Ovary and Cervix
Introduction to histology
Framework for pathology
Aims

- To review the histology of ovary and cervix
- To review relevant embryology and physiology
- Use these to form an intellectual framework to hang on pathology
Female Genital Tract histology

- Age related changes
- Hormonally induced changes
  - Physiological
  - Pathological
  - Iatrogenic
- Pregnancy associated changes
- Müllerian ‘plasticity’
Embryology

- The key to understanding some gynae histology and pathology
- Underlies some histogenetic concepts, especially in ovarian pathology
- Concept of ‘secondary Müllerian system’
### Surface Epithelial-Stromal Tumours

**Serous tumours**
- Benign (cystadenoma)
- Cystadenoma of borderline malignancy
- Malignant (serous cystadenocarcinoma)

**Mucinous tumours, endocervical-like and intestinal type**
- Benign
- Of borderline malignancy

**Endometrioid tumours**
- Benign
- Of borderline malignancy
- Malignant

**Epithelial-stromal**
- Adenosarcoma
- Mesodermal (müllerian) mixed tumour

**Clear cell tumours**
- Benign
- Of borderline malignancy
- Malignant

**Transitional cell tumours**
- Brenner tumour
- Brenner tumour of borderline malignancy
- Malignant Brenner tumour
- Transitional cell carcinoma (non-Brenner type)

### Sex Cord-Stromal Tumours

**Granulosa-stromal cell tumours**
- Granulosa cell tumours
- Tumours of the thecoma-fibroma group
- Sertoli-stromal cell tumours
- Androblastomas
- Sex cord tumour with annular tubules
- Gynandroblastoma
- Steroid (lipid) cell tumours

### Germ Cell Tumours

**Teratoma**
- Immature
- Mature (adult)
- Solid
- Cystic (dermoid cyst)
- Monodermal (e.g., struma ovarii, carcinoid)
- Dysgerminoma
- Yolk sac tumor (endodermal sinus tumour)
- Mixed germ cell tumours

### Malignant, Not Otherwise Specified

- Metastatic Nonovarian Cancer (from Nonovarian Primary)
Ovarian embryology (1)

- Germ cells arise in wall of yolk sac
- Migrate in mid line along dorsal mesentery
- Invade laterally into gonadal ridges
Ovarian embryology
To think / read about:

Where do extragonadal germ cell tumours occur? Why?
Ovarian embryology
Ovarian embryology (2)

- As germ cells arrive, coelomic epi(meso)thelium proliferates to form sex cords around germ cells.
Ovarian histology

- Germ cells – oocytes
- Sex cord / stromal derivatives
  - Granulosa cells
  - Steroidogenic stromal cells
- Surface epithelium
  - Continuous with pelvic peritoneum (ie mesothelium)
- Non-specialised connective tissue components
Ovarian histology

- Germ cells – oocytes
- Sex cord / stromal derivatives
- Surface epithelium
  - Continuous with pelvic peritoneum (ie mesothelium)
  - Non-specialised connective tissue components

Secondary Müllerian system
Primary peritoneal tumours

Secondary peritoneal tumours
# Bringing sense to ovarian tumours

## Surface Epithelial-Stromal Tumours

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## Metastatic Nonovarian Cancer (from Nonovarian Primary)
Oocytes and folliculogenesis

- 500,000 primordial follicles at birth
- Decrease by folliculogenesis, atresia and ovulation
- Disappeared by end of menopause
Follicular ripening

- Begins in 3rd trimester
- Accelerates in first 2 years of postnatal life
- Falls to low level at 4 years
- Increases again
- At puberty becomes complete with ovulation and formation of corpus luteum
Stages of follicular development (1)

Primordial Follicle
- Flattened granulosa cell layer

Primary follicle
- Cuboidal granulosa cell layer

Secondary follicle
- Multiple granulosa cell layers
Stages of follicular development (2)

- Antral follicle
  Development of antrum and cumulus oophorus

- Pre-ovulatory follicle
  Oocyte with surrounding cumulus floats free

- Ovulation

- Corpus albicans

- Corpus luteum
Corpus luteum

- Blood vessels grow into collapsed granulosa cell layer
- Bleeding into lumen
- Luteinisation of granulosa cells
Involution of corpus luteum

- Begins ~day 23
- Hyaline and fatty change
- Cells shrink and disappear
- After a few months becomes a wrinkled collagenous scar (corpus albicans)
Involution of corpus luteum
Ovarian stroma and derivatives

- **Stroma – cortex and medulla**
  - Spindle cells +/- luteinisation collagen
- **Hilus cells**
- **Other hilar structures**
Ovarian surface epithelium

- Single layer of focally pseudostratified epithelium
- Strips off easily
- Invaginations and inclusions
Ovarian surface epithelium

- Source of common ovarian epithelial tumours
- May show:

  - Serous
  - Endometrioid
  - Mucinous
  - Transitional cell

{ \{ morphology \} }
Embryology of the lumenal female genital tract

- Fallopian tubes, uterus and cervix are derived from the Müllerian (paramesonephric) duct
- This is an invagination of coelomic epithelium
Embryology of the lumenal female genital tract
Embryology of lumenal female genital tract

- Mesonephric (Wolffian) duct produces remnant structures:
  - Epoophoron
  - Gartner’s duct
Müllerian epithelial types

- Fallopian tube – serous
- Endometrium – endometrioid
- Endocervix – mucinous
Bringing sense to ovarian tumours

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**Malignant, Not Otherwise Specified**

**Metastatic Nonovarian Cancer (from Nonovarian Primary)**
Müllerian epithelial types

- Differentiation is *plastic*
- Different Müllerian patterns may manifest in metaplastic and neoplastic conditions
- This morphological pluripotentially also applies to pelvic peritoneum (secondary Müllerian system)
Cervix

- Ectocervix
- Endocervix
- Transformation zone(s)
- Stroma
(Acquired) Transformation zone

- Physiological area of squamous metaplasia
- Caused by exposure of endocervical epithelium to acid vaginal environment
- Site of CIN
Transformation zone
To think about:

How do changes in the TZ affect assessment of cervix by cytology and colposcopy?
Cervix - colposcopic appearances

- Original squamous epithelium
- Endocervical ‘villi’
- Metaplastic squamous epithelium
- Upper limit of transformation zone
(Acquired) transformation zone

- Process of squamous metaplasia

- Columnar mucosa

- Reserve cell hyperplasia > immature SM > mature SM

- Mature metaplastic Squamous epithelium
Cervical squamous epithelium

- Stratified, non-keratinising squamous epithelium
- Basal layer
- Orderly maturation
- Superficial flattening
- Glycogenation
- Original vs metaplastic
Congenital transformation zone

- ~5% of colposcopies
- Peripheral to acquired TZ
- Often biopsied
- Poorly glycogenated
- Irregular lower border
Congenital transformation zone
Aceto-white - CIN
Endocervical epithelium

- Columnar mucin secreting cells
- ‘Picket fence’ arrangement
- Ciliated cell component
- Abrupt junction with squamous epithelium
Tuboendometrioid metaplasia

- Prevalence depends on thoroughness of search
- Present in up to 70% of uteruses
- Very often in upper 1/3 of cervix
- At TZ in 25%
- Involving surface in 18%
Tuboendometrioid metaplasia

- More common following:
  - Biopsy
  - Knife cone
  - LLETZ
Embryology of the lumenal female genital tract
Mesonephric remnants

- syn Gartner’s ducts
- In deep lateral wall
- Small tubules around larger duct
- Single layer of cuboidal epithelium
- Eosinophilic intraluminal content
Gynaecological histology - summary

- Massive variety of tissue types
  - Physiologically dynamic
- Be aware of explicable variations
  - Age related
  - Hormonally related
  - Physiological (endogenous)
  - Iatrogenic (exogenous)