Making Care Safer- A Consistent Approach to FHR Tracing Evaluation and Management”

Michael Fox RN, BSN, Director

perinatal resource group for Obstetric and neonatal care

FETAL HEART RATE MONITORING

..."Greater experience does not necessarily lead to expertise. One may simply make the same mistakes with greater and greater confidence."

Cochrane Report

7 Key Operational Components of an Effective FHR Training Program

- Common Goal FHR Monitoring
- Common Interpretive Construct
- Common Language
- Collaborative Intervention and Practice Guidelines
- Consistency In What/How is Taught
- Critical Events Training
- Core Operating Principle “Safety First”

1997
A Common Language

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Electronic Fetal Heart Rate Monitoring: Research Guidelines for Interpretation

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FETAL HEART RATE CHARACTERISTICS AND PATTERNS: NICHD (1997)	
Term	Definition
Baseline Rate	Approximate mean FHR rounded to increments of 5 bpm during a 10 min segment excluding periodic or episodic changes, periods of marked variability and segments of baseline that differs by > 25 bpm. In any 10 minute window the minimum baseline duration must be at least 2 min. or the baseline for that period is indeterminate. In this case, one may need to refer to the previous 10 min. segment for determination of the baseline.
Bradycardia	Baseline rate of < 110 bpm.
Tachycardia	Baseline rate of > 160 bpm.
- Absent variability	Amplitude range undetectable.
- Minimal variability	Amplitude range > undetectable and ≤ 5 bpm.
- Moderate variability	Amplitude range 6-25 bpm.
- Marked variability	Amplitude range > 25 bpm.
Acceleration	Visually apparent abrupt increase (onset to peak is < 30 sec) in FHR above baseline. The increase is calculated from the most recently determined portion of the baseline. Acme is ≥ 15 bpm above the baseline and lasts ≥ 15 sec. and < 2 min. from the onset to return to baseline. Before 32 weeks of gestation, an acme ≥ 10 bpm above the baseline and duration of ≥ 10 sec. is an acceleration.
Prolonged acceleration	Acceleration ≥ 2 min. and < 10 min. duration.
Early deceleration	Visually apparent *gradual* decrease (onset to nadir is ≥ 30 sec) of the FHR and return to baseline associated with a uterine contraction. This decrease is calculated from the most recently determined portion of the baseline. It is coincident in timing, with the nadir of deceleration occurring at the same time as the peak of the contraction. In most cases, the onset, nadir and recovery of the deceration are coincident with the beginning, peak and ending of the contraction, respectively.
Late deceleration	Visually apparent *gradual* decrease (onset to nadir is ≥ 30 sec) of the FHR and return to baseline associated with a uterine contraction. This decrease is calculated from the most recently determined portion of the baseline. It is delayed in timing, with the nadir of deceleration occurring after the peak of the contraction. In most cases, the onset, nadir and recovery of the deceleration occur after the onset, peak and ending of the contraction respectively.
Variable deceleration	Visually apparent abrupt decrease (onset of beginning of nadir is < 30 sec) in FHR below baseline. The decrease is calculated from the most recently determined portion of the baseline. Decrease is ≥ 15 bpm, lasting ≥ 15 sec. and < 2 min. from onset to return to baseline. When variable decelerations are associated with uterine contractions, their onset, depth and duration vary with successive uterine contractions.
Prolonged deceleration	Visually apparent decrease in FHR below baseline. The decrease is calculated from the most recently determined portion of the baseline. Decrease is ≥ 15 bpm, lasting ≥ 2 min. but < 10 min. from onset to return to baseline.

From the National Institute of Child Health and Human Development Research Planning Workshop: Electronic fetal heart rate monitoring: Research guidelines for interpretation. *American Journal of Obstetrics and Gynecology* (1997) 177, 1385-1390 and *Journal of Obstetric, Gynecologic and Neonatal Nursing*, (1997), 26, 635-640.

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Major Impediment to establishing consensus in FHR pattern interpretation and management has been our failure to practice with a common language

NICHD 1996

1997
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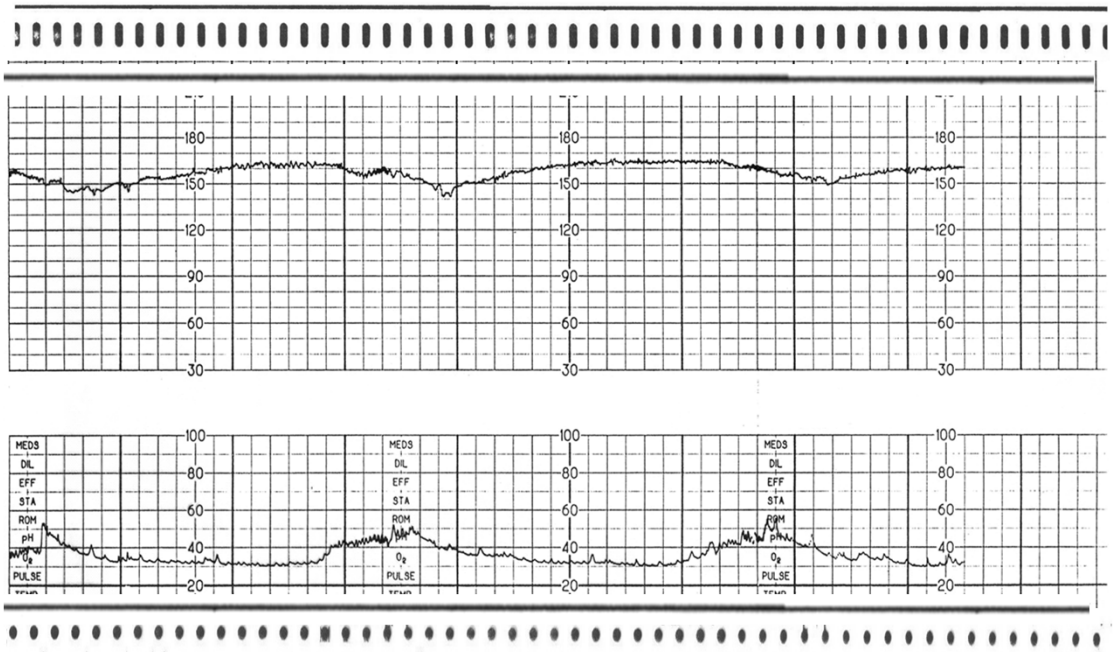

…we have to first agree on what we see…and what we call it.

NICHD 2008 Three-Tier Fetal Heart Rate Interpretation System

JOGNN

PRINCIPLES & PRACTICE

The 2008 National Institute of Child Health and Human Development Workshop Report on Electronic Fetal Monitoring: Update on Definitions, Interpretation, and Research Guidelines

George A. Macones, MD, Gary D. V. Hankins, MD, Catherine Y. Spong, MD, John Hauth, MD and Thomas Moore, MD

ABSTRACT

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The workshop was jointly sponsored by the American College of Obstetricians and Gynecologists, the Eunice Kennedy Shriver National Institute of Child Health and Human Development, and the Society for Maternal-Fetal Medicine.

The Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) convened a series of workshops in the mid-1990s to develop standardized and unambiguous definitions for fetal heart rate (FHR) tracings, culminating in a publication of recommendations for defining fetal heart rate characteristics (NICHD, 997). The goal of these definitions was to allow the predictive value of monitoring to be assessed more meaningfully and to allow evidence-based clinical management of intrapartum fetal compromise.

The definitions agreed upon in that workshop were endorsed for clinical use in the most recent American College of Obstetricians and Gynecologists (ACOG) Practice Bulletin in 2005 and also endorsed by the Association of Women's Health, Obstetric and Neonatal Nurses (ACOG, 2005). Subsequently, the Royal College of Obstetricians and Gynaecologists (RCOG, 2001) and the Society of Obstetricians and Gynaecologists of Canada (SOGC, 2007) convened expert groups to assess the evidence-based use of electronic fetal monitoring (EFM). These groups produced consensus documents with more specific recommendations for FHR pattern classification and intrapartum management actions (Liston, Sawchuck, & Young, 2007; RCOG, 2001). In addition, new interpretations and definitions have been proposed, including terminology such as "tachysystole" and "hyperstimulation" and new interpretative systems using three and five tiers (Liston et al., 2007; Parer & Ikeda, 2007; RCOG, 2001). The SOGC Consensus Guidelines for Fetal Health Surveillance presents a three-tier system (normal, atypical, abnormal), as does RCOG (Liston et al., 2007; RCOG, 2001). Parer and Ikeda (2007) recently suggested a five-tier management grading system. Recently, the NICHD, ACOG, and the Society for Maternal-Fetal Medicine jointly sponsored a workshop focused on EFM.

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For a list of workshop participants, see the Appendix online at www.greenjournal.org/cgi/content/full/112/3/661/DC1.

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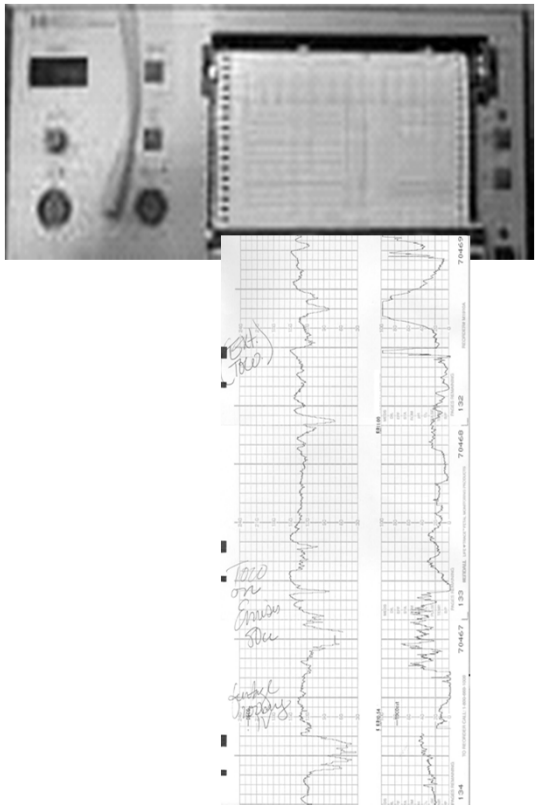
The authors have no financial conflicts of interest to disclose.

AWHONN

http://jognn.awhonn.org

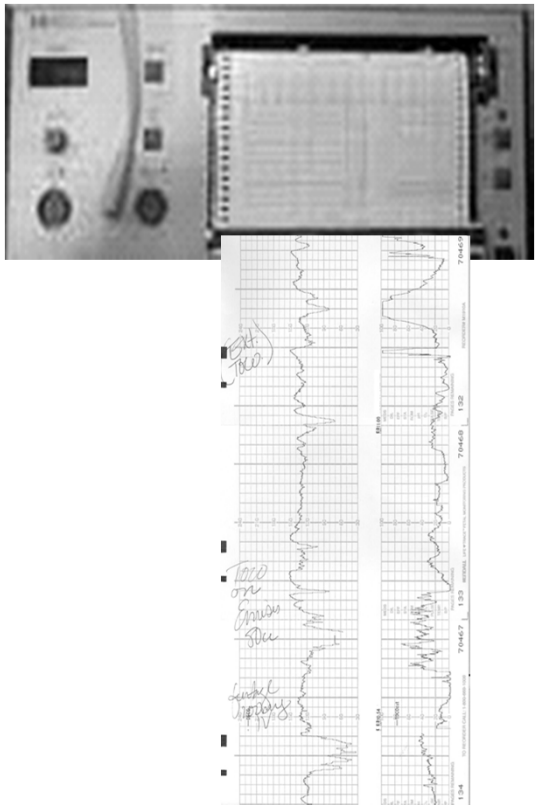
NICHD 2008



Category 1

- FHR 110-160 bpm
- Moderate Variability
- No late or variable decelerations
- ± earlys
- ± accelerations

NICHD 2008

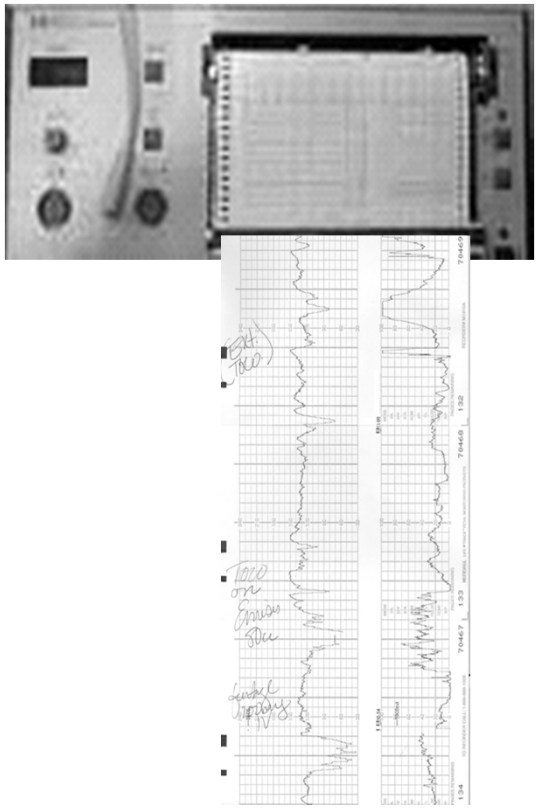


Category III

Absent variability with:
Recurrent

- Late decelerations
- Variable decelerations
- Bradycardia
- Sinusoidal pattern

NICHD 2008



Category II Tracings

Everything else

“Indeterminate”

NICHD: Category II Tracings

Not a homogenous group. Include FHR patterns with:

- Minimal, moderate, marked and absent variability
- Tachycardia and bradycardia
- Variable, late, and prolonged decelerations

NICHD: Category II Tracings

Include FHR patterns with:

- No association with significant acidemia
- Indeterminate association with significant acidemia and
- Presumed association with significant acidemia

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The *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) convened a series of workshops in the mid-1990s to develop standardized and unambiguous definitions for fetal heart rate (FHR) tracings, culminating in a publication of recommendations for defining fetal heart rate characteristics (NICHD, 997). The goal of these definitions was to allow the predictive value of monitoring to be assessed more meaningfully and to allow evidence-based clinical management of intrapartum fetal compromise.

The definitions agreed upon in that workshop were endorsed for clinical use in the most recent American College of Obstetricians and Gynecologists (ACOG) Practice Bulletin in 2005 and also endorsed by the Association of Women's Health, Obstetric and Neonatal Nurses (AOCG, 2005). Subsequently, the Royal College of Obstetricians and Gynaecologists (RCOG, 2001) and the Society of Obstetricians and Gynaecologists of Canada (SOGC, 2007) convened expert groups to assess the evidence-based use of electronic fetal monitoring (EFM). These groups produced consensus documents with more specific recommendations for FHR pattern classification and intrapartum management actions (Liston, Sawchuck, & Young, 2007; RCOG, 2001). In addition, new interpretations and definitions have been proposed, including terminology such as "tachysystole" and "hyperstimulation" and new interpretative systems using three and five tiers (Liston et al., 2007; Parer & Ikeda, 2007; RCOG, 2001). The SOGC Consensus Guidelines for Fetal Health Surveillance presents a three-tier system (normal, atypical, abnormal), as does RCOG (Liston et al., 2007; RCOG, 2001). Parer and Ikeda (2007) recently suggested a five-tier management grading system. Recently, the NICHD, ACOG, and the Society for Maternal-Fetal Medicine jointly sponsored a workshop focused on EFM.

Goal: Reduce variation between providers how we interpret, manage, and communicate about FHR Tracings

The Journal of Maternal-Fetal and Neonatal Medicine, May 2006; 19(5): 289–294

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Fetal acidemia and electronic fetal heart rate patterns: Is there evidence of an association?

J. T. PARER[1], T. KING[1], S. FLANDERS[1], M. FOX[1], & S. J. KILPATRICK[2]

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(Received 23 August 2005; revised 21 November 2005; accepted 22 November 2005)

Abstract

Objective. Despite the ubiquity of electronic fetal monitoring, the validity of the relationship between various fetal heart rate (FHR) patterns and fetal acidemia has not yet been established in a large unselected series of consecutive pregnancies. The aim of this study was to examine the published literature for evidence of such a relationship.

Methods. Four hypotheses based on assumptions in common clinical use were examined. The literature was searched for relationships between certain aspects of FHR patterns (e.g., degree of FHR variability, depth of decelerations), and fetal acidemia, or fetal vigor (5-minute Apgar score ≥7). We also attempted to relate duration of these patterns to the degree of acidemia. Using standardized FHR nomenclature we defined patterns based on baseline FHR variability, baseline rate, decelerations, and accelerations.

Results. The following relationships were observed: (1) Moderate FHR variability was strongly associated (98%) with an umbilical pH >7.15 or newborn vigor (5-minute Apgar score ≥7). (2) Undetectable or minimal FHR variability in the presence of late or variable decelerations was the most consistent predictor of newborn acidemia, though the association was only 23%. (3) There was a positive relationship between the degree of acidemia and the depth of decelerations or bradycardia. (4) Except for sudden profound bradycardia, newborn acidemia with decreasing FHR variability in combination with decelerations develops over a period of time approximating one hour. Most studies identified were observational and uncontrolled (grade III evidence of US Preventive Services Task Force); however, there was general agreement amongst the various studies, strengthening the validity of the observations.

Conclusions. The validity of the relationship between certain FHR patterns and fetal acidemia and/or vigor, is supported by observations from the literature. In addition four assumptions commonly used in clinical management are supported. These conclusions need to be confirmed by a prospective examination of a large number of consecutive, unselected FHR patterns, and their relationship to newborn acidemia. Pending the completion of such studies, these observations can be used to justify certain aspects of current clinical management, and may assist in standardizing the diversity of opinions regarding FHR pattern management.

Keywords: *Fetal pH, fetal monitoring, electronic FHR monitoring, fetal acidemia*

Introduction

Electronic fetal heart rate (FHR) monitoring was introduced into clinical practice without appropriate studies on its reliability (intra- and inter-observer variability), validity (relationship of FHR patterns to fetal outcome), and causal relationship to outcome (ability of intervention to avoid metabolic acidemia) [1].

Recommendations for studies of each of these items were amongst the conclusions of the National Institute of Child Health and Human Development (NICHD) Research Planning Workshop, Electronic fetal heart rate monitoring: Research guidelines for interpretation [2]. In order to determine the validity of FHR monitoring, the suggestion was for a large descriptive epidemiological study of the frequency of different FHR patterns using the standardized definitions, and correlation of these patterns with several immediate outcome measures, including umbilical vessel blood gases and acid–base state (in particular metabolic acidemia) and Apgar scores.

The NICHD panel stated that studies of the reliability and validity of FHR monitoring should precede the development of a system of management of FHR patterns, because such studies would most

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J. T. Parer a; T. King a; S. Flanders a; M. Fox a; S. J. Kilpatrick b

The Journal of Maternal-Fetal & Neonatal Medicine, Volume 19, Issue 5 May 2006

4 Key Guidelines FHR Monitoring

1. FHR decelerations as an independent finding are poorly predictive of complicated outcomes.

2. The degree of variability is the most sensitive indicator of the adequacy of oxygen delivery to the fetus at any given moment in time.

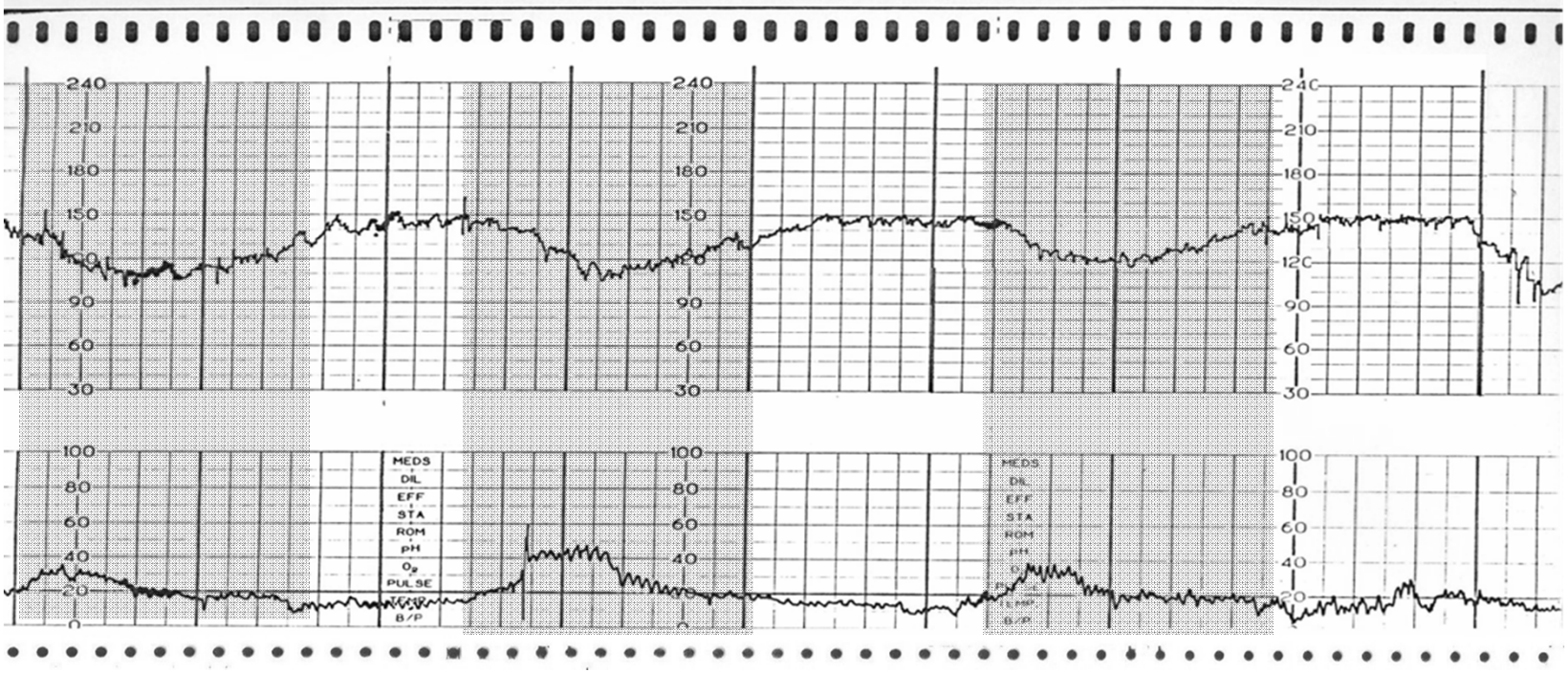
3. **A metabolic acidosis typically develops slowly in association with recurrent decelerations and an evolutionary reduction of FHR variability over time.**

4. **The deeper the decelerations the > likelihood for developing a significant acidosis.**

A Common Goal

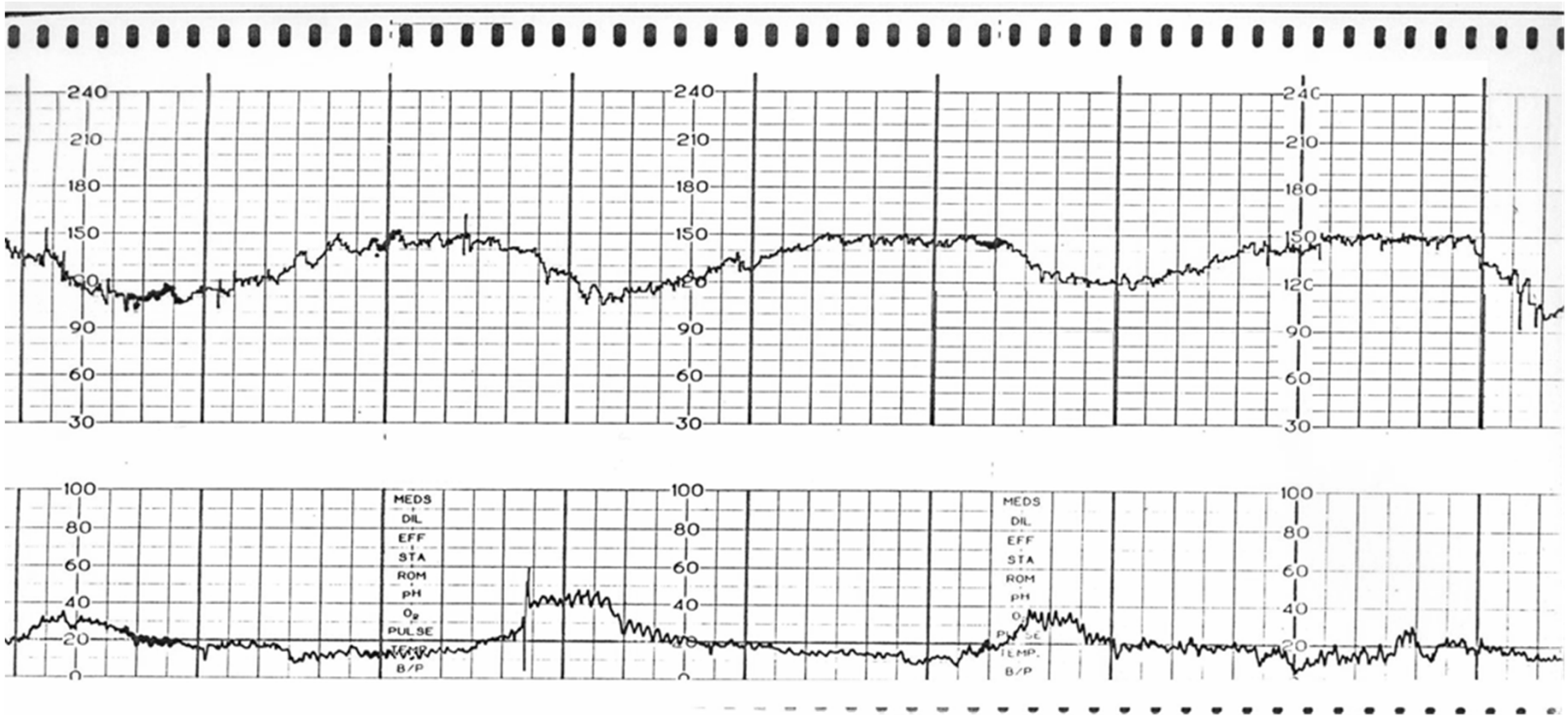
In the OB setting the overriding goal is to accomplish delivery in the absence of significant acidemia defined as cord umbilical artery blood gas at the time of birth, pH ≥ 7.1 and a base excess ≥ -12 mEq L-1 and/or delivery in the presence of neonatal vigor defined as an Apgar score ≥ 7 at 5 minutes of age.

1st Key Interpretive Guideline

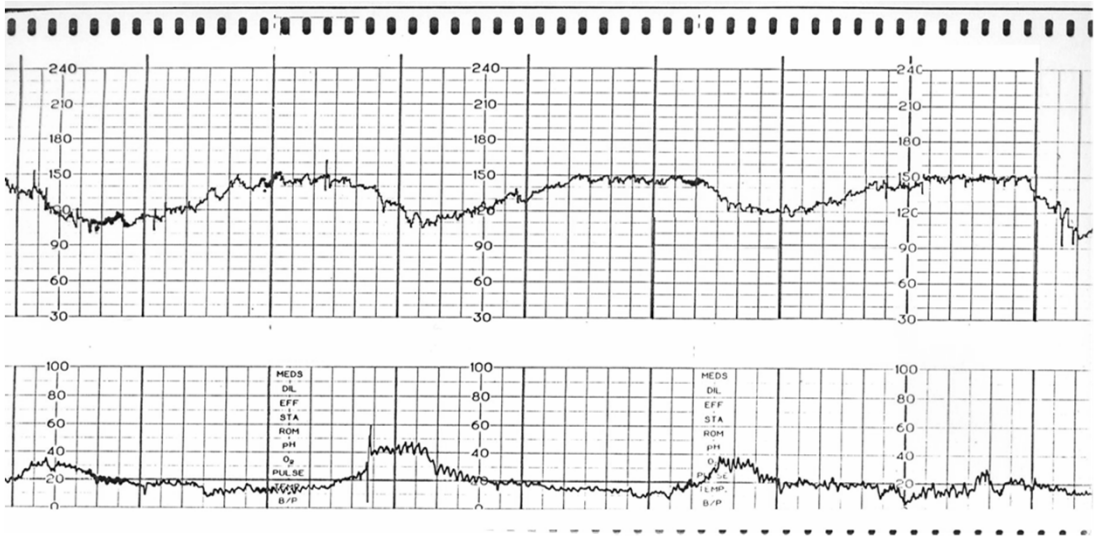


FHR decelerations, as an independent finding, are poorly predictive of an inadequacy of fetal oxygenation or the presence of a significant acidosis.

What % of babies with moderate variability and late decelerations will meet the goal of delivery in the absence of a significant acidosis (CUA gas at the time of birth pH ≥ 7.1 and a base excess ≥ -12 mEq L-1) and/or in the presence of neonatal vigor (Apgar score ≥ 7 at 5 minutes of age)?



a. < 50% b. < 25% c. ≥ 99% d. ≥ 80%



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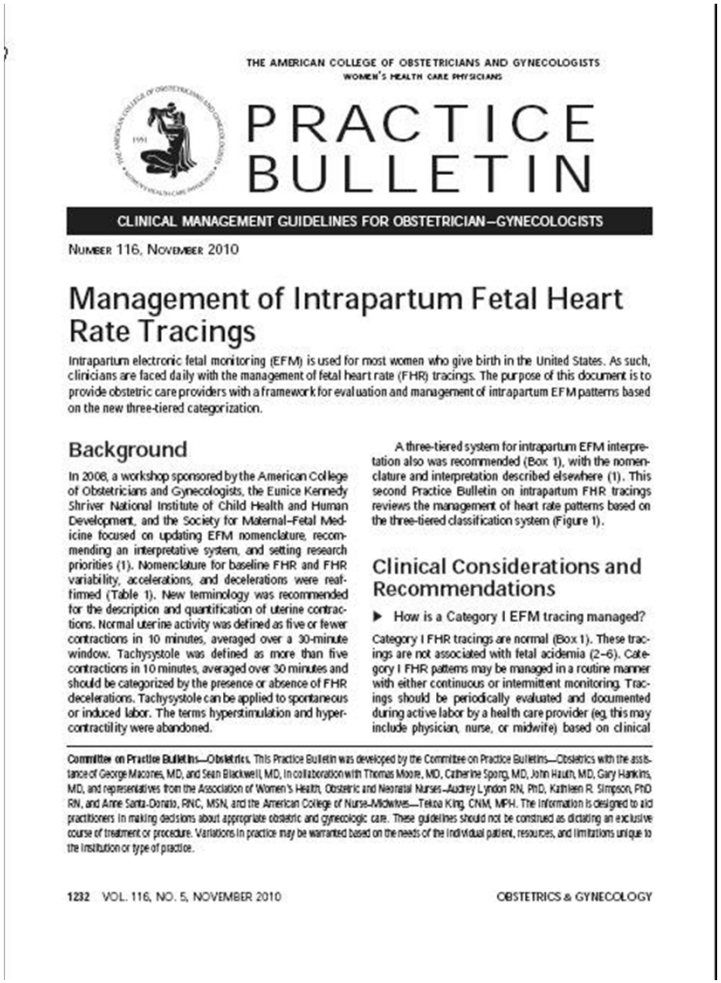
- 98% of the fetuses with moderate FHR variability, with or without decelerations or second stage bradycardia will be born in the absence of a significant metabolic acidosis, and/or in the presence of neonatal vigor.
- When moderate FHR variability is present at the time of birth < 1% of neonates will be born with an Apgar score <7 at 5 minutes.

ACOG Practice Bulletin #116 November 2010



THE AMERICAN COLLEGE OF OBSTETRICIANS AND GYNECOLOGISTS
WOMEN'S HEALTH CARE PHYSICIANS

PRACTICE BULLETIN

CLINICAL MANAGEMENT GUIDELINES FOR OBSTETRICIAN–GYNECOLOGISTS

NUMBER 116, NOVEMBER 2010

Management of Intrapartum Fetal Heart Rate Tracings

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Background

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Clinical Considerations and Recommendations

▶ How is a Category I EFM tracing managed?

Category I FHR tracings are normal (Box 1). These tracings are not associated with fetal acidemia (2–6). Category I FHR patterns may be managed in a routine manner with either continuous or intermittent monitoring. Tracings should be periodically evaluated and documented during active labor by a health care provider (eg, this may include physician, nurse, or midwife) based on clinical

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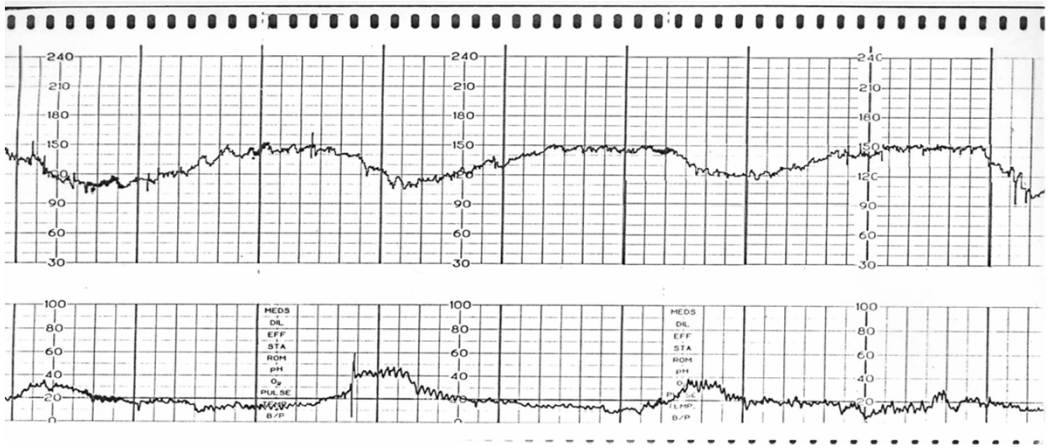
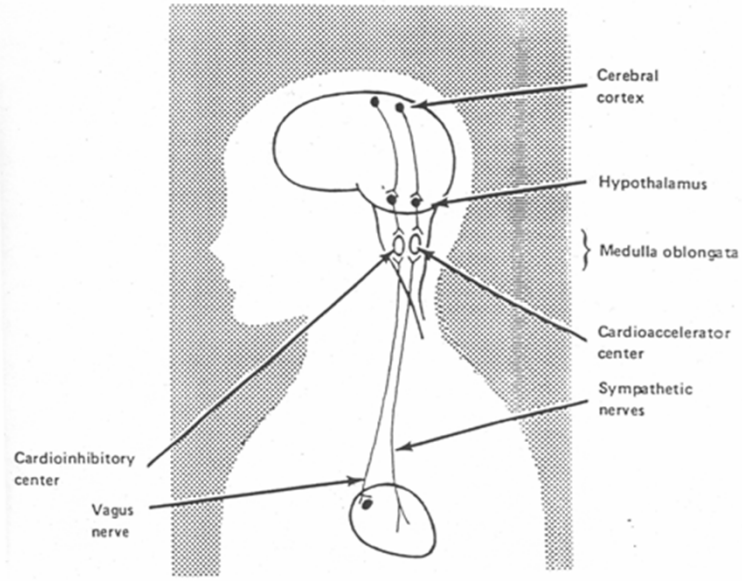
On Late Decelerations

Given the low predictive value of late decelerations for acidemia… the presence of accelerations or moderate FHR variability or both may be useful to assess the risk for fetal acidemia



- ☒ Continuous Observation
- ☒ Notification
- ☒ Bedside Evaluation
- ☒ Prepare for Delivery
- Ø Is Delivery Immediately Necessary
- ☐ Prepare For Neonatal Resuscitation
- ☐ Prepare to Transfer/Transport

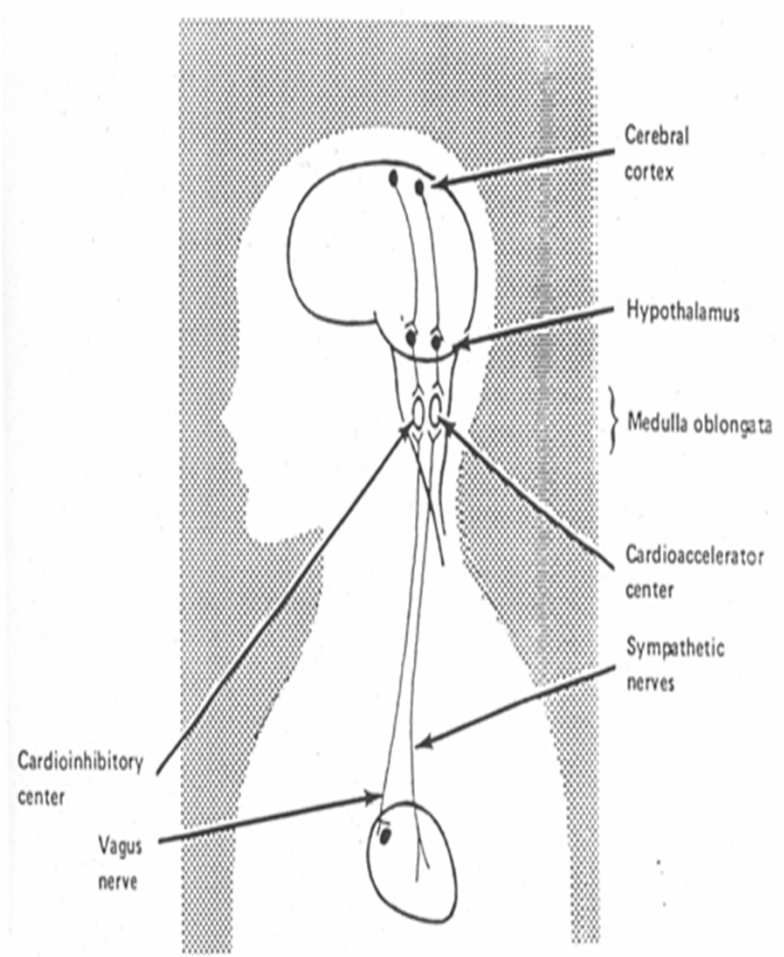
2nd Key Interpretive Guideline



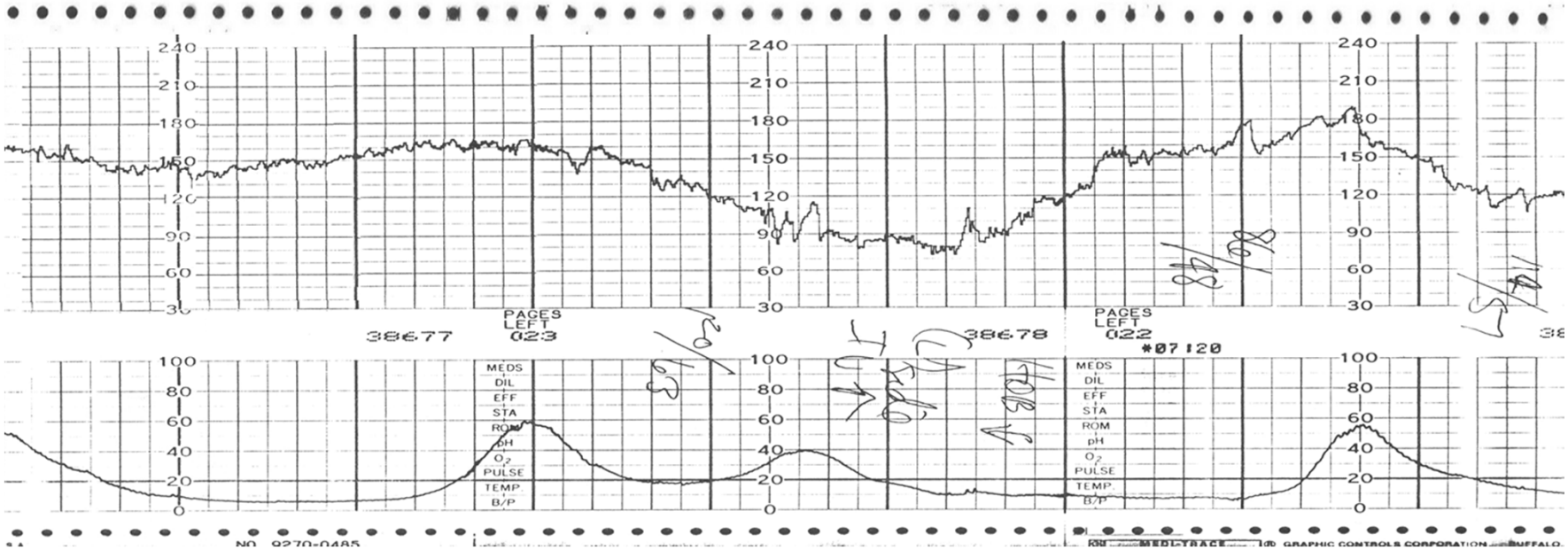
The degree of baseline variability that accompanies the decelerations is the most sensitive indicator of the adequacy of oxygen delivery to the fetus at any given moment in time.

WHY?

FHR variability in the moderate range (with or without accelerations) is the visual representation of an intact,
i.e. adequately oxygenated fetal neurologic pathway, through the midbrain, the vagus nerve and the cardiac conduction system.

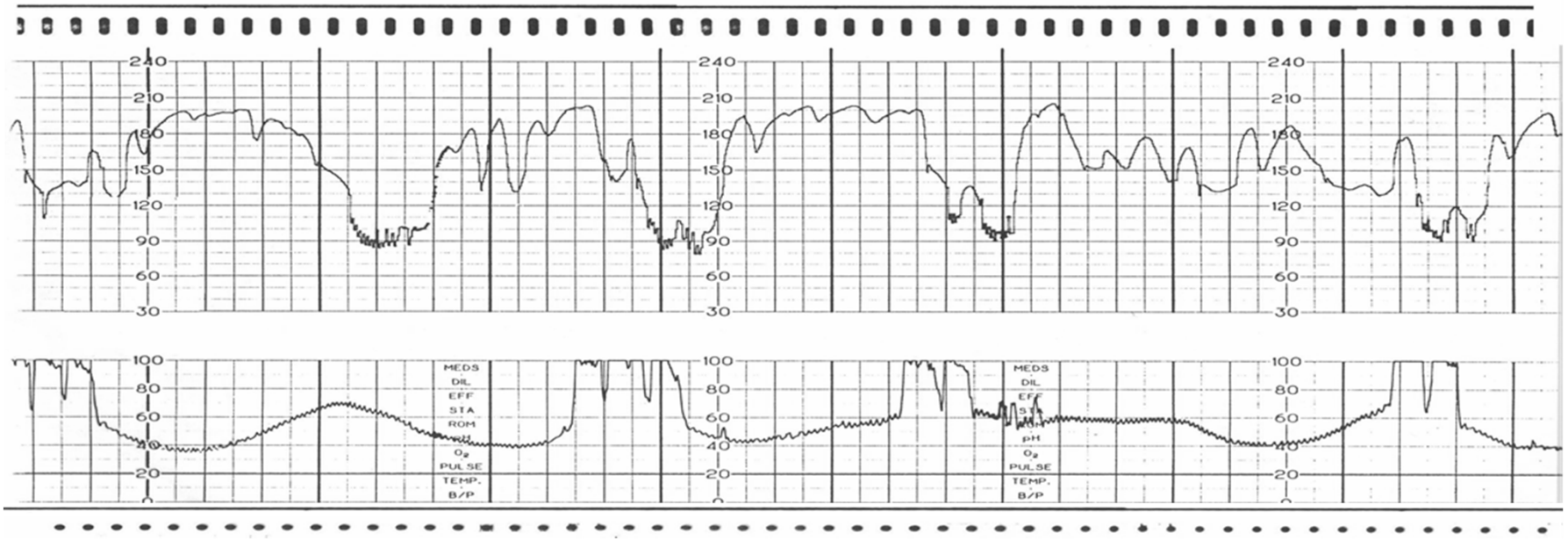


2nd Key Interpretive Guideline



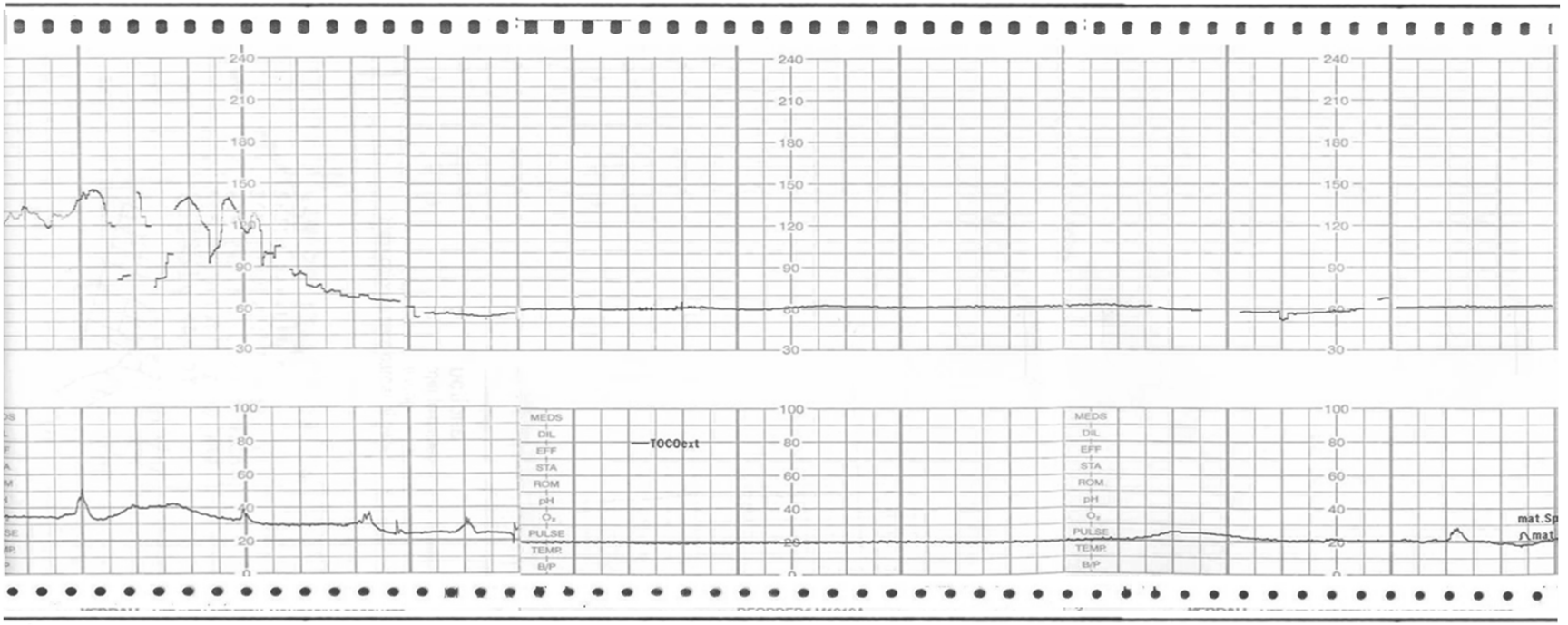
Therefore, in the presence of moderate FHR variability, no matter what patterns are present, clinicians can presume that the fetus, at that time, is not suffering deep central cerebral tissues asphyxia because it is able to centralize available oxygen and thus remain "physiologically compensated."

3rd Key Interpretive Guideline



Absent and/or minimal FHR variability, accompanied by recurrent decelerations and/or a sustained bradycardia of ≤ 60 bpm, are the FHR patterns most consistently associated with a significant acidosis in the fetus.

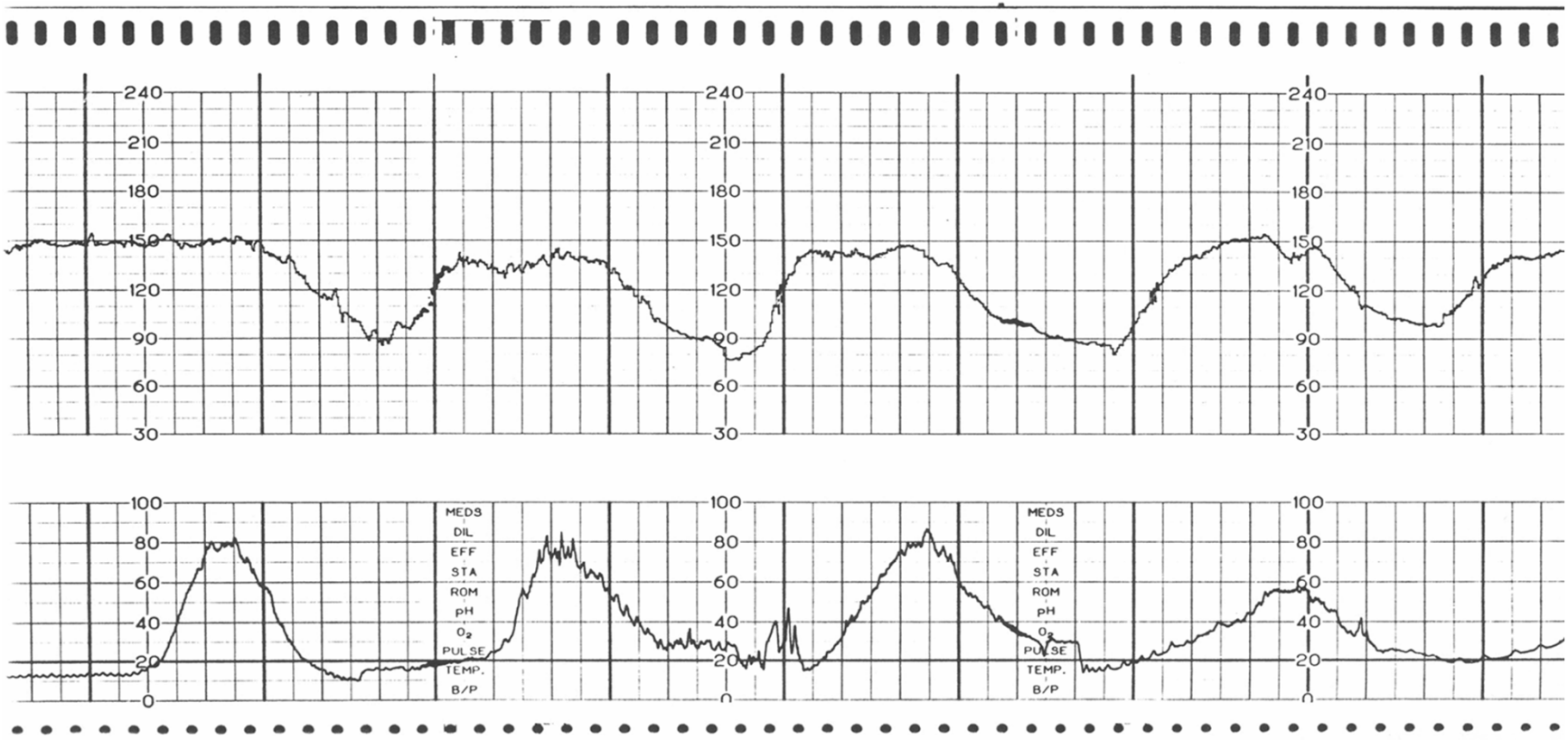
3rd Key Interpretive Guideline



With the exception of acute catastrophic events, a significant metabolic acidosis typically develops slowly in the fetus during labor. Usually over 60-120 minutes…

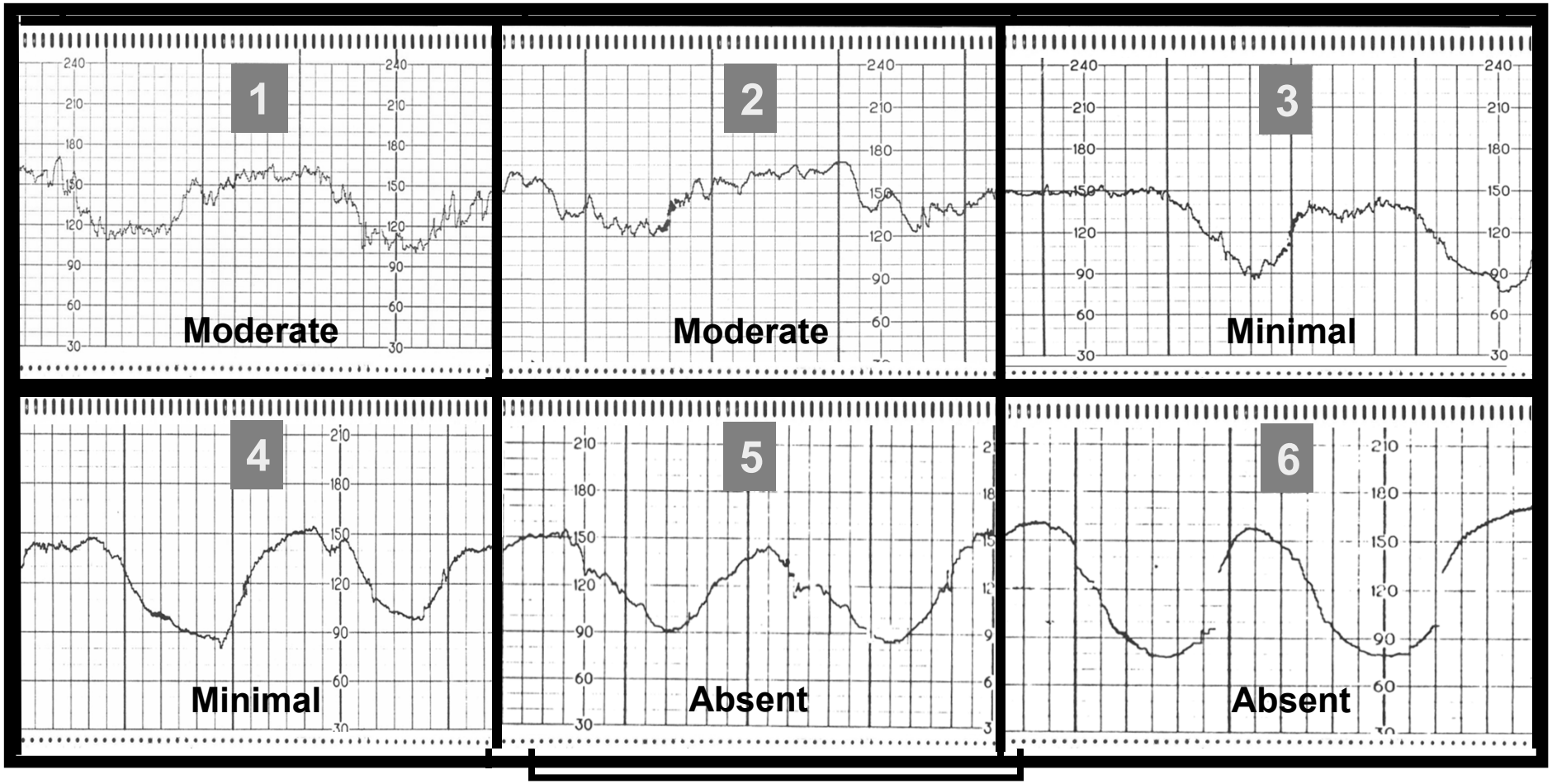
1. Evolutionary loss of FHR Variability
2. In association with recurrent decelerations and/or bradycardia
3. That get deeper over time

3rd Key Interpretive Guideline



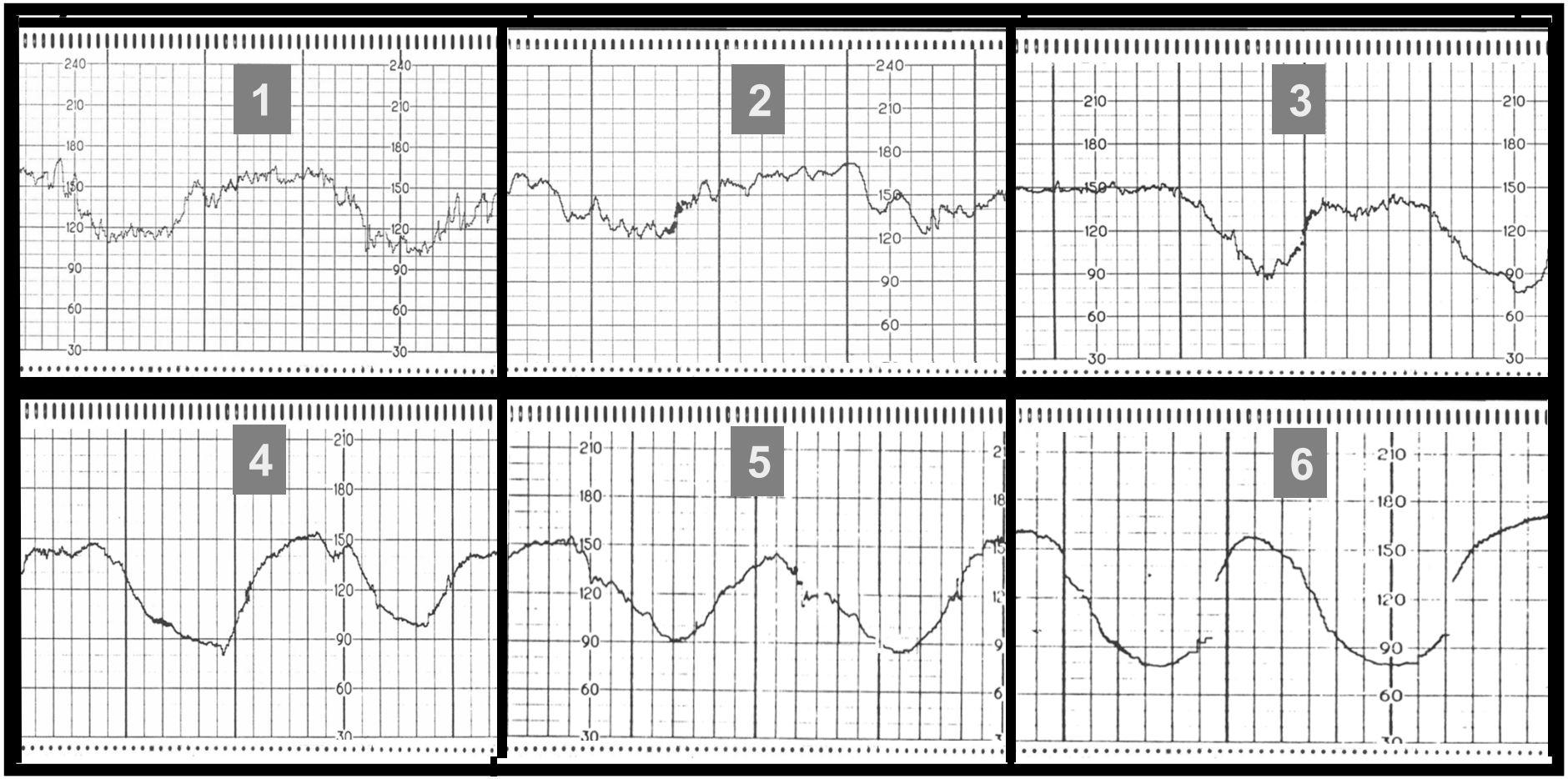
…in association with typical and observable changes in the FHR tracing.

Jagged and Unpredictable



Smooth, Round, Blunted, Flat

Thinking Backwards



Thinking Forwards

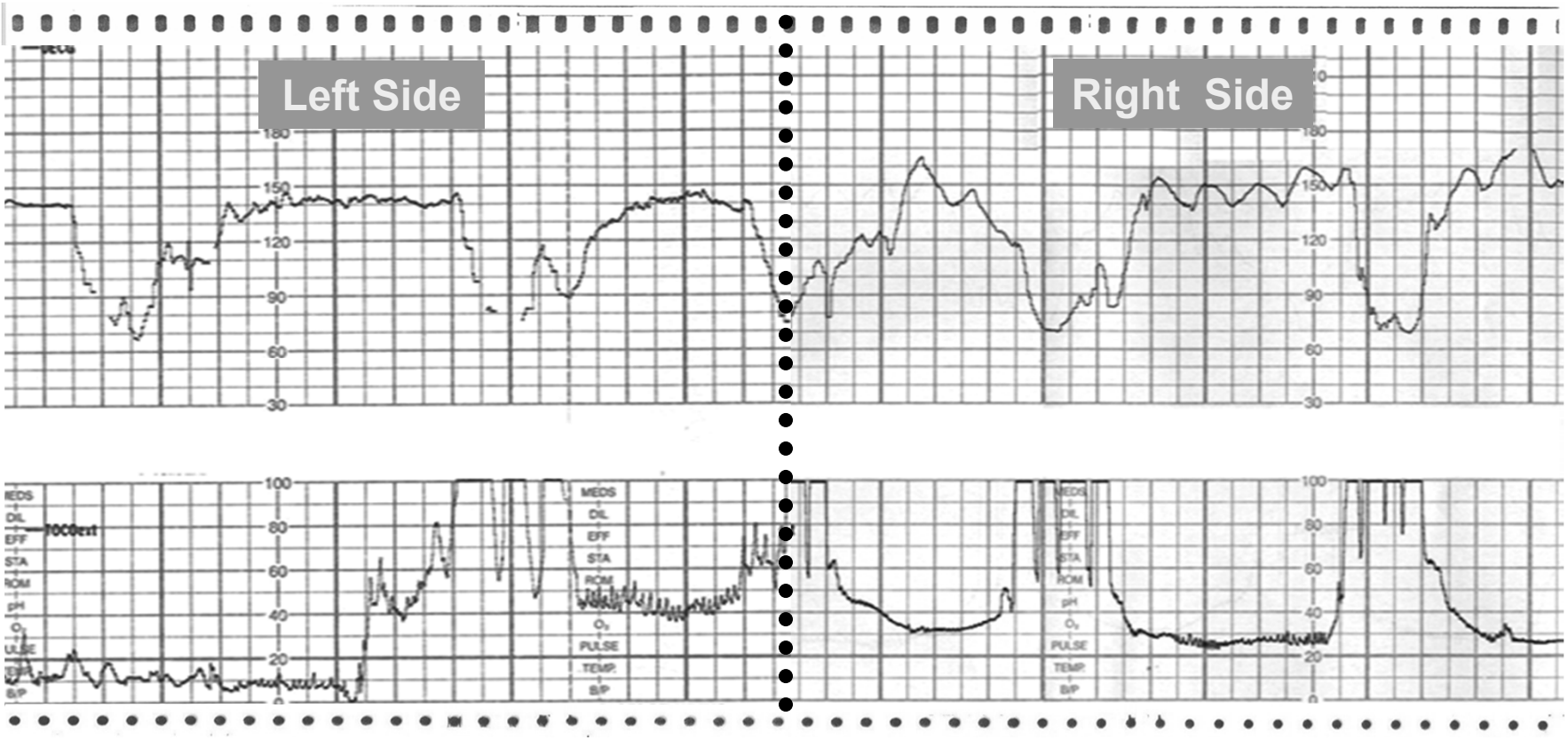
Short term and long term variability

Are they still Relevant?

NICHD-1997 BASIC CLASSES OF FHR VARIABILITY

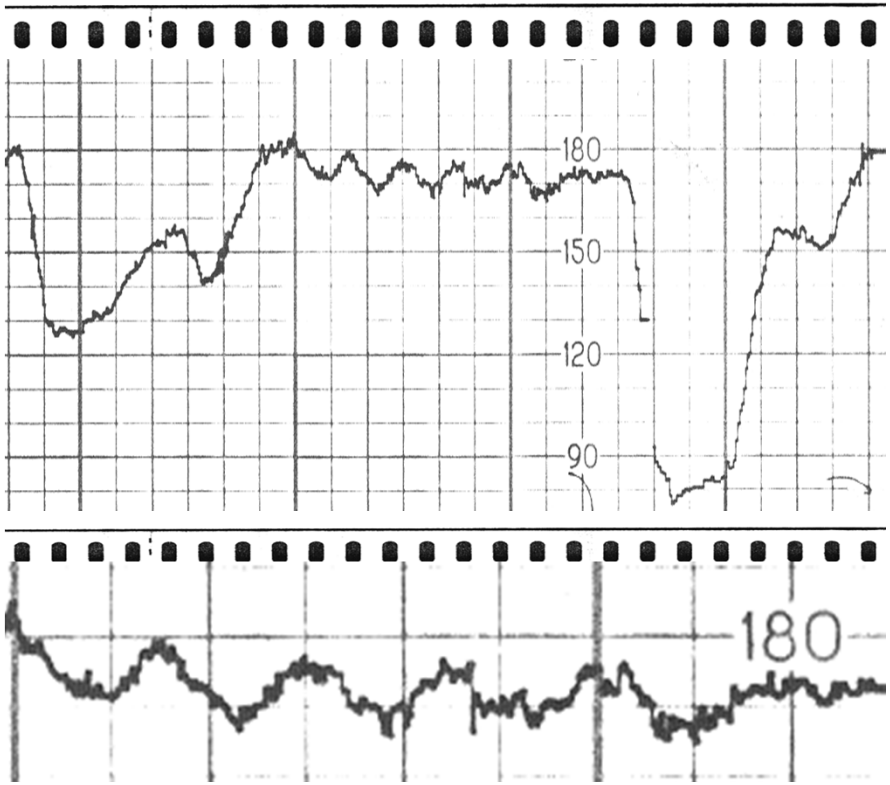
No distinction is made between short-term variability… and long-term variability because in actual practice they are visually determined as a unit. Hence the *definition of variability* is based visually on the amplitude of the complexes, with exclusion of the regular, smooth sinusoidal pattern.

“Typical and Observable Changes”



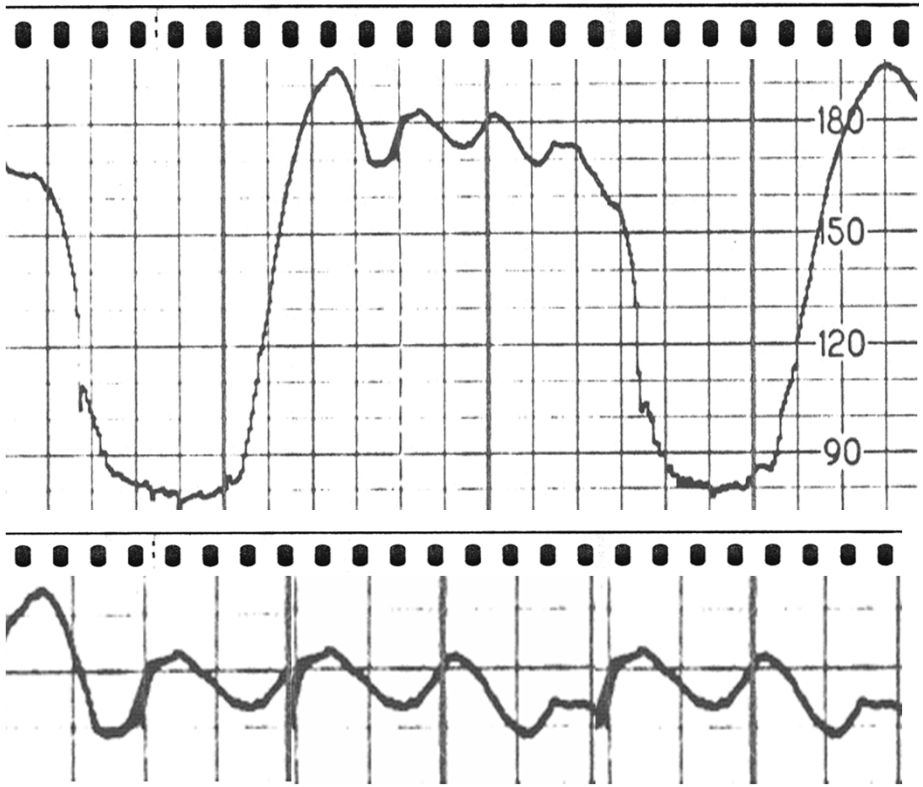
Which side of the tracing is still “jagged and unpredictable?”

Jagged and Unpredictable



Long term variability and Short-term variability

Smooth, Round, Blunted, Flat



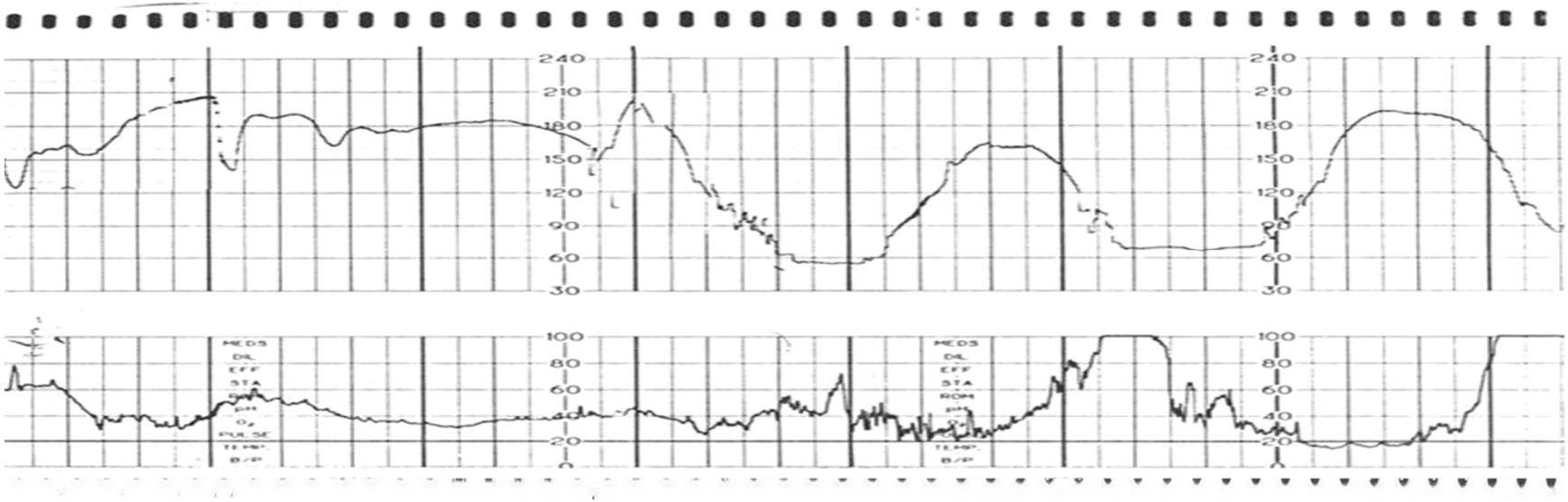
Long term variability with absent Short-term variability

FHR Patterns Associated With Fetal Demise

1. Most have baseline FHR in the upper range of normal I.e. above 150 bpm
2. Dying fetuses *always loose their STV*
3. No dying fetus had normal LTV, although 18% had either decreased LTV or intermittent periods of LTV
4. Of those fetuses with absent LTV approximately 1/3 have either intermittent sinusoidal patterns or an undulating *smooth* baseline.

Parer 1983. Handbook of FHR Monitoring

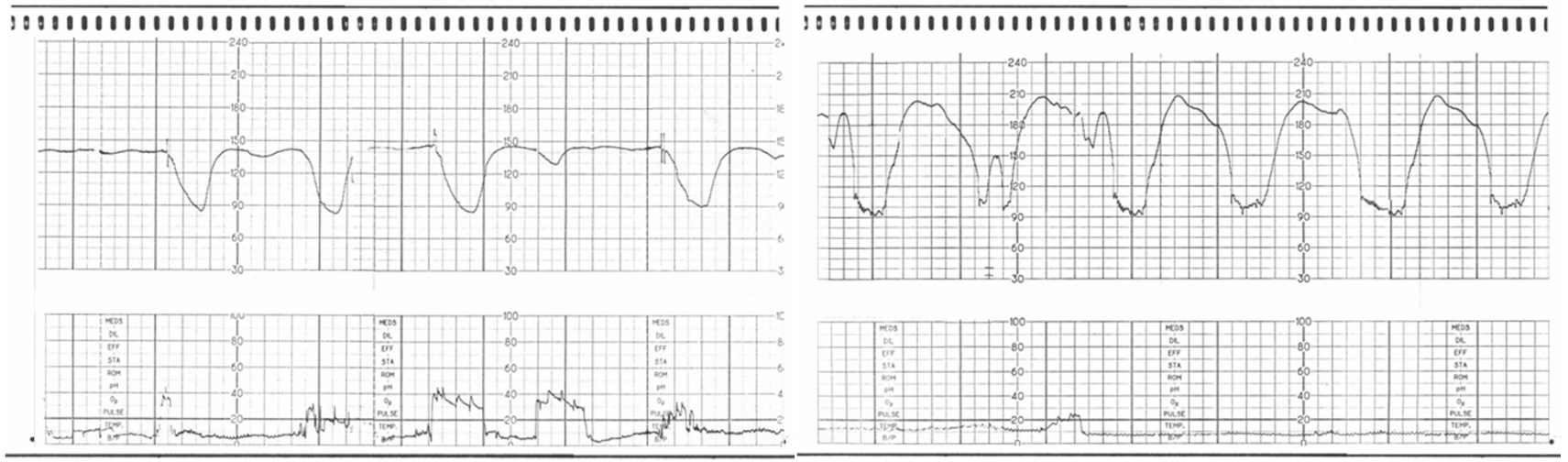
4th Key Interpretive Guideline



There is a positive relationship between the degree of acidemia and the depth of the decelerations.

In the setting of recurrent decelerations or sustained bradycardia the magnitude of the decrease in the FHR appears directly linked to the rapidity with which acidemia may develop.

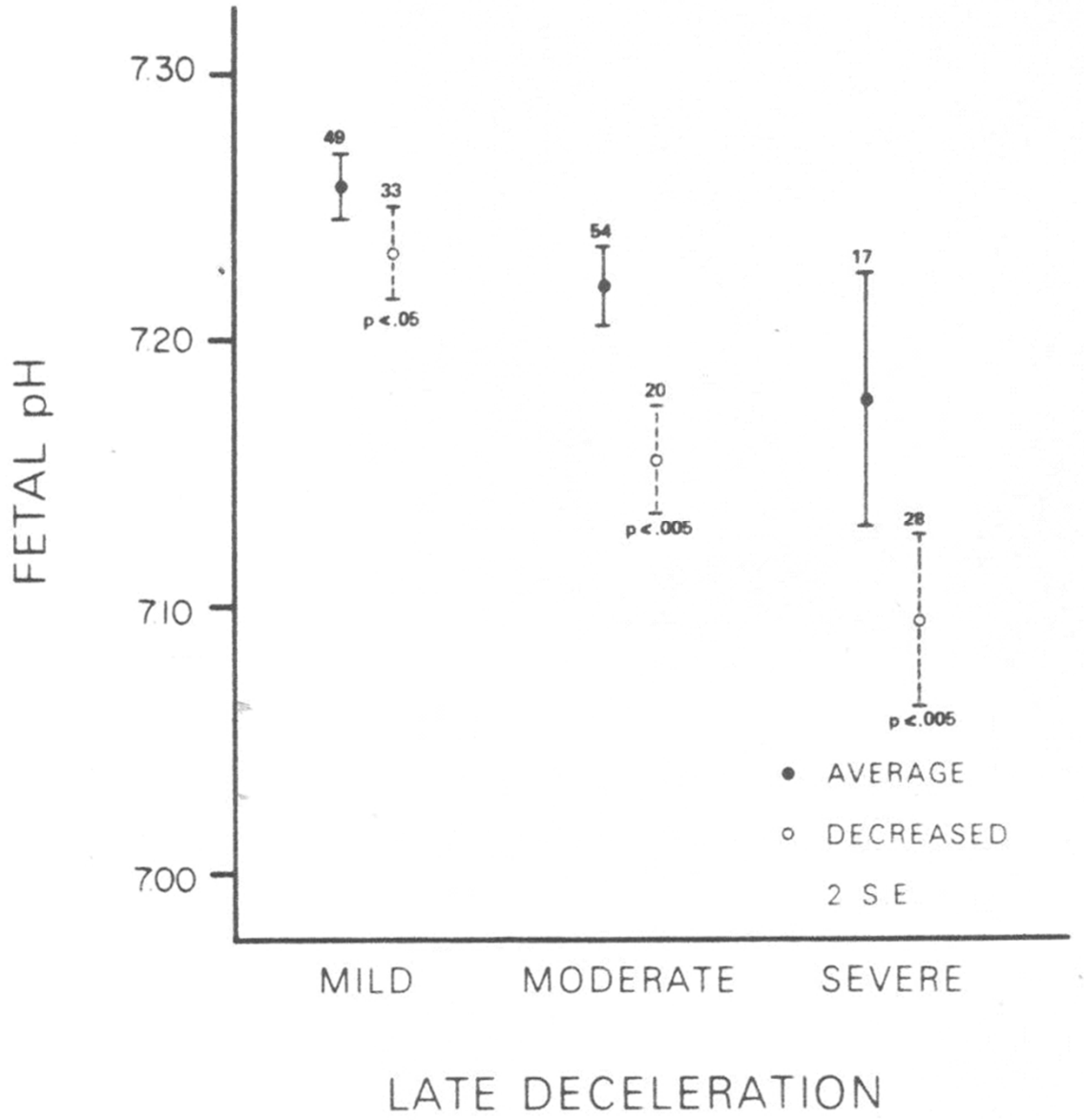
4th Key Interpretive Guideline



- This “dose-response” relationship appears to be particularly true for FHR tracings with minimal and/or absent baseline variability and recurrent decelerations.
- When absent FHR variability accompanies the decelerations, it can be assumed the association is much higher.

Interrelations between fetal pH, FHR variability, & depth of late decelerations

Paul et al, 1975



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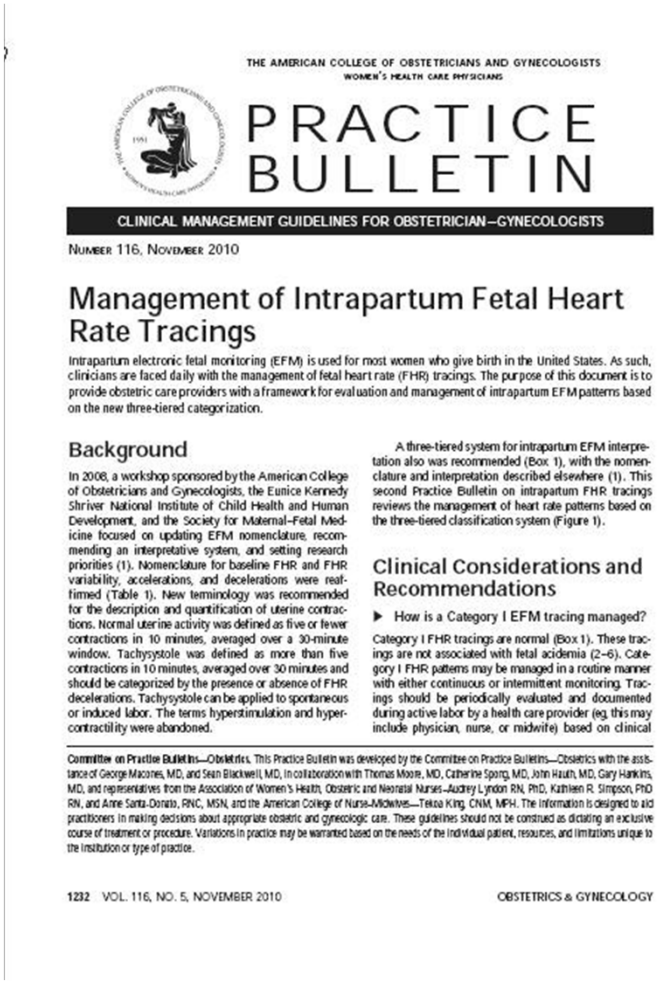

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Depth & Duration Decelerations

Evaluation of recurrent variable decelerations includes their frequency, depth and duration, uterine contraction pattern, FHR variability. Recurrent variable decelerations that progress to greater depth and longer duration are more indicative of impending fetal acidemia.

FHR Pattern Classification Clinical Management

Category and Relationship to significant Acidemia

NICHD-ACOG 1997-2010

Moderate FHR variability reliably predicts the absence of fetal metabolic acidemia at the time it is observed."

Minimal variability should be considered as potentially indicative of fetal acidemia and should be managed accordingly

Absent variability with decelerations… is abnormal and conveys an increased risk of fetal acidemia at the time it is observed

NICHD-ACOG 1997-2010 Significant Acidemia

Moderate FHR variability reliably predicts the absence of fetal metabolic acidemia at the time it is observed."

NO

Minimal variability should be considered as potentially indicative of fetal acidemia and should be managed accordingly

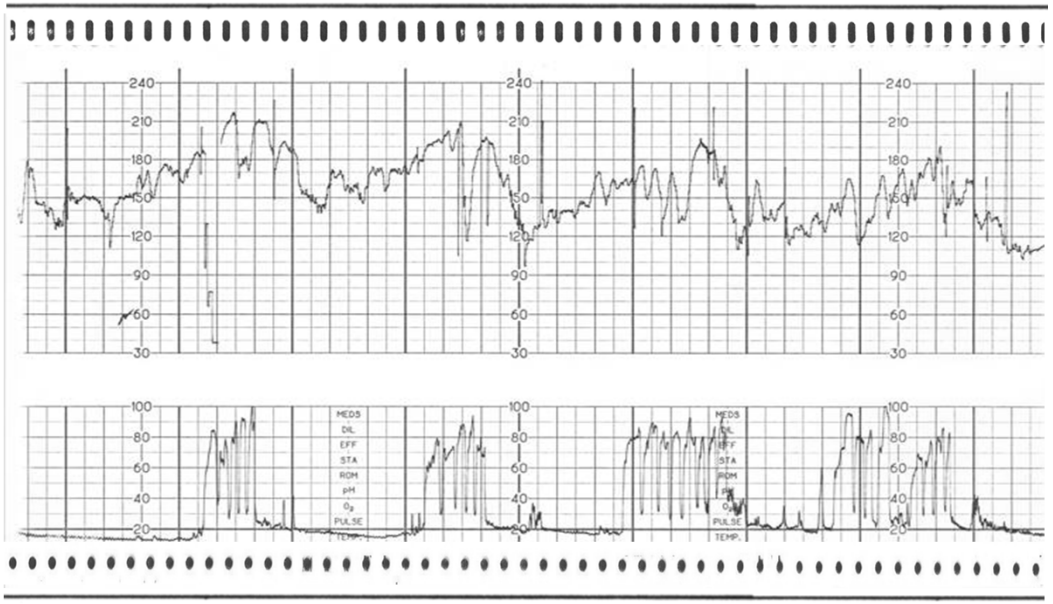
Maybe

Absent variability with decelerations… is abnormal and conveys an increased risk of fetal acidemia at the time it is observed

Yes

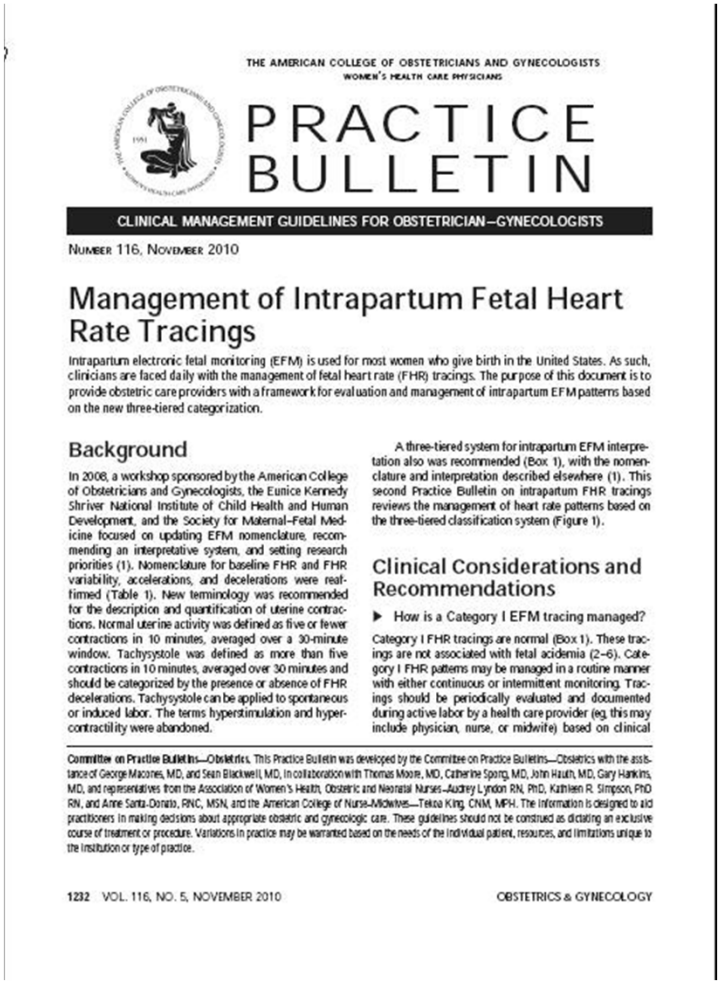
FHR Patterns Not Associated with Significant Acidemia

Moderate Variability with Recurrent Decelerations and/or Bradycardia



A FHR tracing with recurrent decelerations of any type and/or second stage bradycardia, when accompanied by moderate variability, 6-25 beats per minute (bpm), is strongly predictive of the absence of significant acidemia and the presence of neonatal vigor at birth.

ACOG Practice Bulletin #116 November 2010



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Clinical Considerations and Recommendations

▶ How is a Category I EFM tracing managed?

Category I FHR tracings are normal (Box 1). These tracings are not associated with fetal acidemia (2–6). Category I FHR patterns may be managed in a routine manner with either continuous or intermittent monitoring. Tracings should be periodically evaluated and documented during active labor by a health care provider (eg, this may include physician, nurse, or midwife) based on clinical

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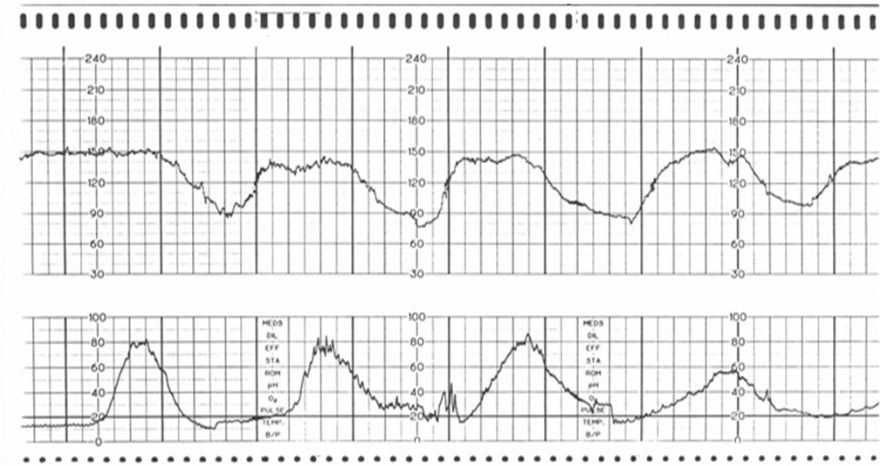
Moderate Variability

Given the diverse spectrum of abnormal FHR patterns in Category II, the presence of FHR accelerations or moderate FHR variability or both are highly predictive of normal fetal acid-base status and thus may help guide clinical management

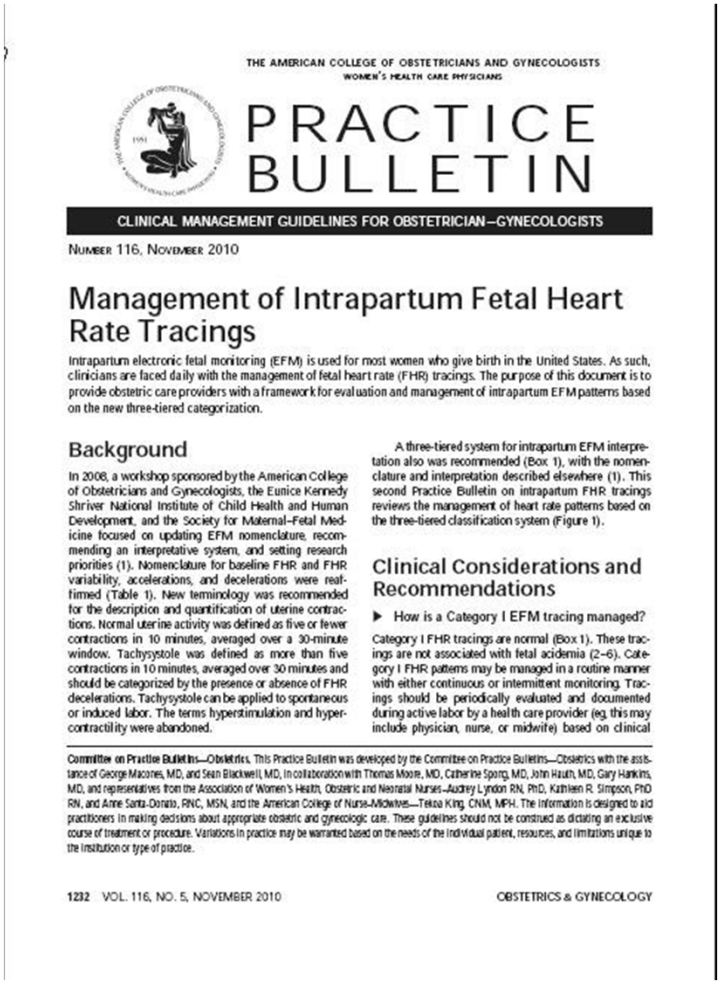
FHR Patterns Inconsistently Associated With Significant Acidemia:



Minimal Variability with Recurrent Decelerations and/or Bradycardia

A FHR tracing with minimal variability, in association with recurrent decelerations of any type and/or second stage bradycardia, is associated with significant acidemia and the absence of fetal vigor at birth, but the consistency of this association is uncertain.

ACOG Practice Bulletin #116 November 2010



THE AMERICAN COLLEGE OF OBSTETRICIANS AND GYNECOLOGISTS
WOMEN'S HEALTH CARE PHYSICIANS

PRACTICE BULLETIN

CLINICAL MANAGEMENT GUIDELINES FOR OBSTETRICIAN–GYNECOLOGISTS

NUMBER 116, NOVEMBER 2010

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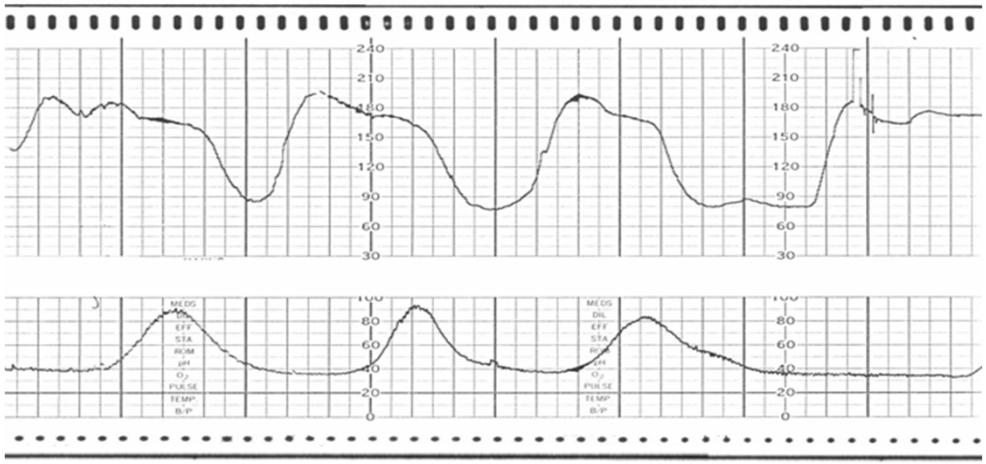
Minimal FHR Variability

Category II tracings with continued minimal variability (in the absence of accelerations or normal scalp ph) that cannot be explained or resoled with resuscitation should be considered as potentially indicative of fetal acidemia and should be managed accordingly

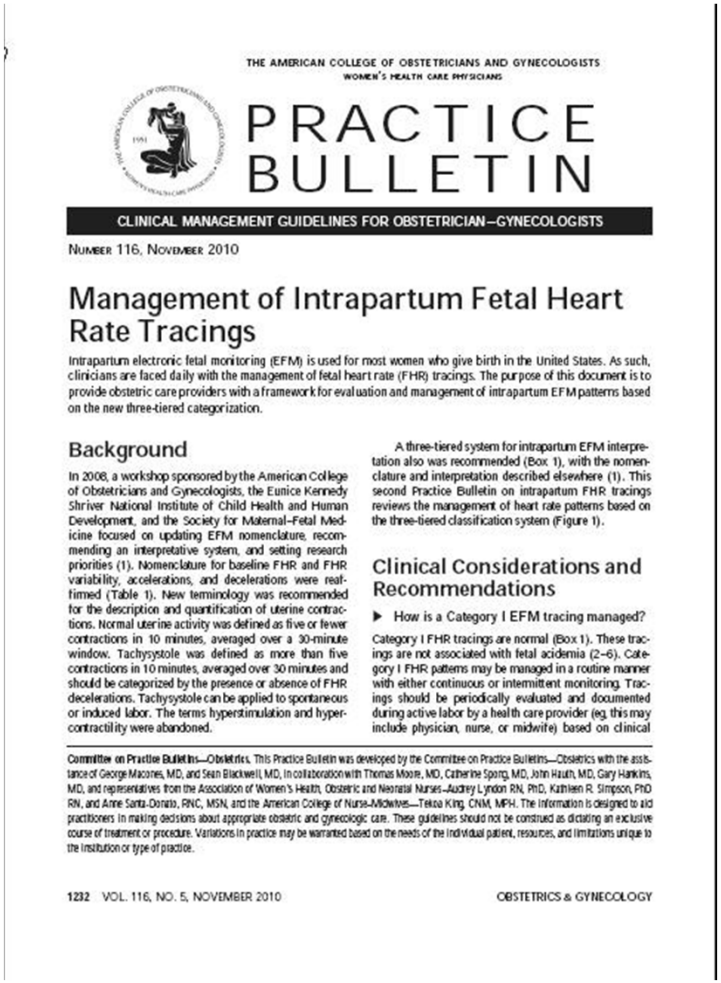
FHR Patterns Associated with Significant Acidemia:



Absent Variability With Recurrent Decelerations and/or Bradycardia

Absent variability in association with recurrent late decelerations, variable decelerations and/or a sustained bradycardia of ≤ 60 bpm, are the FHR patterns most consistently associated with significant acidemia and the absence of fetal vigor at birth.

ACOG Practice Bulletin #116 November 2010



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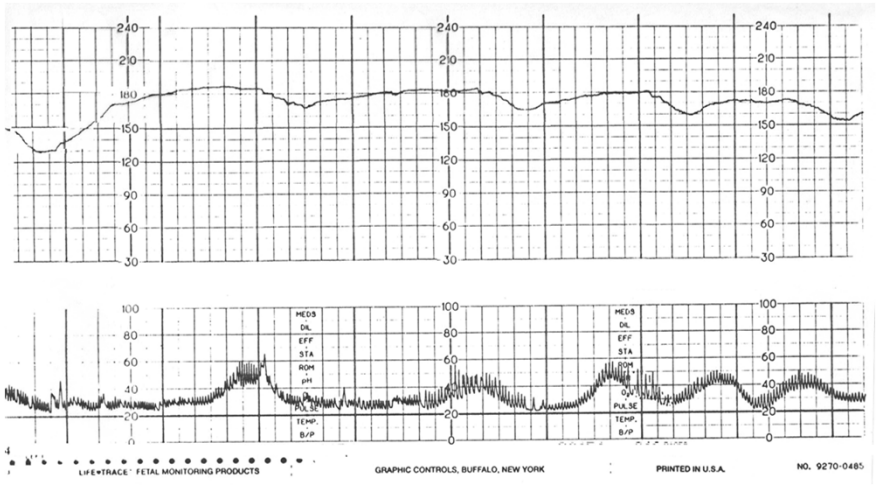
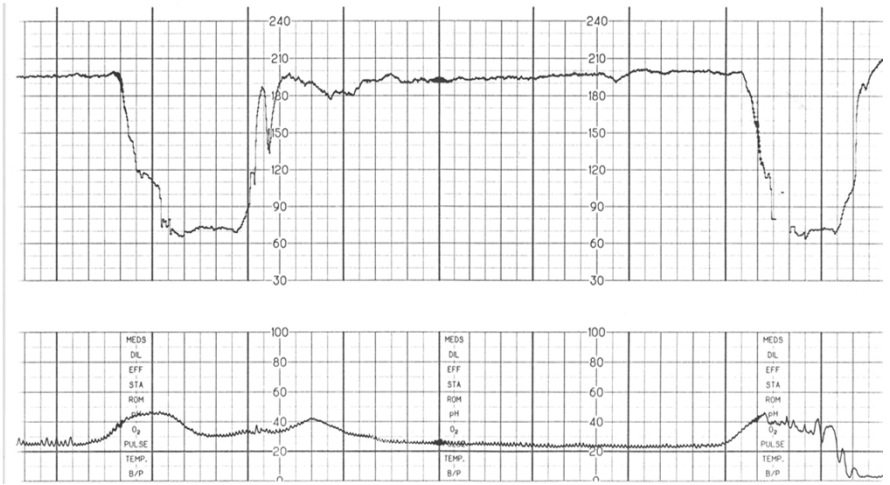
Category III: Absent FHR Variability

A Category III tracing (absent variability with either late or variable decelerations, bradycardia and sinusoidal pattern) is abnormal and conveys an increased risk of fetal acidemia at the time it is observed

FHR Patterns Associated With Significant Acidemia





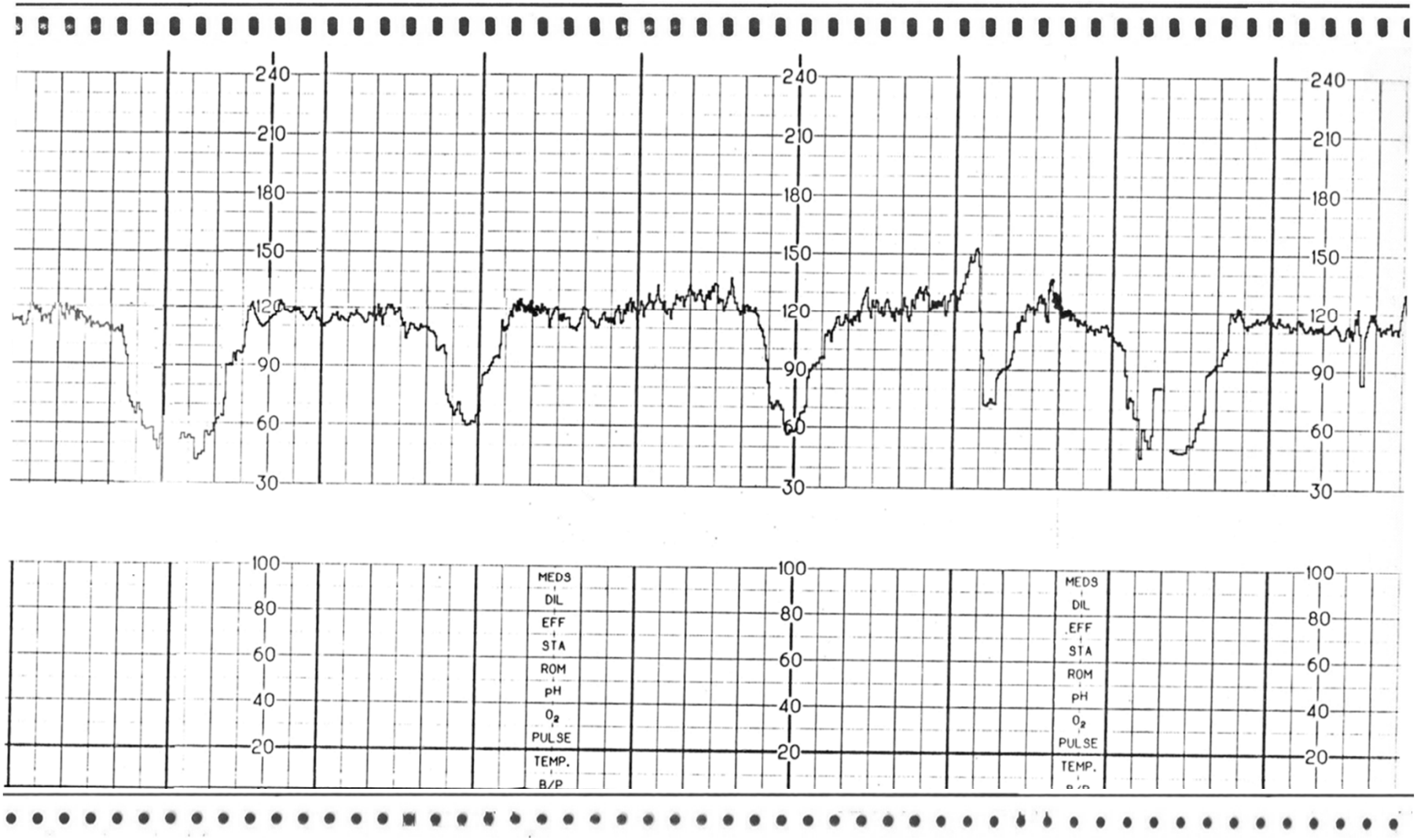
A presumptive diagnosis of a significant fetal acidosis requires two conditions to be met during the intrapartum period;

- ✓ **Minimal and/or Absent Variability**
- ✓ In association With Recurrent Decelerations and or Sustained Bradycardia.

Category and Clinical Diagnosis

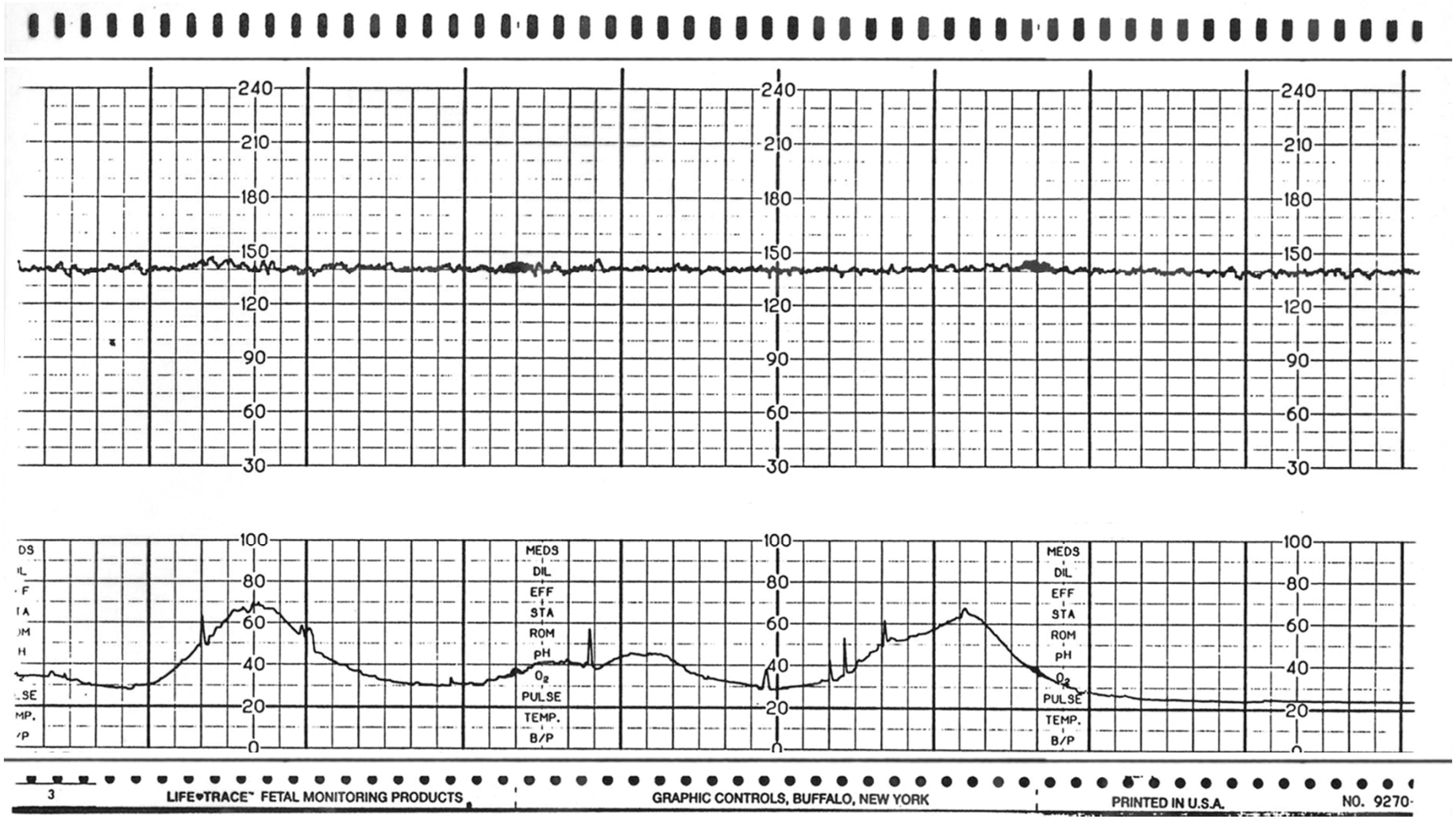
For each of the following FHR tracings identify which NICHD category it belongs in (I, II, III), and it's presumptive association with significant acidemia (Yes, No, Maybe).

Category ☐I ☐II ☐III



Significant Acidemia Yes ☐ NO ☐ Maybe ☐

Category ☐I ☐II ☐III



Significant Acidemia Yes ☐ NO ☐ Maybe ☐

NICHD 2008: On FHR Accelerations

"The presence of FHR accelerations (either spontaneous or stimulated) reliably predicts the absence of fetal metabolic acidemia.

The absence of accelerations does not, however, reliably predict fetal acidemia."

JOGNN

PRINCIPLES & PRACTICE

The 2008 National Institute of Child Health and Human Development Workshop Report on Electronic Fetal Monitoring: Update on Definitions, Interpretation, and Research Guidelines

George A. Macones, MD, Gary D. V. Hankins, MD, Catherine Y. Spong, MD, John Hauth, MD and Thomas Moore, MD

Correspondence: George A. Macones, MD, Chair, Department of Obstetrics and Gynecology, Washington University in St. Louis, MI 63110; macones@wustl.edu

Keywords: fetal heart tracings; uterine contractions; electronic fetal heart rate monitoring

ABSTRACT

In April 2008, the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development, the American College of Obstetricians and Gynecologists, and the Society for Maternal-Fetal Medicine partnered to sponsor a 2-day workshop to revisit nomenclature, interpretation, and research recommendations for intrapartum electronic fetal heart rate monitoring. Participants included obstetric experts and representatives from relevant stakeholder groups and organizations. This article provides a summary of the discussions at the workshop. This includes a discussion of terminology and nomenclature for the description of fetal heart tracings and uterine contractions for use in clinical practice and research. A three-tier system for fetal heart rate tracing interpretation is also described. Lastly, prioritized topics for future research are provided.

JOGNN, 37, 1-6, 2008. DOI: 10.1111/j.1552-6909.2008.00284.x

From the Department of Obstetrics and Gynecology, Washington University in St. Louis, St. Louis, Missouri; Department of Obstetrics and Gynecology, University of Texas Medical Branch, Galveston, Texas; Eunice Kennedy Shriver National Institute of Child Health and Human Development, Bethesda, Maryland; Department of Obstetrics and Gynecology, University of Alabama at Birmingham, Birmingham, Alabama; and Department of Obstetrics and Gynecology, University of California at San Diego, San Diego, California.

For a list of workshop participants, see the Appendix online at www.greenjournal.org/cgi/content/full/112/3/661.DC1.

Financial Disclosure: The authors have no potential conflicts of interest to disclose.

Co-published in *Obstetrics & Gynecology*, Vol. 112, No. 3, September 2008.

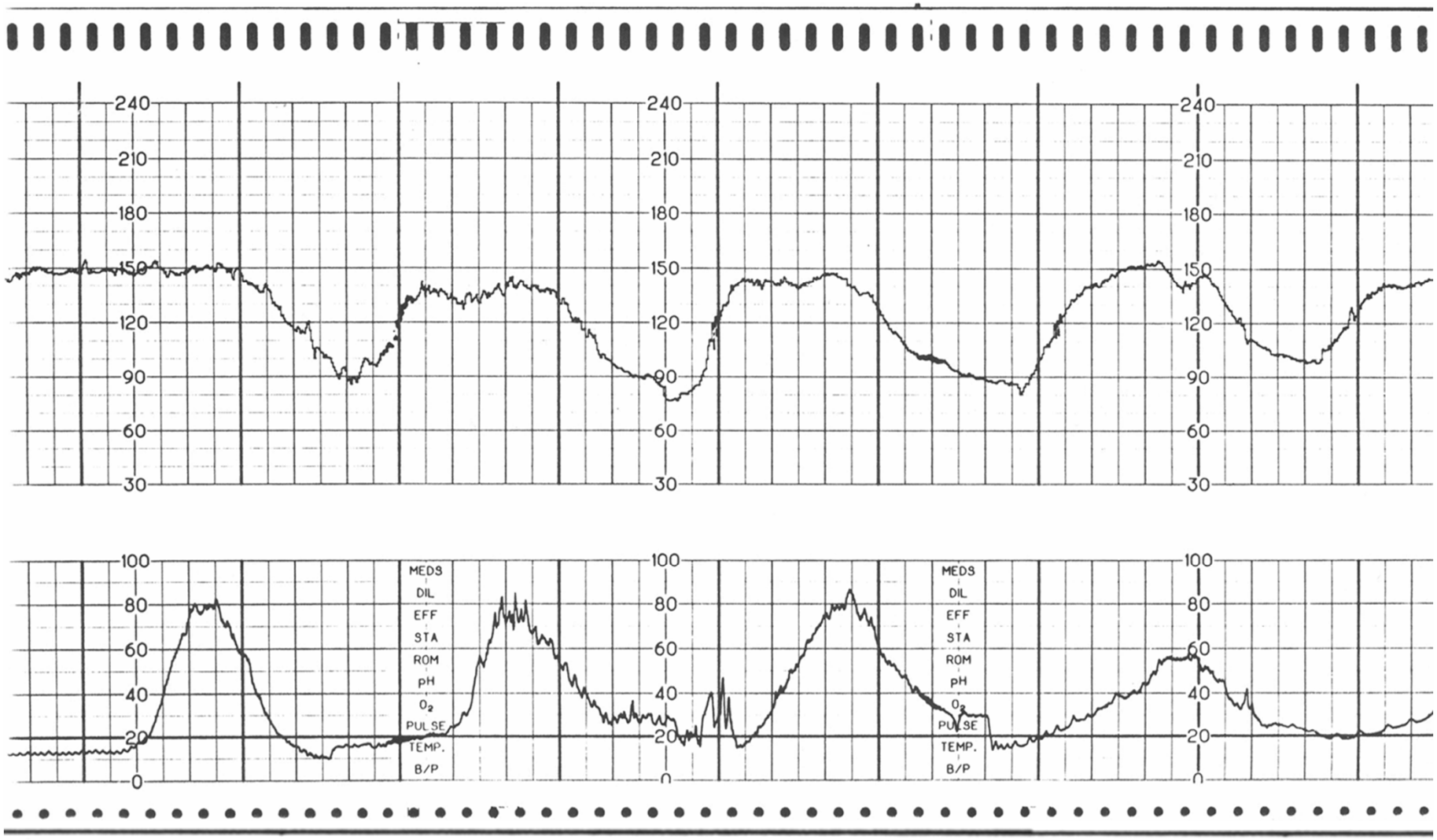
The workshop was jointly sponsored by the American College of Obstetricians and Gynecologists, the Eunice Kennedy Shriver National Institute of Child Health and Human Development, and the Society for Maternal-Fetal Medicine.

The *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) convened a series of workshops in the mid-1990s to develop standardized and unambiguous definitions for fetal heart rate (FHR) tracings, culminating in a publication of recommendations for defining fetal heart rate characteristics (NICHD, 1997). The goal of these definitions was to allow the predictive value of monitoring to be assessed more meaningfully and to allow evidence-based clinical management of intrapartum fetal compromise.

The definitions agreed upon in that workshop were endorsed for clinical use in the most recent American College of Obstetricians and Gynecologists (ACOG) Practice Bulletin in 2005 and also endorsed by the Association of Women's Health, Obstetric and Neonatal Nurses (ACOG, 2005). Subsequently, the Royal College of Obstetricians and Gynaecologists (RCOG, 2001) and the Society of Obstetricians and Gynaecologists of Canada (SOGC, 2007) convened expert groups to assess the evidence-based use of electronic fetal monitoring (EFM). These groups produced consensus documents with more specific recommendations for FHR pattern classification and intrapartum management actions (Liston, Sawchuck, & Young, 2007; RCOG, 2001). In addition, new interpretations and definitions have been proposed, including terminology such as "tachysystole" and "hyperstimulation" and new interpretative systems using three and five tiers (Liston et al., 2007; Parer & Ikeda, 2007; RCOG, 2001). The SOGC Consensus Guidelines for Fetal Health Surveillance presents a three-tier system (normal, atypical, abnormal), as does RCOG (Liston et al., 2007; RCOG, 2001). Parer and Ikeda (2007) recently suggested a five-tier management grading system. Recently, the NICHD, ACOG, and the Society for Maternal-Fetal Medicine jointly sponsored a workshop focused on EFM.

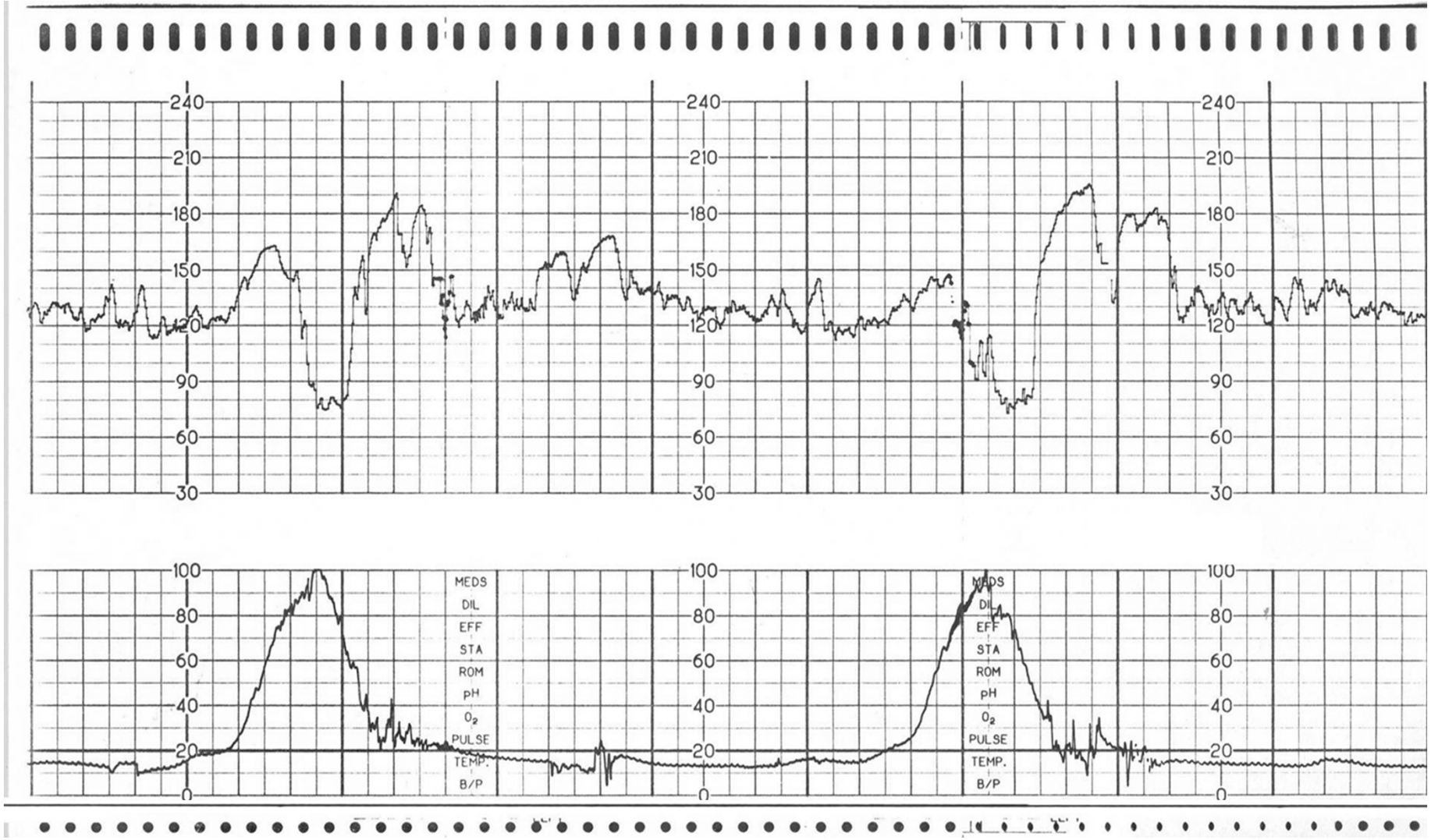
AWHONN

Category ☐I ☐II ☐III



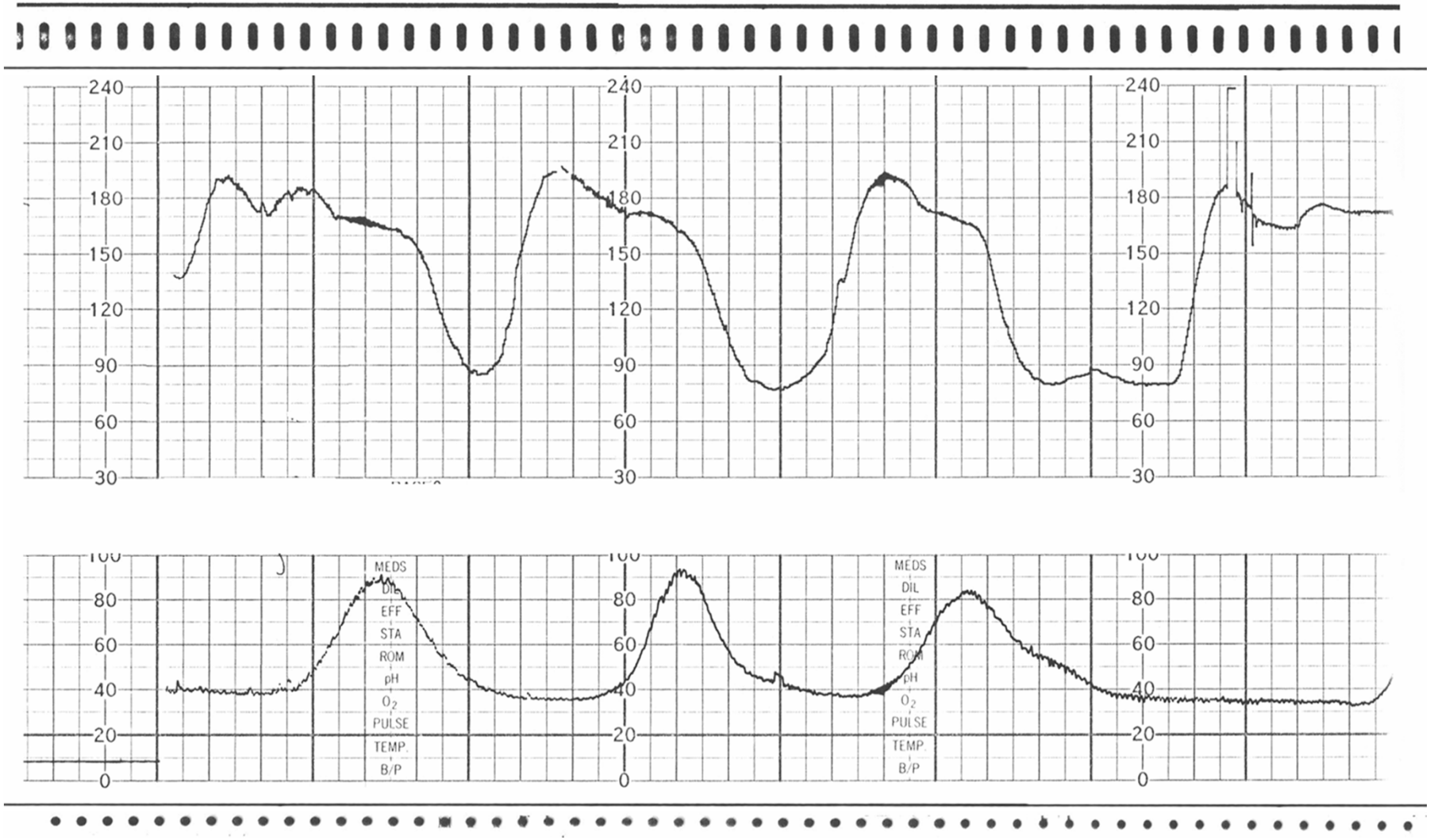
Significant Acidemia Yes ☐ NO ☐ Maybe ☐

Category ☐I ☐II ☐III



Significant Acidemia Yes ☐ NO ☐ Maybe ☐

Category ☐I ☐II ☐III



Significant Acidemia Yes ☐ NO ☐ Maybe ☐

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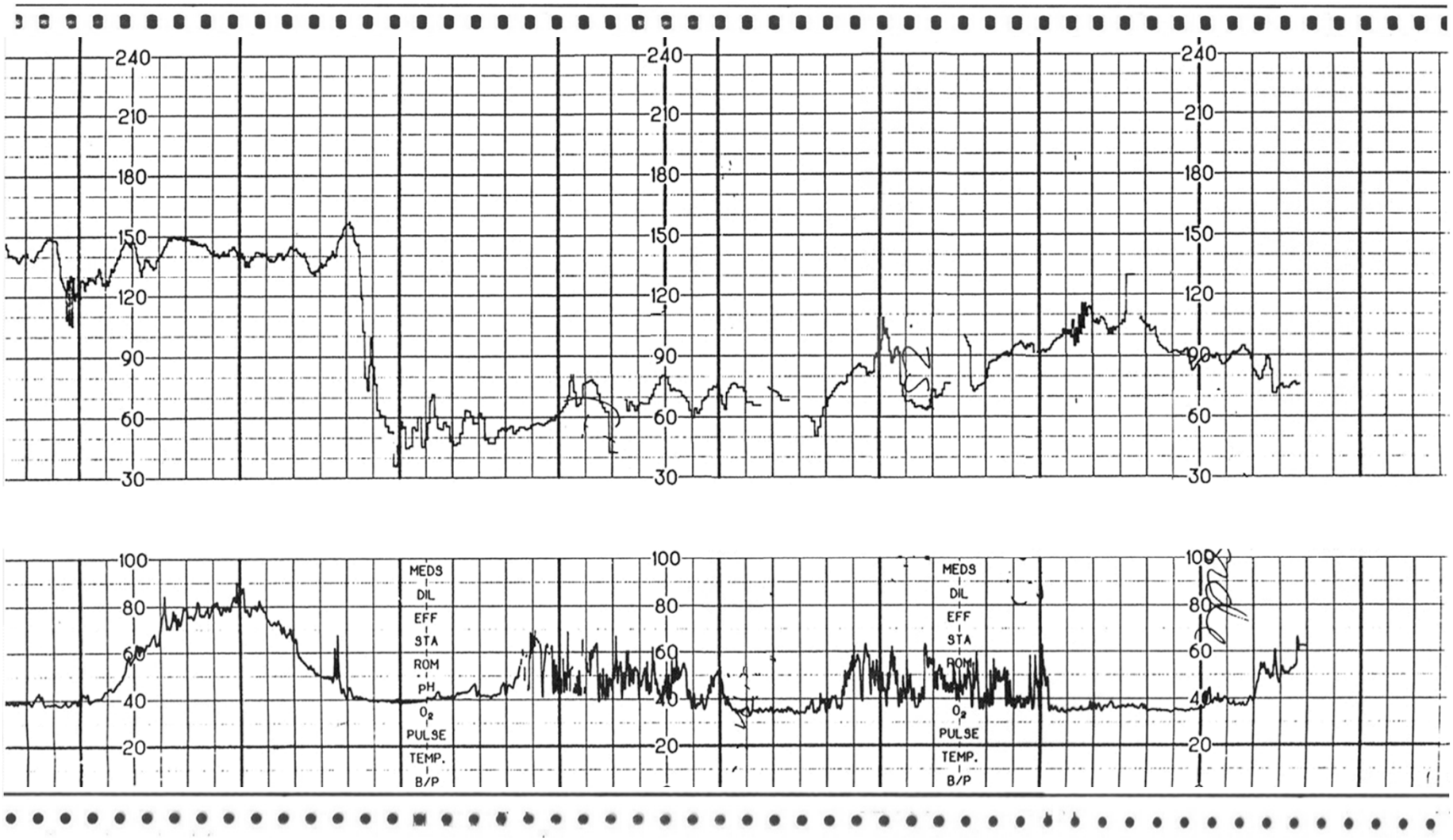
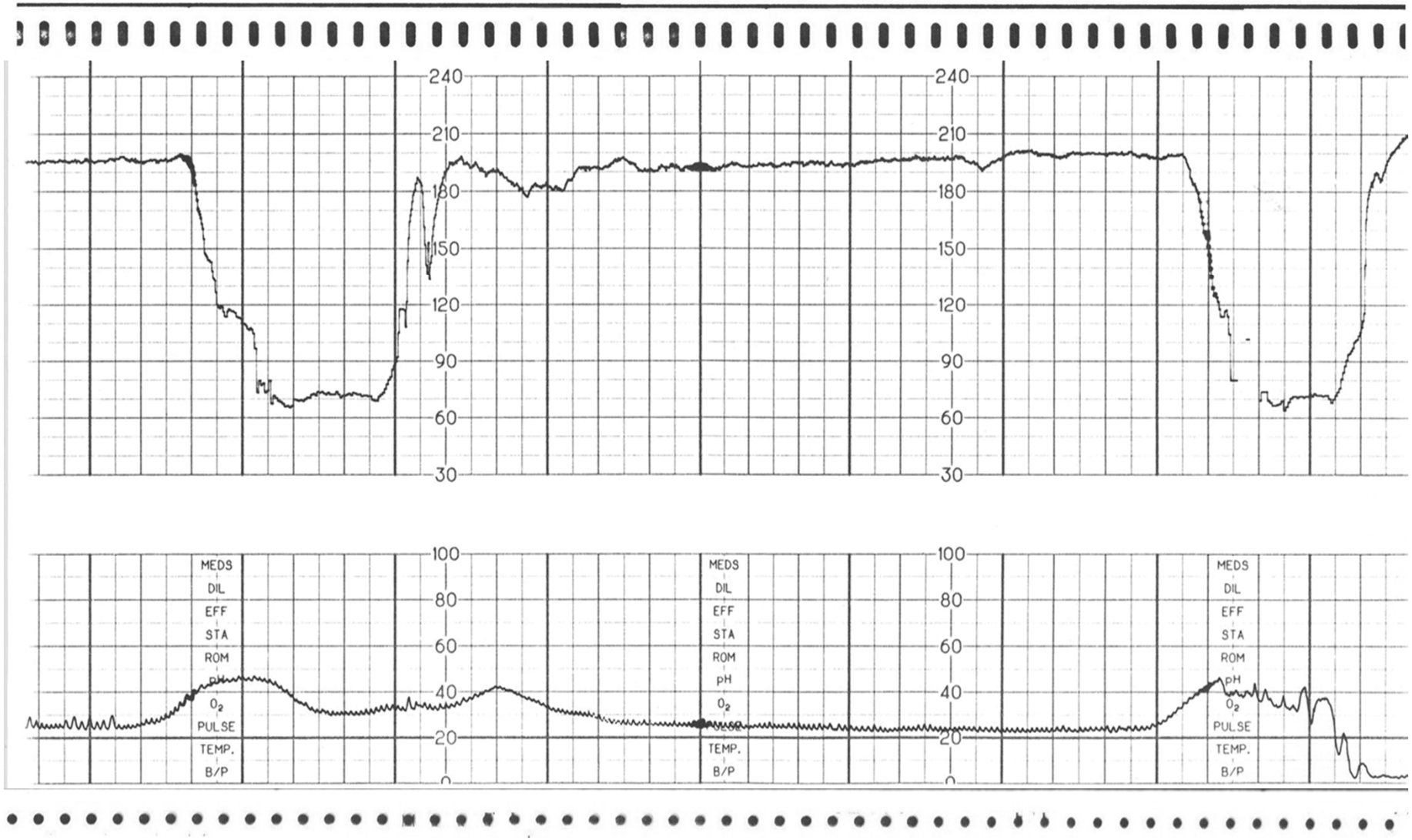


Significant Acidemia Yes ☐ NO ☐ Maybe ☐

Category ☐I ☐II ☐III



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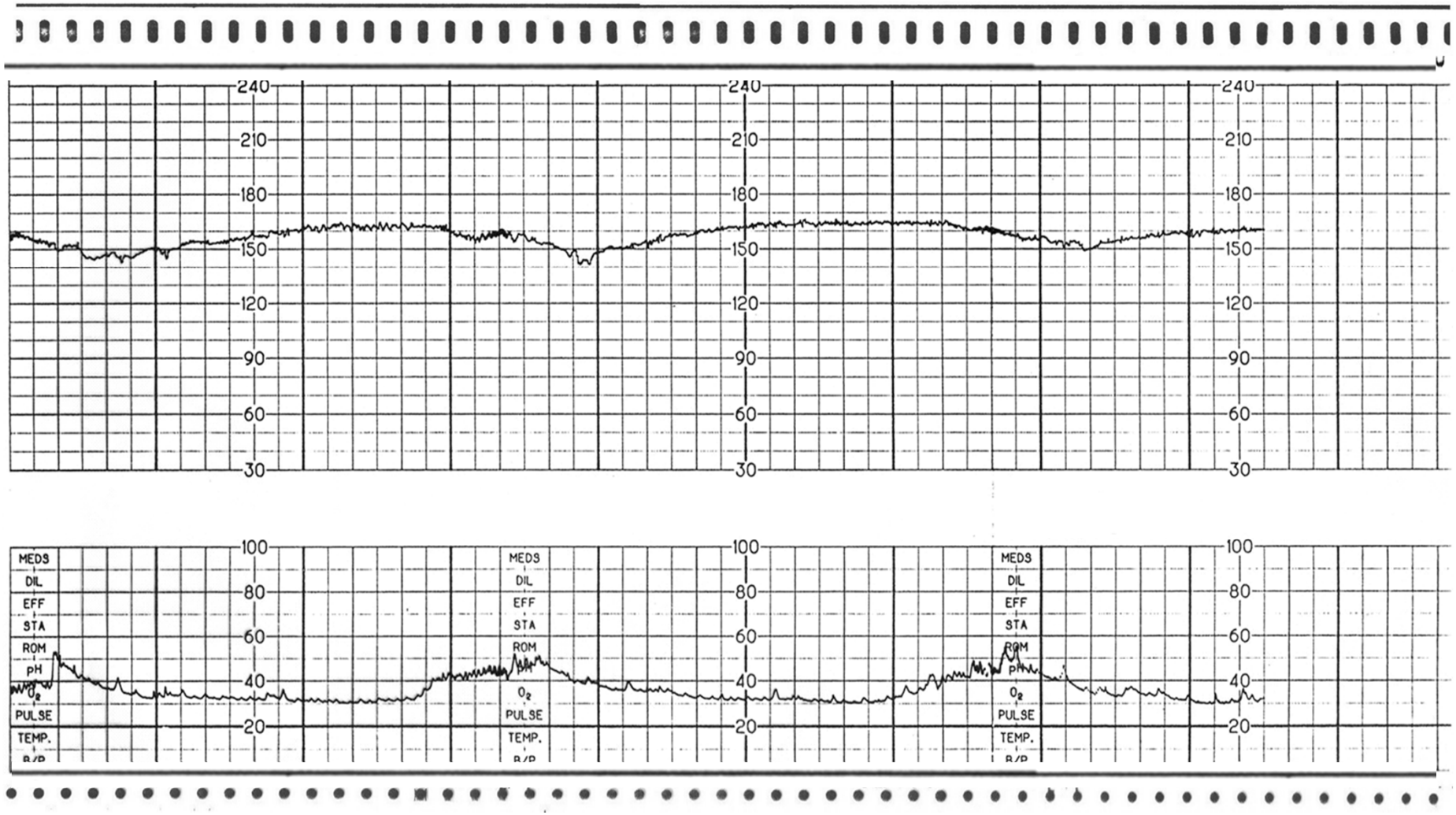

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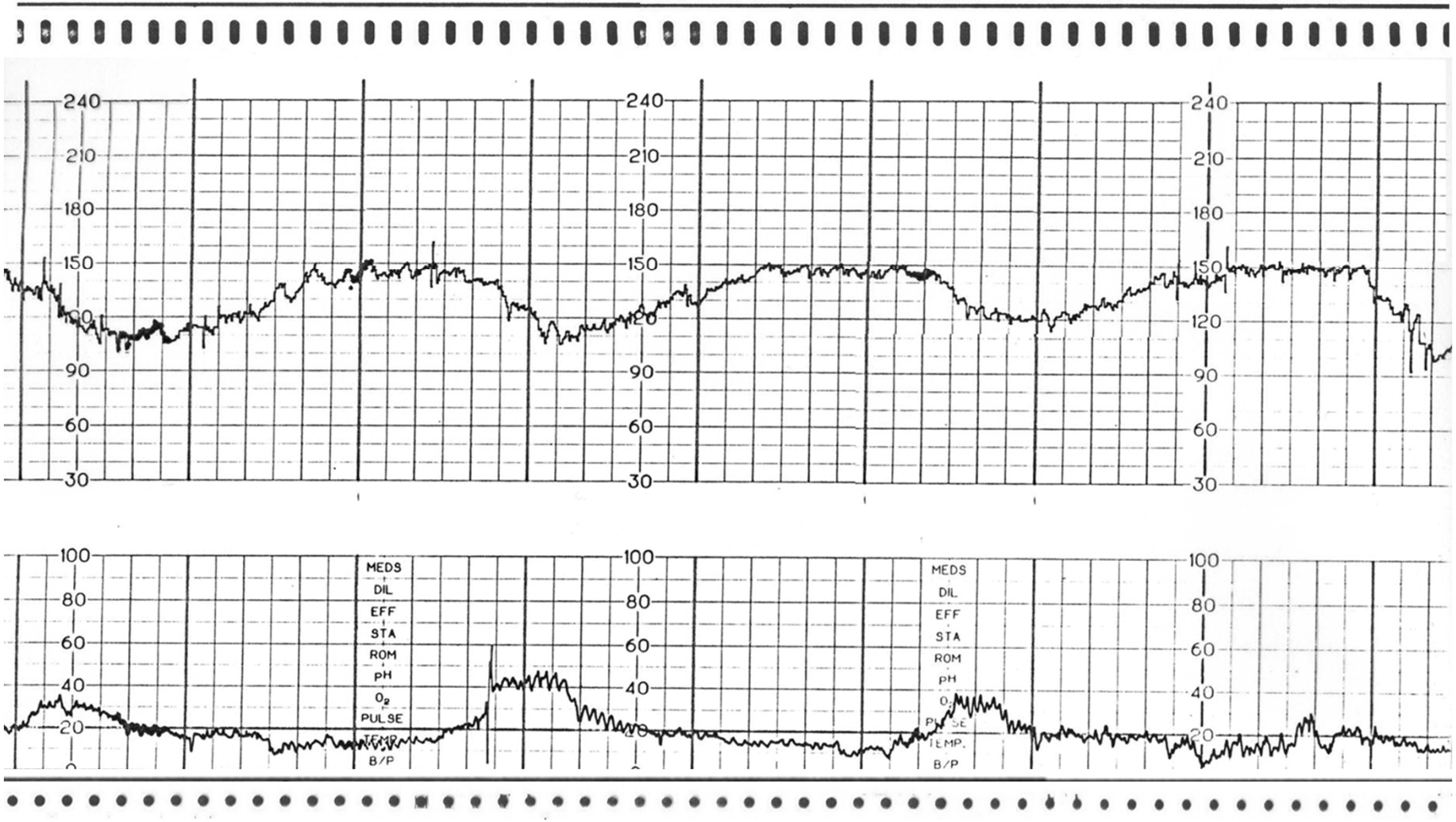
Category ☐I ☐II ☐III



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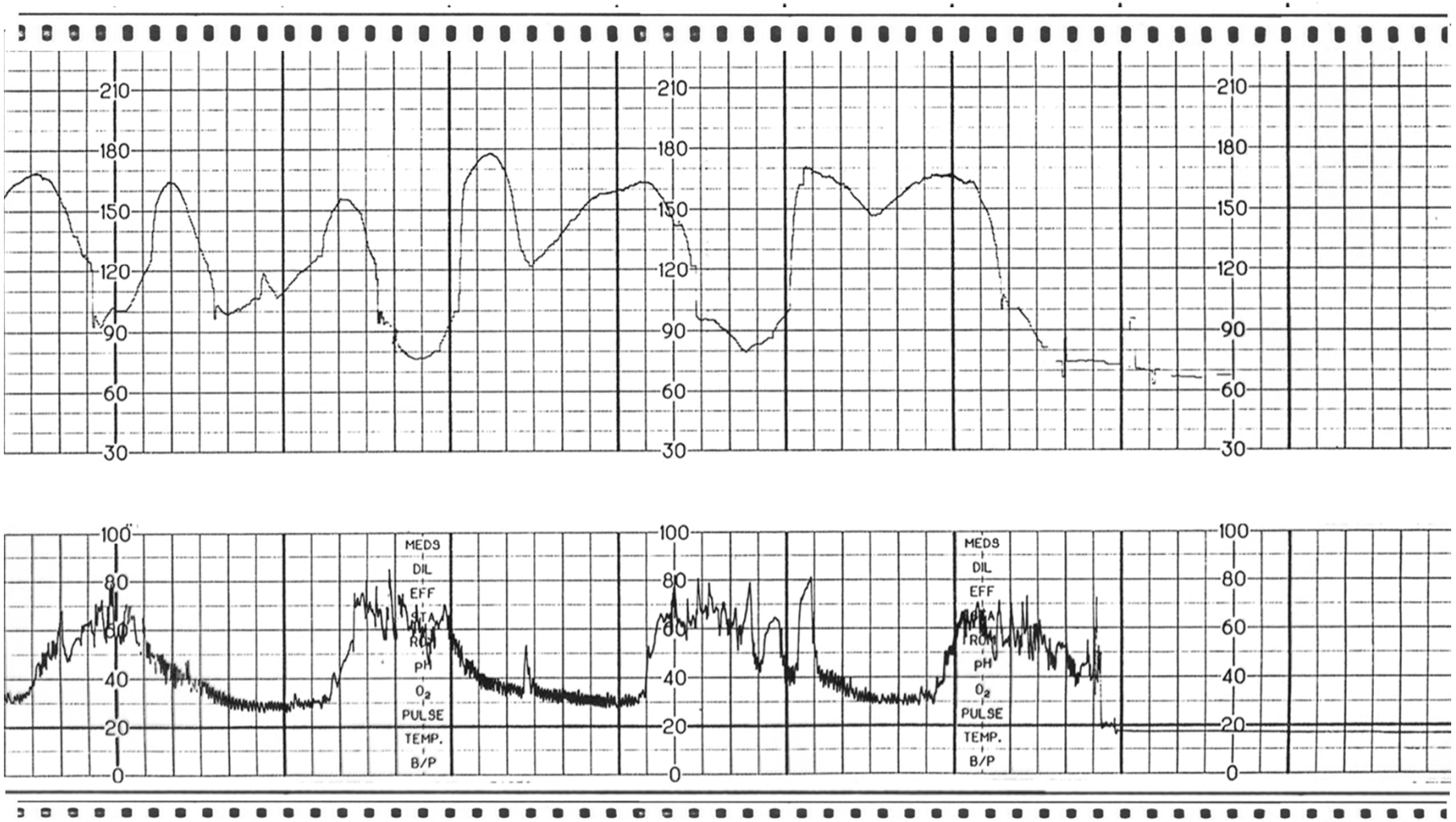
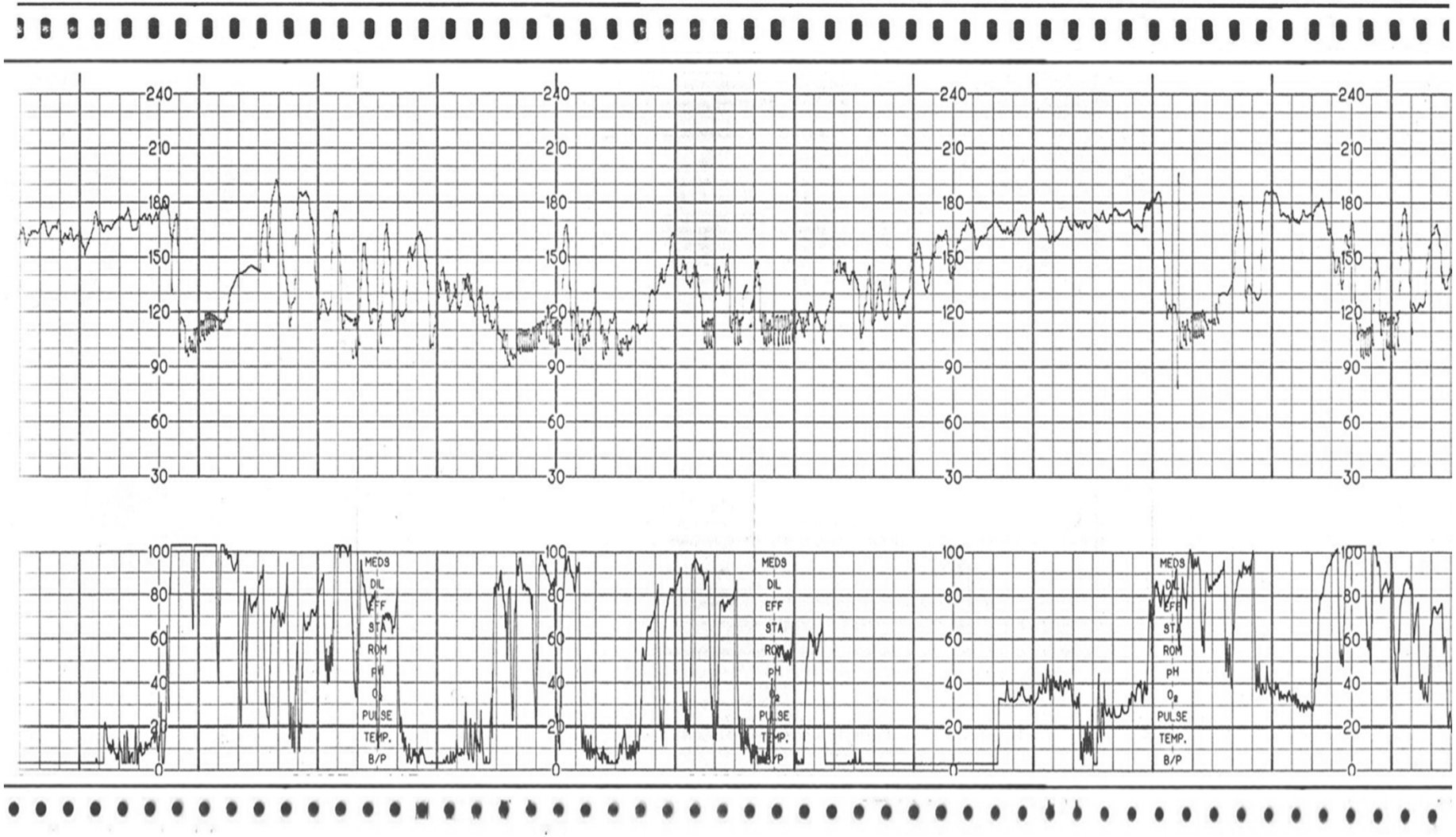


Significant Acidemia Yes ☐ NO ☐ Maybe☐

Category ☐I ☐II ☐III



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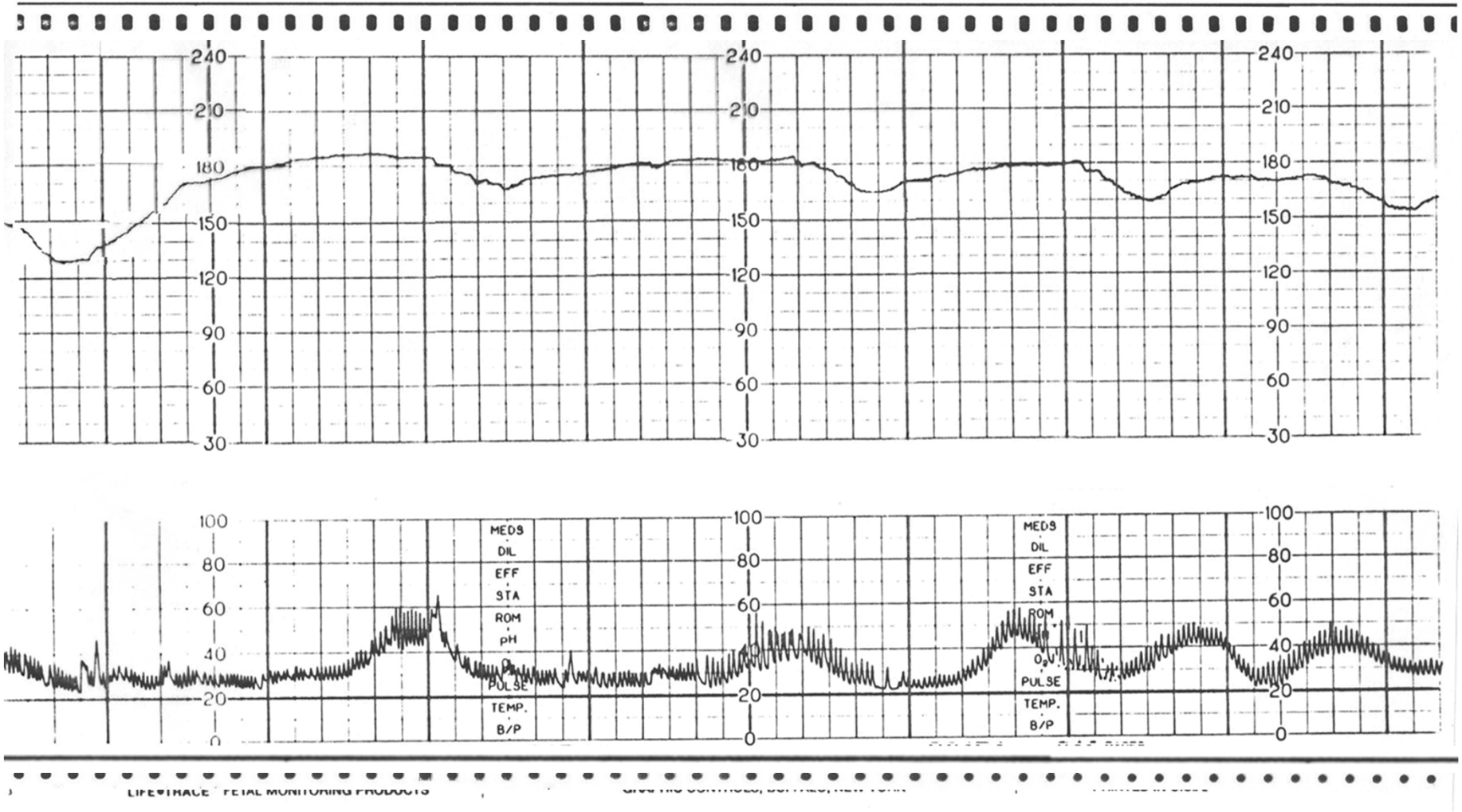

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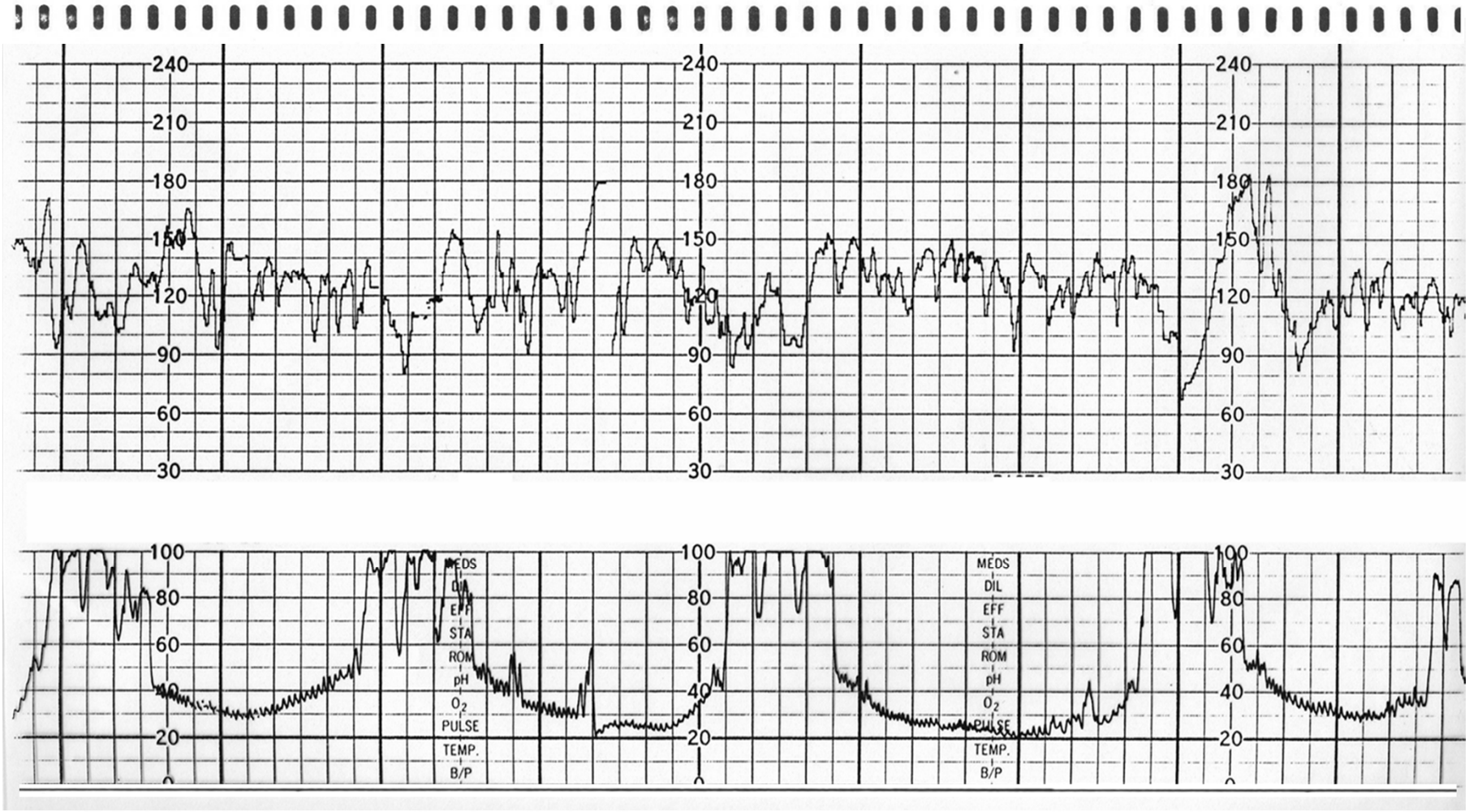

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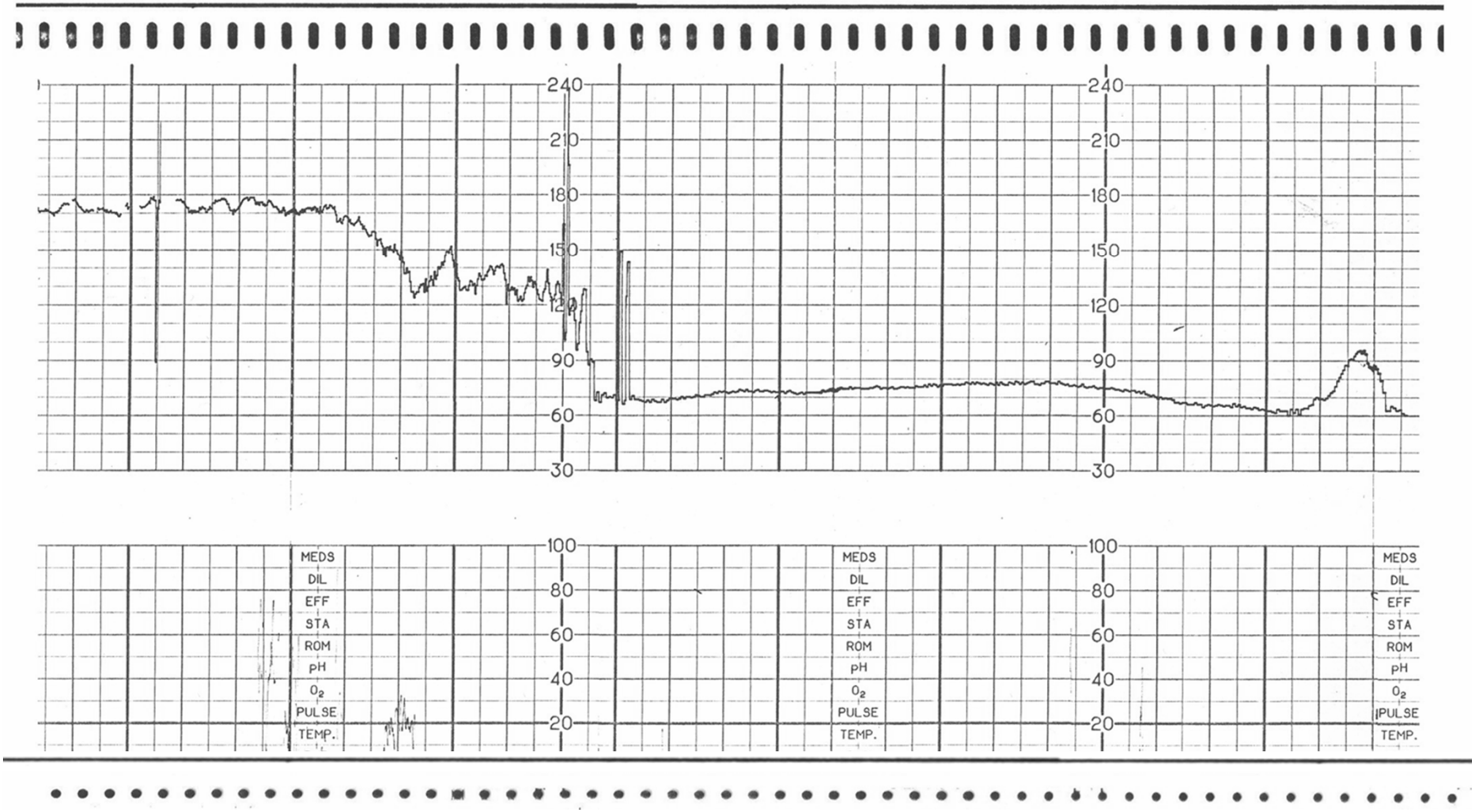

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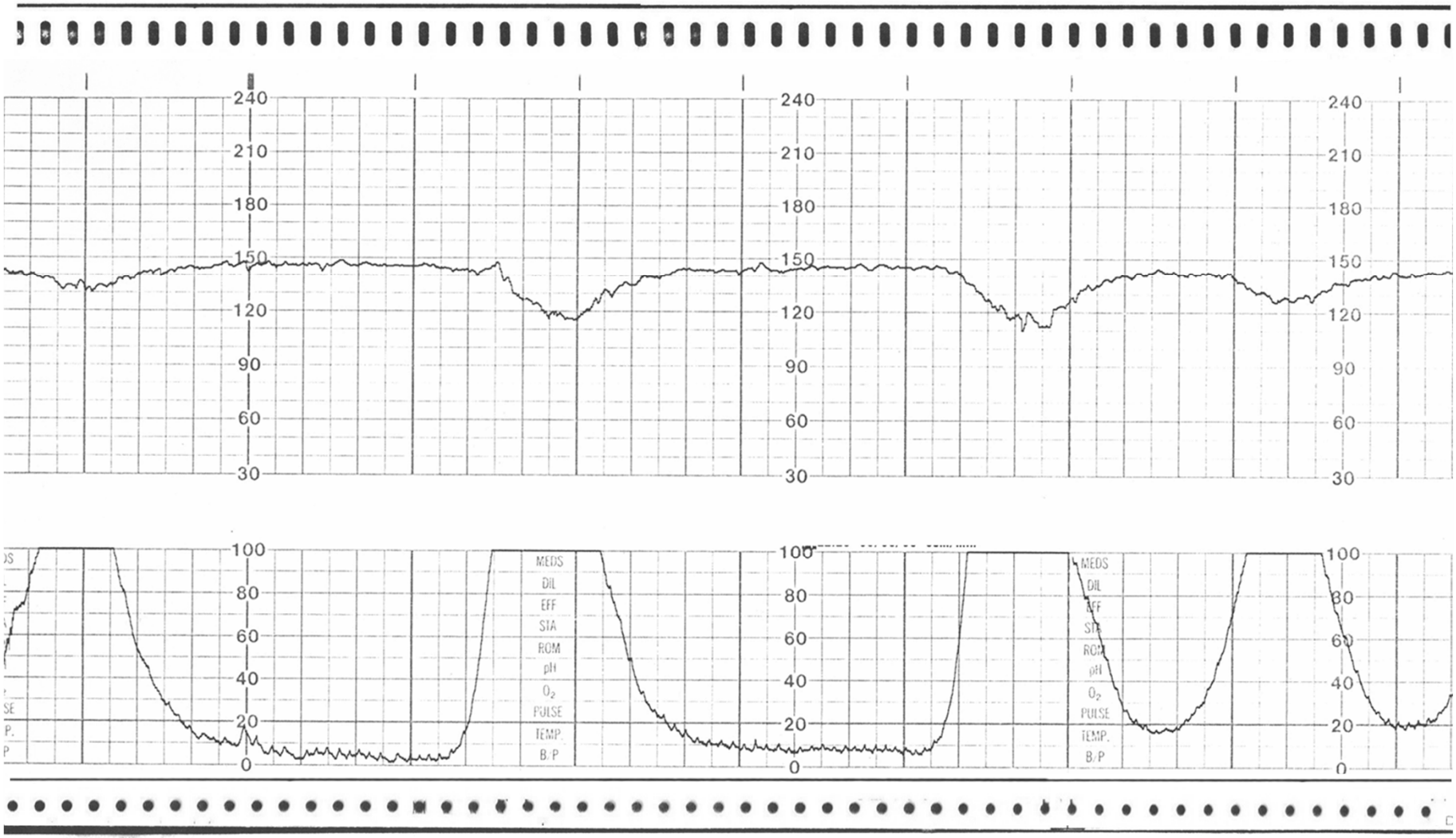
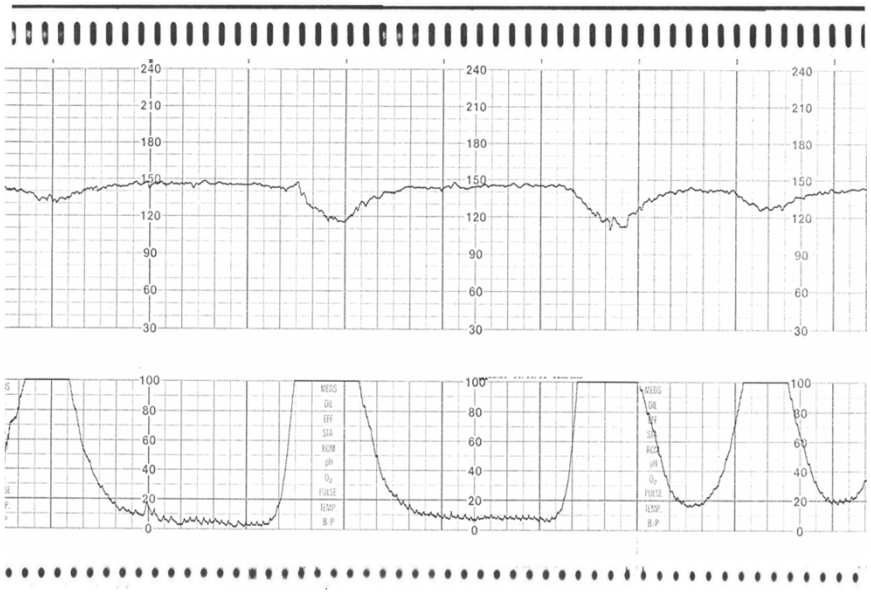


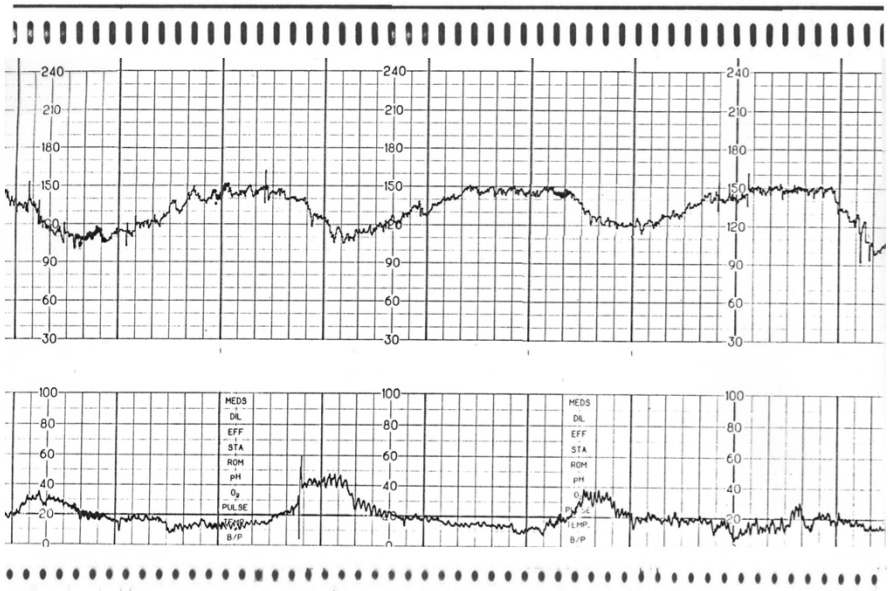
Significant Acidemia Yes ☐ NO ☐ Maybe ☐

Some Things That Trip Us Up In FHR Interpretation and Management

Variability vs. Timing

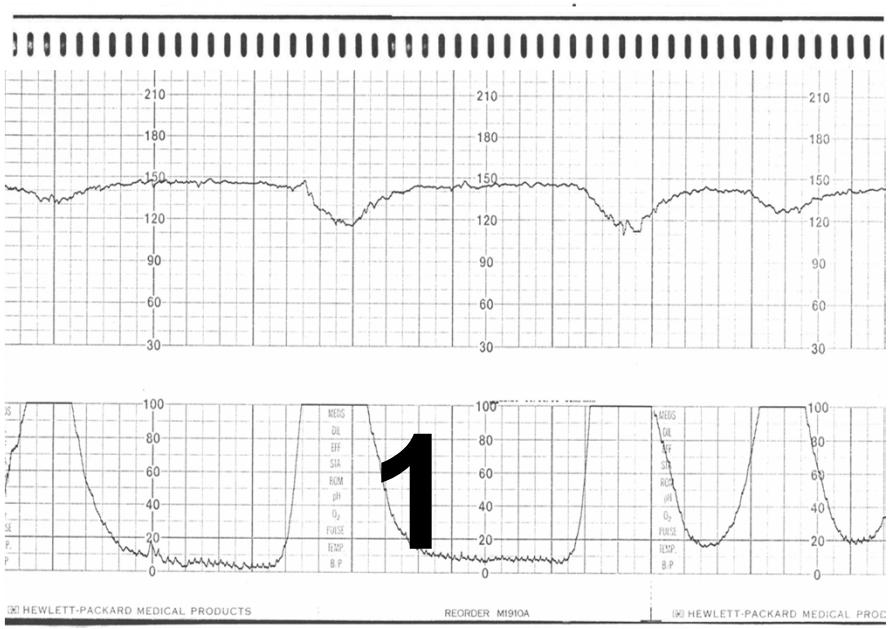
Which Tracing Would You Rather Have?

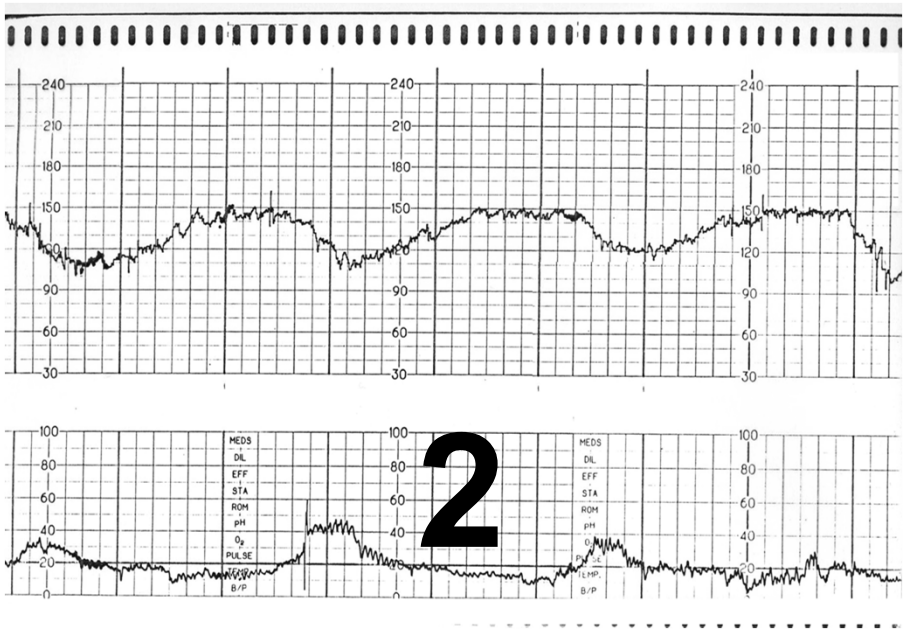




1 Why? 2

Which Tracing Would You Rather Have and Why?



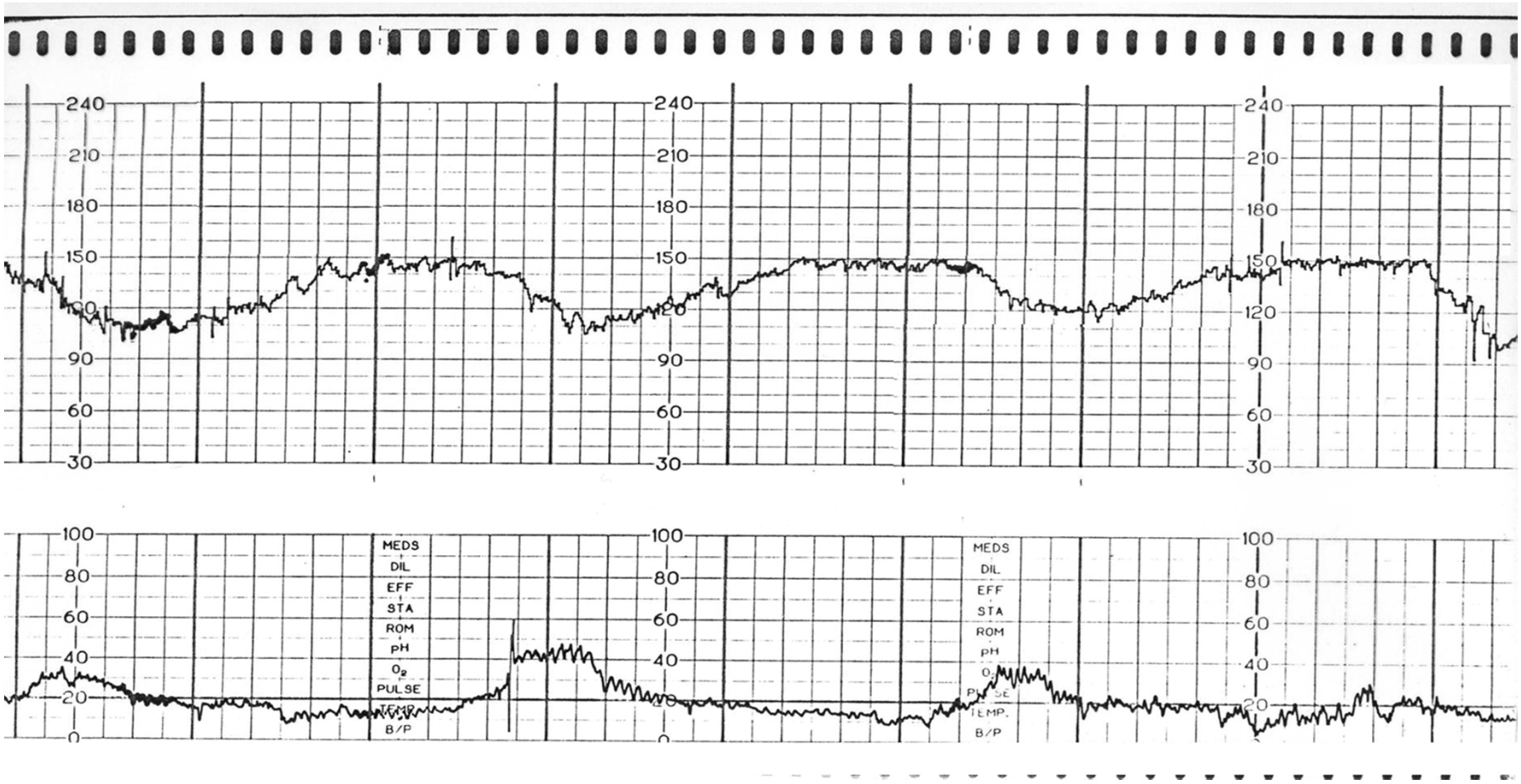


Tracing 1 because they are early decelerations and they are from head compression.

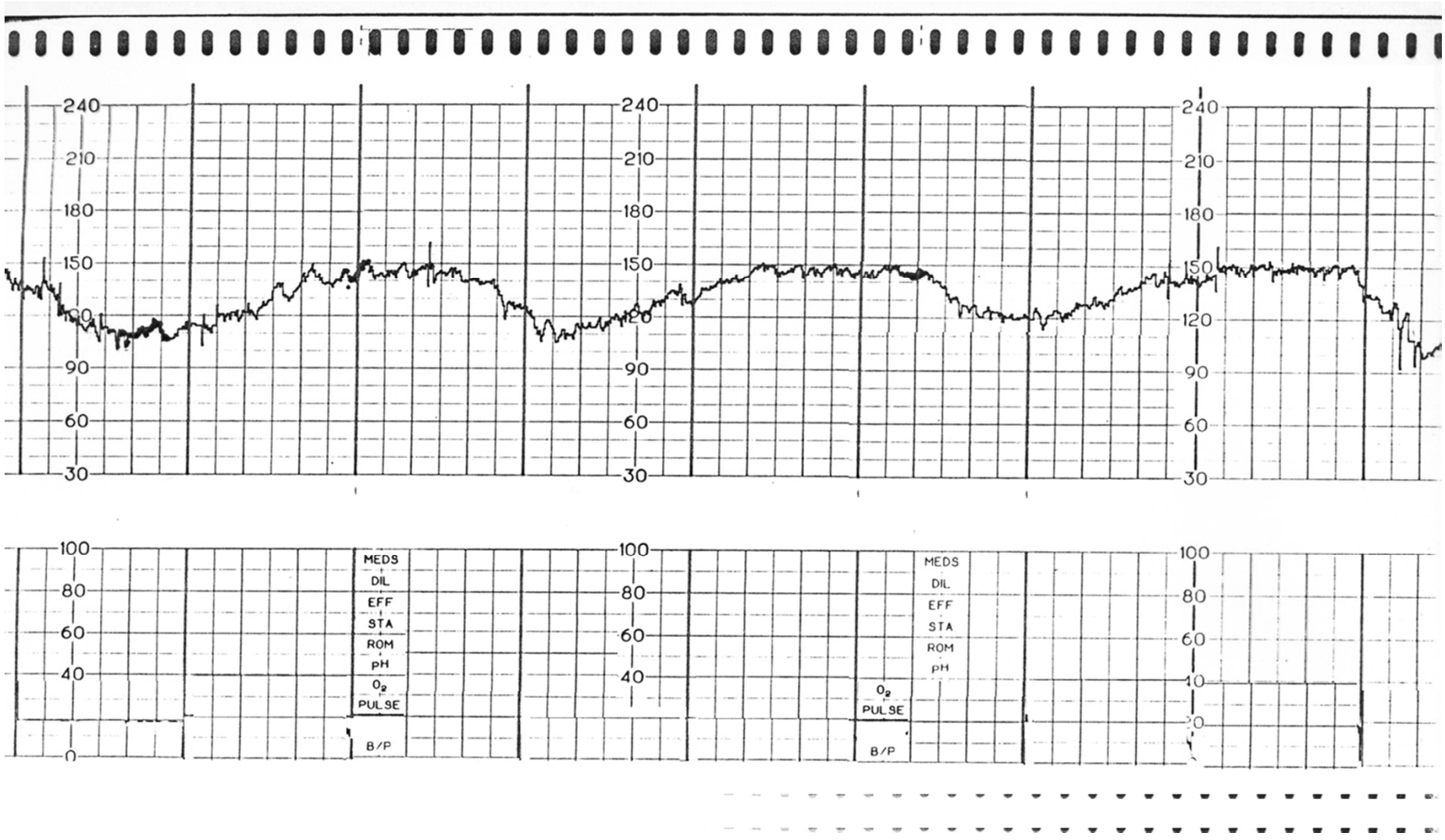
Tracing 2 because there is moderate variability accompanying the late decelerations.

Timing vs. Shape

What type of decelerations are these?

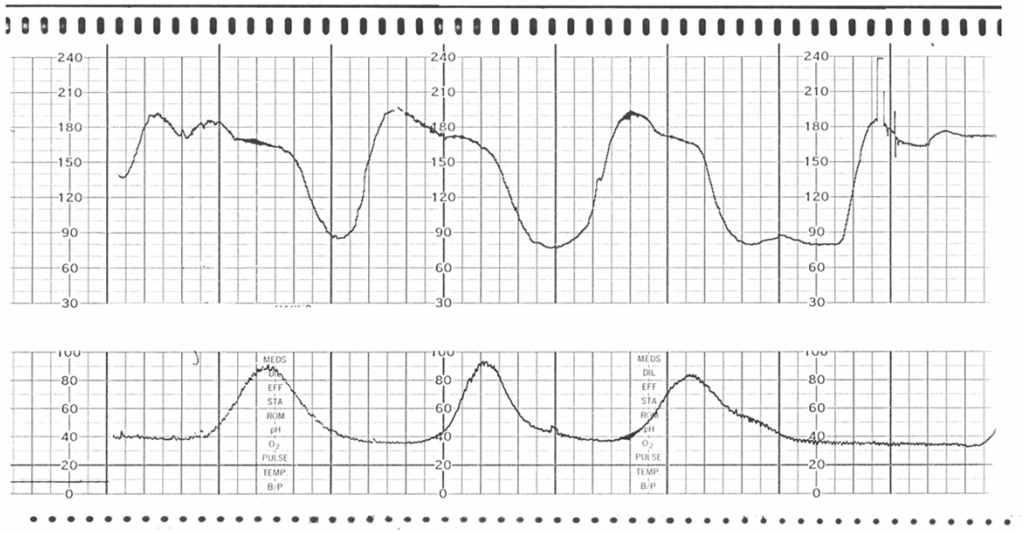


a. Variable b. Late c. Prolonged d. Early



What type of decelerations are these?

5 Recurring Errors In FHR Monitoring



Studies looking at complicated outcomes resulting from intrapartum care have identified 5 types of recurring errors in FHR tracing interpretation and management that lead to patient harm and medical legal litigation.

5 Recurring Errors In FHR Monitoring

These include a failure to:

- Ensure an adequate tracing (13%)
- To recognize an “abnormality” is present (23%).
- Act on recognized “abnormalities” (45%).
- Respond to recognized “abnormalities” in an appropriate time frame (24%).
- To appropriately supervise less experienced staff

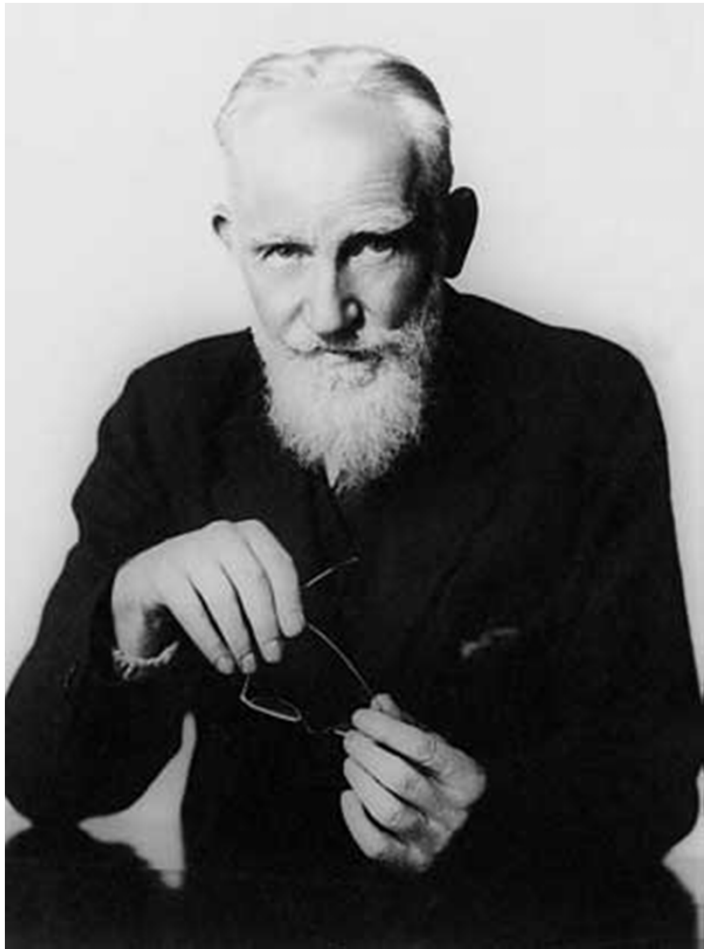
Symonds EM, 1994

Categories of Root Causes

- **Communication**, 63% of all **events and** 84% of all sentinel events.
- **Orientation/training**, 58%
- **Availability of information**, 20%
- **Staffing levels**, 18%
- **Competency/credentialing**, 12%
- **Procedural compliance**, 12%

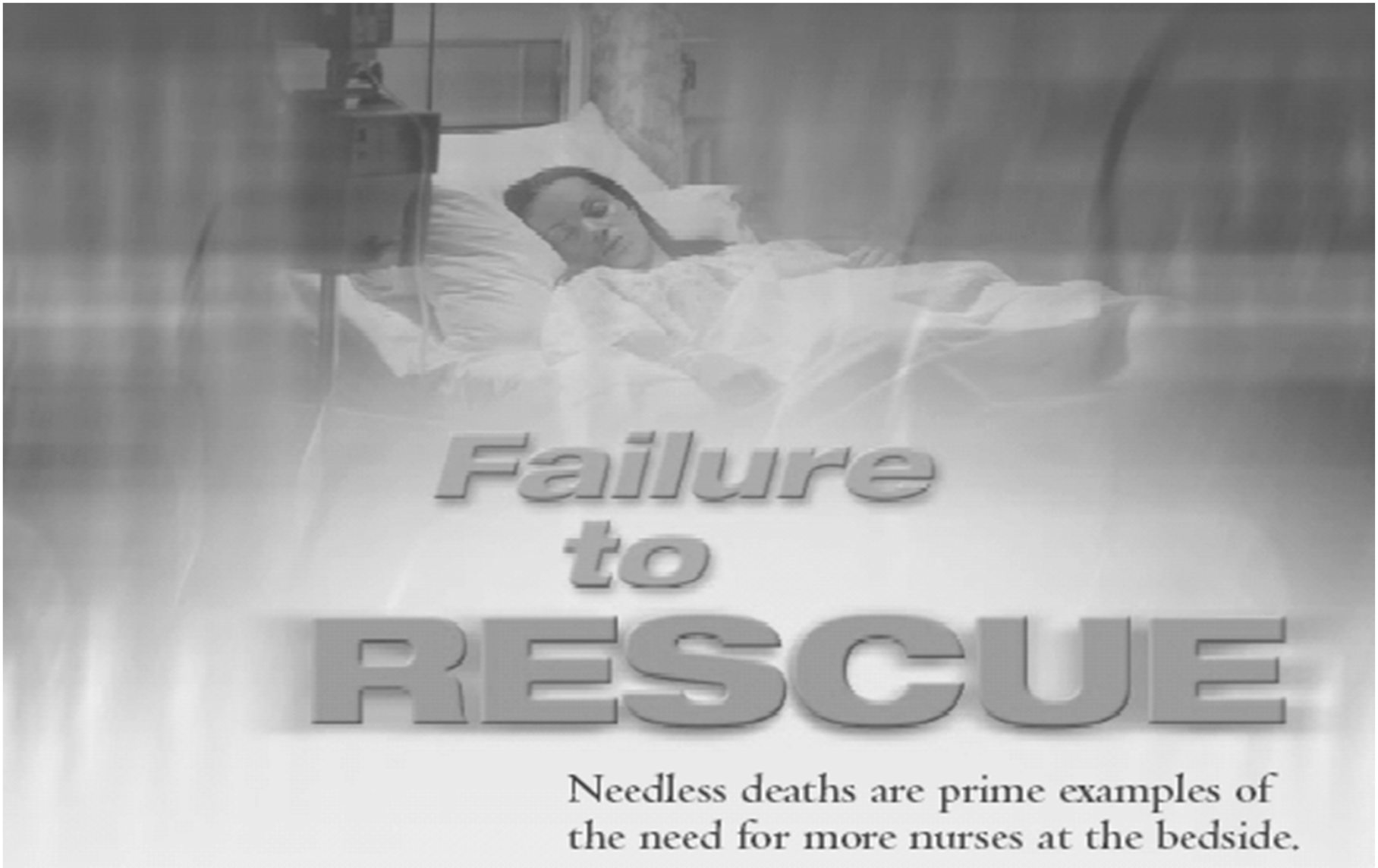
George Bernard Shaw

“The single biggest problem with communication is the illusion that it has taken place.”



How good is our communication and teamwork ?

Death rates from complications vary significantly from hospital to hospital.



Why ?

Because opportunities to identify complications, to mobilize help and resources and to intervene in a timely fashion are commonly lost…

Usually because of communication and teamwork failures.

NICHD 2008

Is Saying Category I, II or III Enough for Safe Communication ?

JOGNN

PRINCIPLES & PRACTICE

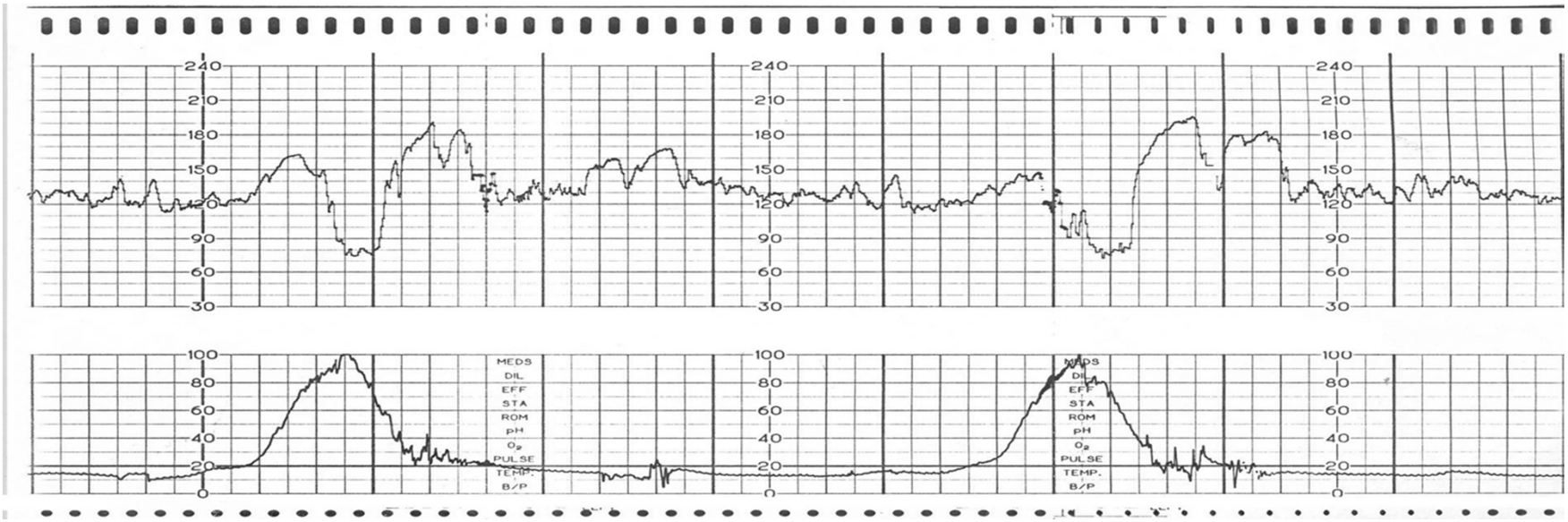
The 2008 National Institute of Child Health and Human Development Workshop Report on Electronic Fetal Monitoring: Update on Definitions, Interpretation, and Research Guidelines

George A. Macones, MD, Gary D. V. Hankins, MD, Catherine Y. Spong, MD, John Hauth, MD and Thomas Moore, MD

ABSTRACT

Co-published in *Obstetrics & Gynecology*, Vol 112, No 3, September 2008.

If I were to document this tracing I would describe it as?



a. Category II reassuring FHR tracing

b. Category II tracing with Moderate variability, recurrent variable decelerations, 50 bpm below lasting 30 second, baseline FHR of 125 bpm. Contractions Q 4 min x 60 seconds

S Dr. Jones this Mary in L&D room 1522. Pt. Jones has a Category II tracing with moderate variability, recurrent variable decelerations, 50 bpm below that are getting progressively deeper for the last hour.

B @ 39 weeks uncomplicated prenatal history no current obvious/documented additional complications

A I'm concerned that the variable decelerations are recurrent and are getting progressively deeper.

R I like you to come to the bedside now and evaluate the FHR tracing.

S **MODERATE VARIABILITY + RECURRENT VARIABLE DECELERATIONS**
presumptive diagnosis

GETTING PROGRESSIVELY DEEPER
Pattern evolution- deeper the deceleration + recurrent- may evolve → loss variability and deeper decelerations

A **I'M CONCERNED**
Cuss Words cue you that the alarm has gone off

R **BEDSIDE NOW**
Clear statement of sense of urgency

Communication and Documentation Recommendations

1. **Include a prospective plan of care** that specifies surveillance and notification parameters consistent with the patient's condition (patient risk factors)?
2. **Objectively describes the FHR tracing using standardized nomenclature (NICHD)?**

Communication and Documentation Recommendations

3. Use the NICHD nomenclature for all documentation.

- Avoid the use of “casualism” and non-standardized, non-specific terminology when communicating and documenting FHR tracings .
- If you end up in medical-legal proceedings, the use of ambiguous non-specific terminology to describe FHR tracings is used to show a lack of knowledge and professionalism.

Communication and Documentation Recommendations

4. Take care to avoid making a presumptive diagnosis in the medical record, based on the presence of decelerations as an isolated fining.
5. **Include the evidence (* degree of FHR variability)** you used to make/support the presumptive diagnosis.

Communication and Documentation Recommendations

6. **Demonstrate the interventions** taken on behalf of the patient are consistent with the evidence on the FHR tracing (presumptive diagnosis) and were accomplished in a time frame consistent with the patient(s) condition?

Communication and Documentation Recommendations

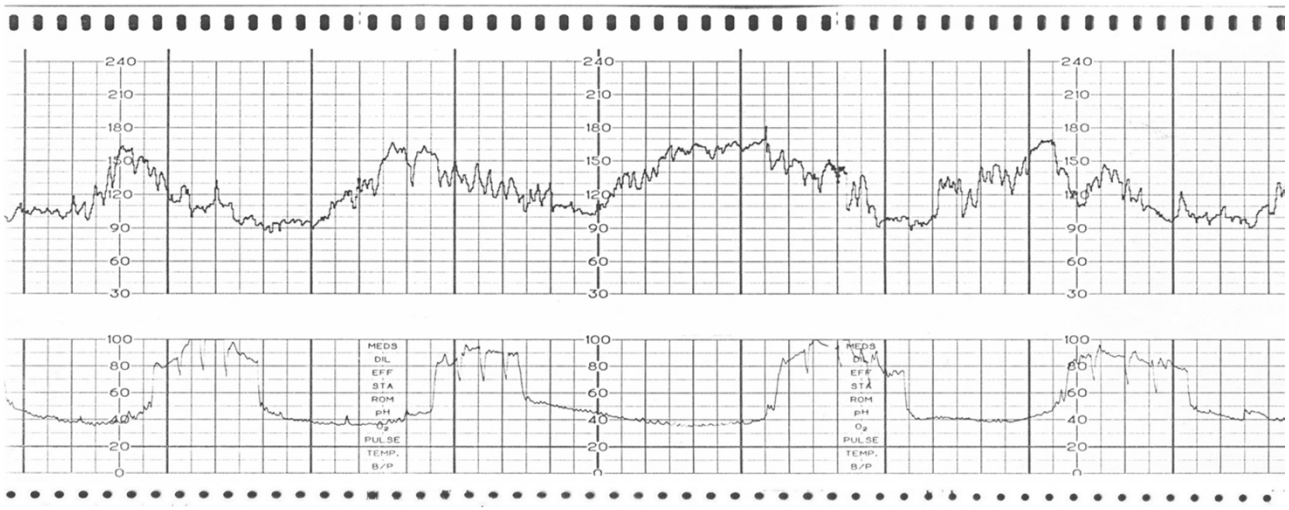
7. **If your documentation includes the terms reassuring non-reassuring, fetal tolerance or fetal intolerance of labor etc.,** remember, these are generally non-specific non-standardized diagnoses and they should be followed by a purely descriptive rendering of the FHR tracing

Communication and Documentation Recommendations

The ACOG Committee Opinion # 325 Inappropriate Use of the Terms Fetal Distress

The term fetal distress is replaced with “non-reassuring fetal status,” “followed by a further description of findings (e.g., repetitive variable decelerations, fetal tachycardia or Bradycardia, late decelerations, or low biophysical profile).

The Ranked Order



Evaluate the tracing and communicate your findings in a ranked order of importance

- Baseline FHR variability
- The presence or absence of recurrent FHR decelerations and/or bradycardia
- The baseline fetal heart rate
- Uterine Activity
- The evolution of the tracing

A Common Goal

Accomplish delivery in the absence of significant acidemia defined as cord umbilical artery blood gas at the time of birth, Delivery in the a CUA gas ≥ 7.1 ≥ -12 mEq L-1 and/or Apgar score ≥ 7 at 5 minutes

NICHD 2008
Three- Tier Fetal Heart Rate Interpretation System

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4 Key Interpretive Guidelines

1. FHR Decelerations as an independent finding are poorly predictive of complicated outcomes.

2. The degree of variability is the most sensitive indicator of the adequacy of oxygen delivery to the fetus at any given moment in time.

3. A metabolic acidosis typically develops slowly in association with recurrent decelerations and an evolutionary reduction of FHR variability over time.

4. The deeper the decelerations the > likelihood for developing a significant acidosis.

Evidence Based Indications For Action

Based on the degree of variability that accompanies the decelerations

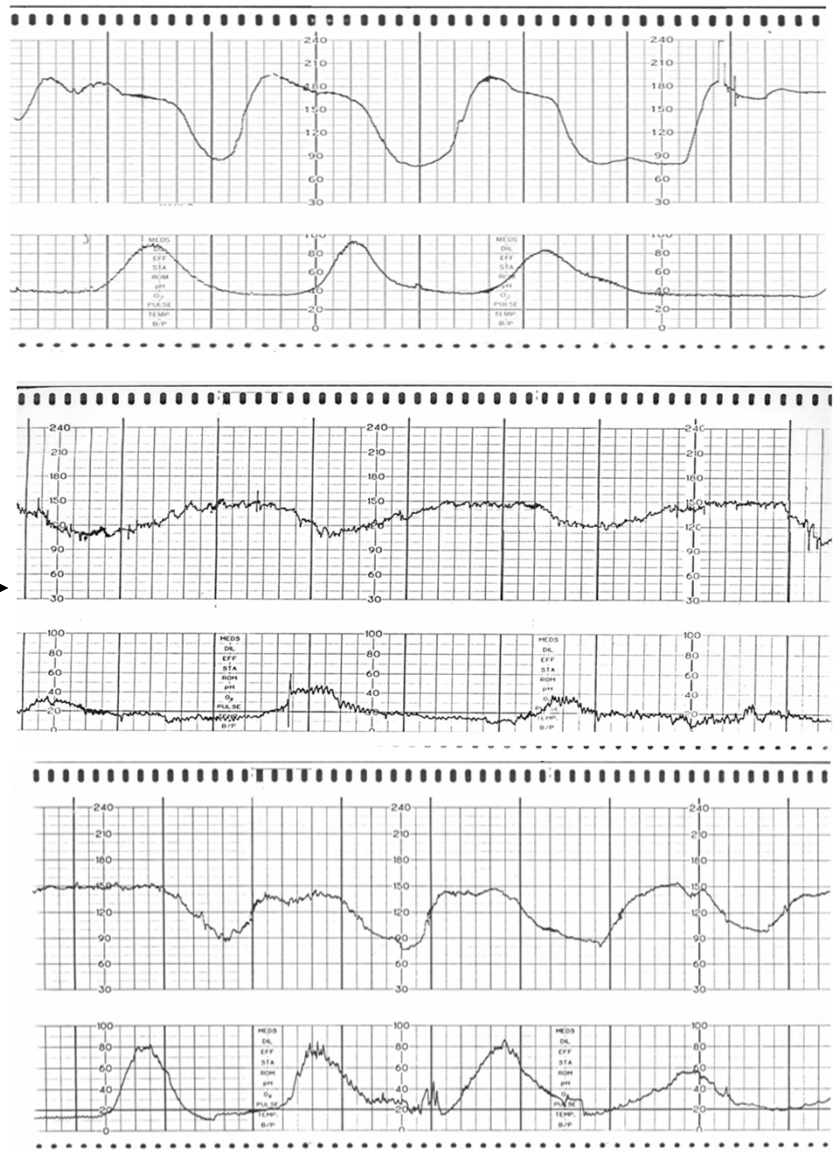
Make a presumptive Diagnosis

Significant Acidosis?

YES?

NO?

MAYBE?



Evidence Based Indications For Action

Based on your presumptive Diagnosis

Significant Acidosis?

YES?
NO?
MAYBE?

7 Key Collaborative Interventions

1. Observation
2. Notification
3. Bedside Evaluation
4. Preparation for Delivery
5. Delivery
6. Resuscitation
7. Transfer/Transport

7 Key Collaborative Practice Guidelines

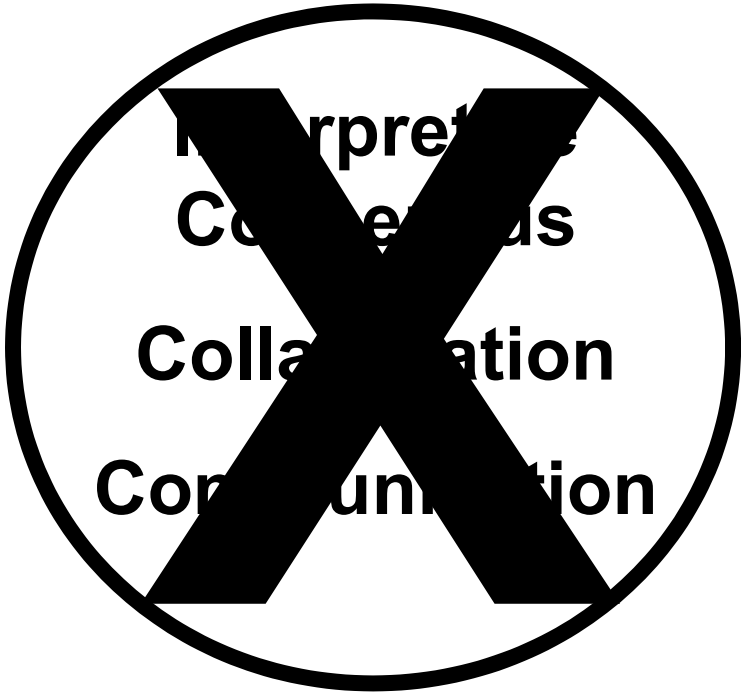
7 key Collaborative Interventions

Linked Collaborative Practice Guidelines

The Bottom Line

When nurses, doctors, midwives disagree about their interpretation of the FHR tracing, the plan of care, or how quickly their calls for assistance need to be responded to, the medical record will usually record and reflect these differences.

You can be sure a concerted effort will be made to highlight these failures in communication and collaboration during deposition and court proceedings.



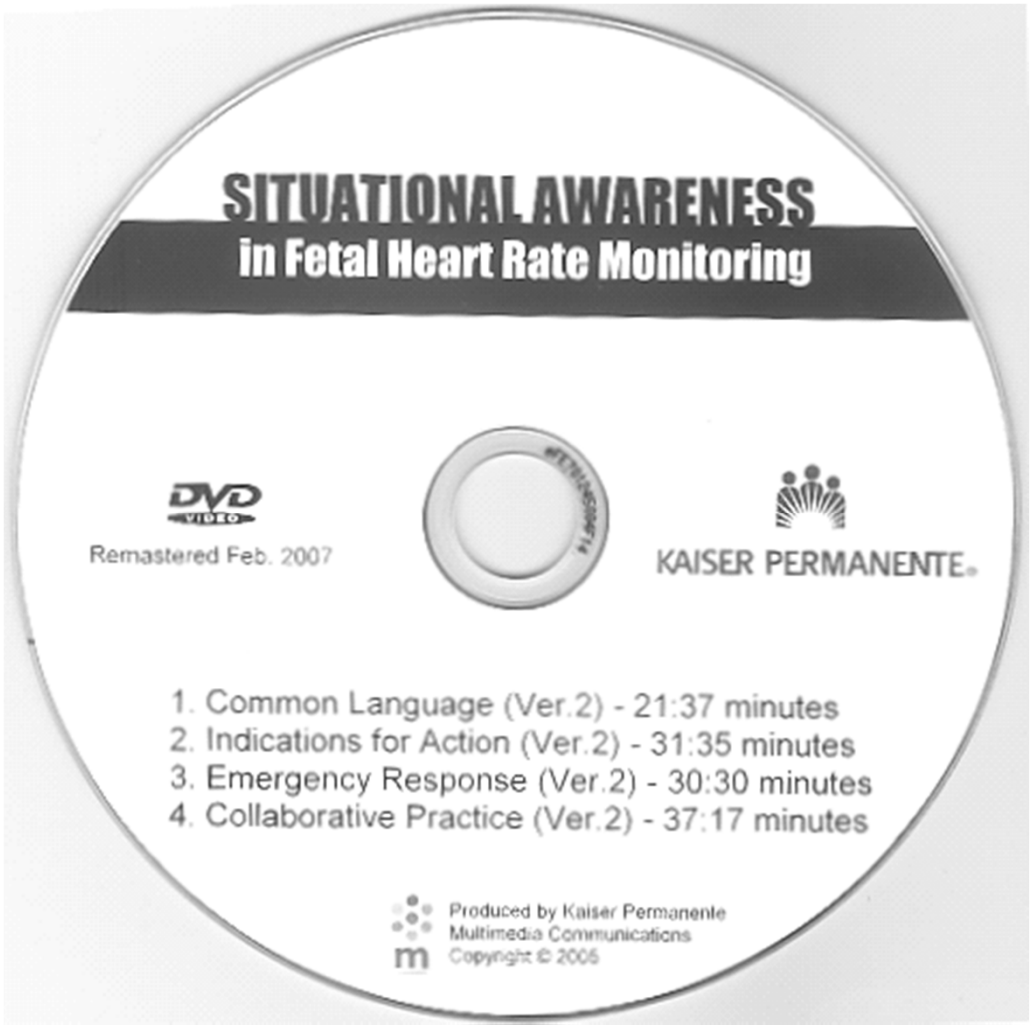
Interpretive chaos and discord at the bedside, communicates to patients, lawyers and lay juries that something was wrong with the clinical care rendered, and the skill of the providers rendering that care.

What Do We Need To Do To Make Care Safer

- Develop consistent, reliable processes for the things we can anticipate.
- Focus on improving our ability to respond to and manage the unexpected.

Michael Leonard

While some of us may be in private practice… none of us practice privately.



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Questions and Case Presentations