[18F]-Fluorodeoxyglucose Positron Emission Tomography for In Vivo Assessment of Glucose Metabolism in Pheochromoctyoma and Paraganglioma

Published: 10-09-2013
Last updated: 22-04-2024

To increase insight in the glucose metabolism in surgically treated PPGL patients by using dynamic FDG-PET/CT for analysis of tumor metabolic activity, blood fraction and full pharmacokinetic parameters. Furthermore, to correlate these finding with...

Ethical review	Approved WMO
Status	Recruiting
Health condition type	Neoplastic and ectopic endocrinopathies
Study type	Observational invasive

Summary

ID

NL-OMON38518

Source
ToetsingOnline

Brief title
GLUMEPP

Condition

- Neoplastic and ectopic endocrinopathies
- Endocrine neoplasms benign

Synonym
adrenal tumours

Research involving
Human

Sponsors and support

Primary sponsor: Universitair Medisch Centrum Sint Radboud
Source(s) of monetary or material Support: afdelings onderzoeksgelden endocriene ziekten

Intervention

Keyword: - dynamic [18F]-Fluorodeoxyglucose Positron Emission Tomography, - glucose metabolism, - paraganglioma, - pheochromocytoma

Outcome measures

Primary outcome

To increase insight in the in vivo glucose metabolism in PPGL by performing

pharmacokinetic analyses of dynamic FDG-PET/CT scanning.

Secondary outcome

- To assess the genotypic specific differences in glucose metabolism across

sporadic and hereditary PPGLs and to evaluate whether higher FDG-PET/CT SUV

observed in SDHx and VHL-related PPGL is a reflection of an increased FDG

uptake and/or metabolism as a reflection the Warburg effect.

- To investigate whether quantitative dynamic FDG-PET/CT parameters correlate

with tumor histology and tissue markers of glucose metabolism (GLUT-1, GLUT-3,

HK-2, HK-3 and MCT-4) and vascularity (VEGF, CD34).

Study description

Background summary

Among pheochromoyctomas and paragangliomas (PPGLs), malignant tumors have a frequency of about 14%, but are more frequent (up to 50%) in patients with mutations in succinate dehydrogenase subunit B (SDHB). Functional imaging is widely used for the localization of PPGL. FDG-PET/CT serves as biomarker of tumor cell viability and proliferative activity and provides a high sensitivity

for the detection of metastases, especially in carriers of underlying germline SDHB-gene mutations, in which it is superior to other techniques. The molecular mechanisms linking SDH mutations to tumorgenesis are starting to be unraveled. Whether genotype-related differences in mitochondrial function and associated changes in cellular energy metabolism are mirrored by differences in in vivo FDG uptake has not been elucidated. Different techniques can be used to quantify and localize glucose uptake on FDG-PET/CT scans. Preliminary results show genotypic differences in glucose uptake in static (single timeframe) FDG-PET. However, static FDG-PET/CT has its limitations in exact quantification of glucose uptake. Pharmacokinetic analysis using dynamic (multi-timeframe) FDG-PET/CT is supposed to more accurately quantify glucose metabolism and findings might correlate better with pathology results.

Study objective

To increase insight in the glucose metabolism in surgically treated PPGL patients by using dynamic FDG-PET/CT for analysis of tumor metabolic activity, blood fraction and full pharmacokinetic parameters. Furthermore, to correlate these finding with histological findings to come to in vivo predictive biological profile. Finally, to assess genotypic specific differences in glucose uptake and metabolism in sporadic and hereditary PPGL.

Study design

Observational pilot study using one group of patients. Pathologist and nuclear medicine physicians are blinded for each others results.

Study burden and risks

For this study, patients undergo an alternative protocol for FDG PET/CT scanning. The PET/CT scan itself is already part of the regular diagnostic workup for patients with PPGL. The additional load for patients will be that they are already lying still in the PET/CT scanner during incubation with 18FDG (and images will be taken simultaneously). Usually during incubation time, patients do lie in a bed in a quiet room. The radionuclide is administered into a brachial vein through an intravenous line. Approximately 1,6MBq.kg-1 FDG is injected. This is similiar to the dose needed for the routine diagnostic static FDG-PET/CT scan. So, no additional FDG will be administered for this study. An additional intravenous cannula is placed in the antecubital vein. One blood sample is drawn from that cannula for correction of the input function. The dynamic FDG-PET/CT scan will take approximately 55 minutes and the static whole body FDG-PET/CT scan will take another 25 minutes (including preparation). Patients are allowed to go to the toilet between dynamic and static scanning. So, patients will in total be for ~ 1 hour and 20 minutes in the FDG-PET/CT scanner. An additional topogram (~0,1 mSv) and low dose CT of the abdomen (~2,04 mSv) will be made for dynamic scanning.

Individual benefit is limited to possible extra clinical relevant data as to PPGL tumor behaviour and prognosis.

Contacts

Public
Universitair Medisch Centrum Sint Radboud

Geert Grooteplein Zuid 8
Nijmegen 6500 HB
NL
Scientific
Universitair Medisch Centrum Sint Radboud

Geert Grooteplein Zuid 8
Nijmegen 6500 HB
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

- Age >= 18 years, no upper limit
- Suspected diagnosis of benign PCC or PGL:
1. Biochemically proven by elevated plasma and/or urinary (nor)metanephrines
2. Anatomically substrate; localization of an (extra)-adrenal tumor by conventional anatomical (MRI/CT) imaging
- Regardless of the genetic status (sporadic or hereditary)
- Planned for surgical resection (adrenalectomy or extra-adrenal tumor resection)

- Size tumor at least 1 cm in smallest diameter (as determined by conventional imaging)

Exclusion criteria

- Malignant PPGL, i.e. presence of lesions on imaging studies suggestive of distant metastasis
- No initial CT or MRI available
- Contra-indication for surgery:
o Based on (biological) age, cardiovascular risk factors, performance status or other co-morbidity as decided by a multidisciplinary team including medical endocrinologist, urologists, radiologists, pathologists and nuclear medicine physicians.
- Contra-indication for dynamic FDG-PET/CT
o Diabetes mellitus or fasted glucose level >= 8.0 mmol.L-1
o Pregnancy
o Breast-feeding
o Sever claustrophobia
- Interval between dynamic FDG-PET/CT and surgery more than 60 days
- Incapability to adhere to study protocol
- Inability to give informed consent (e.g. psychiatric illness)

Study design

Design

Study type: Observational invasive

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Diagnostic

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	01-10-2013
Enrollment:	25
Type:	Actual

Ethics review

Approved WMO Date:	10-09-2013
Application type:	First submission
Review commission:	CMO regio Arnhem-Nijmegen (Nijmegen)
Approved WMO Date:	25-11-2014
Application type:	Amendment
Review commission:	CMO regio Arnhem-Nijmegen (Nijmegen)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL45529.091.13