

# Early Pregnancy Monitoring

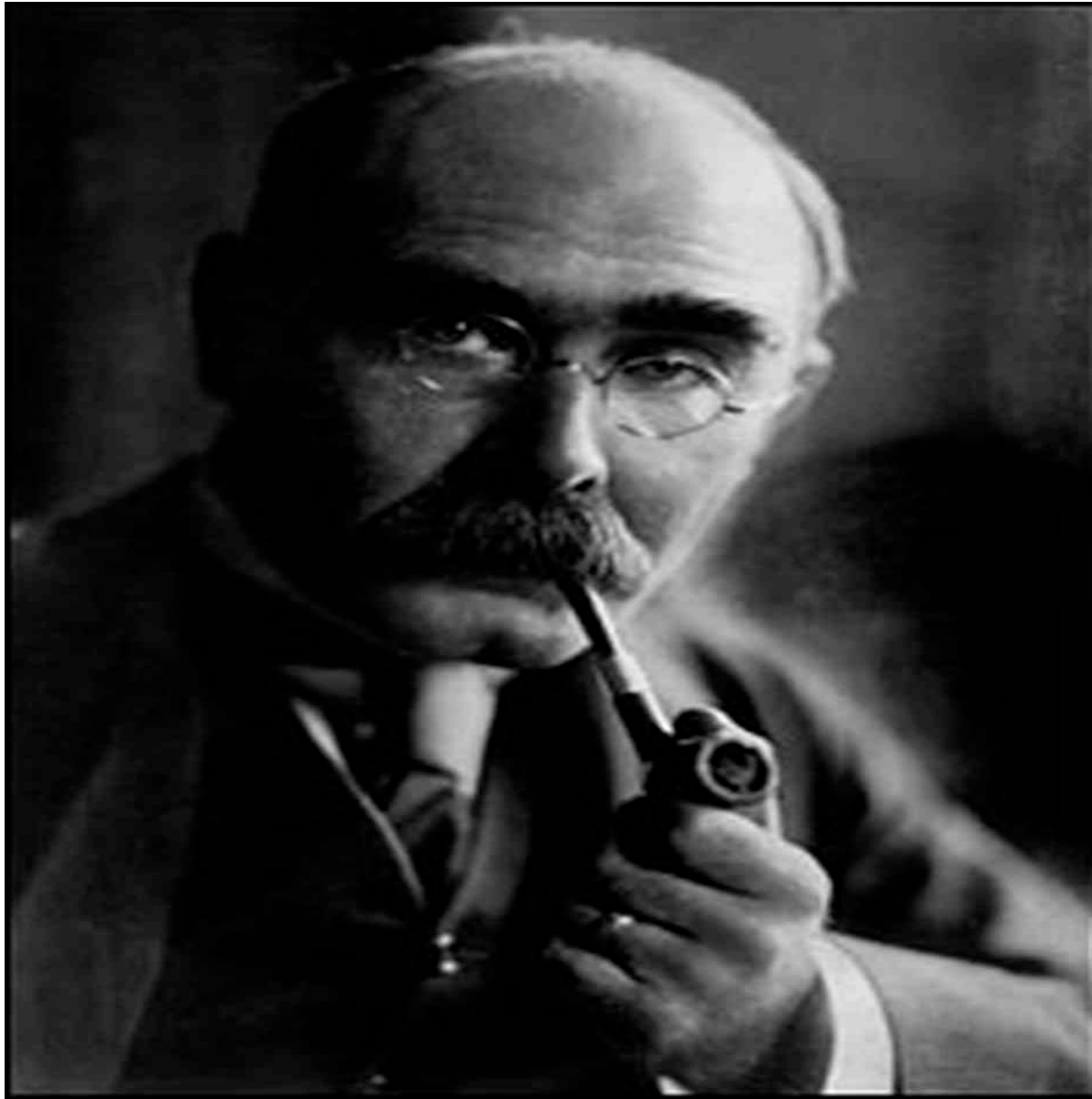
**Peter Scott**

13<sup>th</sup> May 2017

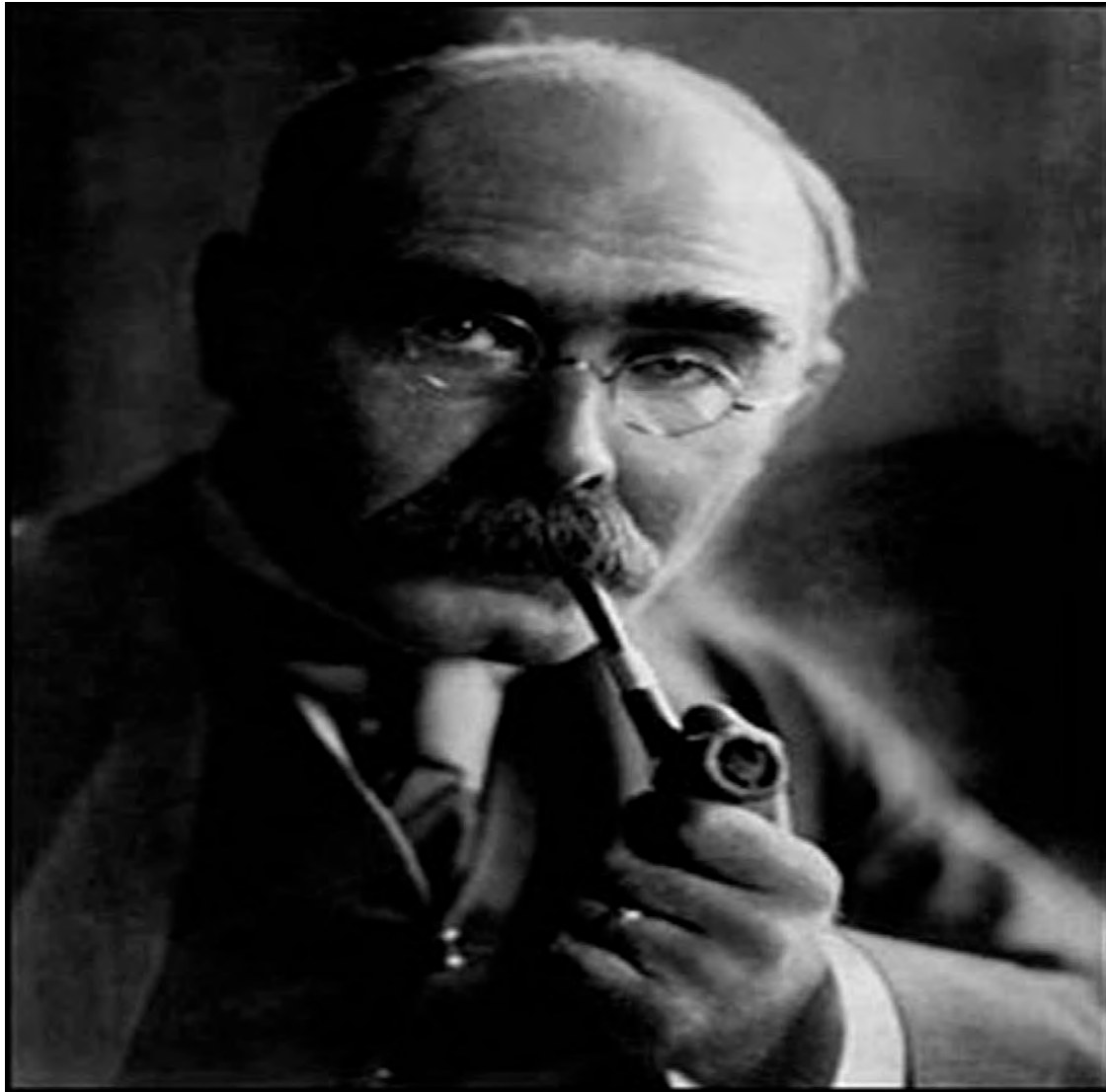
# Aims

- Principles, purpose and *pitfalls* of monitoring of early pregnancy
  - Importance of *Clinical* assessment
  - Laboratory testing
  - Ultrasound

Who is this.....?



# Rudyard Kipling



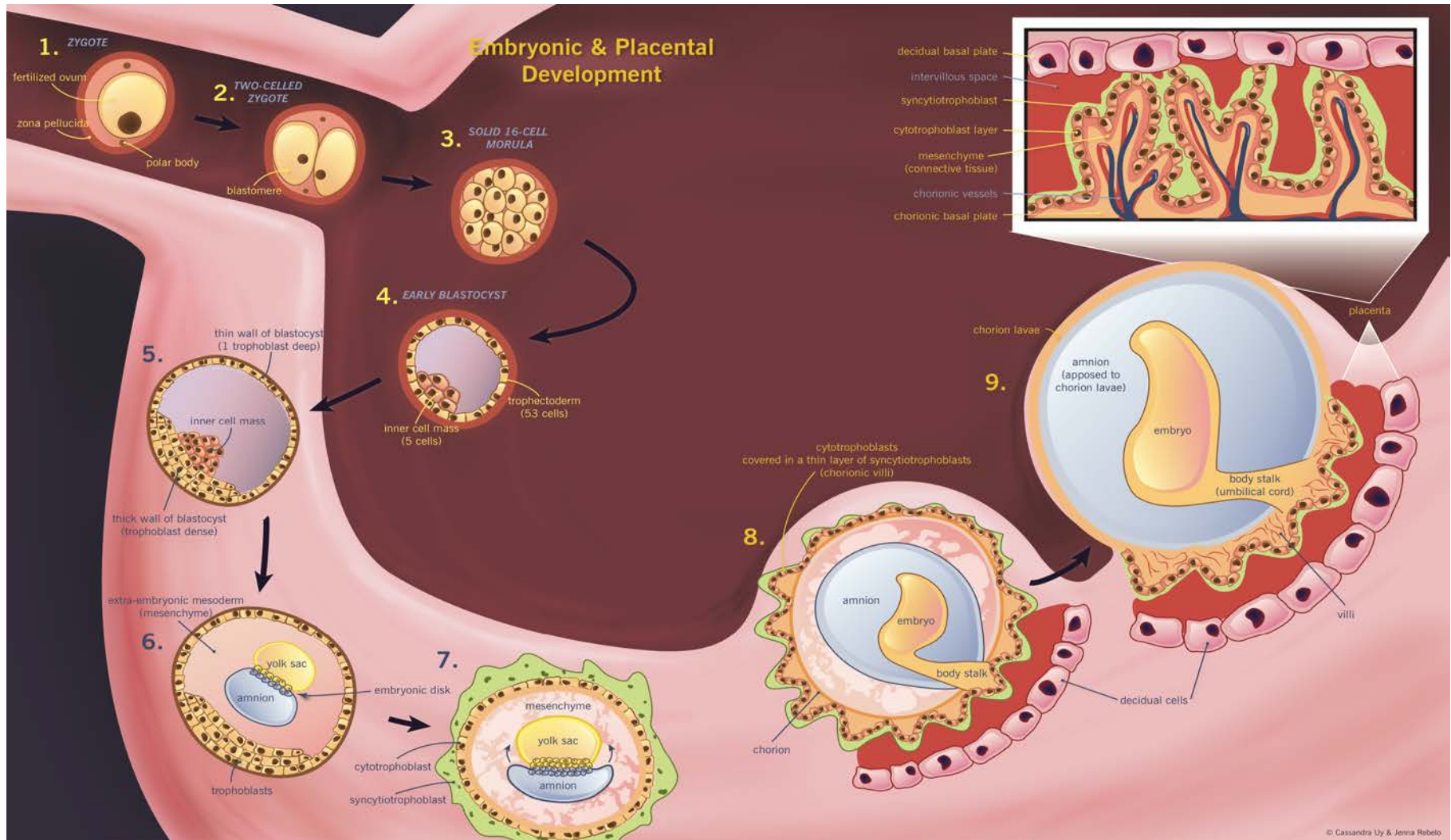
I keep six honest serving-men  
( they taught me all I knew)  
Their names are *What* and *Why* and *When*  
And *How* and *Where* and *Who*.

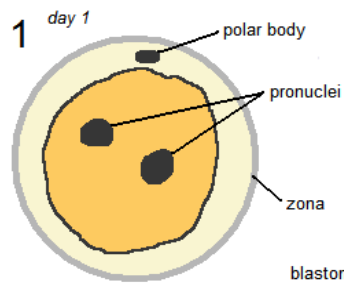
Rudyard Kipling  
“*The Elephant’s Child*”

# What.....?

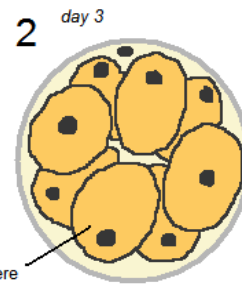
- Early pregnancy
  - Presence
  - Location
  - Viability and progress
  - “Type”
  - Gestational age
  - Number

# Early pregnancy physiology





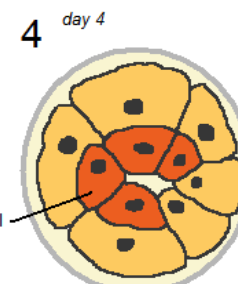
fertilised egg



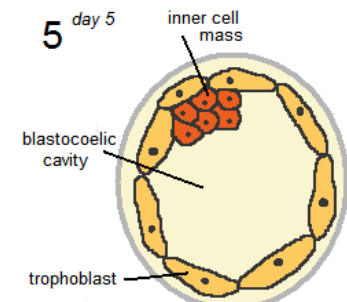
8-cell zygote



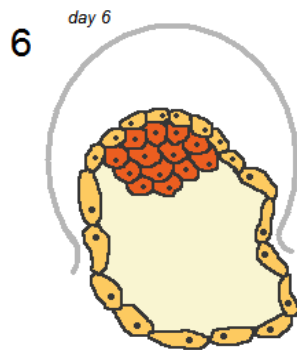
cell adhesion



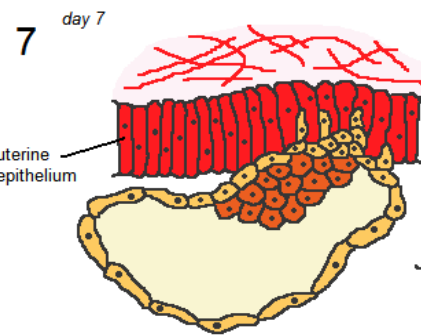
16-cell morula



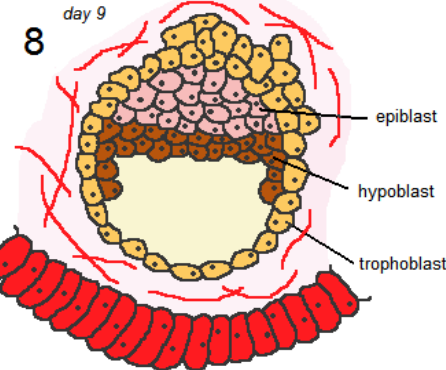
blastocyst



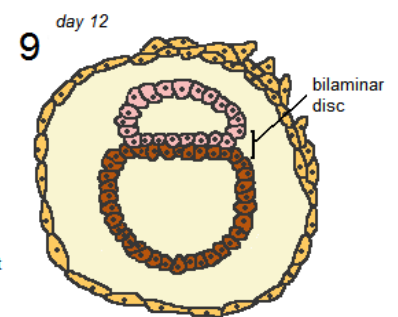
zona hatching



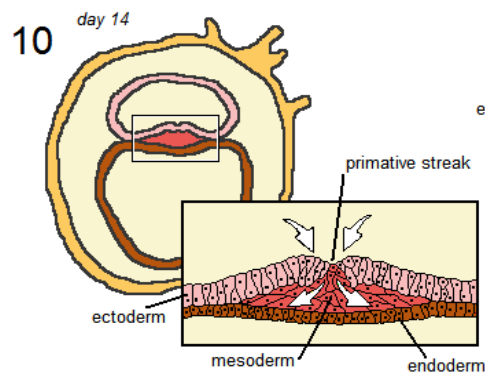
invades uterine wall



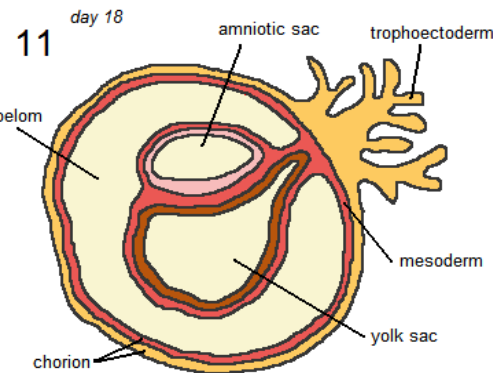
cell mass differentiates



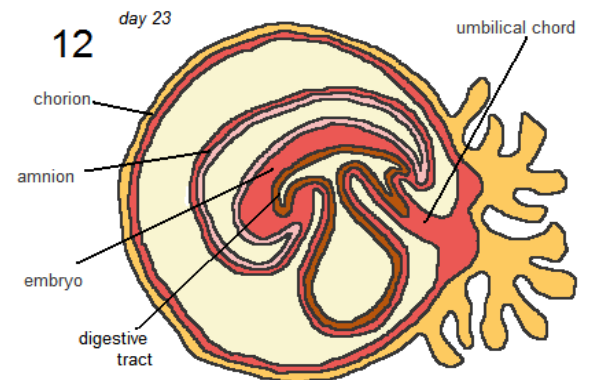
bilaminar disc forms



mesoderm forms



mesoderm spreads



amniotic sac grows

Why.....?

# Possible outcomes of early pregnancy

- Viable intra-uterine pregnancy
  - Including multiple pregnancy/chorionicity
- Non-viable pregnancy
  - Miscarriage
  - Tubal abortion
  - Gestational trophoblastic disease
- Ectopic pregnancy
- Pregnancy of unknown location ( PUL)

# Why.....?

- Potentially life-threatening complications
- Guide management
- Reassurance

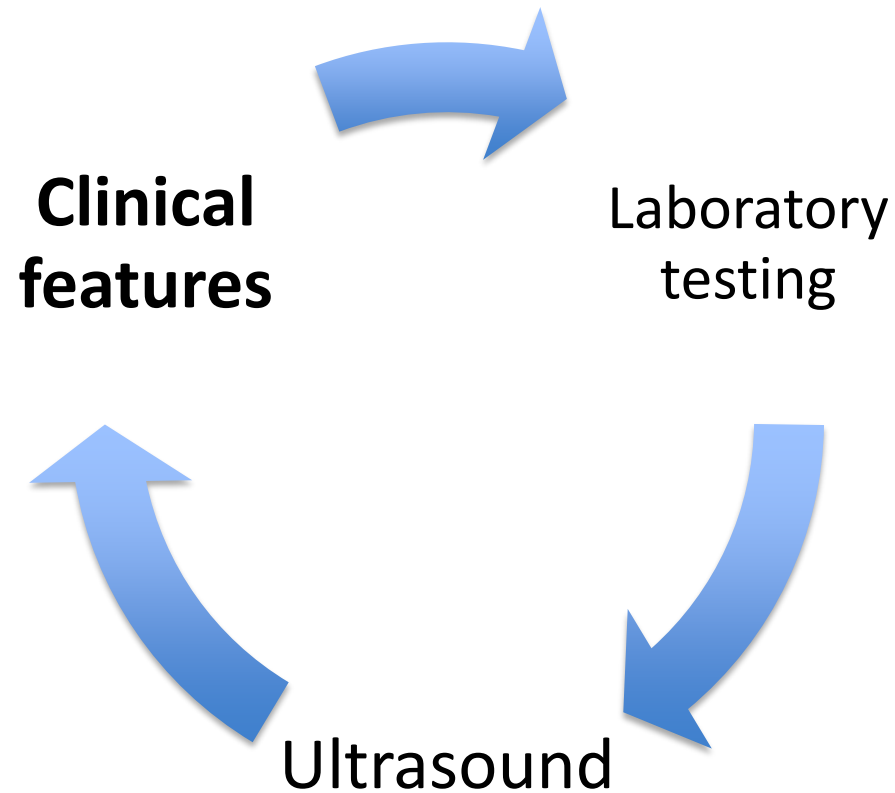
# When.....?

- As early as possible ???
- When abnormal symptoms occur
- Caution with *early* and/or *single* results

# How.....?

- Clinical features
- Laboratory tests
- Ultrasound

# How.....?



# Where.....?

- GP/Outpatient
- EPAU
  - Follow-up
- Admission



# Who.....?

- Clinical assessment
- Symptomatic vs asymptomatic

# Assessment - clinical

- History
  - Medical, surgical and pregnancy history
  - Amenorrhoea – menstrual pattern
  - Symptoms of pregnancy
  - Pain
  - Bleeding \*
  - Other symptoms of ectopic pregnancy may mimic other conditions

# Assessment - clinical

- Examination
  - Vital signs
  - Bimanual
  - Speculum

# Assessment - clinical

“all women are pregnant till proven otherwise

AND

all pregnancies are ectopic till proven otherwise”

# Laboratory assessment

- bHCG
  - Produced by cytotrophoblast cells in early pregnancy
  - Detectable in serum and urine after implantation and vascular communication
    - 5% at day 8
    - 98% at day 11

# Laboratory assessment

bHCG – *rate of rise* in levels

– Viable pregnancy roughly doubles each 48hours

- Peaks at 8 – 10 weeks at 60,000 – 90,000

# Laboratory assessment

## bHCG

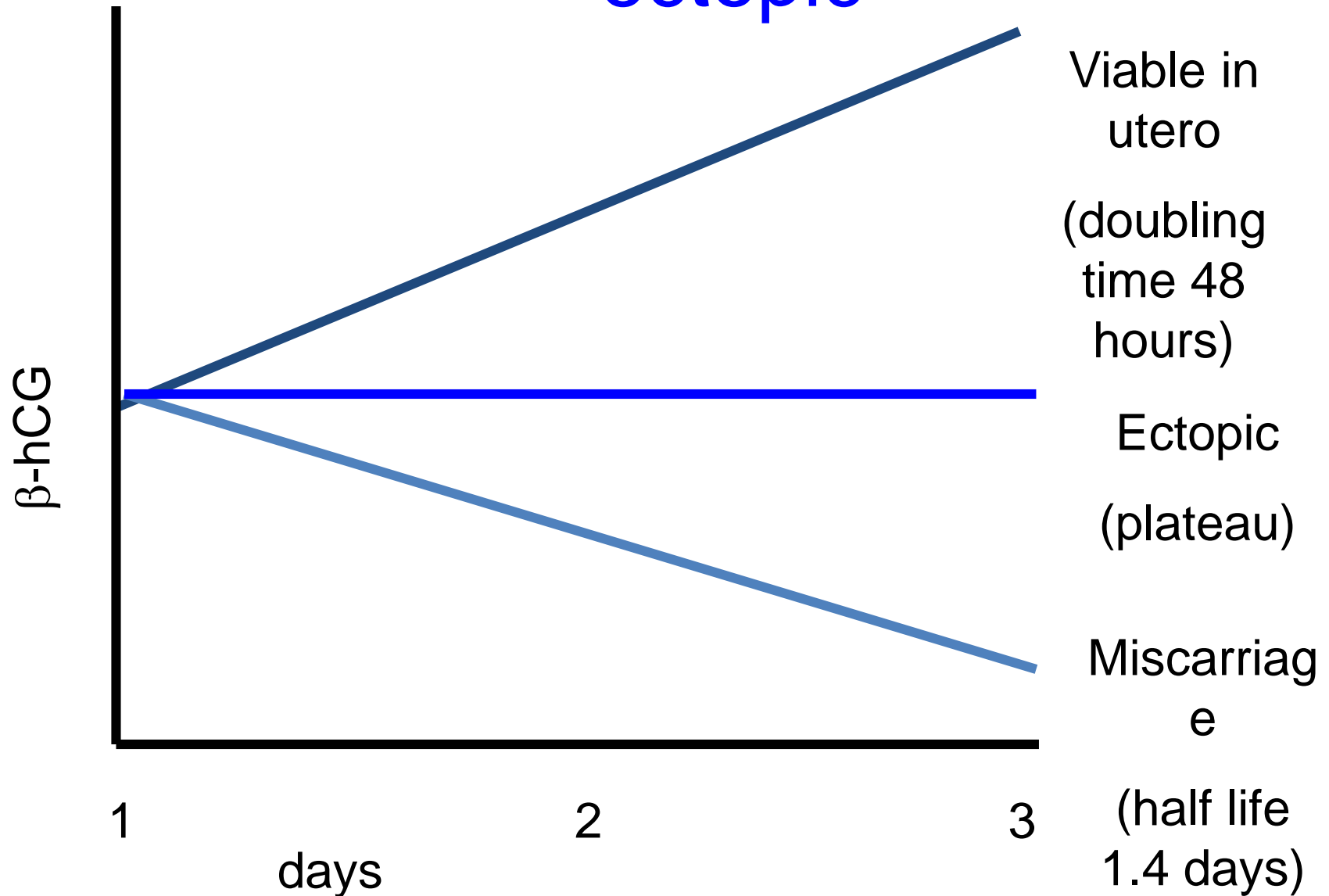
- Slower rise may indicate ectopic pregnancy
- Falling levels indicate non-viable pregnancy

# Laboratory assessment

bHCG

- Rapid rise and/or very high levels associated with *molar* pregnancy
- “discriminatory zone” correlates with U/S findings

# b-hCG in cases with suspected ectopic



# Laboratory assessment

- However.....
  - A single pattern of HCG does not exist for abnormal early pregnancy

# Laboratory assessment

- So.....
  - *Caution* needed in interpreting serial bHCG levels in early pregnancy
  - Importance of *clinical* signs, especially if they *change* (NICE guidelines 2012)

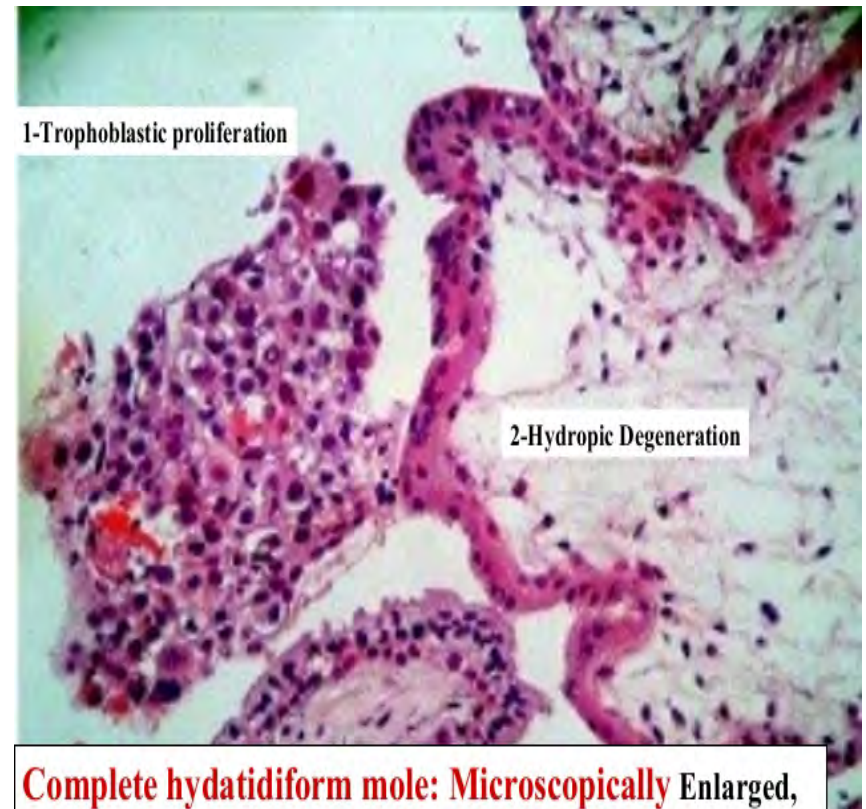
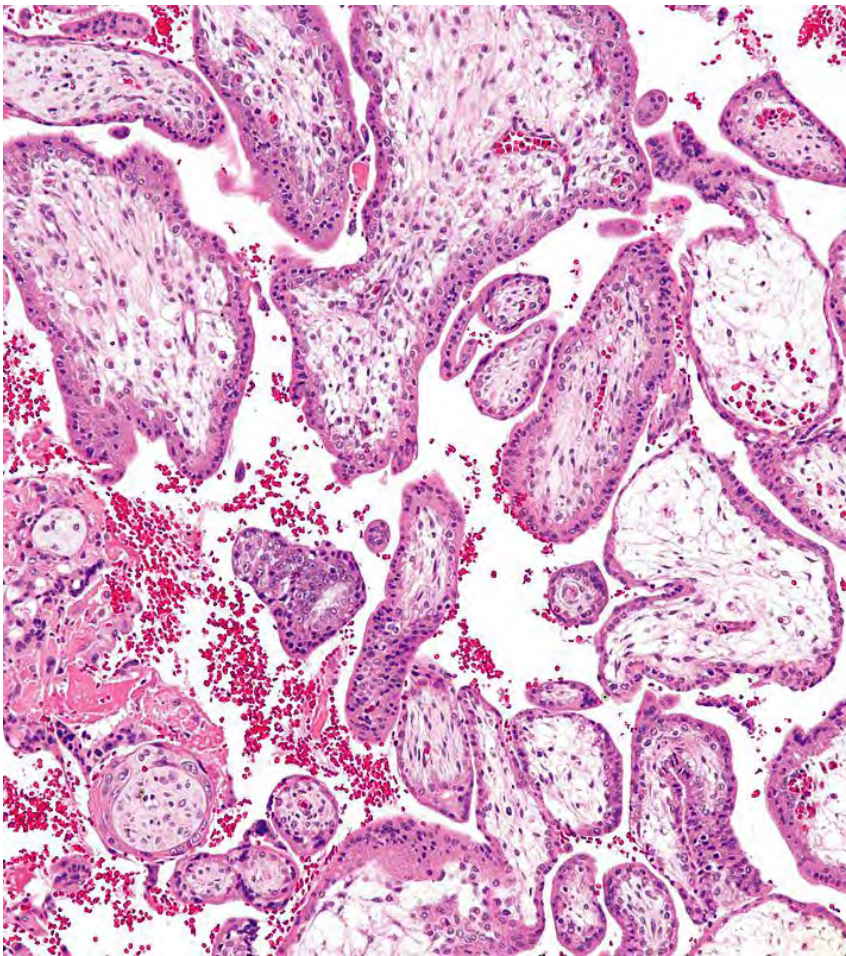
# Laboratory assessment

- Check **blood group**
- Anti-D for Rh negative except TMC < 12/40
  - RANZCOG Guidelines

# Laboratory assessment

- **Histopathology**
  - Molar pregnancy
  - Pregnancy tissue in uterine curettings
  - Pregnancy tissue in removed fallopian tube

# Histopathology



**Complete hydatidiform mole: Microscopically** Enlarged, edematous villi and abnormal trophoblastic proliferation that diffusely involve the entire placenta

# Ultrasound in early pregnancy

- Establish the presence and position of a pregnancy
- Establishing gestational age
- Assess adnexal pathology
- Viability (Criteria for Early Pregnancy Failure)
- Fetal number / type of multiple pregnancy

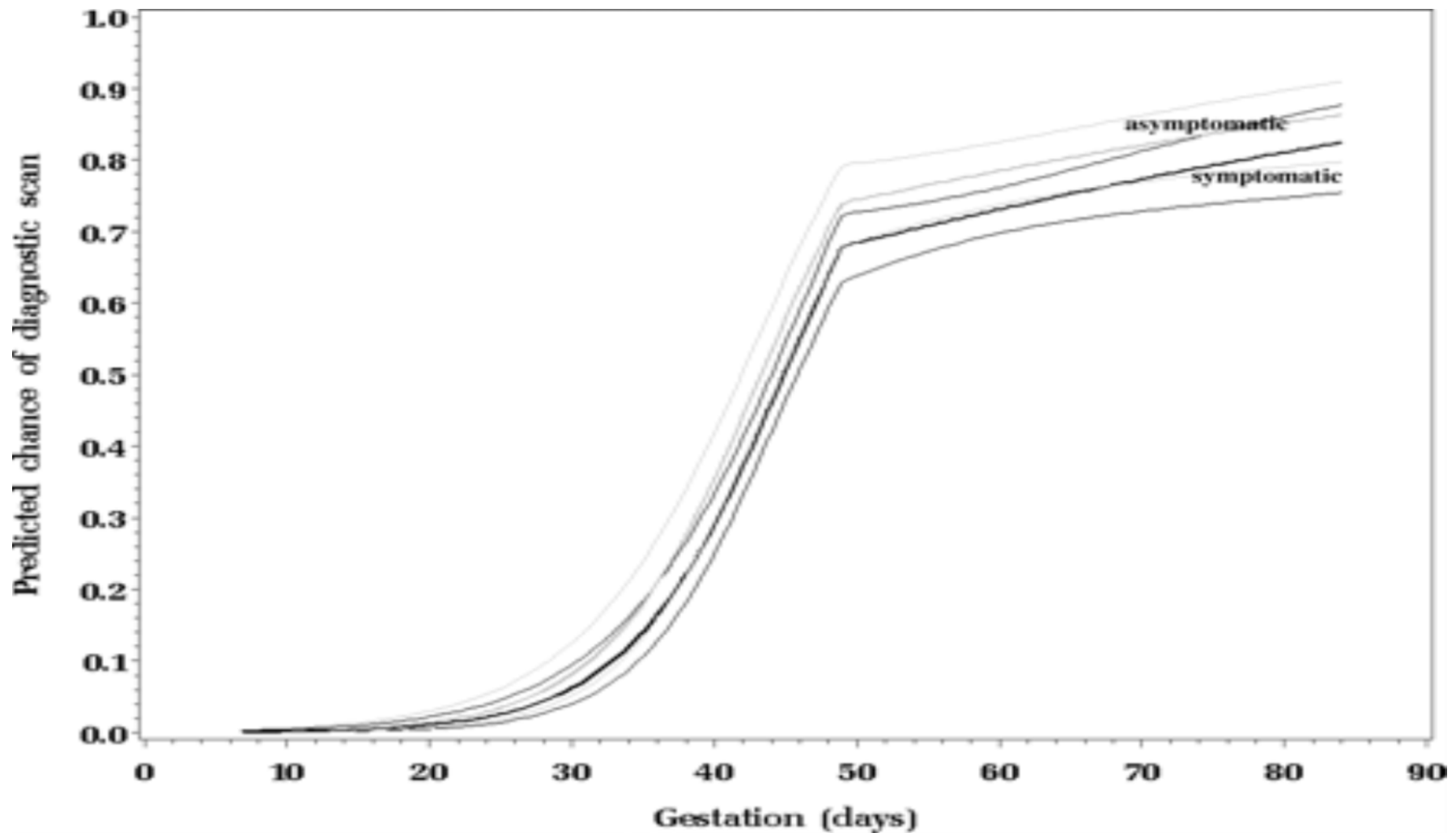
# Ultrasound in early pregnancy

“Inform women that diagnosis of miscarriage using one U/S cannot be guaranteed to be 100% accurate and there is a small chance that the diagnosis may be incorrect, particularly at very early gestational ages”

NICE guidelines 2012

# Early pregnancy failure: managing expectations

- Sensitive home pregnancy tests inform women they are pregnant before their missed period
- the likelihood of a scan showing an intrauterine pregnancy of uncertain viability is:
  - 86% at 28-34 days gestation
  - 60% at 35-41 days gestation
  - 29% at 42-48 days gestation



From: The optimal timing of an ultrasound scan to assess the location and viability of an early pregnancy


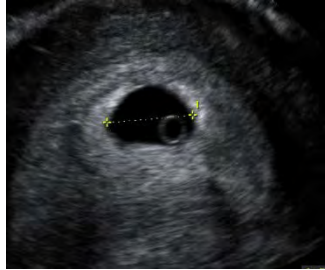


Hum Reprod. 2009;24(8):1811-1817. doi:10.1093/humrep/dep084

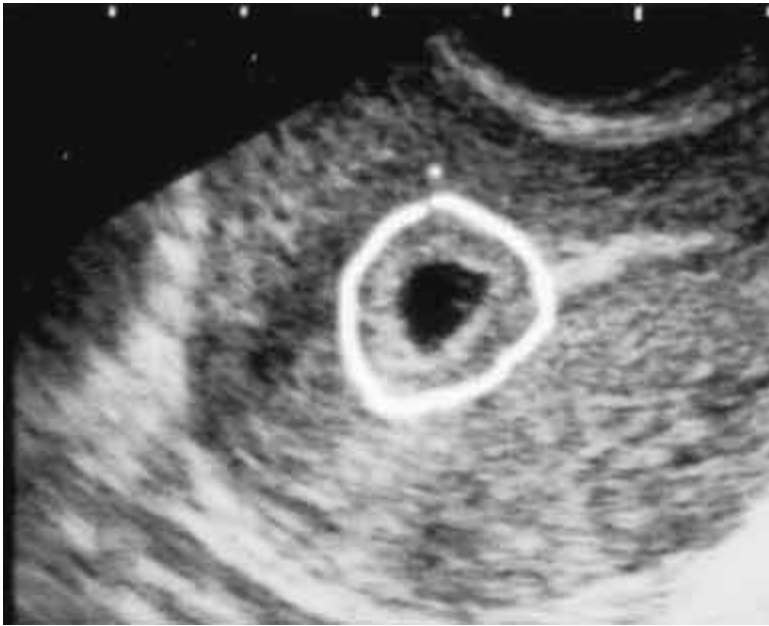
Hum Reprod | © The Author 2009. Published by Oxford University Press on behalf of the European Society of Human Reproduction and Embryology. All rights reserved. For Permissions, please email: journals.permissions@oxfordjournals.org

# Ultrasound in early pregnancy

- Importance of:
  - Appropriate and sensitive counselling
  - Awareness of, and accessibility of, appropriate medical services
  - *Serial* measurements and U/S
  - *Correlation* bHCG , ultrasound and clinical conditions

# Chronological landmarks as seen on TV scan

5 + 0	Empty GS; MSD 10mm	
5 + 4	GS with YS	
6 + 0	GS(MSD 16mm) and YS with adjacent FH but small embryo(3-4mm)	
8 + 0	Embryo with CRL 16mm; AS; YS; FH; FM	



5.5 weeks

Gestation sac  
and contents



6.5 weeks

Yolk sac ( left)  
Fetus is 3mm  
long  
A fetal  
heartbeat

# Establishing (non) viability

- NICE guidelines

1. Mean gestational sac diameter (MGSD)  $\geq 25$ mm and no yolk sac or fetal pole
2. Crown-rump length (CRL)  $\geq 7$ mm and no fetal heart beat present
3.  $\geq 70$  days gestation and the MGSD  $\geq 18$  mm with no embryo or an embryo with CRL  $\geq 3$  mm with no heart activity

Miscarriage

1. Fetal pole  $< 7$  mm with no fetal heart beat
2. MGSD  $\geq 12$  mm and  $< 25$  mm with no embryo/ no yolk sac

Repeat ultrasound scan  $\geq 7$  days

1. Embryo present with no heart beat
2. No embryo is seen

Miscarriage

MGSD  $< 12$  mm

Repeat ultrasound scan  $\geq 14$  days

MGSD has not doubled in size

Miscarriage

# Establishing gestational age

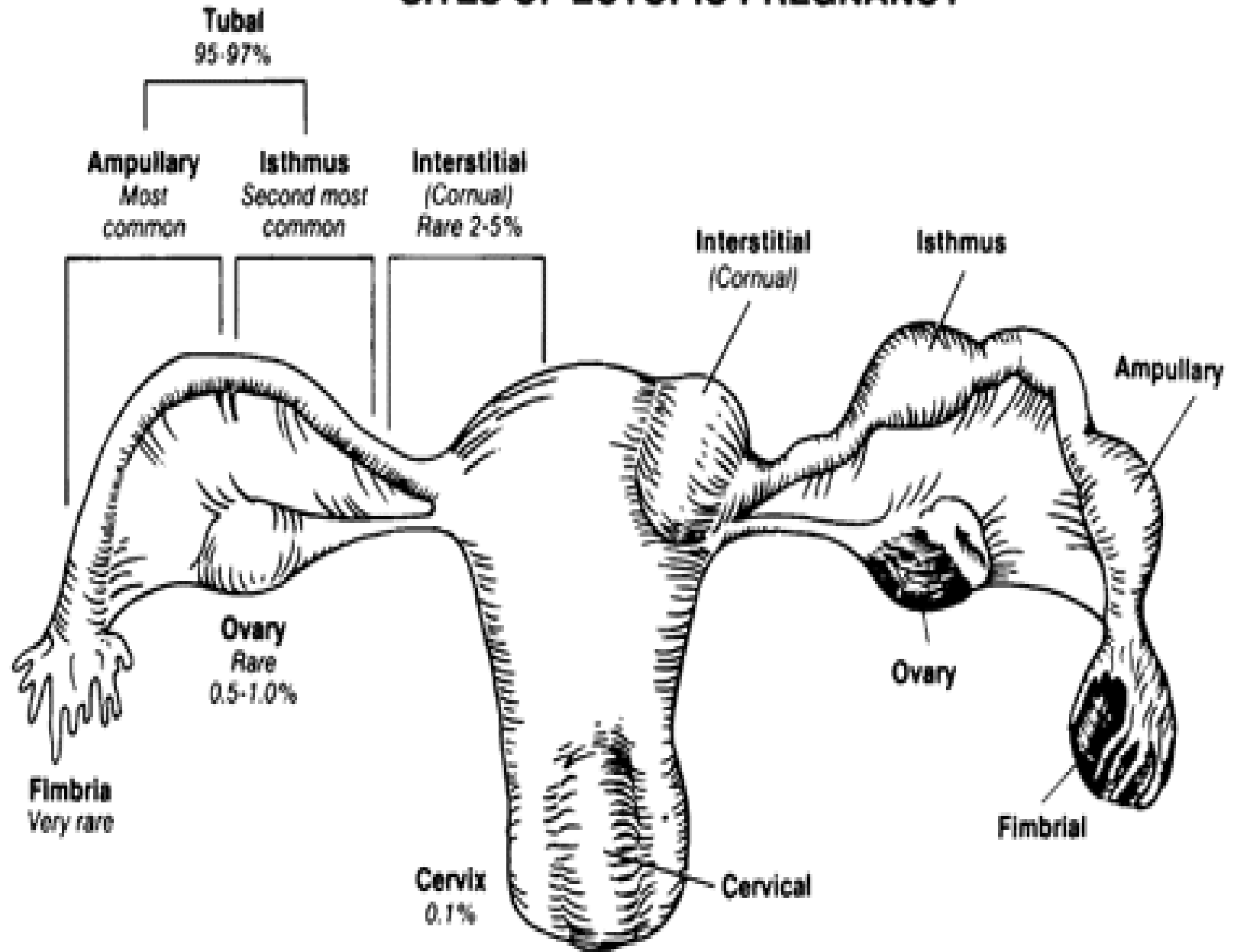
- For approximate due date
  - Mean Sac Diameter under 6 weeks ( $\pm 4$  days)
    - Visible from 4.4 – 5 w on TV scan
    - The subsequent loss rate once a GS has been identified is 11%
  - Crown - rump length (CRL) from 5½ weeks (2 mm)
    - little biological variability
    - rapid increase in measurement
- *EDB determined by CRL measured between 8 and 14 weeks*

*ISUOG Practice Guidelines: performance of first-trimester fetal ultrasound scan*  
Ultrasound Obstet Gynecol 2013; 41: 102–113

# Determining location of pregnancy

- Ectopic pregnancy
  - .25-2% of pregnancies
  - *Incidence* increasing (ART) but *mortality* falling
  - Symptoms may mimic other conditions
  - 30% no known risk factors

# SITES OF ECTOPIC PREGNANCY



# Ectopic pregnancy

- TV ultrasound
  - At best 85 - 90% detection on US
- Biochemistry
  - $\beta$ -hCG – “discriminatory zone” 1500

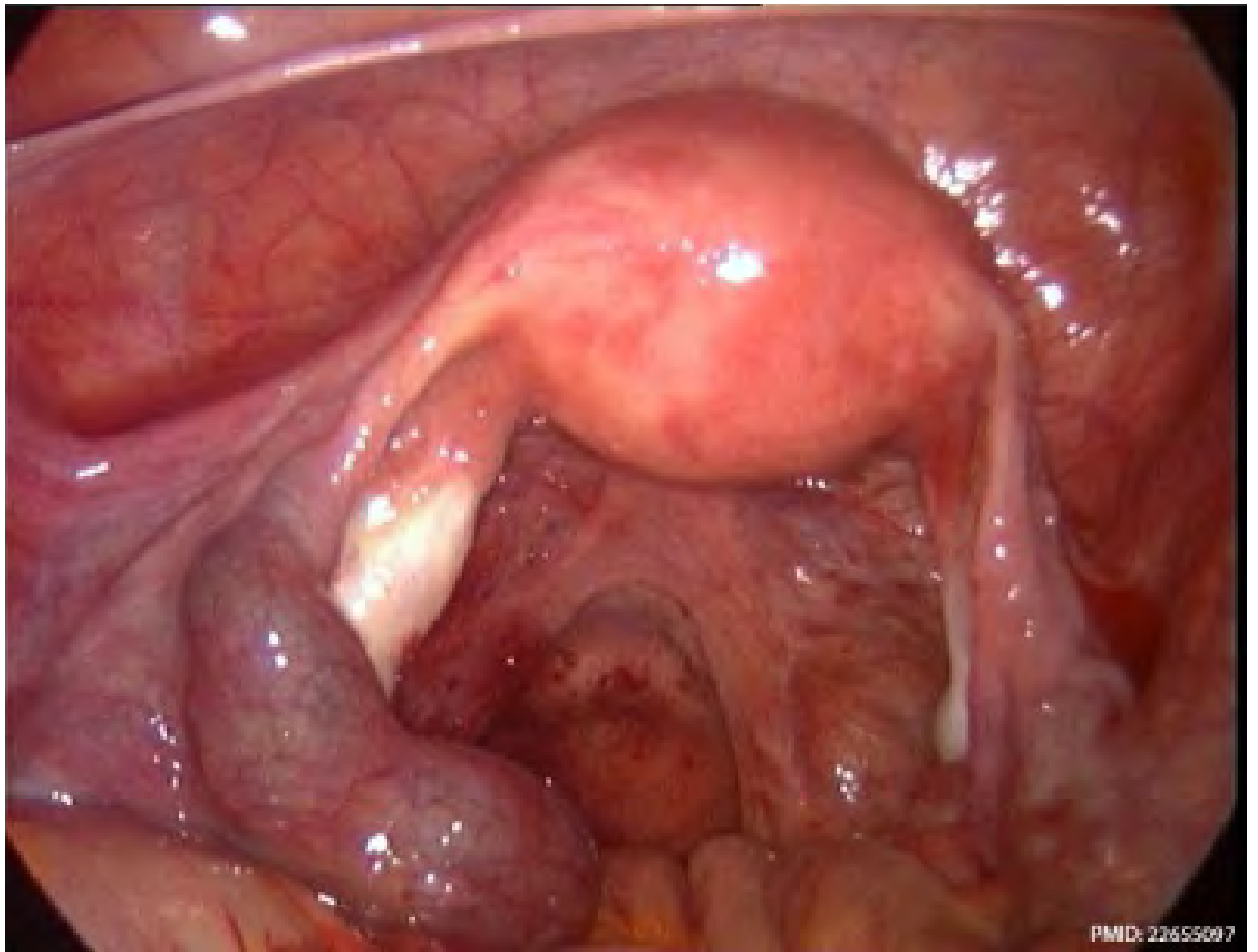
# Reporting ectopic pregnancy

- ***Possible ectopic pregnancy***
  - Clinical Signs & Symptoms
  - BHCG  $>1500$  mIU/ml
  - Absence of IU pregnancy on TV scan

- ***Probable ectopic pregnancy***
  - BHCG > 1500 mIU/ml
  - Absence of IU pregnancy
  - Adnexal mass
  - Free fluid

- ***Ectopic pregnancy***

- GS, YS, +/- embryo & FHM in Fallopian tube on TV ultrasound
- Free fluid



# Pregnancy of unknown location



# Pregnancy of unknown location - A diagnosis of exclusion

## The Clinical Problem:

- positive pregnancy test
- PV bleeding
- inconclusive scan - no evidence of intrauterine or extrauterine pregnancy seen
- *8% of scans will be inconclusive*
- *20% of women cannot recall their LMP*

# PUL

- Commoner if U/S done *early* in gestation

# PUL – natural history

- 8 -31 % of EPAU presentations
  - Normal ongoing pregnancy 71%
  - Miscarriage 18%
  - Inconclusive 8%
  - Ectopic 3%

# PUL - management

- Serial TVS or serum B-HCG
  - Allows a non-surgical “wait & see”
- At least two visits to EPAU
  - Especially with *abnormally rising* B-HCG levels

# Conclusion

- NOT TO MISS
  - Rhesus negative
  - Ectopic pregnancy
  - Molar pregnancy

# Conclusion

Importance of *clinical* features, especially if they *change*

- Limitations and variations of tests –especially if *too early*
- Sensitive, realistic counselling

# Rudyard Kipling

Writer (1865–1936)



*“Words are, of course, the  
most powerful drug used by  
mankind.”*

*—Rudyard Kipling*

