

Epidemiology & Statistics

e • pi • de • mi • o • lo • gy

[e] [ə] [i:] [ɪ] [ɒ] [ɒ] [ɪ]

Circle the stressed syllable(s): remember **primary** stress and **secondary** stress.

Which sound goes with which syllable (in US English)?

[ɒ] as in *bot*

[ɪ] as in *bit*

[e] as in *bed*

[ə] as in *an*

[i:] as in *sheet*

Working definition: what could be a good way of defining epidemiology?

It is the study of the prevalence of diseases (viral or not): their incidence across geographical areas, demographic groups, etc.; their progression over time

1. Describing data: Numbers

Listen and choose the correct answer. Challenge: where needed, can you provide the unit and its notation?

1. What is the dosage of fluoride per kilogram of body weight?

a) 0.166

b) 0.16

c) 0.616

mg: milligram(me)

2. What was the sensitivity of the assay?

a) 0.02

b) 2.0

c) 0.2

pmol: picomole

3. What is the output impedance at the 5V end?

a) 0.02

b) 0.20

c) 0.92

Ω: ohm

4. What amperage of flex is used?

a) 0.6

b) 6

c) 6.8

A: Amp

5. What is the temperature below which the superconductor conducts electricity with no resistance

a) 9/10 °

b) 19°

c) 90°

K: Kelvin

6. What is the enthalpy change when 2 moles of water are formed at a pressure of one atmosphere and a temperature of 298 Kelvin?

a) -517.6

b) -5716

c) -571.6

kJ: kilojoule

7. What is the lowest frequency at which young mice squeak when isolated from their mother?

a) 450

b) 45

c) 405

kHz: kilohertz

8. What laser pulses were used?

a) 15

b) 50

c) -50

ns: nanosecond

Listen and write the correct answer. Are there alternate ways of saying that number?

a. (also “1 over 4”)
1/4

e. (also “10 to the power of 9” or
“10 to the 9th”)
5×10⁹

i.
-57

b.
15%

f. (also “negative 35”)
-35

j.
17%

c.

g.

k. (also “point oh oh 3” or “oh

1.356

 10^6

point oh oh 3" or "zero point oh oh 3")

0.003

d.

2,905,740

h.

10,893

l.

5,090,019

2. Describing data: Charts and Graphs



Which type of chart would be best to visually present the following information?

- A. The distribution of individuals among age groups **bar chart**
- B. The relationship between the time spent studying and the grade on the exam **scatter plot**
- C. The proportion of students enrolled in each of the graduate programs on campus **pie chart**
- D. The evolution of a student's English grades over time **line chart**
- E. Sales to various clients of a range of products **table and/or stacked bar chart**

3. Presenting a Study: Air Pollution and Lung Cancer

Match the vocabulary words from the video and their definitions:

- | | |
|------------------------------|--|
| 1. c progenitor | a) a type of cell that lines the surfaces of organs and body cavities. |
| 2. a epithelial cells | b) highly convincing, persuasive, and strong. |
| 3. f burden | c) precursor of something |
| 4. g unravel | d) a puzzling question or problem that is difficult to resolve. |
| 5. b compelling | e) the lineage of cells in an organism that give rise to gametes |
| 6. d conundrum | f) a heavy load or responsibility |
| 7. e germline | g) to solve or explain something complex or mysterious, often by systematically examining and analyzing it |

Discuss the following terms. What do they mean?

a carcinogen – a never-smoker – correlation vs. causation – particulate matter (PM 2.5) – a stem cell

A carcinogen (cancer+generate) is a substance that promotes the onset of cancer.

A never-smoker is someone who has never smoked. It's different from a non-smoker who may have smoked at one time.

Correlation is the relationship of two things happening concurrently. This does not necessarily mean that one is causing the other.

PM 2.5s or 'particulate matter 2.5' are fine particles 2.5 micrometers or less in diameter than can be inhaled by humans. They can be smoke, soot, liquids, microscopic solids or aerosol chemicals.

A stem cell is an unspecialized human cell that can divide and renew itself while having the potential to develop into many different specialized cell types in the body.

What factors are widely believed to contribute to lung cancer?

Smoking, second-hand smoke, environmental pollutants...

Watch the video and answer the following questions:

1. What were the areas and target population for the study?

The study focused on never-smokers in the UK, Taiwan, and South Korea.

2. What is the significance of the correlation between rising PM 2.5 levels and EGFR mutant lung cancer?

It suggests that there may be a causal relationship between exposure to PM 2.5s and mutations that lead to cancer.

3. What is the difference between tumor initiation and tumor promotion? Which is a concern with EGFR and KRAS mutations?

Tumor initiation is the advent of tumors, whereas tumor promotion is the growth and development of tumors.

5. Are these findings a “silver bullet”? What implications do they have for potential cancer prevention strategies?

These findings are not a cure-all because mutations are a normal part of aging. However, they open potential pathways for molecular treatments.

4. Cancer Town (The Guardian,UK)

The timeline: what happened in Reserve, LA during each of the periods below?

In the 1960s : the plan was built by the DuPont company

In 2015 : DuPont sold the plant to Japanese manufacturer Denka

In 2017 : Denka entered into an agreement to reduce emissions from the plant

Complete the missing numbers or say what they represent.

40	minutes to Reserve, Louisiana from New Orleans
1,505 in a million	risk of cancer from toxic air in Reserve, LA
30 in a million	average national risk of cancer from toxic air
40%	the current value of houses in the area (as ratio of their former value)
0.2 µg	the amount of chloroprene per cubic meter considered safe by the EPA*
nearly 50	the number of toxic chemicals detected in the air in Reserve, LA
\$30 million	the amount Denka invested into the thermal oxidizer
85 to 90 percent	amount by which the thermal oxidizer is expected to reduce emissions

*EPA: Environmental Protection Administration, the US’s government agency for the environment

Fill in the blanks

Local politicians have mostly ignored and minimized residents' concerns, but little by little, their movement is growing, like here at the Tchoupitoulas chapel, which has become a hub for the campaign. "People are

dying these horrible deaths, **suffering** these maladies; it's **unconscionable**. This is really serious. They never **once** said, 'Yeah, of course, there's a simple solution; it is to stop that **monstrosity** from killing us.'"

What are statistics used for in this video? Are they convincing? Explain your opinion.

Answers may vary

Statistics in the video are used to illustrate the fact that people in Reserve are at much higher risk of cancer due to toxic emissions from the neoprene plant. The risk comparison (Reserve vs. national average), the EPA recommendation, the panel of chemicals detected: all contribute to paint a picture of disenfranchisement for the local populations and impunity for the industry.