMOKING PREVALANCE 2003

In the November 12, 2004 issue of the *Morbidity and Mortality Weekly Report* from the Center for Disease Control, it was noted that there are about 440,000 cigarette smoking related deaths in the United States every year. This accounts for 1 out of every 5 deaths. The 2003 Behavioral Risk Factor Surveillance System Survey (BRFSS) is a random-digit dialed telephone survey of United States civilian, non-institutionalized population over 18 years of age. The BRFSS is used by the CDC to collect information about personal behaviors that affect morbidity and mortality nationwide. In this survey, a current smoker was defined as a respondent who reported that he/she currently smoked every day or some days and had smoked at least 100 cigarettes in his/her life. On the next page is a list of prevalence data gathered by the BRFSS.

STUDY THE ATTACHED TABLE ON THE NEXT PAGE

The questions about this scenario and about the table will start on page 4

It is titled: "THE PREVALENCE OF CURRENT CIGARETTE SMOKING AMONG ADULTS"

TABLE. Prevalence of current cigarette smoking among adults*, by state/area and sex — Behavioral Risk Factor Surveillance System, 50 states, District of Columbia, Guam, Puerto Rico, and U.S. Virgin Islands, 2003

State/Area	Men		Women		Total	
	%	(95% CI) [†]	%	(95% CI)	%	(95% CI)
Alabama	28.5	(±3.1)	22.4	(±2.0)	25.3	(±1.8)
Alaska	30.3	(±3.6)	21.9	(±3.0)	26.3	(±2.4)
Arizona	23.8	(±3.9)	18.2	(±2.7)	21.0	(±2.4)
Arkansas	27.6	(±2.5)	22.3	(±1.8)	24.8	(±1.5)
California	20.5	(±2.3)	13.2	(±1.5)	16.8	(±1.4)
Colorado	19.6	(±2.2)	17.5	(±1.7)	18.5	(±1.4)
Connecticut	19.7	(±1.9)	17.9	(±1.6)	18.7	(±1.2)
Delaware	26.0	(±3.0)	18.2	(±2.0)	21.9	(±1.8)
District of Columbia	26.2	(±4.2)	19.0	(±2.9)	22.3	(±2.5)
Florida	26.0	(±3.1)	22.1	(±2.3)	23.9	(±1.9)
Georgia	25.8	(±2.3)	20.0	(±1.5)	22.8	(±1.4)
Hawaii	20.1	(±2.5)	14.4	(±1.7)	17.3	(±1.5)
Idaho	19.5	(±2.1)	18.5	(±1.7)	19.0	(±1.3)
Illinois	28.3	(±2.8)	20.5	(±1.9)	24.3	(±1.7)
Indiana	28.6	(±2.2)	23.8	(±1.6)	26.1	(±1.3)
Iowa	22.8	(±2.2)	20.7	(±1.9)	21.7	(±1.5)
Kansas	21.0	(±2.3)	19.7	(±1.7)	20.4	(±1.4)
Kentucky	33.8	(±2.7)	28.1	(±1.9)	30.8	(±1.7)
Louisiana	30.3	(±2.5)	23.2	(±1.7)	26.6	(±1.5)
Maine	23.1	(±3.1)	24.0	(±2.5)	23.6	(±2.0)
Maryland	23.0	(±2.6)	17.7	(±1.8)	20.2	(±1.6)
Massachusetts	20.0	(±1.8)	18.4	(±1.4)	19.2	(±1.2)
Michigan	30.2	(±3.0)	22.3	(±2.1)	26.2	(±1.8)
Minnesota	22.4	(±2.4)	19.9	(±1.9)	21.1	(±1.5)
Mississippi	31.1	(±2.7)	20.7	(±1.7)	25.6	(±1.6)
Missouri	31.2	(±3.1)	23.8	(±2.5)	27.3	(±2.0)
Montana	19.5	(±2.5)	20.3	(±2.2)	19.9	(±1.7)
Nebraska	23.6	(±2.2)	19.0	(±1.6)	21.3	(±1.4)
Nevada	29.0	(±3.5)	21.3	(±2.9)	25.2	(±2.3)
New Hampshire	22.4	(±2.2)	20.2	(±1.8)	21.2	(±1.4)
New Jersey	21.2	(±1.5)	17.9	(±1.1)	19.5	(±0.9)
New Mexico	23.6	(±2.2)	20.5	(±1.7)	22.0	(±1.4)
New York	24.8	(±2.2)	18.8	(±1.6)	21.6	(±1.3)
North Carolina	28.0	(±2.4)	21.9	(±1.7)	24.8	(±1.5)
North Dakota	22.0	(±2.5)	19.0	(±2.2)	20.5	(±1.7)
Ohio	26.9	(±2.8)	24.0	(±2.2)	25.4	(±1.8)
Oklahoma	27.8	(±2.0)	22.7	(±1.4)	25.2	(±1.2)
Oregon	23.1	(±2.4)	18.9	(±1.8)	21.0	(±1.5)
Pennsylvania	27.1	(±2.7)	24.1	(±2.1)	25.5	(±1.7)
Rhode Island	23.8	(±2.7)	21.1	(±2.0)	22.4	(±1.6)
South Carolina	28.5	(±2.3)	22.8	(±1.6)	25.5	(±1.4)
South Dakota	24.7	(±2.3)	20.7	(±1.8)	22.7	(±1.4)
Tennessee	27.3	(±3.3)	24.2	(±2.4)	25.7	(±2.0)
Texas	26.7	(±2.2)	17.6	(±1.4)	22.1	(±1.3)
Utah	14.0	(±2.2)	9.9	(±1.6)	12.0	(±1.4)
Vermont	19.8	(±2.3)	19.4	(±1.9)	19.6	(±1.5)
Virginia	26.4	(±2.5)	18.0	(±1.6)	22.1	(±1.5)
Washington	20.9	(±1.2)	18.2	(±0.9)	19.5	(±0.7)
West Virginia	27.6	(±2.8)	27.2	(±2.3)	27.4	(±1.8)
Wisconsin	24.0	(±2.6)	20.3	(±2.0)	22.1	(±1.6)
Wyoming	25.2	(±2.4)	24.1	(±2.0)	24.6	(±1.6)
<i>Median</i>	<i>24.8</i>		<i>20.3</i>		<i>22.1</i>	
Guam	42.0	(±5.9)	25.8	(±4.6)	34.0	(±3.8)
Puerto Rico	19.3	(±2.6)	8.5	(±1.3)	13.6	(±1.5)
U.S. Virgin Islands	14.2	(±3.2)	6.6	(±1.6)	10.0	(±1.7)
<i>Median</i>	<i>19.3</i>		<i>8.5</i>		<i>13.6</i>	

* Persons aged ≥18 years who reported having smoked ≥100 cigarettes during their lifetimes and who currently smoke every day or some days.

† Confidence interval.

QUESTIONS FOR SCENARIO A

Questions 1 - 13

1. If the survey is a highly accurate sampling, and if the population of Arkansas in 2003 was 2,725,714, how many adults in that state smoked during 2003?
 - a. cannot be determined
 - b. 200
 - c. 675,977
 - d. 200,000
2. From the data in the table, can you calculate what percentage of the United States population lives in Nebraska?
 - a. yes
 - b. no
3. Which of the following are possible reasons why the survey results may not accurately reflect true cigarette smoking prevalence rates?
 - a. respondents may not be honest
 - b. people without phones may have different rates of smoking
 - c. both a and b
 - d. smoking is a bad habit
4. Six states (California, Connecticut, Delaware, Maine, Massachusetts, and New York) have statewide laws against smoking in all indoor workplaces and public places. What is the average prevalence (in %) of smoking in those 6 states?
 - a. 25.2%
 - b. 30.1%
 - c. 15.6%
 - d. 20.3%
5. Which of the 50 states had the lowest smoking prevalence in 2003?
 - a. Utah
 - b. California
 - c. Washington
 - d. Connecticut
6. If the population of the United States is 290,000,000 what is the annual overall mortality rate in deaths per thousand per year.
 - a. 20.5 deaths per thousand per year
 - b. 7.6 deaths per thousand per year
 - c. 19.1 deaths per thousand per year
 - d. 1.5 deaths per thousand per year

7. Can the data in the table give you information about a woman's risk for becoming a smoker during the course of a year in a particular state?
- yes
 - no
8. Could this data be helpful in studying the efficacy of anti-smoking programs?
- Yes, because survey could be repeated after anti-smoking programs
 - Yes, because only states with high prevalence would benefit
 - No, because anti-smoking programs do not work
 - No, because surveys are too inaccurate
9. What state has the highest prevalence of smoking in women?
- California
 - Maine
 - Indiana
 - Kentucky
10. The study seemed to focus on the importance of cigarettes in United States mortality statistics. Chronic bronchial inflammation caused by cigarettes
- is counted in mortality statistics
 - contributes significantly to improving quality of life for smokers
 - can lead to end stage lung disease even if cancer does not develop
 - is only found in cigar smokers
11. The BRFSS
- was designed to predict how many people will die each year
 - uses case controls
 - surveys every US civilian, non-institutionalized person over 18 with a phone
 - provides useful information that could help lead to behavioral modification
12. The prevalence of cigarette smoking in the United States
- is important since lung cancer is fairly uncommon in nonsmokers
 - is not impacted by media campaigns
 - does not influence the rates of bladder and oral cancer
 - contributes to large-for-gestation size newborns
13. If cigarette smoking was curtailed in the United States
- the mortality rate of breast cancer would probably increase
 - occupational lung disease would also decrease
 - lung cancer not related to smoking would increase
 - we could expect cigarette related death to account for less than 20% of all US mortality

SCENARIO B – Questions 14 - 26

In the early 1990s, “1,364 children became ill out of a total of 5,824 who had eaten lunch served at 16 elementary schools in Texas. The lunches were prepared in a central kitchen and transported to the schools by truck. Epidemiological studies revealed that 95% of the children who became ill had eaten a chicken salad. The afternoon of the day preceding the lunch, frozen chickens were boiled for 3 hours. After cooking, the chickens were deboned, cooled to room temperature with a fan, ground into small pieces, placed into 12-inch-deep aluminum pans and stored overnight in a walk-in refrigerator at 42°-45°F.

The following morning, the remaining ingredients of the salad were added and the mixture was blended with an electric mixer. The food was placed in thermal containers and transported to the various schools at 9:30 AM to 10:30 AM. It was then kept at room temperature until served between 11:30 AM and noon. Bacteriological examination of the chicken salad revealed the presence of large numbers of *Staphylococcus aureus*.

Contamination of the chicken probably occurred when it was deboned. The chicken was not cooled rapidly enough because it was stored in 12-inch-deep layers. Growth of the staphylococcus probably also occurred after delivery to the schools during the period when the food was kept in the warm classrooms. Prevention of this incident would have involved screening the individuals who deboned the chicken for carriers of the staphylococcus, more rapid cooling of the chicken, and adequate refrigeration of the salad from the time of preparation to its consumption.”

It is thought that Staphylococcal food poisoning is caused by eating the enterotoxins that some strains of staphylococcus aureus produce. Staphylococci are present in the nasal passages of at least 50% of all healthy individuals. But not all such individuals pass on disease to others. Growth of the bacteria and production of the toxin need to occur. This usually happens in foods that are not kept cold enough or hot enough.

QUESTIONS FOR SCENARIO B

14. What was the absolute risk in % of becoming ill in this outbreak?
- 10.9%
 - 33.4%
 - 50.5%
 - 23.4%
15. If the illness was indeed due to ingestion of chicken salad contaminated with staphylococcus, then how can you explain that only 95% of children who became ill had eaten a chicken salad?
- they could have had another illness
 - they could have forgotten that they ate the chicken salad
 - their food could have been contaminated by the chicken salad
 - a, b, and c are all correct
16. What type of epidemiological study was used to gather the information above?
- retrospective
 - double-blind
 - prospective
 - randomized
17. If a randomized, controlled, prospective, double blind study is the gold standard (best) for the least biased method of study, then why shouldn't you do one of those to study food poisoning attack rates?
- too costly
 - unethical because you would have to infect people with Staphylococcal toxin or other agents
 - too time consuming
 - too difficult because there are so many different types of food poisoning

18. Would isolating these children from their siblings for 3 days be important to help prevent the siblings from contracting the illness?
- a. yes
 - b. no, because the children are contagious for 2 weeks
 - c. no, because only people who directly ingest the toxin will get sick
 - d. no, because isolation never works
19. What was the approximate relative risk of a brown bagger (someone who brings his/her lunch to school) getting sick that day with similar symptoms?
- a. 2
 - b. 10
 - c. difficult to know exactly unless you find out how many brown baggers there were that day and if any of them got sick
 - d. 1
20. The detailed description of food handling in this scenario was
- a. tedious and of no use in understanding the outbreak
 - b. important in defining the setting of the outbreak and helping track down the source
 - c. evidence of how dangerous all chicken salad really is
 - d. of some value but not critical to the conclusions of the investigation
21. Food related illness is important because
- a. it causes significant morbidity, even though it does not usually cause mortality
 - b. it can be totally eradicated throughout the world
 - c. it is always highly contagious
 - d. it is usually incurable
22. Because 50% of all healthy individuals harbor *Staphylococcus* in their nasal passages:
- a. all food handlers should be tested so that they are free of this bacteria
 - b. it is critical that school cafeterias adhere strictly to public health regulations
 - c. we should expect 50% of those handling food will cause an outbreak like the one in this scenario
 - d. we should treat all foods with antibiotics before consumption

23. What was the most definitive finding that confirmed this to be food poisoning?
- a. the fact that 95% of the sick children ate the chicken salad
 - b. the fact that bacteriologic studies of the chicken salad showed Staphylococcus
 - c. a and b were both critical
 - d. the presence of Staphylococcus in 50% of healthy individuals

24. Investigators felt that contamination occurred during deboning

- a. because that is when cooling of chicken occurred
- b. because this is when food handlers contaminated the chicken
- c. because some of the chickens were probably already infected with Staphylococcus before boiling and during deboning they contaminated other clean chickens
- d. because the countertops were probably unclean

25. When handling frozen poultry

- a. thawing should be done in a refrigerator
- b. thawing should be done in a warm bath of water overnight
- c. thawing should be done at room temperature over 24 hours
- d. boiling the chicken will prevent contamination

26. Handling large quantities of food for preparation

- a. requires a thorough understanding of bacteriology
- b. requires knowledge of how viruses replicate
- c. requires adherence to infection prevention principles
- d. requires that the food handler have a degree in public health

SCENARIO C

The North Carolina Department of Health and Human Services reported on another type of gastroenteritis caused by E. Coli infection as described below.

E. coli Outbreak

E. coli Case Update, December 16, 2004

An outbreak of enterohemorrhagic (bloody diarrhea) illnesses caused by E. coli O157:H7 associated with visits to the North Carolina State Fair occurred in North Carolina during October and November, 2004. After receiving reports of hemolytic uremic syndrome (HUS,) a severe complication of E. coli O157:H7 disease, among State Fair visitors in late October, the North Carolina Division of Public Health recognized the potential for a large outbreak with potentially hundreds of thousands of fair visitors exposed. We gathered resources from within state government as well as the Centers for Disease Control and Prevention (CDC) to investigate the outbreak.

We classified 108 reported cases as outbreak-related. To more clearly identify the nature of the exposures, we designed a case-control study to compare cases to other fair attendees who did not become ill.

Our leading hypothesis was that contact between animals and case-patients at petting zoos at the fair had led to infection. However, we were careful to avoid biasing the study toward petting zoo exposures. We designed the questionnaire to include questions about the fair's 2 petting zoos as well as 8 other animal exhibit areas. We also included questions about foods and beverages such as undercooked hamburger or fresh apple cider which have well-known associations with E. coli O157:H7 outbreaks. Questions about other food and beverage items purchased at the fair were also included. We asked about household exposures that might have led to illness as well. Between November 14th and 21st interviewers enrolled 45 cases and 188 controls—persons chosen randomly from a list of persons who purchased tickets to the fair online who did not become ill after attending the fair. Interviewers selected controls to match the age distribution of case-patients.

Preliminary analysis showed that 4 animal exhibits at the State Fair were associated with illness. These exhibits included the Crossroads Farm Petting Zoo where direct contact with sheep and goats occurred, the Children's Barnyard, the Graham Building, and the Poultry Tent. Many activities in the Crossroads Farm Petting Zoo were associated with illness in the preliminary analysis, while only a few activities were associated with illness in the other 3 sites. Among children younger than 3 who visited Crossroads Farm Petting Zoo, case-patients were seven and a half times more likely to have reported contact with manure. Children who became ill were over five times more likely to fall or sit on the ground than children who did not fall or sit on the ground in the petting zoo.

Findings from clinical specimens and environmental lab samples, along with the case-control study findings, support that most case-patients in this outbreak became ill after exposure at the Crossroads Farm Petting Zoo

QUESTIONS FOR SCENARIO C – 27 - 38

27. In addition to the 108 likely cases of E. Coli, what other information do you need to calculate the incidence of disease for people who attended the state fair?
- the number of animals in the petting zoo
 - the number of toddlers who attended the fair
 - the number of cases of HUS (hemolytic uremic syndrome)
 - the total number of visitors who attended the fair and the number of days it was open
28. What was the relative risk for contracting E. Coli for children under age 3 who visited Crossroads Farm Petting Zoo and had contact with manure compared to those who did not have contact with manure?
- 3
 - 7.5
 - 2
 - 10
29. Why was an outbreak of diarrhea of such grave concern?
- because diarrhea can cause dehydration
 - because state fairs are an important source of community revenue
 - because of the Hemolytic Uremic Syndrome cases that can lead to kidney damage
 - the outbreak was not a grave concern, it just was a good opportunity to do a study
30. In this outbreak, some secondary cases were noted to occur. How might you explain this happening with cases of E. Coli when this is not seen with the Staphylococcus described above in Scenario B?
- E. Coli can be spread by the fecal oral route, infect a new host and cause disease again, while the preformed Staphylococcus toxin must be ingested to cause disease
 - the study was better done and researchers looked harder for secondary cases
 - secondary cases only occur in certain months
 - Secondary cases only occur in certain age groups

31. This study (Scenario C) design was
 - a. randomized prospective
 - b. experimental prospective
 - c. case-controlled retrospective
 - d. case-controlled prospective
32. This outbreak in North Carolina
 - a. might occur in other petting zoos
 - b. probably is from an E. Coli specific to that state only
 - c. will not occur after the year 2005 due to the E.Coli vaccine
 - d. should lead to legislation urging antibiotics for children before attending petting zoos
33. Hemolytic uremic syndrome
 - a. occurred in all children who visited the Crossroads Farm Petting Zoo
 - b. is one of the most frequent diseases of childhood
 - c. is the only severe complication of diarrheal disease
 - d. is a condition that may necessitate dialysis
34. The findings of this study are subject to some error because
 - a. E. Coli cannot be cultured in a laboratory
 - b. questionnaires can be filled out incorrectly
 - c. case-controls are often misleading
 - d. experience with HUS is limited
35. The combination of epidemiologic and laboratory investigation
 - a. is useful since neither is very accurate
 - b. allows different kinds of evidence to be compiled and analyzed
 - c. is useful only in infectious disease outbreaks
 - d. cannot help reduce occupational hazards
36. Transmission of E. Coli 0157:H7 disease
 - a. occurs rapidly because it is an encapsulated virus
 - b. also causes toxic shock syndrome
 - c. is mediated by prions
 - d. could be reduced with certain sanitary precautions

37. Secondary outbreaks of E. Coli

- a. are seen only in children
- b. result in milder disease
- c. complicate disease containment
- d. is transmitted through respiratory droplets

38. Public health investigators

- a. faced a risk of contracting E. Coli when doing this study
- b. avoid bias by case controls
- c. would classify this study as randomized
- d. would classify this study as prospective

SCENARIO D

ASBESTOS AND THE WORLD TRADE CENTER

“The Agency for Toxic Substances and Disease Registry (ATSDR), at the request of the New York Department of Health, conducted air and dust sampling in the Lower Manhattan area after the September 11th tragedy to determine if residents are being exposed to hazardous materials.” One concern was that of asbestos because its potential health risks.

“Significant exposure to any type of asbestos will increase the risk of lung cancer, mesothelioma and nonmalignant lung and pleural disorders, including asbestosis, pleural plaques, pleural thickening, and pleural effusions. This conclusion is based on observations of these diseases in groups of workers with cumulative exposures ranging from about 5 to 1,200 fiber-year/mL. Such exposures would result from 40 years of occupational exposure to air concentrations of 0.125 to 30 fiber/mL

“The sampling was conducted from November 4 through December 11, 2001, in and around 30 residential buildings in lower Manhattan. As a comparison, four more buildings in upper Manhattan (above 59th Street) were also sampled. Airborne levels of total fibers were similar in lower and upper Manhattan. Airborne levels of mineral components of concrete and mineral components of building wallboard were sometimes higher in lower Manhattan than in the upper Manhattan comparison area. Low levels of asbestos were found in some settled surface dust in lower Manhattan, primarily below Chambers Street. No asbestos was found in the upper Manhattan comparison area. Lower Manhattan had higher percentages of fiberglass, mineral components of concrete, and mineral components of building wallboard in settled surface dust than did the upper Manhattan comparison area.”

“Because more asbestos, synthetic vitreous fibers (e.g., fiberglass), mineral components of concrete (quartz, calcite, and portlandite), and mineral components of building wallboard (gypsum, mica, and halite) were found in settled surface dust in lower Manhattan residential areas when compared to comparison residential areas, the New York City Department of Health and Mental Hygiene and the U.S. Agency for Toxic Substances and Disease Registry are recommending that people continue to conduct frequent cleaning with HEPA vacuums and damp cloths/mops to reduce the potential for exposure.”

QUESTIONS FOR SCENARIO D – 39-45

39. The measurements made on air and dust samples for these studies could underestimate the actual levels after the twin towers collapsed because:
- investigators are usually biased
 - clean-up procedures had already been instituted in New York City by the time these studies were done
 - indoor surfaces in buildings near the twin towers cannot be contaminated if the windows are closed
 - asbestos rapidly breaks down into harmless substances
40. The reason for checking air and dust samples in upper Manhattan was
- to use these results as a likely reasonable control
 - because investigators thought the debris spread across the entire eastern United States
 - all such studies must be done over a large geographical area
 - these studies are routinely done in all cities every day
41. Asbestos fibers that are long and thin are
- the least toxic since they are coughed up immediately
 - are felt to pass into the distal air sacs (alveoli) of the lung and break down rapidly
 - are linked to mesothelioma after long term exposure
 - implicated in stomach and bladder cancers
42. This study of air and dust samples during the same time interval in another urban center would
- provide an additional control
 - probably show equal asbestos levels as lower Manhattan
 - prove that the asbestos could be transmitted over hundreds of miles
 - be of no value
43. This study is best described as
- randomized
 - prospective clinical trial
 - case-controlled
 - introspective

44. Use of HEPA filters
- will eliminate the risk of asbestosis
 - will be of no value in upper Manhattan
 - is recommended for all urban areas
 - may reduce the amount of inhaled fibers
45. The discovery of toxic fibers in lower Manhattan after 9/11
- could explain increases in coughing and wheezing in Manhattan dwellers after 9/11
 - could explain increased cases of mesothelioma many years hence in Manhattan dwellers
 - could explain increased cases of lung cancer many years hence in Manhattan dwellers
 - a, b, and c are correct

SCENARIO E: CIGARETTE SMOKING AND ASBESTOS EXPOSURE

Questions 46-50

“Cigarette smoking and exposure to other carcinogens greatly increase the risk of asbestos-associated lung cancer. A comparison of the experiences of 17,800 asbestos insulation workers with matched controls showed that asbestos workers who did not smoke suffered five times the number of lung cancer deaths than did controls who neither smoked nor worked with asbestos (55 deaths per 100,000 person-years for asbestos workers who did not smoke compared to 11 deaths per 100,000 person-years for controls who were neither asbestos workers nor smokers). Persons who smoked but did not work with asbestos had a death rate of 122 per 100,000 person-years; and among persons with both exposures (asbestos and cigarette smoking), 601 deaths occurred per 100,000 person-years”

46. This information
- implies synergism (a dynamic relationship) between asbestos and cigarette smoking in the linkage with lung cancer
 - shows that the relative risk of lung cancer decreases in adults who smoke and work with asbestos
 - shows that that overall rate of asbestos related lung cancers is insignificant
 - shows that 601 people die each year of asbestos related cancer
47. Based on the information in SCENARIO E above, which group will be at the greatest risk for getting lung cancer?
- non-smokers
 - asbestos workers
 - smokers
 - people who did not work with asbestos

48. The study in SCENARIO E above indicates that asbestos cause lung cancer by the following mechanism
- inhaled fibers settle in the lower lung
 - asbestos activates oncogenes
 - asbestos infiltrates the pleura
 - none of the above
49. The study in SCENARIO E above indicates that the death rate of smokers who did not work with asbestos was
- 55/100,000 person-years
 - 122/100,000 person-years
 - 11/100,000 person-years
 - 601/100,000 person-years
50. The occurrence of lung cancer in people exposed to asbestos
- is proof of causality
 - can take years to develop
 - can only occur with occupational exposure
 - is the only pulmonary risk of asbestos