Ushering in a New Era for Nuclear Medicine in the Philippines

On the cover of this journal issue are three PET/CT maximum intensity projection images representing the first ^{68}Ga-DOTATATE scan, ^{18}F-fluorocholine scan, and ^{68}Ga-PSMA scan (from left to right) done in the Philippines.

Going back 16 years earlier in the year 2002, the pioneer Positron Emission Tomography (PET) Center in the Philippines, equipped with a cyclotron and a PET scanner, located at St. Luke's Medical Center-Quezon City began its operation [1]. Through the years, PET/CT helped in the management of oncologic, neurologic, and cardiac cases using ^{18}F-fluorodeoxyglucose. With a half-life of 110 minutes [2], ^{18}F proved to be an excellent radioisotope as it provided enough time for patient preparation and scanning. Its most commonly paired compound, deoxyglucose (i.e., in the form of FDG), became useful in different indications as it secured its place as a global staple in PET. As a glucose analog, FDG accumulated in areas of increased glucose metabolism, thereby pointing to likely pathologies such as malignancy, inflammation, or infection [3].

In 2008, St. Luke's Medical Center-Quezon City again introduced another first in the country: the PET/CT scanner [1]. PET combined with computed tomography (CT) increased both sensitivity and specificity [4], producing fewer equivocal findings than PET alone [5], as well as improved localization and characterization of lesions [6]. In 2010, St. Luke's Medical Center established another PET/CT Center, this time in Bonifacio Global City, and expanded its list of services to include the ^{18}F-sodium fluoride (NaF) bone PET. Compared to ^{99m}Tc-MDP, ^{18}F-NaF had faster blood clearance and two-fold higher uptake in bone [7]. Thus, ^{18}F-NaF bone PET became a good option for the evaluation of skeletal metastasis.

In November 2015, KHealth Corporation, in partnership with the National Kidney and Transplant Institute, opened the third PET-CT Center, and added ^{18}F-fluoromethylcholine (FCh) to the available radiopharmaceuticals in the country. According to studies, ^{18}F-FCh PET-CT had high specificity for detecting lymph node metastases > 5 mm, as well as osseous metastases, in prostate cancer patients [8]. In January 2017 and March 2017, respectively, Angeles University Foundation Medical Center and Cardinal Santos Medical Center, both in business with KHealth Corporation, followed suit in offering PET-CT.

On the heels of these achievements is another innovation from St. Luke's Medical Center: the introduction of the popular theranostic radionuclide pair, ^{68}Ga and ^{177}Lu, in the Philippines. St. Luke's Medical Center did the first ^{68}Ga-prostate-specific membrane antigen (PSMA) scan in October 2017 and the first ^{68}Ga-DOTATATE scan in November 2017. It officially began accepting patients in January 2018.

Theranostics dates back to the use of ^{131}I for both diagnosis and therapy of thyroid cancer patients. Currently, it is a hot topic in many nuclear medicine journals and conferences due to its potentially huge impact on personalized disease management. Diseases seen on ^{68}Ga-labeled PET-CT scans can be targeted by ^{177}Lu using the same peptides or ligands [9].

With ^{68}Ga having a half-life of 68 minutes and DOTATATE specifically localizing in somatostatin receptors, ^{68}Ga-DOTATATE PET-CT posse es favorable imaging characteristics for neuroendocrine tumors (NET). It has a shorter imaging time compared to Octreoscan or MIBG scintigraphy, as well as lower radiation exposure [10]. It also has a high sensitivity and specificity in the diagnosis of primary or metastatic lesions in NET compared to gold standard pathology. It also results in change in clinical management in 71%-81% of patients with neuroendocrine cancers [11].

Due to overexpression of PSMA in prostate cancer, ^{68}Ga-PSMA PET-CT shows higher diagnostic efficacy compared to conventional imaging, including PET with other tracers. It also promises accurate staging

of primary prostate cancer and re-staging after biochemical recurrence [12–16].

Meanwhile, with a half-life of 6.7 days, and both beta and gamma emissions, ^{177}Lu allows scintigraphy with the same therapeutic compound. In 2013, the International Atomic Energy Agency, European Association of Nuclear Medicine, and Society of Nuclear Medicine and Molecular Imaging have collectively issued guidelines on peptide receptor radionuclide therapy (PRRT) with ^{177}Lu-DOTA-labeled peptides, acknowledging its utility for PET [17]. After PRRT, investigators have started studying PSMA radioligand therapy (PRLT). Recently, the Germans have conducted a retrospective multicenter data analysis and concluded that PRLT is effective in metastatic castration-resistant prostate cancer, causing tumor shrinkage and symptom reduction. Furthermore, they found that PRLT might exceed the performance of other third-line systemic therapies reported in the literature [18].

Since 2015, the field of nuclear medicine in the Philippines has experienced substantial growth. In 2018, it has finally caught up with global developments. Hopefully, the needs of Filipinos can now be better addressed.

Definitely, more tracers will be discovered and more trials will be done. Indeed, the future looks exciting.

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