Please answer the following questions to the best of your ability. Your responses will help us to understand how you evaluate online articles that provide scientific evidence

Will my responses be graded?
No. Your responses will be used by our research team to understand how you think critically about science and to inform the design of our sInvestigator lessons.

Will my results be confidential?
The professors and researchers on our team will compile your responses for our project; no one outside of our team will have access to your responses.

If you encounter problems or have questions while you are completing this pretest, please raise your hand and a member of the research team will assist you.

Key Terms

Author competence refers to the extent to which we can believe that the author of an article is an expert in the subject matter of that article.

Author objectivity refers to the extent to which we can believe that the author's claims have a scientific basis and are not influenced by non-scientific factors.

Article credibility refers to the extent to which we can believe what an article is telling us.

Section 1: Evaluating Evidence (19 Questions)

You may answer the questions in this section in any order, and you may change your responses at any time.

Article #1	Article #2	Article #3
Title	***Title***	***Title***
The Surprising Effects of CT Scans and X-rays *Patients are often exposed to cancer-causing radiation for little medical reason, a Consumer Reports investigation finds*	What are the risks from medical X-rays and other low-dose radiation?	The Harmful Side Effects of X-rays Often Pose a Greater Risk than the Original Health Problem
Publisher	***Publisher***	***Publisher***
Consumer Reports	The British Institute of Radiology	Ener-Chi Wellness Center

1. You need to write a paper about the potential dangers of medical X-rays. A Google search leads you to the following three articles. Which article are you *most likely* to use as a reference?

- ○ *The Surprising Effects of CT Scans and X-rays* from Consumer Reports
- ○ *What are the risks from medical X-rays and other low-dose radiation?* from The British Institute of Radiology
- ○ *The Harmful Side Effects of X-rays Often Pose a Greater Risk than the Original Health Problem* from the Ener-Chi Wellness Center

Evaluate Article #1

Here is more detailed information about the first article.

CR Consumer Reports | Product Reviews | News | Take Action | About Us

RADIATION RISKS

The surprising dangers of CT scans and X-rays

Patients are often exposed to cancer-causing radiation for little medical reason, a Consumer Reports investigation finds

Published: January 27, 2015 06:00 AM

The following text is an excerpt from the article.

X-rays have been used for almost 120 years, but the introduction of computed tomography, or CT scans, in the 1970s, was revolutionary. The new tests, which use multiple X-ray images, allowed doctors to see with unprecedented precision the inner workings of the human body, and earned the inventors of the device the 1979 Nobel Prize in medicine. Use of the tests grew quickly, rising from fewer than 3 million per year in 1980 to more than 80 million now.

But recent research shows that about one-third of those scans serve little if any medical purpose. And even when CT scans or other radiology tests are necessary, doctors and technicians don't always take steps to limit radiation exposure.

All of that exposure poses serious health threats. Researchers estimate that at least 2 percent of all future cancers in the U.S.—approximately 29,000 cases and 15,000 deaths per year—will stem from CT scans alone.

2. Assuming that the above text is true, is it relevant to your question about the dangers of medical X-rays?

- **Certainly** relevant
- **Very likely** relevant
- **Likely** relevant
- **Likely not** relevant
- **Very likely not** relevant
- **Certainly not** relevant

Please examine the screenshot of the above website before responding to Questions 3-7.

If you would like more information, you may visit the website by clicking on the following link:
https://www.consumerreports.org/cro/magazine/2015/01/the-surprising-dangers-of-ct-sans-and-x-rays/index.htm
You are also welcome to visit other websites to support your evidence evaluation.

3. What is the reputation of the publisher of this article?

- **Certainly** reputable
- **Very likely** reputable
- **Likely** reputable
- **Likely not** reputable
- **Very likely not** reputable
- **Certainly not** reputable
- I have no basis by which to evaluate the publisher's reputation.

4. What is the competence of the author of this article?

- **Certainly** competent
- **Very likely** competent
- **Likely** competent
- **Likely not** competent
- **Very likely not** competent
- **Certainly not** competent
- I have no basis by which to evaluate the author's competence.

5. What is the objectivity of the author of this article?

- **Certainly** objective
- **Very likely** objective
- **Likely** objective
- **Likely not** objective
- **Very likely not** objective
- **Certainly not** objective
- I have no basis by which to evaluate the author's objectivity.

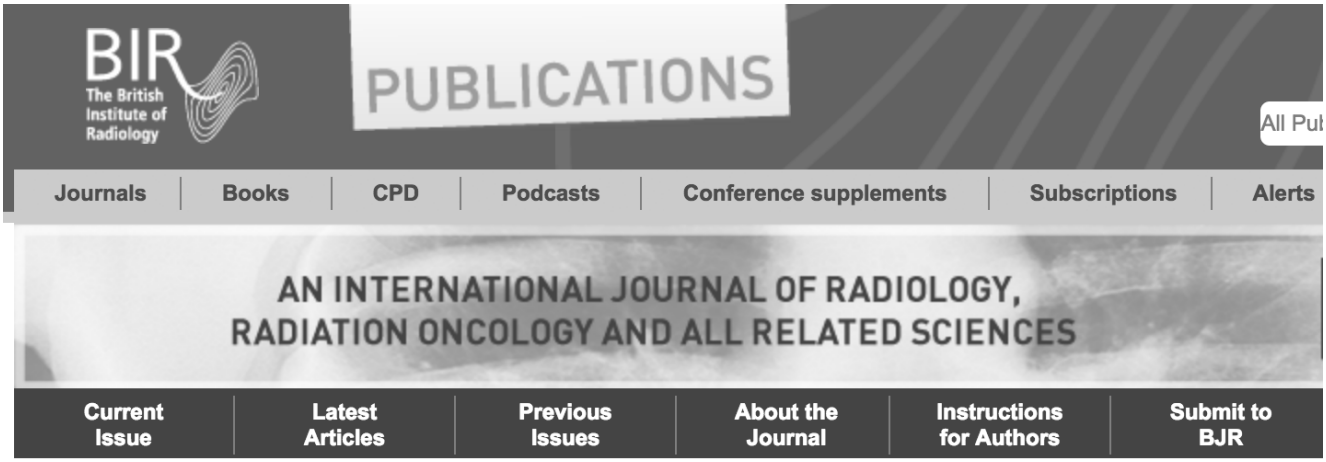
6. What is the credibility of this article?

- **Certainly** credible
- **Very likely** credible
- **Likely** credible
- **Likely not** credible
- **Very likely not** credible
- **Certainly not** credible
- I have no basis by which to evaluate the credibility of the article.

7. Would you use the article as a reference for your paper?
Justify your response in 2 or 3 sentences.

Evaluate Article #2

Here is more detailed information about the second article.



Review article

What are the risks from medical X-rays and other low dose radiation?

B F Wall, BSc, G M Kendall, PhD, A A Edwards, MSc, S Bouffler, PhD, C R Muirhead, PhD, and J R Meara, FFPH

Health Protection Agency, Radiation Protection Division, Centre for Radiation, Chemical and Environmental Hazards, Chilton, Didcot, Oxon. OX11 0RQ, UK

The following text is an excerpt from the article.

The magnitude of the risks from low doses of radiation is one of the central questions in radiological protection. It is particularly relevant when discussing the justification and optimization of diagnostic medical exposures. Medical X-rays can undoubtedly confer substantial benefits in the healthcare of patients, but not without exposing them to effective doses ranging from a few microsieverts to a few tens of millisieverts. Do we have any evidence that these levels of exposure result in significant health risks to patients? The current consensus held by national and international radiological protection organizations is that, for these comparatively low doses, the most appropriate risk model is one in which the risk of radiation-induced cancer and hereditary disease is assumed to increase linearly with increasing radiation dose, with no threshold (the so-called linear no threshold (LNT) model). However, the LNT hypothesis has been challenged both by those who believe that low doses of radiation are more damaging than the hypothesis predicts and by those who believe that they are less harmful, and possibly even beneficial (often referred to as hormesis). This article reviews the evidence for and against both the LNT hypothesis and hormesis, and explains why the general scientific consensus is currently in favour of the LNT model as the most appropriate dose–response relationship for radiation protection purposes at low doses. Finally, the impact of the LNT model on the assessment of the risks from medical X-rays and how this affects the justification and optimization of such exposures is discussed.

8. Assuming that the above text is true, is it relevant to your question about the dangers of medical X-rays?

- ○ **Certainly** relevant
- ○ **Very likely** relevant
- ○ **Likely** relevant
- ○ **Likely not** relevant
- ○ **Very likely not** relevant
- ○ **Certainly not** relevant

Please examine the screenshot of the above website before responding to Questions 9 - 13.

If you would like more information, you may visit the website by clicking on the following link:
http://www.birpublications.org/doi/abs/10.1259/bjr/55733882

You are also welcome to visit other websites to support your evaluation.

9. What is the reputation of the publisher of this article?

- ○ **Certainly** reputable
- ○ **Very likely** reputable
- ○ **Likely** reputable
- ○ **Likely not** reputable
- ○ **Very likely not** reputable
- ○ **Certainly not** reputable
- ○ I have no basis by which to evaluate the publisher's reputation.

10. What is the competence of the author of this article?

- ○ **Certainly** competent
- ○ **Very likely** competent
- ○ **Likely** competent
- ○ **Likely not** competent
- ○ **Very likely not** competent
- ○ **Certainly not** competent
- ○ I have no basis by which to evaluate the author's competence.

11. What is the objectivity of the author of this article?

- ○ **Certainly** objective
- ○ **Very likely** objective
- ○ **Likely** objective
- ○ **Likely not** objective
- ○ **Very likely not** objective
- ○ **Certainly not** objective
- ○ I have no basis by which to evaluate the author's objectivity.

12. What is the credibility of this article?

- ○ **Certainly** credible
- ○ **Very likely** credible
- ○ **Likely** credible
- ○ **Likely not** credible
- ○ **Very likely not** credible
- ○ **Certainly not** credible
- ○ I have no basis by which to evaluate the credibility of the article.

13. Would you use the article as a reference for your paper? Justify your response in 2 or 3 sentences.

Evaluate Article #3

Here is more detailed information about the third article.

The following text is an excerpt from the article.

One of the riskiest of all diagnostic tools is the X-ray machine. Most people who visit a doctor will experience at least one exposure to these high-frequency waves of ionizing radiation (X-rays). These are the facts that have been discovered so far about the adverse side effects of X-rays:

- Scientists have told the American Congress that X-radiation of the lower abdominal region puts a person at risk for developing genetic damage that can be passed on to the next generation. They also linked the 'typical diseases of aging, such as diabetes, high blood pressure, coronary heart disease, strokes and cataracts, with previous exposure to X-rays.
- It is estimated that at least 4,000 Americans die each year from X-ray related illnesses.

14. Assuming that the above text is true, is it relevant to your question about the dangers of medical X-rays?

- **Certainly** relevant
- **Very likely** relevant
- **Likely** relevant
- **Likely not** relevant
- **Very likely not** relevant
- **Certainly not** relevant

Please examine the screenshot of the above website before responding to Questions 15-19

If you would like more information, you may visit the website by clicking on the following link:
http://www.ener-chi.com/the-harmful-side-effects-of-x-rays-often-pose-a-greater-risk-than-the-original-health-problem/

You are also welcome to visit other websites to support your evaluation.

15. What is the reputation of the publisher of this article?

- **Certainly** reputable
- **Very likely** reputable
- **Likely** reputable
- **Likely not** reputable
- **Very likely not** reputable
- **Certainly not** reputable
- I have no basis by which to evaluate the publisher's reputation.

16. What is the competence of the author of this article?

- **Certainly** competent
- **Very likely** competent
- **Likely** competent
- **Likely not** competent
- **Very likely not** competent
- **Certainly not** competent
- I have no basis by which to evaluate the author's competence.

17. What is the objectivity of the author of this article?

- **Certainly** objective
- **Very likely** objective
- **Likely** objective
- **Likely not** objective
- **Very likely not** objective
- **Certainly not** objective
- I have no basis by which to evaluate the author's objectivity.

18. What is the credibility of this article?

- **Certainly** credible
- **Very likely** credible
- **Likely** credible
- **Likely not** credible
- **Very likely not** credible
- **Certainly not** credible
- I have no basis by which to evaluate the credibility of the article.

19. Would you use the article as a reference for your paper? Justify your response in 2 or 3 sentences.

Section 3: Demographic Survey (7 Questions)

20. Please enter your first name and last name. We will use this information for matching with future surveys; your name will be removed prior to the analysis of the responses.

21. I am a

- First-year student (freshman)
- Second-year student (sophomore)
- Third-year student (junior)
- Fourth-year or more student (senior)
- Transfer student

22. What is your current gender identity?

- Male
- Female
- Other

23. What was the primary language spoken in your home?

- Arabic
- Armenian
- Chinese
- English
- French
- French Creole
- German
- Greek
- Gujarati
- Hindi
- Italian
- Japanese
- Korean
- Persian
- Polish
- Portuguese
- Russian
- Spanish
- Tagalog
- Urdu
- Vietnamese
- Other (please specify)

24. What was your most recent science class?

25. What is your undergraduate major?

26. What is your undergraduate minor?

Thank you for completing this pre-assessment.

If you have further questions about the study, please email Dr. Nancy Holincheck in the Graduate School of Education at GMU, nholinch@gmu.edu