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Chemistry, Period 1
Research Project

Innovations & Methods through Radiation for Oncology Patients

A Sam Beddar, Mary Lou Kubu, Mary Ann Domanovic, Rod J Ellis, and et al. "A new approach to intraoperative radiation therapy." *Association of Operating Room Nurses. AORN Journal* 74.4 (2001): 500-505. Discovery, ProQuest. Web. 9 Dec. 2010.

1. Written by professors from Case Western Reserve University and University Hospitals of Cleveland, this article suggests a new approach to intraoperative radiation therapy or IORT. This means that a large dose of rays can be aimed at specific cancer masses, without killing other surrounding tissue. It is used by a device called a 'mobile electron linear accelerator,' when compared to the dated immobile equipment, this device offers benefits that the older methods do not. The older methods, like the use of a linear accelerator, required costly shields for the operating room. The *mobile* electron linear accelerator doesn't require patients to move to and from different rooms in the hospital, making their treatment go more smoothly. The new accelerator also offers high-energy electron beams, which can be much more effective when killing cancer, compared to x-rays. Especially when being first developed, in 1909, the reason this method didn't work was because the rays were too weak and didn't eliminate any cells at all. Though this device requires a specifically trained team for patient care, this method is much cheaper than the immobile accelerator, which was sometimes built inside a room with foot-thick concrete walls. Larger hospitals can greatly benefit from this device and can treat a higher number of patients thanks to the cheap cost and the mobility.

2. Innovation in cancer treatment is important to me because I have had multiple relatives die from or have lived with cancer. I know that there are scientists and doctors in laboratories all over the world currently trying to find a cure. The fact that I know people are dedicated and committed to fighting this disease inspires me.

3. Since the last advancement in IORT was in 1994, I think that this source is credible because it was published in October of 2001. Though it may not be brand-new, it holds some of the latest information on IORT and offers some ideas for the future.

4. This article was published by the Association of Operating Room Nurses, which is a journal whose information is contributed by educated nursing graduates. After browsing their website, I believe the AORN is a credible source. This article was peer-reviewed and I found it on ProQuest, just like all my other sources. Their mission statement says, "AORN is a professional association that empowers the OR nurse with education, standards of practice, and peer networking."

5. The main author, Sam Beddar, holds a PhD and a FCCPM. He is currently the assistant professor of radiation oncology at Case Western Reserve University in Cleveland. He is also a clinical medical physicist at the University Hospitals of Cleveland. Clearly, Beddar is educated in his field and passionate about what he does, making him a reliable author.

Fiona Farmer. "Nursing management and radiation oncology. " *Australian Nursing Journal* 7.1 (1999): 21-23. Discovery, ProQuest. Web. 9 Dec. 2010.

1. This article discusses new ways for patients who are undergoing radiation therapy to cope and become healthy again. This article gives a brief history and explains the different ways the linear accelerator, as mentioned previously, can destroy cancer cells. Focusing on the patient, this article suggests the pre-treatment, radiation patients should go through what

is called ‘planning.’ This helps the patient and doctor know the dosage of radiation and the patient’s tolerance for it. The article goes on to describe some side affects for a patient undergoing radiation therapy, but most importantly gives options on how to make the treatment less stressful. The patient must know that in order to kill the cancerous cells, some good cells must be killed as well. But this article offers information on how to take care of your body as a radiation patient. It includes good tips on how to take care of your skin, and also prepares patients for other symptoms like fatigue, hair loss, etc. The concluding statement mentions that patients require different types of support to go through treatment successfully.

2. I recently had a friend diagnosed with cancer, and now that I know I can emotionally support her, this article was helpful for me and it gave me some great ideas.
3. This article was published in July of 1999. The good thing is that it is mostly an article on how radiation patients can be supported and guided through the process, which is timeless information. This article is credible despite the date because the helpful hints are backed by scientific information and suggestions from a doctor.
4. This article was published by the Australian Nursing Journal, which is the official journal of the Australian Nursing Federation. This journal is written by certified nurses, and is estimated that about 120,000 people read the journal. This source is credible because it is published by a federation, and it is written by nurses, who, after all, know health more than anybody. This is a peer-reviewed source. Also, I think it was appropriate to use as a source because it offers more ideas from around the world, not just the United States.
5. The author’s name of this particular article is Fiona Farmer. She is a registered nurse and a CM. She holds a Bereavement Counseling Certificate from Calvary Hospital and a

Radiation Safety Certificate. She is also a nurse educator and graduated from The New South Wales College of Nursing with a graduate certificate in Oncological Nursing. I think she would be a credible author because of her schooling and because of her awards. She obviously understands how to treat cancer patients.

H Edwin Romeijn, Ravindra K Ahuja, James F Dempsey, and Arvind Kumar. "A New Linear Programming Approach to Radiation Therapy Treatment Planning Problems. " *Operations Research* 54.2 (2006): 201-219. Discovery, ProQuest. Web. 9 Dec. 2010.

1. This article suggests another type of radiation treatment, called intensity-modulated radiation therapy or IMRT. The intention of this therapy is also to avoid killing non-cancerous cells. The process of this method includes dividing up main beams into multiple smaller beams. One can do this by irradiating the large beams and decomposing them into smaller ones. The advantage to doing so is that each beam can be individually adjusted as far as the intensity goes. This method is supposed to be one of the newest technologies out there today. Aside from informational graphs, charts, and diagrams, this article is very long and detailed. This method has already been used for real situations and is still being altered and adjusted so that it works most efficiently. Although treatment must be carefully calculated by a planner, and can be frustrating at times because of the math computations, it is worth it in the end to save someone's life.
2. Again, this subject is close to my heart because people I care about have been affected by cancer. Of course, I want those people to get the best care. That is why I am passionate about donating my time and money to this cause.

3. This article was published in March and April 2006. It is more recent than some of my other articles, and shows advances in this field from some of them. This article is also very technical and math-based, which means that a lot of research must have been done to publish it correctly.

4. This article was published by Operations Research, whose mission is to "publish results that are truly insightful." This organization was made to serve practitioners, educators, researchers, and students. This organization is easy to find on the web and they are easy to contact. This source is credible because they have an editorial office and board, and because it is a peer-reviewed source. They also seem to be dedicated to their work, their mission statement also includes "that the paper…contains important insights, and makes a substantial contribution to the field that will stand the test of time."

5. The main author is H. Edwin Romeijn, who is in the Department of Industrial and Systems Engineering at the University of Florida, Gainesville. His contribution to the article was mostly the mathematical calculations and contributing to the medicinal information. Another author, James F. Dempsey, is in the Department of Radiation Oncology at the College of Medicine, located also at U of F, Gainesville. His research is specified in figuring out the dosage of radiation for specific patients. Both of these authors are highly credible as they are college professors and work together, despite that they are in different departments

"Low-Dose Radiation Better at Killing Cancer Cells. " *Association of Operating Room Nurses. AORN Journal* 81.1 (2005): 66-66. Discovery, ProQuest. Web. 9 Dec. 2010.

1. Though short, this article is straight to the point and uses facts and figures to support the claims within the piece. According to a study, "lower doses of radiation elude a damage

detection ‘radar’ in DNA and actually kill more cancer cells than high-dose radiation,” reported on October 4th, 2004. The study was repeated by Johns Hopkins Kimmel Cancer Center and they tested the theory on cultured prostate and colon cancer cell lines. The results agreed with the first study. They found that “35% of colon cancer cells survived low-dose radiation, compared to 60% receiving high-dose radiation. In prostate cancer cell lines, half of the cells survived low-dose radiation, and 65% survived in higher doses.” Researchers came to the conclusion that stronger radiation damages more surrounding tissue, not always being cancerous tissue. So far, this theory has only been tested in cultured cells. At the moment, scientists are not sure if this method can be used in the human body.

2. I think it is important for scientists at this time to try many combinations of treatments to cure cancer, whether it is promising or not. If researchers keep using different combinations for treatment, eventually there will be a cure. No one I know wants anyone to have cancer; it will benefit us all to find a cure.

3. This article was published in January 2005, so it is somewhat recent. It also connects to my other articles well and uses some of the same terminology, which helps develop a research process for all of my sources. I think it is reliable because of the article length, it is short and to the point and briefly explains *why* low power radiation can be more effective in certain cases, all while backing it up with facts.

4. This article was published by the Association of Operating Room Nurses, also mentioned in the first citation, or the AORN Journal. They have been publishing medical findings since 1998. On their website, there are tabs such as “Membership,” “Education,” “Community,” “Practice resources,” “Public Policy,” and more. There are plenty of links

that you can go on and learn more about health topics. That is part of the reason I chose this as a credible source, it is also a peer-reviewed publication.

5. There is no specific author for this article, but was released by Johns Hopkins Medicine.

Srinivasan Vijayakumar, and Samuel Hellman. "Advances in radiation oncology. " *The Lancet* : Oncology (1997): Platinum Periodicals, ProQuest. Web. 9 Dec. 2010.

1. Like some of the other articles, this one finds that radiation dose-distribution, which is sending radiation to specific locations, is appropriate when treating most tumors. This type of therapy uses advances in computer technology, imaging, and treatment planning to make sure that the tumor is most effectively eliminated from the body. This also is useful because radiation can conform to the shapes of tumors better than other types of treatment. A specific type of radiation therapy is also mentioned, stereotactic radiotherapy. This explains that it works best on brain tumors and that it is easier to keep the tumor contained because of the skull. This method, like others also saves non-cancerous tissues, making the patient feel less symptoms of treatment. One of the most helpful contributors to understanding radiation treatment is technological advancements, thanks to technology; we have come a long way.
2. As always, cancer patients have always held a special place in my heart because they are strong people who have to fight for their life harder than anyone else. I would always want the best treatment for anyone who had or has cancer.
3. Although published in May 1997, this article allows scientists and researchers to go back and see the work that has been done, whether it’s for inspiration or correcting mistakes made in the past with treatment. It is still reliable today because most of the facts mentioned still have not changed.

4. This article was published by The Lancet, in London. The Lancet is the world's leading general medical journal with more specific journals in oncology, neurology, and infectious diseases. The site is mostly used for medical professionals, but it is still simple to navigate the website. This source is credible because new articles are always being published and posted, and almost all are written by medical professionals. This article is also peer-reviewed.
5. The authors are Srinivasan Vijayakumar and Samuel Hellman. Both work in the Department of Radiation and Cellular Oncology at the University of Chicago. Vijayakumar is an MD and Hellman is a Professor and MD. These authors are credible, since the University of Chicago is a school of academic excellence, and they teach there. They also teach in a field that is not easily understood.

Personal Reflection:

The topic of radiation oncology caught my interest because Cancer has always been interesting to me. I have had three grandparents alone die from different types of cancer; lung, brain, melanoma, and leukemia. I think that contributing to cancer research had made a big difference in how far scientists have come in understanding this disease. My friend Anna* was recently diagnosed with Hodgkin's Lymphoma. As soon as I found out, I went online and researched the disease. Thankfully, the survival rate for Hodgkin's Lymphoma is eighty-five percent, which made me, feel a little bit better. I learned that there are a few different ways for treating it, and radiation was one of them. Soon after, Anna* told me that she decided to go through radiation therapy. Unfortunately, to previous knowledge, I knew that hair-loss was one side affect to radiation therapy, though it was powerful. As any girl would naturally fear, Anna* was most scared of her hair being gone. I thought back to a time when I had donated 10 inches of my hair to locks of love in the eighth grade. Doing so made me realize that whoever got my hair probably appreciated it more than I could understand. Next time I donate, this topic will be even more near to my heart.

*Name has been changed.