Nuclear Medicine and Molecular Imaging (2019) 53:30–32
https://doi.org/10.1007/s13139-018-0560-7

PERSPECTIVE

ISSN (print) 1869-3482
ISSN (online) 1869-3474

The Emergence of Theranostics in the Philippines: Overcoming Challenges and Bringing Hope

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Received: 3 December 2018 / Accepted: 5 December 2018 / Published online: 18 December 2018

Abstract

Medical managements are becoming personalized while diseases are being understood at the molecular level. Nuclear medicine is one of the fields actively contributing to this development. In particular, theranostics, a combinatorial term for therapy and diagnostics, enables accurate imaging and subsequent targeted radionuclide treatment. Due to its high impact in healthcare, many countries have begun to offer Ga-68 PET/CT scans and Lu-177 therapies. The Philippines has followed suit through the initiative of this author and able support of the administration and staff of St. Luke's Medical Center. The Ga-68 DOTATATE and PSMA PET/CT scans became officially available in January 2018 while the first peptide receptor radionuclide therapy for neuroendocrine tumor and first PSMA radioligand therapy for prostate cancer occurred in May and June 2018, respectively. Amidst past, present, and future challenges, theranostics has emerged in the Philippines, offering hope to cancer patients in the country.

Keywords Theranostics · Ga-68/Lu-177 DOTATATE · Ga-68/Lu-177 PSMA · Philippines · Pioneer

The Mission

The practice of medicine is now highly specialized. Medical managements are becoming personalized while diseases are being understood at the molecular level. In this revolutionary era, nuclear medicine is one of the fields actively contributing to this development. In particular, theranostics, a combinatorial term for therapy and diagnostics, enables accurate imaging and target-expression confirmation, and subsequent radionuclide treatment [1].

Inspired by what theranostics can offer, this author boldly approached Prof. Dr. Richard P. Baum, one of the world leaders in theranostics, during an annual convention in 2016 and asked to train under him at Zentralklinik Bad Berka in Germany. Aware that setting up the foundation for theranostics in a developing country is an enormous task, this author went ahead and absorbed as much as she could during the training from July to September 2016, despite financial constraints and the risk of not having a career to return to.

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Challenges

Not all observership or fellowship produces an output. To be able to pioneer something entails extensive knowledge and experience, as well as passion and grit. Establishing theranostics is not as easy as ordering a radiopharmaceutical and giving it to the patient. Unlike radioactive iodine, which has been utilized since the 1940s, gallium-68 and lutetium-177 have only been studied and incorporated into clinical practice since the early 2000s [1–3]. As such, these are not yet available in all nuclear medicine centers and not yet a part of all nuclear medicine training curricula. Although Ga-68 is a PET radiopharmaceutical, it is generator-produced unlike F-18, which is cyclotron-produced [4]. Although Lu-177 therapy is non-invasive like radioactive iodine therapy, it has different patient preparations and radiation precautions. Moreover, it requires a more detailed pre-treatment assessment and stringent monitoring [5]. Thus, many challenges await the ambitious. However, with the right motivation and proper preparation, one is able to focus on the goal and make a dream into a reality.

To start off, the hospital administration must be convinced to invest in new equipment. In the Philippines, it is easier for private hospitals compared to government hospitals to purchase a new machine. Still, the administrative staff must be guided on how to ask for quotations from potential suppliers

and then, decide on what is necessary and cost-effective to buy. Upholding its reputation as a world-class institution with state-of-the-art technology, St. Luke's Medical Center bought the GMP $^{68}Ge/^{68}Ga$ 30 mCi generator and the iQS-Theranostics Synthesizer from iTG. After it became the first in Southeast Asia to open a PET center back in 2002, St. Luke's can again pride itself in being the only hospital in the country that offers Ga-68 DOTATATE and PSMA PET/CT scans and Lu-177 DOTATATE and PSMA therapies [6].

While waiting for the delivery and installation of the new equipment, along with the renovation of the laboratory, other matters must be attended to. Several meetings with pharmacy, finance, marketing, ancillary services, as well as the cancer institute were held. Costing was proposed and modified. A lot of letters and emails were sent. Orientations for the Department of Nuclear Medicine and PET Center staff and Nursing Division were conducted in both branches of St. Luke's Medical Center—Quezon City and Global City. Work instructions, consent forms, and patient brochures were prepared. The requisite licenses to import and operate were obtained.

All of the above took 1 year to accomplish. This project was spearheaded by this author, who was assisted by the PET center staff in Quezon City. The test scans were carried out in October and November 2017. In January 2018, the Ga-68 scans and Lu-177 therapies were officially included in the list of hospital procedures.

Current Practice

Requests for Ga-68 DOTATATE and PSMA PET/CT scans are slowly increasing. Of course, Ga-68 PSMA PET/CT scans are being done more often compared to Ga-68 DOTATATE PET/CT scans owing to the higher incidence of prostate cancer relative to neuroendocrine tumors.

A few months passed before a referral for peptide receptor radionuclide therapy (PRRT) came. Unfortunately, the importation of lysine and arginine has not yet been approved by the local Food and Drug Administration until this writing. Hence, gelofusine is the only agent being used for kidney protection [7]. Dealing with government agencies is one of the stumbling blocks in the efficient implementation of theranostics in the Philippines. Another source of frustration is the Bureau of Customs, which cannot release the imported Lu-177 at an anticipated time. Hence, coordination or adjustment of schedules falls on the nuclear medicine physician.

Anyhow, the first PRRT and first PSMA radioligand therapy (PRLT) were successfully performed by this author on May 16, 2018, and June 15, 2018, respectively; the former for small cell neuroendocrine carcinoma in the mediastinum and the latter for castration-resistant prostate cancer with lymph node, pulmonary, hepatic, and osseous metastases. Two PRRT and three PRLT patients have follow-up Ga-68 PET/CT scans already, showing mostly promising results. Also, as reported in most of the literature, none of them manifest nephro- or hematotoxicity [8]. Moreover, patients love the fact that there is no downtime; that they can go back to their normal daily activities immediately after discharge.

As soon as theranostics was introduced at St. Luke's Medical Center, the doors were opened for other nuclear medicine physicians to expand their scope of practice. Now, nuclear medicine is becoming recognized as a significant specialty that can both diagnose and treat not only thyroid cancer but other cancers as well. Of course, the hard work is far from over. There are other specialists who are still not receptive to theranostics and view nuclear medicine physicians as competitors rather than partners or teammates in the management of patients. There are also a few patients and relatives who still do not fully believe in the competence of Filipino doctors and would rather go abroad. To address these issues, this author has delivered lectures in various conferences and has educated the laypeople during lengthy consultations, as well as television and radio interviews.

The Future

There are remaining challenges to be hurdled. With patience and perseverance, the minor problems with the local FDA and Bureau of Customs will hopefully be solved. Through ethical practice, the complete trust of patients and referring doctors can be earned. Optimistically, the cost of the scans and treatments would be reduced so that more patients may afford them.

There are a lot of radiopharmaceuticals being developed at present. With the foundation of theranostics already in place, local and international patients in the Philippines would have ready access to these novel diagnostic and therapeutic procedures. Currently, the availability of theranostics in the country must be disseminated to more patients, and evidence of its efficacy and tolerability must be proven in the local setting.

Conclusion

The role of nuclear medicine has become prominent in healthcare since the advent of theranostics. Due to its impact in individualized disease management, many countries have begun to offer Ga-68 PET/CT scans and Lu-177 therapies. The Philippines has caught up with this latest development through the initiative of this author and able support of the administration and staff of St. Luke's Medical Center. Amidst past, present, and future challenges, theranostics has emerged in the Philippines, offering hope to cancer patients in the country.

Acknowledgements The author would like to thank Prof. Dr. Baum and his staff at Zentralklinik Bad Berka for their generosity, the St. Luke's Medical Center administration for their approval, the SLMC-QC PET Center staff for their substantial help, and the SLMC-QC Nuclear Medicine staff for their cooperation.

Compliance with Ethical Standards

Conflict of Interest Patricia A. Bautista declares that she has no conflict of interest.

Ethical Approval This article does not contain any studies with human participants or animals performed by any of the authors.

Informed Consent No informed consent was necessary.

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