Antenatal Testing Guidelines

Purpose: To provide guidance for antenatal testing. The individual clinician should make decisions for an individual patient as to timing, frequency, and type of testing.

1. Antepartum fetal surveillance has been used in pregnancies in which the risk of antepartum fetal demise is increased.

2. Non-stress test (NST): The concordance between fetal movement and accelerations in the fetal heart rate is good evidence of fetal wellbeing. **The non-stress test should be conducted for at least 20 minutes.**
    a. NST results
        i. Reactive NST for pregnancies at 32 weeks or more: Two or more accelerations of at least 15 beats per minute above the baseline, that last for at least 15 seconds, in a 20-minute period of combined FHR and uterine activity monitoring.
        ii. Reactive NST for pregnancies less than 32 weeks: Two or more accelerations of at least 10 beats per minute above the baseline, that last for at least 10 seconds, in a 20-minute period of combined FHR and uterine activity monitoring.
        iii. Nonreactive NST: Lack of sufficient FHR accelerations over a 40-minute period.
    b. Frequency of NSTs**: There are no large clinical trials to guide the frequency of testing, and thus, the optimal testing frequency remains unknown; it depends on several factors and should be individualized and based on clinical judgment.** The following recommendations are proposed by the SHMG Maternal Fetal Medicine group.

Table 2. Suggested Antenatal Fetal Surveillance with Non-stress Test and Growth Ultrasound

Diagnosis	Initiation of NST	Frequency	Initiation of Growth US	Frequency
Advanced Maternal Age (age 35-39 at EDC)	36 weeks	1 x week	32 weeks	Once
Advanced Maternal Age (age > 40 at EDC)	36 weeks	2 x week	28 and 34 weeks	
Alloimmunization (only if doing MCA Doppler) and for all Kell antibodies	32 weeks	2 x week	28 weeks	Q4 weeks
Antiphospholipid Antibody Syndrome	32 weeks	2 x week	28 weeks	Q4 weeks
Cholestasis	32 weeks	2 x week	28 weeks	Q4 weeks
Diabetes, Pre-gestational	32 weeks	2 x week	24 weeks	Q4 weeks
Diabetes, Gestational			At diagnosis	Q4 weeks
Diet controlled	40 weeks	1 x week		
PO medication	32 weeks	2 x week		
Insulin	32 weeks	2 x week		

Diagnosis	Initiation of NST	Frequency	Initiation of Growth US	Frequency
Fetal arrhythmia				
Premature atrial contractions	Not indicated	Not indicated		
SVT and Atrial Flutter. Follow up after cardioversion	At diagnosis	2x week	At diagnosis	Q4 weeks
Bradycardia	At diagnosis	2 x week	At diagnosis	Q4 weeks
Fetal congenital heart disease	Not Indicated	Not Indicated	24 weeks	Q4 weeks
FGR <10th percentile, normal Doppler	See FGR protocol			
FGR with abnormal Doppler	See FGR protocol			
Gastroschisis	32 weeks	2 x week	24 weeks	Q4 weeks
Hemoglobinopathy (only if fetus is growth restricted)	32 weeks	2x week	At diagnosis	Per FGR protocol
Hypertension, Chronic				
No medication	32 weeks	1 x week	28 weeks	Q4 weeks
Medication	32 weeks	2 x week	28 weeks	Q4 weeks
Hypertension, Gestational	Time of Diagnosis	2 x week	At diagnosis	Q4 weeks
Hyperthyroidism Low TSI, Euthyroid	Not indicated	No	32 weeks	Once
Hyperthyroidism High TSI, Euthyroid or uncontrolled	32 weeks	2 x week	28 weeks	Q4 weeks
Hypothyroidism controlled	Not indicated	No	32 weeks	Once
Hypothyroidism uncontrolled	32 weeks	2 x week	28 and 34 weeks	
Maternal cyanotic heart disease	32 weeks	2 x week	24 weeks	Q4 weeks
Obesity (morbid), BMI > 40	36 weeks	1 x week	28 and 34 weeks	
Oligohydramnios (MVP < 2 cm) At 23-37 weeks (Deliver if > 37 weeks)	At diagnosis + Weekly AFI	1 x week	At diagnosis	Q3-4 weeks
Polyhydramnios (idiopathic) (MVP > 8 cm)	32 weeks	1 x week	At diagnosis	Q4 weeks
Post Dates	40 weeks	2 x week		
	42 weeks	IOL		
Pre-eclampsia, normal AFV	Time of Diagnosis	2 x week	At diagnosis	Q4 weeks
Previous IUFD	32 weeks	2 x week	28 weeks	Q4 weeks
Single Umbilical Artery (not indicated unless FGR)	Not indicated		28 weeks and 34 we	
Systemic lupus erythematosus	32 weeks	2 x week	24 weeks	Q4 weeks
Renal Disease, chronic	32 weeks	2 x week	24 weeks	Q4 weeks
Thrombophilia	Not indicated	Not Indicated		

Diagnosis	Initiation of NST	Frequency	Initiation of Growth US	Frequency
Trisomy 21	32 weeks or sooner if FGR	2 x week	24 weeks	Q4 weeks
Turner Syndrome	32 weeks or sooner if FGR	2 x week	24 weeks	Q4 weeks
Twins				
Di-Di concordant growth	Not Indicated	Not Indicated	24 weeks	Q4 weeks
Mono-Di	32 weeks	2 x week	20 weeks	Q4 weeks
Mono-Di, discordant growth with one fetus with selective growth restriction	See FGR Protocol	2 x weeks	At diagnosis	Q2 weeks
Mono-Di with demise of one twin	Time of Diagnosis	2 x week	At diagnosis	Q2 weeks
Umbilical artery Doppler abnormalities Hypocoilling or hypercoiling of cord Umbilical vein varix	32 weeks	2 x week	24 weeks	Q4 weeks
Chorioangioma (> 4 cm)	32 weeks	2 x week	28 weeks	Q4 weeks
Marginal cord insertion	Not indicated		Not indicated	
Velamentous cord insertion	Not indicated unless FGR		28 weeks	Q4 weeks

c. Decelerations
   i. Variable decelerations that are nonrepetitive and brief (less than 30 seconds) are not associated with fetal compromise or need for obstetric intervention. Variable decelerations may be observed in 50% of NSTs.
   ii. Repetitive variable decelerations (at least three in 20 minutes), even if mild, have been associated with increased risk of cesarean delivery for nonreassuring intrapartum FHR pattern.
   iii. Fetal heart rate decelerations during NST that persist for 1 minute or longer are associated with markedly increased risk for both cesarean delivery for nonreassuring intrapartum FHR pattern and fetal demise.
   iv. We recommend prolonged fetal heart monitoring in the presence of fetal heart rate decelerations during NST. We also recommend evaluating amniotic fluid volume. We do not recommend using biophysical profile as the first step to assess fetal heart rate decelerations.

3. Biophysical Profile (BPP): Consists of NST combined with four observations made by real-time ultrasonography.

Table 3. Interpretation of BPP variables in 30 minutes

Fetal variable	Normal behavior (score=2)	Abnormal behavior (score=0)
Fetal breathing movements	One or more episodes of more than 30 seconds duration, within 30 min BPP time frame. Hiccups count.	Completely absent breathing or no sustained episodes. Continuous breathing without cessation
Body or limb movements	At least three discrete body or limb movements in 30 minutes. Includes fine motor movements, rolling movements, but not REM or mouthing movements	Three or fewer body/limb movements in a 30 minute observation period
Fetal tone/posture	One or more episodes of active extension with rapid return to flexion of fetal limbs and brisk repositioning/truck rotation. Opening and closing of hand, mouth, kicking, and so on	Low-velocity movement only. Incomplete flexion, flaccid extremity positions, abnormal fetal posture. Must score = 0 when FM completely absent
Amniotic fluid evaluation	At least one pocket ≥2 cm with no umbilical cord. Also consider criteria for subjectively reduced fluid	No cord-free pocket ≥ 2 cm, or multiple elements of subjectively reduced amniotic fluid volume definite
Non-stress test	At least two episodes of fetal acceleration of ≥15 beats/minute and of ≥15 seconds duration. Normal mean variation (computerized FHR interpretation), accelerations associated with maternal palpation of FM (accelerations graded for gestation)	Fetal movement and accelerations not coupled. Insufficient accelerations, absent accelerations, or decelerative trace. Mean variation < 20 on numerical analysis of NST

Table 4. Biophysical Profile Scoring

BPP	Interpretation	Predicted PNM/1000*	Recommended Management
10/10 8/8 8/10 (AFV- normal)	No evidence of fetal asphyxia present	Less than 1/1000	No acute intervention on fetal basis. Serial testing indicated by disorder-specific protocols
8/10 (oligohydramnios)	Chronic fetal compromise possible	89/1000	For absolute oligohydramnios, prove normal urinary tract, disprove asymptomatic rupture of membranes
6/10 (AFV normal)	Equivocal test, fetal asphyxia is not excluded	Depends on progression (61/1000 on average)	Repeat testing immediately, before assigning final value. If score is 6/10, then 10/10 in two continuous 30-min periods, manage as 10/10. For persistent 6/10, deliver the mature fetus, repeat within 24 hours for the immature fetus, then deliver if less than 6/10.
4/10*	Acute fetal asphyxia likely. If oligohydramnios, acute or chronic asphyxia very likely	91/1000	Delivery by obstetrically appropriate method with continuous monitoring
2/10*	Acute fetal asphyxia, most likely with chronic decompensation	125/1000	Delivery for fetal indications (usually cesarean section)
0/10*	Severe, acute asphyxia virtually certain	600/1000	Delivery immediately by cesarean section

PNM- perinatal mortality. Per 1,000 live births, within 1 week of test result shown, without intervention.

*For scores of 0, 2, or 4, intervention should begin virtually immediately, provided the fetus is viable.

4. Modified BPP: Combines the NST and amniotic fluid volume assessment.
    a. Normal modified BPP result: NST is reactive and the amniotic fluid volume is greater than 2 cm in the deepest vertical pocket .
    b. Abnormal modified BPP result: Either the NST is nonreactive or the amniotic fluid volume in the deepest vertical pocket is 2 cm or less (ie, oligohydramnios is present).

5. Umbilical artery Doppler velocimetry: A technique of fetal surveillance for the growth-restricted fetus. **Currently there is no evidence that umbilical artery Doppler velocimetry provides information about fetal well-being in the fetus with normal growth.**
    a. Flow velocity waveforms in the umbilical artery of normally grown fetuses differ from those of growth restricted fetuses. Specifically, the umbilical flow velocity waveform of normally

growing fetuses is characterized by high-velocity diastolic flow, whereas in growth-restricted fetuses, there is decreased umbilical artery diastolic flow.

b. Commonly measured flow indices:
    i. Systolic to diastolic ratio (S/D)
    ii. Resistance index (S-D/S)
    iii. Pulsatility index (S-D/A
c. Randomized studies generally have defined *abnormal flow* as either absent or reversed end-diastolic flow.

References:

Antepartum fetal surveillance. Practice Bulletin No.145. America College of Obstetricians and Gynecologists. Obstet Gynecol 2014; 124:182-92.

Harman CR, Kush ML, Baschat AA. Antepartum Testing. Maternal Fetal Medicine Evidence Based Guidelines 2008; 360-382.