

# Placenta Macro

SASHA LIBBRECHT

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# Why placenta?



- ❖ Food & Oxygen for the baby
- ❖ Interface between 2 organisms
- ❖ “Black box” of the pregnancy



# Something went wrong...



Help now

Treat

Vigilance

Therapy

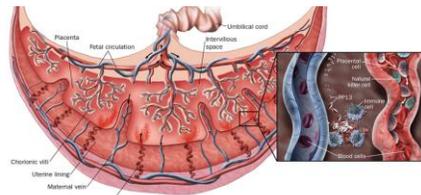
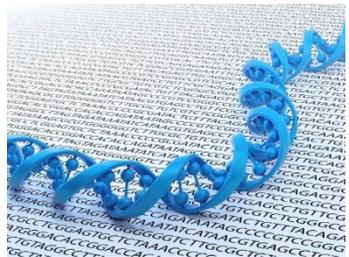
Follow-up

Life style

Screening

Why?

Prevent



# SUMMARY

- ❖ **Systematic Placental Examination**
- ❖ **Histologic sampling**
- ❖ **Examples / Focus points**



# Placental Examination

Conference Proceedings

## Sampling and Definitions of Placental Lesions

### Amsterdam Placental Workshop Group Consensus Statement

*T. Yee Khong, MD; Eoghan E. Mooney, MB, FRCPath; Ilana Ariel, MD, PhD; Nathalie C. M. Balmus, MD; Theonia K. Boyd, MD; Marie-Anne Brundler, MD; Hayley Derricott, BSc; Margaret J. Evans, FRCPath (Paeds); Ona M. Faye-Petersen, MD; John E. Gillan, MD; Alex E. P. Heazell, MBChB, PhD; Debra S. Heller, MD; Suzanne M. Jacques, MD; Sarah Keating, MD; Peter Kelehan, MD; Ann Maes, MD; Eileen M. McKay, MD; Terry K. Morgan, MD, PhD; Peter G. J. Nikkels, MD, PhD; W. Tony Parks, MD; Raymond W. Redline, MD; Irene Scheimberg, MD; Mirthe H. Schoots, MD; Neil J. Sebire, MD; Albert Timmer, MD, PhD; Gitta Turowski, MD; J. Patrick van der Voorn, MD; Ineke van Lijnschoten, MD; Sanne J. Gordijn, MD, PhD*

• **Context.**—The value of placental examination in investigations of adverse pregnancy outcomes may be compromised by sampling and definition differences between laboratories.

**Objective.**—To establish an agreed-upon protocol for sampling the placenta, and for diagnostic criteria for placental lesions. Recommendations would cover reporting placentas in tertiary centers as well as in community hospitals and district general hospitals, and are also relevant to the scientific research community.

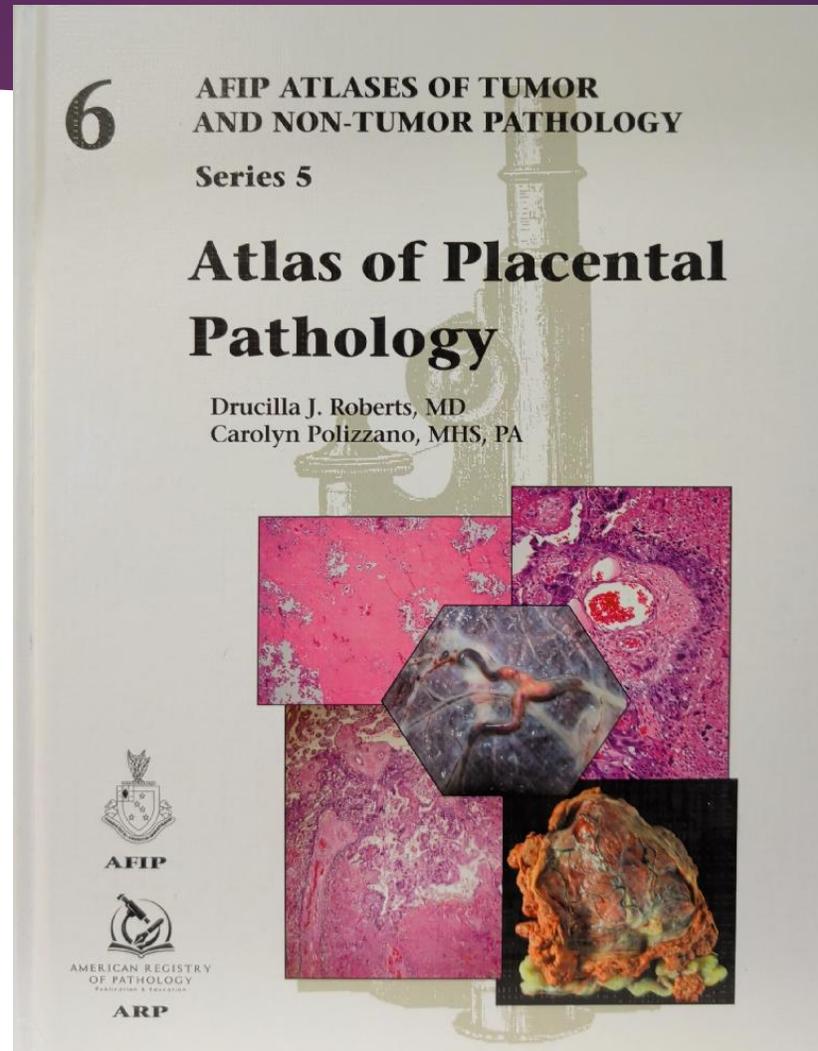
**Data Sources.**—Areas of controversy or uncertainty were explored prior to a 1-day meeting where placental and perinatal pathologists, and maternal-fetal medicine specialists discussed available evidence and subsequently reached consensus where possible.

**Conclusions.**—The group agreed on sets of uniform sampling criteria, placental gross descriptors, pathologic

terminologies, and diagnostic criteria. The terminology and microscopic descriptions for maternal vascular malperfusion, fetal vascular malperfusion, delayed villous maturation, patterns of ascending intrauterine infection, and villitis of unknown etiology were agreed upon. Topics requiring further discussion were highlighted. Ongoing developments in our understanding of the pathology of the placenta, scientific bases of the maternofetoplacental triad, and evolution of the clinical significance of defined lesions may necessitate further refinements of these consensus guidelines. The proposed structure will assist in international comparability of clinicopathologic and scientific studies and assist in refining the significance of lesions associated with adverse pregnancy and later health outcomes.

(*Arch Pathol Lab Med.* 2016;140:698–713; doi: 10.5858/arpa.2015-0225-CC)

# Placental Examination



# Flow Placental Examination

## ► FRESH

Remove loose blood clots & Weigh

Inspect membranes

Colour, velamentous vessels, adherent tissue,...

Twins: Membrane transparent (MCDA)? Torn (intra-uterine surgery)?

Remove membranes with small rim of placenta

Inspect umbilical cord & remove just above insertion

Length & Diameter

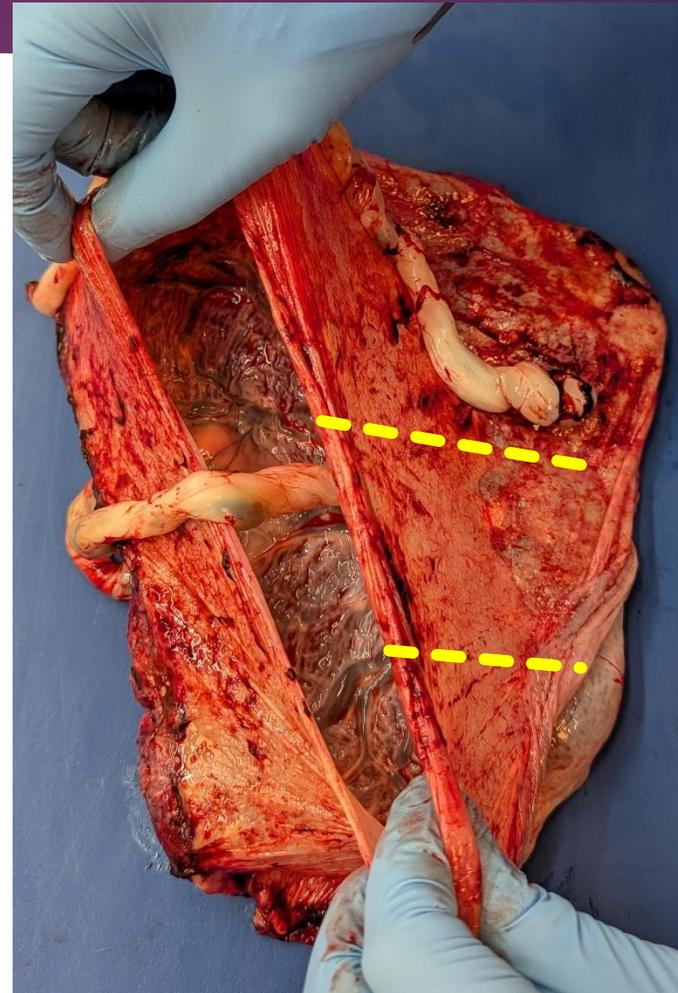
# Coils

Colour & sudden colour changes

Lesions

Insertion site

# Flow Placental Examination: Membranes



# Flow Placental Examination

## ► FRESH

### Inspect fetal side

Color (≈ membranes)

Fetal vessels (thrombi? ectasia?) → Removing amnion can help

Twins: Vascular equator, anastomoses, dividing membrane

### Inspect maternal side

Intactness (missing areas?)

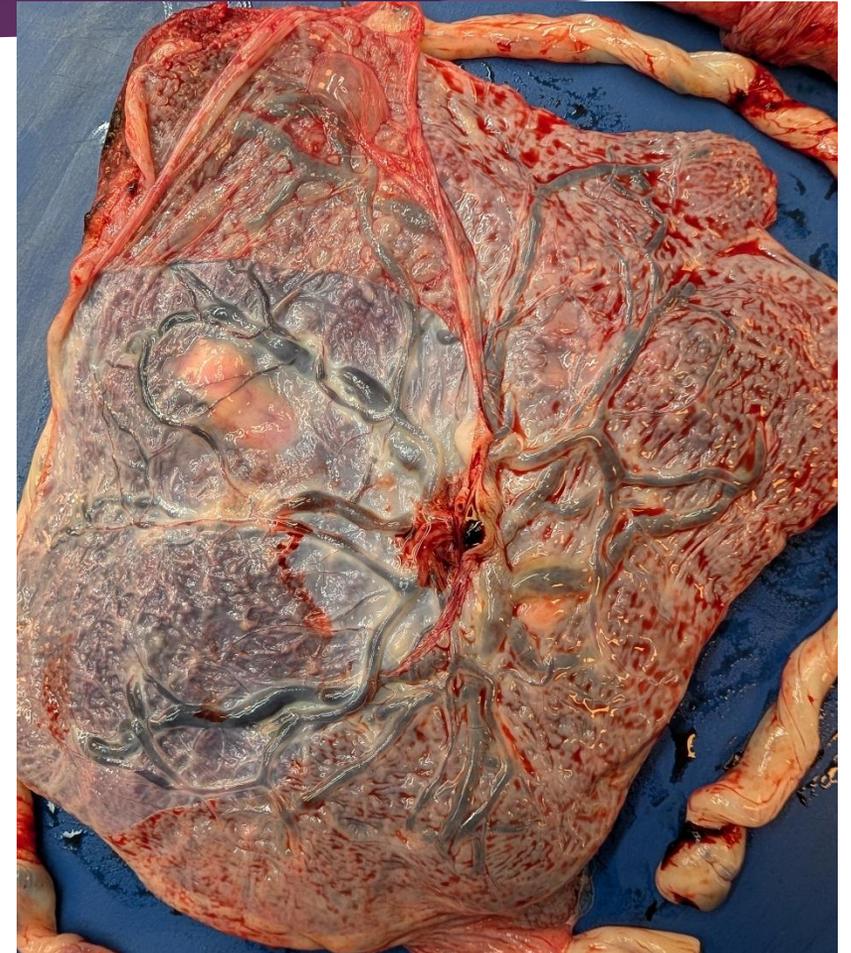
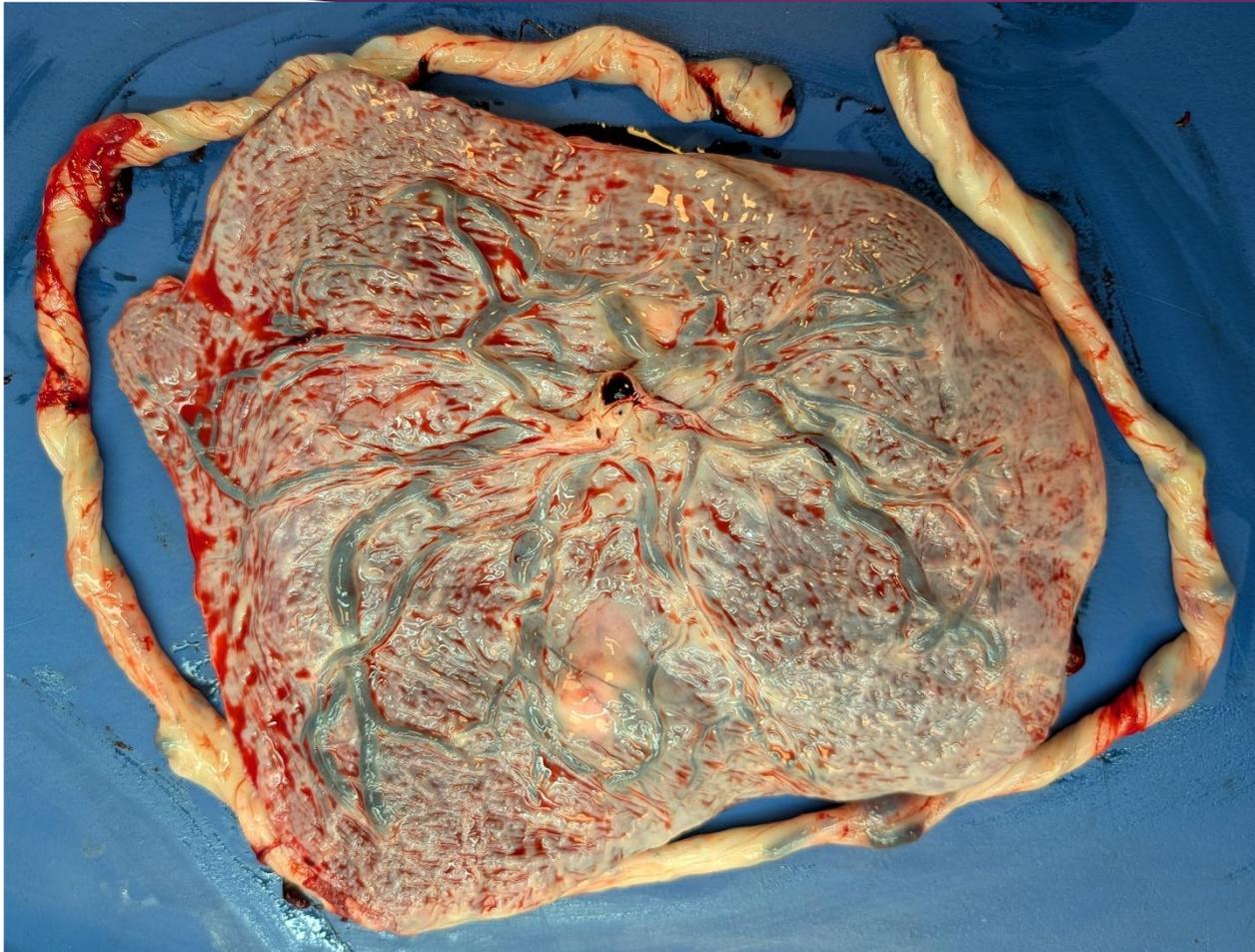
Adherent blood clots (parenchymal impression?)

Visible lesions?

Color differences/areas of discoloration (%, location)

Measure thickness (extent abnormally thin areas in %)

# Flow Placental Examination: Cord & Plate

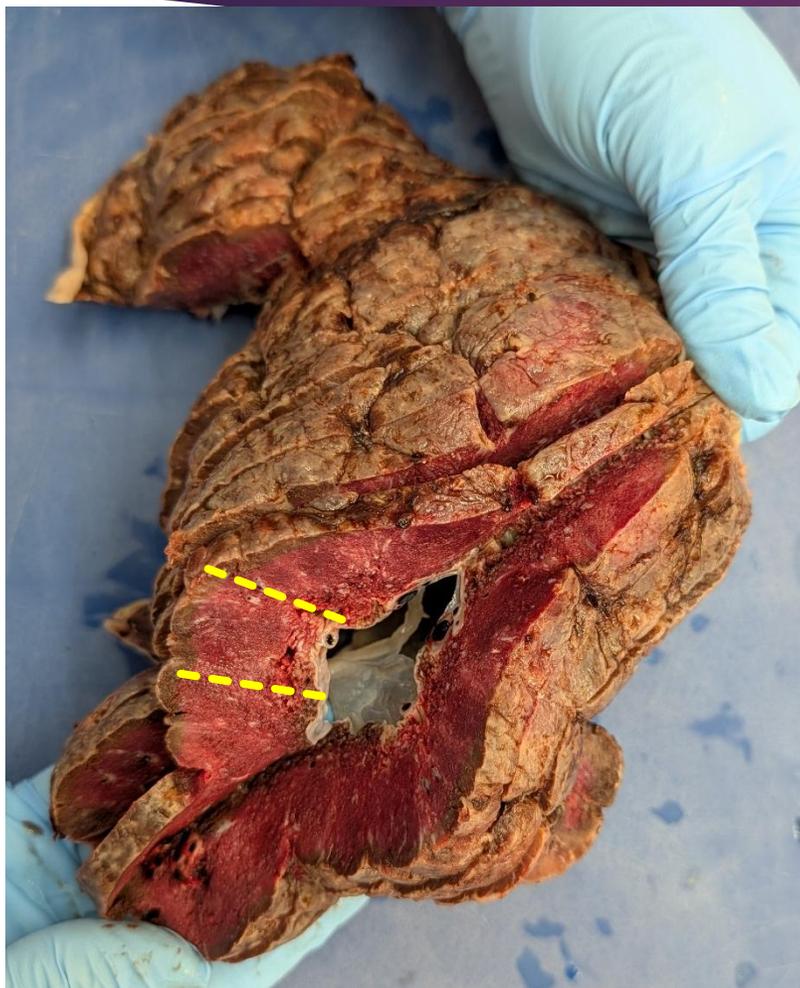


# Flow Placental Examination

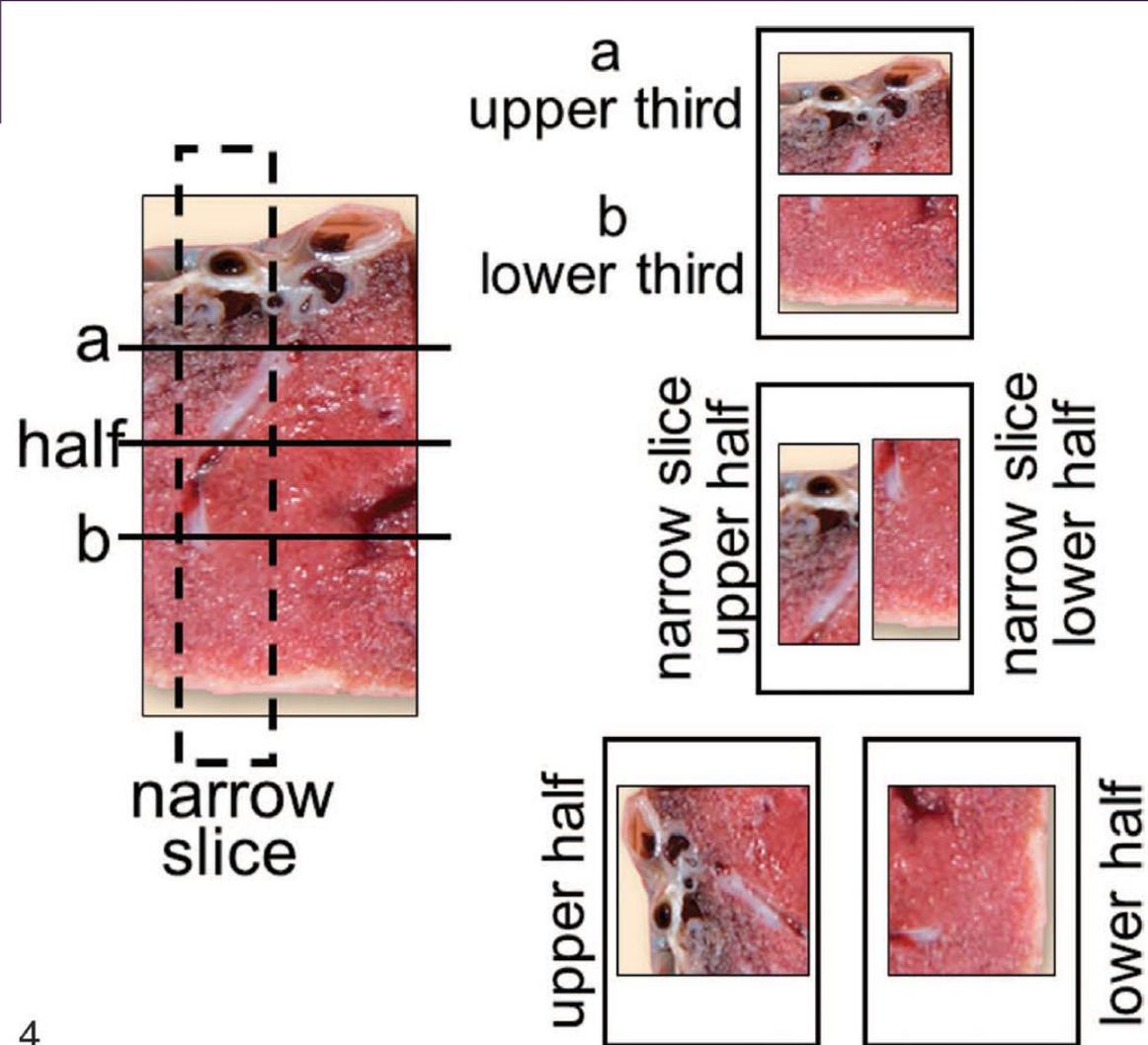
## ▶ **FORMALIN FIXED**

- ▶ Slice placenta in 0,5-1cm thin lamellae
  - ▶ Color differences (not fixation artefact) → %?
  - ▶ Lesions → %? (**per different lesion type**)
- ▶ Standard sections (TOP vs Live Birth ( $\pm$ IUGR) vs FDIU):
  - ▶ Umbilical Cord cross-section x2: Fetal & Maternal side (5cm from insertion)
  - ▶ 1-2 x membrane rolls
  - ▶ Full thickness sections central 2/3 of **normal** placenta x3:  
1x umbilical insertion + 2x random
  - ▶ ( $\pm$  Sampling placental edge)

# Flow Placental Examination: Sections



# How to sample a thick placenta



# Flow Placental Examination

## ADDITIONAL SAMPLING

- ▶ Umbilical cord lesion(s)
- ▶ Fetal vessel
  - ▶ Thrombi
  - ▶ Ruptures
  - ▶ Ectasia
  - ▶ Membranous/velamentous vessels
- ▶ Plate
  - ▶ Areas above adherent bloodclots
  - ▶ Infarcts
  - ▶ Consolidations / extensive fibrin deposition
  - ▶ Clear discolorations / hemorrhagic areas
  - ▶ 1 sample / 1 type of lesion morphology



“

**Examples, tips & tricks**

”

# WEIGHT = FUNCTION

## ▶ FRESH

- ▶ formalin can add up to 10%, inconsistent!
- ▶ most large cohorts with weight centiles are with fresh placenta's
- ▶ better morphology

## ▶ Remove large (loose) clots

## ▶ TRIMMED (no umbilical cord, no membranes)

## ▶ UNTRIMMED

## ▶ Feto:Placental weight ratio (F:P ratio)

USE CORRECT  
REFERENCE!

# WEIGHT

## SIZE COHORT

## SAMPLE SIZE PER GESTATION

## TYPE POPULATION

## METHODS (Trimmed? Fixed?)

DOI: 10.1111/j.1471-0528.2007.01327.x  
www.blackwellpublishing.com/bjog

Epidemiology

## Placenta weight percentile curves for singleton deliveries

JMD Thompson,<sup>a</sup> LM Irgens,<sup>b</sup> R Skjaerven,<sup>b</sup> S Rasmussen<sup>b</sup>

<sup>a</sup> Department of Paediatrics, University of Auckland, Auckland, New Zealand <sup>b</sup> The Medical Birth Registry of Norway, Locus of Registry Based Epidemiology, University of Bergen and Norwegian Institute of Public Health, Bergen, Norway

*Correspondence:* Dr JMD Thompson, Department of Paediatrics, University of Auckland, Private Bag 92019, Auckland, New Zealand.  
Email j.thompson@auckland.ac.nz

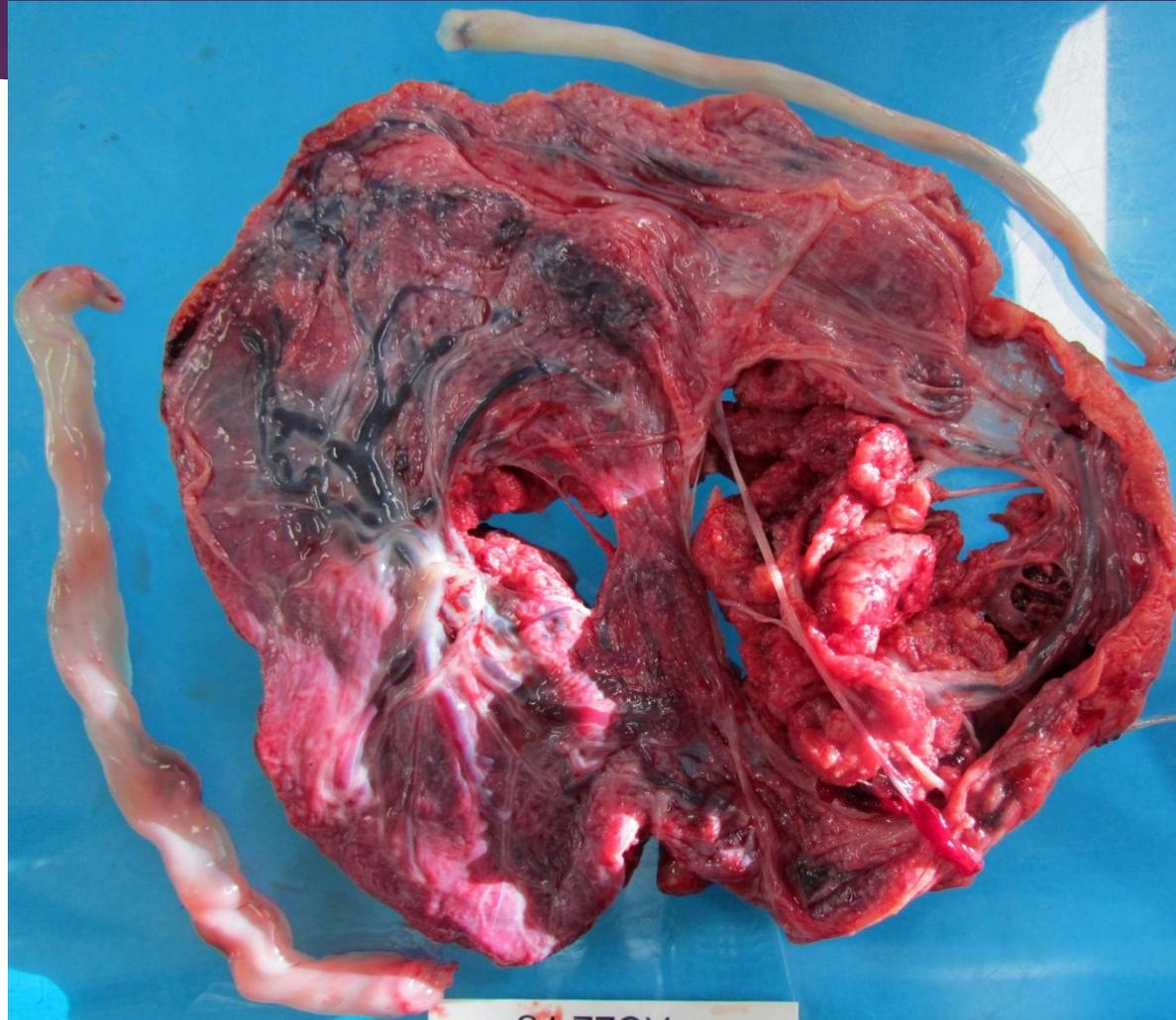
*Accepted 3 February 2007.*

The present study included all births from 1 January 1999 to 31 December 2002, amounting to 231 806 deliveries. To

It should be noted that these placental weights refer to untrimmed placentas; hence, the ratios for trimmed placentas would be somewhat higher.

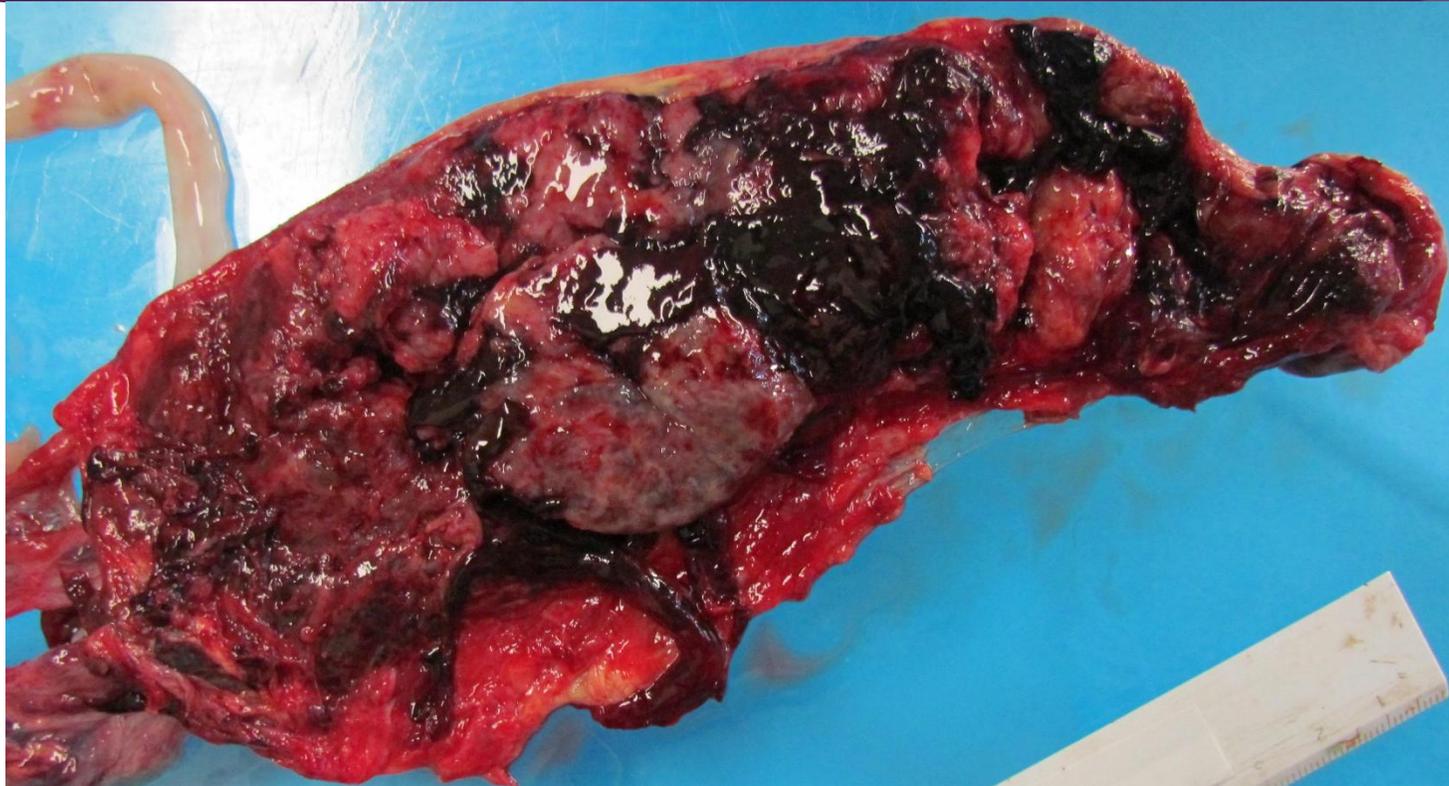
Describe overall intactness

**WEIGHT**



“Weird shapes”

PLACENTATION  
UTERINE ANATOMY





**“Weird shapes”**

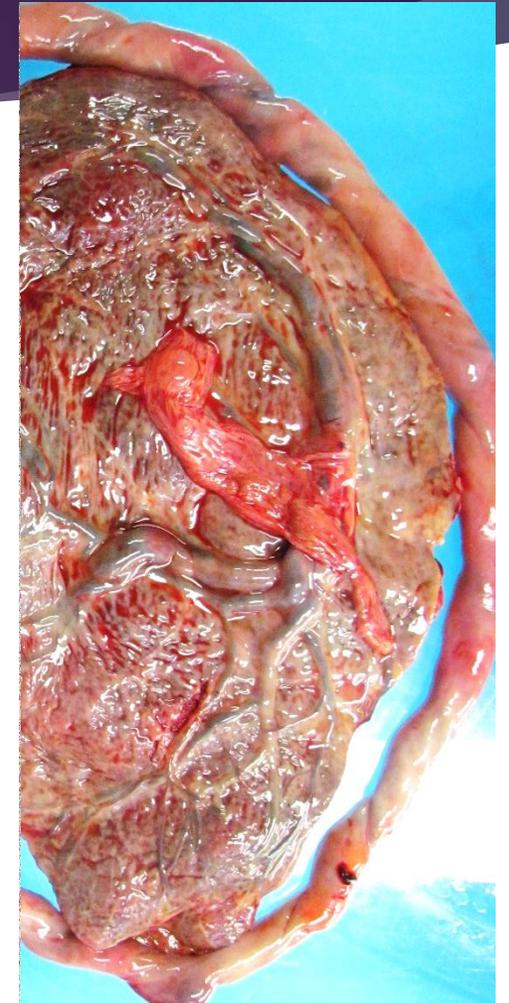
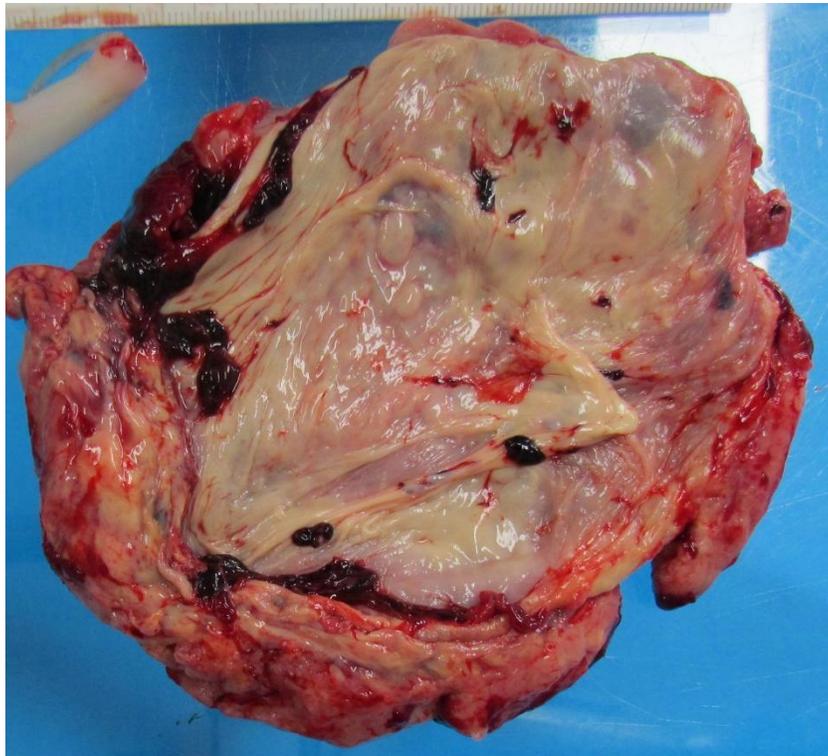
# Measurements

- ▶ Diameter + thickness
- ▶ Accessory lobe separate (separate weight can help)
- ▶ Note thin areas (%?)

# Membranes: Colour

## Meconium

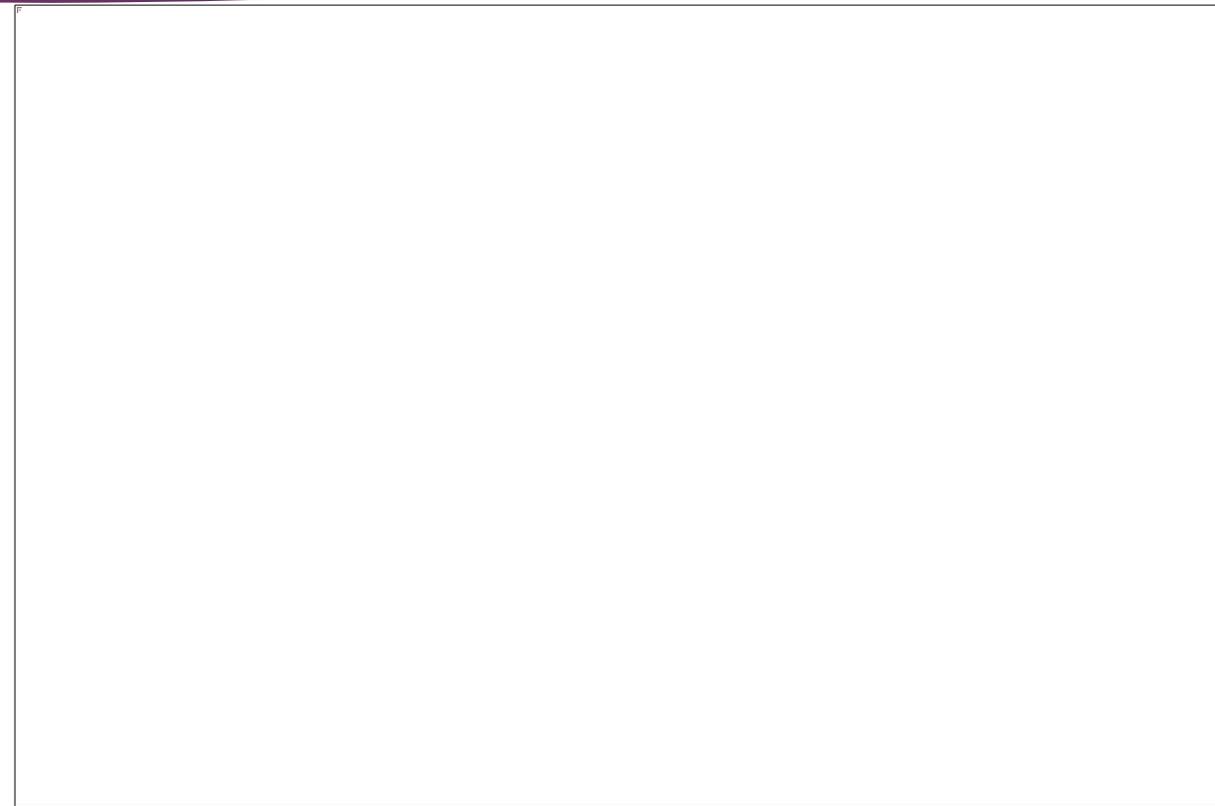
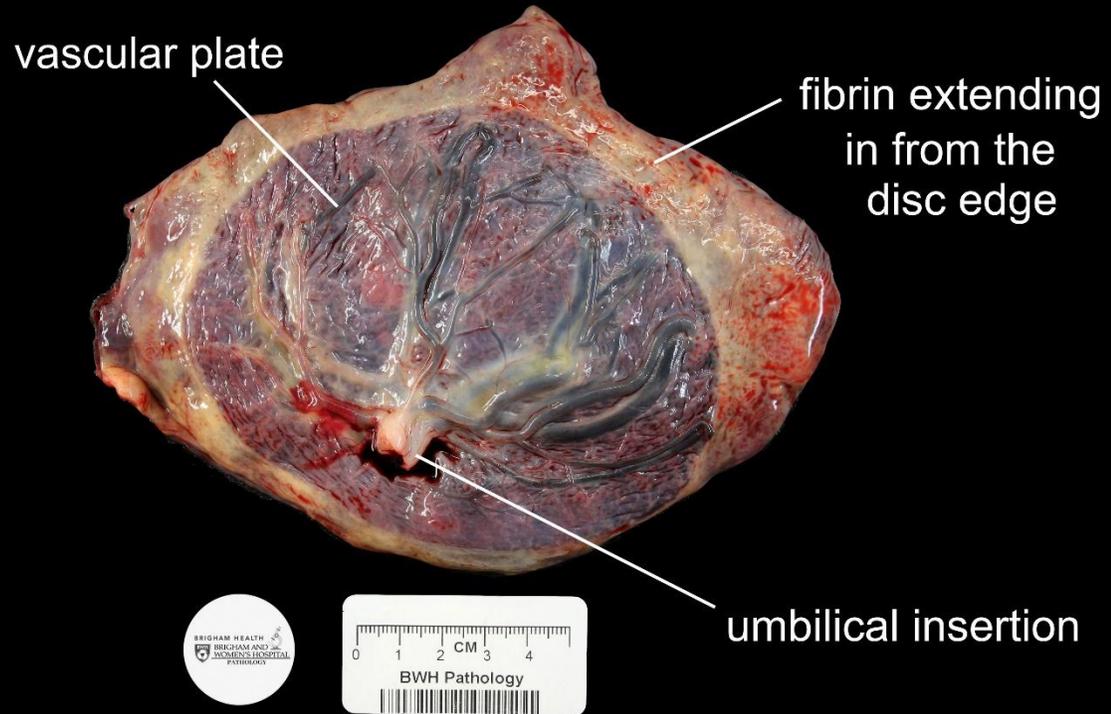
### Chorioamnionitis



# Membranes: “Implantation”

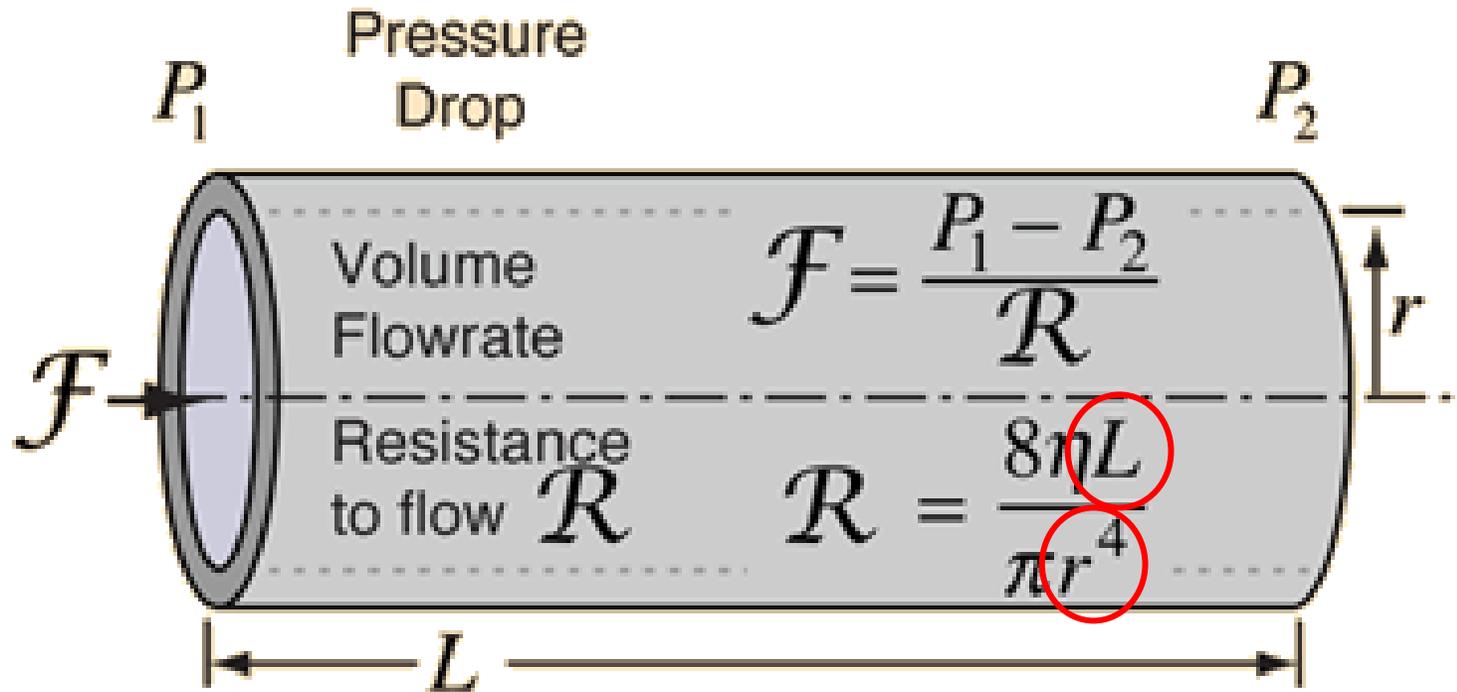
Circummarginate

Circumvallate



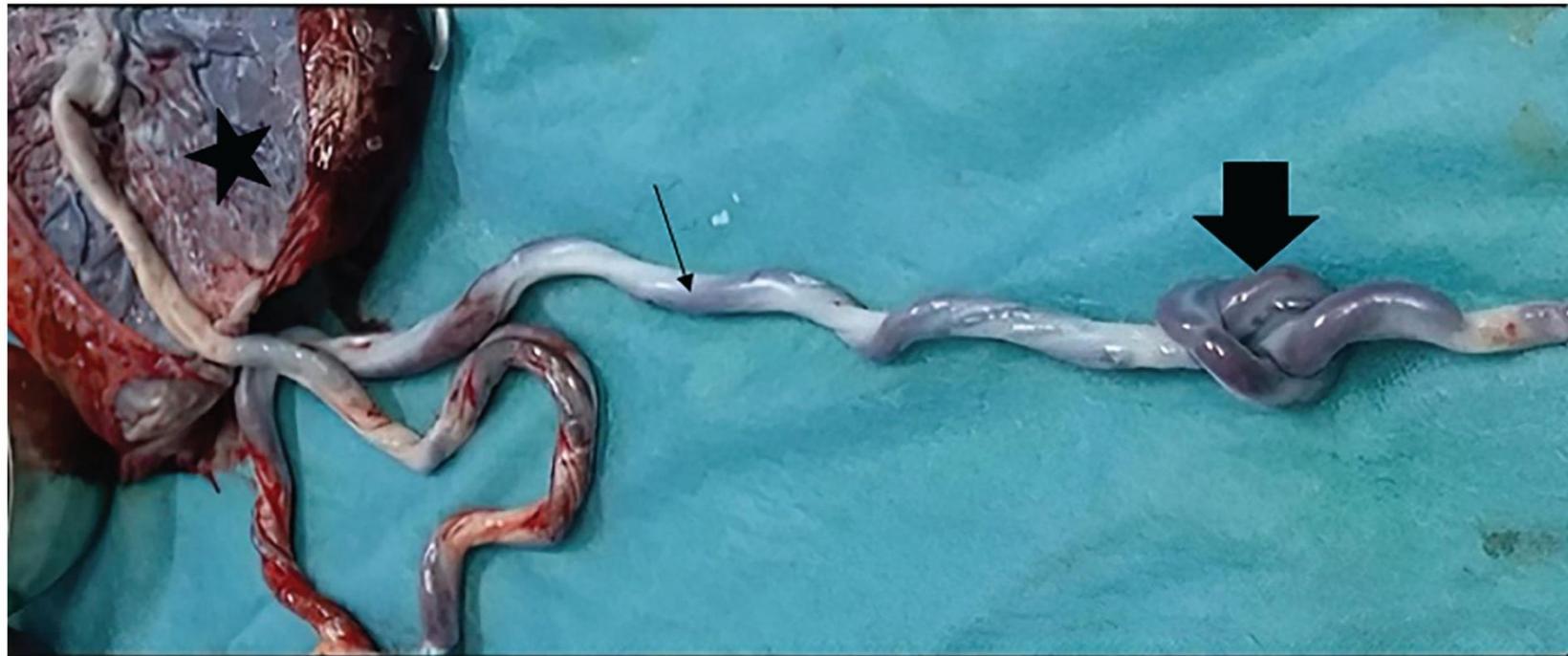
# Umbilical cord = TUBE

- Poiseuille's law: laminar (blood) flow rate of fluids through a tube



# Umbilical cord

## ► Length (references per gestation)



Hanna, Majd, et al. "A misdiagnosed case of a 150-cm umbilical cord coiled twice around the fetal neck with a true cord knot: A rare Syrian case report." *SAGE Open Medical Case Reports* 11 (2023): 2050313X231164858.

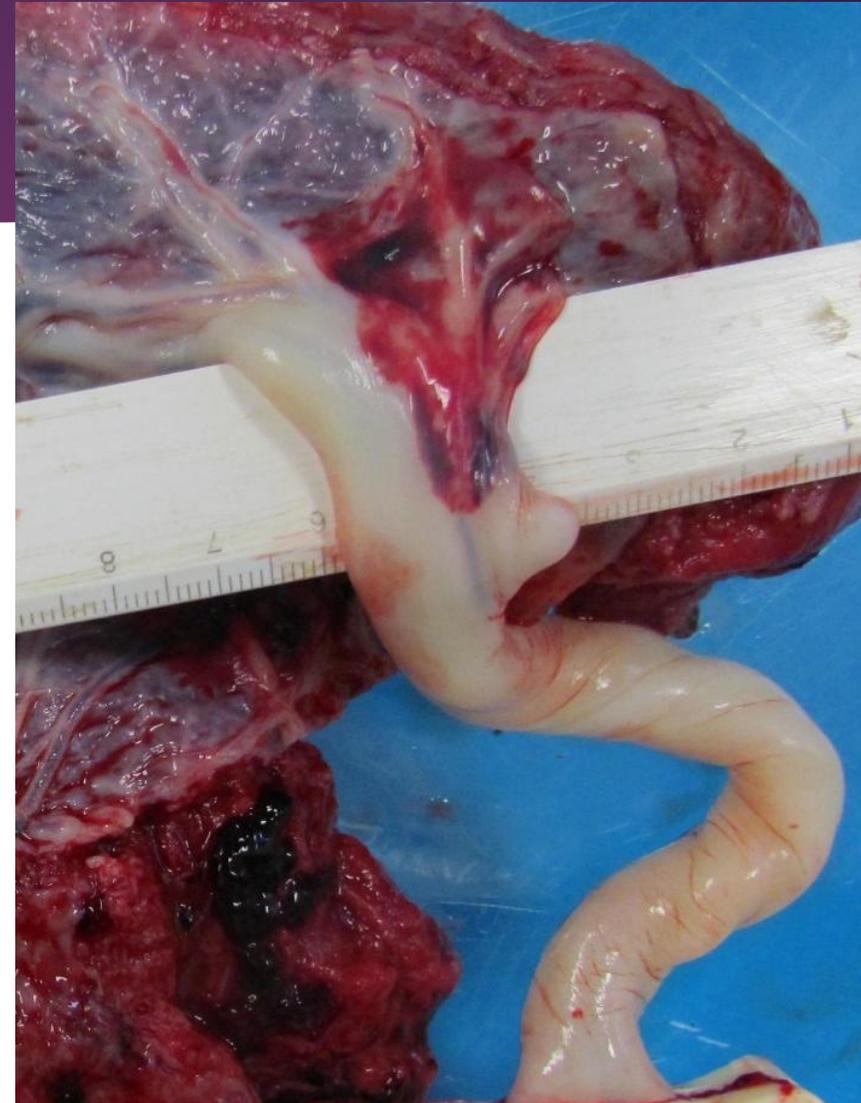
Dr. D. J. Roberts (MGH, Boston)

# Umbilical cord

- ▶ Length
- ▶ (Diameter)
- ▶ Implantation
  - ▶ Central/paracentral
  - ▶ Peripheral (<3cm from edge)
  - ▶ **Marginal (<1cm from edge)**
  - ▶ **Velamentous (in membranes)**
    - ▶ **Distance membranous vessels travel**

**NO WHARTON'S JELLY  
/ PLACENTAL PLATE  
PROTECTION**

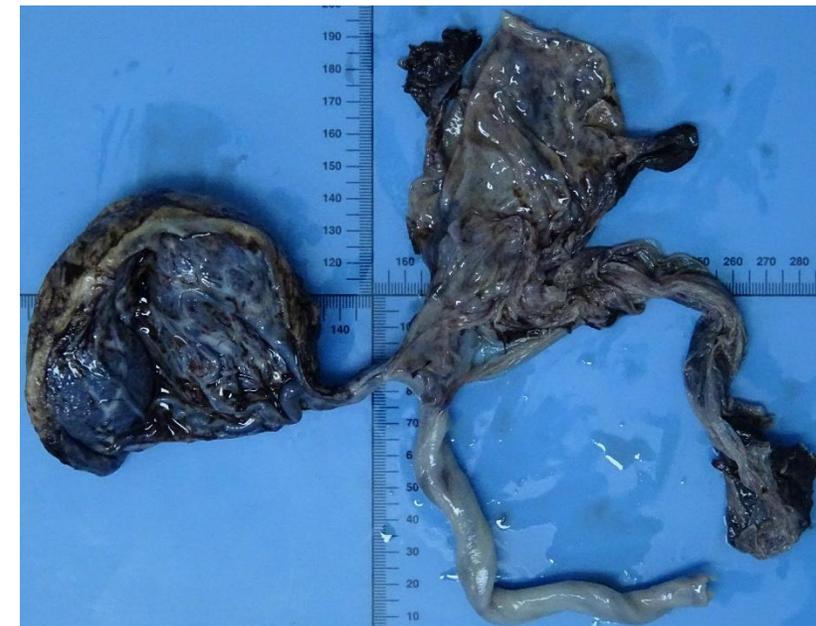
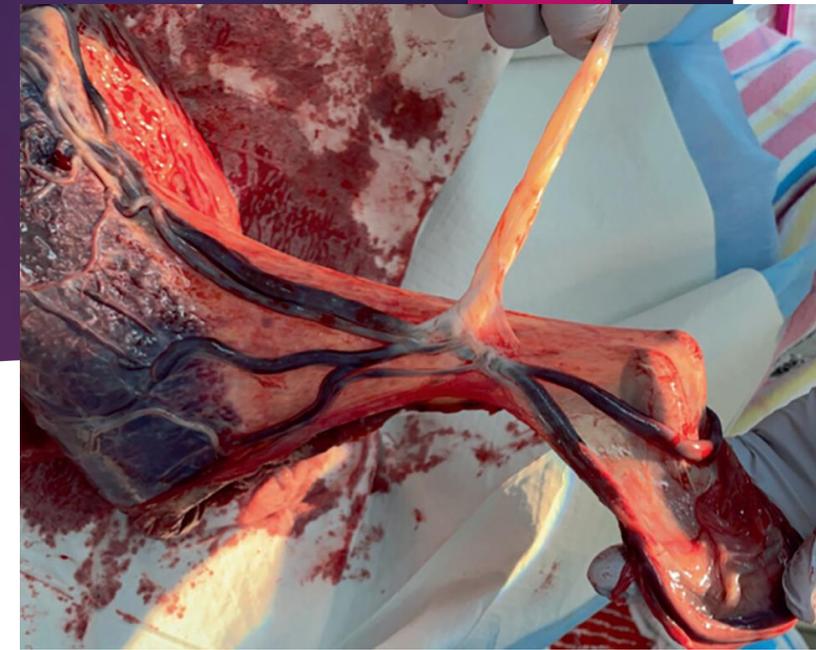
## Furcate insertion



# Umbilical cord

- ▶ Length
- ▶ (Diameter)
- ▶ Implantation
  - ▶ Central/paracentral
  - ▶ Peripheral (<3cm from edge)
  - ▶ Marginal (<1cm from edge)
  - ▶ Velamentous (in membranes)

**NO WHARTON'S JELLY  
/PLACENTAL PLATE  
PROTECTION**



# Umbilical cord: Coiling



Undulating



Rope



Segmented



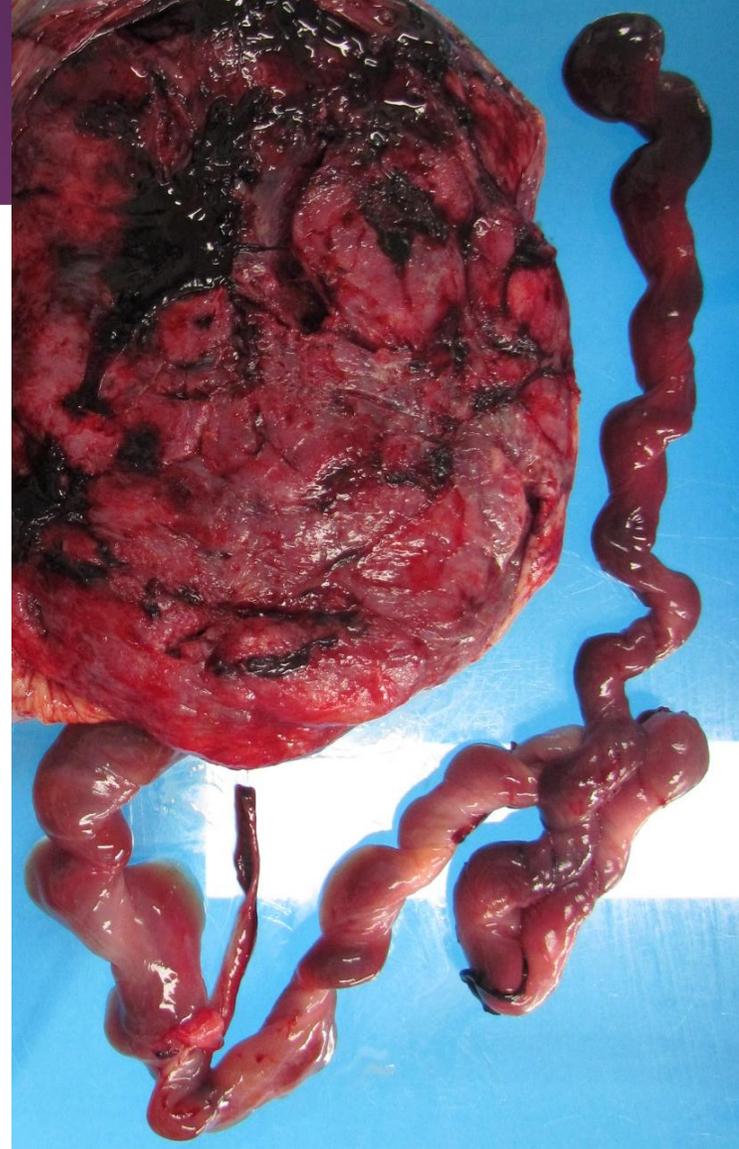
Linked

*Ernst LM, Minturn L, Huang MH, et al. Gross patterns of umbilical cord coiling: correlations with placental histology and stillbirth. Placenta 2013; 34:583.*

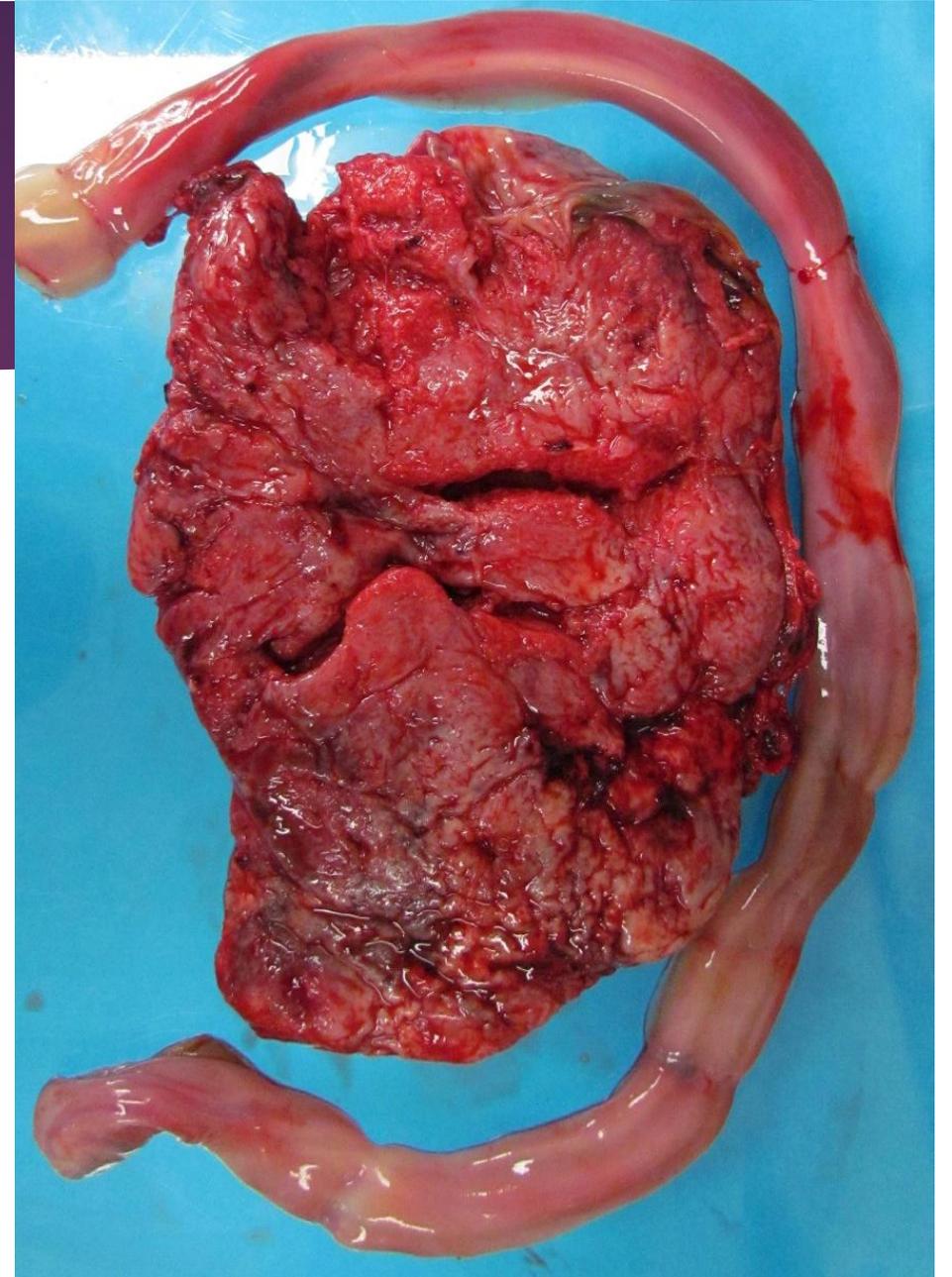
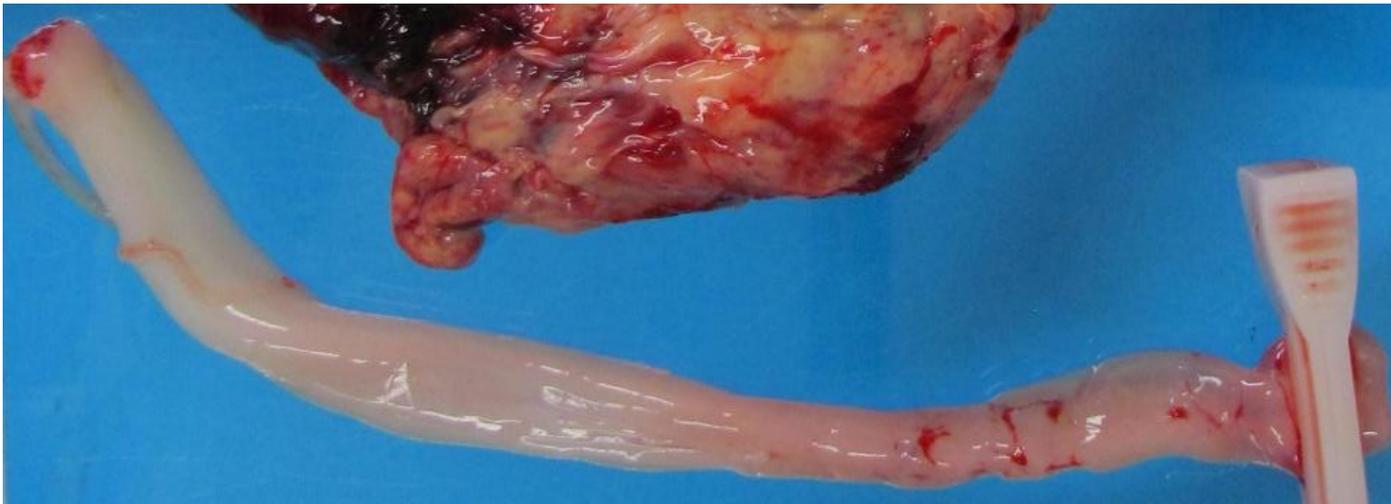
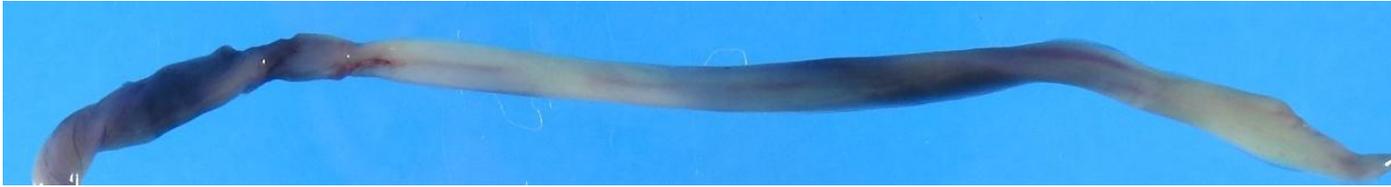
# Umbilical cord: Hypercoiling ( $>0,4/cm$ )



# Umbilical cord: Hypercoiling



# Umbilical cord: Hypocoiling ( $<0,1/cm$ )



# Umbilical cord "lesions"

Stricture



Amniotic web



True Knot



# Umbilical cord "lesions"

Amniotic band/amniotic web

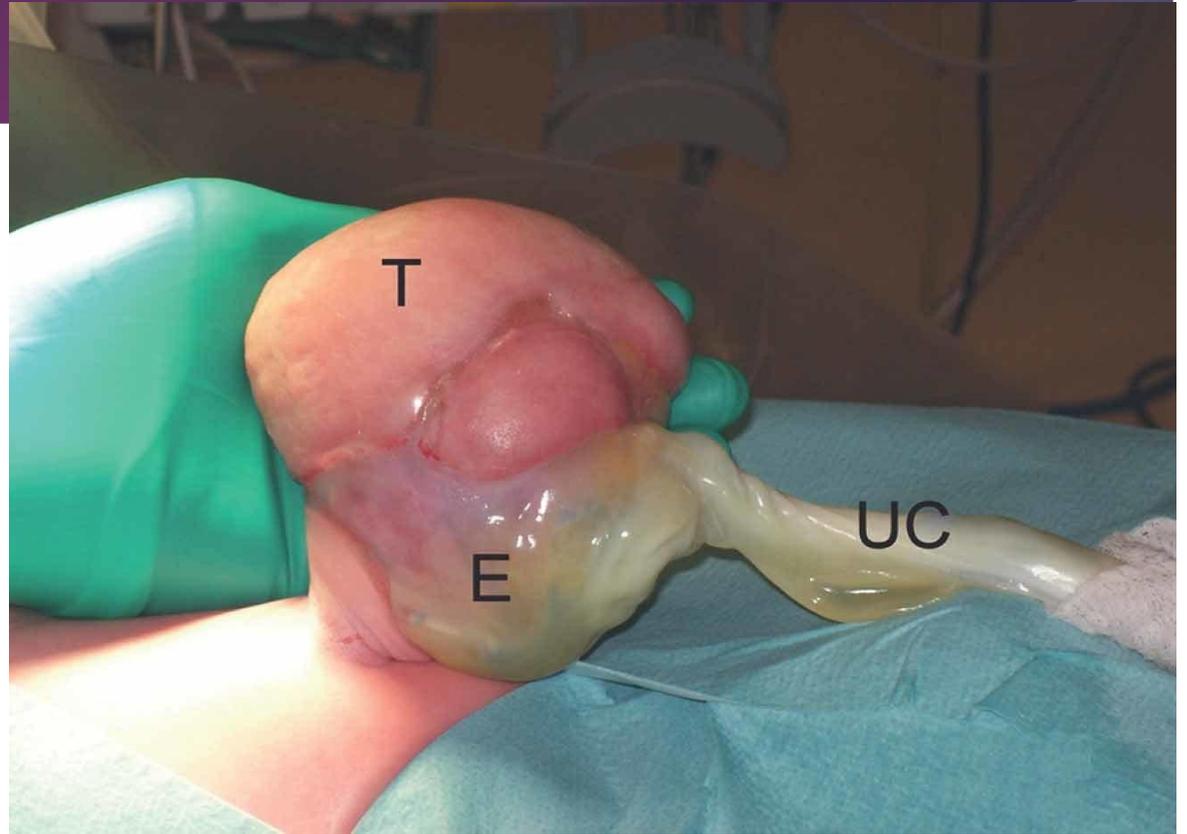


# Umbilical cord "lesions"

## Cyst



## Teratoma



Campo, Leyre Ruiz, et al. "Prenatal diagnosis of umbilical cord cyst: clinical significance and prognosis." *Taiwanese Journal of Obstetrics and Gynecology* 56.5 (2017): 622-627.

Keene, D. J. B., et al. "Rare combination of exomphalos with umbilical cord teratoma." *Ultrasound in Obstetrics & Gynecology* 40.4 (2012): 481-481.

# Umbilical cord “lesions”

▶ “Barbed wire”

=

▶ Necrotizing Funisitis

(Syphilis, but also other long lasting infections)



<https://obstetricalpathology.com>

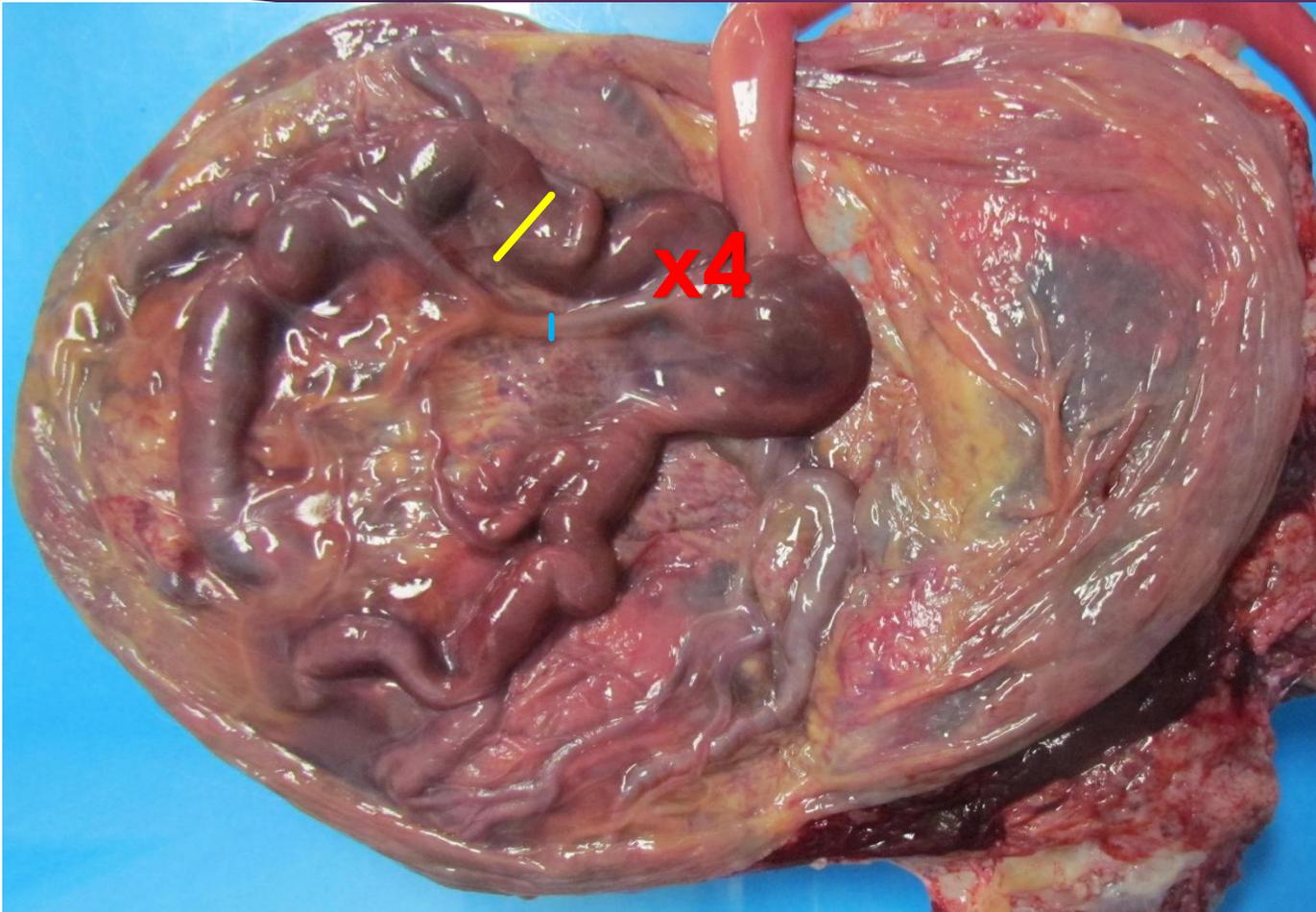
# Umbilical cord emergency: Candida



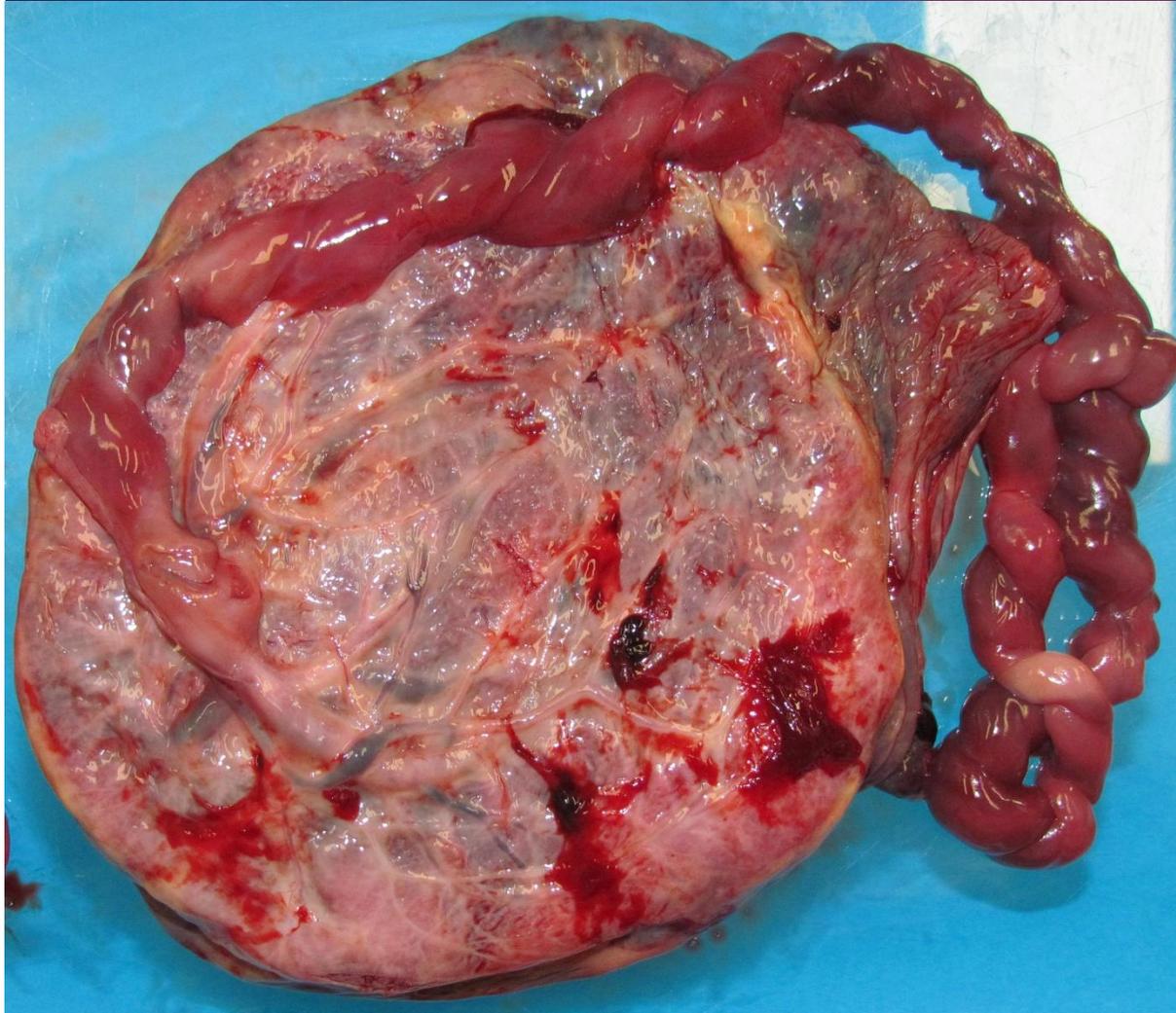
<https://basicmedicalkey.com/implantation-and-placenta/>  
<https://obstetricalpathology.com>

Rezaei, N. (ed.) (2022) "Placenta and Fetus Infections: Fungi," in *Encyclopedia of infection and immunity*. MA: Elsevier.

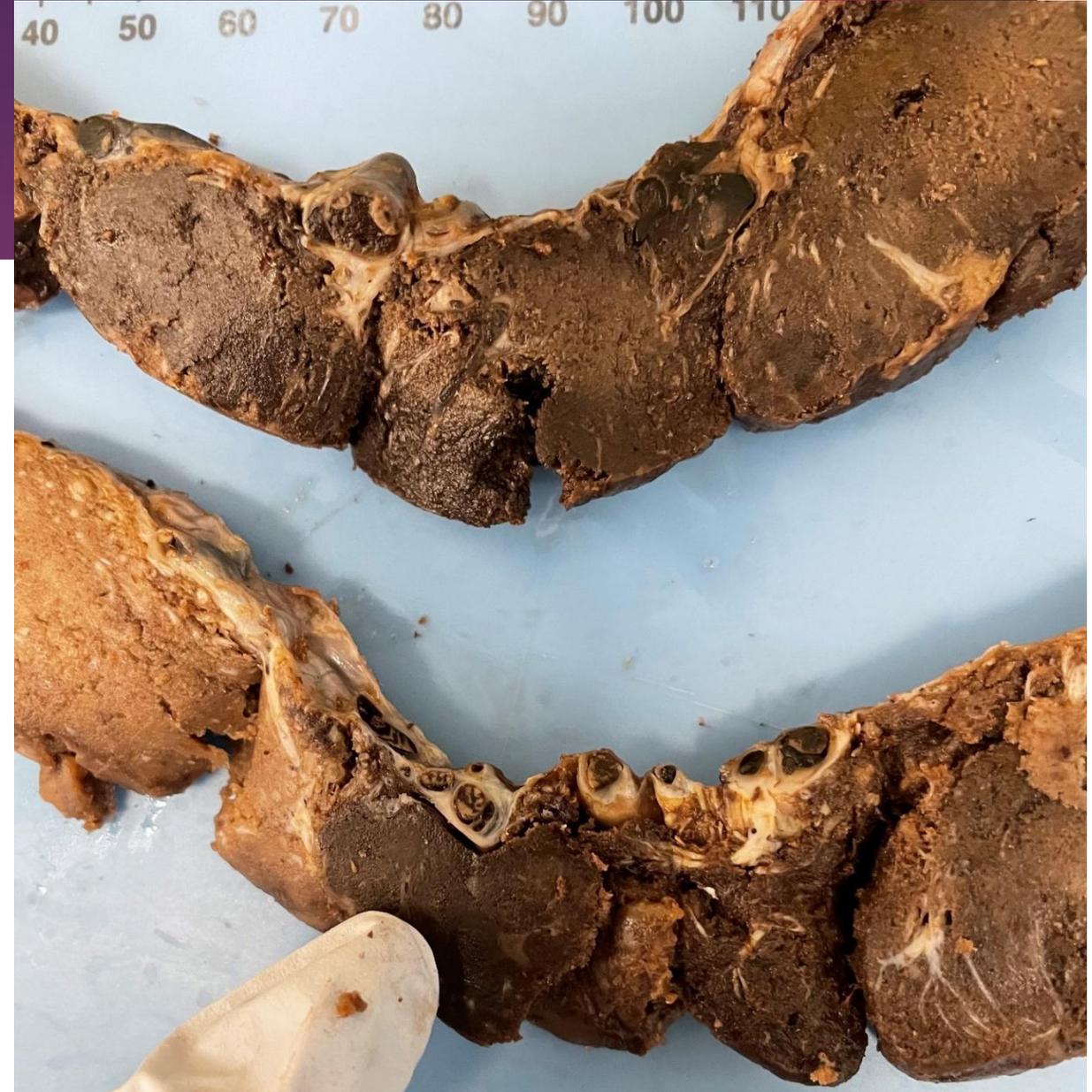
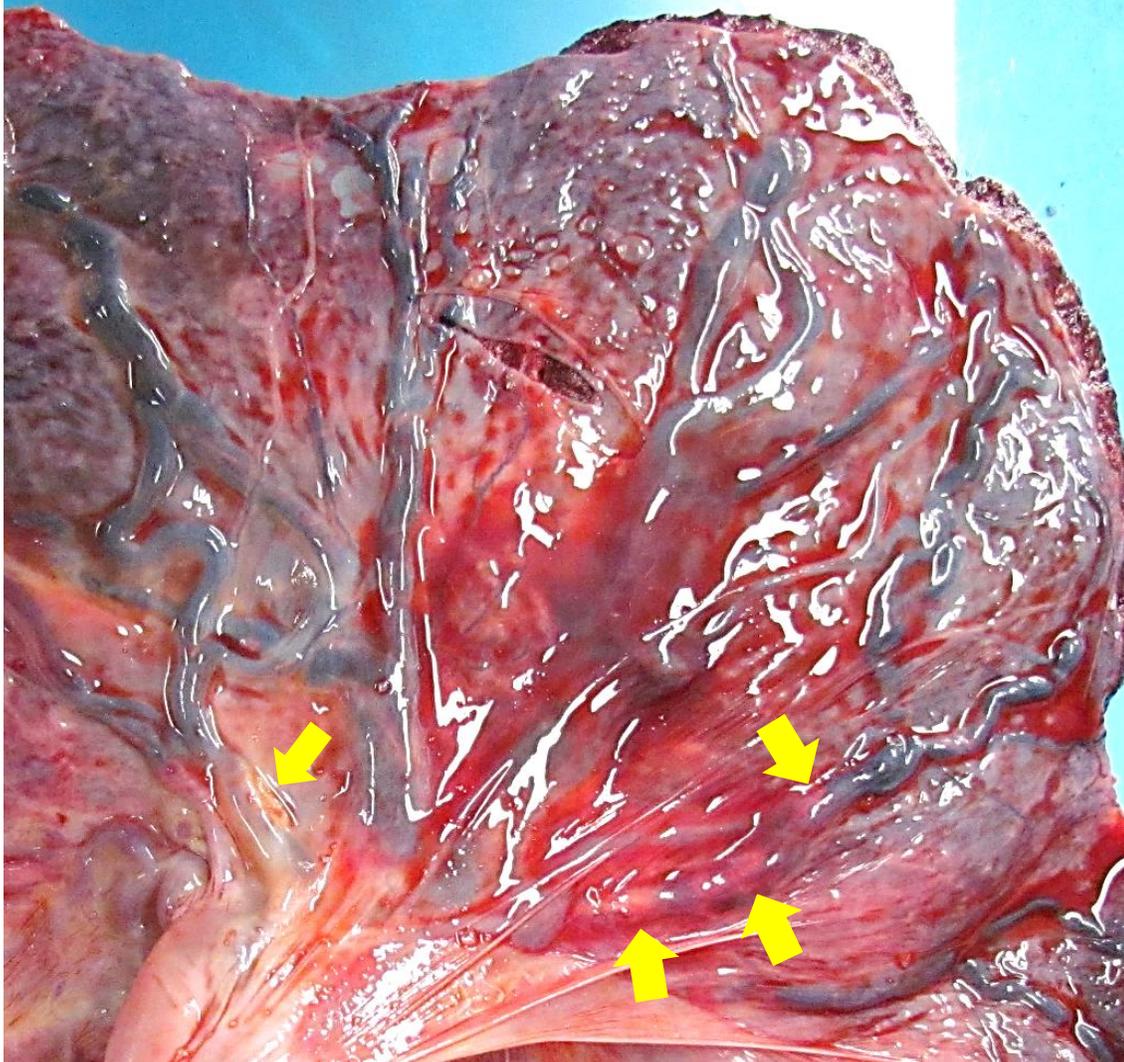
# Fetal vessels: Ectasia



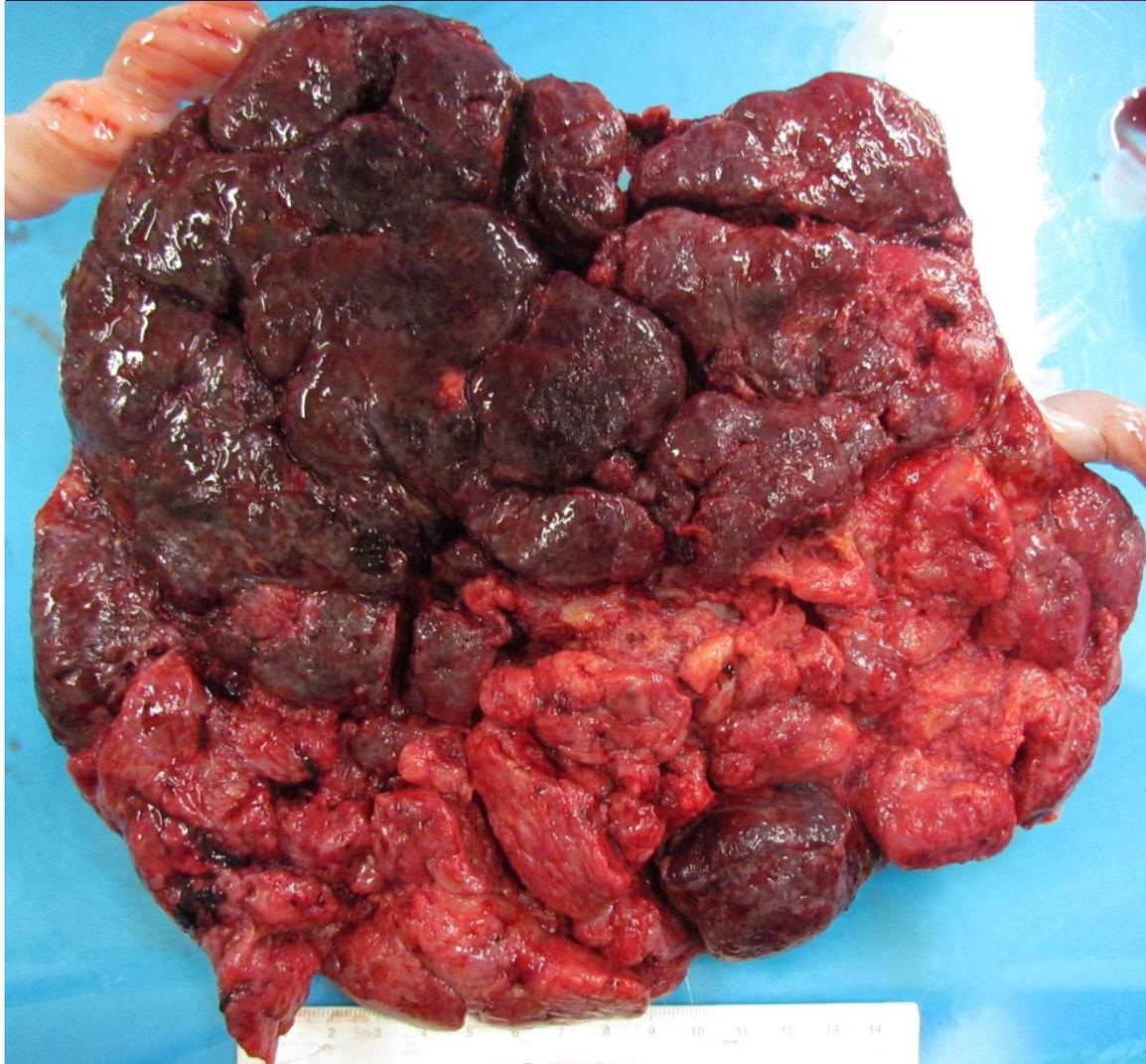
# Fetal vessels: Ectasia



# Fetal vessels: Thrombi



# Fetal vessels: Thrombi

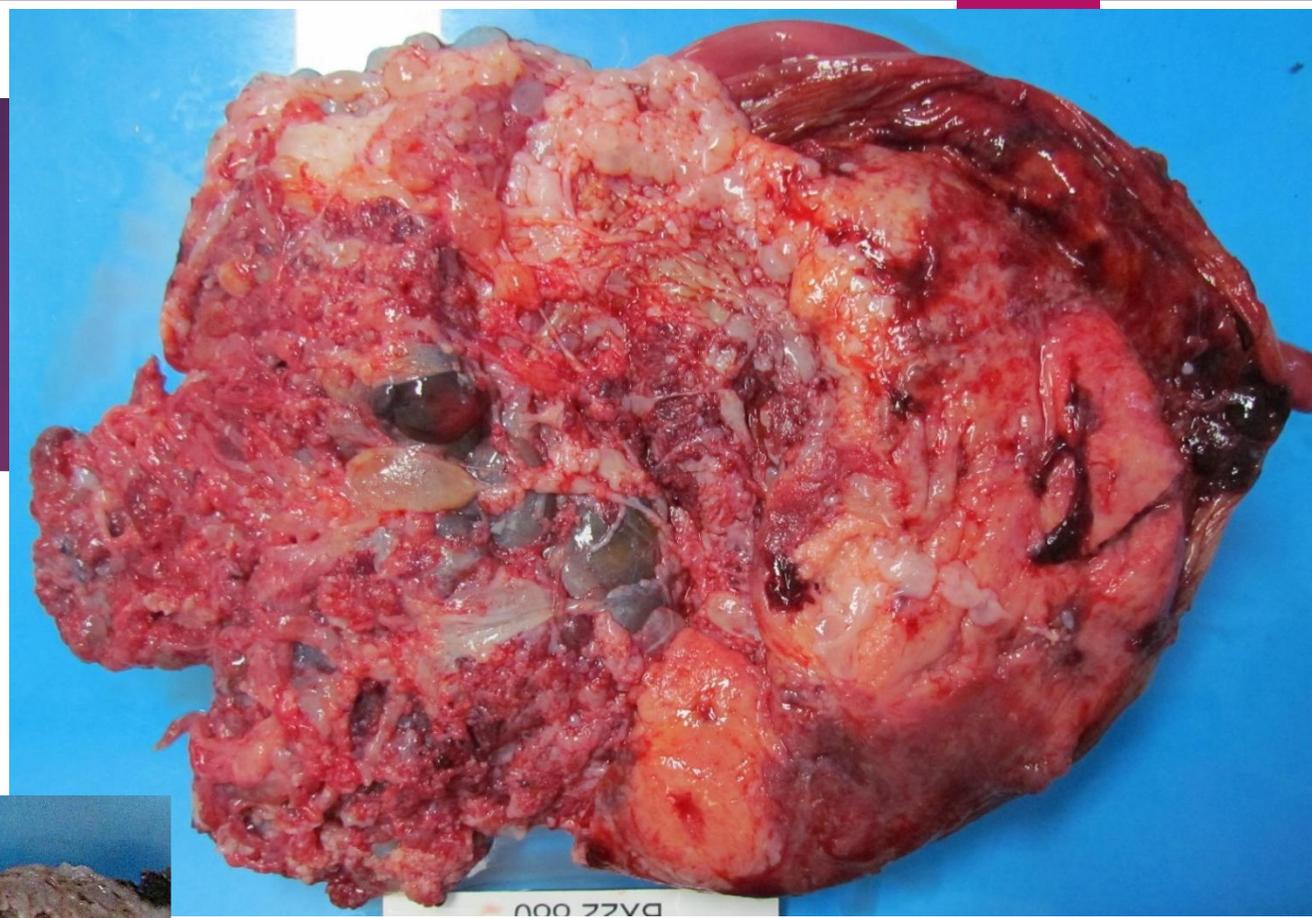


# Placental lesions: Infarct?



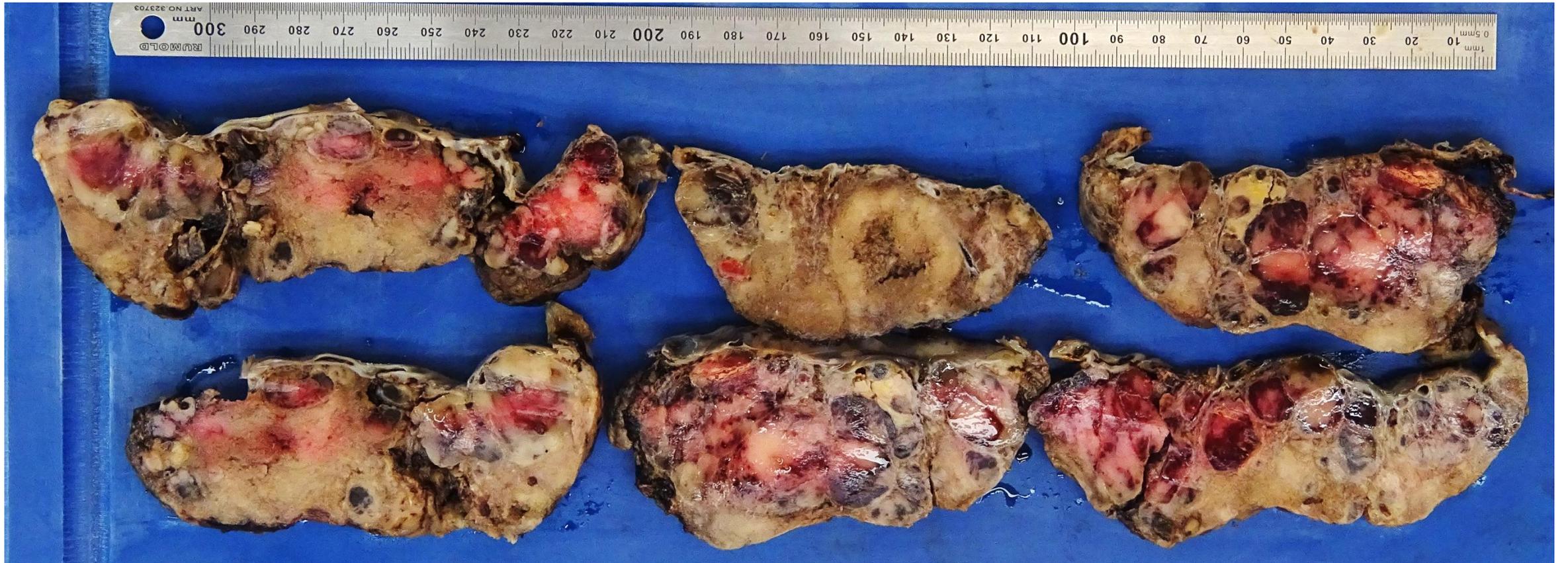
# Placental lesions

## Mesenchymal Dysplasia



# Placental lesions

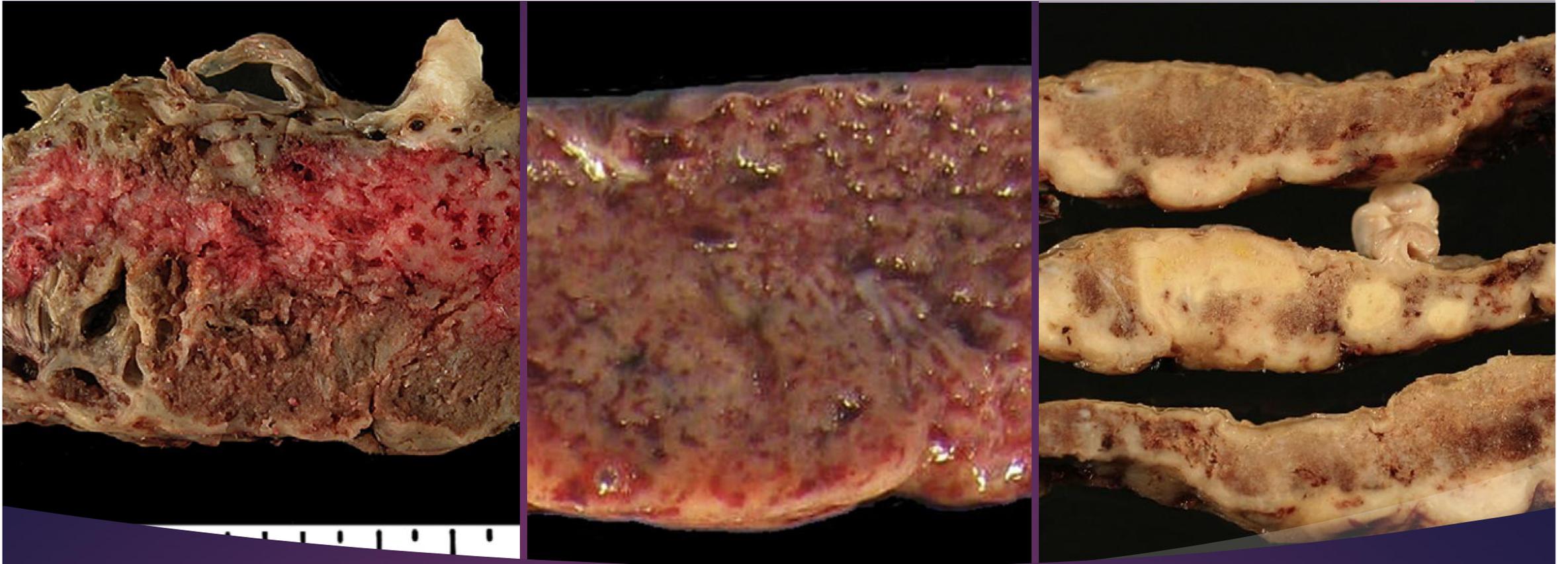
## Chorangioma (>4cm!)



# Placental lesions: Diffuse consolidation (>25%)



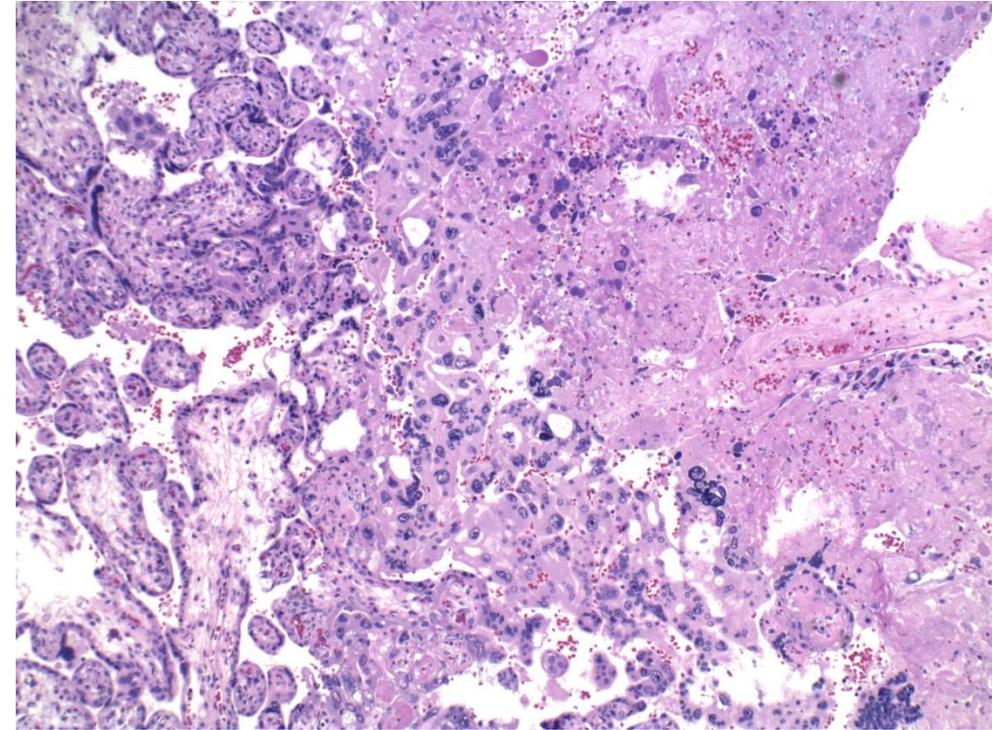
MPFD  
Contributed by  
Dr. K. Cokelaere  
(Jan Yperman  
Hospital)



# Placental lesions: Diffuse consolidation (>25%)

Faye-Petersen, Ona Marie, and Linda M. Ernst. "Maternal floor infarction and massive perivillous fibrin deposition." *Surgical pathology clinics* 6.1 (2013): 101-114.

# Placental lesions: **DO NOT MISS**





Not super  
interesting...

Inter-cotyledon  
septum

- Can be cystic
- Can bleed

# Abruption

Published in final edited form as:

*Hum Pathol.* 2017 September ; 67: 187–197. doi:10.1016/j.humpath.2017.08.007.

## The histologic evolution of revealed, acute abruptions

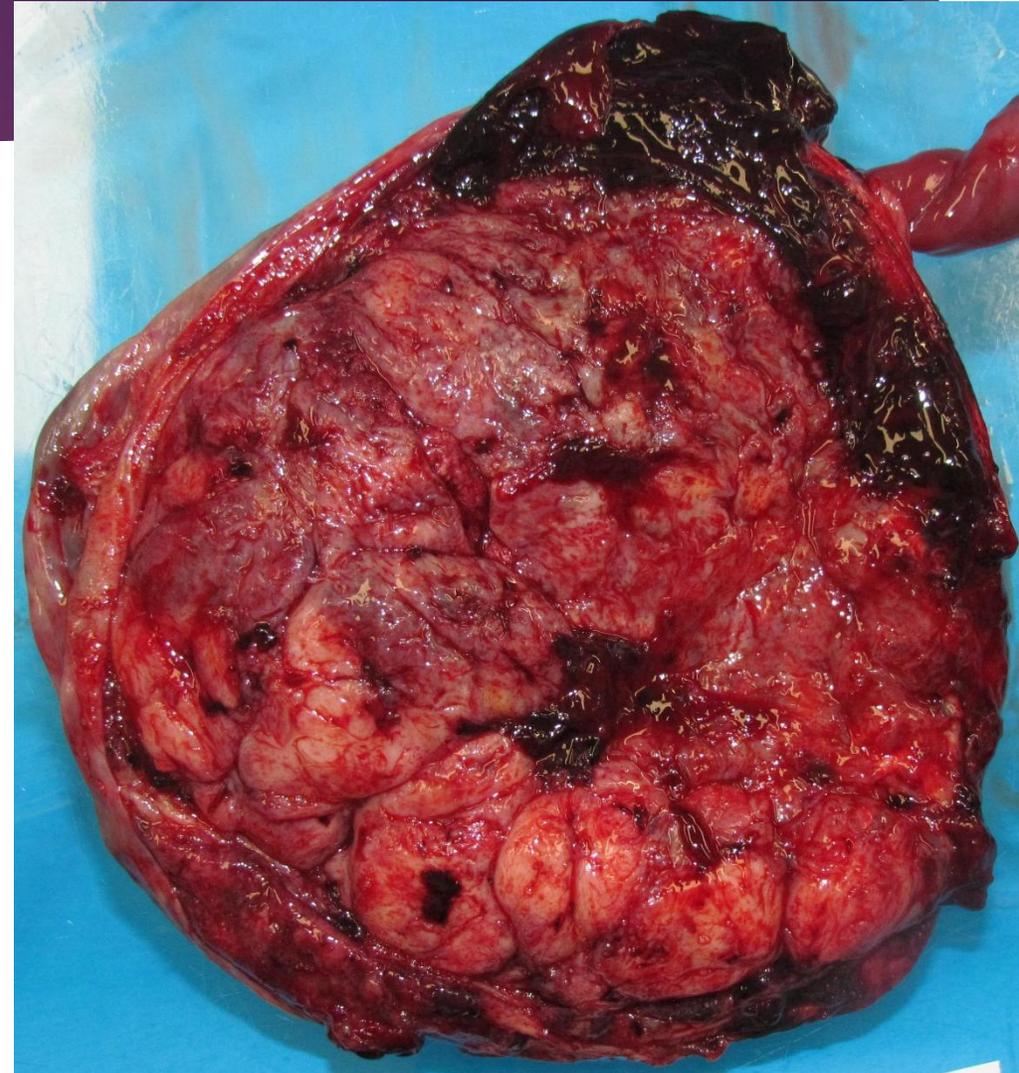
Athena L. CHEN, MD<sup>a</sup>, Ilona T. GOLDFARB, MD, MPH<sup>b</sup>, Aristana O. SCOURTAS<sup>c</sup>, and  
Drucilla J. ROBERTS, MD<sup>a</sup>

<sup>a</sup>Department of Pathology, Massachusetts General Hospital, Boston, MA

<sup>b</sup>Department of Obstetrics and Gynecology, Division of Maternal Fetal Medicine, Massachusetts General Hospital, Boston, MA

<sup>c</sup>Tufts University, Medford, MA

# Abruption

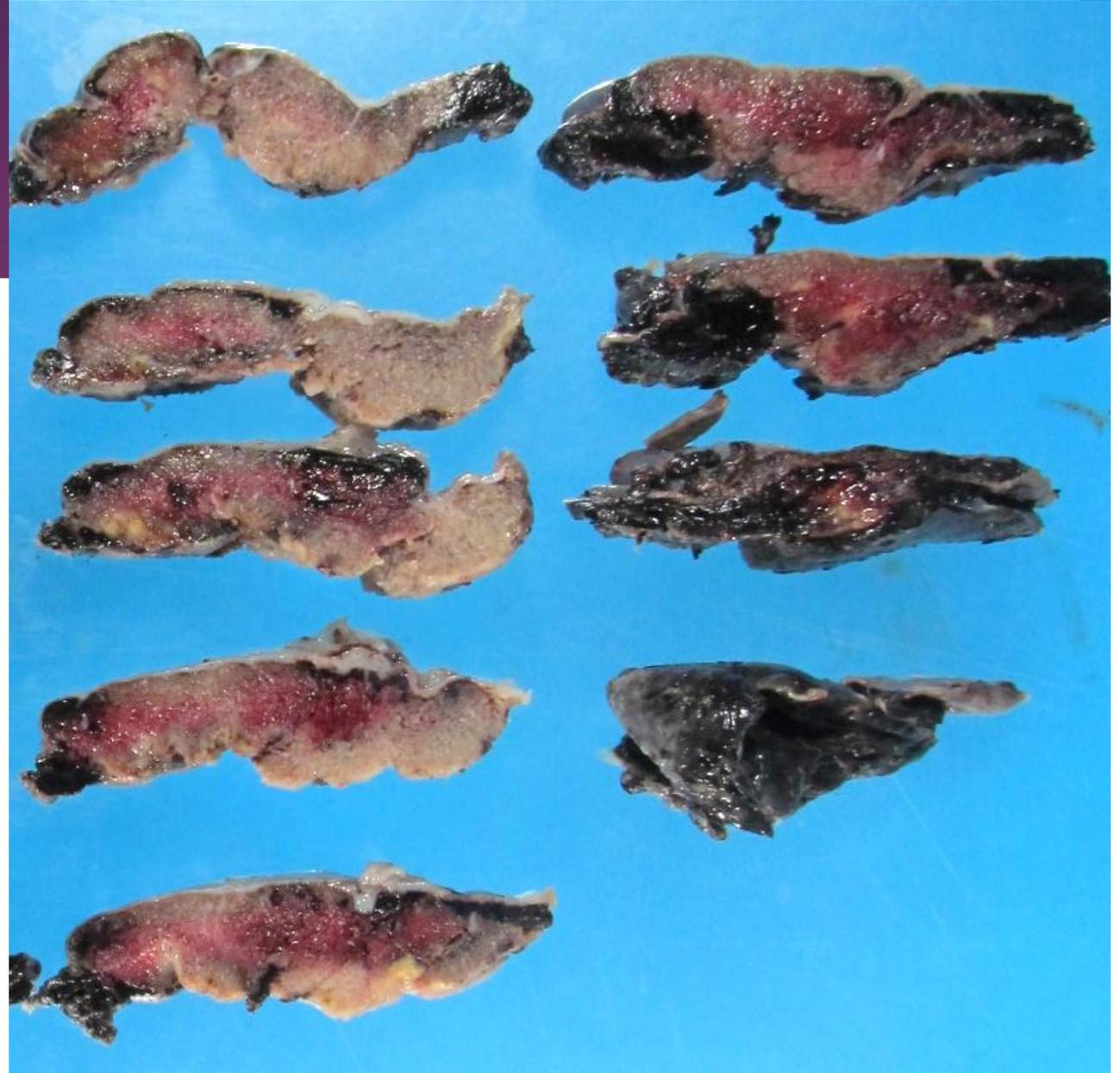




## Breus' Mole

- ▶ = massive subchorionic thrombohematoma (25%,  $\geq 1$ cm thick)

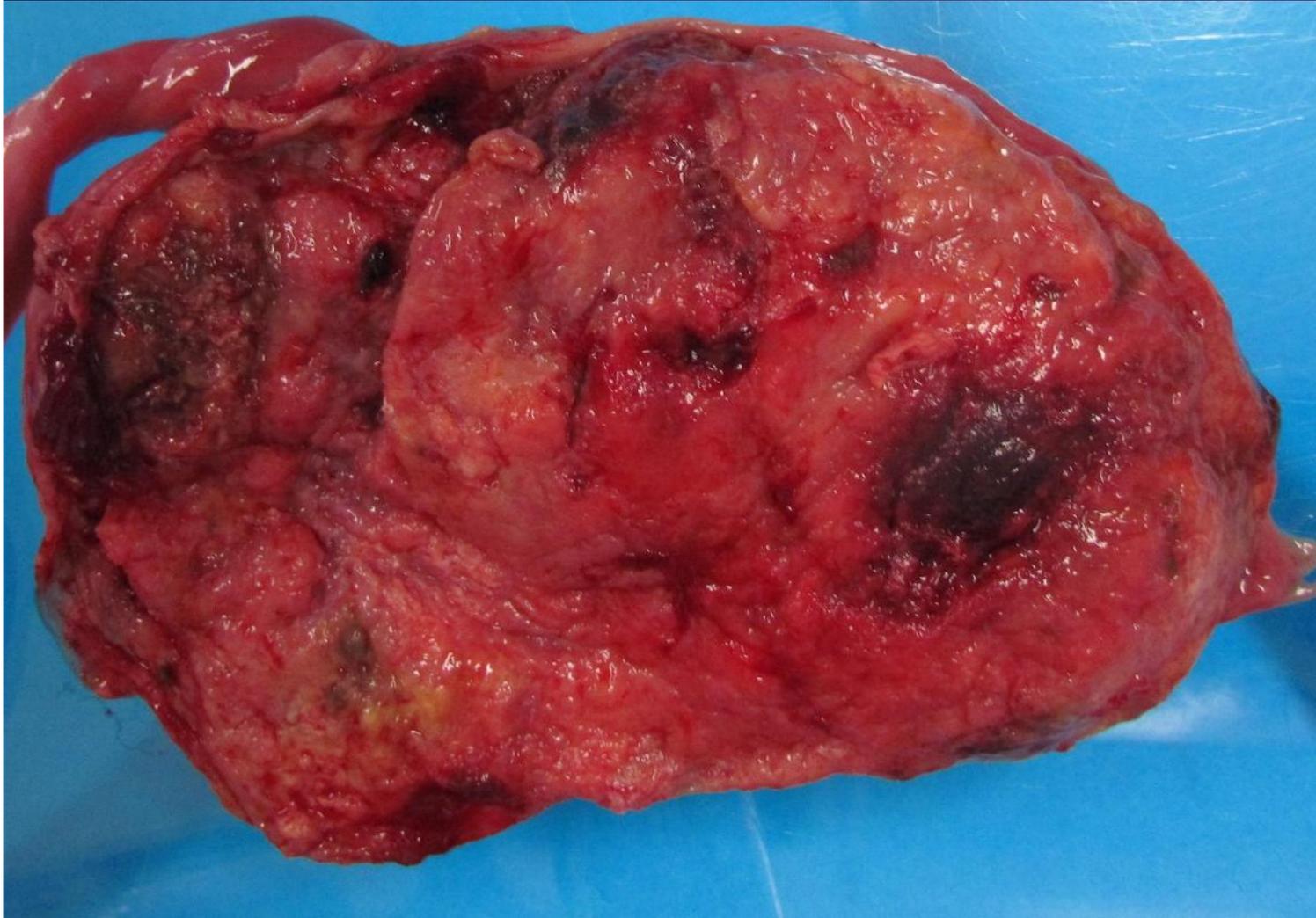
# Abruption



# Abruption



# Abruptio



# Twins

- ▶ Basically the same as singletons (x2)
- ▶ Discrepancy in weight
- ▶ Premature (uterine overdistention!)
- ▶ Few specific things to look out for
- ▶ Different weight reference values!  
(even if separate plates)

# Twins



REVIEW ARTICLE

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## Histopathological examination of the placenta in twin pregnancies

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BRENDAN FITZGERALD

Department of Pathology, Cork University Hospital, Cork, Ireland

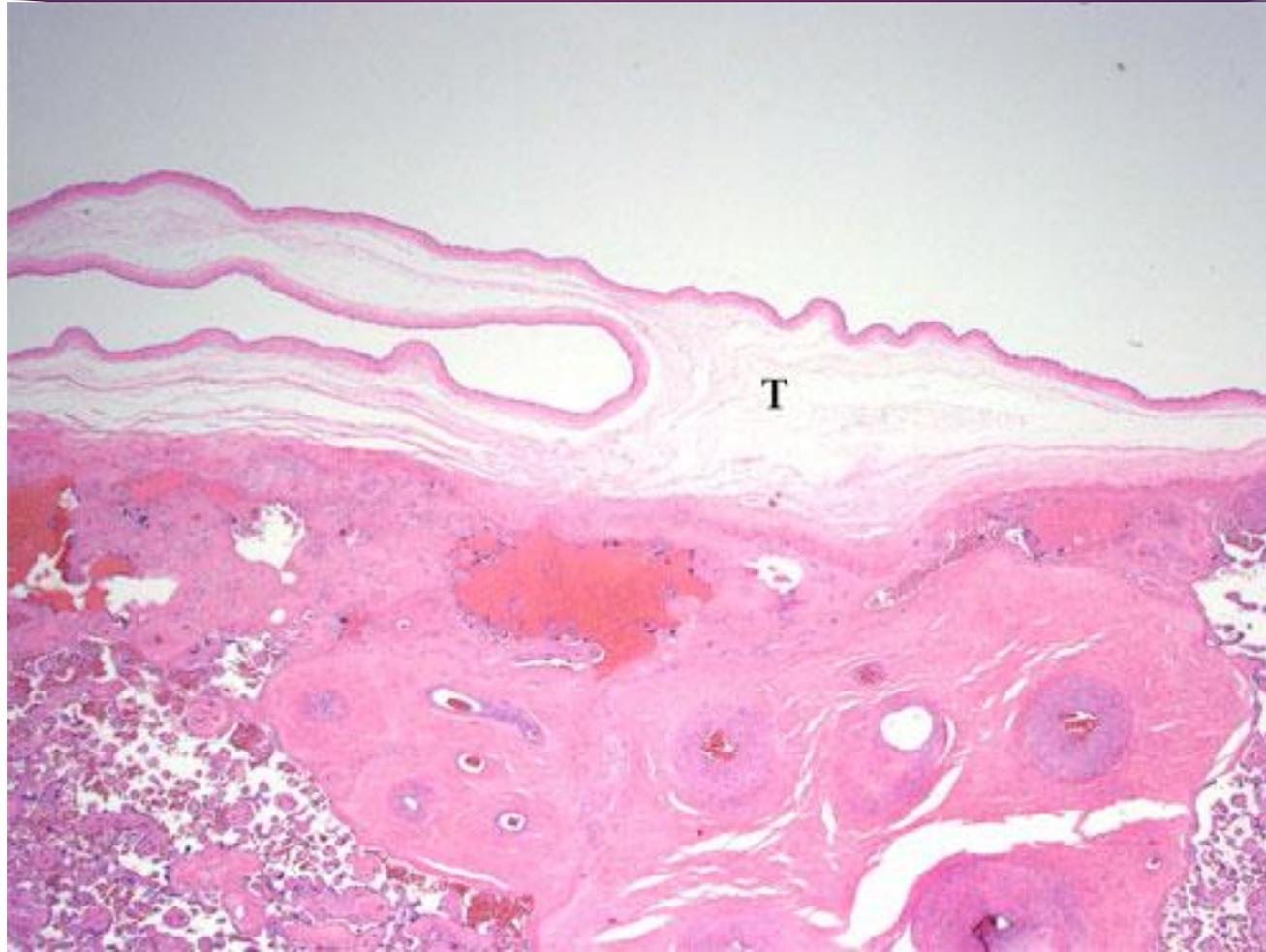
Fitzgerald B. Histopathological examination of the placenta in twin pregnancies. APMIS 2018; 126: 626–637.

Twin placentas are frequently received in pathology laboratories for evaluation of chorionicity and because twin pregnancies have higher rates of pregnancy complications. In addition to pathologies common in singleton pregnancies, twin pregnancies have increased frequencies of complications such as preterm birth and velamentous cord insertions and also are affected by complications unique to multiple pregnancies that are mediated by vascular connections between the placental territories of certain types of twins. This article aims to provide an approach to examination of the twin placenta for practicing pathologists or those interested in placental pathology while outlining the key characteristics of twin complications as seen in the placenta.

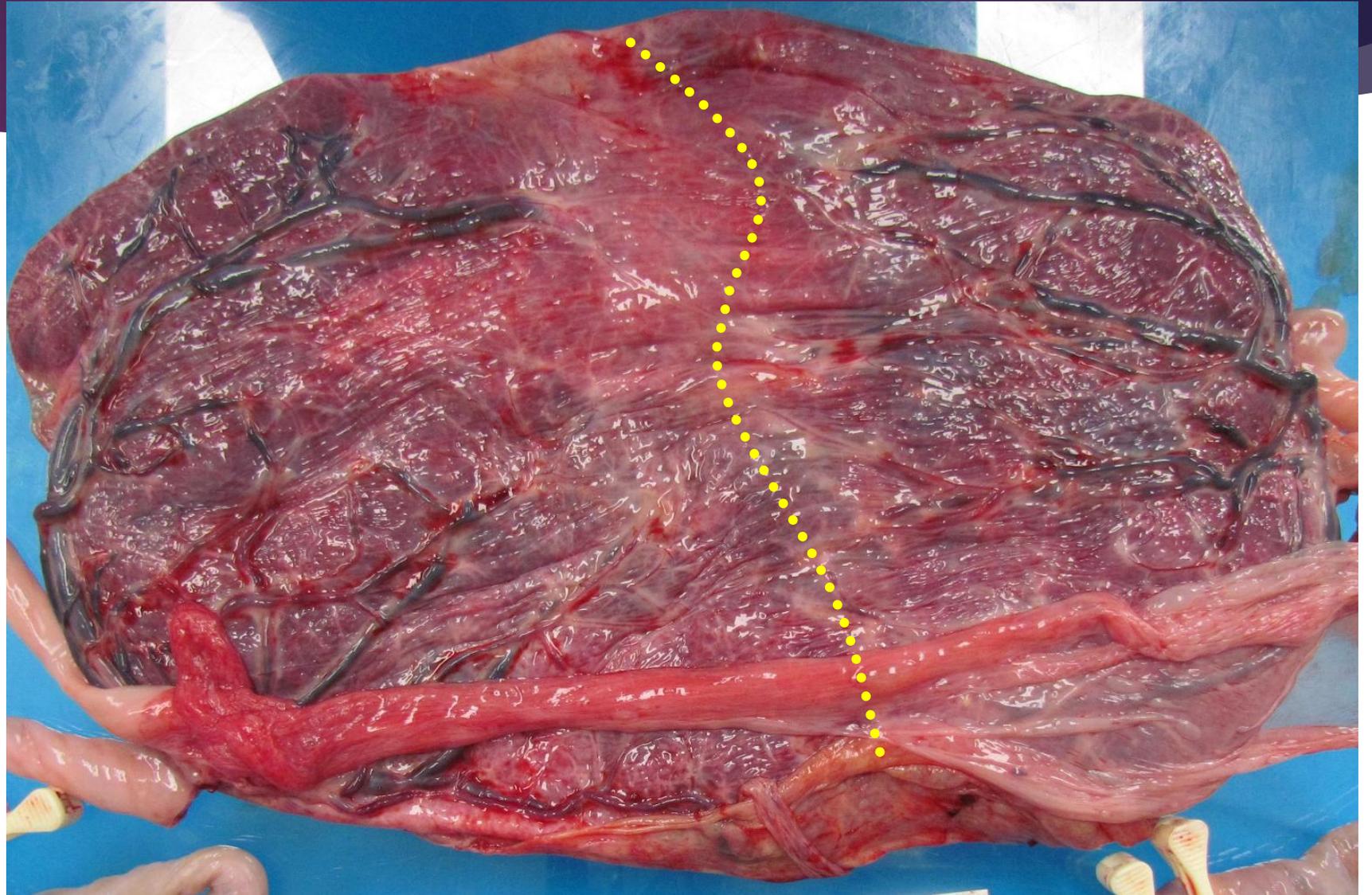
Key words: Twin placenta; twin–twin transfusion; twin oligohydramnios polyhydramnios sequence; twin anemia polycythemia sequence; twin reversed arterial perfusion sequence; acute peripartum transfusion; acute perimortem transfusion; isolated growth discordance.

Brendan Fitzgerald, Department of Pathology, Cork University Hospital, Cork, T12 DFK4, Ireland. e-mail: brendan.fitzgerald@hse.ie

# TWINS: Septum /chorionicity



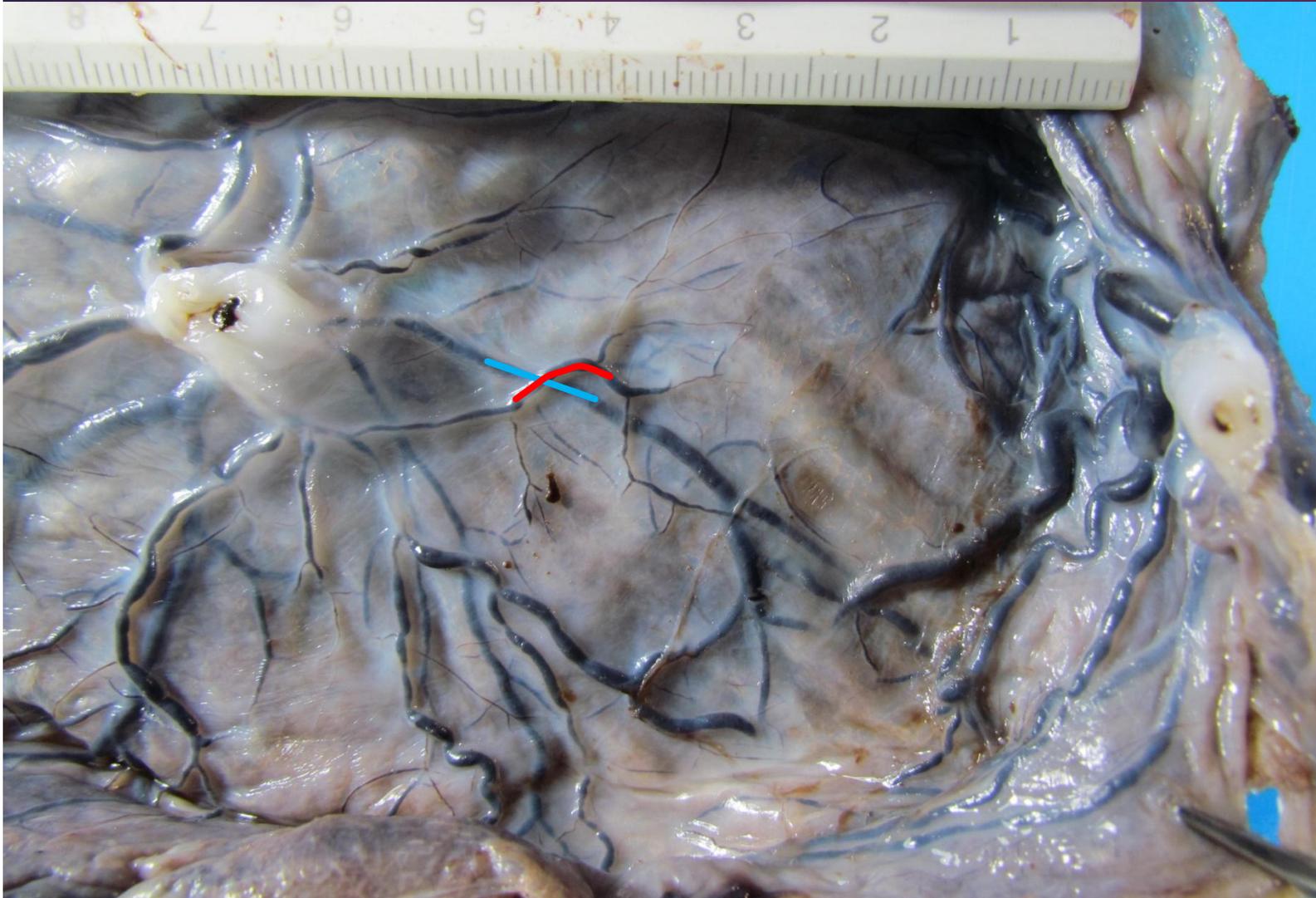
# Twins: Vascular equator



# Twins: Discrepancy vascular bed coverage



# Anastomosis



**Artery: Over**  
**Vein: Under**

**AA anastomoses appear to be protective against TTTS & TAPS**

**VV are more frequent in TTTS**

**AV typically essential in TTTS**

