# Routine Production of [$^{18}$F]FDG with KIRAMS [$^{18}$F]FDG Module

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## 1. Introduction

2-[$^{18}$F]fluoro-2-deoxy-D-glucose ([$^{18}$F]FDG) is widely used radiopharmaceutical for Positron Emission Tomography (PET). The main advantage of PET is early diagnosis in patients with cancer. Recently, installation of cyclotron and PET-scanner are booming in Korea as well as [$^{18}$F]FDG production module. As a part of a Regional Cyclotron Installation Project, we optimized our [$^{18}$F]FDG production module which will be installed at regional cyclotron center. We have changed the module frame to have a good exterior view and control system to give a convenience and reliance to operator.

## 2. Methods and Results

The details will be discussed in this section.

### *2.1 Main Frame*

The prototype [$^{18}$F]FDG module was put together on an aluminum profile base which is a convenient frame and easy to assemble and dismantle during development. We have designed the frame chassis with 3-dimensional designing tool. We put up a large rear door to archive an easy access to internal parts and maintenance. Main frame was anodized to prevent and reduce the oxidation and scratch during preparation.

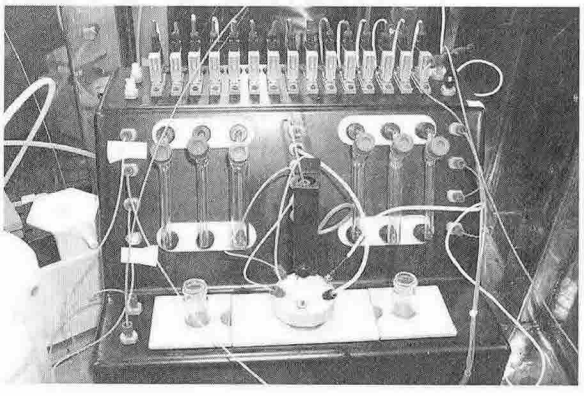

Figure 1. [$^{18}$F]FDG production module installed in hot cell, KIRAMS. (Ver. 2.1.)

PEEK polymer was used as a tighten material which holds on the glass ware and reaction vial. PEEK is known as an inert material to a variety of chemicals including acid and base.

### *2.2 Control Program*

Programmable Logic Controller (PLC) was used for the last version of [$^{18}$F]FDG production module with touch pad display panel. There have been some restrictions; for example, hard to change the variables like a process time, temperature and etc. LabView (National Instrument, USA) was adopted as a control tool. Communication between LabView and [$^{18}$F]FDG production module was extended with I/O card and data cable. The program was also developed on a LabView base which make easy to change variables and acquire the processed data.

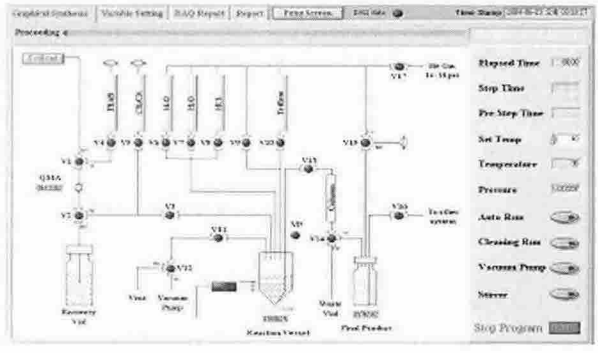

Figure 2. Main view of [$^{18}$F]FDG module software which is designed and programmed using LabView.

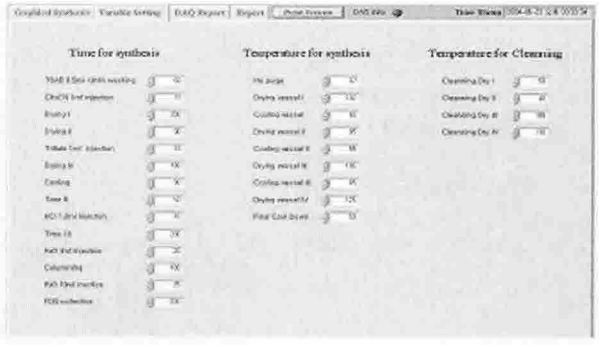


Figure 3. Main view of variable settings panel. Time and temperature can be changed.

### *2.3 [$^{18}$F]FDG production yield*

[$^{18}$F]FDG production yield with our prototype module was ranging from 38% to 45%. We have upgraded the software and optimized the sequence, evaporation temperature and reaction time. The yield

was increased to ranging from 44% to 53% during test period and maintained 51±2% in a routine production, decay uncorrected.

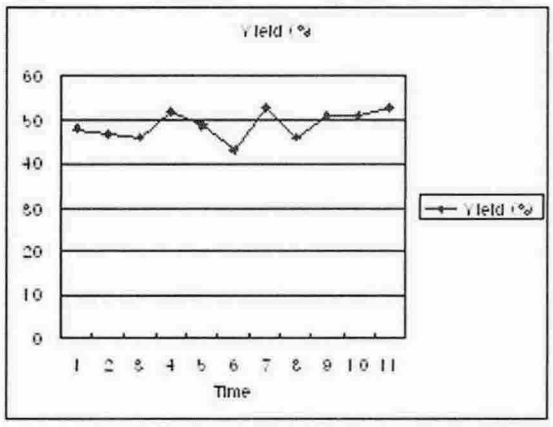


Figure 4. [$^{18}$F]FDG production yield with KIRAMS [$^{18}$F]FDG module (Ver. 2.1)

### 3. Conclusion

In conclusion, KIRAMS [$^{18}$F]FDG production module has been effectively renovated and upgraded from prototype module. From the test production results, KIRAMS [$^{18}$F]FDG module has been proven to be useful for routine production with KIRAMS-13 cyclotron.

### REFERENCES

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