

## Obstetrics Guidelines

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### **SUBJECT: ANTEPARTUM TESTING-FETAL SURVEILLANCE**

#### **OBJECTIVE**

This guideline provides a consistent approach to fetal surveillance and utilization of various methods of antenatal testing.

#### **DEFINITIONS**

Antepartum testing: Assessments that may include the use of maternal self-monitoring, electronic fetal monitoring, vibroacoustic stimulation, and/or ultrasound to assess various indicators of fetal well being.

AFI: Amniotic Fluid Index: A semi-quantitative technique use to evaluate amniotic fluid volume

BPP: Biophysical Profile: The combined observation of four separate fetal biophysical variables (fetal breathing movements, fetal body movement, fetal tone, amniotic fluid index) obtained via ultrasound and a fifth component of fetal reactivity evaluated via a non-stress test using electronic fetal monitoring.

CST: Contraction Stress Test: The observation of fetal heart rate response to three contractions that must be felt by the mother in ten minutes.

NST: Non-stress Test: A method of assessing fetal well being by observing the fetal heart rate response to fetal movement.

VAS: Vibroacoustic Stimulation: A non-invasive method of evoking a reactive NST in fetuses found to be in a low activity state via a device that emits vibration and sound.

#### **POSITION STATEMENTS**

The purpose of antenatal testing is to identify a pregnancy/fetus at risk for perinatal mortality or morbidity. Antenatal testing is intended for evaluation of pregnancies/fetuses > 25 weeks gestation.

The basic formal testing scheme is NST/AFI, also called the modified BPP (Eden et al., 1988; Miller, Rabello, & Paul, 1996). On occasion NST alone may suffice. Antenatal testing begins at different gestational ages depending on the maternal and/or fetal condition. Antenatal testing is initiated when the condition is recognized (e.g. IUGR-Intrauterine growth restriction, postterm) or at a gestational age when the pregnancy is felt to be at risk (e.g. 32 weeks for history of an unexplained, third trimester, fetal demise). For other conditions, antepartum testing begins in the third trimester at 34 - 36 weeks (e.g. active substance abuse).

To avoid high false positive results, antenatal testing should be initiated only in pregnancies at risk for perinatal mortality or morbidity. Utilizing a screening test in a low risk population will cause an unacceptable rate of false positive results and inappropriate patient anxiety. There are many conditions that when seen alone may not necessitate antepartum testing.

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Some examples include: well controlled asthma, advanced maternal age, smoking, inactive substance abuse, well controlled seizure disorders, non-cyanotic maternal heart disease, omphalocele, and fetal arrhythmia with normal baseline heart rate documented by ultrasound.

Abnormal tests warrant further investigation as outlined in the procedure that follows.

### PROCEDURE

#### I. Methods of Fetal Surveillance

##### A. Fetal Movement Assessment (fetal kick counts)

Fetal assessment via recording of fetal movement by the mother, may be done by any obstetrical patient. It is most often used as the initial test for patients with mild risk factors in pregnancies > 25 week's gestation. Patients undergoing NST/AFIs and other antenatal testing should be given Fetal Movement (Kick Count) instructions (Sadovsky, Weinstein, & Even, 1981).

1. Instruct the patient to assess her fetal movements for a period of up to 60 minutes, once daily, usually at or after a meal. Four movements in one hour are considered normal and she may stop counting once this number is reached.
2. If the patient perceives less than 4 movements in a 60-minute period, she should call her provider.
3. See Appendix A for Fetal Movement [Kick Count] Patient Instruction Sheet

##### B. Non Stress Test (NST)

A Non Stress Test is a method of assessing fetal well being by observing the fetal heart rate response to fetal movement. This test has been shown to be predictive of fetal outcomes. The NST is usually administered, when indicated, to women after 26 weeks gestation.

A reactive NST is associated with survival of the fetus for one week or more in more than 90% of cases [99.8% in the ACOG document] (ACOG, 1999). A non-reactive test is associated with poor fetal outcome in 20% of cases. Because of the high false positive rate in clinical applications of this test (80%), the non-reactive fetus requires further evaluation such as biophysical profile (BPP) and/or contraction stress test (CST). The clinician administering a NST is to assist the patient in understanding the purpose and process of the procedure.

Indications: Refer to Section II: Testing Guidelines

Procedure:

1. Gather needed equipment including an electronic fetal monitor, external transducers (ultrasound; tocodynamometer), activate the patient on the BirthNet monitoring system, and label the paper tracing (if used) with the patient's name, medical record number, gravida, para, week's gestation, and test indication.
2. Position the patient in right or left lateral recumbent or semi-fowler's position to maximize uterine blood flow (supine position decreases uteroplacental blood flow).
3. Blood pressure

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4. Additional patient assessments as indicated by patient condition are recorded on the monitor strip. Blood pressure is re-taken if the initial finding is different from the patient baseline blood pressure. If the patient is diabetic, record the last accucheck reading on the monitor strip.
5. Apply the external transducers. The tocodynamometer is applied to record any spontaneous contractions the patient may have; this information may be important should periodic fetal heart rate changes be present.
6. Obtain a good quality fetal monitor strip with no interruptions in fetal heart rate tracing if possible.
7. If the fetus is inactive several minutes after beginning the procedure, stimulate the baby once with gentle physical manipulation.
8. If no reactivity by 20 minutes, proceed to VAS (below) and continue the test for 20 more minutes. If no VAS performed, monitor for 40 minutes maximum before proceeding to either a Biophysical Profile (BPP) or Contraction Stress Test (CST).
9. Take the patient off the monitor when the test is complete. The test is complete when the fetus has had 2 accelerations within a 20-minute period of at least 15 beats per minute (BPM) from the fetal heart rate baseline lasting at least 15 seconds. (Under 32 weeks gestation, 10 bpm lasting 10 seconds may be used per ACOG guidelines [1994])
10. Review the NST with the responsible clinician (RN, CNM, MD) prior to patient discharge.
11. Document NST results, patient instructions, and planned follow-up in the patient record (e.g. MARS).
12. Place all monitoring strips in the appropriate bin/box for daily review by an attending physician.

#### Criteria for interpretation of NST

Reactive: Two episodes of FHR accelerations in a 20-minute period that are 15 seconds duration and 15 bpm above baseline (< 32 weeks: 10 bpm for 10 seconds). Accelerations are usually associated with fetal movement.

Non-reactive: Failure to meet reactive criteria; less than 2 accelerations or accelerations less than 15 bpm peak amplitude or accelerations less than 15 seconds duration in 20 minutes; baseline rate may be outside or within the normal range.

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### C. Vibroacoustic Stimulation (VAS)

VAS may be used to obtain reactive NSTs in fetuses who are found to be in a low activity state. Reactivity evoked by VAS is as reliable as that occurring spontaneously (Smith, Phelan, Platt, Broussard & Paul, 1986). Small variable decelerations occurring immediately after VAS are quite common and non-pathologic. Further, a sustained acceleration lasting 3 minutes (coalescence) also constitutes a reactive NST.

#### Procedure:

1. After at least 20 minutes of non-reactivity stimulate (“Buzz”) the fetus through the maternal abdomen
2. Stimulate for 1 second and wait 1 minute
3. If the fetus is non-reactive, stimulate up to 2 seconds
4. Failure to become reactive requires further evaluation (BPP or CST)

### D. Amniotic Fluid Index (AFI)

Amniotic fluid index is a semi-quantitative technique used to evaluate amniotic fluid volume (Phelan, Ohn, Smith, Rutherford, & Anderson, 1987; Moore & Cayle, 1990).

#### Procedure:

1. The patient is positioned in the semi-fowler or supine position. The uterus is divided into 4 quadrants with the linea nigra and the umbilicus serving as the dividing points.
2. An ultrasound transducer is placed along the patient’s longitudinal axis and perpendicular to the floor.
3. Each quadrant is scanned using this technique and the vertical diameter of the largest pocket, excluding cord in the measurement, in each quadrant is measured in centimeters. (In patients less than 24 weeks [usually not candidates for antenatal testing], a maximal vertical pocket should be measured and recorded).
4. Results are defined as follows:
  - a.  $\leq 5$  oligohydramnios
  - b. 5.1 to 8 low normal
  - c. 8.1 to 24 normal
  - d.  $> 24$  polyhydramnios
5. In twins, the maximal vertical pocket (MVP) is measured for each fetus. Normal is 3.0 – 8.0 cm.

### E. Biophysical Profile (BPP)

A biophysical profile is the combined observation of five separate biophysical variables: movement, tone, reactivity, breathing, and amniotic fluid volume (Manning, Morrison, Lange, & Harman, 1985). At least one identified AF pocket measuring 2 x 2 cm is scored a 2; less amniotic fluid is scored a 0. When a BPP is done in the ultrasound unit, this is how it is reported.

When the BPP is done in the antepartum testing unit, the AFI described above is reported as well as the BPP. Today, more information is provided if the four biophysical variables are assessed and reported as x of 8 ( which includes the NST) along with an assessment and calculation of an amniotic fluid index as described above (e.g. 6

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of 8; AFI 7.0). Fetal movement, tone, breathing, and AFI are assessed with the use of real time ultrasound for a maximum of 30 minutes. A score of 0 may not be **given for any variable** unless the provider has observed for 30 minutes.

<b><i>BPP SCORING: X OF 8</i></b>		
<b><u>VARIABLE</u></b>	<b><u>NORMAL (Score = 2)</u></b>	<b><u>ABNORMAL (Score = 0)</u></b>
a) Fetal Breathing Movements (FBM)	1 episode of FBMs (or hiccoughs) of 30 seconds duration	< 30 seconds of sustained FBMs
b) Fetal Movements (FM)	3 discrete body/limb movements (simultaneous limb and trunk movements are counted as a single movement)	≤ 2 episodes of FMs
c) Fetal Tone	1 episode of active extension with rapid return to flexion of fetal limb(s), trunk, or hand	Either slow extension with return to partial flexion or movement of limb in full extension or absent fetal movement
d) Reactive Fetal Heart Rate (FHR)	2 accelerations of 15 bpm peak amplitude lasting 15 seconds at the baseline within 20 minutes	< 2 accelerations or accelerations < 15 bpm peak amplitude or accelerations < 15 seconds duration in 20 minutes
<b>PLUS</b>		
<b><u>AFI</u></b>	<b><u>AFI INTERPRETATION</u></b>	
Amniotic Fluid Index (AFI) (four quadrant technique)	≤ 5 oligohydramnios 5.1 to 8 cm : low normal 8.1 – 24 cm : normal >24 polyhydramnios	

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### F. **Contraction Stress Test (CST)**

Assessment of feto-placental respiratory reserve by observation of FHR response to the stress of uterine contractions. This test has been shown to be a predictor of fetal outcome.

A negative CST is associated with fetal survival of 1 week in greater than 99% of cases (0.4/1,000). A positive test is prognostically worse if it is accompanied by a non-reactive NST with absent variability.

The CST is used primarily as a follow-up test to a non-stress test with suspected decelerations. A CST may also be used before the application of prostaglandin gel to ascertain safety in certain situations (e.g. severe intrauterine growth restriction, decreased amniotic fluid).

#### Relative Contraindications:

- a. Placenta previa
- b. Third trimester bleeding
- c. Previous classical cesarean section
- d. Multiple gestation

To avoid inadequate or prolonged contractions due to improper use of oxytocin, make sure uterine contractions occur no less than 3 in 10 minutes and no closer than every 2 minutes. Contractions should last at least 35 seconds and no more than 90 seconds. The contractions should be palpable, discernible by the patient, and registered on the monitor strip.

#### Procedure:

1. A CST is performed by an experienced registered nurse.
2. The clinician is to assist the patient/family in understanding the purpose and process of the procedure.
3. Gather needed equipment including an electronic fetal monitor, external transducers (ultrasound and tocodynamometer), activate the patient on the BirthNet monitoring system, and label the paper tracing (if used) with the patient's name, medical record number, gravida, para, weeks gestation, and test indication.
4. Position the patient in right or left lateral recumbent or semi-fowler's position to maximize uterine blood flow (supine position decreases utero placental blood flow).
5. The initial blood pressure and maternal pulse are recorded on the monitor strip. Vital signs are repeated as indicated.
6. The baseline FHR and any uterine activity are recorded for 10-20 minutes or perform the NST as ordered. If 3 adequate contractions (lasting > 30 seconds; palpable) are present in a 10 minute period, the test is complete.
7. If no uterine contractions are present, proceed based on type of CST planned:

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**Oxytocin Challenge Test** - obtain the following equipment:

- A. IV start kit
- B. Lactated Ringers, D5 .45 Normal Saline , or 0.9 Normal Saline
- C. Infusion tubing
- D. Infusion pump
- E. Oxytocin bag (pharmacy prepared)

An intravenous main line infusion of a non-oxytocin containing, electrolyte solution should be initiated. A piggyback infusion of oxytocin solution (usually 30 units/500cc) is delivered via infusion pump in a titrated fashion. The initial dose is usually 0.5 – 1.0 milliunits/min. At 15-20 minute intervals the dose may be doubled until there is an increase in uterine activity. Once a rate of 8 milliunits/min is achieved, the infusion should be increased in increments of 2-4 milliunits/min until an adequate challenge is obtained. **NOTE** the difference in titration of oxytocin between this guideline and the Induction-Augmentation guideline (I 1.20).

The fetal heart rate, resting uterine tone, and the frequency, duration, and intensity of contractions should be continuously monitored. Maternal blood pressure and pulse should be monitored and recorded periodically as indicated by patient condition [typically every 15 minutes while titrating oxytocin and every 30 minutes once a stable oxytocin dose is achieved].

When there are 3 adequate contractions in a ten minute period, discontinue the Oxytocin infusion and consult with the responsible physician. Continue monitoring with mainline IV at a TKO (keep open) rate until uterine activity is appropriate for gestational age.

**Nipple Stimulation** – Patient is instructed to gently rub the nipple of one breast through light clothing for 2 minutes. If a contraction is palpated during stimulation, withhold further stimulation until contraction frequency is assessed.

1. After 5 minutes of rest, assess contraction frequency and if inadequate, begin another 2- minute cycle. Continue cycles of 2-minute stimulation-5 minute rest until contraction frequency of 3 in 10 minutes is achieved. The patient should alternate nipples.
2. With either method, discontinue if:
  - a. Test is positive
  - b. Hyperstimulation occurs:

In the event of uterine hyperstimulation, i.e. beginning of contractions less than two minutes apart, lasting greater than 90 seconds in duration, or an elevated resting tone of the uterus, oxytocin should be reduced; or discontinued immediately and the physician notified. If severe fetal heart rate decelerations occur, the infusion should be discontinued immediately, the main line opened to infuse fluids at a rapid rate, the patient placed in the lateral position, oxygen administered, and the responsible physician notified. Terbutaline 0.25 mg SQ should be available for administration if ordered.
  - c. Criteria for a negative test are met
  - d. FHR decelerations are observed

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- e. Spontaneous rupture of membranes

Interpretation:

*Negative CST:*

No decelerations observed after three consecutive uterine contractions in a 10-minute period and normal baseline fetal heart rate (FHR).

*Positive CST:*

- a. **Repetitive (with greater than 50% of contractions)** late decelerations observed with an adequate challenge test
- b. Persistent late decelerations with 3 consecutive uterine contractions in any time period

*Suspicious CST:*

- a. Intermittent late decelerations with an adequate challenge
- b. Variable decelerations
- c. Abnormal FHR baseline, i.e. less than 110 bpm or greater than 160 bpm

*Unsatisfactory CST:*

- a. Quality of FHR/UC recording is inadequate for interpretation i.e. due to obesity or excessive fetal movement
- b. Adequate contraction frequency (3 in 10 minutes) cannot be achieved

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**II. ANTENATAL TESTING GUIDELINES: DIAGNOSTIC CONDITIONS AND FREQUENCY**

(Note: Other conditions may arise; test as indicated)

<u>CONDITION</u>	<u>TEST FREQUENCY</u>	<u>GESTATIONAL AGE TO INITIATE TESTING</u>
<b>Postterm</b>	Twice weekly NST/AFI	41 weeks
<b>Decreased fetal movement</b>	May only require one NST/AFI	
<b>Current hypertensive diseases:</b> Pre-eclampsia	Twice weekly NST/AFI or more (severity; consider hospitalization)	
Chronic hypertension on meds	Consider weekly NST/AFI	32 weeks
Chronic hypertension with IUGR	Same as IUGR (twice weekly) NST/AFI	At diagnosis of IUGR
<b>Diabetes mellitus-</b> Gestational diabetes: -Diet treated with good control	No formal testing needed	
-Insulin or oral hypoglycaemic treated with good control	Weekly NST/AFI	36 weeks
-Insulin treated with poor control	Weekly AFI Twice weekly NST	32 weeks
Type I or Type II (pre-gestational): -Without complications, in good control	Weekly AFI Twice weekly NST	32 weeks
-Without complications, poor control	Weekly AFI Twice weekly NST	Begin earlier than 32 weeks
-With complications (htn, poor growth, vascular dx.)	Weekly AFI Twice weekly NST	When complications arise or by 32 weeks
<b>Intrauterine growth restriction</b> (IUGR: < 10 <sup>th</sup> percentile)	Twice weekly NST/AFI	At diagnosis of IUGR
<b>History of unexplained third trimester IUFD</b>	Weekly NST/AFI	32 weeks or earlier if prior IUFD was earlier
<b>Active drug/methadone/ETOH abuse</b>	Weekly NST/AFI	36 weeks
<b>Unexplained, elevated MSAFP &gt; 3.0 mom</b>	Weekly NST/AFI	32 weeks No testing for decreased MSAFP
<b>Twins</b> >20 % discordant growth or IUGR (< 10 <sup>th</sup> percentile) in one	Twice weekly NST/AFI	When detected
Normal growth	Weekly NST/AFI	38 weeks Consider delivery at > 38 weeks

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<b><u>CONDITION</u></b>	<b><u>TEST FREQUENCY</u></b>	<b><u>GESTATIONAL AGE TO INITIATE TESTING</u></b>
<b>SLE; antiphospholipid syndrome</b>	Weekly or more NST/AFI	30-34 weeks (earlier if microvascular disease)
<b>Oligohydramnios</b>	As indicated	
<b>Red cell alloimmunization with erythroblastosis</b>	Weekly or as indicated NST/AFI	28 weeks or at onset of disease
<b>Hypothyroid disease, if uncontrolled</b>	Weekly NST/AFI	32-34 weeks
<b>Maternal Graves Disease</b>	Weekly NST/AFI	36 weeks
<b>Cholestasis of pregnancy</b>	Weekly NST/AFI Twice Weekly NST/AFI	Before bile acid results At diagnosis *Induce at 37 wks
<b>Major fetal congenital anomaly</b>	Weekly NST/AFI	34 weeks
<b>HIV if on therapy</b>	Weekly NST/AFI	32-36 weeks
<b>Fetal heart block</b>	Weekly BPP	At diagnosis
<b>Sickle cell disease</b>	Weekly NST/AFI	32 weeks; earlier if severe disease
<b>Severe maternal cardiac disease</b>	Weekly	32 weeks; earlier if indicated
<b>Severe asthma</b>	Weekly NST/AFI	32 weeks; earlier if indicated

**II. FOLLOW-UP GUIDELINES FOR ABNORMAL TESTING:**

1. Non-reactive NST is followed by BPP and physician informed of results before the patient leaves
2. Guidelines for BPP (NST + Fetal movement, Fetal tone, and Fetal breathing) score with AFI (x of 8 plus AFI score) [e.g. 6 of 8 AFI 7.0]:
  - a. BPP 6-8 and AFI > 5: Repeat NST/AFI per schedule
  - b. BPP 4 and AFI > 5: Repeat, usually within 24 hours or less
  - c. BPP 0-2 and any AFI: Consider for delivery
3. Guidelines for normal BPP with AFI ≤ 5
  - a. Must discuss case with Maternal Fetal Medicine Service
  - b. Requires a follow-up plan per Maternal Fetal Medicine
  - c. Follow-up plan may range from more frequent testing to delivery
4. Contraction Stress Test (Nipple stimulation or oxytocin)
  - a. May be used as follow up to NST with suspected decelerations
  - b. May be used before certain inductions (e.g. cervical ripening agent with decreased AFI)

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**GUIDELINES CROSS REFERENCE**

Antepartum Obstetrical Ultrasound Examination Guidelines – U 1.10

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Appendix A

# UIC

University of Illinois at Chicago

## DAILY FETAL MOVEMENT [KICK COUNTS]

Being aware of your baby's movement is one of the most important things you can do during your pregnancy. The baby's kicks and movements are a sign that he/she is doing well. If the baby does not move, we need to find out why. We would like you to keep track of your baby's movements and to count them at least once every day. Try to count at the same time each day. Choose the time when your baby is usually active.

**Follow these steps:**

- After you have eaten and you feel the baby move, look at the time.
- Remember the time or write it down and begin counting the baby's kicks and movements.
- In the next hour make sure you feel the baby move or kick 4 times.  
  
\_\_\_\_\_
- If the baby moves or kicks 4 times before the hour is up, you may stop counting.
- If you do not feel the baby move 4 times by the end of the hour,  
Call your doctor or midwife or Labor and Delivery at: \_\_\_\_\_.

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[Signatures on file]

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