

INPLASY

Diagnostic performance of 18F-DCFPyL PET vs. 68Ga-PSMA PET/CT in patients with suspected prostate cancer: A systemic review and meta-analysis

INPLASY202420059

doi: 10.37766/inplasy2024.2.0059

Received: 13 February 2024

Published: 13 February 2024

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ADMINISTRATIVE INFORMATION

Support - The University Student Innovation and Entrepreneurship Training Program Project (grant no. S202210541145), the Key Projects of Hunan Provincial Department of Education (grant no. 21A0242) and the General Project of Hunan Natural Science Foundation (grant no. 2021JJ30506).

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202420059

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 13 February 2024 and was last updated on 13 February 2024.

INTRODUCTION

Review question / Objective Diagnostic performance of 18F-DCFPyL PET vs. 68Ga-PSMA PET/CT in patients with suspected prostate cancer: A systemic review and meta-analysis.

Condition being studied The patients in the study were diagnosed with suspected prostate cancer and underwent 18F-DCFPyL PET and 68Ga-PSMA PET/CT scans.

METHODS

Search strategy The guidelines for preferred reporting items for systematic reviews and meta-analyses (PRISMA) were followed when conducting this study.

Using the PubMed, Embase and Web of Science databases, a comprehensive search for literature up until September 2023 was conducted. 'Positron-Emission Tomography' OR 'PET' OR 'Positron Emission Tomography Imaging' OR 'PET Scan' OR 'PET Imaging' AND 'Prostate Specific Membrane Antigen' OR 'PSMA' AND 'Prostate Neoplasms' OR 'Prostatic Cancers' OR 'Prostatic Cancer' OR 'Prostatic Neoplasm' OR 'Prostate Neoplasm' OR 'Prostate tumor' were the key words used. Two researchers independently integrated computer-generated search results with manual searches to ensure diversity and prevent omitting pertinent literature.

Participant or population The patients in the study were diagnosed with suspected prostate cancer and underwent 18F-DCFPyL PET and 68Ga-PSMA PET/CT scans.

Intervention They involved untreated patients with suspected PCa, which included individuals whose prostates had abnormalities found during an abnormal PSA test, an abnormal MRI scan or a digital rectal examination. The patients in the study were diagnosed with suspected prostate cancer and underwent 18F-DCFPyL PET scans.

Comparator The patients in the study were diagnosed with suspected prostate cancer and underwent 18F-DCFPyL PET and 68Ga-PSMA PET/CT scans.

Study designs to be included Studies were considered eligible for inclusion if they met all of the following criteria: i) They involved untreated patients with suspected PCa, which included individuals whose prostates had abnormalities found during an abnormal PSA test, an abnormal MRI scan or a digital rectal examination; ii) diagnostic imaging was performed using an 18F-DCFPyL PET scan or a 68Ga-PSMA PET/CT scan; iii) the reference standard used for comparison was either histological; and iv) the number of subjects was ≥ 10 .

Eligibility criteria Inclusion and exclusion criteria. Studies were considered eligible for inclusion if they met all of the following criteria: i) They involved untreated patients with suspected PCa, which included individuals whose prostates had abnormalities found during an abnormal PSA test, an abnormal MRI scan or a digital rectal examination; ii) diagnostic imaging was performed using an 18F-DCFPyL PET scan or a 68Ga-PSMA PET/CT scan; iii) the reference standard used for comparison was either histological; and iv) the number of subjects was ≥ 10 . The following exclusion criteria were applied: i) Duplicate articles; ii) abstracts, editorial comments, letters, case reports, reviews or meta-analyses; iii) titles and abstracts that were clearly irrelevant; iv) insufficient data to perform calculations; and v) articles not written in English.

Information sources Using the PubMed, Embase and Web of Science databases, a comprehensive search for literature up until September 2023 was conducted.

Main outcome(s) The pooled sensitivity, specificity and AUC for 18F-DCFPyL PET and 68Ga-PSMA PET/CT in patients with suspected prostate cancer.

Quality assessment / Risk of bias analysis Using the Quality Assessment of Diagnostic Performance Studies (QUADAS-2) technique, two researchers

independently assessed the quality of the included studies. Each study's risk of bias and applicability were evaluated. The evaluation of each study was rated as high, low, or unclear in terms of risk of bias and applicability. To settle any potential disagreements, a third reviewer was engaged. ReMan (version 5.3) was used for the analysis.

Strategy of data synthesis The best outcome was chosen for analysis when the included publications provided a range of diagnostic performances based on cut-off thresholds for classifying positive and negative scans. Stata 16.0 (StataCorp LP) and Meta-Disc 1.4 were used to examine the data of a four-grid table. As the bivariate random-effects model can simultaneously adapt to the inherent correlation between the sensitivity and specificity of different studies, it also explains the heterogeneity between studies. Using a bivariate random-effects model, the pooled sensitivity and specificity for 18F-DCFPyL PET and 68Ga-PSMA PET/CT were reported as estimates with 95% confidence intervals (CIs). In addition, because the summary receiver operating characteristic (SROC) model facilitates the interpretation of diagnostic test accuracy in the presence of heterogeneity and varying threshold effects, this model was used to generate the SROC curve and determine the area under the curve (AUC). The difference of the pooled AUC between 18F-DCFPyL PET and 68Ga-PSMA PET/CT was analyzed using Z test statistics (20, 21). Using the I^2 statistic, the heterogeneity between the pooled studies was evaluated. Meta-regression analysis was used to explore potential causes of heterogeneity when there was significant heterogeneity ($I^2 > 50\%$). The funnel plot test developed by Deek was used to evaluate publication bias. Stata 16.0 and Meta-Disc (version 1.4) were used for all statistical calculations. Statistical significance was defined as a $P < 0.05$.

Subgroup analysis None.

Sensitivity analysis State software carries on the sensitivity analysis, and responds to the sensitive situation of the article by deleting one of the articles.

Language restriction English.

Country(ies) involved China.

Keywords 18F-DCFPyL PSMA PET, 68Ga-PSMA PET/CT, prostate cancer, diagnostic performance, meta-analysis.

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