Respiratory signal driven breathing instructions to improve spatial alignment between respiratory gated PET and breath-hold CT

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Is it possible to increase the spatial match between PET and CT imaging with the use of a respiratory instructed breath hold CT?

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Respiratory and mediastinal neoplasms malignant and unspecified
Study type	Interventional

Summary

ID

NL-OMON42538

Source
ToetsingOnline

Brief title
Breathing instructions in PET/CT

Condition

- Respiratory and mediastinal neoplasms malignant and unspecified

Synonym
lung cancer, pulmonary carcinoma

Research involving
Human

Sponsors and support

Primary sponsor: Radiologie en Nucleaire Geneeskunde
Source(s) of monetary or material Support: Ministerie van OC&W,Siemens Healthcare

Intervention

Keyword: Breathing instructions, Lung cancer, PET/CT, Respiratory gating

Outcome measures

Primary outcome

The mismatch between PET and CT measured for standard low-dose CT and PET, and breath-hold low-dose CT and PET for 1 anatomical location (lung-liver transition)

Secondary outcome

The mismatch between PET and CT measured for standard low-dose CT and PET and, breath hold low-dose CT and PET for lung lesions, measured by:

• Mismatch between centroids of the lesions on PET and CT

• Mismatch between lesions on PET and CT measured with the Jaccard similarity coefficient

• Effect of attenuation correction of the CT on the PET reconstruction measured by the mean tracer uptake.

Study description

Background summary

Respiratory motion artefacts during positron emission tomography (PET) may introduce a significant effect on quantification of radiotracer uptake in PET images. Additional miscalculation of uptake can be caused by inappropriate attenuation correction due to a spatial mismatch between PET and CT. Both reducing respiratory motion artefacts and matching PET and CT are important for an accurate quantification in radiotherapy planning and therapy response monitoring of lung cancer.

Recently the department of Radiology and Nuclear Medicine (Radboudumc) acquired a tool to reduce respiratory motion artefacts in PET images. In the recent year

different studies were performed to find the best method to improve the match between PET and CT to optimize PET/CT imaging for patients with lung cancer, however these methods did not provide the optimal results.

Study objective

Is it possible to increase the spatial match between PET and CT imaging with the use of a respiratory instructed breath hold CT?

Study design

technical efficacy feasibility study

Intervention

Twenty patients, will undergo a respiratory gated PET/CT protocol, consisting of a topogram, a low-dose CT and a respiratory gated PET scan. In addition a low-dose CT will be made with a respiratory instruction.
Before these 20 patients are scanned, 5 patients will be scanned with the standard protocol. For these patients only the breathing instructions are given and recorded, the additional CT scan is not performed.

Study burden and risks

The patient will receive a respiratory gated PET/CT scan. This scan will be used for routine clinical care. Furthermore, an additional low-dose CT will be acquired. The additional radiation dose corresponds to approximately 37% of the total dose. This additional scan will not be harmful to the patient and is classified as low-risk (NFU risk classification).

Contacts

Public
Selecteer

Geert Grooteplein-Zuid 10
Nijmegen 6525 GA
NL
Scientific
Selecteer

Geert Grooteplein-Zuid 10
Nijmegen 6525 GA
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

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

Inclusion criteria

Patients with suspected lung malignancy, who will have a PET/CT scan.

Exclusion criteria

Mentally incompetent

Study design

Design

Study type:	Interventional
Intervention model:	Other
Allocation:	Non-randomized controlled trial
Masking:	Open (masking not used)
Control:	Active
Primary purpose:	Diagnostic

Recruitment

NL
Recruitment status: Recruitment stopped

Start date (anticipated):	07-10-2015
Enrollment:	25
Type:	Actual

Ethics review

Approved WMO Date:	23-07-2015
Application type:	First submission
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	NL52837.091.15