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# General Principles of Perinatal Pathology



# What Is Perinatal Pathology?

## Perinatal pathology

- = study of diseases of the placenta, fetus and neonate

## Perinatal period, WHO

- 22 completed weeks of gestation until 7 completed days after birth

## Perinatal mortality:

- World Health Organisation (WHO)
  - Perinatal mortality = stillbirth and death in the first week of life
  - Fetal mortality = death prior to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy, preferably > 500 grams
- National Center for Health Statistics (NCHS)
  - Perinatal mortality = 20 weeks of gestation or more and infant deaths younger than 7 days

# Scale of the Problem

## World Health Organisation (WHO)

- Perinatal mortality
  - WHO European region, 2022: 5,6 per 1000 births
  - WHO Belgium, 2021: 4 per 1000 births
- Fetal mortality
  - WHO European region, 2022: 5 per 1000 births
  - WHO Belgium, 2021: 5 per 1000 births

## National Center for Health Statistics (NCHS)

- U.S. 2023: 8.36 per 1000 births and fetal deaths

## Role of perinatal pathology

Determine or confirm or refine cause of fetal/neonatal death

Detect or confirm congenital anomalies or infections

Support genetic counselling & improve recurrence risk assessment

Perinatal  
specimens

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Placenta

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Fetus

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Neonate

Perinatal  
specimens

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Early pregnancy loss

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Placenta

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Fetus

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Neonate

# Early pregnancy loss

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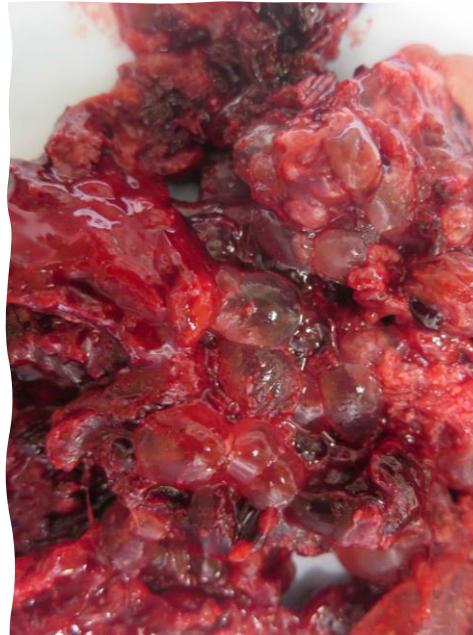
- First trimester (1-13 weeks)
- ~50% of spontaneous conceptions
- Causes:
  - Genetic disorders
  - Gestational trophoblastic diseases
  - Infectious causes
  - Immunological causes
  - Implantation abnormalities, ectopic pregnancy
  - Anatomic abnormalities of the uterus
  - Endocrine abnormalities

# Early pregnancy loss

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## Macroscopy:

- Normal findings: blood clots, decidua, villous tissue
- Abnormal findings: enlarged, hydropic villi, vesicles

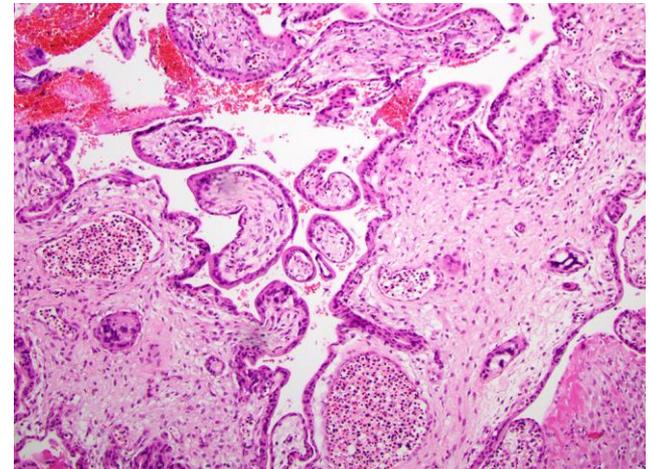
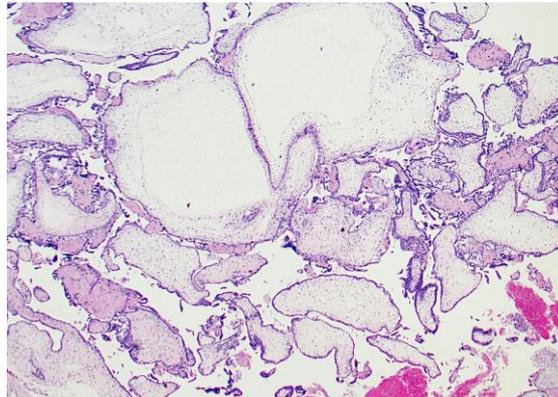
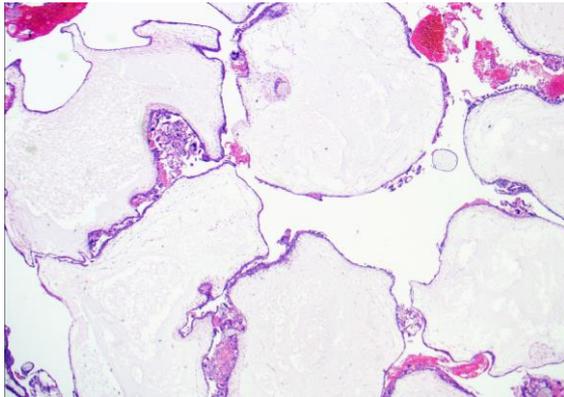
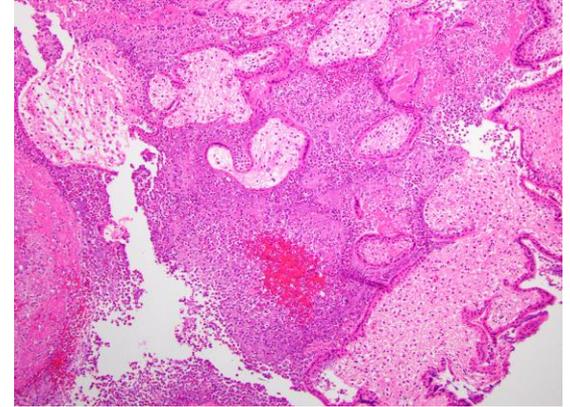


# Early pregnancy loss

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## Histological evaluation

- Normal
- Inflammation/infection
- Suggestive for chromosomal disorder
- Partial/complete mola



Perinatal  
specimens

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**Placenta**

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**Fetus**

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**Neonate**



# Placenta

## Role

- = organ that links mother and fetus during pregnancy
- Crucial for fetal growth and development
  - ⑩ Exchange of nutrients and oxygen
  - ⑩ Removing fetal waste products
  - ⑩ Barrier to toxins and infective organisms

## Macroscopy

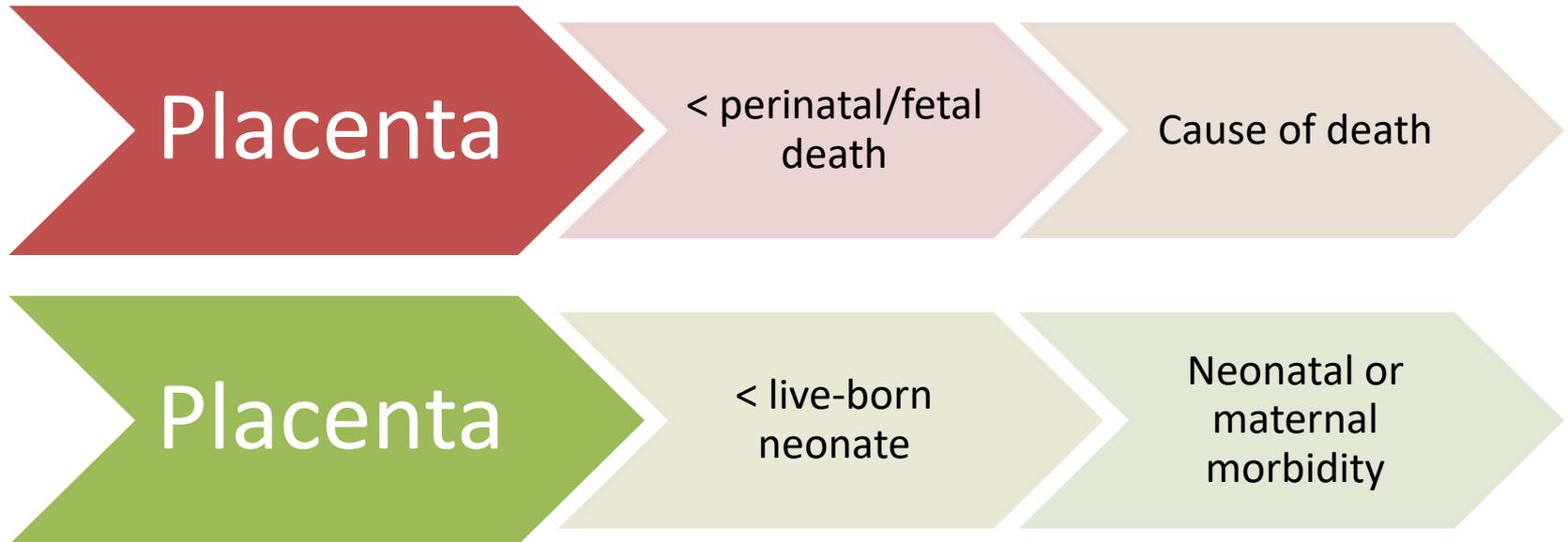
- → *Systematic grossing by Dr Sasha Libbrecht*

## Amsterdam classification system- 4 major patterns of placental injury

- Acute chorioamnionitis
- Villitis of unknown etiology
- Maternal vascular malperfusion
- Fetal vascular malperfusion

# Placenta

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# Placenta < live-born neonate

## Maternal conditions

- Hypertension, Gestational diabetes
- Auto-immune disorders
- Neoplasia
- Sickel cell anemia
- Toxicomania

## Obstetric problems

- Pre-eclampsia, HELLP
- PPROM
- High CRP, fever, etc
- Oligo/an/polyhydramnios
- Prematurity, dysmaturity, non evolutive pregnancy

## Fetal disorders

- Hypoxia, fetal stress
- SGA, IUGR, macrosomia
- Congenital or genetic anomalies

## Placental anomalies

- US-findings
- Hematoma
- Macroscopic anomalies at partus
- Placenta praevia
- Twin pregnancy

# Placenta < live-born neonate

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- Impaired placental functioning
  - implications for live-born neonate (neonatal morbidity)
  - implications for future pregnancy (maternal morbidity)
- Association still unclear

# Placenta < live-born neonate

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## Placental Pathology, Perinatal Death, Neonatal Outcome, and Neurological Development: A Systematic Review

Annemiek M. Roescher<sup>1\*</sup>, Albert Timmer<sup>2</sup>, Jan Jaap H. M. Erwich<sup>3</sup>, Arend F. Bos<sup>1</sup>

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Placental lesions can be associated with neonatal conditions :

- Low Apgar scores at 1 and 5 minutes
- Perinatal asphyxia
- Higher illness severity during the first 24 hours
- Lung development and neonatal respiratory problems ( RDS & BPD)
- Necrotizing enterocolitis
- Retinopathy of prematurity
- Fetal cardiac abnormalities
- Neonatal encephalopathy

...

Most frequent associated placental lesions:

- Ascending intrauterine infection
- Fetal thrombotic vasculopathy.

# Placenta < perinatal/ fetal death

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## Placental causes of fetal demise:

- Fetal/maternal vascular malperfusion
- Fetal maternal hemorrhage
- Neoplasia (massive chorangioma, placental choriocarcinoma)
- Umbilical cord constriction by amniotic band
- ...

# Placenta < perinatal/fetal death

« Paramount for perinatal autopsy »

RESEARCH

Open Access

## Understanding the clinical utility of stillbirth investigations: a scoping review



Tania Marsden<sup>1,5\*</sup> , Heidi Shukralla<sup>2</sup>, T. Yee Khong<sup>3</sup>, Jane E. Dahlstrom<sup>4</sup>, Vicki Flenady<sup>1</sup> and Jessica Sexton<sup>1</sup>

- **Placental investigation can help identify a cause of death in 61–71% of case**
- **Placental investigation changed medical management in subsequent pregnancies in 36% of cases**

Perinatal  
specimens

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Early pregnancy loss

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Placenta

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**Fetus**

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**Neonate**

# Perinatal autopsy

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- **Gold standard for determining fetal/neonatal abnormalities**
- Role:
  - Determining, confirming or refining cause of perinatal death
  - Detecting or confirming congenital anomalies or infections
  - Support genetic counselling and improve recurrence risk assessment
  - Audit for fetal prenatal diagnostic tools

# Role of perinatal autopsy



European Journal of Obstetrics & Gynecology  
and Reproductive Biology

Volume 210, March 2017, Pages 201-206



Review article

## Correlation between fetal autopsy and prenatal diagnosis by ultrasound: A systematic review

A. Cristina Rossi <sup>a</sup>  , Federico Prefumo <sup>b</sup>

- **Autopsy confirmed prenatal diagnosis in 68% of cases**
- **Autopsy provided additional information in 22,5% of cases**
  - **Leading to changes in final diagnosis or genetic counseling in 2-3% of cases**
- **Autopsy unconfirmed prenatal diagnosis in 9,2% of cases**

# IDC Perinatal mortality

## ANTEPARTUM

- After fetal viability (from 20 weeks of conception until partum)
- Congenital malformations and chromosomal abnormalities
- Infection

## INTRAPARTUM

- During labor and delivery
- Acute intrapartum event

## NEONATAL

- Within the first week after birth
- Prematurity and low birth weight

# IDC Perinatal mortality

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## ANTEPARTUM

- 54.6% of perinatal deaths

## NEONATAL

- 31.7% of perinatal deaths

## INTRAPARTUM

- 13.7% of perinatal death

# Conclusion

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## Perinatal pathology

Determining or confirming or refining cause of death/congenital abnormalities/infection

Perinatal autopsy

Placenta

Potential neonatal and maternal morbidity

Placenta

# Thank you for your attention!



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