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An Argument against Offering PET/CT Screenings

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The decision to begin offering ¹⁸F-FDG PET/CT screenings may seem like a great idea for a medical imaging company, but it is laced with complex issues that need to be addressed before the matter is finalized.

The purpose of this document is to bring to the attention of the administration the facts on topics of the effects of ionizing radiation, guidelines from accrediting bodies and professional societies in the field of nuclear medicine on the use of PET/CT screening, and ethical responsibilities that healthcare workers and their administration must uphold. Links to recent studies showing the benefits and risks of PET/CT screening and a very brief synopsis of the articles referenced are provided. However, a true scientific breakdown of all the data is not.

The American College of Radiology (ACR) has documents intended to guide clinicians on the acceptable use and appropriate practice of PET/CT. Oncologic PET/CT is a valuable tool needed to stage, restage, monitor therapy and plan radiation therapy in patients with a known malignancy. Characterization of a known pulmonary nodule over 4 mm in size is also considered appropriate for diagnosis of early stage lung cancer [1].

¹⁸F-FDG PET/CT is high in sensitivity but lacks specificity and carries with it a fairly high dose of ionizing radiation to the patient. The risks concerning low specificity (i.e. false positive/negative, low FDG tumor avidity/FDG avidity for non-malignant processes) and those involved with this type of radiation are typically weighed against the benefit of using the study to design a plan of attack on a cancer that is already a threat to the patient's life [2].

In this case, the benefit almost always outweighs the risk. However, there is little scientific literature that condones the use of oncologic PET/CT for screening. The risks outweigh the benefits. There is no way to rule out cancer with ¹⁸F-FDG PET/CT.

The ACR practice parameter offers guidelines on the use of oncologic PET/CT in the clinical setting. According to the ACR, examination specifications include a written or electronic request for ¹⁸F-FDG PET/CT that provides sufficient information to demonstrate medical necessity for the study and proper interpretation. This type of documentation includes, signs and symptoms the patient is experiencing and relevant history including the known diagnosis or indication for the scan.

Indications for oncologic PET/CT include staging for initial treatment strategy for a known malignancy, restaging, monitoring response to therapy for a known malignancy, locating an unknown primary when metastases are present and guiding radiation therapy planning of a known malignancy. There is no mention of the use of PET/CT for screening in the ACR practice parameter [3].

The practice parameter guidelines for PET/CT are worded in a way that gives the impression that they are flexible suggestions and do not need to be considered mandatory for continued accreditation. However, an ACR PET program specialist confirmed verbally and through email that, ACR accredited facilities are to comply with the ACR practice parameters and if a facility chooses not to comply with those parameters, it can put accreditation in jeopardy.

Medical use of ionizing radiation accounts for the highest amount of artificially produced radiation exposure to the public. Nuclear medicine and CT are among the highest contributors to these growing levels. When PET/CT for screening purposes is called into question from the standpoint of a clinical trial for determining cancer risk in a population, the level of radiation to the patient is the least concerning, this isn't to say it's insignificant [4].

Nuclear medicine operates under the linear non-threshold model of radiation exposure. This means, there is no amount of radiation a nuclear medicine technologist can administer for any scan where the level of radiation exposure will cause obvious cellular damage to the patient. There is no threshold where if exceeded we can see a burn or breakdown of tissue when our scans are done correctly [5].

Therefore, it is difficult to know whether the damage done to a patient's DNA is permanent or whether the DNA will be able to repair itself. In an article from Medscape, latency for ionizing radiation induced cancer can be more than 20 years. Studies like the one in the Medscape article primarily use estimates of exposure to Japanese populations affected by atomic bombing, and more recently, radiation exposure to populations affected by natural disasters causing radiation contamination.

The same article lists the average level of background radiation from natural sources in this region was as around 3.0 mSv (millisievert) per year. The sievert being a unit of measure for equivalent dose, or a sum of relative damage to each organ depending on the organs sensitivity [6].

According to the American Cancer Society, the average PET/CT study subjects the patient to approximately 25 mSv of exposure. That is the equivalent of more than 8 years of background radiation exposure. Again, if the scan is indicated and requested by a licensed medical practitioner with clinical documentation for one of the reasons listed on ACR's practice parameter, then this dose is less of a factor.

When there is no indication or requisition by a licensed medical practitioner treating the patient, it is uncalled for and some might say dangerous if repeated at any interval as a regular screening. There is no way to exercise ALARA (as low a reasonably achievable) with regard to radiation protection when the study is not reasonable to begin with.

There is no licensure for practice of nuclear medicine in Oklahoma. Until a licensure exists, the organizations that guide clinicians and their leaders on how to build a proper practice will continue to be professional societies like the Society of Nuclear Medicine and Molecular Imaging (SNMMI), American Society of Radiologic Technologists (ASRT), ACR, and of course Certifying bodies, Nuclear Medicine Technology Certification Board (NMTCB) and American Registry for Radiologic Technologists (ARRT). All documents available through the professional organizations listed above are designed to guide a clinic to practice PET/CT safely and ethically [7,8].

The NMTCB defers to SNMMI for defining a nuclear medicine technologists scope of practice. In addition to the practice standards set forth by the ACR, these documents can be helpful in the question as to whether an order is required for a study (screening) or not. In the patient care section of the scope of practice the society states that orders must be verified before injection.

The ASRT scope of practice is much the same, verification of a written order is needed. As stated early in the ACR practice parameter, an indication for a scan from a licensed practitioner treating the patient is needed in order to comply with best practice standards of the accreditation mega association. It is the responsibility of both the administration and technologist to know the role and boundaries the technologist has in the sequence of events leading up to an injection.

The ethics committee at ARRT states that if a technologist deviates from best practice guidelines and is reported to the NMTCB or ARRT, the technologist can be sanctioned and possibly lose their certifications permanently and with it their ability to work [9].

In the medical community, high ethical values are an important virtue to possess. This field is built on a theoretical, philosophical and scientific foundation. Each level supports the other. It's designed so medical professionals have the choice to make the right choice, not forced to.

This profession is set up so that it attracts the type of virtue it was built on, beneficence and non-maleficence. When offering medical services directly to the public for cash without a referral, it cuts the expert knowledge that comes from the theory, philosophy and science out. It's going behind the doctors back and over the technologists head, and placing this specialty of medicine in the hands of a population whose general knowledge of the specialty comes from what a google search yields. This is not empowering the patient, it is taking advantage of them.

The studies done testing the potential and limitations of PET/CT screening are limited. After reviewing several articles on studies performed, the general feeling left from them goes something like this:

It's best not to spend money on researching the effectiveness of screening studies. Please continue to use whole body PET/CT for staging, restaging and monitoring treatment. The articles referenced are attached to this document.

If the administration would a true breakdown of the data submitted within each trial, rather than to read them and deduce for yourself, please request. However, this type of scientific document will not come to fruition overnight.

Suggested Reading

- Off Script: The Dangers of Writing Off-Hand Prescriptions for Friends and Family, Emergency Physicians Monthly, Michael Silverman MD, 2015.
- ACR Statement on Whole Body CT Screening.
- Implementation and organization of lung cancer screening. Jesper P. and Haseem A. NL. 2016.

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