



Assessing Fetal Lung Maturity

FLAME LECTURE: 60

BUTLER 2/10/15

Learning Objectives (CREOG)

- ▶ Describe approaches to assessing fetal lung maturity
- ▶ Understand the indications and contraindications for assessing fetal lung maturity
- ▶ Identify and interpret the commonly used fetal lung maturity tests
- ▶ Know which tests are affected by blood and meconium contamination
- ▶ Prerequisites (suggested):
 - ▶ FLAME LECTURE 23: fetal and placental physiology
- ▶ See also – for closely related topics
 - ▶ None

Indications for FLM Assessment

- ▶ To confirm fetal pulmonary maturity before elective scheduled deliveries when a gestational age of 39 weeks or greater can not be inferred
- ▶ Historic criteria used to infer 39 weeks gestation
 - ▶ Ultrasound measurement <20 weeks supporting a gestational age of 39 weeks or greater
 - ▶ Fetal heart tones have been documented as present for 30 weeks by Doppler

Indications for FLM Assessment

- ▶ Testing for fetal lung maturity **should not be performed** if delivery is indicated for immediate fetal or maternal reasons
- ▶ On the flip side, a mature FLM test result before 39 weeks gestation, in the absence of clinical circumstances, is **not an indication** for delivery in itself
 - ▶ RDS, IVH and NEC have been reported in premature newborns with mature FLM tests

Fetal Lung Maturity Tests

- ▶ Two types of FLM tests:
 - ▶ Biochemical tests measure the concentration of certain components of pulmonary surfactant
 - ▶ Biophysical tests evaluate the surface-active effects of these phospholipids.
- ▶ Choice of tests should be based on:
 - ▶ Availability
 - ▶ Presence or absence of contaminants
 - ▶ Physician preference
- ▶ No test has been proven superior

Fetal Lung Maturity Tests

Test	Technique/Concept
Fluorescence polarization TDx-FLM II (No longer available)	Competitive binding of a fluorescent probe to albumin (high polarization) and surfactant (low polarization)
Lecithin/sphingomyelin ratio (L/S ratio)	Thin-layer chromatography; Lecithin increases and sphingomyelin remains constant as preg advances
Phosphatidyl-glycerol (PG)	Thin-layer chromatography; Presence indicates more advanced state of fetal pulmonary maturity
Lamellar body counts	Hematology counter used; Surfactant stored within type II pneumocytes as lamellar bodies
Foam Stability Index (FSI)	Presence of stable bubbles noted; Surfactant generates stable foam in the presence of ethanol

Fetal Lung Maturity Tests

Test	Cut-Off Value	NPV (Mature)	PPV (Immature)	Blood Affects Results	Meconium Affects Results
Fluorescence polarization	55 mg or >	96-100%	47-61%	Yes	Yes
L/S Ratio	> 2	95-100%	33-50%	Yes	Yes
PG	Present	95-100%	23-53%	No	No
Lamellar body counts	50,000	97-98%	29-35%	Yes	No
FSI	47-48 or >	95%	51%	Yes	Yes

Fetal Lung Maturity Tests

- ▶ The negative predictive value for mature neonatal lung function is high
 - ▶ Better at predicting the chance the infant will not develop RDS, than that the infant will
- ▶ TDx-FLM II and PG can be collected and interpreted from vaginal pool samples

Clinical Caveats

- ▶ Complication rate for 3rd trimester amniocenteses: 0.7% (in one study)
- ▶ Before 32 weeks gestation, FLM testing is not indicated because there is such a small % chance of the fetus showing maturity even with poor dating
- ▶ Corticosteroid administration reduces the incidence of RDS but may not have an impact on the results of FLM testing

Clinical Caveats



- ▶ Twin pregnancies:
 - ▶ May need to perform amniocentesis on both twins
 - ▶ Depends on gestational age, concordance of gender and growth
- ▶ Amniotic fluid volumes should not affect results
- ▶ Same cut-off values for FLM tests should be used in diabetics
- ▶ No consensus about when (and whether) to repeat testing if immature

References

- ACOG Practice Bulletin Number 97, September 2008. Fetal Lung Maturity.
- UpToDate.Com, Gillen-Goldstein J, MacKenzie A, Funai E. Assessment of fetal lung maturity.
- Bates E et al. Neonatal Outcomes After Demonstrated Fetal Lung Maturity Before 39 Weeks of Gestation. *Obstet Gynecol* 2010; 116:1288-1295.