

Introduction of ^{18}F FDG PET-CT Imaging of Inflammatory Diseases at NINMAS

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During the past decade, Nuclear Medicine practice has developed remarkable advancement in instrumentation, radiopharmacy and information technology. All these had played a prominent role in propelling the growth of Nuclear Medicine practice. The novel technology of positron emission tomography (PET) has reinvigorated the service of nuclear medicine in medical management. In particular, hybrid imaging equipment such as PET-CT has provided a valuable momentum for diagnostic and therapeutic applications for cancer. The application of ^{18}F FDG PET-CT in infection imaging is under evaluation. Tuberculosis (TB) is one of the top infectious diseases in developing countries. TB has become or is becoming a medical emergency not only in developing member States but also in some high-income countries, because of frequent co-infection with HIV/AIDS, and because of the development of drug-resistant strains of TB. The diagnosis of extrapulmonary TB (EPTB) and management of multidrug resistance (MDR) TB is a challenge. Nuclear medicine imaging may have a potential role in certain stages of TB infection to characterize the disease state and to assess the response to therapy by using ^{18}F FDG PET-CT (1). IAEA has initiated a coordinated research project (CRP) on extrapulmonary TB imaging with ^{18}F FDG PET-CT. The National Institute of Nuclear Medicine & Allied Sciences (NINMAS), Dhaka, Bangladesh has joined this CRP project in 2015.

Bangladesh is striving and providing good health services hand in hand to its population through the introduction of modern technologies and methods with its limited resources. Towards this effort, a PET-CT centre has been established at the NINMAS in 2014 by the government's own fund. Next, a further development is the establishment of another PET-CT and a Cyclotron centre (18-MeV Cyclotron) at NINMAS, which is now under the process of

installation. Only one cyclotron centre at private set up in Dhaka city is supplying FDG to the country at present.

It is very likely, that each country or department meets some limitations in initiation of new technology or project implementation, and more or less, they are common with issues of all other departments involved but could be specific. The NINMAS has faced different limitations in introducing PET-CT imaging of inflammatory diseases.

The most challenging issue for NINMAS was the initiation of PET-CT studies. After completion of the installation of PET-CT at NINMAS, there was no allocated budget sanction to purchase FDG from the private hospital. Several meeting has been conducted between NINMAS authority, BAEC, project director (PET-CT) and Chief Scientific Investigator of the CRP with this issue. Unavailability of FDG has delayed the recruitment of patient for the project initially. For the survival of this project we had to perform PET-CT scan for baseline study in there patient from a private PET-CT centre expending a lot of money. Finally, FDG became available in January 2016.

Another limitation of this project was the socio economic condition as well as the psychological status of the patients. Most of the patients with the diagnosis of EPTB and MDRTB were from low socio-economic background. Some of them were severely depressed with their diagnosis and due to long time treatment failure. Our project protocol comprised of three visits of each patient, like pre therapy baseline study before starting the anti-tubercular then two visits after two months and six months for treatment evaluation. We faced difficulty in performing follow scan of those patients living in another city and they needed to travel several hours from their home towns. They needed to arrive a day before the test and stay in hotel or guest house, which was expensive. Due to the severe depression of a few

patients, we and even the referring clinicians have failed to convince them for their follow up visits. Another reason of patient drop out was the death event of the patients.

Another major issue that hampered the PET-CT scan at NINMAS was that we had only one cyclotron in private level, which provided FDG to our department. We had to postpone patient recruitment for several weeks or months due to the unavailability of FDG, as because the only cyclotron was out of order.

According to Bangladesh Bureau of Statistics cancer is the sixth leading cause of death and each year more than 200,000 new cases develop cancer (2). As NINMAS is the

only PET-CT centre at government level with low cost, we always had to encounter long oncology patient queues, which made recruitment of TB patients difficult. NINMAS is attached to a tertiary referral BSMM University hospital. Each NM personnel (physician/technical staff) are overloaded with work and busy schedules. As a result, we had to reschedule in order to allocate the duty equally and convince the technical staff to cooperate for the CRP works.

REFERENCES

1. Ginsberg AM, Spigelman M. Challenges in tuberculosis drug research and development. *Nature Medicine* 2007;13:290-4.
2. Source: "The National Cancer Control Strategy and Plan of Action for 2009-2015" 2008,