

---

---

# A Student's Perspective on PET/MR: Technologies Can Merge, but Can Technologists?

In recent years, MR imaging and PET technologies have been merged to create a powerful diagnostic imaging modality known as PET/MR, a technology capable of superior lesion characterization with half the radiation exposure of PET/CT. PET uses radio-nuclides to provide metabolic and physiologic information. MR imaging, however, uses a strong magnetic field to align the hydrogen atoms within the body. Radio frequency is directed at the region of interest to knock the atoms out of alignment and receive a signal that is used to create a detailed anatomic image. As PET/MR continues to evolve and new applications are developed, it could potentially hold many promises in fields such as oncology, neurology, and cardiology. Thus, there is a need for highly trained individuals in the fields of both nuclear medicine and MR imaging.

Currently, there are 2 dedicated PET/MR systems available for use. One is manufactured by Philips Healthcare, and the other by Siemens Healthcare. The Philips Ingenuity TF PET/MR system is designed with the PET detector ring and MR imaging magnet in tandem; that is, the gantries are housed in the same room but separated by a rotating table that allows the technologist to move the patient from one machine to the other without repositioning. The Siemens Biograph mMR PET/MR system is designed with the PET detector ring located inside the MR imaging magnet hardware, allowing for simultaneous

imaging. The information is coregistered, showing the structure and what that region of interest is doing bio-chemically. Both these designs are achieved through the use of MR-compatible avalanche photodiodes in the PET detector ring rather than the standard photomultiplier tubes (1).

With the merging of these 2 technologies comes the need to “merge” technologists. The American Registry for Radiologic Technologists—the world’s largest credentialing organization for imaging professionals ([www.arrt.org](http://www.arrt.org)), states that there are currently 13,238 credentialed nuclear medicine technologists and 30,239 credentialed MR technologists. However, only 569 of those technologists hold dual certification in both nuclear medicine and MR (American Registry for Radiologic Technologists, written communication, September 26, 2013).

A joint consensus paper from the Society of Nuclear Medicine and Molecular Imaging and the Section for Magnetic Resonance Technologists published last year outlines competency requirements for both nuclear medicine technologists and MR technologists. The paper states that nuclear medicine technologists and MR technologists should have appropriate didactic and clinical education. Both modalities have specific requirements for safety, image quality and control, and quality assurance. The authors concluded that “it is not in the best interest of either program, or the field, to add competencies to either curriculum at this time. It is recommended that the additional education needed for PET/MR technologists be in the form of advanced-level education” (2).

As PET/MR systems become more available in the clinical setting, it may be advantageous for both nuclear medicine technologists and MR technologists to cross-train to operate the

hybrid imaging system. The question is: Can the technologists be merged? I created a Web-based electronic survey using the Qualtrics survey tool and sent it to both nuclear medicine technologists and MR technologists in the Saint Louis, Missouri, area, where a PET/MR system is installed and currently in use. The survey attempted to address a wide range of topics such as technologist demographics, educational background (i.e., type of educational program and year of completion), and awareness of hybrid technologies (including PET/MR). One question was left open-ended, asking the respondents to indicate any factors they felt would affect their willingness to cross-train.

The survey was emailed to a total of 118 technologists; 37 respondents began the survey, but only 33 surveys were completed, yielding an overall response rate of 28%. Of the 33 who completed the survey, 21 were nuclear medicine techs and 12 were MR techs. Two respondents were either currently working or training on a PET/MR system. Of the remaining respondents ( $n = 31$ ), 87% indicated willingness to cross-train (55% nuclear medicine techs; 32% MR techs) (Table 1).

The demographics questions allowed for further classification. The graduation dates of those surveyed spanned 40 y. The data were categorized as those who graduated in the last 10 y and those who graduated between 11 and 40 y ago. Of the former group, 86% (12/14) indicated willingness to cross-train; in the latter group, 88% (15/17) indicated willingness to cross-train. With regard to education, 3% (1/31) completed some form of hospital- or facility-based training; 10% (3/31) completed a certificate program; 19% (6/31) completed a 2-y degree program; 58% (18/31) completed a 4-y degree program; and 10% (3/31) held a master’s degree or higher. Education seemed to play a

---

Received Sep. 30, 2013; revision accepted Nov. 18, 2013.

For correspondence or reprints contact: Elizabeth D. Young, Saint Louis University, 5724 Potomac St., St. Louis, MO 63139.

E-mail: [eyoung22@slu.edu](mailto:eyoung22@slu.edu)

Published online Jan. 21, 2014.

COPYRIGHT © 2014 by the Society of Nuclear Medicine and Molecular Imaging, Inc.

DOI: 10.2967/jnmt.113.133371

large role in the willingness of respondents. Those who had completed a higher degree of education were more likely to want to cross-train (Tables 2 and 3).

PET/MR is an elegant but complex system. For the safety of the technologists, patients, and anyone involved, a new educational pathway should be

created. Members of the Section for Magnetic Resonance Technologists and Society of Nuclear Medicine and Molecular Imaging are already working together to map out uncharted territory by outlining an educational program that goes beyond entry-level instruction. As with PET/CT and SPECT/CT,

PET/MR is an emerging technology that cannot be ignored. With the anatomic resolution of MR imaging and the physiologic information of PET, there really is not much these two cannot do together. The technology has been merged; now it is time to merge the technologists.

**TABLE 1**  
Willingness of Respondents to Cross-Train, by Technologist Type

Willing to cross-train?	Nuclear medicine technologist	MR imaging technologist
Yes	55% (17/31)	32% (10/31)
No	10% (3/31)	3% (1/31)

**TABLE 2**  
Willingness of Respondents to Cross-Train, by Time Since Completion of Education

Willing to cross-train?	Years since completion of educational program	
	≤10	11–40
Yes	86% (12/14)	88% (15/17)
No	14% (2/14)	12% (2/17)

**TABLE 3**  
Level of Education

Hospital-based training	Certificate program	2-y degree program	4-y degree program	Master's degree or higher
3% (1/31)	10% (3/31)	19% (6/31)	58%(18/31)	10% (3/31)

**DISCLOSURE**

No potential conflict of interest relevant to this article was reported.

**ACKNOWLEDGMENT**

I thank Marcey Kennedy, MA, ARMRIT, R(MR) (ARRT), and Austin Turner, BS, CNMT, R(MR) (ARRT), for contributions and advice concerning this paper.

**Elizabeth Young**

*Magnetic Resonance Imaging Program  
Saint Louis University  
St. Louis, Missouri*

**REFERENCES**

1. Rakheja R, Friedman K. Simultaneous PET/MR: early experience. *MI Gateway Newsletter*. 2013;7:1–3.
2. Gilmore CD, Comeau CR, Alessi AM, et al. PET/MR imaging consensus paper: a joint paper by the Society of Nuclear Medicine and Molecular Imaging Technologist Section and the Section for Magnetic Resonance Technologists. *J Nucl Med Technol*. 2013; 41:108–113.