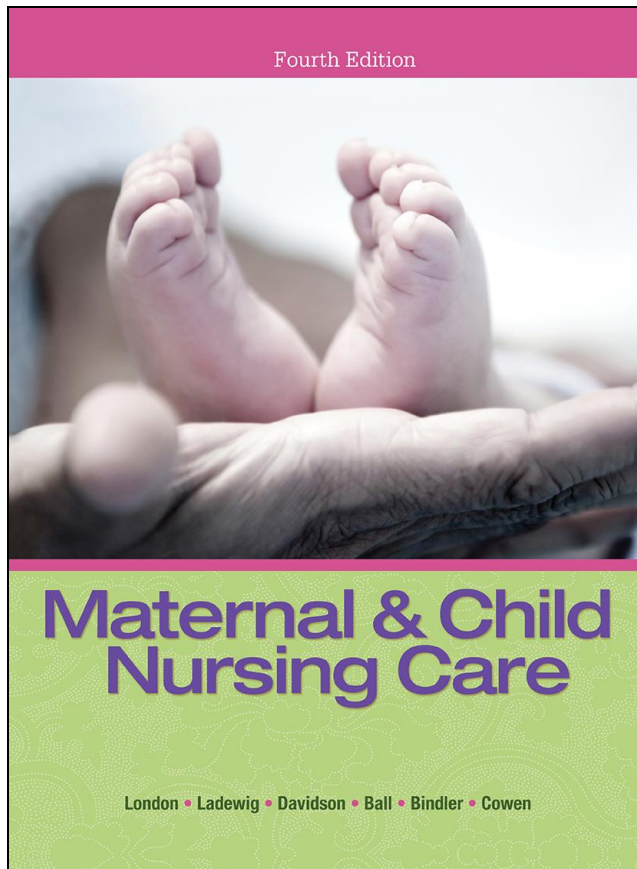


MATERNAL & CHILD NURSING CARE

FOURTH EDITION



CHAPTER 14

Assessment of Fetal Well-Being

Learning Outcome 14-1

Identify pertinent information to be discussed with the woman regarding her own assessment of fetal activity and methods of recording fetal activity.

Maternal Assessment of Fetal Activity

Maternal Assessment of Fetal Activity

- Monitors fetal well-being
- Begins at approximately 28 gestational weeks
- Reduction in movement may indicate fetal hypoxia, growth restriction, or fetal death
- There is no definitive definition of how many movements should occur within a specified time period

Procedure for Maternal Assessment of Fetal Activity

- Count fetal movements at the same time each day
- Report to the healthcare provider:
 - Less than 10 movements in a 3-hour period
 - Significantly less-than-normal fetal movement
 - Perception of decreased fetal movement in a 24-hour period

Factors Potentially Affecting Fetal Movement

- Sleep-wake cycle of fetus
- Maternal factors
 - Hypoglycemia
 - Weight
 - Psychologic factors
- Fetal trunk movement frequency
- Sound
- Cigarette smoking and drugs

Criteria for Proper Maternal Understanding

- Purpose of the assessment
- How to record the fetal activity
- Whom to call for questions
- What to report

Ultrasound

Learning Outcome 14-2

Describe the methods, clinical applications, and results of ultrasound in the nursing care management of the pregnant woman.

Methods of Ultrasound in Management of the Pregnant Woman

- Transabdominal
 - Transducer with transmission gel over the abdomen
 - Visualization facilitated with a full bladder
- Transvaginal
 - Probe inserted in vagina
 - Clearer images
 - Utilized earlier in pregnancy

Clinical Applications of Maternal Ultrasound

- Determining gestational age after 6 weeks
- Identifying fetal heart rate and fetal breathing movements
- Estimating size of the fetus
 - Measure biparietal diameter of head, femur length, estimate weight
- Screen for fetal anomalies such as Down syndrome

Clinical Applications of Maternal Ultrasound

- Detect certain cardiac defects
- Identify amniotic fluid index
- Identify placental location and grading
- Detect fetal position and presentation
- Detect fetal death

Doppler Blood Flow Studies (Umbilical Velocimetry)

Learning Outcome 14-3

Describe the use, procedure, information obtained, and nursing considerations to the following: first trimester combined screening, MaterniT21, Doppler velocimetry, nonstress test, fetal acoustic and vibroacoustic stimulation tests, biophysical profile, and contraction stress test.

Doppler Blood Flow Studies (Umbilical Velocimetry)

- Noninvasive ultrasound test
- Measures blood flow changes that occur in maternal and fetal circulation to assess placental function
- Creates "picture" (waveform) that looks like a series of waves

Doppler Blood Flow Study Measurements

- Systolic measurement is highest-velocity peak of waves
- Lowest point is diastolic velocity
- S/D ratio calculated by dividing systolic (S) peak by end-diastolic (D) component

Doppler Blood Flow Study Measurements

- Normal S/D ratio
 - Approximately 2.0 at 20 weeks' gestation
 - Below 3 after 30 gestational weeks

Doppler Blood Flow Study Measurements

- Helpful in assessing and managing pregnancies with suspected uteroplacental insufficiency before asphyxia occurs

Abnormal Doppler Flow Study Plus Decreased Amniotic Fluid – Potential Implications

- Small-for-gestational-age (SGA) fetuses
- Intrauterine growth restriction (IUGR)
- Cesarean section for nonreassuring fetal status

Abnormal Doppler Flow Study Plus Decreased Amniotic Fluid – Potential Implications

- Respiratory distress syndrome
- Neonatal intensive care unit (NICU) admission
- Perinatal death

Doppler Flow Study Findings in Extreme Cases of IUGR

- Flow may become absent or reversed
- Fetuses may have major fetal anomaly
- Abnormal S/D ratio warrants complete fetal assessment

Doppler Flow Study Findings in Extreme Cases of IUGR

- ACOG (2009) recommendations
 - Doppler velocimetry recommended only for fetuses suspected of having IUGR
 - Routine use of this technique for low risk pregnancies not advised

Nonstress Test (NST)

Nonstress Test (NST)

- Widely used method of evaluating fetal status [alone or as part of biophysical profile (BPP)]
- Adequately oxygenated fetus with intact fetal central nervous system should demonstrate accelerated fetal heart rate (FHR) in response to fetal movement

Nonstress Test (NST)

- Requires electronic monitor to observe and record fetal heart rate accelerations

External Electronic Fetal Heart Rate Monitoring With 3 Types of Output

1. A SPEAKER IN THE BACK OF THE MONITOR GIVES AN AUDIBLE REPORT OF EACH FETAL HEART BEAT.



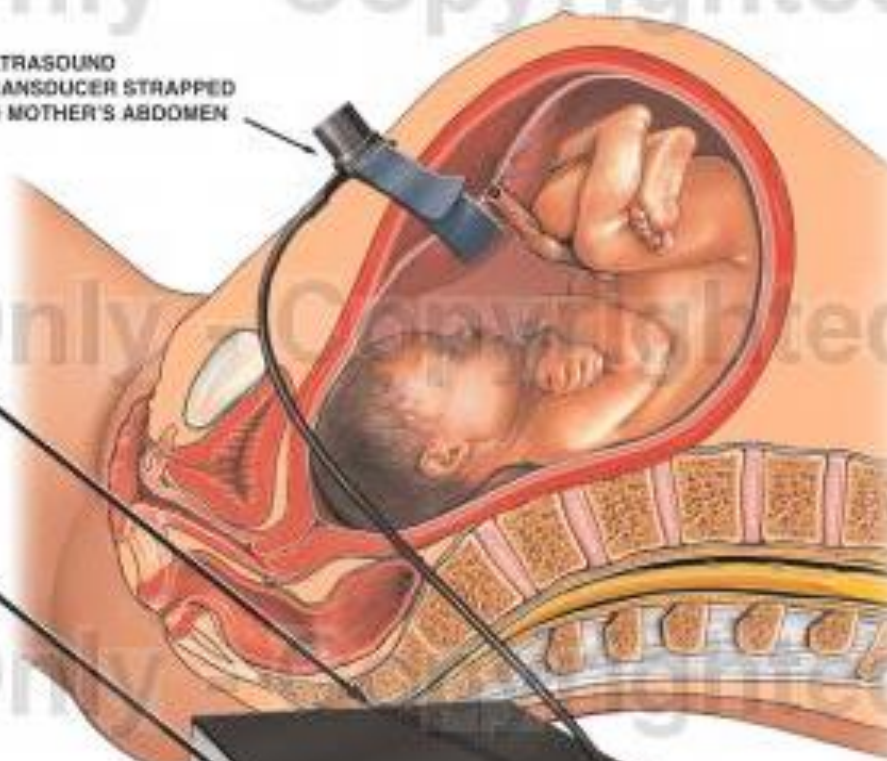
2. A DIGITAL DISPLAY INDICATES THE FETAL HEARTBEAT IN BEATS PER MINUTE.



3. THE FETAL HEARTBEAT AND MATERNAL CONTRACTIONS ARE RECORDED ON A PAPER PRINTOUT.



ULTRASOUND
TRANSDUCER STRAPPED
TO MOTHER'S ABDOMEN



Advantages of NST

- Quick to perform
- Permits easy interpretation
- Inexpensive
- Can be done in an office or clinic setting
- No known side effects

Disadvantages of NST

- Sometimes difficult to obtain a suitable tracing
- Woman must remain relatively still for at least 20 minutes
- High false-positive rate

Performing the NST

- Positioning options
 - Reclining chair or in bed
 - Left-tilted, semi-Fowler's or side-lying position
- Avoid supine position
 - Less fetal movement
 - Maternal back pain
 - Maternal shortness of breath

Performing the NST

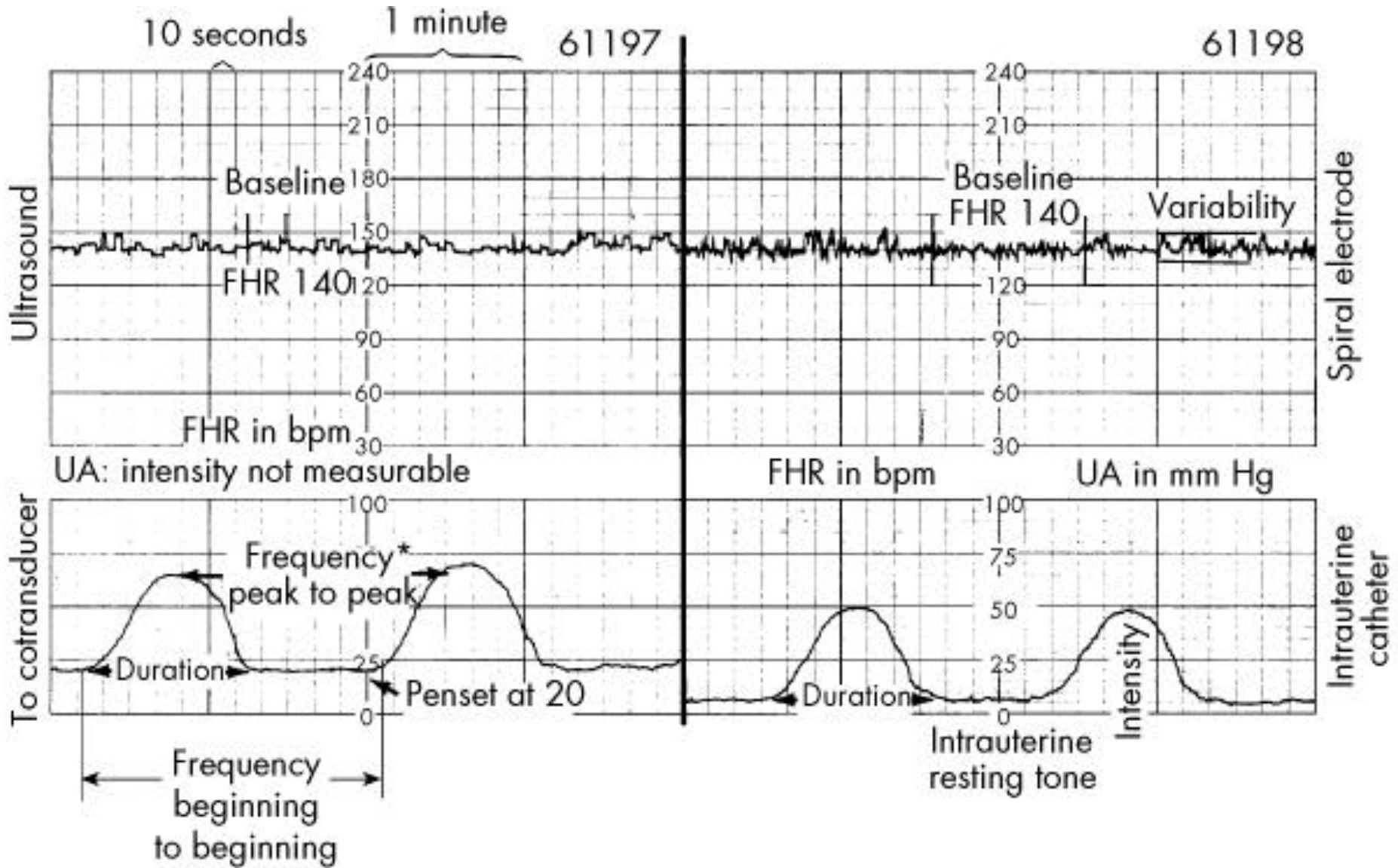
- Electronic fetal monitor to obtain data
 - Fetal heart rate (FHR) tracing
 - Fetal movement (FM)
- Monitor placed beneath woman's clothing
- Provide woman with privacy

NST Results Interpretation – Reactive (desired result)

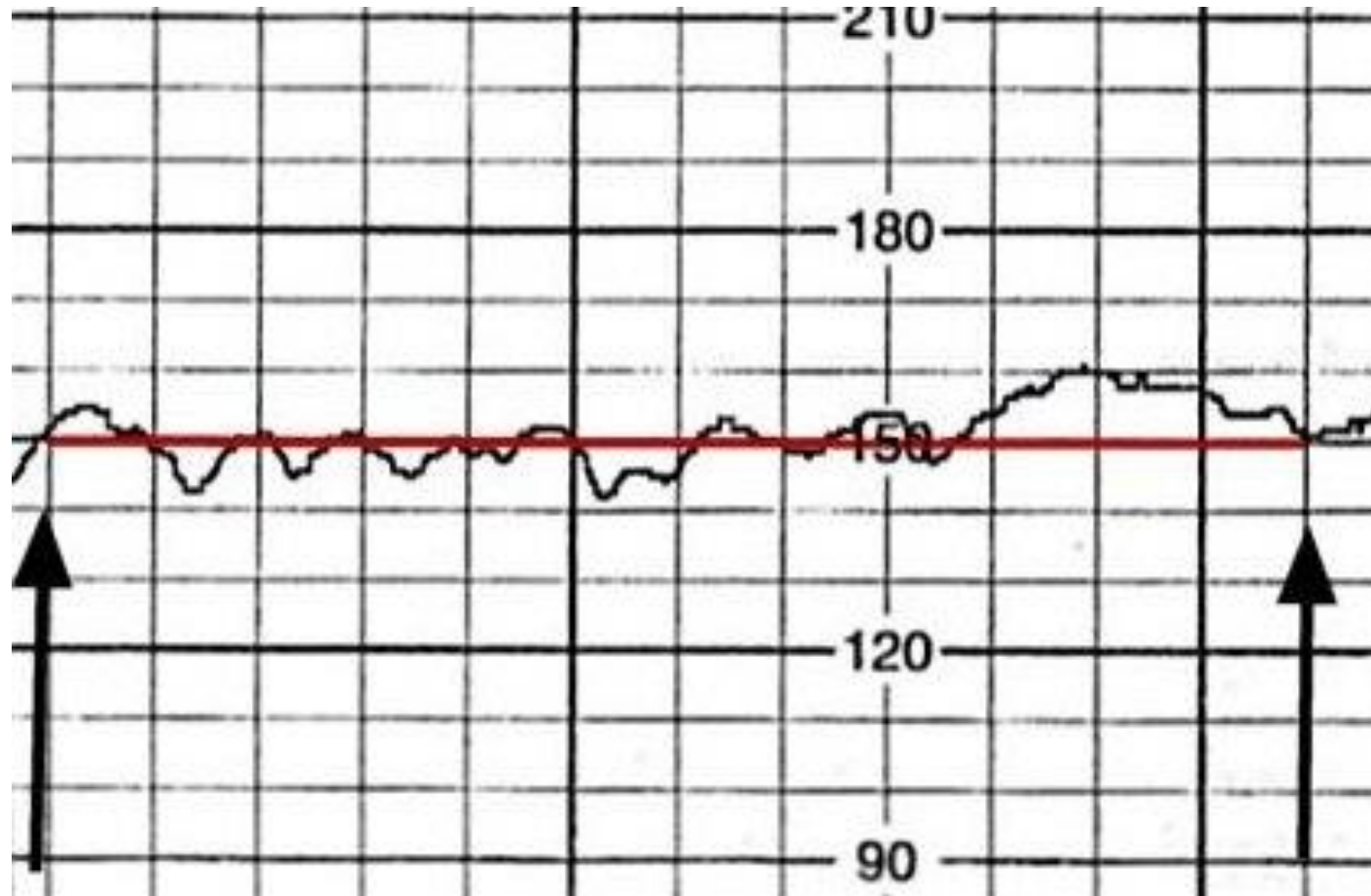
- Shows at least two accelerations of FHR with fetal movements of 15 beats/min, lasting 15 seconds or more, over 20 minutes
- In preterm fetuses, rate is 10 beats above baseline for 10 seconds in a 20-minute window

NST Results Interpretation – Reactive (desired result)

- Up to 50% of 28- to 32-week gestational age fetuses have a nonreactive NST
- Reactive criteria are not met
 - For example, the accelerations do not meet the requirements of 15 beats/min or do not last 15 seconds



Baseline Fetal Heart Rate



Two Minutes

NST Results Interpretation – Reactive (desired result)

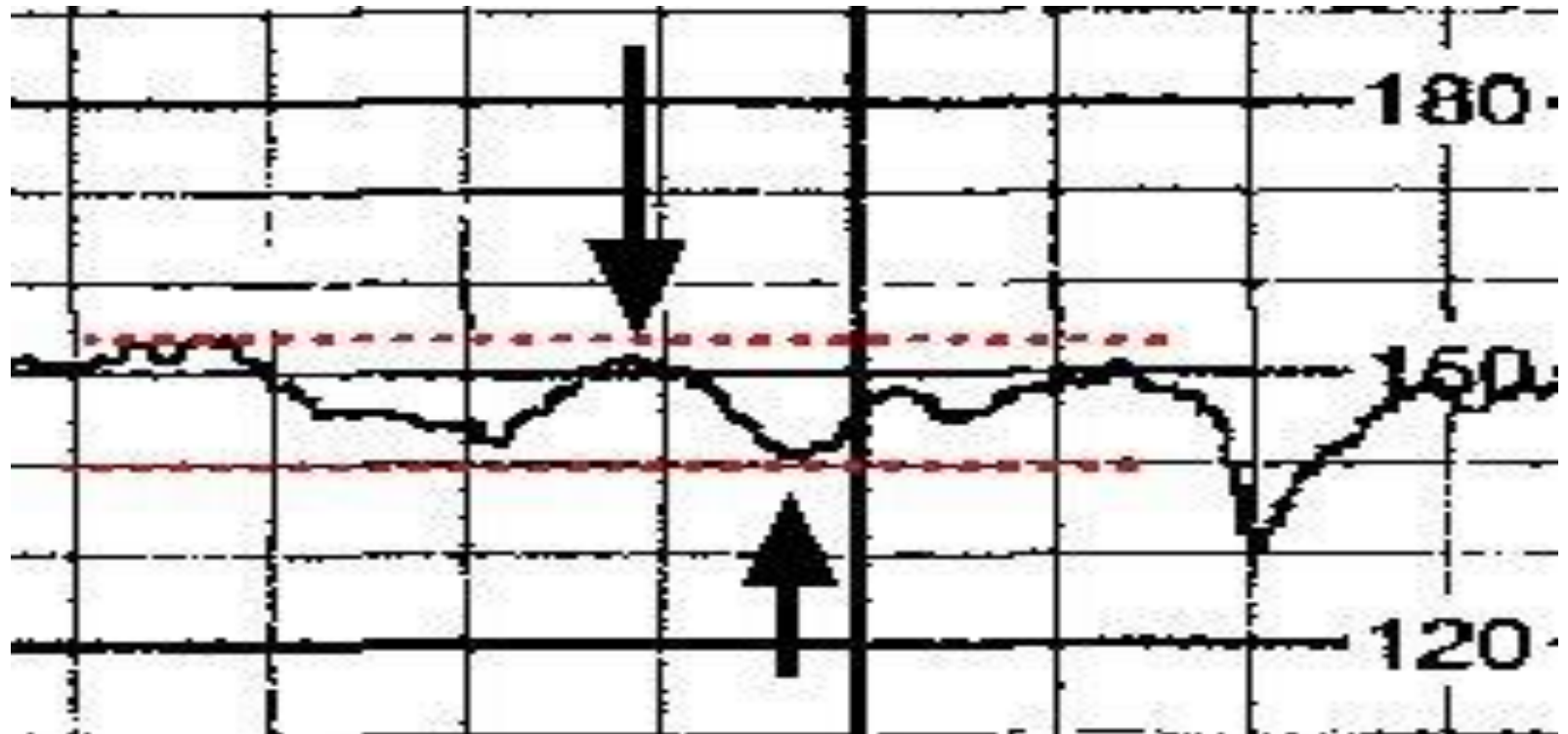
Variability

- **Baseline variability:** is the fluctuation in the baseline FHR that are irregular in amplitude & frequency.

Variability is classified into:

- Absent or undetectable variability
- Minimal variability: < 5bpm
- Moderate variability: 6-25bpm
- Marked variability: >25 bpm

FHR Variability



Reduced variability (Less than 10 bpm over a period of time)

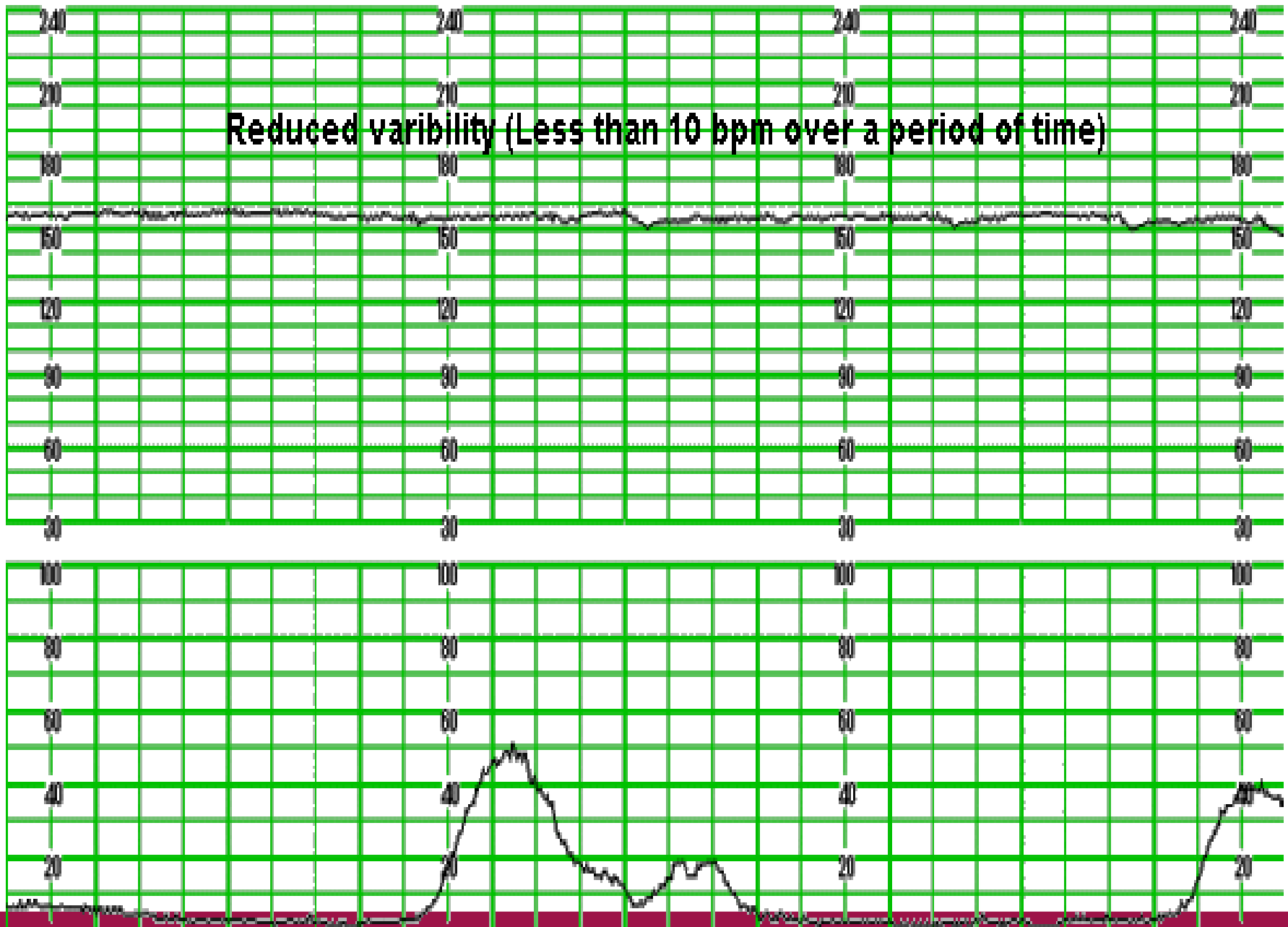


Figure 14-4 Example of a reactive nonstress test (NST). The test shows accelerations of 15 beats/min lasting 15 seconds with each fetal movement (FM). Top of strip shows fetal heart rate (FHR); bottom of strip shows uterine activity tracing. Note that FHR increases (above the baseline) at least 15 beats and remains at that rate for at least 15 seconds before returning to the former baseline.

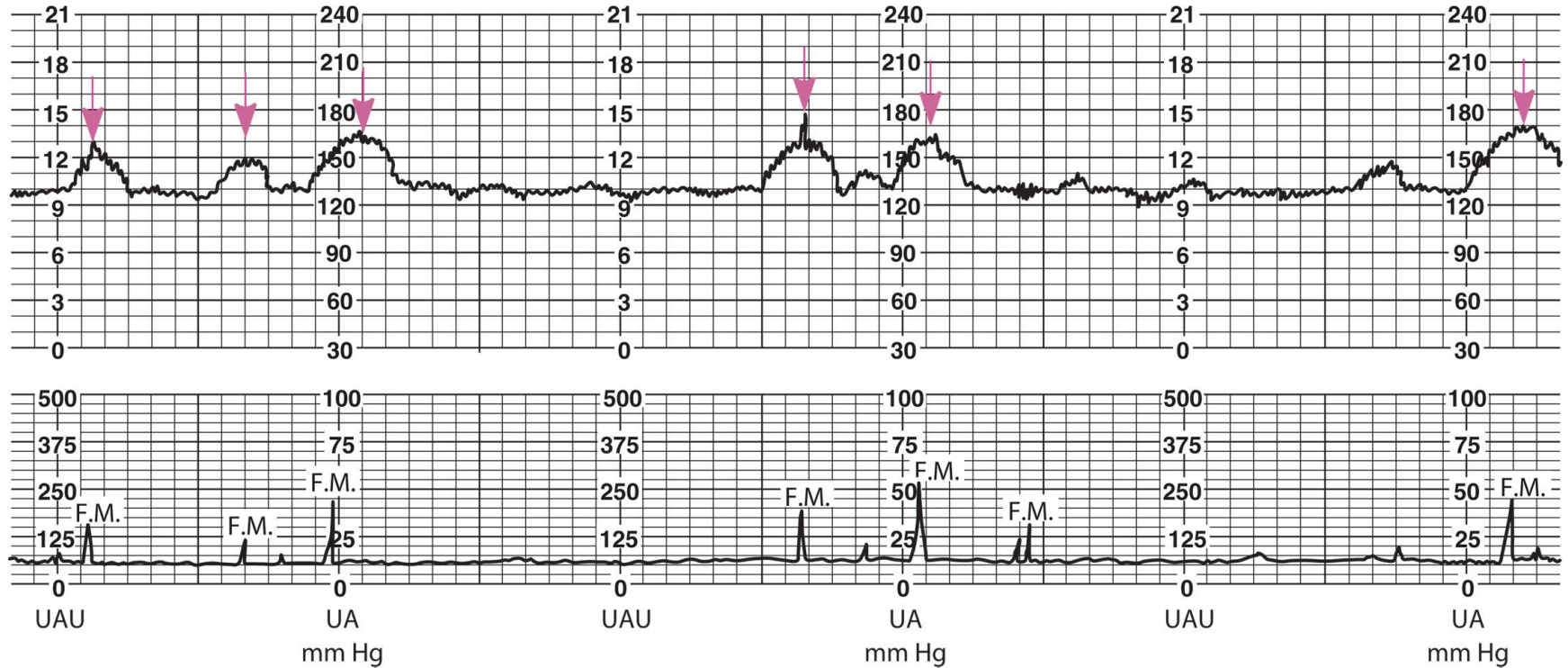
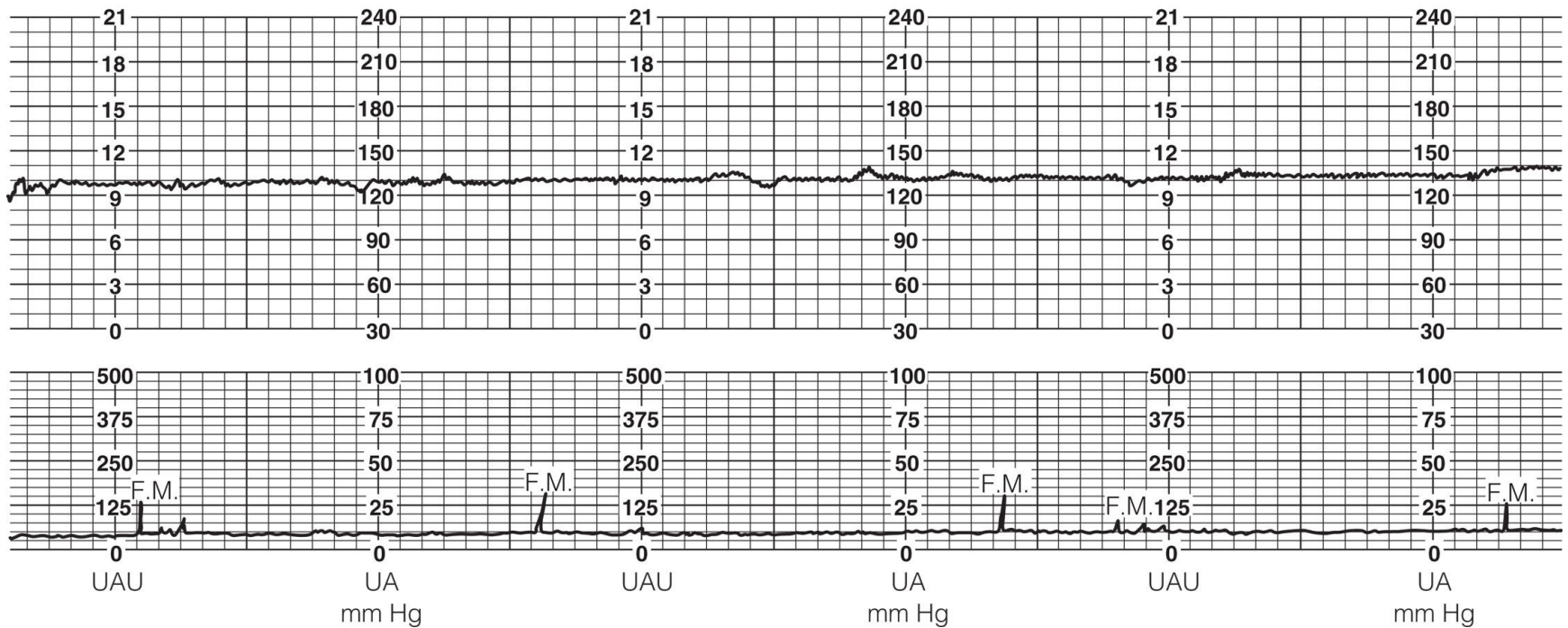


Figure 14-5 Example of a nonreactive NST. There are no accelerations of fetal heart rate (FHR) with fetal movement (FM). Baseline FHR is 130 beats/min. The tracing of uterine activity is on the bottom of the strip.



NST Results Interpretation

- Accelerations → means absence of fetal metabolic acidemia
- Absence of acceleration does not mean fetal acidemia
- Variability can be decreased due to fetal hypoxia, drugs that depresses CNS or sleep

Tachycardia:

- ✓ a baseline FHR > 160 bpm for duration of 10 minutes or longer
- ✓ It means early sign of fetal hypoxia especially if accompanied by decelerations and minimal variability
- ✓ Could be related to fetal infection, fetal anemia or drugs

Bradycardia:

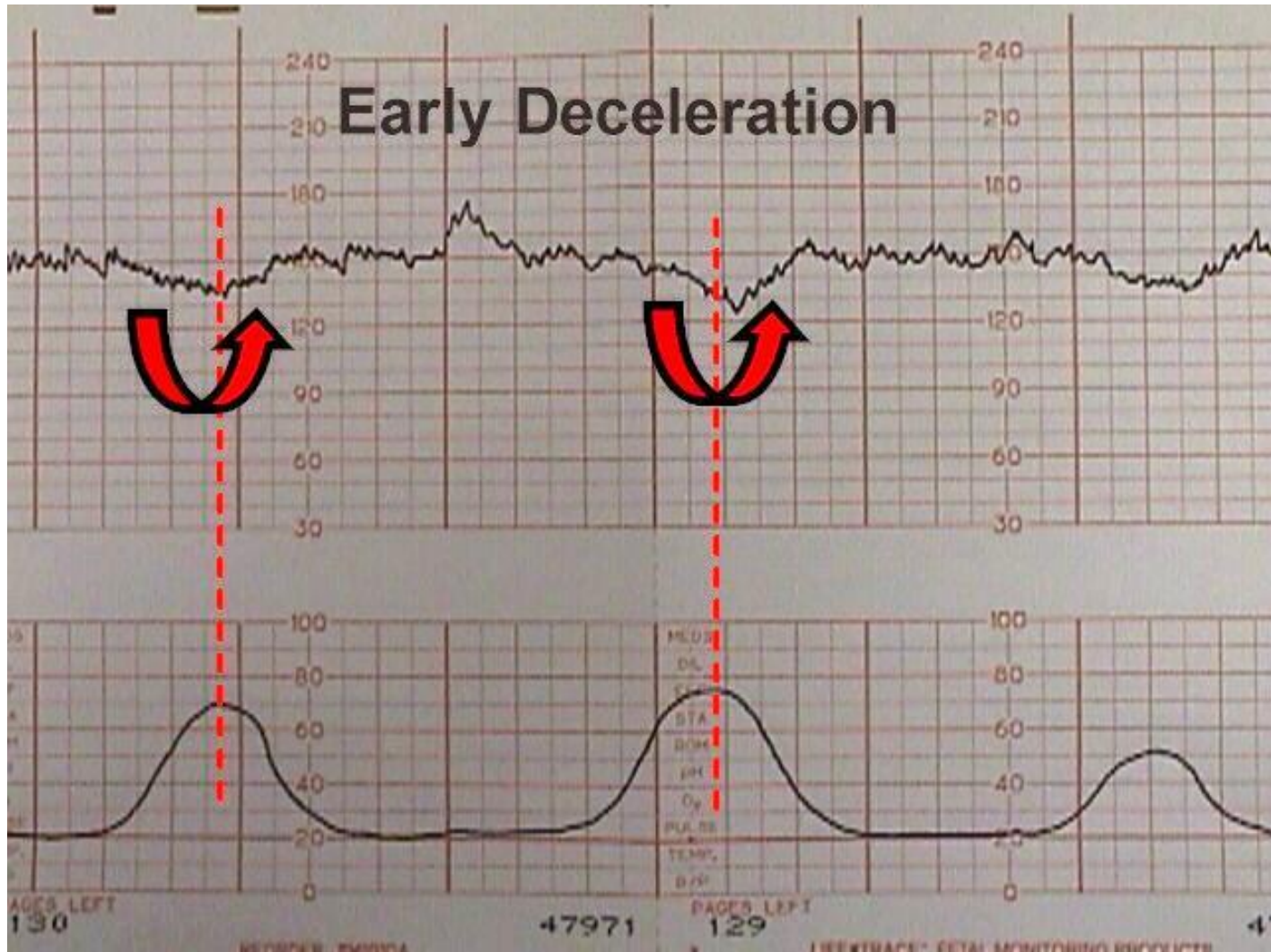
- ✓ FHR < 110bpm for 10 min or longer
- ✓ It is rare & due to viral infection, maternal hypoglycemia or maternal hyperthermia

NST Results Interpretation

Decelerations: 2 types: early & late

- ✓ Early decelerations: gradual decrease & return to baseline & is associated with uterine contractions; corresponds to the shape of UC.
- ✓ uniform in shape, mirror the contraction
- ✓ Caused by transient fetal head compression & its usually benign
- ✓ Usually occur during 1st stage @ 4-7 cm dilation & may be during pushing
- ✓ It is a sign of reassurance
- ✓ Nsg interventions: none

Early decelerations



http://www.brooksidepress.org/Products/OBGYN_101/MyDocuments4/Text/LaborandDelivery/EFM/Early.jpg

NST Results Interpretation

Late decelerations:

- ✓ Gradual decrease in & return to the baseline FHR associated with uterine contractions
- ✓ It begins after contraction has started & lowest point after the peak of contraction
- ✓ Uniform but late in contracting phase
- ✓ Typical Deceleration < 60bpm & duration < 60 seconds
- ✓ It reflects insufficient oxygenation to the fetus i.e. fetal hypoxia

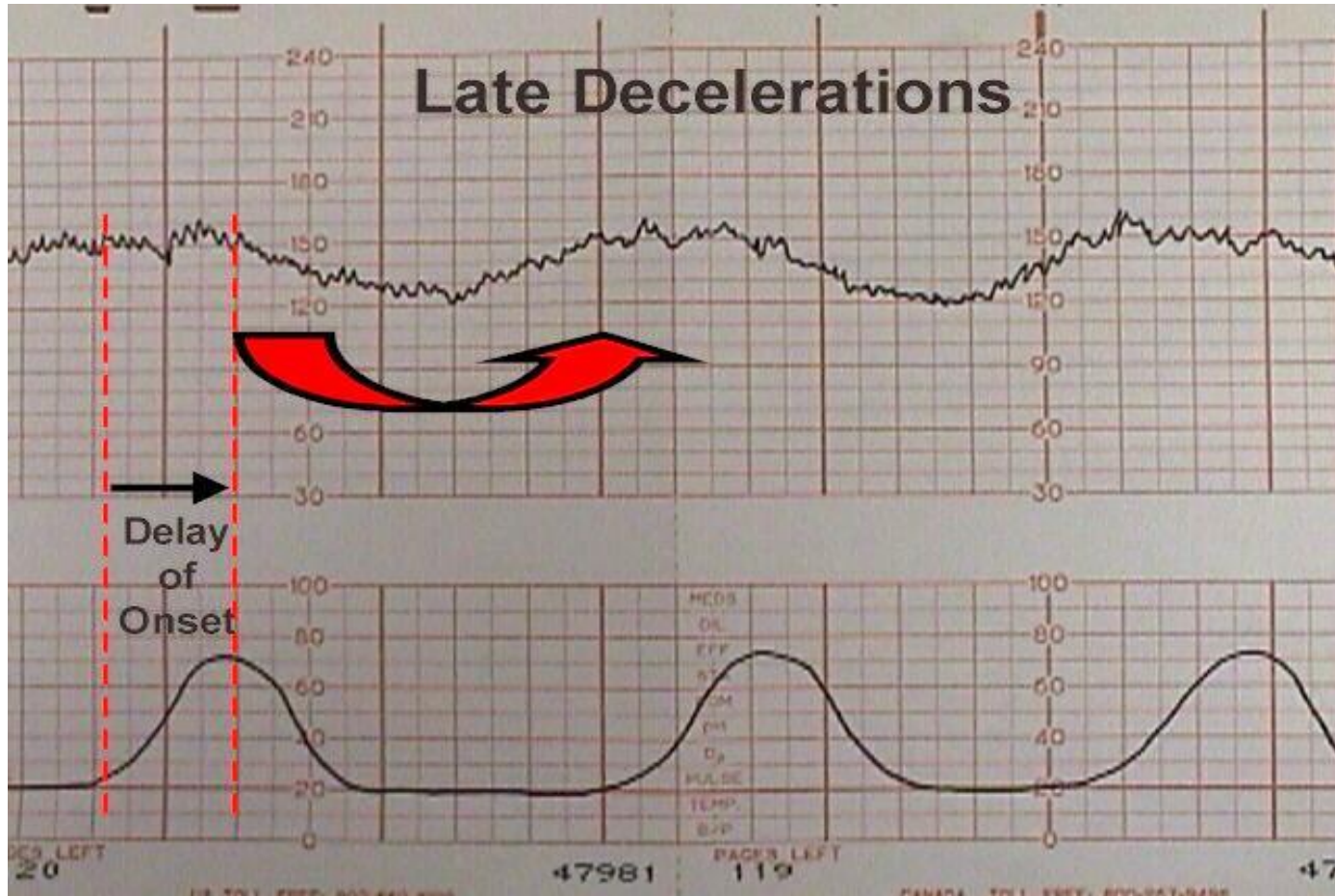
NST Results Interpretation

Causes: any cause that can influence oxygenation of the baby i.e. placental, maternal position, hyperstimuli, hypertension, IUGR, DM

Nsg intervention:

- Inform the Physician/midwife
- Change maternal position
- Correct hypotension
- Hydration
- Assess uterine hyperstimulation
- D/C oxytocin if administered
- Consider more accurate monitoring i.e. internal monitoring

Late decelerations



NST Results Interpretation – Unsatisfactory

- Data cannot be interpreted, or there was inadequate fetal activity

Administration of the NST

- Anyone who performs the NST must understand the significance of any decelerations of the FHR during testing
- If decelerations are noted, the certified nurse–midwife or physician should be notified for further evaluation of fetal status

Interpretation: Mnemonic

Is an easy way to remember & use for FHR interpretation

DR C BRAVADO

- DR = Determine Risk
- C = Contractions
- BRA = Baseline RATE
- V = Variability
- A = Accelerations
- D = Decelerations
- O = Overall Assessment

Mnemonic: DR C BRAVADO

- DR = define risk (low / high)
- C = Contractions (look & describe...etc)
- Bra = Baseline Rate (bradycardia, normal 110-160 bpm or tachycardia)
- V = variability @ least 10-15 bpm (persistent, reduced variability)
- A = Accelerations (present / absent) at least $>$ or $=$ 15 beat change from baseline lasting $>$ than or $=$ 15 seconds
- D = decelerations (early / late / variable)
- O = overall assessment (reassuring, or non reassuring & plan of MGT)

Contraction Stress Test (CST)

Contraction Stress Test (CST)

- Evaluates placental respiratory function (oxygen and carbon dioxide exchange)
- Allows identification of fetus at risk for intrauterine asphyxia
- Disadvantages
 - Time consuming
 - Yields a high false-positive result or equivocal results

Usage of the CST

- In many settings, CST has been replaced by biophysical profile (BPP)
- CST still utilized in certain settings
 - Reduced or limited availability of other technology
 - During night shifts
 - At small community hospitals or birthing centers

Usage of the CST

- May also be used as adjunct to other forms of fetal assessment

CST – Contraindications

- Third-trimester bleeding from placenta previa
- Marginal abruptio placentae or unexplained vaginal bleeding
- Previous cesarean with classical incision (vertical incision in fundus of uterus)
- Premature rupture of the membranes
- Cervical insufficiency (incompetent cervix)

CST – Contraindications

- Cerclage in place
- Anomalies of the maternal reproductive organs
- History of preterm labor (if being done before term)
- Multiple gestation

Performing the CST

- Requires presence of contractions
 - Spontaneous contractions unusual before the onset of labor
 - Contractions may be induced
 - Intravenous oxytocin (Pitocin)
 - Breast stimulation
- Electronic fetal monitor provides continuous data about fetal heart rate and uterine contractions

Performing the CST

- 15-minute baseline recording of uterine activity and FHR obtained
- Tracing evaluated for evidence of spontaneous contractions
- If 3 spontaneous contractions of good quality and lasting 40 to 60 seconds occur in a 10-minute window, results are evaluated, and test is concluded

Performing the CST

- Options if contractions absent or insufficient for interpretation
 - Oxytocin may be administered intravenously
 - Breast self-stimulation or electric breast pump may be applied

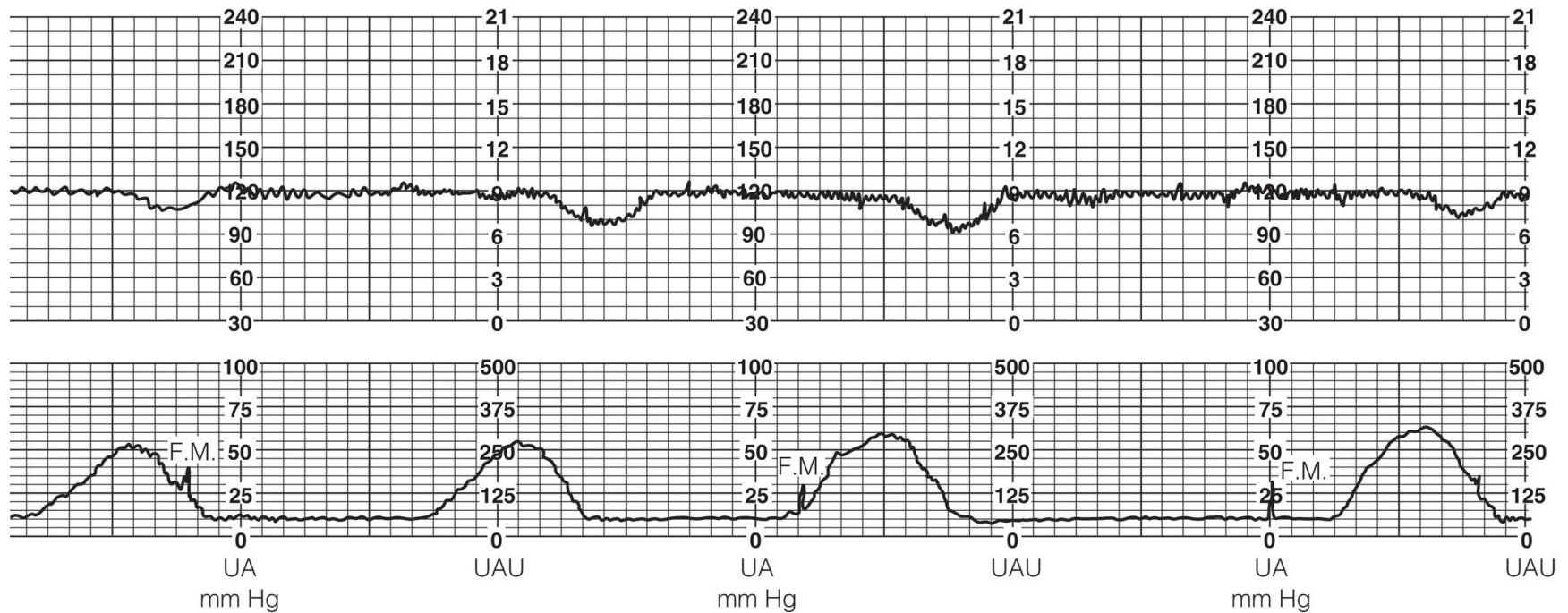
Performing the CST

- Should only be conducted in setting where tocolytic medications are available
 - Test may produce hypersystole pattern or stimulate labor

Interpretation of CST Results – Negative

- Stress of uterine contraction
 - Three good-quality contractions
 - Contractions last 40 or more seconds in 10 minutes
 - No evidence of late decelerations

Figure 14-6 Example of a positive contraction stress test (CST). Repetitive late decelerations occur with each contraction. Note that there are no accelerations of fetal heart rate (FHR) with three fetal movements (FM). The baseline FHR is 120 beats/min. Uterine contractions (bottom half of strip) occurred four times in 12 minutes.



Interpretation of CST Results – Equivocal

- Suspicious test
- Inconsistent late decelerations or significant variable decelerations
- Hyperstimulation test shows uterine contraction frequency of every 2 minutes or contractions lasting greater than 90 seconds with a late deceleration

Interpretation of CST Results – Unsatisfactory

- Data cannot be interpreted
 - Poor-quality tracing
 - Inadequate fetal activity

CST Results – Clinical Application

- Negative CST implications
 - Normal placental function
 - Adequate fetal oxygenation
 - Fetus likely to withstand the stress of labor

CST Results – Clinical Application

- Positive CST implications
 - With nonreactive NST, suggests fetus unlikely to withstand stress of labor
 - Positive CST may provide earlier identification of fetal compromise than nonreactive NST

CST – Pre-procedure Patient Considerations

- The nurse should ensure that the patient understands:
 - Reasons for the test
 - Possible results before the test begins
- Written consent required in some settings
 - Certified nurse–midwife or physician responsible for fully informing the woman about the test

CST – Nurse's Role

- Administering CST
 - CNM or physician presence may be required
- Interpreting results
- Reporting findings
 - To the certified nurse–midwife or physician
 - To the expectant woman

CST – Nurse's Role

- Performing critical assessments
- Providing continual reassurance

Biophysical Profile (BPP)

Biophysical Profile (BPP) – Assessment of Five Variables

- Four variables assessed by ultrasound:
 - Fetal breathing movement
 - Fetal movements of body or limbs
 - Fetal tone (extremity extension and flexion)
 - Amniotic fluid volume (pockets of fluid around the fetus)

Biophysical Profile (BPP) – Assessment of Five Variables

- One variable assessed by NST
 - Reactive fetal heart rate (FHR) with activity (reactive nonstress test [NST])

Purpose of the BPP

- Helps to either identify the compromised fetus or confirm the healthy fetus
- Provides an assessment of placental functioning

BPP Scoring Criteria

- Score of 2 assigned to each normal finding
- Score of 0 assigned to each abnormal finding
- Maximum score of 10

BPP Scoring Criteria

- Scores of 8 (with normal amniotic fluid) and 10 considered normal
 - Reflect least chance of being associated with compromised fetus unless decreased amount of amniotic fluid noted

Indications for BPP – Risk Factors Related to Placental Insufficiency or Fetal Compromise

- Intrauterine growth restriction (IUGR)
- Maternal diabetes mellitus
- Maternal heart disease
- Maternal chronic hypertension
- Maternal preeclampsia or eclampsia
- Maternal sickle cell anemia

Indications for BPP – Risk Factors Related to Placental Insufficiency or Fetal Compromise

- Suspected fetal postmaturity (more than 42 weeks' gestation)
- History of previous stillbirths
- Rh sensitization
- Hyperthyroidism
- Renal disease
- Nonreactive NST

Fetal Lung Maturity Determination – L/S Ratio

Learning Outcome 14-4

Explain the use of amniocentesis as a diagnostic tool.

Fetal Lung Maturity Determination

– L/S Ratio

- Amniotic fluid may be analyzed to determine fetal lung maturity
- Lecithin/Sphingomyelin (L/S) Ratio
 - Lecithin and sphingomyelin are components of surfactant
- Fetal lung maturity is determined by
 - The lecithin/sphingomyelin ratio

Fetal Lung Maturity Determination

– L/S Ratio

- By 35 weeks' gestation:
 - L/S ratio of 2:1 (also reported as 2.0) usually achieved in the normal fetus
 - 2:1 L/S ratio indicates low risk for respiratory distress syndrome (RDS)

Amniotic Fluid Analysis

Learning Outcome 14-5

Describe the tests that can be performed using amniotic fluid.

Amniotic Fluid Analysis

- The triple test & quadruple screen
 - Measure substances in the amniotic fluid
 - Information helps identify fetal anomalies

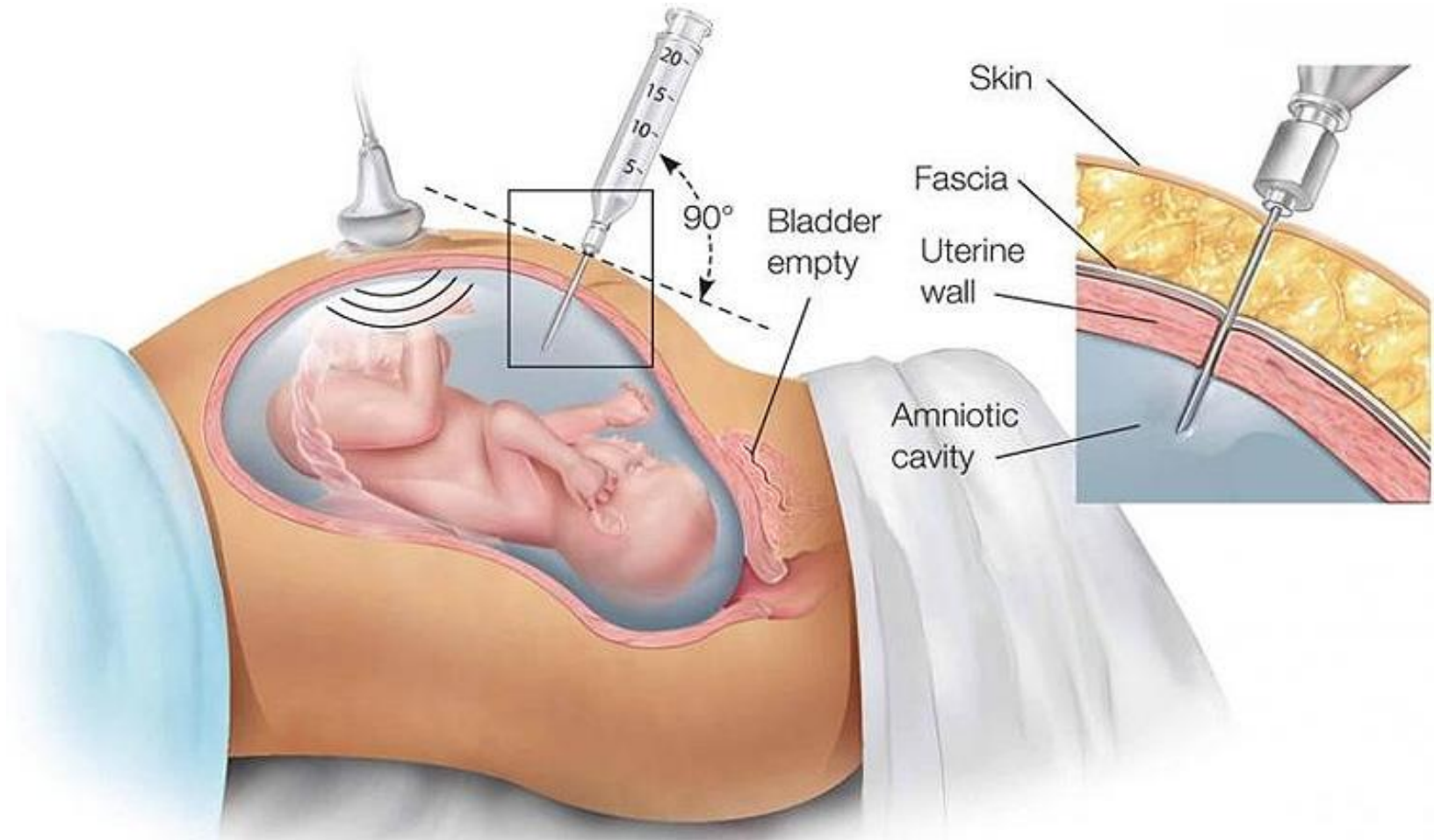
Amniotic Fluid Analysis

- Triple test assesses for:
 - Appropriate levels of alpha-fetoprotein (AFP) a protein produced by the fetus
 - Human chorionic gonadotropin (hCG)
 - Unconjugated estriol (UE3) an estrogen produced by both the fetus and the placenta
- Triple test is most widely used test to screen for Down syndrome (trisomy 21)

Amniotic Fluid Analysis

- Triple test is most widely used test to screen for trisomy 18, and neural tube defects (NTDs)
- Quadruple screen
 - Measurement of Diameric Inhibin-A: protein produced by placenta & ovaries
 - More sensitive accurate detector of trisomy 21 & false +ve is rare
 - Will replace the triple screen in the near future

Amniocentesis



Chorionic Villus Sampling (CVS)

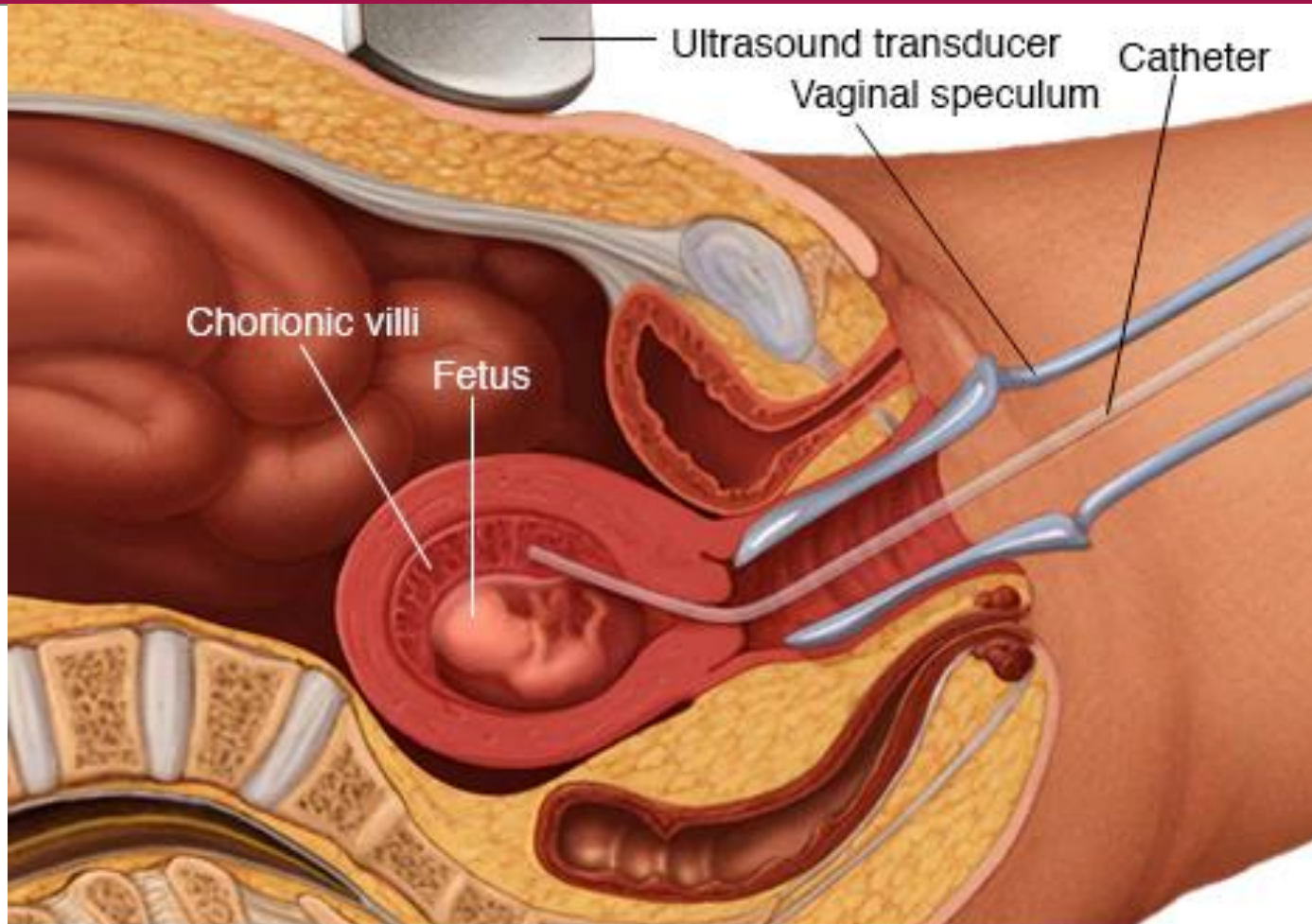
Learning Outcome 14-6

Compare the advantages and disadvantages of chorionic villus sampling (CVS).

Chorionic Villus Sampling (CVS)

- Small sample of chorionic villi taken from developing placenta
- Performed in some medical centers for first-trimester diagnosis of genetic and deoxyribonucleic acid (DNA) studies

Chorionic Villus Sampling (CVS)



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Chorionic Villus Sampling (CVS)

- Transabdominal or transcervical approach
 - Dependent upon placenta location
 - Fetal loss rate is the same regardless of approach
 - Vaginal spotting more common with transcervical approach

CVS – Advantages

- Early diagnosis
- Short waiting time for results
- Typically performed between 10 and 13 weeks
- Second-trimester amniocentesis is not done until at least 15 weeks' gestation

CVS – Risks and Disadvantages

- Studies suggest early CVS may be linked to limb reduction birth
- Most practitioners do not recommend early CVS before 10 gestational weeks (ACOG, 2007b; Farina, 2011)

CVS – Risks and Disadvantages

- Risks of CVS include:
 - Failure to obtain tissue
 - Rupture of membranes
 - Leakage of amniotic fluid
 - Bleeding
 - Intrauterine infection
 - Maternal tissue contamination of specimen
 - Rh izoimmunization

CVS – Risks and Disadvantages

- Spontaneous abortion rate following CVS estimated to be 0.5% (ACOG, 2007b; Farina, 2011)
- Cannot detect neural tube defects
 - Women who desire testing for neural tube defects would need quadruple screening at 15 to 20 weeks' gestation

- END