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64CuCl2 PET/CT in presurgical evaluation of prostate cancer in patients with high risk of extracapsular disease

Submission date 20/01/2014	**Recruitment status** No longer recruiting	[X] Prospectively registered [_] Protocol
Registration date 31/01/2014	**Overall study status** Completed	[_] Statistical analysis plan [_] Results
Last Edited 31/01/2014	**Condition category** Cancer	[_] Individual participant data [_] Record updated in last year

Plain English summary of protocol

Background and study aims
The accurate detection of a disease confined to the prostate gland versus an extraglandular spread is of key importance when defining the therapeutic approach in patients affected by prostate cancer. Imaging methods play an important role in the staging of prostate cancer. However, the reported sensitivity and specificity of current imaging methods, such as bone scintigraphy, computed tomography (CT), magnetic resonance imaging (MRI), and ultrasonography (US) vary considerably. Despite their relatively high sensitivity, conventional imaging methods are not very specific. Moreover, none of the current standard diagnostic procedures at present may be considered suitable to stage prostate cancer in a single, whole body examination.
Positron emission tomography (PET) is a widely accepted non-invasive diagnostic tool especially in oncology, where the use of 18 F-FDG PET has revolutionized cancer management. During the last decade, a number of new copper-based PET tracers have been developed and tested in both animals and patients. This study aims to evaluate the potential value of copper-based PET /CT diagnostic methods in the preoperative staging of prostate cancer patients who are at risk of disease spread.

Who can participate?
High-risk prostate cancer patients aged 18 and older.

What does the study involves ?
All patients will undergo a copper-based PET/CT scan.

What are the possible benefits and risks of participating ?
All participants will receive a further evaluation in order to detect the risk of extracapsular extension (spread of the disease). There are no specific risks related to the procedure.

Where is the study run from?
Department of Urology and Nuclear Medicine - Magna Graecia University of Catanzaro, Italy.

When is the study starting and how long is it expected to run for?
The study will start in April 2014 and will run for 6 months or until the required number of 20 patients have been recruited and evaluated.

Who is funding the study?
Magna Graecia University of Catanzaro, Italy.

Who is the main contact?
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Contact information

Type(s)
Scientific

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Additional identifiers

Protocol serial number
UROLUMG_1_2014

Study information

Scientific Title
64CuCl2 PET/CT in presurgical evaluation of prostate cancer in patients with high risk of extracapsular disease: an observational study

Study objectives
To evaluate the potential value of 64CuCl2 in the preoperative staging of patients with prostate cancer at high risk of extracapsular disease.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Institutional Review board (IRB) of Magna Graecia University, Italy, 20/12/2013, ref.: 2013_74

Study design
Observational prospective cohort study

Primary study design
Observational

Study type(s)
Diagnostic

Health condition(s) or problem(s) studied
Prostate cancer diagnosis

Interventions
All participants undergo the same positron emission tomography/computerised tomography (PET/CT) diagnostic test.

Imaging started 1 min after intravenous injection of 925 MBq of 64CuCl2 with acquisition of dynamic PET images at one constant bed position of the pelvic region for 5 min. Six or seven bed position whole body images will be acquired with an acquisition time of 4 minutes for bed position from the thigh to the base of skull 10 minutes after injection. In case of abnormal accumulation of Cu4Cl2 in the whole body images, delayed static acquisition will be performed on the abnormal uptake 90-120 minutes after injection. PET images will be acquired in two-dimensional mode and will be reconstructed with standard reconstruction iterative algorithm and were reformatted into transverse, coronal and sagittal views.Unenhanced CT will be performed for localization and attenuation correction with a low beam current modulation.

Dynamic PET acquisition will be elaborated using region-of-interest (ROI) on prostate bed and dynamic curve analysis. Semiquantitative analysis of the abnormal radiotracer will be performed by using the maximum standardized uptake value (SUV max). To determine the SUV max, a volume of interest covering the abnormal lesion will be drawn.The average value of the five voxels with the highest activity will be calculate to minimize overestimation of the SUV max caused by a single high-activity voxel. SUV max will be also measured in the first and last frames of dynamic PET images.

PET images will be interpreted by two nuclear medicine specialists with minimum 5 years of experience, who will be aware of the referral diagnosis and risk assessment of the extracapsular disease.They will have access to CT and PET/CT images for morphologic correlation and localization of abnormal PET lesions. Images will read sequentially within a maximum of three days after the performance of each study by using advanced PET/CT software. A lesion will be considered abnormal when focal tracer accumulation will be greater than background activity. The diagnosis of malignant lymphnodes (LNs) on PET images will be based on the visual assessment of focal increased Cu64 uptake corresponding to LN chains on CT images. At PET imaging LNG with increased tracer uptake will be considered positive for metastatic spread, even if their short axis diameter was less than 10 mm. LNs without abnormal tracer uptake will be considered benign on PET images, even if their short-axis diameter was larger than 10 mm. The CT will be interpreted by a radiologist with a minimum 10 years of experience who was aware of only the referral diagnosis.

LNs will be categorized as malignant on CT images because the short axis diameter was larger than 10 mm, contrast enhancement will be visible and there will be neither fatty hilus nor round configuration. Bone lesions will be considered malignant depended on their anatomic location

(pedicle and posterior on vertebral lesion), characteristic morphologic changes (cortical destruction) or both. Visualized prostate volume on PET images will be cut by means of a commercial software program. The extrapolated prostate volume will be divided in basal, middle and apical thirds on the basis of a sextant template biopsy. The segment with the highest tracer intensity will be identified and visually compared with the sextant with maximum tumor involvement at histopatologic examination.The surgically resected specimens will be fixed in formalin. After fixation the prostate specimens will be sectioned at 0.5 cm intervals perpendicular to the long axis from the apex to the base. Histologic samples will be obtained from at least two slices of tissue. The exact location and extension of carcinomatous tissue will be determined independently by a pathologist. Visual comparison of histophatologic findings with 64CuCl2 PET/CT will be performed in consensus. In patients who underwent lymphadenectomy, histopathologic results will be correlated with PET/CT findings. Malignant LNs will be categorized into three groups: 2 mm or smaller (micrometastases), those between 2 and 5 mm, and those 5 mm or larger.

Intervention Type
Other

Phase
Not Applicable

Primary outcome(s)
Evaluate the potential value of 64CuCl2 in the preoperative staging of patients with prostate cancer at high risk of extracapsular disease in the form of specificity, sensibility, positive and negative predictive value. Outcome assessment at one month.

Key secondary outcome(s))
1. Comparative effectiveness with magnetic resonance (MR) for T and N staging
2. Comparative effectiveness with bone scintigraphy for M staging

Outcome assessment at one month.

Completion date
01/10/2014

Eligibility

Key inclusion criteria
1. Age > 18 years
2. High-risk prostate cancer patients defined planned for surgical treatment (radical prostatectomy with lymphadenectomy)
3. Prostate-specific antigen (PSA) > 20 ng/ml
4. Biopsy gleason score 8-10
5. Stage ≥ cT3a
6. Negative bone scintigraphy and magnetic resonance imaging (MRI) of the pelvis negative for metastatic disease

Participant type(s)
Patient

Healthy volunteers allowed

No

Age group
Adult

Lower age limit
18 years

Sex
Male

Key exclusion criteria
1. Age < 18 years
2. Evidence of metastatic disease
3. Other tumours diagnosed within the past 5 years, except basal cell or squamous cell skin carcinoma, if properly treated
4. Other medical or psychological diseases that could interfere with the participation in the study and follow-up controls
5. Refusal to participate in the study and anonymous publication of data
6. Participation in other clinical trials, including the follow-up period

Date of first enrolment
01/04/2014

Date of final enrolment
01/10/2014

Locations

Countries of recruitment
Italy

Study participating centre
Magna Graecia University of Catanzaro
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Sponsor information

Organisation
Magna Graecia University of Catanzaro (Italy)

ROR
https://ror.org/0530bdk91

Funder(s)

Funder type
University/education

Funder Name
Magna Graecia University of Catanzaro (Italy)

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Not provided at time of registration