

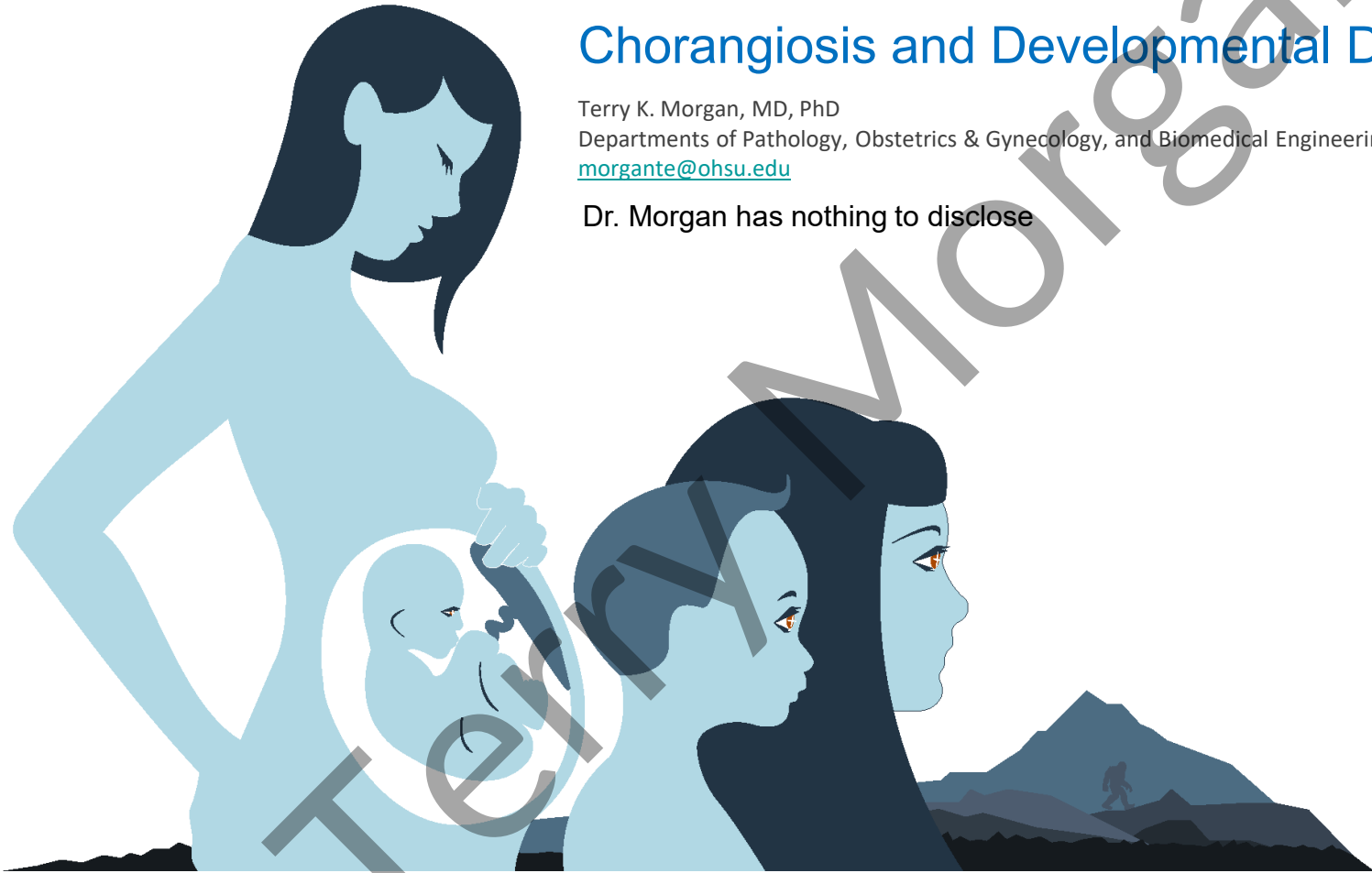
Chorangiosis and Developmental Delay

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Dr. Morgan has nothing to disclose





Most pregnancies
are normal

but when they are
“abnormal”

some mom’s may
blame themselves

and/or their doctors:



MOM



Placenta

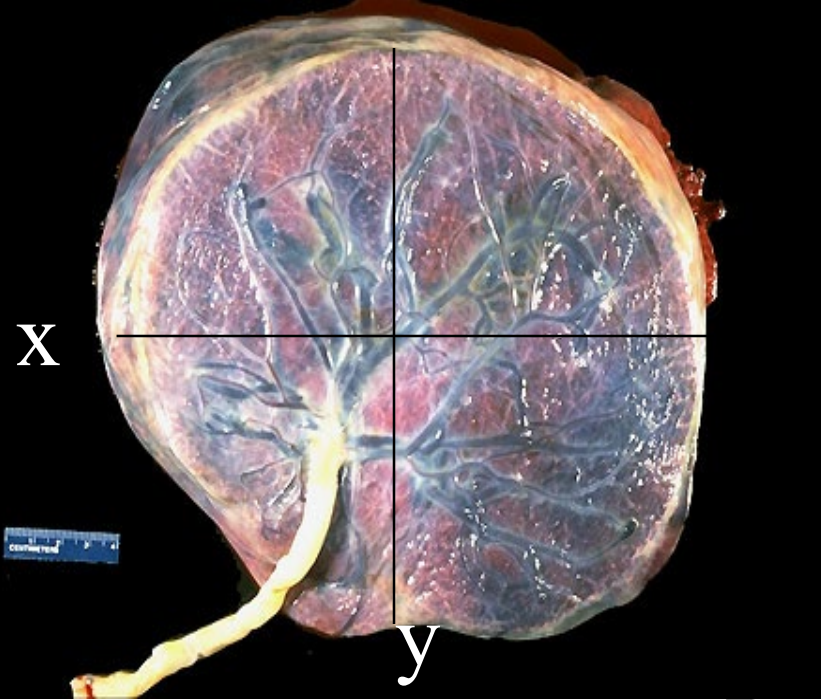
Nutrient “buffer” to “regulate” supply

Nutrient Sink taking away from Fetus (50% rule)



Baby

Autopsy of the Pregnancy



Placenta Goes to Pathology:

1. Sick Mom
2. Sick Baby
3. Abnormal Placenta



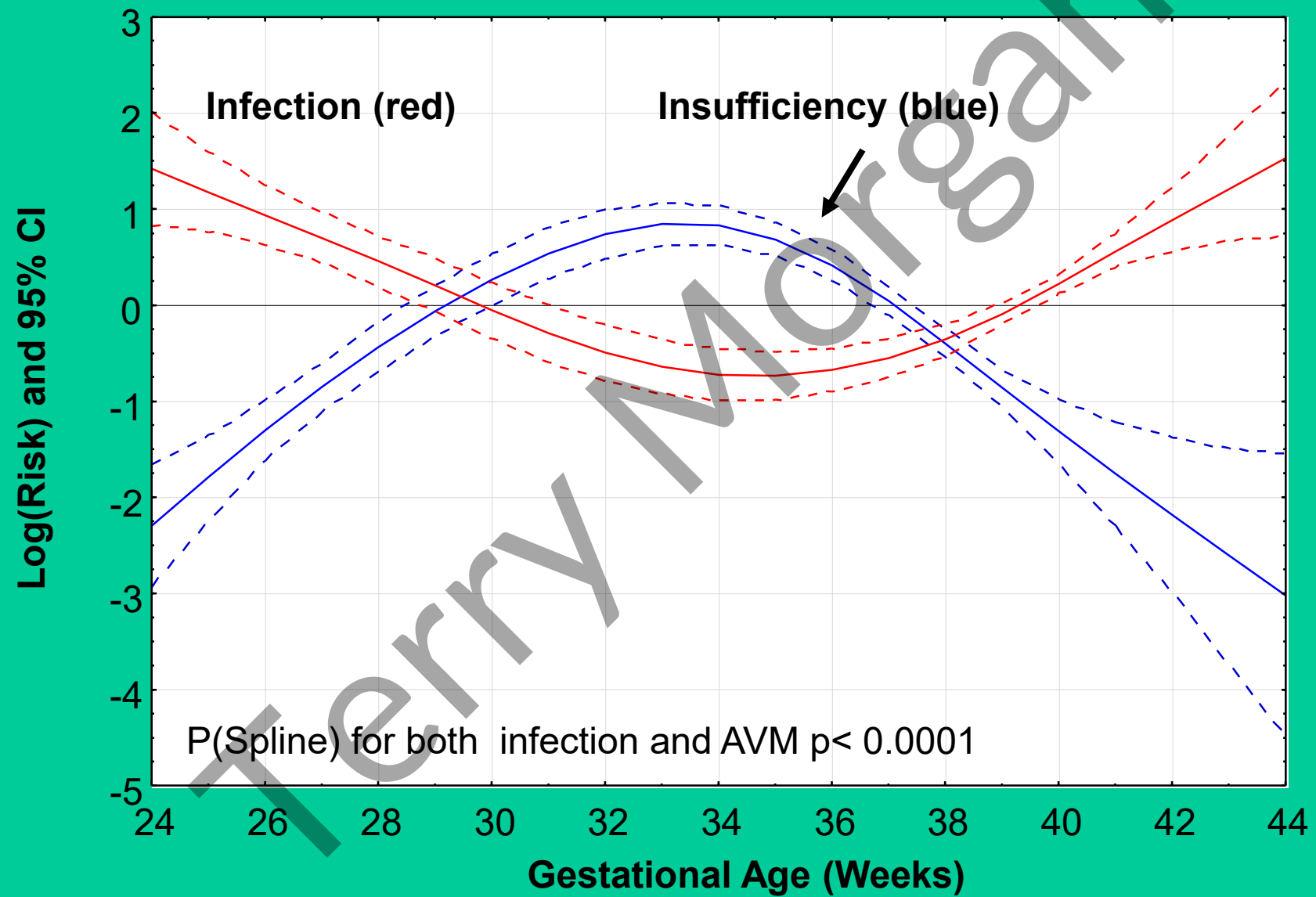
Placentas from Complicated Pregnancies

1252 placentas from University of Oklahoma

- 10% of all deliveries submitted to pathology
- Features of uteroplacental insufficiency (40%)
- Meconium (27%)
- Chorioamnionitis (21%)
- Abruptio (9%)
- Villitis (4%)

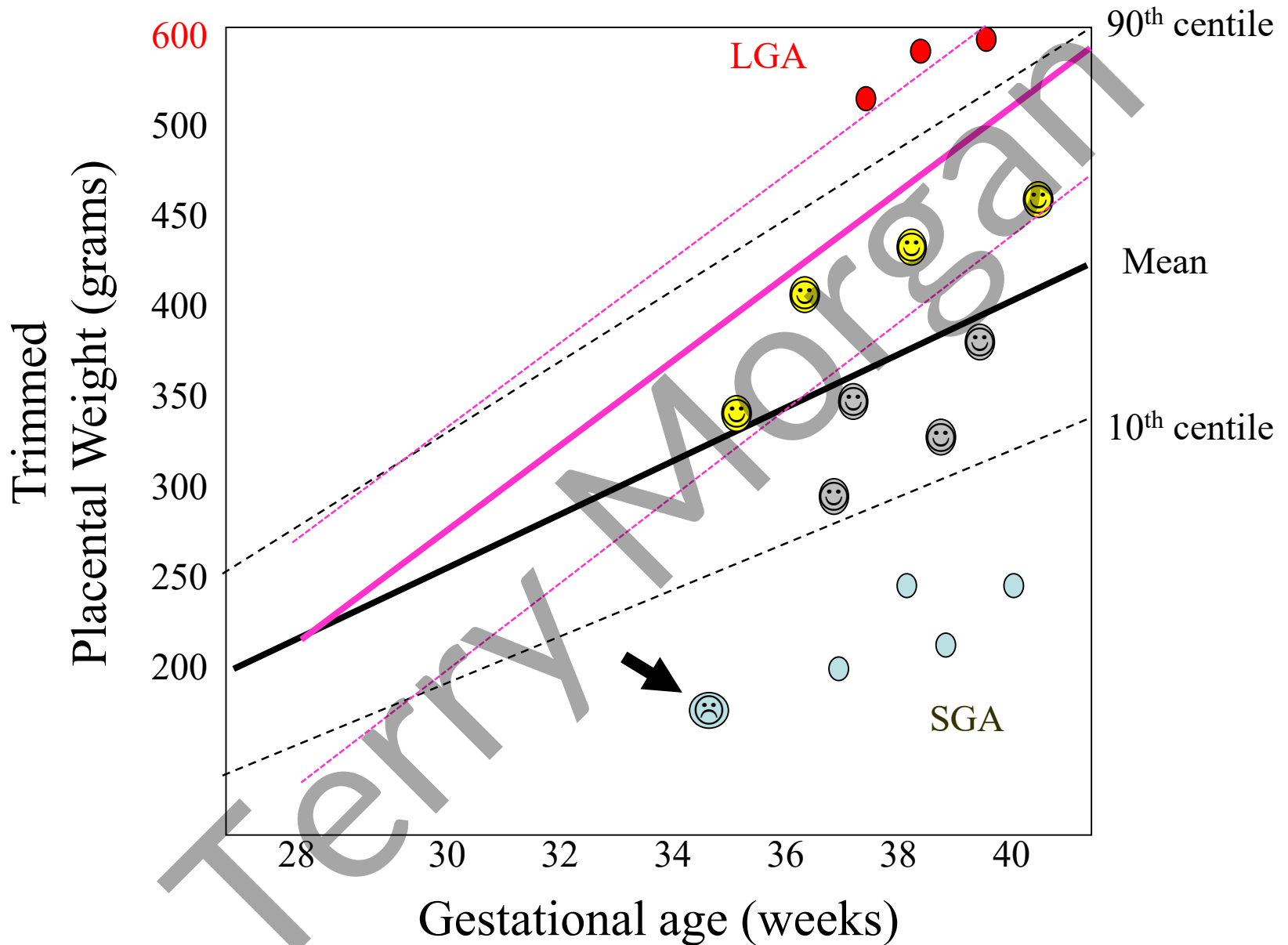
(Beebe L. et al, *Obstet & Gynecol.* 1996; 87 (5): 771-8)

Placental Pathology in OHSU Singletons:



“Uteroplacental Insufficiency” Maternal Vascular Malperfusion

- Small for gestational age: $(\text{age} \times 10) - 50 \text{ g}$
- Infarctions
- Accelerated villous maturation
- **Chorangiomas (fetal angiogenesis in villi)**



Infarction



WebPath



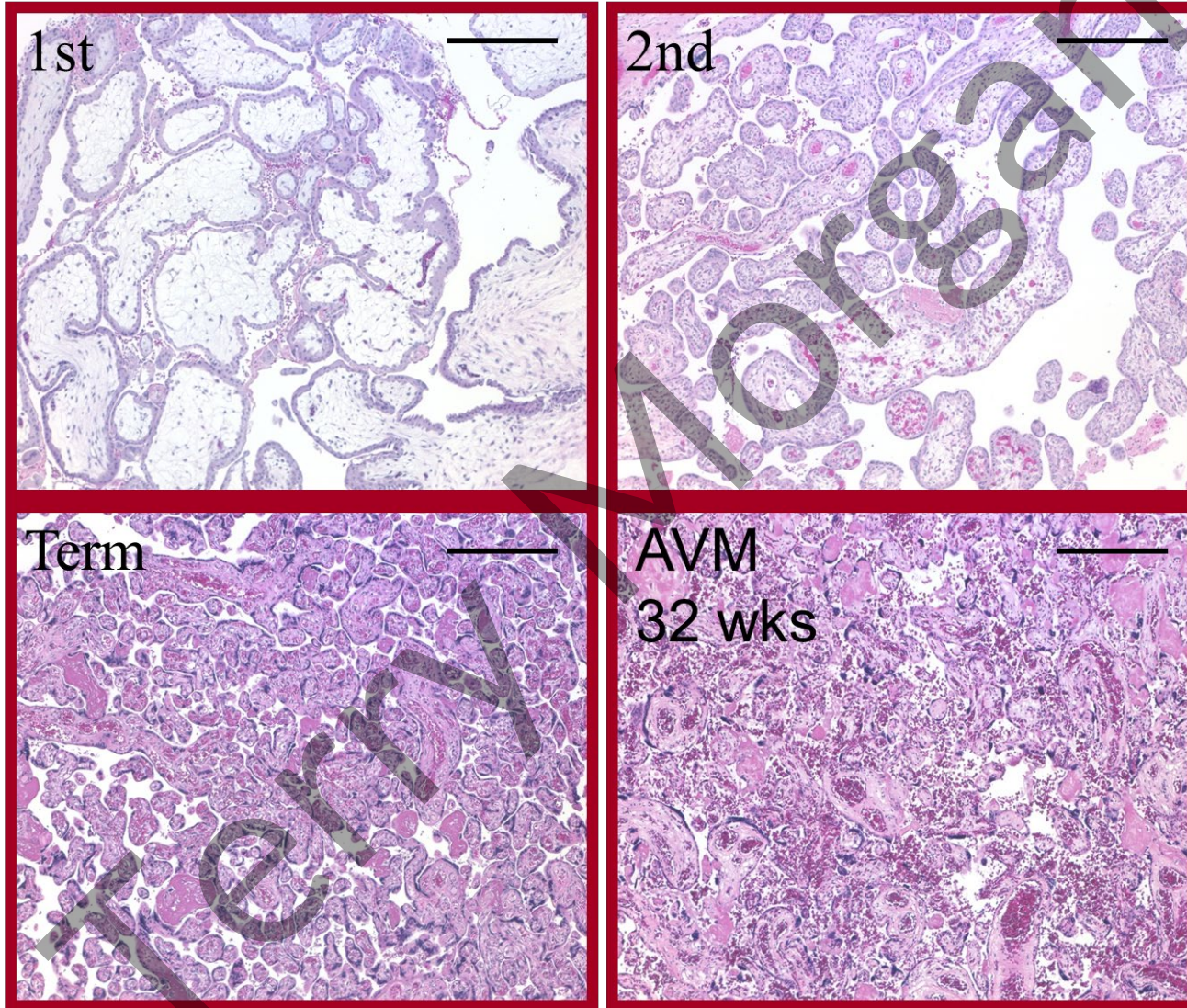
Logan



Snapshot of
Maternal Vascular
Malperfusion (MVM)
34 weeks' PET/IUGR

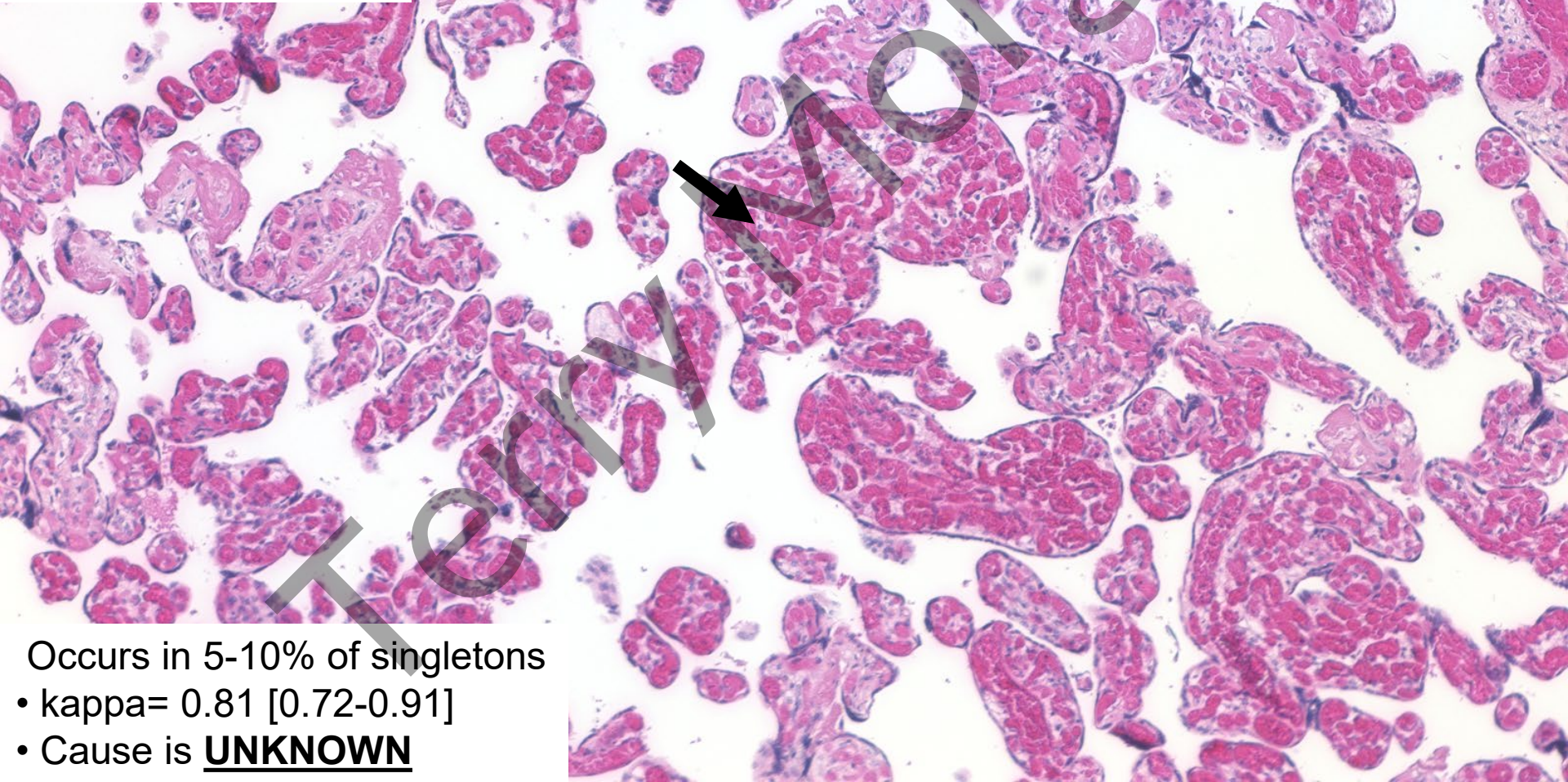
Amsterdam Placental Workshop
Consensus Statement: Khong T, et al. Arch
Pathol & Lab Med. 140:698-713

AVM is Reproducible < 38 weeks'



Altshuler G. **Chorangiosis**.
Arch Pathol Lab Med. 1984;
108: 71-4. *Semin Pediatr Neurol.*
1995 Mar;2(1):90-9

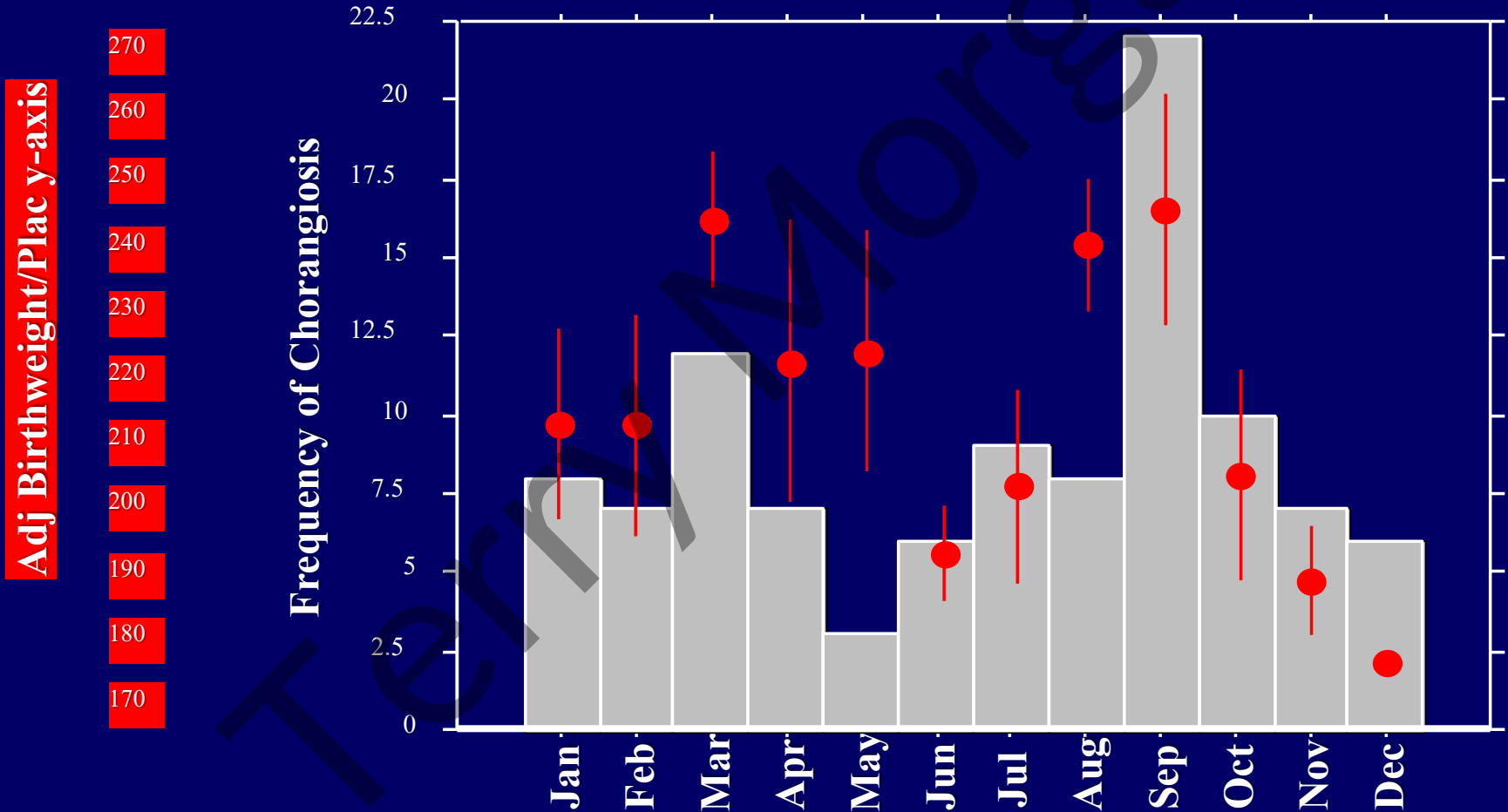
- Cerebral Palsy (weak)
- Stillbirth (weak)
- Smoking (unclear)
- Altitude (likely)
- Diabetes (likely)
- Twins [very likely]



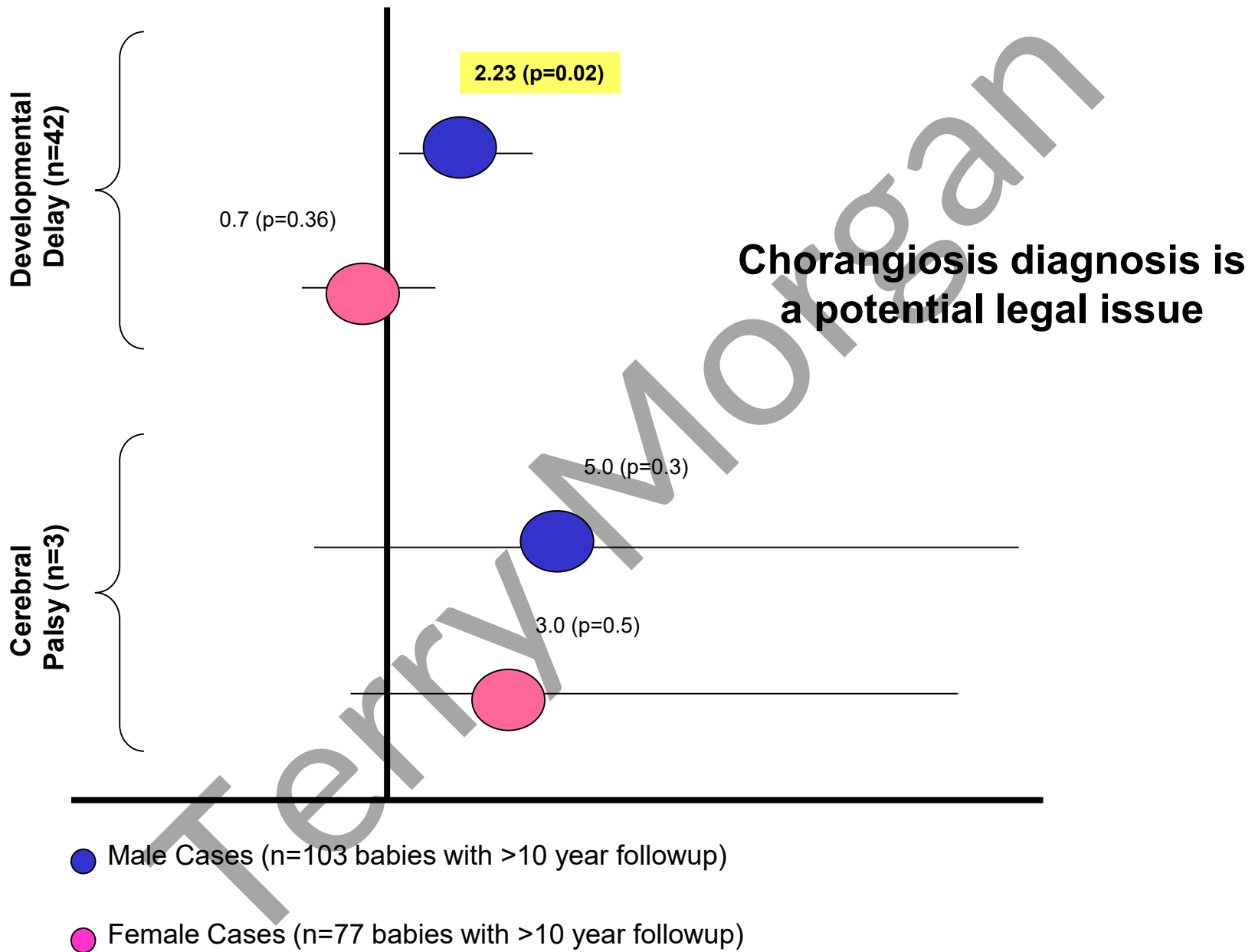
Occurs in 5-10% of singletons

- kappa= 0.81 [0.72-0.91]
- Cause is **UNKNOWN**

Potential Relationship Between *Chorangiosis Frequency* and Birthweight Relative to Placental y-axis length (*Reserve Capacity*)



Null OR=1.0 Compared with Expected Frequencies



Gaps in Knowledge

Is MVM a multifactorial disease with

- Severity problem?
- Timing problem?

What is the underlying pathophysiology?

What are the long-term impacts on baby's health?

Multifactorial Hypothesis

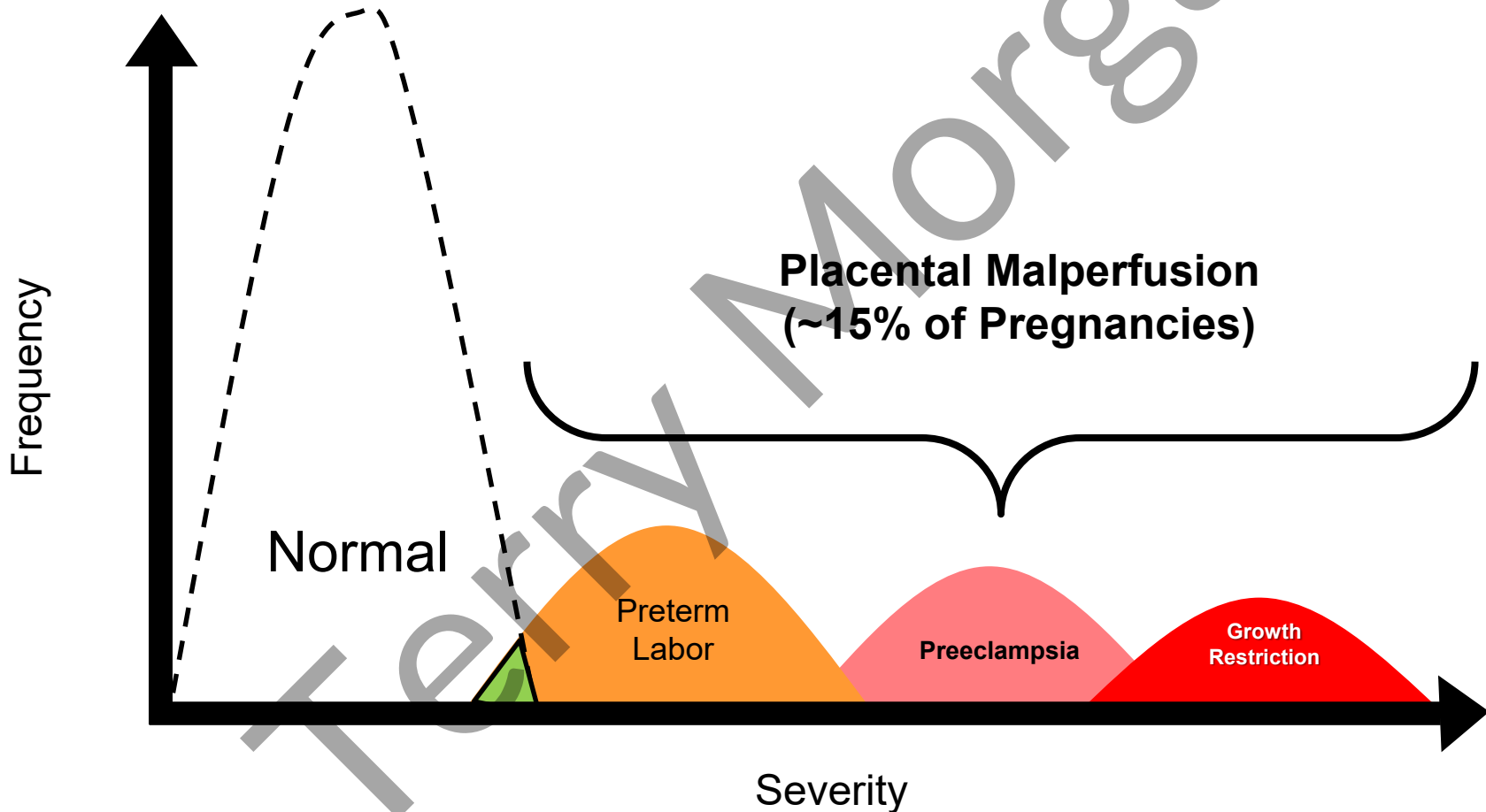


Table 2. Gross and Histologic Findings in Preterm Birth: Oregon Health & Science University Experience^a

| Variable | No. (%) of Cases | | | |
|------------------|-------------------------------|-----------------------------------|--------------------------------|----------------------|
| | PTL with IAI (<i>n</i> = 68) | PTL without IAI (<i>n</i> = 179) | Preeclampsia (<i>n</i> = 121) | FGR (<i>n</i> = 29) |
| SGA placenta | 0 [Reference] | 0 | 12 (10) ^b | 28 (97) ^c |
| Gross infarction | 4 (6) [Reference] | 21 (12) ^d | 30 (25) ^c | 10 (35) ^c |
| AVM | 13 (19) [Reference] | 106 (59) ^c | 70 (58) ^c | 16 (55) ^b |

AVM=accelerated villous maturation; FGR=fetal growth restriction; IAI=intra-amniotic infection; PTL=preterm labor; SGA=small for gestational age.

^aGross and histologic data from the Department of Pathology, Oregon Health & Science University (OHSU), diagnosed by a single placental pathologist (T.K.M.) scoring for small placentas (SGA), which were defined as less than the 10th percentile when using trimmed weight and adjusting for gestational age, gross infarctions (usually 1–2 cm in diameter), and AVM, which was defined as term villous morphologic findings with conspicuous syncytial knotting and perivillous fibrin deposition before 38 weeks' gestation. (9) PTL with or without IAI was defined by the presence or absence of histologic chorioamnionitis (Figure 1). Severe preeclampsia and late-onset FGR were defined clinically by the maternal fetal medicine faculty at the OHSU. Findings were compared by χ^2 analysis with the Fisher exact probability test when appropriate.

^b*P* < .01.

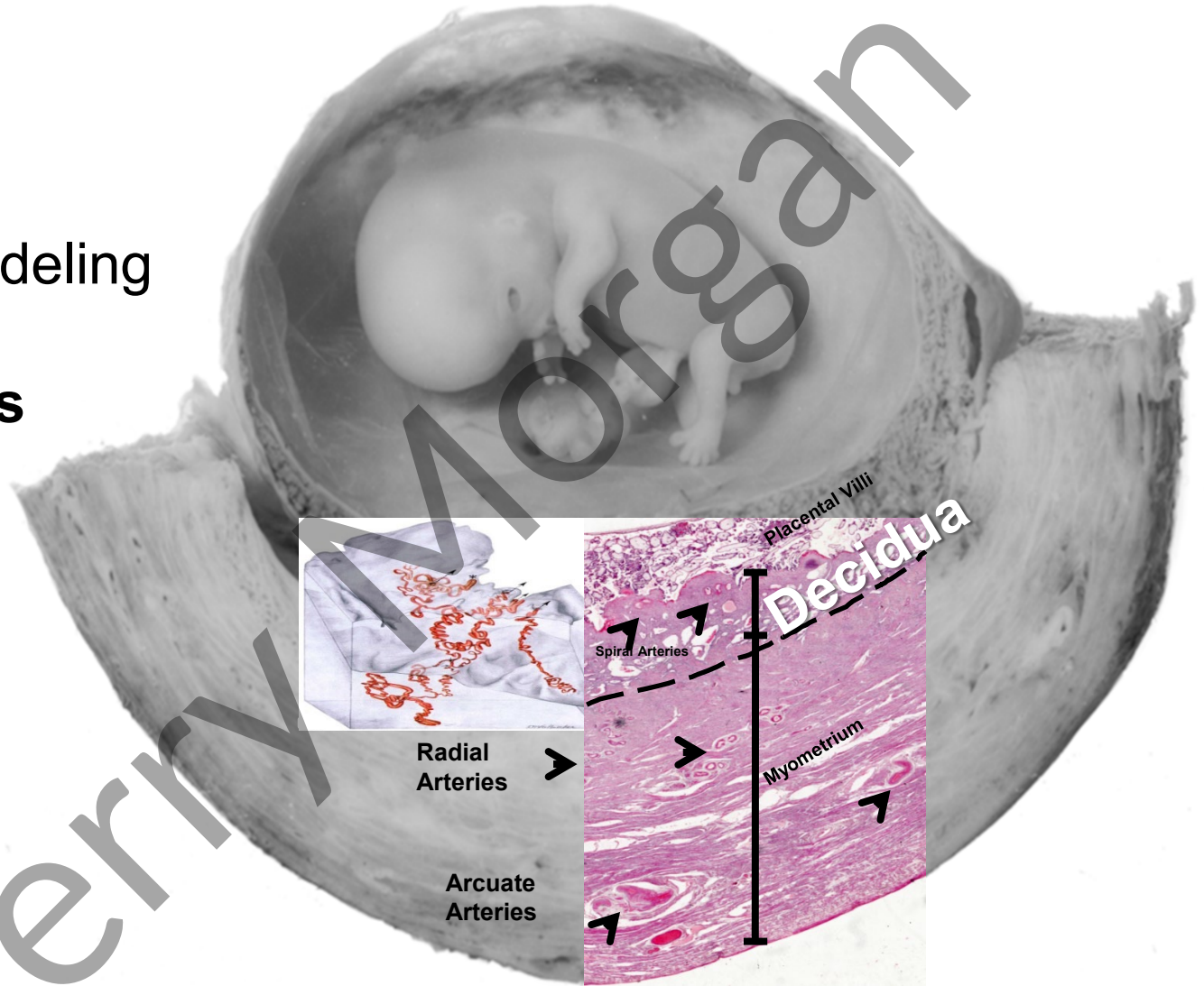
^c*P* < .001.

^d*P* < .05.

Spiral Artery Angiogenesis Is the “Soil”

Upstream Remodeling

Variance Across
Placental Bed



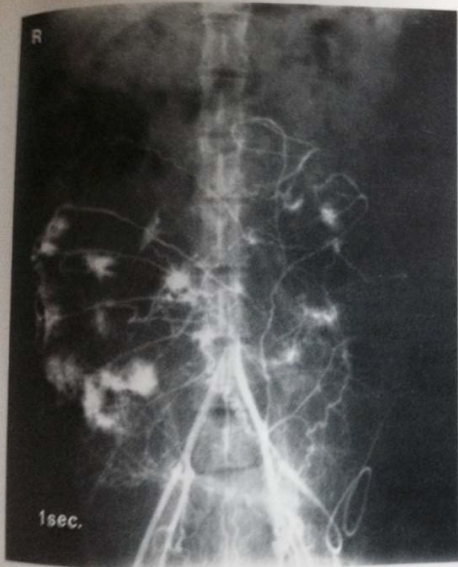


Fig. 86

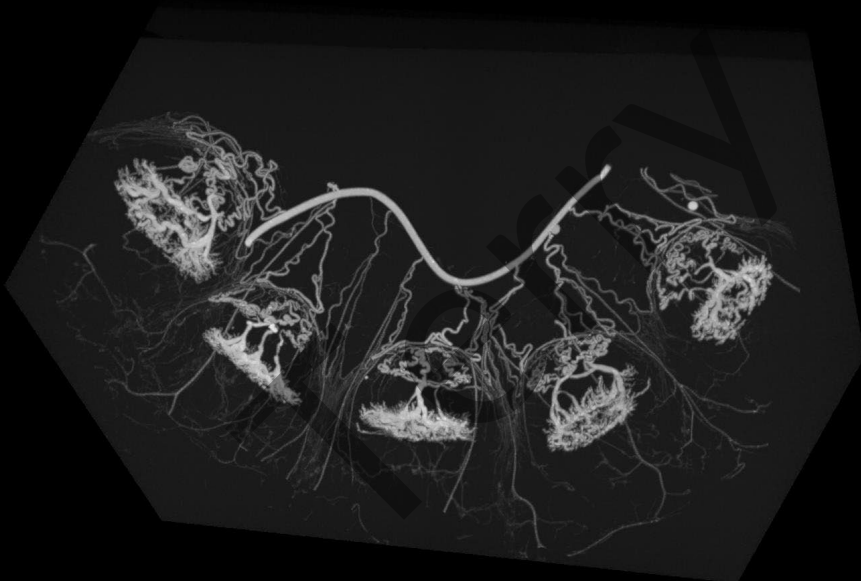


Fig. 87

Dr. Elizabeth Ramsey's
Day 115 Rhesus Pregnancy
Angiography:

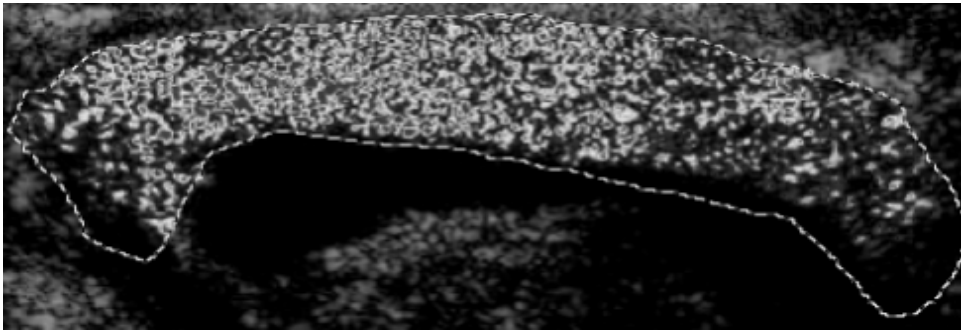
Variable "Spurts"—
*Blood Flow Heterogeneity
Between Cotyledons—*

(Placental Vasculature and Circulation. Ramsey
E, Donner M. 1980. WB Saunders Co.)

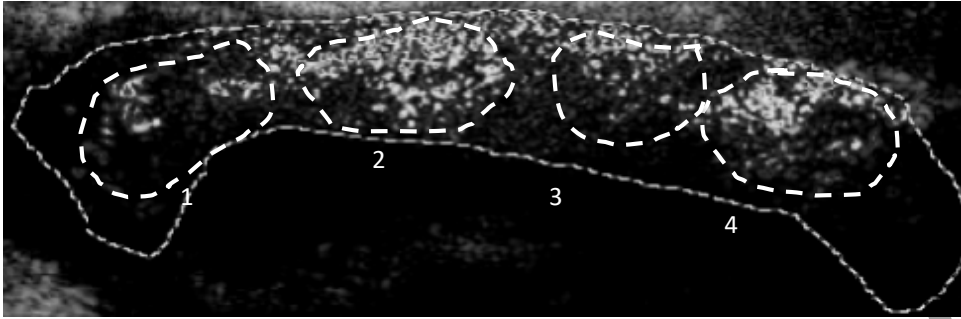
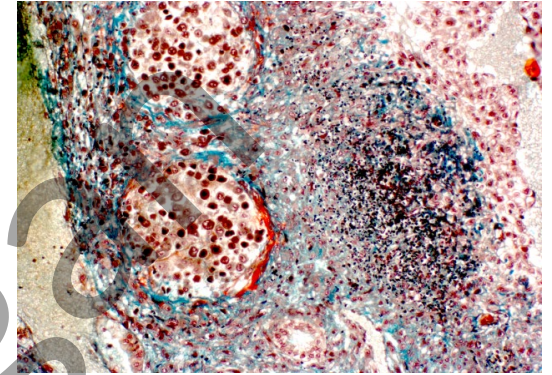


Variable Spiral Artery Growth
and Branching in Mouse Uterus

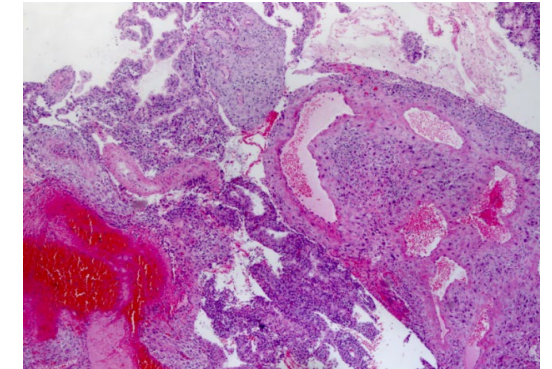
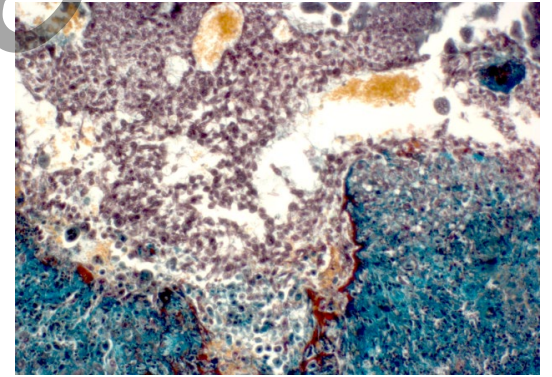
Courtesy Dr. Monique Rennie



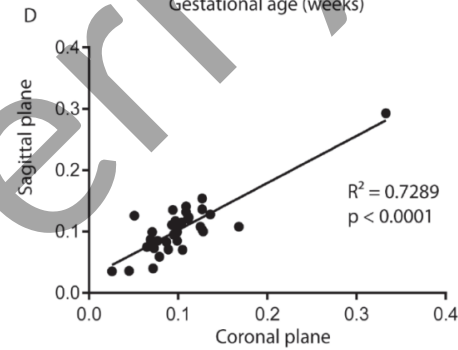
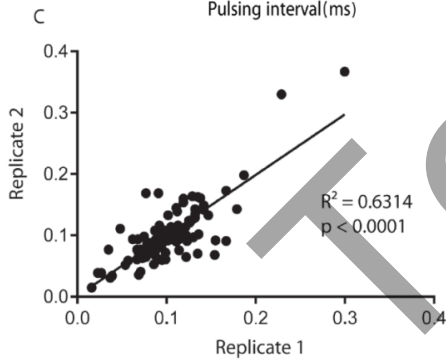
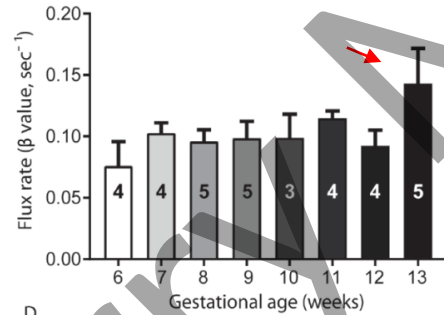
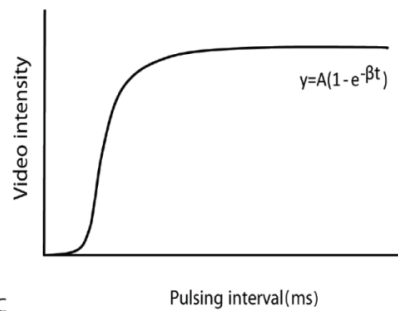
6 Weeks
Arterial Plugs



7 Weeks
Channels



10 Weeks
Wide Open



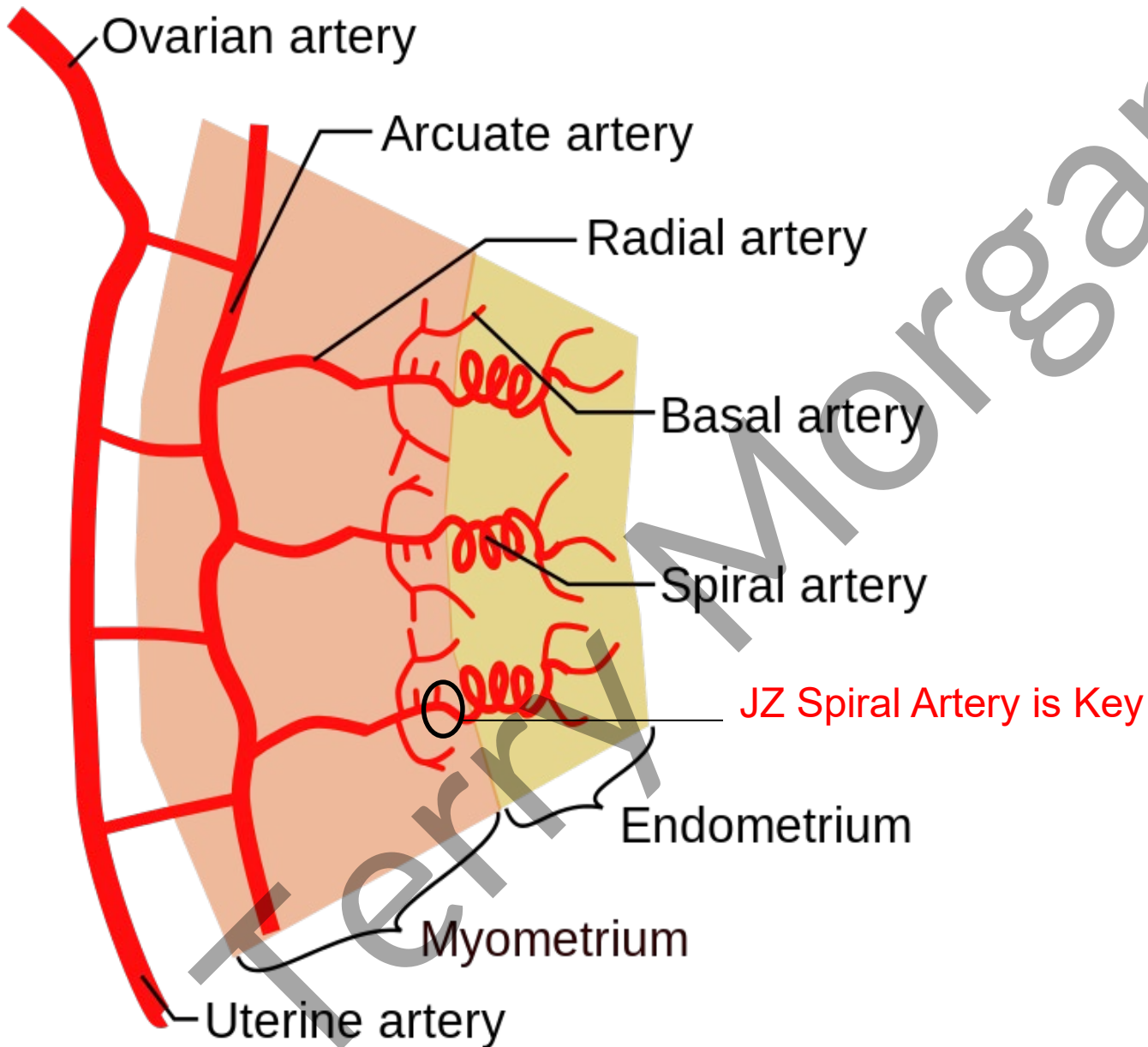
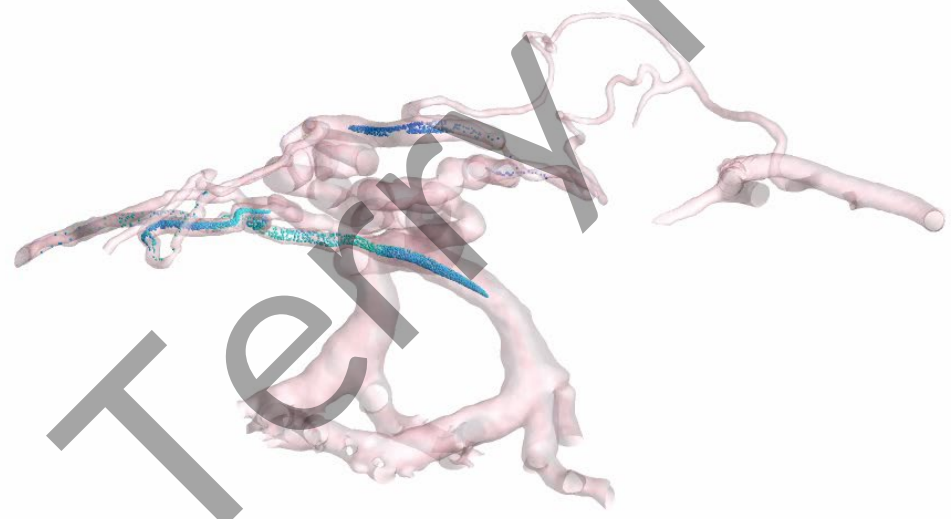


Table III Size of junctional zone spiral arteries (JZSAs) acquired from serial sections of Boyd Collection samples.

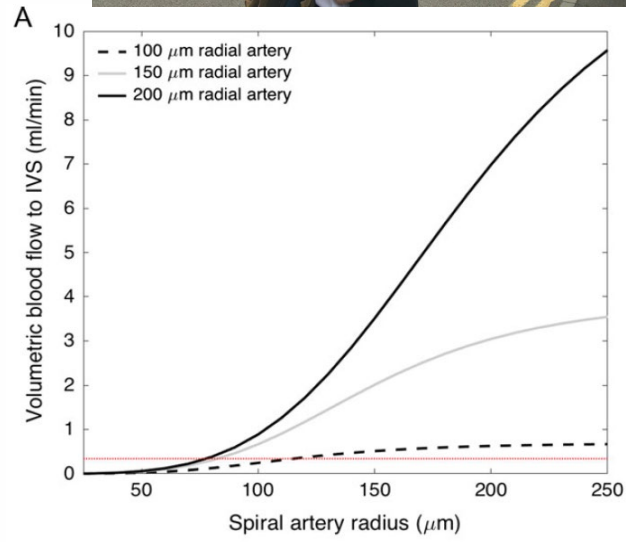
| Sample ID | Gestational week | No. of JZSAs | Mean luminal diameter \pm SD (μm) |
|-----------------------|------------------|--------------|--|
| H710 | 6.1 | 3 | 50.0 \pm 3.6 |
| H750 | 7.0 | 5 | 74.6 \pm 6.5 |
| H937 | 7.6 | 4 | 62.0 \pm 10.4 |
| H916 | 8.4 | 4 | 100.0 \pm 12.4 |
| H630 | 9.6 | 5 | 99.6 \pm 8.4 |
| H653 | 11.3 | 3 | 125.0 \pm 15.0 |
| H691 | 12.3 | 4 | 501.3 \pm 54.7 |
| H1094 | 13.3 | 4 | 250.0 \pm 124.6 |
| H671 | 18.5 | 3 | >600 (outside range) |
| Secretory endometrium | - | 4 | 50.0 \pm 3 |
| Menstrual endometrium | - | 3 | 45.0 \pm 5.0 |

No. indicates how many different blood vessels were examined in each sample.

Allerkamp H, et al. *Hum Reprod.* 2021; 36(3): 571-86

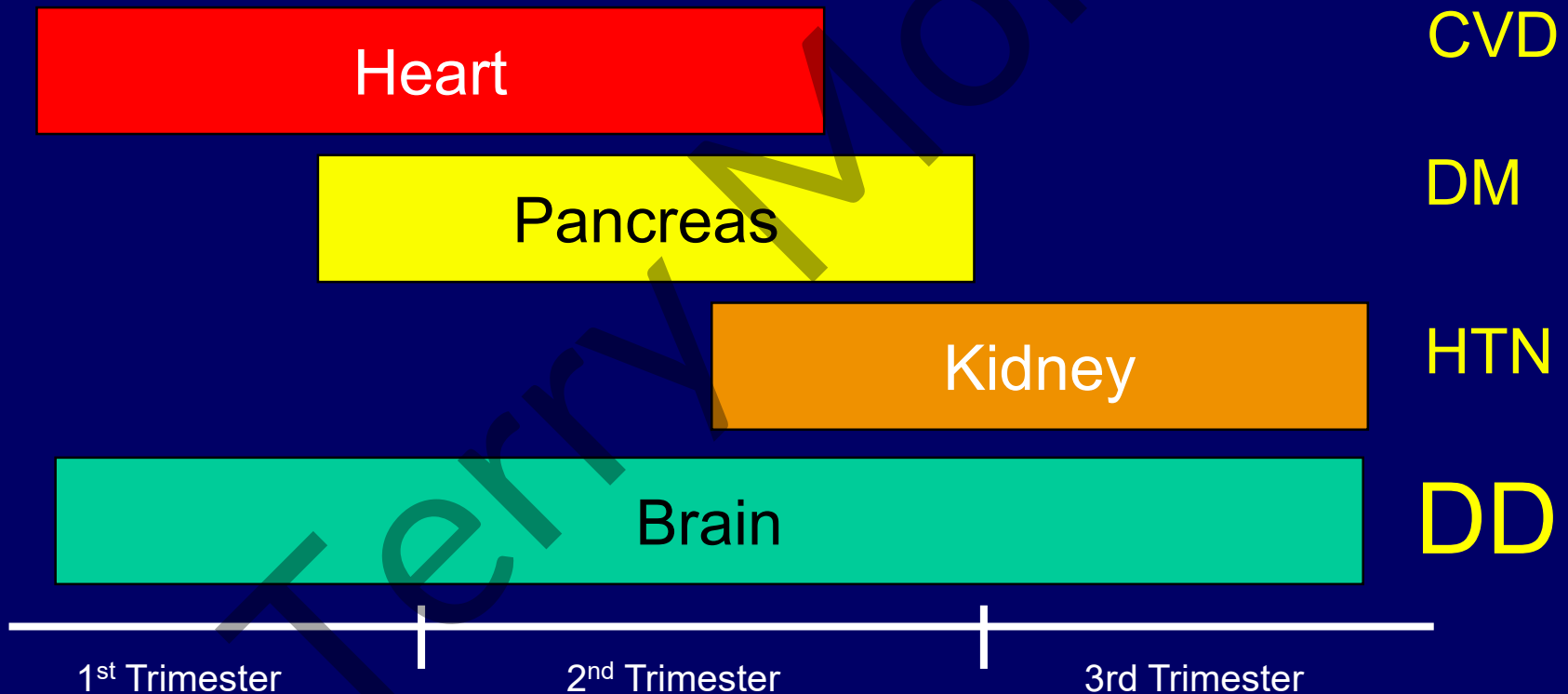


Alys Clark, PhD (NZ)



James J. *Hum Reprod* 2018; 33(8):1430-41

Placental “Insufficiency” and Developmental Programming



“meconium happens”

