

CAREER WEBQUEST- STUDENT HANDOUT-TEACHER RESOURCE

Visit the webpage: <https://renayez9.wixsite.com/careerswebquest> and use the information you find there to answer the following questions.

This webquest discusses the development pathway of a new tool for diagnosing disease. Steps in the development process include research, testing, ethics evaluation, further testing, and final implementation. This example is focused on PET scan imaging and the radiotracers that are created for it. Follow along with the development steps and answer questions about the scientists who carry out this research and their careers.

Step 1: Development

The idea to develop new types of radioisotopes to be used in PET scans has to come from someone! Dr. Chris Phenix is a professor at the University of Saskatchewan.

1. Outline the main aspects of Dr. Chris Phenix's career.

Research related to nuclear medicine

Teaches university classes

Interact with 8 lab members

Administrative duties/on committees

2. Explain his educational pathway to this career.

Applied to SIAST but didn't get in; went to U of R initially in sports physiotherapy but then switched to chemistry; went to U of S to get PhD; to Vancouver for a post-doc fellowship; to Thunder Bay as a scientist and then back to U of S as a researcher/professor

3. Outline 3 pieces of information that he shares that can be encouraging to high school students.

- Mediocre students can be successful in University as long as they are hardworking, dedicated, and put effort into their studies.
- Get through the first couple years of university and then you can see the applications and appreciate school more.
- Everyone has strengths; put in the effort to be successful; don't limit yourself; have confidence.

4. Would you consider this career? Explain.

(answers will vary)

Step 2: Research/Testing

To put an idea/innovation into action, a lot of testing and research is required. This next step explains what a graduate student, Carly Olafson, does and her role in the development of a new PET scan radiotracer.

1. Explain what Carly's research involves.

She is developing new diagnostic methods for cancer (a specific enzyme found in tumors) and she develops compounds labeled with radioactive isotopes to image the tumors.

2. Outline the education and training Carly has taken thus far.

University of Alberta (Augustana Campus) with a chemistry major- 3 years of undergrad research-U of S as a grad student- WHMIS and lab safety; animal handling; radiochemistry safety.

3. How is a graduate student's day different from that of a high school student? How is it different from an undergraduate university student's day?

Undergrad- more flexibility with course selection and times and choose when to do homework
Grad- not as many courses; most time in lab and preparing for lab (research in library, journals, etc)

4. Outline 3 pieces of information that Carly shares that can be encouraging to high school students.

- Enrol in lots of classes to see what interests you.
- Don't have to know exactly what you want to do, figuring it out as you go is perfectly fine
- University has lots of flexibility and choice in classes.

5. Does being a grad student/researcher interest you? Explain.

(answers will vary)

Step 3: Animal Use Approval

Many research projects require the use of animal models in order to understand the potential effects on humans. There are many ethical and animal care protocols to abide by in the research process. The next step in our pathway looks at the career of Dr. Kurtis Swekla and his role in research and development.

1. Outline the main responsibilities in Dr. Kurtis Swekla's career.

Takes care of animals for research and teaching purposes

Training/teaching students and faculty on how to handle animals and procedures

Performs surgeries and anaesthesia

Ethics review- on committee to review research proposals

2. Explain his educational pathway to his career.

[Always liked animals and interested in science] did an undergrad degree in science and then went on to do a vet degree after that.

3. Outline 3 pieces of information that he shares that can be encouraging for high school students.

- Talk to people in science to see if you're interested in certain careers
- Many opportunities to be part of real-life applications of science
- Network as much as you can

4. Would you consider this career? Explain

(answers will vary)

5. (For more examples of medical advances that have been made because of the use of animal models, see VIDEO LINKS on the homepage)

Step 4: Attaching the Isotope

Once approval for the use of animal models and the proper training is in place, the next step is to attach the radioisotope to the molecule that has been created in the lab. Radioisotopes are created right on University grounds at the Saskatchewan Centre of Cyclotron Sciences. Once the molecule is radiolabeled, the next step is further testing of the radiotracer. Considering the nature of this endeavor, quality assurance is an important part of the process.

1. What is Shannon Colbert's job description?

Quality Assurance Manager - she promotes a centre of excellence with radiopharmaceutical manufacturing and development; Health Canada and regulatory manager

2. Outline her educational pathway to this career.

University [chemistry, then engineering - biomedical engineering, then toxicology]- did regulatory development in pharmaceuticals work - grad studies in Western College of Veterinary Medicine and Physiology - taught at U of S Cyclotron Centre

3. What advice does she have to offer to high school students?

Pursue basic science and see if there is a specific pathway that might interest you
Hard work and schooling can be fulfilling

4. Would you consider this career? Explain.

(answers will vary)

Step 5: the PET Scan

After all the testing has been done and the process has been approved, patients will benefit from the opportunity to use the new diagnostic tool. At the Royal University Hospital in the PET/CT scan department you will be introduced to Scott Mildenberger and his career highlights.

1. What is Scott Mildenberger's job description?

PET/CT Supervisor and Nuclear Medicine Technologist

Injects patients with radioactive molecules and scan them to detect various medical conditions.

2. What schooling and training did he need for his job?

Went to University, then went to SAIT in Alberta (Nuclear Medicine Technologist certificate) - did a national exam and then CT certification as well.

3. What types of diseases and medical conditions do PET scans help to diagnose?

Alzheimer's Disease, Parkinson's Disease, epilepsy, cancer, inflammation and infections.

4. Would you consider this career? Explain.

(answers will vary)

List one more career that could fit into this pathway. What would its job description be?

Where do you think they would fit in the steps of this pathway?

(answers will vary)

Some possibilities- Nurse, Doctor, Delivery person (bring radioisotope to hospital), maintenance workers.

Trace your own pathway related to research, development, or an event associated with science or the healthcare system. Outline at least 4 careers that would be involved.

(answers will vary)

The example from Background information- from 911 call to discharge from hospital:
Dispatcher- first responder- paramedic- police officer-admissions at hospital-(ER) nurse- (ER) doctor- x-ray technician- counsellor- dietician- etc-etc-etc

Watch the additional videos on the EXTRA VIDEOS page. Choose one of the video topics and discuss any ethical considerations involved in the process of the medical advancement. Comment on whether you think all the resources needed (money, people, research time, testing of subjects, etc) is worth it for the technique they are discussing.

ETHICS: Students could discuss the ethics of testing a procedure time and time again without positive results. (Although it was never actually mentioned in any of the videos, it can be insinuated that there was a lot of animal testing that went on before they actually tried it on humans). They may possibly bring up how ethical it is to spend 'x' amount of dollars on something that they didn't know would ever work instead of diverting money elsewhere (ie. food and Medicare for those in need).

IS IT WORTH IT? EXPLAIN.

(opinion- with defense)