## Congratulations! You passed!

TO PASS 80% or higher

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# Unit 8 Homework

LATEST SUBMISSION GRADE
100%

1. The following abstract appeared in *PLOS Medicine*: 1 / 1 point

**Background:** Observational epidemiological studies have shown that high body mass index (BMI) is associated with a reduced risk of breast cancer in premenopausal women but an increased risk in postmenopausal women. It is unclear whether this association is mediated through shared genetic or environmental factors.

**Methods:** We applied Mendelian randomization to evaluate the association between BMI and risk of breast cancer occurrence using data from two large breast cancer consortia. We created a weighted BMI genetic score comprising 84 BMI-associated genetic variants to predicted BMI. We evaluated genetically predicted BMI in association with breast cancer risk using individual-level data from the Breast Cancer Association Consortium (BCAC) (cases = 46,325, controls = 42,482). We further evaluated the association between genetically predicted BMI and breast cancer risk using summary statistics from 16,003 cases and 41,335 controls from the Discovery, Biology, and Risk of Inherited Variants in Breast Cancer (DRIVE) Project. Because most studies measured BMI after cancer diagnosis, we could not conduct a parallel analysis to adequately evaluate the association of measured BMI with breast cancer risk prospectively.

**Results:** In the BCAC data, genetically predicted BMI was found to be inversely associated with breast cancer risk (odds ratio [OR] = 0.65 per 5 kg/m2 increase, 95% confidence interval [CI]: 0.56–0.75, p = 3.32 × 10−10). The associations were similar for both premenopausal (OR = 0.44, 95% CI:0.31–0.62, p = 9.91 × 10−8) and postmenopausal breast cancer (OR = 0.57, 95% CI: 0.46–0.71, p = 1.88 × 10−8). This association was replicated in the data from the DRIVE consortium (OR = 0.72, 95% CI: 0.60–0.84, p = 1.64 × 10−7). Single marker analyses identified 17 of the 84 BMI-associated single nucleotide polymorphisms (SNPs) in association with breast cancer risk at p < 0.05; for 16 of them, the allele associated with elevated BMI was associated with reduced breast cancer risk.

**Conclusions:** BMI predicted by genome-wide association studies (GWAS)-identified variants is inversely associated with the risk of both pre- and postmenopausal breast cancer. The reduced risk of postmenopausal breast cancer associated with genetically predicted BMI observed in this study differs from the positive association reported from studies using measured adult BMI. Understanding the reasons for this discrepancy may reveal insights into the complex relationship of genetic determinants of body weight in the etiology of breast cancer.

When summarizing this research for a lay audience, which THREE details should you OMIT?

- [x] This type of study is called a Mendelian randomization study.

✓ **Correct**
This answer is correct. The specific name of the study design will not be helpful to a lay reader (rather, you need to provide a description of what was done.)

- [x] The data came from the Breast Cancer Association Consortium .

✓ **Correct**
This answer is correct. The lay reader does not need to know the name of the consortium that collected the data.

- [ ] Other studies have found that being overweight is associated with a lower risk of breast cancer in premenopausal women but a higher risk in postmenopausal women.
- [x] The p-value associated with the main effect was p = 3.32 × 10−10.

✓ **Correct**
This answer is correct. The lay reader does not need to know the p-value.

- [ ] Women who were genetically predisposed to being overweight were less likely to develop breast cancer.

2. Questions 2-6 use excerpts from science news stories that appeared in: *The New York Times*, Stanford news, *Stanford* magazine, *Science News*, and *Science* magazine. 1 / 1 point

**One person's risky bet is another's exciting opportunity.**

This excerpt is most likely an example of which part of the science news story?

- ( ) First quote
- ( ) Nut graf
- (•) Lead

✓ **Correct**
This is the correct answer. This was the lead of a story, meant to draw the reader in.

3. "Like most people, I used to look at plants as passive," says lead author Efrat Dener, a master's student in environmental sciences at Ben-Gurion University of the Negev in Beersheba, Israel. 1 / 1 point

This excerpt is most likely an example of which part of the science news story?

- (•) First quote
- ( ) Lead
- ( ) Kicker

✓ **Correct**
This answer is correct. This was the first quote of a science news story.

4. In a study published Friday in *Science*, researchers revealed that the sunflower's internal clock and ability to detect light work together, turning on genes related to growth at just the right time to allow the stems to bend with the arc of the sun. The research team also showed that when fully grown, as tall as people in some cases, plants that always face east get a head start, warming up early to attract pollinators. 1 / 1 point

This excerpt is most likely an example of which part of the science news story?

- (•) Nut graf
- ( ) Kicker
- ( ) Lead

✓ **Correct**
This answer is correct. This is the nut graf, as it gives the story in a nutshell.

5. By following these changes, researchers might be able to learn more about how these networks evolved, Noble says. "The headline of this study is that we can probably get a lot of information about life by studying death." 1 / 1 point

This excerpt is most likely an example of which part of the science news story?

- (•) Kicker
- ( ) Lead
- ( ) Nut graf

✓ **Correct**
This is the correct answer. This was the kicker of a science news story, as it gives a parting thought.

6. "Fat is a great natural resource. It's easy to obtain; it's yourself; and it's renewable," says Longaker, who is professor of plastic and reconstructive surgery and co-director of the Institute of Stem Cell Biology and Regenerative Medicine. 1 / 1 point

This excerpt is most likely an example of which part of the science news story?

- ( ) Nut graf
- (•) First quote
- ( ) Lead

✓ **Correct**
This is correct. This was the first quote from a story.

7. Questions 7-10 have more than one possible answer. Grading is based on completion only. After submission, you should compare your answer to the model answer provided. 1 / 1 point

Rewrite the following sentence to make it more appropriate for a lay audience:

"It is worth noting that in addition to intertumor genetic heterogeneity, variability between cells within individual tumors has been observed."

We observed that this phenomenon not only happens between tumors but also between cells within the same tumors

✓ **Correct**
Model Answer:

The genetic changes that cause cancer not only vary between different tumors, but also between different cells within the same tumor.

8. This excerpt comes from the transcript of an interview with a scientist. 1 / 1 point

"The opposite can also happen, that is that during REM sleep and during nightmare, for example, the motor inhibition is lost, and the person can act out their dreams, which is usually violent."

Edit this excerpt as you would for a Q+A piece.

During REM sleep and during nightmare, the motor inhibition is lost, and the person can be violent.

✓ **Correct**
Model Answer:

The opposite can also happen: During REM sleep or nightmares, motor inhibition can be lost, and people can act out their dreams—which may be violent.

9. The following is an excerpt from a paper in *Nature*: 1 / 1 point

"Here we leverage the wide usage of smartphones with built-in accelerometry to measure physical activity at the global scale. We study a dataset consisting of 68 million days of physical activity for 717,527 people, giving us a window into activity in 111 countries across the globe. We find inequality in how activity is distributed within countries and that this inequality is a better predictor of obesity prevalence in the population than average activity volume."

Write a brief summary of the design and results of this study for a lay audience. (Do not simply edit or paraphase the original; rather, write a new summary as you would for a news story.)

Researchers used data from smartphones to observe the walking habit of 717,527 people from 111 countries. Countries that have the widest gaps between the most active and the least active people also had the highest obesity rate. This inequality was a stronger predictor of obesity than the total amount of activity.

✓ **Correct**
Model Answer:

Researchers used data from smartphones to look at the walking habits of 717,527 people from 111 countries. Countries with the widest gaps between the most active and least active people also had the highest obesity rates. Surprisingly, this "activity inequality" was a stronger predictor of obesity than the total amount of activity.

10. The following is an abstract from a paper in *Nature*: 1 / 1 point

"DNA is an excellent medium for archiving data. Recent efforts have illustrated the potential for information storage in DNA using synthesized oligonucleotides assembled *in vitro*[1, 2, 3, 4, 5]. A relatively unexplored avenue of information storage in DNA is the ability to write information into the genome of a living cell by the addition of nucleotides over time. Using the Cas1–Cas2 integrase, the CRISPR–Cas microbial immune system stores the nucleotide content of invading viruses to confer adaptive immunity[6]. When harnessed, this system has the potential to write arbitrary information into the genome[6]. Here we use the CRISPR–Cas system to encode the pixel values of black and white images and a short movie into the genomes of a population of living bacteria. In doing so, we push the technical limits of this information storage system and optimize strategies to minimize those limitations. We also uncover underlying principles of the CRISPR–Cas adaptation system, including sequence determinants of spacer acquisition that are relevant for understanding both the basic biology of bacterial adaptation and its technological applications. This work demonstrates that this system can capture and stably store practical amounts of real-data within the genomes of populations of living cells."

Write an appropriate tweet (<=140 characters) that introduces the paper. Include a link to the paper in *Nature*: http://go.nature.com/2vdRtJB

Scientists encode images or videos into living bacteria: http://go.nature.com/2vdRtJB

✓ **Correct**
These are real tweets that were used to introduce the paper:

"Lights, camera, CRISPR: Biologists use gene editing to store movies in DNA http://go.nature.com/2t6iBC4"

"Images and a short movie have been encoded into the DNA of bacteria using the CRISPR system http://go.nature.com/2vdRtJB"

"Researchers used CRISPR to encode a movie into DNA http://oops.ci/CKWHbT "