Endometrial Cancer Histopathology Reporting Guide

Family/Last name

Given name(s)

Date of birth DD – MM – YYYY

Patient identifiers

Date of request DD – MM – YYYY

Accession/Laboratory number

Elements in **black text** are CORE. Elements in **grey text** are NON-CORE.

OPERATIVE PROCEDURE

- ◯ Simple hysterectomy
- ◯ Radical hysterectomy
- ◯ Other, *specify*

ATTACHED ANATOMICAL STRUCTURES

- ☐ Vaginal cuff
- ☐ Left ovary
- ☐ Right ovary
- ☐ Left fallopian tube
- ☐ Right fallopian tube
- ☐ Parametria

ACCOMPANYING SPECIMENS

- ☐ None submitted
- ☐ Peritoneal biopsies
- ☐ Other, *specify*
- ☐ Omentum
- ☐ Lymph nodes

TUMOUR SITE (Note 1)

☐ Fundus ☐ Body ☐ Isthmus/lower uterine segment

MAXIMUM TUMOUR DIMENSION (Note 2)

mm

HISTOLOGICAL TUMOUR TYPE (Note 3)

- ☐ Endometrioid carcinoma
- ☐ Mucinous carcinoma
- ☐ Serous endometrial intraepithelial carcinoma (SEIC)
- ☐ Serous carcinoma
- ☐ Clear cell carcinoma
- ☐ Mixed cell adenocarcinoma
- ☐ Undifferentiated carcinoma
- ☐ Dedifferentiated carcinoma
- ☐ Neuroendocrine tumour

Specify subtype

☐ Carcinosarcoma (Note 4) ⇒ % Epithelial & % Sarcomatous

⇩

- ◯ Homologous
- ◯ Heterologous

HISTOLOGICAL GRADE (Note 5)

- ◯ Grade 1
- ◯ Grade 2
- ◯ Grade 3
- ◯ Not gradeable
- ◯ Not applicable

MYOMETRIAL INVASION (Note 6)

◯ None ◯ < 50% ◯ ≥ 50%

⇩ ⇩

PERCENTAGE OF MYOMETRIUM INFILTRATED BY CARCINOMA (Note 7) %

DISTANCE OF MYOINVASIVE TUMOUR TO SEROSA (Note 8)

mm

LYMPHOVASCULAR INVASION (Note 9)

◯ Present ◯ Not identified ◯ Indeterminate

Specify site

CERVICAL SURFACE OR CRYPT INVOLVEMENT (Note 10)

◯ Present ◯ Not identified ◯ Indeterminate

CERVICAL STROMAL INVASION (Note 11)

◯ Present ◯ Not identified ◯ Indeterminate

DISTANCE OF TUMOUR TO CERVICAL RESECTION MARGINS (Note 12)

mm

VAGINA

◯ Involved ◯ Not involved ◯ Not applicable

OMENTUM

◯ Involved ◯ Not involved ◯ Not applicable

PERITONEAL BIOPSY/BIOPSIES

◯ Involved ◯ Not involved ◯ Not applicable

UTERINE SEROSA (Note 13)

◯ Involved ◯ Not involved ◯ Indeterminate

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PARAMETRIA (Note 14)

◯ Involved ◯ Not involved ◯ Not applicable

ADNEXA (Note 15)

◯ Involved ◯ Not involved ◯ Not applicable

BACKGROUND ENDOMETRIUM (Note 16)

☐ Cyclical ☐ Hormone effect
☐ Atrophic ☐ Polyp/s
☐ Hyperplasia without atypia
☐ Atypical hyperplasia/Endometrial intraepithelial neoplasia

PERITONEAL CYTOLOGY (Note 17)

◯ Positive ◯ Atypical/suspicous
◯ Negative ◯ Not submitted

LYMPH NODE STATUS (Note 18)

◯ Involved ◯ Not involved ◯ Not applicable

⇩

Left pelvic:
Number retrieved
Number involved

Right pelvic:
Number retrieved
Number involved

Para-aortic:
Number retrieved
Number involved

Extra-nodal spread

◯ Present ◯ Not identified ◯ Not applicable

HISTOLOGICALLY CONFIRMED DISTANT METASTASES

◯ Present ◯ Not identified ◯ Indeterminate

ANCILLARY STUDIES (Note 19)

☐ Immunohistochemical markers

☐ Molecular data

PROVISIONAL PATHOLOGICAL STAGING PRE-MDTM*

Provisional FIGO stage (2009) (see table below) (Note 20)

Pathological staging (TNM 8th ed.) (see table below)

Tumour stage FIGO & pTNM## ^

Primary Tumour (T)		
TNM	FIGO	
TX		Primary tumour cannot be assessed
T0		No evidence of primary tumour
T1	I	Tumour confined to the corpus uteri[a]
T1a	IA	Tumour limited to endometrium or invading less than half of myometrium
T1b	IB	Tumour invades one half or more of myometrium
T2	II	Tumour invades cervical stroma, but does not extend beyond the uterus
T3	III	Local and/ or regional spread as specified here:
T3a	IIIA	Tumour invades the serosa of the corpus uteri or adnexae (direct extension or metastasis)
T3b	IIIB	Vaginal or parametrial involvement (direct extension or metastasis)
T4	IVA	Tumour invades bladder/ bowel mucosa[c]
Regional Lymph Nodes (N)		
NX		Regional lymph nodes cannot be assessed
N0		No regional lymph node metastasis
N1,N2	IIIC	Metastasis to pelvic or para-aortic lymph nodes[b]
N1	IIIC1	Metastasis to pelvic lymph nodes
N2	IIIC2	Metastasis to para-aortic lymph nodes with or without metastasis to pelvic lymph nodes
Distant Metastasis (M)		
M0		No distant metastasis
M1	IVB	Distant metastasis (excluding metastasis to vagina, pelvic serosa, or adnexa, including metastasis to inguinal lymph nodes, intra-abdominal lymph nodes other than para-aortic or pelvic nodes)

a Endocervical glandular involvement only should be considered as stage I.

b Positive cytology has to be reported separately without changing the stage.

c The presence of bullous oedema is not sufficient evidence to classify as T4.

* Multidisciplinary management team

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Scope

This dataset has been developed for resection specimens of endometrial cancers. It is not applicable for small endometrial biopsy specimens.

Note 1 - Tumour site (Non-core)

Reason/Evidentiary Support:
There may be an association between lower uterine segment/isthmic tumours and Lynch syndrome.[1,2]

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Note 2 - Maximum tumour dimension (Non-core)

Reason/Evidentiary Support:
There is a significant correlation between primary tumour diameter >20 mm and peritoneal failure. This does not yet reach III-2 evidence level.[3]

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Note 3 - Histological tumour type (Core)

Reason/Evidentiary Support:
Endometrial carcinomas should be typed according to the 2014 World Health Organisation (WHO) Classification.[4] Accurate typing is necessary in both biopsies and resection specimens. Diagnosis of aggressive tumours such as serous carcinoma, clear cell carcinoma, carcinosarcoma, undifferentiated carcinoma and grade 3 endometrioid adenocarcinoma will usually result in full surgical staging including pelvic and para-aortic lymphadenectomy and omentectomy.

Mucinous adenocarcinoma refers to a subtype of endometrial adenocarcinoma in which more than 50% of the tumour cells contain intracytoplasmic mucin. Many endometrioid adenocarcinomas contain focal mucinous areas and endometrioid and mucinous adenocarcinomas form part of a spectrum. Although carcinosarcomas (malignant mixed Müllerian tumours) are still classified as mixed epithelial and mesenchymal tumours in the 2014 WHO Classification,[4] their behaviour is similar to other high grade endometrial carcinomas and they are treated in the same way as aggressive endometrial carcinomas. Carcinosarcomas are believed to be epithelial neoplasms that have undergone sarcomatous metaplasia, the epithelial elements being the 'driving force'.

The 2014 WHO classification of endometrial carcinomas (see below) now includes serous endometrial intraepithelial carcinoma (serous EIC).[4] Even in the absence of demonstrable stromal invasion, malignant cells can shed from serous EIC and metastasise widely to extra-uterine sites. Neuroendocrine tumours are also a new addition to the 2014 WHO Classification.[4] They are rare primary uterine neoplasms and the diagnosis should be confirmed immunohistochemically, although some small cell neuroendocrine carcinomas may not express neuroendocrine markers (see note on **ANCILLARY STUDIES**). Neuroendocrine neoplasms of the endometrium are divided into low-grade neuroendocrine tumour (carcinoid tumour) which is extremely rare and high-grade neuroendocrine carcinoma (small cell and large cell neuroendocrine carcinoma) which is more common but also rare. Large cell neuroendocrine carcinoma should demonstrate a neuroendocrine growth pattern in at least part of the tumour, and show expression of one or more neuroendocrine markers (chromogranin, synaptophysin, CD56, PGP9.5) in >10% of the tumour. Undifferentiated carcinoma[5,6] is defined by WHO as a 'malignant epithelial neoplasm with no differentiation',[4] and may show immunohistochemical evidence of epithelial differentiation in only occasional tumour cells (see notes on ancillary studies). Dedifferentiated carcinoma[7] is defined as an undifferentiated carcinoma that contains a second component of either FIGO grade 1 or 2 endometrioid adenocarcinoma; in such cases, it is believed that the undifferentiated component develops as a result of dedifferentiation in the low-grade endometrioid component.

Mixed carcinomas must contain two or more different histological types of endometrial carcinoma recognisable on H&E-stained sections. At least one of the subtypes must be a type II tumour and the second component, according to the 2014 WHO Classification,[4] must comprise at least 5% of the neoplasm. The most common mixture is endometrioid and serous carcinoma. Immunohistochemistry may assist in confirming the presence of a second, morphologically distinct subtype. All subtypes should be specified in the histopathology report, even if <5% of the neoplasm is composed of type II tumour, because the behaviour of these tumours is determined by the highest grade component.[4]

In cases where there is no residual tumour in the hysterectomy specimen or where there is a significant discrepancy between the reported tumour type in the biopsy and that in the hysterectomy, it may be necessary to review the prior biopsy. If high-risk/aggressive variants of carcinoma e.g. serous carcinoma, carcinosarcoma etc., are confirmed in the endometrial biopsy but are not identified in the final hysterectomy specimen, the carcinoma should be categorised according to the worst histology.

Adequate sampling of the tumour is required (minimum of 4 blocks) to allow meaningful assessment of this data item.

WHO histological classification (2014)[4]

Endometrial carcinoma - Epithelial tumours	**ICD-O code**
Endometrioid carcinoma	8380/3
Squamous differentiation	8570/3
Villoglandular	8263/3
Secretory	8382/3
Mucinous carcinoma	8480/3
Serous endometrial intraepithelial carcinoma (SEIC)	8441/2*
Serous carcinoma	8441/3
Clear cell carcinoma	8310/3
Neuroendocrine tumours	
Low-grade neuroendocrine tumour	
Carcinoid tumour	8240/3
High-grade neuroendocrine carcinoma	
Small cell neuroendocrine carcinoma	8041/3
Large cell neuroendocrine carcinoma	8013/3
Mixed cell adenocarcinoma	8323/3
Undifferentiated carcinoma	8020/3
Dedifferentiated carcinoma	
Mixed epithelial and mesenchymal tumours	
Carcinosarcoma	8980/3

* This new code was approved by the International Agency for Research on Cancer (IARC) /WHO committee for ICD-O in 2013.

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Note 4 - Carcinosarcoma (Non-core)

Reason/Evidentiary Support:
A recent study has shown that the presence of heterologous elements in stage I carcinosarcomas is an important adverse prognostic feature; this does not yet reach III-2 evidence level.[8]

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Note 5 - Histological grade (Core)

Reason/Evidentiary Support:
The FIGO grading system for endometrioid adenocarcinomas of the uterine corpus is based on the following architectural features:[9]

Grade 1: 5% or less non-squamous solid growth pattern

Grade 2: 6% to 50% non-squamous solid growth pattern

Grade 3: >50% non-squamous solid growth pattern

Notable nuclear atypia, which exceeds that which is routinely expected for the architectural grade, increases the tumour grade by 1. Notable nuclear atypia should be present in >50% of the tumour.[10]

In addition, the following guidelines should be used in grading:

(1) Non-gland forming squamous elements should be disregarded for grading purposes.
(2) Endometrioid and mucinous carcinomas should be graded using the FIGO grading system.
(3) Serous, clear cell and undifferentiated carcinomas and carcinosarcomas are not graded but are regarded as high grade neoplasms.[11] When the dataset is being completed, these should be designated as “not applicable” for histologic grade.
(4) In mixed carcinomas, the highest grade should be assigned.

In general, if there is a discrepancy between the grade of an endometrioid adenocarcinoma in the pre-operative biopsy and the final resection specimen, the final histological tumour grade should be based on findings in the hysterectomy specimen, which usually contains a larger volume of tumour for assessment. This is particularly important if the hysterectomy specimen contains abundant low-grade tumour and the biopsy showed grade 3 endometrioid adenocarcinoma. In this specific situation, application of the guidelines for FIGO grading may result in the tumour being downgraded, although this will not always be the case; for example, where the biopsy contained abundant grade 3 endometrioid adenocarcinoma and the hysterectomy a limited amount of low-grade tumour, the final diagnosis might still be grade 3 endometrioid adenocarcinoma.

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Note 6 - Myometrial invasion (Core)

Reason/Evidentiary Support:
Depth of invasion should be measured from the endomyometrial junction (not the surface of exophytic tumours) to the deepest focus of tumour invasion. Measurement of the depth of invasion may be rendered difficult by irregularity of the endomyometrial junction, polypoid tumour growth, intramural leiomyomas, adenomyosis and uncommonly by smooth muscle metaplasia within polypoid neoplasms.[12] Deep myometrial invasion has repeatedly been shown to be an important poor prognostic indicator in endometrial carcinoma. This is an independent predictor of haematogenous dissemination by endometrial carcinoma and it is therefore an important determinant of adjuvant therapy.[13]

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Note 7 - Percentage of myometrium infiltrated by carcinoma (Non-core)

Reason/Evidentiary Support:
Tumour-free distance (to the uterine serosa) and percentage of myometrium infiltrated are independent prognostic factors for lymph node metastasis in endometrial carcinoma but studies do not reach level III-2 evidence.[14]

The percentage of myometrium infiltrated by carcinoma is defined as the percentage of myometrium involved as determined by the depth of myometrial invasion from the endomyometrial junction to the deepest focus of invasive carcinoma in comparison to the overall myometrial thickness.

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Note 8 - Distance of myoinvasive tumour to serosa (Non-core)

Reason/Evidentiary Support:
Tumour-free distance and percentage of myometrium infiltrated are independent prognostic factors for lymph node metastasis in endometrial carcinoma; studies do not reach level III-2 evidence.[14]

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Note 9 - Lymphovascular invasion (Core)

Reason/Evidentiary Support:
Lymphovascular invasion is a predictor of tumour recurrence and lymph node metastasis.[15] However, lymphovascular space invasion does not alter the tumour stage. For example, if an endometrial adenocarcinoma is confined to the inner half of the myometrium but shows lymphovascular invasion in the outer half of the myometrium, this should still be staged as FIGO 1A. Similarly lymphovascular invasion alone in cervical, parametrial or para-ovarian vessels does not upstage the tumour. There is an increased incidence of vascular pseudoinvasion in laparoscopic hysterectomy specimens associated with the use of an intrauterine balloon manipulator.[15,16]

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Note 10 - Cervical surface or crypt involvement (Non-core)

Reason/Evidentiary Support:
Not necessary for staging but some oncologists administer vault brachytherapy if this is identified. Level III-2 evidence currently not available.

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Note 11 - Cervical stromal invasion (Core)

Reason/Evidentiary Support:
Cervical stromal infiltration by endometrial carcinoma is associated with a risk of recurrence and is a predictor of pelvic lymph node metastases.[17,18]

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Note 12 - Distance of tumour to cervical resection margins (Non-core)

Reason/Evidentiary Support:
Close margins may indicate a need for vault brachytherapy. Vascular invasion at cervical resection margin should be documented but does not upstage the tumour.

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Note 13 - Uterine serosa (Core)

Reason/Evidentiary Support:
Carcinoma should penetrate through the serosa in order to be classified as serosal involvement. Involvement of the serosa (FIGO stage IIIA) carries a higher risk of locoregional recurrence than does adnexal involvement (also FIGO stage IIIA).[19]

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Note 14 - Parametria (Core)

Reason/Evidentiary Support:
Most hysterectomies for endometrial cancer will be simple hysterectomies and will not have parametrial resections. Endometrial carcinomas with parametrial invasion are staged as FIGO IIIB. Although not an independent prognostic indicator, parametrial involvement by direct extension is a poor prognostic factor and also correlates with other poor prognostic factors. The presence of lymphovascular invasion in parametrial tissues should be documented but does not constitute parametrial involvement.[20,21]

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Note 15 - Adnexa (Core)

Reason/Evidentiary Support:
FIGO staging is based on tumour involvement of either the fallopian tube or ovary (stage IIIA). Especially with low-grade endometrioid adenocarcinomas, involvement of the uterine corpus and adnexa may indicate synchronous, independent neoplasms rather than metastasis from the endometrium to the adnexa; a variety of pathological parameters is useful in the distinction between synchronous independent and metastatic neoplasms. As for other sites in the gynaecological tract in which lymphovascular invasion by endometrial adenocarcinoma may be identified e.g., myometrium and parametrial tissue, the identification of lymphovascular space invasion alone in adnexal structures does not alter the tumour stage i.e. endometrial carcinoma should not be upstaged if there is vascular involvement in the adnexa in the absence of tumour outside of vascular channels.

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Note 16 - Background endometrium (Non-core)

Reason/Evidentiary Support:
The appearance of the background endometrium and the presence of abnormalities such as hyperplasia or polyps, should be documented.

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Note 17 - Peritoneal cytology (Non-core)

Reason/Evidentiary Support:
This data item is not necessary for staging but there is lack of consensus in the literature regarding the prognostic significance of positive peritoneal washings in the absence of other evidence of extrauterine spread. A recommendation is made by FIGO and the Union for International Cancer Control (UICC) to record positive peritoneal washings without altering the tumour stage.[22,23]

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Note 18 - Lymph node status (Core and Non-core)

Reason/Evidentiary Support:
Pelvic and para-aortic node status should be recorded separately since this affects tumour stage. Pelvic node involvement without para-aortic involvement is stage IIIC1 while para-aortic node involvement is stage IIIC2.[24,25]

Note that micrometastases (greater than 0.2 mm but not greater than 2.0 mm in diameter) are regarded as lymph node involvement and N1mi or N2mi while metastases greater than 2.0 mm in maximum dimension are classified as N1a or N2a. Isolated Tumour Cells (ITCs), in common with TNM8 staging practices at other tumour sites, are regarded as node negative (N0(i+)).

The number of nodes involved and the site of involvement is prognostically important and may direct adjuvant treatment.

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Note 19 - Ancillary studies (Non-core)

Reason/Evidentiary Support:
Immunohistochemistry may be useful in certain diagnostic scenarios. For example, a panel of markers (ER, PR, vimentin, CEA, p16) may be useful in the distinction between a primary endometrial and cervical adenocarcinoma.[26-27] Other markers (ER, PR, p53, p16, PTEN, IMP3) may be useful in the distinction between an endometrioid and a serous adenocarcinoma.[28-29] p53 and p16 may help to highlight serous EIC and distinguish this from surface atypias which can mimic it. Immunohistochemistry for mismatch repair proteins (MLH1, MSH2, MSH6, PMS2) may be useful in helping to establish whether endometrial carcinomas are associated with underlying mismatch repair gene abnormalities and Lynch syndrome (hereditary non-polyposis colorectal cancer) .[30-31]

Undifferentiated endometrial carcinomas are often only focally, but characteristically intensely, positive with broad spectrum cytokeratins, CK18 and epithelial membrane antigen (EMA). This may be useful in the distinction from an undifferentiated sarcoma or other neoplasms and may also help to establish a diagnosis of dedifferentiated carcinoma when a component of low-grade endometrioid adenocarcinoma is present.[5-7] Some undifferentiated carcinomas exhibit focal expression of neuroendocrine markers.[32]

High-grade neuroendocrine carcinomas are usually positive with the neuroendocrine markers chromogranin, synaptophysin, CD56 and PGP9.5. Some small cell neuroendocrine markers are negative with these markers but usually at least one is positive. Large cell neuroendocrine carcinomas should be positive with at least one of these markers in >10% of tumour cells.

Different morphological subtypes of endometrial adenocarcinoma are associated with distinct molecular abnormalities. However, at present molecular analysis has little role in diagnosis or as an independent prognostic or predictive factor. However, this may change in the future and it is likely that targeted therapies will be developed against carcinomas exhibiting specific molecular abnormalities.

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Note 20 - Provisional Pathological FIGO Stage Pre-MDTM* (Core and Non-core)

Reason/Evidentiary Support:
Staging is provisional since final stage should be determined at multidisciplinary team/tumour board meeting when all relevant clinical and radiological information is available.[11,33] Since serous EIC is regarded as a type of endometrial carcinoma, it is staged as FIGO stage IA (T1a).

The reference document TNM Supplement: A commentary on uniform use, 4th Edition (C Wittekind editor) may be of assistance when staging.[34]

* Multidisciplinary management team

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References

1 Westin SN, Lacour RA, Urbauer DL, Luthra R, Bodurka DC, Lu KH and Broaddus RR (2008). Carcinoma of the lower uterine segment: a newly described association with Lynch syndrome. *J Clin Oncol* 26(36):5965-5971.

2 Masuda K, Banno K and Yanokura M et al (2011). Carcinoma of the Lower Uterine Segment (LUS): Clinico-pathological characteristics and association with Lynch Syndrome. *Curr Genomics* 12:25-29.

3 Mariani A, Webb MJ, Keeney GL, Aletti G and Podratz KC (2003). Endometrial cancer: predictors of peritoneal failure. *Gyneco Oncol* 89:236-242.

4 Kurman RJ, Carcangiu ML, Herrington CS and Young RH (2014). *WHO classification of tumours of the female reproductive organs*. IARC press, Lyon.

5 Silva EG, Deavers MT and Malpica A (2007). Undifferentiated carcinoma of the endometrium: a review. *Pathology* 39(1):134-138.

6 Tafe LJ, Garg K, Chew I, TornosA. C and Soslow R (2010). Endometrial and ovarian carcinomas with undifferentiated components: clinically aggressive and frequently underrecognized neoplasms. *Mod Pathol* 23(6):781-789.

7 Silva EG, Deavers MT, Bodurka DC and Malpica A (2006). Association of low-grade endometrioid carcinoma of the uterus and ovary with undifferentiated carcinoma: a new type of dedifferentiated carcinoma? *Int J. Gynecol Pathology* 25(1):52-58.

8 Ferguson SE, Tornos C, Hummer A, Barakat R and Soslow R (2007). Prognostic features of surgical stage I uterine carcinosarcoma. *Am J Surg Pathol* 31(11):1653-1661.

9 Creasman W, Odicino F and Maisonneuve P et al (2001). Carcinoma of the corpus uteri: FIGO Annual Report. *J Epidemiol Biostat* 6:45-86.

10 Zaino RJ, Kurman RJ, Diana KL and Morrow CP (1991). The utility of the revised International Federation of Gynecology and Obstetrics histologic grading of endometrial adenocarcinoma using a defined nuclear grading system. A Gynecologic Oncology Group study. *Cancer* 75(1):81-86.

11 FIGO Committee on Gynecological Cancer (2009). Revised FIGO staging for carcinoma of the vulva, cervix and endometrium. *Int. J. Gynecol. Obstet.* 105:103-104.

12 Ali A, Black D and Soslow R (2007). Difficulties in Assessing the Depth of Myometrial Invasion in Endometrial Carcinoma *Int J. Gynecol Pathology* 26:155-123.

13 Mariani A, Webb MJ, Keeney GL, Calori G and Podratz KC (2001). Hematogenous dissemination in corpus cancer. *Gynecol Oncol* 80:233–238.

14 Kondalsamy-Chennakesavan S, van Vugt S, Sanday K, Nicklin J, Land R, Perrin L, Crandon A and Obermair A (2010). Evaluation of tumor-free distance and depth of myometrial invasion as prognostic factors for lymph node metastases in endometrial cancer. *Int J Gynecol Cancer* 20:1217-1221.

15 Watari H, Todo Y, Takeda M, Ebina Y, Yamamoto R and Sakuragi N (2005). Lymph_vascular space invasion and number of positive para_aortic node groups predict survival in node_positive patients with endometrial cancer. *Gynecol Oncol* 96:651−657.

16 Logani S, Herdman AV, Little JV and Moller KA (2008). Vascular "pseudo invasion" in laparoscopic hysterectomy specimens: a diagnostic pitfall. *Am J Surg Pathol* 32:560-565.

17 Mariani A, Webb MJ, Keeney GL and Podratz KC (2001). Routes of lymphatic spread: a study of 112 consecutive patients with endometrial cancer. *Gynecol Oncol* 81:100−104.

18 Fanning J, Alvarez PM, Tsukada Y and Piver MS (1991). Prognostic significance of the extent of cervical involvement by endometrial cancer. *Gynecol Oncol* 40:46−47.

19 Jobsen JJ, Naudin Ten Cate L, Lybeert ML, Scholten A, van der Steen-Banasik EM, van der Palen J, Stenfert Kroese MC, Slot A, Schutter EM and Siesling S (2011). Outcome of Endometrial Cancer Stage IIIA with Adnexa or Serosal Involvement Only. *Obstet Gynecol Int.*:doi: 10.1155/2011/962518.

20 Sato R, Jobo T and Kuramoto H (2003). Parametrial spread is a prognostic factor in endometrial carcinoma. *Eur J Gynaecol Oncol* 24:241−245.

21 Yura Y, Tauchi K, Koshiyama M, Konishi I, Yura S and Mori T et al (1996). Parametrial involvement in endometrial carcinomas: its incidence and correlation with other histological parameters. *Gynecol Oncol* 63:114−119.

22 Grimshaw RN, Tupper WC, Fraser RC, Tompkins MG and Jeffrey JF (1990). Prognostic value of peritoneal cytology in endometrial carcinoma. *Gynecol Oncol* 36:97−100.

23 Fadare O, Mariappan MR, Hileeto D, Wang S, McAlpine JN and Rimm DL (2005). Upstaging based solely on positive peritoneal washing does not affect outcome in endometrial cancer. *Mod Pathol* 18:673−680.

24 Morrow CP, Bundy BN, Kurman RJ, Creasman WT, Heller P and Homesley HD et al (1991). Relationship between surgical_pathological risk factors and outcome in clinical stage I and II carcinoma of the endometrium: a Gynecologic Oncology Group study. *Gynecol Oncol* 40:55−65.

25 Hoekstra AV, Kim RJ, Small W Jr, Rademaker AW, Helenowsky IB and Singh DK et al (2009). FIGO stage IIIC endometrial carcinoma: Prognostic factors and outcomes. *Gynecol Oncol* 114:273−278.

26 Castrillon DH, Lee KR and Nucci MR (2002). Distinction between endometrial and endocervical adenocarcinoma: an immunohistochemical study. *Int J Gynecol Pathol* 21:4-10.

27 McCluggage WG, Sumathi VP, McBride HA and Patterson A (2002). A panel of immunohistochemical stains, including carcinoembryonic antigen, vimentin, and estrogen receptor, aids the distinction between primary endometrial and endocervical adenocarcinomas. *Int J Gynecol Pathol* 21:11-15.

28 McCluggage WG (2007). Immunohistochemistry as a diagnostic aid in cervical pathology. *Pathology* 39(1):97-111.

29 Yemelyanova A, Hongxiu J, Shih I, Wang T, Wu L and Ronnett B (2009). Utility of p16 expression for distinction of uterine serous carcinomas from endometrial endometrioid and endocervical adenocarcinomas. *Am J Surg Pathol* 33:1504-1514.

30 Walsh MD, Cummings MC, Buchanan DD, Dambacher WM, Arnold S, McKeone AS and Byrnes R et al (2008). Molecular, pathologic, and clinical features of early-onset endometrial cancer: identifying presumptive Lynch syndrome patients. *Clin. Cancer Res.* 14(6):1692-1700.

31 Garg K and Soslow RA (2009). Lynch syndrome (hereditary non-polyposis colorectal cancer) and endometrial carcinoma. *J Clin Pathol* 62:679-684.

32 Taraif SH, Deavers MT, Malpica A and Silva EG (2009). The significance of neuroendocrine expression in undifferentiated carcinoma of the endometrium. *Int J. Gynecol Pathology* 28(2):142-147.

33 Amin MB, Edge SB and Greene FL et al (eds) (2017). *AJCC Cancer Staging Manual. 8th ed.*, Springer, New York.

34 Wittekind C (ed) (2012). *TNM Supplement : A Commentary on Uniform Use*, The Union for International Cancer Control (UICC), Wiley-Blackwell.