Appropriateness of pre-treatment [^{18}F]FDG PET/CT in women with advanced ovarian cancer

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Abstract

Ovarian cancer is a leading cause of death among women and one of the ten most deadliest malignancies. Current imaging modalities remain insufficient for making optimal treatment decisions, leading to unnecessary surgeries in patients with unresectable tumours. [^{18}F]FDG PET/CT is viewed as a promising imaging modality for detecting non-resectable tumours in ovarian carcinoma. Therefore, this Critical Appraisal of a Topic (CAT) investigates the appropriateness of [^{18}F]FDG PET/CT for pre-treatment assessment in women with advanced ovarian cancer. A literature search was conducted on PubMed, focusing on studies that utilized [^{18}F]FDG PET/CT as a pre-treatment imaging modality in advanced ovarian cancer. The reviewed studies suggest that [^{18}F]FDG PET/CT offers favourable properties in detecting unresectable tumour spread. Mallet et al. and Feng et al. reported sensitivities between 72% and 82%, and specificities between 57% and 85%. While some studies demonstrated the potential of [^{18}F]FDG PET/CT to adjust treatment strategies or upstage disease, discrepancies in study sizes, methodologies, and PET/CT scanner models were evident. Notably, specific anatomical areas such as the small bowel presented challenges in accurate tumour detection. Despite promising indications, the reviewed studies' limitations prevent a definitive conclusion on the modality's appropriateness. For future research, it is recommended to prioritize larger, more focused studies that emphasize the surgical resectability of metastases and explore alternative tracers. Preliminary evidence suggests potential benefits of [^{18}F]FDG PET/CT in the pre-treatment imaging of advanced ovarian cancer. However, more robust research is needed to conclusively determine its appropriateness, keeping in line with evolving treatment perspectives and technological advancements.

Introduction

Ovarian cancer is a leading cause of death among women. The disease is responsible for more deaths than any other gynaecological malignancy, with 220,000 new diagnoses and around 160,000 cancer-related deaths recorded worldwide (1). A significant cause of the high mortality rates of ovarian cancer is that many patients are diagnosed in advanced stages (III/IV) with a spread to the peritoneal cavity, leading to a poor prognosis (2). Contributing factors are an absence of distinguishing symptoms and lack of a routine screening test (3,4). Additionally, restricted optimal treatment exists at advanced stages. Together, this leads to 70% of the patients having a five-year survival rate of less than 30% (1).

After diagnosis, the standard treatment of ovarian cancers involves a combination of cytoreductive surgery (CRS) and chemotherapy, with the treatment order being determined by the tumour's resectability. When complete tumour resection is unlikely, neoadjuvant chemotherapy (NACT) is often preferred. Hence, knowledge of the localization and resectability is crucial for the patient to benefit sufficiently from the chemotherapy and to not be exposed to unnecessary surgical risks (5,6). Consequently, a CT scan is often first conducted to visualize the tumour's location. If there remains any uncertainty of the resectability a laparotomy or laparoscopy is performed.

However, there are several limitations to these current diagnostic tools. Firstly, the accuracy of CT and laparoscopy is constrained; CT cannot reliably detect mesenteric, peritoneal, or bowel surface tumour implants, and laparoscopy cannot optimally assess the small bowel and hepatoduodenal ligament (7,8). These are critical areas specifically associated with poor resection because they are challenging to access during surgery (9,10). Secondly, laparotomy remains an invasive procedure, even though it is the most reliable diagnostic tool for tumour localization in the abdomen

and pelvis. With these difficulties in mind, the question has been raised if there is another imaging modality that is less invasive and has higher accuracy. This question brings [^{18}F]FDG PET/CT into the picture. It visualizes metabolic abnormalities before morphological alterations occur, and research suggests [^{18}F]FDG PET/CT might be a useful diagnostic tool for ovarian carcinoma (11). Therefore, the clinical question that arises is:
Is pre-treatment [^{18}F]FDG PET/CT an appropriate imaging modality to detect unresectable tumour spread in a patient suspected of advanced epithelial ovarian cancer?

Methods

A literature search was conducted using PubMed. The search strategy, outlined in the appendix, contained three components: "Fluorodeoxyglucose," "PET/CT," and "Ovarian cancer." To refine the search results, Mesh terms and [ti] / [tiab] were used, and a 10-year filter was applied, which yielded 201 results. Most of the results were in the category "initial staging". This critical assessment and the clinical research question are based on these findings.

For the selection of the best articles to critically evaluate, the inclusion criteria were; employing a recent scanner dated 2011 onwards, the use of a combined PET and CT scanner model, and a study population of at least forty participants. One exception was made for the inclusion of the article of Mallet et al. Because of the relatively large study population, this article is included despite the absence of information about the release date of the scanners.

As a result, the following four articles were included in the critical evaluation of this CAT:

1. *Mallet E, Angeles MA, Cabarrou B, Chardin D, Viau P, Frigenza M. Performance of Multiparametric Functional Imaging to Assess Peritoneal Tumor Burden in Ovarian Cancer. Clin Nucl Med. 2021;46:797-806*
2. *Feng Z, Liu S, Ju X, Chen X, Li R, Bi R, Wu X. Diagnostic accuracy of ^{18}F-FDG PET/CT scan for peritoneal metastases in advanced ovarian cancer. Quant Imaging Med Surg. 2021;11:3392-98*
3. *Hynninen J, Kemppainen J, Lavonius M, Virtanen J, Matomäki J, Oksa S, et al. A prospective comparison of integrated FDG-PET/contrast-enhanced CT and contrast-enhanced CT for pretreatment imaging of advanced epithelial ovarian cancer. Gynecol Oncol. 2013;131:389-94*
4. *Mikkelsen MS, Petersen LK, Blaakaer J, Marinovskij E, Rosenkilde M, Andersen G. Assessment of peritoneal metastases with DW-MRI, CT, and FDG PET/CT before cytoreductive surgery for advanced stage epithelial ovarian cancer. Eur J Surg Oncol. 2021;47:2134-41*

These studies were evaluated using the JAMA guidelines (12). Besides the JAMA criteria, four extra criteria were taken into account. These include the study population size, the PET/CT scanner used, the evaluated critical anatomical areas, and additional

Appropriateness Category Name	Appropriateness Rating	Appropriateness Category Definition
Usually Appropriate	7, 8, or 9	The imaging procedure or treatment is indicated in the specified clinical scenarios at a favourable risk-benefit ratio for patients
May Be Appropriate	4, 5, or 6	The imaging procedure or treatment may be indicated in the specified clinical scenarios as an alternative to imaging procedures or treatments with a more favourable risk-benefit ratio, or the risk-benefit ratio for patients is equivocal
May Be Appropriate (Disagreement)	5	The individual ratings are too dispersed from the panel median. The different label provides transparency regarding the panel's recommendation "May be appropriate" is the rating category and a rating of 5 is assigned
Usually Not Appropriate	1,2, or 3	The imaging procedure or treatment is unlikely to be indicated in the specified clinical scenarios, or the risk-benefit ratio for patients is likely to be unfavourable

Figure 1. Appropriateness category names and definitions according to the American College of Radiology (17).

limitations. The critical areas considered for this research are the mesentery, diaphragm, peritoneum, omentum, porta hepatis, and small bowel, where research has shown that tumour invasion is paired with low chances of complete resectability (9,10,13-16). Furthermore, the description of the "Appropriate Use Criteria," provided by the Journal of the American College of Radiology and as presented in figure 1, was used to answer the clinical question (17).

Critical evaluation

Mallet E, Angeles MA, Cabarrou B, Chardin D, Viau P, Frigenza M, et al. Performance of Multiparametric Functional Imaging to Assess Peritoneal Tumor Burden in Ovarian Cancer. Clin Nucl Med. 2021;46:797-806

The aim of the study of Mallet et al. was to compare the clinical application of pre-treatment [^{18}F]FDG/CT with staging laparoscopy in patients diagnosed with peritoneal carcinomatosis ([18]). Compared to the other articles included in this CAT, with 84 participants, the study population of the study from Mallet et al. was relatively large and representable for a clinical setting. The main weakness of this study is the use of different generations of PET/CT scanners over time and the absence of the specifications of these different scanners. Considering the substantial time frame of the study, it is unlikely that only scanners with the same performance were used. Consequently, the average accuracy may be lower than in a current situation. However, unlike every other included study, Mallet et al. mentioned the Peritoneal Cancer Index (PCI) per region in the result section, and they also focused on extra-abdominal metastases, which can be crucial in determining the operability of a patient. Further details of this research are presented in table 1. Altogether this article has high validity. Nevertheless, the possibility of underestimating the accuracy of modern PET/CT scanners, should be considered when analyzing the results.

Feng Z, Liu S, Ju X, Chen X, Li R, Bi R, Wu X. Diagnostic accuracy of ^{18}F-FDG PET/CT scan for peritoneal metastases in advanced ovarian cancer. Quant Imaging Med Surg. 2021;11:3392-98

The aim of the second study included in this evaluation, conducted by Feng et al, was to evaluate the diagnostic accuracy of [^{18}F]FDG PET/CT to determine the Eisenkop score and PCI in correlation with surgical findings in patients with advanced ovarian cancer (19). One of the significant strengths of this study was the independent performance of a laparotomy as a reference test on all patients, providing the current most optimal indication of tumour localization possible. Also, their use of only one new generation [^{18}F] FDG PET/CT scanner strengthens the validity of the study. On the other hand, the limitations of this study consist of the small study population (n = 43) and the exclusion of patients with non-resectable disease at the start of the study. Therefore, a high prevalence of resectable tumours existed in the study population. However, together with the other characteristics of the study, as presented in table 1, the strengths outweigh the limitations, and the validity of this article is acceptable.

Hynninen J, Kemppainen J, Lavonius M, Virtanen J, Matomäki J, Oksa S, et al. A prospective comparison of integrated FDG-PET/contrast-enhanced CT and contrast-enhanced CT for pretreatment imaging of advanced epithelial ovarian cancer. Gynecol Oncol. 2013;131:389-94

The following study, conducted by Hynninen et al. aimed to compare [^{18}F] FDG PET/CT and contrast-enhanced CT in detecting and disseminating abdominal cancer to prevent successful primary debulking surgery (20). For this purpose, this study also took into account the spread of extra-abdominal diseases. As a reference standard, a systematic laparoscopic or laparotomic exploration of the abdominal cavity was conducted. Thus, not every patient underwent the same reference procedure. A second limitation of this study is the potential bias introduced by the surgeons' awareness of the results from preoperative PET/CT and CT imaging studies. Another weakness is the Discovery STE or VCT, General Electric Medical Systems PET/CT scanner that was used for the data collection. This is a relatively old model. Finally, the main limitation was the small study population (n = 41), which also did not exclusively include patients with cancer of ovarian origin. Due to these limitations, the validity of this study must be questioned. Especially, the presented values of the test properties of [^{18}F]FDG PET/CT for the detection of ovarian cancer are unreliable in this article.

Mikkelsen MS, Petersen LK, Blaakaer J, Marinovskij E, Rosenkilde M, Andersen G. Assessment of peritoneal metastases with DW-MRI, CT, and FDG PET/CT before cytoreductive surgery for advanced stage epithelial ovarian cancer. Eur J Surg Oncol. 2021;47:2134-2141

Mikkelsen et al. conducted a study with the primary objective of comparing the effectiveness of preoperative diffusion-weighted magnetic resonance imaging (DW-MRI), contrast-enhanced CT, and [^{18}F]FDG PET/CT in assessing PCI in patients with advanced-stage epithelial ovarian cancer (21). This study included a relatively smaller group (n = 50) of participants, of which a large proportion (44%) of participants with a tumour of non-ovaria origin. In addition, the results of the patients with non-resectable diseases were excluded, so a selection bias exists. Furthermore, the presentation of the study's results is limited, because the PCI is solely mentioned as a total score, rather than with an overview per region. Altogether, the results of the study from Mikkelsen et al. cannot

Table 1. Evidence table with a summary about the validity of the evaluated articles.

	Mallet et al.	Feng et al.	Hynninen et al.	Mikkelsen et al.
population size	84	43*	41*	50*
PET/CT scanner	unknown*	Siemens Biograph 16HR PET/CT	Discovery STE or VCT, General Electric Medical Systems FDG-PET/CT*	64-slice General Electric Discovery 690 FDG PET/CT
timeframe	2011 - 2019*	2015 - 2018	2009 - 2012*	2015 - 2019
reference standard	laparoscopy, PCI per region	laparotomy, PCI and Eisenkop	laparoscopy or laparotomy, unique scoring**	laparoscopy or laparotomy, total PCI
diagnostic stadium	stage IIIC-IV extra-abdominal spread (CT)	stage III–IV CRS eligible (CT, surgery)	stage I-IV 6/41 non-ovarian*	stage III-IV CRS eligible (PET/CT, surgery) 22/50 non-ovarian*
independent scoring	yes	yes	no***	yes
results omitted	yes (reference unclear)	no	no	yes (not CRS eligible)
every critical area evaluated	yes	yes	yes	yes
additions	+ extra abdominal spread		+ extra abdominal spread + histological confirmation	+ histological confirmation
validity	++	+	+/-	+/-
side notes	possibly lower accuracy than with modern scanners	high prevalence of patients with resectable disease	low validity for values of test properties	no insight to localization dependent accuracy

*Lowers the validity
**Scoring of 22 abdominal and 18 extra-abdominal sites
***Scans interpreted blinded to surgical findings, not vice versa

be used to provide valid insight into the localization-dependent accuracy and the post-test probability of the presence of non-resectable disease.

To consolidate all the information about the validity of the articles, a summary of the observations is presented in table 1.

Summary of results

Based on the validity of the studies, more weight must be given to the results of the first two articles by Mallet et al. and Feng et al. The primary focus of the articles under review is the accuracy of pre-treatment [^{18}F] FDG PET/CT in predicting peritoneal tumour spread in advanced ovarian cancer. The primary outcomes assessed were the sensitivity, specificity, and overall accuracy of pre-treatment [^{18}F] FDG PET/CT. To begin with, Mallet et al. found that the accuracy of [^{18}F]FDG PET/CT metabolic parameters (71.4%) is suitable for predicting peritoneal tumour spread. The study by Feng et al. showed comparable results, with an accuracy of 78.5% for PCI. The studies of Hynninen et al. and Mikkelsen et al. showed no significant difference ($p > 0.05$) with the accuracy of CT and DW/MRI. Furthermore, the demonstrated sensitivities in the studies of Mallet et al. and Feng et al. are respectively 82.9% and 72.7%, and the specificities 57.0% and 84.0%. The small bowel is

the region with the lowest measured sensitivity (38.9% - 60.0%), whereas the central abdomen, pelvis, and left upper region were the locations with the highest sensitivity (79.1% - 100%). In addition, in the study of Mikkelsen et al., [18F]FDG PET/CT showed the best sensitivity for detection of tumour involving the critical organs compared to CT and DW-MRI (Se: 85%). In the study of Hynninen et al., in five evaluated critical areas; the diaphragm, omentum, bowel mesentery, serosae of the colon, and serosae of the sigmoid, a significant difference in sensitivity was demonstrated ($p < 0.05$) compared to CT. Based on the study results, the likelihood ratios (LR) and positive- and negative predictive values (PPV and NPV) were also calculated and presented in table 2. The studies also reported several important secondary outcomes. The study conducted by Mallet et al. demonstrated the upstaging of 35 patients from stage IIIC to IV (41.6%) after [18F]FDG PET/CT and there were treatment adjustments made in 30 patients (35.7%). Moreover, 7 out of 41 patients were upstaged in the study of Hynninen et al. This study also showed more extra-abdominal spread after [18F]FDG PET/CT (n = 32/41) compared to CT (n= 27/41). In cases where extra-abdominal spread was already identified with CT, PET/CT often revealed additional spread (26/27). A more detailed presentation of the results is shown in the table below.

Commentary

If an [18F]FDG PET/CT is implemented in a clinical setting, the primary purpose of the results is treatment allocation by considering if the tumour spread is operable or inoperable. However, research has demonstrated little constructive evidence to support advocating one treatment over the other, judging by the patient survivability alone (10,22). Based on this information, the main asset of the ability to carefully select patients with unresectable tumour spread

Table 2. Comparison of results

	Mallet et al.	Feng et al.	Hynninen et al.	Mikkelsen et al.
validity	++	+	+/-	+/-
scoring system	PCI	PCI, Eisenkop	Unique system*	PCI
accuracy (%)	71.4	78.5, 85.1	64 $p > 0.05$**	$p > 0.05$***
sensitivity (%)	82.9	72.7, 84.2	51 $p < 0.05$****	85 (critical areas)
specificity (%)	57.0	84.9, 87.0	89	
PPV (%)	71.2	83.5, 86.6	90	
NPV (%)	72.1	74.7, 83.0	48	
LR+	1.9	4.8, 6.5	4.8	
LR -	0.30	0.32, 0.20	0.55	
secondary outcomes	35/84 upstaged 30/84 treatment adjustments		7/41 upstaged 26/27 PET/CT detected additional spread after CT	PET/CT highest sensitivity in critical organs

*Scoring system of 22 abdominal and 18 extra-abdominal sites
**PET/CT v.s. CT
***PET/CT v.s. CT v.s. DW-MRI
****in critical areas: the diaphragm, omentum, bowel mesentery, serosae of the colon, and serosae of the sigmoid

is keeping the number of surgical complications as low as possible. Also, there are almost no disadvantages for wrongly postponing the debulking surgery because of the false positive detection of inoperable carcinomatosis (23,24). Taking this into account, false negative test results of patients that will undergo CRS despite the presence of inoperable masses do more harm than false-positive results of patients that have operable masses but receive chemotherapy prior to surgery instead of afterwards. This aims for a higher sensitivity than specificity, which comes with high rates of false positives but is relatively good for not overlooking possible metastases. The results of Mallet et al. and Feng et al., with a demonstrated sensitivity of 72% - 82% and a specificity of 57% - 85% are in line with this aim. Adding up to this, the number of patients that received treatment adjustments or were upstaged in the studies after [^{18}F]FDG PET/CT, and the comparison in sensitivity of tumour detection in the critical areas, this imaging modality has potentially additional value to CT in detecting inoperable carcinomatosis.

Besides the test properties, two other aspects that need to be considered for determining the appropriateness of [^{18}F]FDG PET/CT, are the possible harmful effects and the costs of the scan compared to the other diagnostic modalities. Where surgical exploration by laparotomy or laparoscopy poses a risk of complications, CT and PET/CT are risk-free, only the radiation exposure must be considered (25). However, with the current high sensitivity technology, the radiation dosage is limited. Furthermore, there are substantial differences in costs between imaging and surgery, with surgery being the more expensive option. However, the costs of this expensive exploratory surgery can be saved if the imaging modality provides accurate insight in the inoperability of the tumour.

Conclusion

Based on the four evaluated studies, indications are present which support the possible appropriateness of implementing [^{18}F]FDG PET/CT as a pre-treatment imaging modality to detect unresectable tumour spread in patients suspected of advanced epithelial ovarian cancer. The studies show test properties favourable for preventing overlooking inoperable peritoneal and extra-peritoneal carcinomatosis in these patients, which can forestall an expensive exploratory surgery with a risk of complications. Also, it can be suggested that this quality is of additional value for the staging of advanced disease compared to a contrast-enhanced CT scan because of the presented higher sensitivity in the critical and extra-abdominal areas.

Discussion

Despite finding an adequate number of references on the initial staging of ovarian carcinoma using [^{18}F]FDG PET/CT, there appears to be a scarcity of studies in this area with large study populations. Due to this shortage, the data from this critical appraisal provide insufficient evidence for determining the appropriateness of pre-treatment [^{18}F]FDG PET/CT, and firm conclusions cannot be drawn. Interestingly, the overview of appropriateness criteria by the American College of Radiology (ACR) in 2018 yielded similar results (17). The ACR reached the same conclusion regarding the suitability of [^{18}F]FDG PET/CT for staging in patients with advanced disease. They also noted a lack of available evidence and presented the same values for sensitivity.

Apart from the size of the studies, there are also other limiting factors in this research that could be taken into account in future research. Two other possible explanations for the heterogeneity between the studies in this critical evaluation are the variation between laparotomy and laparoscopy as a reference test, and the absence of histological evaluation in the studies. Both can have influenced the observed test characteristics. Performing a laparotomy can result in higher sensitivity and specificity compared to laparoscopy according to research by Han et al. They also found that the absence of histological confirmation can lead to more false-positive results (26).

What further stood out about the studies was that all four primarily focused on the accuracy of detecting metastases in general, without assessing the resectability of these metastases. However, multiple sources indicate that the presence of tumour masses in specific locations is more crucial for making appropriate treatment decisions than the total number of masses (8,27,28). Therefore, future research should investigate the accuracy of [^{18}F] FDG PET/CT in making the correct treatment choices by focusing more on the potential surgical resectability of metastases. The development of a new scoring method might be helpful for this.

Finally, there are two other aspects important for future research. First, the controversy regarding the effects of therapy choices on patient outcomes. Some studies indicate that the sequence of chemotherapy and surgery does not impact survival rates (29-31). If determining the resectability of the metastases does not impact patient outcomes, assessing the imaging accuracy for this purpose would not offer any benefit. Hence, further research on the effectiveness of treatment options is of utmost importance. Second, the limitations of [^{18}F]FDG PET/CT in the diagnostic stage of ovarian cancer should not be overlooked. As demonstrated by the results of the studies in this critical appraisal, there are specific anatomical areas in the abdomen where accuracy with the [^{18}F]FDG tracer remains very low, such as the small bowel. This

might be attributed to physiological metabolic activities, which are unavoidable. This considering, it could be beneficial to further research tracer alternatives, such as [^{68}Ga]Ga-FAPI, which have demonstrated enhanced image contrast and improved tumour delineation in ovarian cancer patients, as evidenced by studies conducted by Xi et al. and Chen et al.(32,33).
This critical appraisal highlights the need for more focused and qualitative research in the field of PET/CT imaging for ovarian cancer, a prevalent and serious condition. The emergence of PET/CT technology offers promising avenues for diagnosing these patients, and as indicated in this review, [^{18}F] FDG already makes a significant contribution. Moving forward, it will be crucial to keep an eye on the development of new tracers and closely follow the evolution of treatment perspectives. This will ensure that the radiological approach remains aligned with the latest advancements, benefiting patients in the long run.

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Appendix

Search strategy

("Fluorodeoxyglucose F18"[mesh] OR "Fluordeoxyglucose F18"[ti] OR "[18F]Fluorodeoxyglucose"[ti] OR "tiab"[ti] OR "18FDG"[ti] OR "18F-FDG"[ti] OR "18 F-FDG"[ti] OR "Fluorodeoxyglucose"[ti] OR "F18, Fluorodeoxyglucose"[ti] OR "F 18,Fluorodeoxyglucose"[ti] OR "Fluorodeoxyglucose F 18"[ti] OR "Fluordeoxyglucose F18"[ti] OR "Fluorodeoxyglucose, 18F"[ti] OR "Fludeoxyglucose F 18"[ti] OR "F 18, Fludeoxyglucose"[ti] OR "18F-Fluorodeoxyglucose"[ti] OR "18F Fluorodeoxyglucose"[ti] OR "F18-Fluorodeoxyglucose"[ti] OR "F18 Fluorodeoxyglucose"[ti] OR "[18F] Fluorodeoxyglucose"[ti] OR "[18F]-Fluorodeoxyglucose"[ti] OR "Fluorine-18-Fluorodeoxyglucose"[ti] OR "Fluorine 18 Fluorodeoxyglucose"[ti] OR "Fluorine-18-2-fluoro-2-deoxy-d-glucose"[ti] OR "2-Fluoro-2-deoxy-D-glucose"[ti] OR "2 Fluoro 2 deoxy D glucose"[ti] OR "2-Fluoro-2-deoxyglucose"[ti] OR "2 Fluoro 2 deoxyglucose"[ti] OR "[18F]-2-Fluoro-2-deoxy-D-glucose"[ti] OR "[18F]2-Fluoro-2-deoxy-D-glucose"[ti] OR "[18F] 2-Fluoro-2-deoxy-D-glucose"[ti] OR "[18F]-2-Fluoro-2-deoxyglucose"[ti] OR "[18F]2-Fluoro-2-

deoxyglucose"[ti] OR "[18F] 2-Fluoro-2-deoxyglucose"[ti] OR "[18F] 2 Fluoro 2 deoxyglucose"[ti] OR "[18F] 2 Fluoro 2 deoxy D glucose"[ti] OR "2-Deoxy-2-[18F]fluoroglucose"[ti]) AND

("Positron Emission Tomography Computed Tomography"[mesh] OR "Positron Emission Tomography Computed Tomography"[ti] OR "PET/CT"[tiab] OR "PET / CT"[tiab] OR "Positron Emission Tomography / Computerized Tomography"[ti] OR "Positron-Emission Tomography / Computerized Tomography"[ti] OR "Positron-Emission Tomography / Computerized-Tomography"[ti] "Positron-Emmission-Tomography / Computerized Tomography"[ti] OR "Positron-Emmission-Tomography / Computerized-Tomography"[tw] OR (("Positron Emission Tomography"[ti] OR "Positron-Emission Tomography"[ti] OR "Positron-Emission-Tomography"[ti] OR "PET"[tiab]) AND ("Computerized Tomography"[ti] OR "Computerized-Tomography"[ti] OR "CT"[tiab]))) AND

("Ovarian Neoplasms"[mesh] OR "Ovarian Neoplasms"[ti] OR "Ovarian Neoplasm"[ti] OR "Ovarian Neoplasia"[ti] OR "Ovarian Cancers"[ti] OR "Ovarian Cancer"[ti] OR "Ovarian Carcinomas"[ti] OR "Ovarian Carcinoma"[ti] OR "Ovary adenocarcinomas"[ti] OR "Ovary Adenocarcinoma"[ti] OR "Ovarian Tumors"[ti] OR "Ovarian Tumor"[ti] OR "Ovarian Tumours"[ti] OR "Ovarian Tumour"[ti] OR "Ovarian Maligancy"[ti] OR "Ovary Malignancy"[ti] OR "Ovarian Malignancies"[ti] OR "Ovary Malignancies"[ti] OR (("Ovarian"[ti] OR "Ovary"[ti] OR "Ovaries"[ti]) AND ("Neoplasms"[ti] OR "Neoplasm"[ti] OR "Neoplasia"[ti] OR "Cancers"[ti] OR "Cancer"[ti] OR "Carcinomas"[ti] OR "Carcinoma"[ti] OR "Adenocarcinomas"[ti] OR "Adennocarcinoma"[ti] OR "Tumors"[ti] OR "Tumor"[ti] OR "Tumours"[ti] OR "Tumour"[ti] OR "Malignancy"[ti] OR "Malignancies"[ti]))