



# Nitroglycerin for assisting difficult delivery at C-section

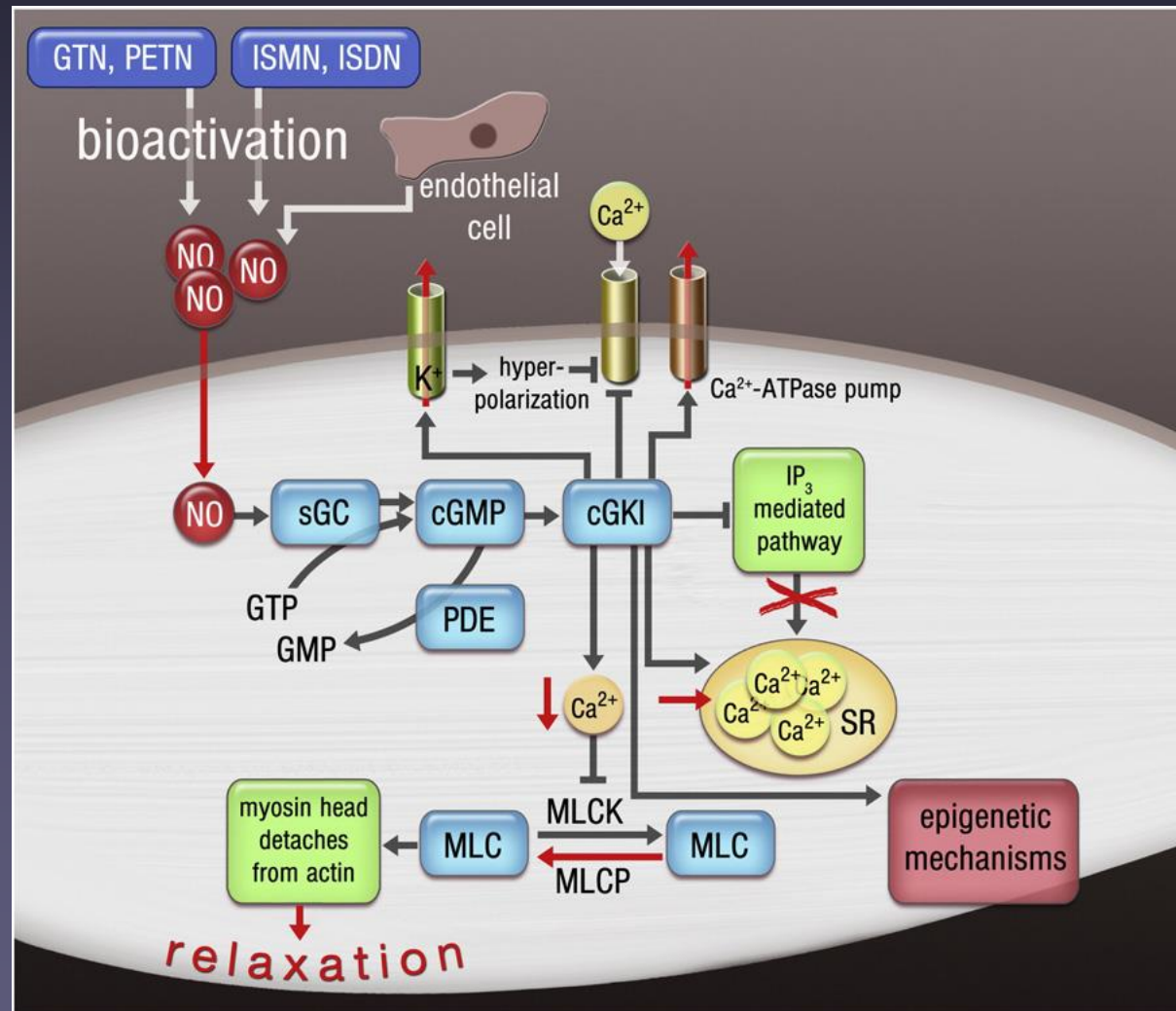
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Cardiac Anesthesiology and  
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University of Utah



# Overview - Nitroglycerin

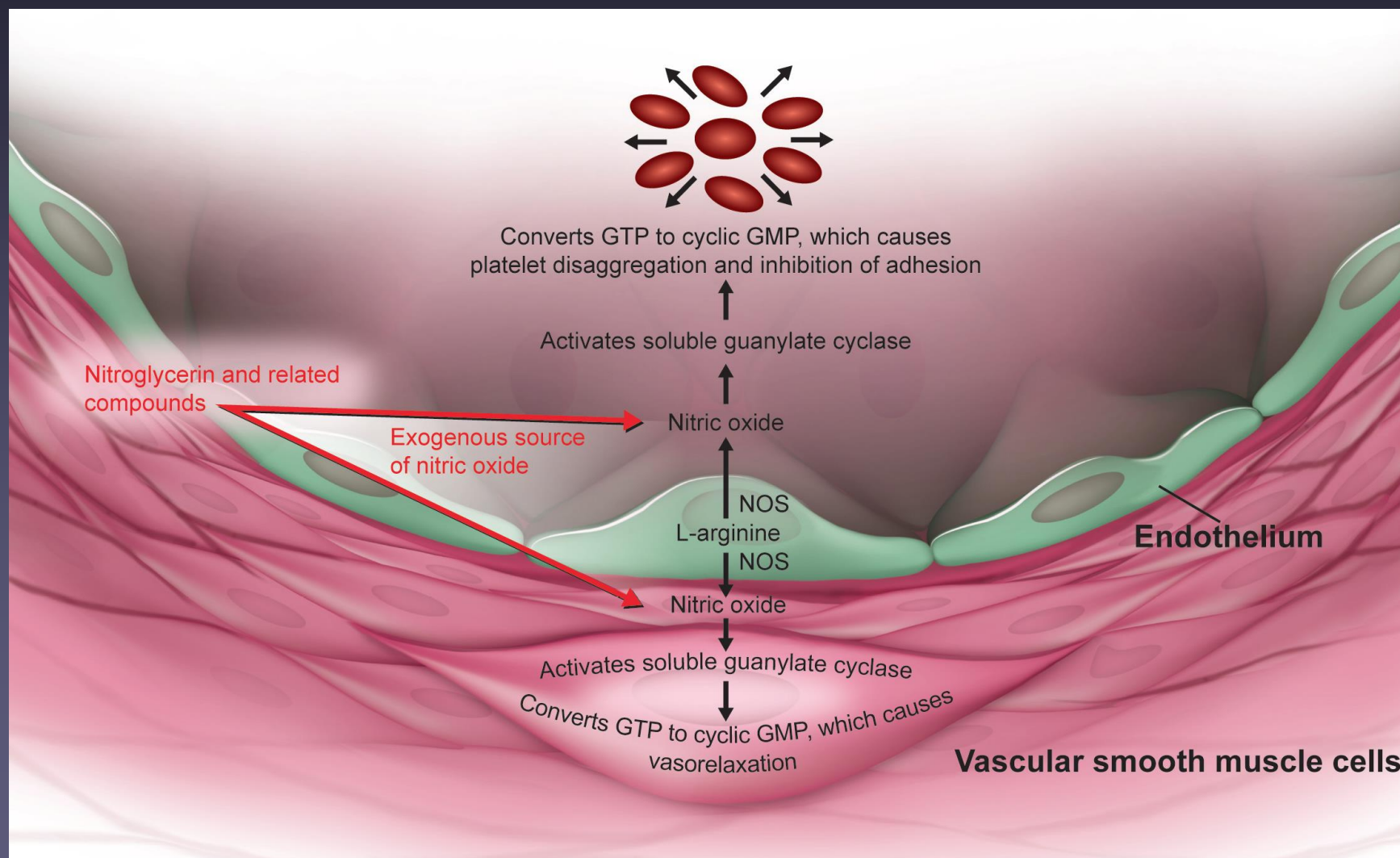
- Nitroglycerin general uses
- Mechanism of action
- Evidence
- Caveats

# Mechanism of Action





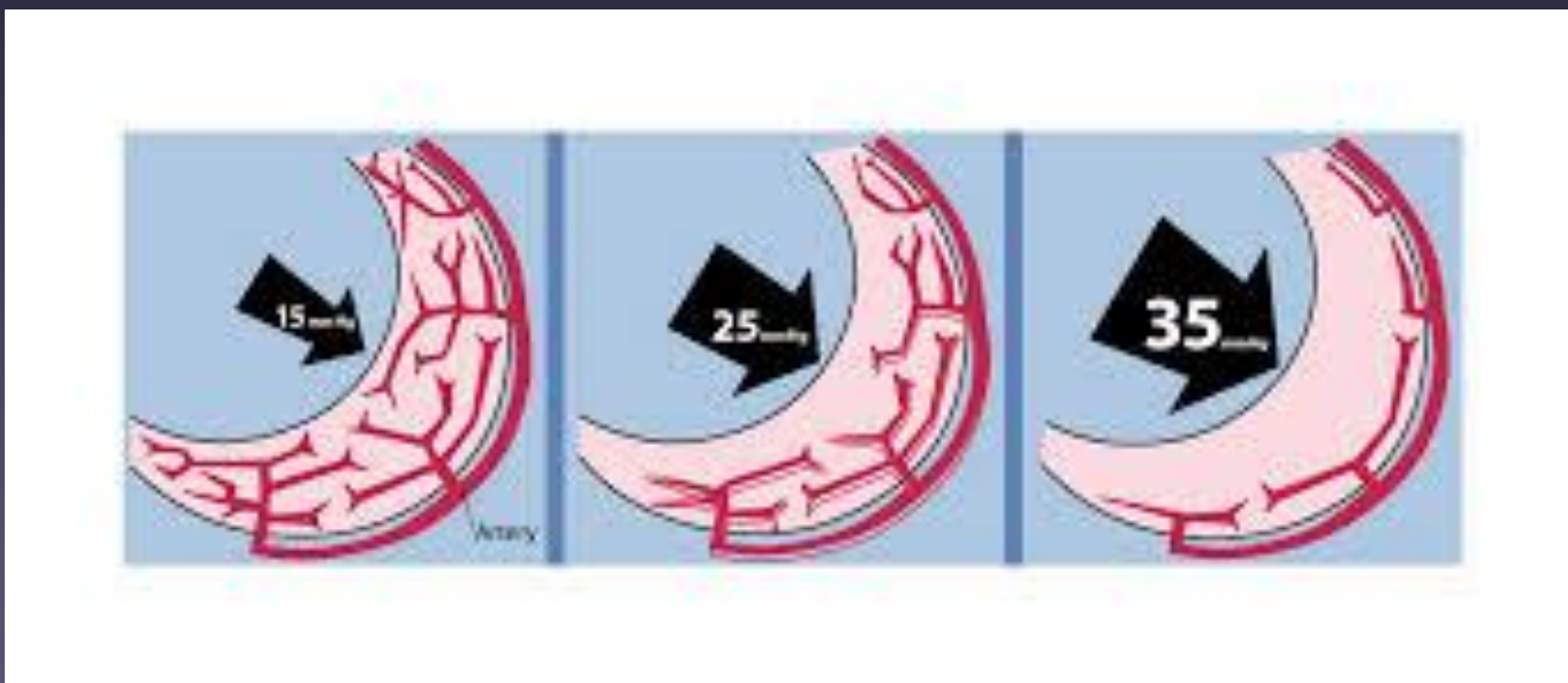
# Nitroglycerin and platelets



# Nitroglycerin cardiovascular use



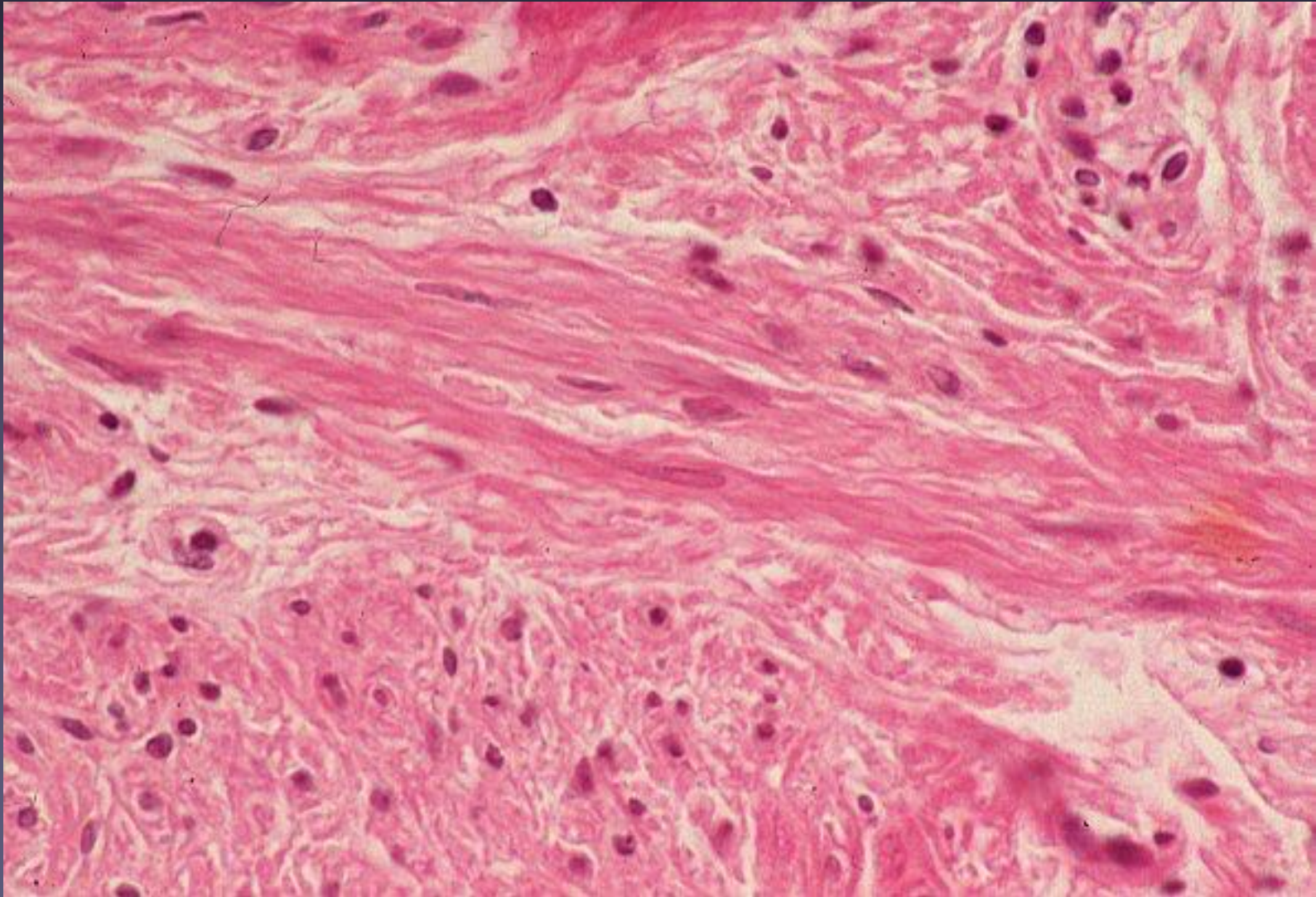
# Nitroglycerin and LVEDP



Coronary Perfusion Pressure = Diastolic BP - LV End Diastolic Pressure



# Smooth muscle of the uterus



# Nitroglycerin as a uterine relaxant

- Uses as a uterine relaxant:
  - Cervical ripening
  - Acute Tocolysis
  - External version
  - Extraction at Cesarean section
  - Primary dysmenorrhea
  - Development of preeclampsia



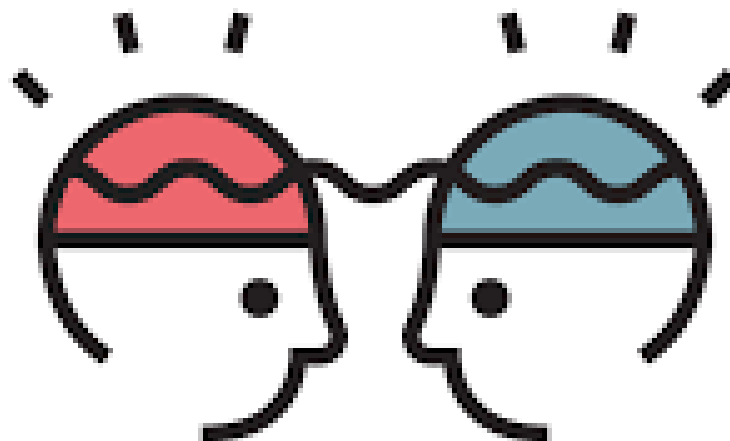
# Competing interests?



# Competing interests?



# Common understanding





## IV Nitroglycerin

- General benefits:
  - Onset of action (clinically evident in 30 seconds)
  - Rapid termination ( $T_{1/2}$  2-2.5 min)
  - \*\*\*Relative hemodynamic stability\*\*\*
- General side effects:
  - Dose-dependent HA/flushing and dizziness

# Nitroglycerin

- Relative Contraindications:
  - Hypertrophic cardiomyopathy
  - Left ventricular outflow obstructions
- Contraindication:
  - Allergy to organic nitrates
  - Increased Intracranial Pressure
  - Pericardial constriction/restriction/tamponade

# Nitroglycerin use in delivery of infant

- Benefits in the setting of difficult delivery
  - Uterine relaxation facilitating delivery with decreased birth trauma
- Concerns
  - Profound hypotension in the setting of reduced preload
  - Uterine atony resulting in PPH?
  - Platelet dysfunction resulting in increased bleeding?
  - Fetal effects?



# Nitroglycerin use in delivery of infant

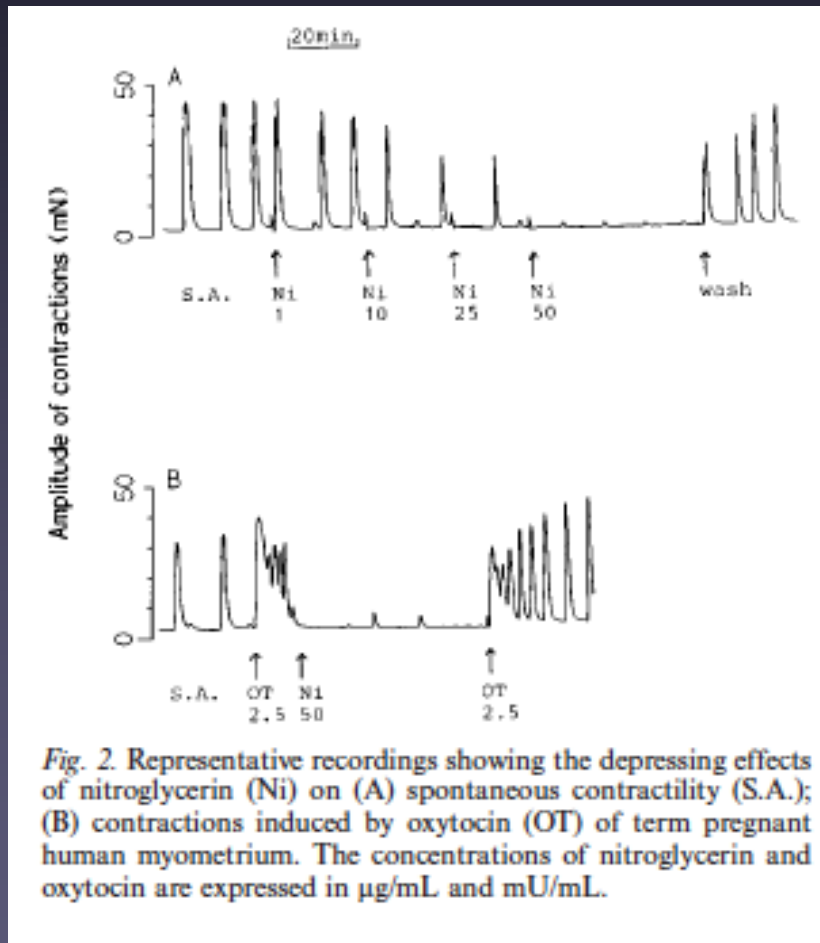
## Intravenous nitroglycerin for rapid uterine relaxation

PIA AXEMO<sup>1</sup>, XIN FU<sup>1</sup>, BO LINDBERG<sup>1</sup>, ULF ULMSTEN<sup>1</sup> AND ARNE WESSÉN<sup>2</sup>

From the Departments of <sup>1</sup>Obstetric and Gynecology and <sup>2</sup>Anesthesiology and Intensive Care, University Hospital, Uppsala, Sweden

In the 31 pregnant women to whom intravenous nitroglycerin was administered uterine relaxation was obtained within 30–45 seconds after a bolus injection of 100–200  $\mu$ g. The effect remained for about two minutes and facilitated atraumatic deliveries at cesarean section in all of the patients.

# Nitroglycerin use in delivery of infant



# Nitroglycerin use in delivery of infant

Nitroglycerin application during cesarean delivery: Plasma levels, fetal/maternal ratio of nitroglycerin, and effects in newborns

Matthias David, MD,<sup>a</sup> Matthias M. Walka, MD,<sup>b</sup> Bernhard Schmid, MD,<sup>d</sup> Pranav Sinha, MD,<sup>c</sup>  
Siegfried Veit, MD,<sup>a</sup> and Werner Lichtenegger, MD<sup>a</sup>  
*Berlin and Neu-Ulm, Germany*

**CONCLUSION:** The level of nitroglycerin in umbilical plasma was two to three orders of magnitude lower than that found in maternal plasma and clearly in a subtherapeutic range. There was no indication that pre-natal application of nitroglycerin to facilitate obstetric management is hazardous for neonates. (Am J Obstet Gynecol 2000;182:955-61.)



# Nitroglycerin - Cochrane Review



**Cochrane**  
**Library**

Cochrane Database of Systematic Reviews

## Techniques for assisting difficult delivery at caesarean section (Review)

Waterfall H, Grivell RM, Dodd JM

# Nitroglycerin - Cochrane Review

## Tocolysis versus no tocolysis

The search identified a single randomised controlled trial of 97 women, that was able to be included in the review. This study involving a three-way comparison between nitroglycerin (comparing two different doses 0.25 mg and 0.5 mg), and placebo administered at the time of caesarean section to facilitate fetal extraction (David 1998). Data were analysed as a single-pair comparison; nitroglycerin (either 0.25 mg or 0.5 mg) compared with placebo.

# Nitroglycerin - Cochrane Review

## Primary outcomes

Infant birth trauma was not reported in the David 1998 trial.

## Secondary outcomes

There were no differences identified between nitroglycerin and placebo for the occurrence of any **maternal side-effect** (one study; 97 women; risk ratio (RR) not estimable), **Analysis 1.1**. There were no other prespecified maternal or infant outcomes reported that could be included in this review. The trial reported the ease of delivery of the baby at caesarean section, and mean infant Apgar scores, but the method of reporting in the published paper precluded inclusion in the results of this review.

# Nitroglycerin - Cochrane Review

## **Tocolysis versus no tocolysis**

Tocolytic agents have been used extensively to induce uterine relaxation, and have been used anecdotally at the time of caesarean section, where difficulties with birth of the infant are anticipated or encountered. While uterine relaxation at caesarean section may be a beneficial effect as it relaxes the uterus to facilitate birth of the infant, it can also be followed by uterine atony (where the uterus does not contract after birth) causing subsequent postpartum haemorrhage. Any benefit to facilitate infant birth and reduction in birth trauma has to be balanced against the potential complications for the woman, including postpartum haemorrhage secondary to uterine atony.

There is currently insufficient information from randomised controlled trials assessing the role of tocolytic agents in facilitating infant birth at caesarean section and reducing the risk of infant birth trauma. The occurrence of maternal side-effects and risk of postpartum blood loss was similarly not reported in the single trial identified and included in the review.

Further information is required to address the role of tocolysis to facilitate infant birth at caesarean section adequately, with attention particularly to adequate reporting of maternal and infant health outcomes.

# ACOG

- 2006
  - Nitroglycerin may be used when immediate relaxation of the uterus is needed.

“We’ve got to get the baby out!”  
-Porth



## Dose matters

- Recommended dose IV nitroglycerin
  - 100-200 micrograms
  - redose in 2 minutes
- Reverse tocolytics with oxytocin
- Hypovolemia and hypotension should be corrected prior to administration

Chandrasekaran E and Arulkumaran S, "Acute Tocolysis," Curr Opin Obstet Gynecol, 2005, 17(2):151-6. [PubMed 15758607]

# Thank You