

FAMILY MEMBERS AND PROSTATE BRACHYTHERAPY

One of the most common questions I'm asked about prostate brachytherapy from both patients and family members is what is the radiation exposure when active radiation seeds are placed into the prostate?

There are all kinds of conceptions and most commonly misconceptions. Many believe they cannot be by loved ones, children, pregnant women and others. There have been a variety of studies that have looked at this and one more has been recently published by Michalski et al and published in the prestigious International Journal of Radiation Oncology Biology and Physics.

Transrectal ultrasound placed prostate brachytherapy or seed placement has been a superb alternative to radical prostatectomy or straight external beam radiation for treatment of prostate cancer. Control rate seems great and many people like the quality of life after treatment.

It has been estimated that in the year 2000 about 20,000 men underwent prostate brachytherapy. One big concern of health professionals is whether men chose or refuse prostate brachytherapy based upon radiation exposure to loved ones and neighbors. For this reason a study was undertaken about radiation exposure.

In the United States the nuclear regulatory commission requires that patients undergo permanent brachytherapy receive instructions about unnecessary exposure to others.

The purpose of this study was actually to measure radiation exposure to family members living in the same house as patients undergoing permanent seed brachytherapy. Patients and household members were asked to participate in perspective study of radiation exposure after seed placement into the prostate.

The study was reviewed by an institutional review board and patients signed an informed consent expressing their willingness. Patients had either permanent seed placement with iodine or palladium. Iodine has a half-life of about 60 days meaning half the radiation is gone every 60 days whereas palladium has a half-life with about 17 days. The choice of the isotope was made by the physician.

Physicians generally at that time in that institution used iodine for lower risk cancers and palladium for higher risk cancers. Eleven of the participants were excluded because they did not return the devices to measure dose and another five patients were excluded because they did not comply with instructions.

Forty-four patients formed the basis of the study with 29 of the patients having iodine and 15 palladium. The difference in patients who received implant alone versus implant plus external radiation – and so all patients were analyzed as a group.

To be eligible for the study patients had to have one household member living with them who was willing to be monitored. Each patient wore two monitors one at the collar and one at the waist. The spouse was usually the other household member. Some men had children at home as well as spouse. On the day that seed implant took place all participants were asked to wear their meters continuously for the three weeks of the study.

During the study no patient or family member traveled by air that would account for radiation exposure above background. Patients who had pets at home were also included as household members if they could wear meters on the collar. Four rooms were monitored for exposure

including the bedroom, bathroom, kitchen and living room. Patients were asked to place meters where they would sit or sleep. After use the meters were returned by the patient and family to the company for measurement. There were controlled meters held by radiation safety officer to measure background radiation. Background radiation was subtracted from each meter to estimate the actual radiation that was contributed by the prostate implantation.

Since palladium has a shorter half-life it delivers its radiation more quickly. Iodine has a half-life of 60 days and delivers 98% of its radiation dose in the first year while palladium delivers 99.9% of its radiation the first year.

Results showed that patients had the highest measurements which would be expected. Iodine gave higher exposure readings than palladium because of higher photon energy. Values don't however reflect the patient dose because the meters were used to detect external radiation exposure not the internal implant.

The majority of patients, spouse and other family members showed very little radiation exposure where calculated lifetime radiation exposures were skewed towards no measurable dose detected above background.

The affected dose equivalent for spouses was 0.10mSv for iodine implant and 0.02mSv for palladium for palladium implantation. Other family members and pets had an equivalent dose of 0.07mSv for iodine and 0.02mSv for palladium implants.

The majority of 94% of the room monitors had no detectable radiation exposure above what would otherwise be normal. In the 25% groups, a special analysis took place, spouses received less radiation from palladium implant than from iodine implant. All exposures were well below limits set by the United States Nuclear Regulatory Commission for both isotopes.

The reasons for this – well there are a variety of reasons including that there is internal absorption of radiation by the patient so very little radiation is emitted. With patients from permanent brachytherapy are below the limits permissible. After brachytherapy exposures for patients are measured at 1meter or about 39" away and in more than 300 consecutive prostate brachytherapy patients never has an exposure rate exceeded the Nuclear Regulatory Commissions guidelines.

It is estimated that based upon these calculations that meters measure well below the annual limits set by the Nuclear Regulatory Commission and other regulatory agencies. Even the highest exposures received by patients' spouses are barely half the annual limit for members of the general public. Less intimate members of the household such as children, pets, and environment, suggests that it is very unlikely to have high exposure levels at home.

There has to be an understanding that people in different parts of the country receive different amounts of radiation. For example, someone in Denver receives 5-fold greater life time exposure when compared to a person in St. Louis. The St. Louis person was exposed to someone who had undergone iodine seed implantation.

The authors write, "The magnitude of radiation exposure to family members from patients undergoing prostate brachytherapy is no worse than that from events most people take for granted every day." An implant patient can hold a child but should restrict activities such as the child sitting on his lap for many hours on multiple occasions. The authors also note that the choice of palladium will reduce radiation exposure to members especially pregnant woman and the fetus but that the level of concern should be modest at best.

The authors in their concluding remarks note that, "Radiation exposure to family and household members from a patient receiving a radioactive prostate brachytherapy implant is very low and should be a minor factor in the decision making process for his primary therapy. This study

demonstrates that the lifetime exposure to household members is below the limit set by the Nuclear Regulatory Commission for members of the lay public.”

For another reason why we have used palladium seed implantation is that there is the shorter half-life and less radiation exposure to loved ones. Also, there seems to be at ten years the possibility of greater cancer free survival and fewer complications. These points are still being studied as we write this article.

We have seminars open to the public to discuss treatment options. We also have multi-disciplinary panels of physicians to review films, reports and medical history. We have a cancer hot line to answer questions: 212-CHOICES and as well have an e-mail address: gil.lederman@rsny.org.