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# Clinical impact of pre-treatment FDG-PET/CT staging of primary ovarian-, fallopian tube- and peritoneal cancer in women

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**ABSTRACT**

**Introduction:** To assess the clinical impact of preoperative flourdeoxyglucose with positron emission tomography and computed tomography in women with ovarian-, fallopian tube-, or peritoneal cancer with focus on consequences of added findings. **Material and methods:** Flourdeoxyglucose with positron emission tomography and computed tomography was implemented as a standard imaging modality for women with newly diagnosed ovarian, fallopian tube, or peritoneal cancer at our institution in 2008. After full implementation, all preoperative scans were reviewed and added findings were evaluated from January 2011 – December 2012. Decisions regarding further examination made at the first multidisciplinary team conference were recorded. Subsequent procedures were tracked via medical records, and the impact of added findings on additional examinations, delay and change in treatment plans were evaluated. **Results:** Forty-four (21.1%) of 209 women presented with added findings. Further examination was performed in 35/44 (79.5%). Malignancy was identified in 15/35 (42.9%), revealing metastases from ovarian, fallopian tube, or peritoneal cancer in 11, a synchronous primary cancer in three, and recurrence of a previous cancer in one woman. The ovarian-, fallopian tube-, or peritoneal cancer metastases were localized in the lungs, uterus, colon, vagina, and breasts. The remaining 20 added findings revealed two benign lesions and one pre-malignant lesion, whereas no abnormality was found in 17. Further examination of added findings resulted in a significant time delay until treatment start of median four days (range 1-83, $P < 0.004$). **Conclusions:** Further examinations of added findings by flourdeoxyglucose with positron emission tomography and computed tomography delayed time to start of treatment by median four days in women with newly diagnosed ovarian-, fallopian tube-, or peritoneal cancer in a contemporary institution with fast track access to additional diagnostics. The clinical implications of this must be balanced against the gain of detecting unrecognized malignancy in 15 of 209 women (7.2%).

**Keywords**

ovarian cancer, fallopian tube cancer, peritoneal cancer, flourdeoxyglucose, positron emission tomography, computed tomography, preoperative diagnostic evaluation, Incidental Findings

**Abbreviations**

OC: ovarian, fallopian tube or peritoneal cancer

FDG: flourdeoxyglucose

PET: positron emission tomography

CT: computed tomography

AF: added findings

MDT: multidisciplinary team

**Key Message**

FDG-PET/CT imaging in the preoperative diagnostic evaluation of women with ovarian cancer leads to a high rate of added findings. Prompt and accurate diagnostics of these findings should be encouraged to avoid possible delay in the treatment of ovarian cancer.

## INTRODUCTION

Approximately 450 women are diagnosed with ovarian-, fallopian tube-, and peritoneal cancer (abbreviated to OC) each year in Denmark. Denmark has the second highest incidence (15 pr. 100.000) of ovarian cancer in the world.[1-2] In Denmark, the diagnostics and treatment of ovarian cancer were centralized to cancer centers with highly specialized expertise in imaging and surgical treatment in the year 2004.

Imaging techniques have improved considerably over the past years, and a major step forward is the combination of the tracer flourdeoxyglucose (FDG) with positron emission tomography (PET) and computed tomography (CT).[3-4] FDG-PET/CT is increasingly used in the preoperative evaluation of primary OC in highly specialized Gynecological Cancer centers in Denmark.[5] The use of FDG PET/CT is not mandatory but has been recommended in the Danish Gynecological Cancer Ovarian guidelines since 2009 for the evaluation of women with suspicion of ovarian cancer (Risk of malignancy Index > 200). FDG-PET/CT in this patient group contributes to the diagnostic of OC or other cancers, diagnosing metastatic lymph nodes, distant metastases, and assessing operability.[6] The literature has focused on the clinical impact of introducing FDG-PET/CT in the preoperative disease assessment while there has been less focus on the benefits or disadvantages associated with identifying added findings (AFs), eg PET-positive lymph nodes outside areas where we would usually identify lymph node metastasis in OC and increased FDG-uptake in other organs. Added findings may display concern as to the correctness of diagnosis or the stage and may thus delay decision-making.[7-8]

Implementation of FDG-PET/CT as standard imaging in women with OC inevitably increases the possibility of identifying AFs, prompting a clinical decision if further examinations are necessary. Further diagnostics may add valuable information to the clinical decisions, but the diagnostic procedures may also be unnecessary and unpleasant to the women besides being expensive to the society. Finally, it may result in delay of treatment start.

The aim of the present study was to evaluate the clinical impact of implementing preoperative FDG-PET/CT for primary staging in OC with focus on detecting AFs, and the consequences hereof, regarding changes in treatment plans, upstaging, and time delay until treatment start.

## MATERIAL AND METHODS

We performed a historical review of FDG-PET/CT scans in 209 consecutive women with at Odense University Hospital in Denmark from January 1, 2011 to December 31, 2012. The FDG-PET/CT was performed prior to a multidisciplinary team (MDT) conference.[1] MDT participants were highly specialized physicians within gynecological cancer surgery, clinical oncology, clinical pathology, nuclear medicine, and radiology. Eligible women represented all newly diagnosed OC (ovarian-, fallopian tube and peritoneal cancer) cases regardless of histology at Odense University Hospital in the study period. FDG-PET/CT was performed as a part of initial staging, and only the pre-treatment FDG-PET/CT was included.

**Image reports**

All FDG-PET/CT images were analyzed and reported by a nuclear medicine physician in routine clinical practice. The first author reviewed these reports, and all AFs were recorded. An AF was defined as *a lesion located in a site where it was less likely to be related to OC.* The lesion should also present with significant FDG-uptake or with morphological change on the CT component of the FDG-PET/CT. Any AF could therefore represent a potential synchronous primary cancer, eg FDG-avid solid process in the breast, lung or uterus.

Ascites, pleural effusion, hydronephrosis, hydroureter, and retroperitoneal, inguinal and thoracic lymph nodes were considered related to the OC and were not nominated as AFs. In women who had findings indicating multiple liver- or lung metastases the findings were considered related to OC and were not nominated as AFs. In the case of eg multiple pulmonary foci, it is very unlikely that the woman has a primary lung cancer along with a metastatic OC. These were the cases where the pulmonary foci were interpreted as metastatic OC and *not* an AF. On the contrary, in a case with eg a single pulmonary foci in a woman with ovarian disease with eg abdominal metastases, the pulmonary focus was interpreted as an AF and the woman would undergo further investigation to rule out whether the woman had two synchronous cancers or metastatic OC above the diaphragm. FDG-uptake in the colon/sigmoideum in relation to an extraluminal tumor on CT-imaging was considered related to OC and was not nominated as an AF. Gallstones, age related skeletal abnormalities, findings related to chronic lung disease, physiological FDG-uptake in eg brown adipose tissue, the colon, and simple liver cysts without FDG-uptake were considered benign and not of clinical relevance.

**MDT and follow-up**

Sociodemographic and clinical data were obtained from the medical records of the women. Additional information on each woman was tracked via the local hospital database or using the online national medical records if the finding of an AF led to further examination. Diagnostic procedures eg biopsy, mammography, endoscopy and corresponding histopathology/diagnosis were documented. Dates of examination, diagnosis and treatment plan of the AFs were registered. It was noted when further examination changed the original treatment plan of the OC. Comments in the medical records were used to determine why further examination had not been performed in cases where AFs were not further examined.

Dates of the FDG-PET/CT, the first MDT conference, and start of primary cancer treatment were registered, and any delay in the treatment potentially caused by the examination of an AF was identified. The treatment decision was made after a primary invasive diagnostic procedure in cases where women were assessed inaccessible to primary debulking surgery on diagnostic imaging, and in those cases the date of the succeeding MDT was used.

**FDG-PET/CT**

Women were required to fast for at least 6 hours before the FDG-PET/CT scan. The tracer $^{18}$F-FDG (fludeoxyglucose, 4 MBq/kg) was administered intravenously. Thereafter, the woman rested and rehydrated with 800 ml of water. The scan was performed after 60 minutes (± 5 min) including a field from the neck to the proximal femur. A contrast enhanced high-dose CT scan was applied and immediately followed by a PET scan of the same area.

FDG-PET/CT scanning was performed using either General Electric Discovery STE or Discovery RX (GE Medical Systems, Milwaukee, USA) with the following settings: CT-scan 140 kV and 30-110 mA Smart mA, rotation time 0.8 sec., pitch 1.375:1, Noise Index 25, detector coverage 40mm.

**Statistical analyses**

Descriptive analyses were performed using the Statistical Package for the Social Sciences (SPSS), version 23.0 (SPSS Inc., Chicago, IL). Non-parametric (Mann Whitney U) tests were used to examine the relation between the time intervals from the MDT conference to start of the primary treatment of the OC. A *P* value of less than 0.05 was considered significant. Women with

missing data, eg women who chose not to receive treatment of their OC were excluded from the analyses.

**Ethical approval**

The study was a quality assurance study with no ethical conflicts concerning the women. Only medical records were reviewed and all included data was anonymized. The Danish Data Protection Agency (Nr. 13/19540, 29th July 2013) and the Danish Heath and Medicines Authority (Nr. 3-3013-823/1/, 19th November 2014) authorized this study.

**Results**

In total 209 consecutive women were included of which the majority (71.3%) had OC FIGO stage IIIC/IV (see Table 1).[9] In 44/209 (21.1%) an AF was identified and suspected to be a synchronous primary cancer; eg FDG-avid solid process in the breast, lung or uterus (see Table 2). Fig. 1 shows a flow chart of the patient population and the frequency of AFs.

A total of 35/44 (79.5%) of the women with AFs were referred to further examination such as ultrasound, colonoscopy, bronchoscopy etc. (see further details in Table 3 and 4). Malignancy was identified in 15/35 (42.9%). Eleven of these had metastases from OC which lead to upstaging of the cancer. The metastases were identified in the lungs, the vagina, the breasts, the uterus, and in the colon. A synchronous primary cancer was found in three women: a carcinoid tumor of the lung, an endometrial adenocarcinoma grade 1 in the uterus, and two synchronic ductal carcinomas in the breast of one woman (see Fig. 2). One woman was diagnosed with a recurrence of a previous parotid gland cancer.

Further examination identified benign etiologies in 20/35 (57.1%) of the women with AFs. Eight women had benign etiologies verified by biopsy, and these were located in the lungs, axillary lymph nodes, uterus, colon, breasts, the thyroid gland, and in the vulva. One of the women was diagnosed with non-toxic multinodular goiter and another woman had vulva intraepithelial neoplasia. Non-invasive diagnostics revealed apparently benign findings in 12 women, eg a cyst in the breast, and a biopsy was not performed.

Further examination of AFs changed the treatment plan for one woman who was referred and suspected for OC. The woman was referred for a gynecologic examination in general anesthesia including cystoscopy and proctoscopy due to an AF in the uterus and cervix to evaluate

the origin of the cancer. A diagnostic laparoscopy was also planned to evaluate the presence of peritoneal carcinomatosis although not visible on imaging. Findings upon the gynecological examination revealed a completely normal cervix and a 15 cm large bulky tumor involving the rectovaginal septum and firmly lodged to the pelvis bones with no ulceration of the vagina or the rectum. Based on these findings and with the knowledge of the histology, it was concluded to be a primary peritoneal cancer inaccessible to primary surgery. The planned diagnostic laparoscopy was therefore cancelled, and the woman was referred to neoadjuvant chemotherapy.

Nine women had AFs that did not lead to further examination prior to treatment of the OC. In one woman further examination took place after the treatment of the OC, and a benign lesion was identified. In another woman a synchronous primary cancer in the uterus was suspected, however it was decided not to do further diagnostics since the surgical treatment of the OC would treat a potential endometrial cancer as well. Postoperative histopathology revealed a synchronous endometrial adenocarcinoma grade 1 in the uterus. The AFs in the remaining six women were not further examined and it is therefore unknown what they represented.

Time from the MDT conference to treatment of the primary OC ranged from 1-83 days, with a median of 12 days (95% confidence interval; 11 to 13). The 95% percentile of the range (1-83 days) was 32 days, which left seven women who had a time to treatment of their OC of more than 32 days. Five of these women were in the group with an AF detected, and two were in the group without AFs. These seven women each had various reasons that could explain this delay, eg lost referral for bronchoscopy and complications from a diagnostic laparoscopy. A significantly longer time to treatment of a median of four days was found in the 35 women who had further examination of AFs performed ($P = 0.004$) (see Table 5).

## DISCUSSION

Here we present AFs and consequences of identifying AFs following the implementation of advanced imaging diagnostics, FDG-PET/CT, in a large cancer center with multidisciplinary access to OC treatment. Our results represent our first experience with FDG-PET/CT imaging in women with suspected OC with a specific focus on identification and handling of AFs. We found AFs in 21.1% of the scans, and 31.4% of the examinations of an AF led to the identification of a

metastasis of OC. As a consequence these women were more often correctly diagnosed with stage IV disease.

A malignancy rate of 42.9% in AFs corresponds to findings in previous studies.[10-11] Further examinations of AFs led to stage migration of OC to stage IV in about one third of the women in our study. However, the treatment plan was changed in one woman only. In three cases where further examination revealed synchronous primary tumors, the OC treatment was prioritized over treatment of a breast cancer, a low risk lung cancer and an endometrial cancer; the latter was included in the primary surgery for OC. Hence, in our study the detection of synchronous primary tumors and metastases of OC did not have a great impact on the treatment plan of the OC. Previous studies that have investigated the value of primary surgery vs neo-adjuvant chemotherapy for advanced ovarian cancer did not include as thorough staging procedures as in the present study. The implementation of FDG-PET/CT is suggested to validly assist in detecting metastatic lymph nodes and distant metastases.[6] This may have several important consequences. As mentioned, more patients may be diagnosed with metastatic stage IV disease, which may ultimately influence on decision making regarding the choice of primary treatment. Further, the potential stage migration observed as a consequence of further examination of AFs is likely to influence national statistics by further increasing survival rates for women diagnosed with true stage IIIC. Finally, the knowledge of metastases with unusual locations,[7] eg the vulva and the breast, may have an impact when allocating women with OC to primary debulking surgery or neo-adjuvant chemotherapy in the future.

The median time from the MDT conference to treatment of the OC was 12 days. Statistical significance was found for the median time delay of four days until treatment due to further examination of AFs. Similar studies of AFs related to FDG-PET/CT imaging did not investigate the issue of treatment delay in the treatment of the primary cancer.[10-13] A delay in treatment of four days was not assumed to have a clinical impact on patient survival. However, caution is still advised, considering that the 95% confidence interval of the median of time until treatment was much wider in women who were further examined (95% confidence interval; 10 to 21) as opposed to women who were not (95% confidence interval; 10 to 13). This indicates that further examination of AFs may lead to a considerably delayed treatment start in some women and this may have a significant clinical impact. The delay until treatment of the primary cancer may be even more significant at other centers where cancer diagnostic packages are not available as in Denmark. Each cancer center must therefore consider the risk of delay if further examination of an

AF is necessary. It is suggested that an implementation of advanced imaging such as FDG-PET/CT should be associated with a particular focus and allocation of resources to interdisciplinary fast track diagnostics.

In a systematic review by Lumbreras et al the mean frequency of AFs was 13.4% in studies using MRI, ultrasound or PET and 31.1% in studies using CT alone.[14] The ability of FDG-PET/CT to locate findings suggestive of a synchronous primary malignancy was 12% in a study by Beatty et al and 4.1% in a similar study by Ishimori et al.[10,12] A higher frequency of 21% was found by Chopra et al in patients undergoing FDG-PET/CT imaging in the examination of lung cancer.[13] A frequency of AFs of 21.1% in the present study is in the same range as in studies of other cancer diseases with a high incidence of diagnosing distant metastases. Comparison of studies is, however, difficult since varying definitions of AFs were used. OC is well known for a wide range of metastatic sites and with OC as the primary malignancy in the present study this may account for the comparatively high frequency of AFs.[7] It is our impression that we have gone through a learning curve during the implementation of FDG-PET/CT in women with OC in the MDT group in our institute. After several diagnostic biopsies of eg FDG-avid parasternal lymph nodes we are today convinced that such lymph nodes represent stage IV disease in women with OC. Hence, the implementation of FDG-PET/CT may very well broaden our knowledge considerably on metastatic sites for OC that were not previously recognized.

The historical review of the FDG-PET/CT reports revealed that approximately one quarter of AFs were not further examined, and no reason for this was given in the medical file. This indicates a discrepancy between the FDG-PET/CT reports and the MDT conferences that could be strengthened. Up to December 2012 a radiologist physician reported the FDG-PET/CT scans at the MDT conference. Although the nuclear medicine physicians described the scan, they did not attend our MDT conference until December 2012, which was the last month of inclusion for the present study. As a consequence of the present study and an increasing need for clear interpretation of the findings on the FDG-PET/CT scans, it was decided that a nuclear medicine physician should routinely attend the MDT conferences. We believe that this organizational change has strengthened the collaboration between the nuclear medicine physicians, the radiologists, the medical oncologists, and the gynecological cancer surgeons in decision-making at the MDT conferences. The experience from introducing FDG-PET/CT for the assessment of operability in OC and the knowledge gained from the present study has helped considerably in interpreting findings on FDG-PET/CT scans.

We used FDG-PET with contrast-enhanced diagnostic CT, which influenced on our evaluation of AFs. Of the 35 AFs which were further investigated, 7 were found exclusively on the PET component of the scan, 3 exclusively on the CT component of the scan, and 24 were found on both modalities. The remaining AF was not described on imaging results, but discussed at an MDT conference. Of the 35 findings which were further investigated, 26 were FDG-avid while one AF was not described in imaging results (See Table 4). A total of 31/35 (88.6%) AFs with further investigation were visible on the PET component of scan. We therefore consider our results to be comparable to other PET centers where the CT component is not standard procedure.

The strength of the present study was that it was performed in a homogenous group of consecutive women with OC. Our study population is representative regarding age and FIGO stage compared to women with OC in Denmark and internationally. Thus, our results are suggested to be applicable to other countries with a similar prevalence of OC.[2] However, the generalizability of our results mainly refers to institutions with experience in systematic use of FDG-PET/CT and with a specialized gynecological oncology department, since all women in our study were referred with a Risk of Malignancy Index > 200. The literature does not give a clear definition of how to define an AF. It may depend on the primary malignancy, possibly leading to a selection bias and thereby difficulty in comparing with other studies. The relatively high frequency of AFs in our study that did not receive further examination may have impacted on the outcome of the present study.

## CONCLUSION

The present study revealed potential pitfalls that deserve attention when implementing FDG-PET/CT in the initial staging and preoperative evaluation of women with OC. Added findings led to a considerable stage migration and may impact the decision-making regarding the choice of treatment. We show that further examination of AFs leads to a four-day delay in the treatment of OC that encourages prompt and accurate diagnostics.

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**Table and figure legends:**

**Table 1.** Characteristics of included women.

**Table 2.** Localizations of added findings and the results of further examination performed.

**Table 3.** The different types of examinations performed on added findings.

**Table 4.** The added findings and their characteristics, further examination and results hereof.

**Table 5.** Time from multidisciplinary team conference until treatment of ovarian cancer, fallopian tube cancer and peritoneal cancer stratified to groups of women with and without further examination.

**Figure 1.** Flow chart of added findings found on FDG-PET/CT imaging and their follow-up.

**Figure 2.** Three synchronous primary cancers incidentally identified in diagnostic FDG-PET/CT imaging for ovarian cancer. The transaxial images show (A) increased FDG-uptake in a breast tumor representing one of two diagnosed synchronic ductal carcinomas of a seventy-two year-old woman, (B) moderate FDG-uptake in a carcinoid tumor of the lung in an eighty-three year-old woman, and (C) moderate FDG-uptake in the endometrium representing an endometrial adenocarcinoma grade 1 in a sixty-eight year-old woman.

**Table 1.** Characteristics of included women.

| | **All** | **No added findings** | **Added findings** | **% (n Added findings / n All)** | **Added findings with malignant etiology** |
|---|---|---|---|---|---|
| | **n = 209** | **n = 165** | **n = 44** | | **n = 14** |
| **Age at FDG-PET/CT scan, years** | | | | | |
| Min.-max. | 16-95 | 16-95 | 46-85 | | 58-81 |
| Median | 66 | 65 | 66.5 | | 70 |
| **Cancer type, n** | | | | | |
| Ovarian cancer | 183 | 148 | 35 | 19.1% | 12 |
| Fallopian tube cancer | 11 | 11 | 0 | - | 0 |
| Peritoneal cancer | 15 | 6 | 9 | 60% | 2 |
| **FIGO classification, n** | | | | | |
| IA | 16 | 14 | 2 | 21.7% | 1 |
| IB | 2 | 0 | 2 | FIGO | 0 |
| IC | 14 | 12 | 2 | 1A - IIIB | 0 |
| IIA | 5 | 2 | 3 | | 1 |
| IIB | 9 | 8 | 1 | | 0 |
| IIC | 4 | 3 | 1 | | 0 |
| IIIA | 2 | 0 | 2 | | 0 |
| IIIB | 8 | 8 | 0 | 20.8% | 0 |
| IIIC | 95 | 81 | 14 | FIGO | 4 |
| IV | 54 | 37 | 17 | IIIC + IV | 8 |

FDG-PET/CT: 18-fluorodeoxyglucose-positron emission tomography/computed tomography

**Table 2.** Localizations of added findings and the results of further examination performed.

| **Site of added finding** | **Total cases** (n[a]) | **Cases examined** (n[a]) | **Synchronous primary cancer** (n[a]) | **Metastasis OC** (n[a]) | **Recurrence previous cancer** (n[a]) | **Benign result** (n[a]) |
|---|---|---|---|---|---|---|
| Lungs | 8/3 | 8/3 | 1/0 | 4/1 | 0/1 | 3/1 |
| Kidneys | 2/0 | 1/0 | | | | 1/0 |
| Axillary lymph node | 1/0 | 1/0 | | | | 1/0 |
| Uterus/cervix | 6/1 | 5/1 | 1/0 | 1/0 | | 3/1 |
| Colon/sigmoideum/ rectum | 3/1 | 3/1 | | 1/0 | | 2/1 |
| Vagina/vulva | 3/0 | 3/0 | | 2/0 | | 1/0 |
| Ventricle | 1/2 | 0/2 | | | | 0/2 |
| Oro-/laryngopharynx | 1/0 | | | | | |
| Breast | 5/2 | 4/2 | 0/1 | 2/0 | | 2/1 |
| Heart | 1/0 | | | | | |
| Skeletal FDG-uptake | 1/0 | | | | | |
| Thyroid gland | 3/0 | 1/0 | | | | 1/0 |
| **TOTAL** | **35/9** | **26/9** | **2/1** | **10/1** | **0/1** | **14/6** |

[a] Number of women ovarian cancer/women with peritoneal cancer)

FDG-PET/CT: 18-fluorodeoxyglucose-positron emission tomography/computed tomography

OC: Ovarian cancer, fallopian tube cancer and peritoneal cancer

**Table 3.** The different types of examinations performed on added findings.

| **Type of examination** | **Total procedures (n)** | |
|---|---|---|
| | Procedures | Biopsy |
| New FDG- PET/CT in 3 months | 1 | - |
| Conference opinion | 4 | - |
| Ultrasound neck | 1 | 1 |
| Ultrasound thyroid | 1 | 1 |
| Ultrasound breast | 2 | 1 |
| Ultrasound kidney | 1 | - |
| Mammography | 6 | 4 |
| Blood sample (thyroid) | 1 | - |
| Gynecological examination<br>- Cervix smear<br>- Endometrial biopsy<br>- Vulva biopsy | 7 | <br>1<br>3<br>3 |
| Gastroscopy | 2 | - |
| Colonoscopy | 3 | 1 |
| Sigmoidoscopy | 1 | 1 |
| Rectoscopy | 1 | - |
| Cystoscopy | 2 | - |
| Bronchoscopy | 2 | 1 |
| Endobronchial ultrasound (EBUS) | 2 | 2 |
| Gynecological examination in general anaesthesia | 2 | 1 |
| Video-assisted thoracoscopic surgery (VATS) | 2 | 2 |
| **TOTAL** | **41** | **22** |

FDG-PET/CT: 18-fluorodeoxyglucose-positron emission tomography/computed tomography

OC: Ovarian cancer, fallopian tube cancer and peritoneal cancer

**Table 4.** The added findings and their characteristics, further examination and results hereof.

| **Nr.** | Ovarian cancer (1)<br>Peritoneal cancer (2) | **Added finding localization** | **FDG-avid** (Yes/No)<br><br>**Visible on PET portion** (+/-) **/ Visible on CT portion** (+/-) | **Type of further examination** | **Biopsy**<br><br>(Yes/ No) | **Result**<br><br>Synchronous primary cancer (1)<br>Recurrence previous cancer (2)<br>Metastasis OC (3)<br>Benign (4) | **Change in treatment plan of ovarian cancer**<br><br>(Yes/No) |
|---|---|---|---|---|---|---|---|
| 1 | 2 | Breast | Yes (+/+) | Mammography | Yes | Two synchronic ductal carcinomas (1) | No |
| 2 | 1 | Uterus | Yes (+/+) | Gynecological examination | Yes | Endometrial adenocarcinoma grade 1 (1) | No |
| 3 | 1 | Lungs | No (+/+) | Video assisted thoracoscopic surgery | Yes | Carcinoid tumor of the lung (1) | No |
| 4 | 2 | Lungs | Yes (+/+) | Conference opinion | No | Recurrence previous parotid cancer with metastasis in lungs (2) | No |
| 5 | 1 | Lungs | Yes (+/+) | Ultrasound guided fine needle biopsy in neck | Yes | Metastasis OC (3) | No |
| 6 | 1 | Lungs | Yes (+/+) | Endobronchial ultrasound | Yes | Metastasis OC (3) | No |
| 7 | 1 | Lungs | Yes (+/+) | Conference opinion | No | Metastasis OC (3) | No |
| 8 | 1 | Lungs | Yes (+/+) | Conference opinion | No | Metastasis OC (3) | No |
| 9 | 1 | Colon/ sigmoideum | Yes (+/+) | Sigmoidoscopy | Yes | Metastasis OC (3) | No |
| 10 | 2 | Lungs | Yes (+/+) | Endobronchial ultrasound | Yes | Metastasis OC (3) | No |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11 | 1 | Breast | No (+/-) | Mammography, ultrasound | Yes | Metastasis OC (3) | No |
| 12 | 1 | Breast | Yes (+/+) | Mammography | Yes | Metastasis OC (3) | No |
| 13 | 1 | Uterus/ cervix | No (-/+) | Gynecological examination in general anesthesia, cystoscopy | Yes | Metastasis OC (3) | No |
| 14 | 1 | Vagina/vulva | Yes (+/+) | Gynecological examination | Yes | Metastasis OC (3) | No |
| 15 | 1 | Vagina | Yes (+/-) | Gynecological examination | Yes | Metastasis OC (3) | No |
| 16 | 1 | Thyroid gland | Yes (+/+) | Ultrasound guided fine needle biopsy, thyroid panel blood sample | Yes | Nontoxic multinodular goiter (4) | No |
| 17 | 1 | Vagina/vulva | Yes (+/-) | Gynecological examination | Yes | Severe dysplasia (4) | No |
| 18 | 1 | Lungs | Yes (+/+) | Bronchoscopy | Yes | No malignant cells (4) | No |
| 19 | 1 | Colon/ sigmoideum | Yes (+/+) | Colonoscopy | Yes | No malignant cells (4) | No |
| 20 | 1 | Uterus | Yes (+/+) | Gynecological examination | Yes | No malignant cells (4) | No |
| 21 | 1 | Uterus | No (-/+) | Gynecological examination | Yes | No malignant cells (4) | No |
| 22 | 2 | Breast | Yes (+/-) | Mammography | Yes | No malignant cells (4) | No |
| 23 | 1 | Lungs | Yes (+/+) | Video-assisted thoracoscopic surgery | Yes | No malignant cells (4) | No |
| 24 | 1 | Colon/ sigmoideum | Yes (+/-) | Colonoscopy | No | Benign appearance (4) | No |
| 25 | 2 | Ventricle | Yes (+/-) | Gastroscopy | No | Benign appearance (4) | No |
| 26 | 1 | Breast | Yes (+/+) | Conference opinion | No | Benign appearance (4) | No |
| 27 | 2 | Colon/ sigmoideum | (Not in description, | Colonoscopy | No | Benign appearance (4) | No |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | found at MDT) | | | | |
| 28 | 2 | Ventricle | No (-/+) | Gastroscopy | No | Benign appearance (4) | No |
| 29 | 1 | Axillary lymph node | Yes (+/+) | Mammography | No | Benign appearance (4) | No |
| 30 | 2 | Uterus | Yes (+/+) | Gynecological examination in general anesthesia, cystoscopy, rectoscopy | No | Benign appearance (4) | Yes |
| 31 | 2 | Lungs | Yes (+/+) | Bronchoscopy | No | Benign appearance (4) | No |
| 32 | 1 | Kidney | No (+/+) | Ultrasound | No | Benign appearance (4) | No |
| 33 | 1 | Lungs | No (+/+) | New FDG-PET/CT in 3 months | No | Benign appearance (4) | No |
| 34 | 1 | Uterus | Yes (+/-) | Gynecological examination | No | Benign appearance (4) | No |
| 35 | 1 | Breast | No (+/+) | Mammography, ultrasound | No | Cyst, benign appearance (4) | No |

FDG-PET/CT: 18-fluorodeoxyglucose-positron emission tomography/computed tomography

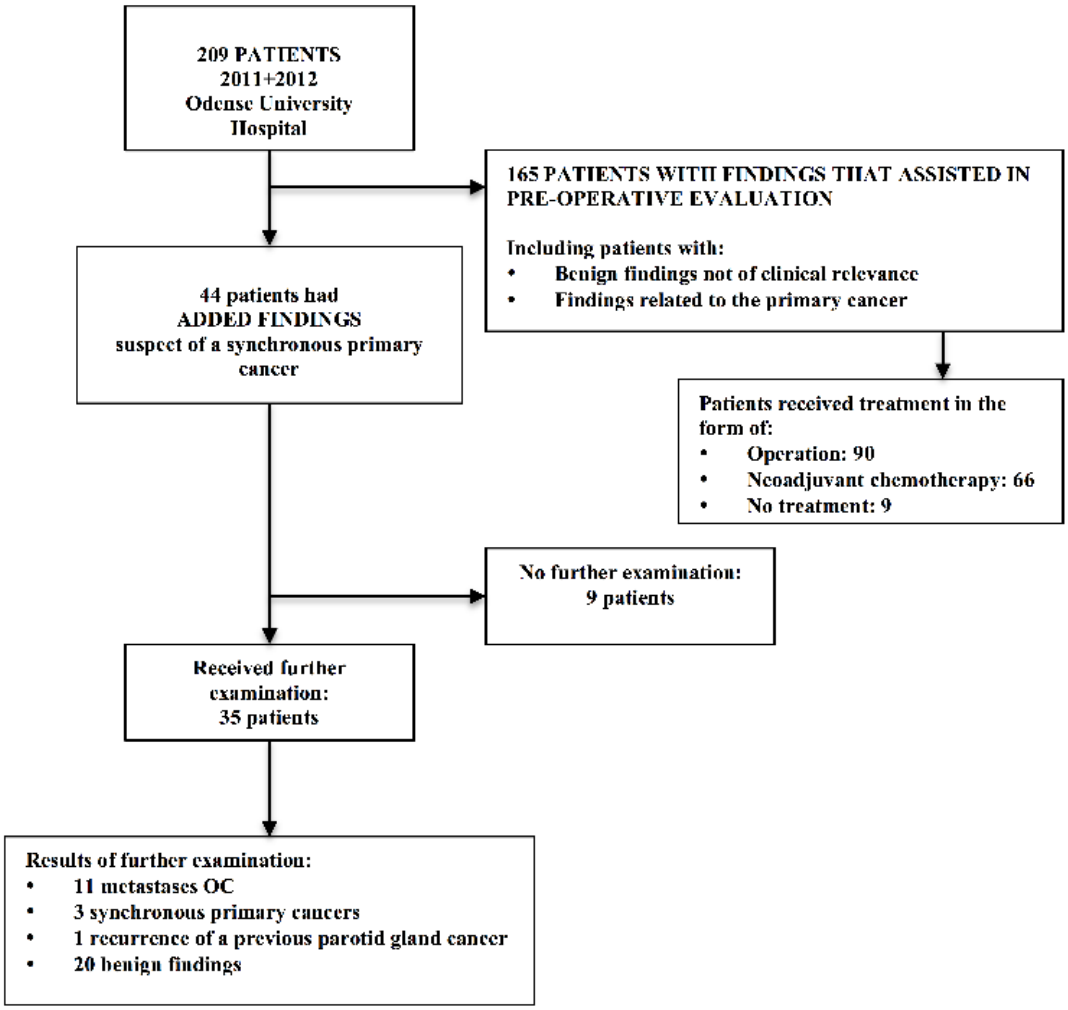
OC: Ovarian cancer, fallopian tube cancer and peritoneal cancer

MDT: Multidisciplinary team conference

**Table 5.** Time from multidisciplinary team conference until treatment of ovarian cancer, fallopian tube cancer and peritoneal cancer stratified to groups of women with and without further examination.

| | **Days median** | **95% Confidence interval (CI)** | **Range** | **Valid (n)** | **%** | **Missing[a] (n)** | **%** |
|---|---|---|---|---|---|---|---|
| All patients | 12 | 11 to 13 | 1-83 | 192 | 91.9 | 17 | 8.1 |
| Patients with further examination of added findings | 15 | 10 to 21 | 2-83 | 31 | 88.6 | 4 | 11.4 |
| All other patients | 11 | 10 to 13 | 1-42 | 161 | 92.5 | 13 | 7.5 |

[a]For included patients in Table 3 and 4 missing data was observed in 17 patients, eight of these did not receive treatment of their ovarian cancer as they were deemed terminal, six chose not to receive treatment and in one case there was no multidisciplinary team conference before treatment. The remaining two patients were excluded from this analysis, as one of them was sent home with benign histological results from operation and planned for surgery three months later where malignancy was found, the other was treated with neoadjuvant chemotherapy one day before final diagnosis was confirmed at the multidisciplinary team conference, and the third was referred to another department due to uncertainty as to the origin of the primary cancer and referred back to the gynaecologic department with verified ovarian cancer, fallopian tube cancer and peritoneal cancer several months later.

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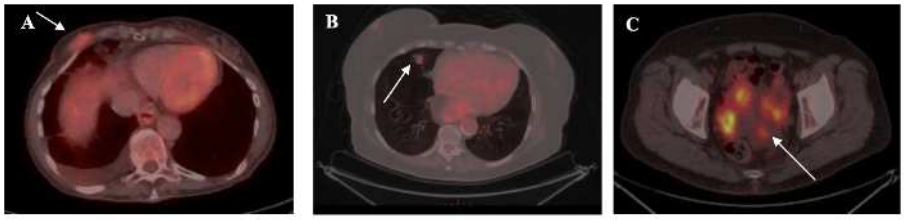


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