Medical health club with clinical PET

Introduction

The High Technology Medical Complex (HIMEDIC) Imaging Centre at Lake Yamanaka is a membership-based medical health club with clinical PET which was established in October 1994. The centre is set up within the XIV Yamanaka hotel (a “membership resort hotel”), which is located about 130 km from Tokyo, near to Mount Fuji.

At the centre, we conduct medical health check-ups on our members using PET, MRI, spiral CT and other imaging modalities. Here, we report on the facilities and the medical health check system of the centre, and on the preliminary results of our experience.

The PET system and other instruments

We have one cyclotron (CYPRIS-HM 18, Sumitomo Heavy Industry, Japan) and two automatic FDG synthesizers (anion method; Sumitomo Heavy Industry). We have three PET scanners (ECAT EXACT 47, Siemens/CTI, USA), two MRI scanners (Magnetom Impact, Siemens, Germany), two spiral CT scanners (Super Helix TCT900S, Toshiba, Japan), and three ultrasound (US) scanners. Moreover, electroencephalography (EEG), electrocardiography (ECG) with a treadmill, five Holter ECG recorders with an analyser, and five ambulatory blood pressure recorders with an analyser are installed. A sketched map of the centre, (the floor space of which totals about 1700 m²) is shown in the figure beside.

We can produce 18F-fluorodeoxyglucose (FDG), 13N ammonia, 11O-labelled gas and water, and 13C compounds. Ordinarily, we produce 7.4 GBq of FDG twice daily, and 3.7 GBq of ammonia 4 times daily.

Health check-up programmes

We have three check-up programmes:
(a) brain programme,
(b) cardiovascular programme and (c) oncology programme.

The brain programme comprises chest radiography, rest ECG, MRI of the brain including MR angiography, EEG, US of the carotid artery, ambulatory blood pressure monitoring and FDG PET of the brain.

In the cardiovascular programme, chest radiography, CT of the chest, treadmill ECG testing, ultrasonic echocardiography (UCG), Holter ECG and ammonia PET with dipyridamole are conducted.

Personnel

Our personnel comprise four medical doctors (one cardiologist, one neurologist and two oncologists), ten radiological technologists, five nurses, one cyclotron operator, two chemists, six medical technologists and ten office workers.
In the oncology programme, chest radiography, CT of the chest and abdomen, US of the abdomen, thyroid and breast, and FDG PET from the neck to the lower abdomen (5–7 bed positions) are conducted.

When members are receiving one of these programmes, they are expected to stay one night at the hotel, while those receiving all three stay two nights.

Membership system

The admission fee for members is U.S. $50000 and the annual fee, U.S. $2000. Members can receive one of the three health check-up programmes once a year. For those hoping to receive all three programmes, the admission fee is U.S. $100000, and the annual fee, U.S. $4000.

There are currently about 1500 members. Basically, our members think themselves healthy (not having any diseases), so we refer to them as our guests, not as patients.

Protocols for PET studies

The protocols for PET studies are as follows:

1. Heart studies
   a) FDG study
      (October 1994–March 1996)
      (1) Take transmission scan
      (2) Oral glucose loading (keeping the blood glucose level within the 130–1500 mg/dl range)
      (3) Injection of 259 MBq of FDG
      (4) Wait for 45 min
      (5) Start emission scan
   b) Ammonia study (April 1996–)
      (1) Take transmission scan
      (2) Infusion of dipyridamole (0.57 mg/kg)
      (3) Injection of 740 MBq of ammonia
      N.B. If decreased myocardial perfusion is suspected, a rest study is performed.

2. Brain study
   (1) Injection of 259 MBq of FDG in the fasted state
   (2) Wait for 45 min
   (3) Take emission scan (automatic correction mode); reconstruct with calculated attenuation correction

3. Oncology study
   (1) Injection of 259 MBq of FDG in the fasted state

A case of thyroid cancer: coronal slices of the trunk
A case of breast cancer: coronal (left) and sagittal (right) images of the trunk
A case of gastric cancer: coronal images of the upper half of the body