

## Third Stage of Labor Uncomplicated & Complicated



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### Objectives

- Identify the normal changes that occur during the third stage of labor
- Discuss the interventions for active management of the third stage
- Examine the uterotonic medications and their pharmacological effects
- Review common third stage complications and their medical treatments

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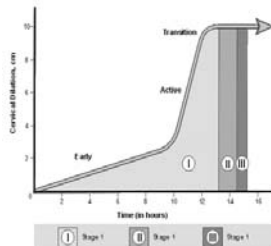
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### Background

- Relatively little thought or teaching seems to be devoted to the third stage of labor compared with that given to the first and second stages
- Within a minute, the normal delivery can become abnormal and can turn swiftly to disaster



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## Definition

- The third stage of labor begins with the delivery of the baby and ends with the completed delivery of the placenta and its attached membranes
- The normal duration of the third stage is usually 5-30 minutes, w/ a mean delivery time of 8.3 minutes. Only 3.3% last >30 minutes
- The *absolute time* limit for delivery of the placenta, without evidence of significant bleeding, ranges from 30-60 minutes

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## Significance

- 3<sup>rd</sup> stage is usually uneventful, although significant complications can occur
- Joint Commission 2010 'Sentinel Alert' warns that half of the reported maternal deaths are preventable!
- In 2002-2004, OB Hemorrhage/PPH was leading cause of maternal mortality in California
- Initial California Maternal Quality Care Collaborative (CMQCC) Toolkit subsequently developed in 2010
- Current version on-line is 2015

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## Impact of OB Hemorrhage

- In U.S. OB Hemorrhage increased 26% between 1994-2006
- In 2013, OB Hemorrhage accounted for 25% of maternal deaths
- 70% of hemorrhage related deaths have been found to be preventable
- WHO estimates the U.S. Maternal Mortality Ratio (MMR) increased 136%, 12 deaths per 100,000 live births in 1990, to 28/100,000 in 2013
- However, cardiovascular disease is replacing OB Hemorrhage as leading cause of maternal deaths

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## Complications

**\*All women who deliver are at risk of complications in the third stage of labor**

- Most common complication is **Postpartum Hemorrhage (PPH)**
- More than half of postpartum deaths are due to PPH and are within 4 hrs. of delivery

### Other Complications include:

- Retained placenta (*discussed in other lecture*)
- Uterine inversion
- Placenta accreta, increta, percreta (*discussed in other lecture*)
- Any exploration or instrumentation of the uterus increases the risk of sepsis

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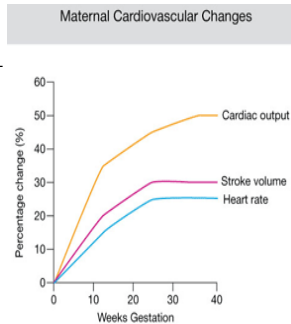
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## Physiology

- Over the course of a pregnancy, maternal blood volume  $\uparrow$  50%, from 4 to 6 L
- The increase in blood volume serves to fulfill the perfusion demands and to provide a reserve for the blood loss that occurs at the time of delivery
- Blood flow from the placenta to the uterus is 600mL/min. so there is a great potential for significant blood loss in a short period of time



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## Physiology

- Changes also occur in the coagulation system, with an  $\uparrow$  in clotting factors and a  $\downarrow$  in fibrinolytic activity
- Pregnancy is considered a **hypercoagulable state**
- Although uterine contraction is initially responsible for controlling blood loss at the placental site, clot formation and fibrin deposition occur rapidly and are essential in maintaining hemostasis and promoting involution in the days following delivery.

(Sleep, 1993)

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## The 4 "T"'s

### Causes of Bleeding in Stage 3

**T**one (70%) Uterine atony

**T**rauma (20%) Lacerations & vessel injuries

**T**issue (10%) Abnormal placentation;  
Retained placental fragments

**T**hrombin (<1%) Inherent coagulopathies;  
& acquired (HELLP, DIC)



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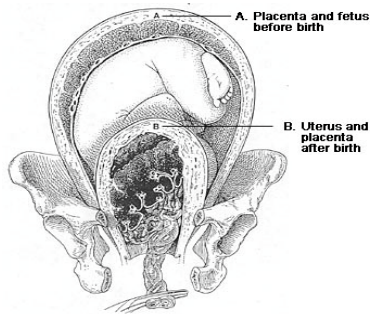
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### Size Changes of Uterus During the Third Stage



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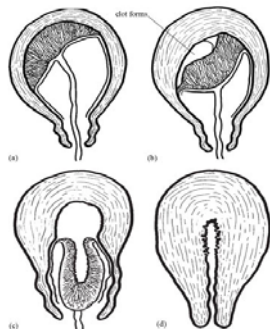
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### Mechanism of Placental Separation

- Following delivery of the fetus, uterine contractions continue and the placenta is sheared from the underlying endometrium



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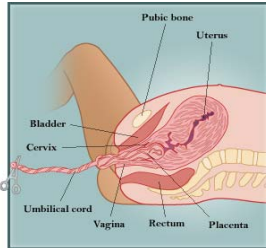
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## Signs of Placental Separation

- Lengthening of the umbilical cord
- The uterus takes on a more globular shape and becomes firmer
- The uterus rises in the abdomen
- A gush of blood occurs




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## Uterotonic Agents

- Several agents cause uterine contractions
- The sensitivity of the myometrium is specific to *oxytocin*
- Synthetic ergot alkaloids (*methergine*, *hemabate*) cause *strong tetanic contraction* of the uterus



- Agents that cause uterine *relaxation* (*magnesium sulfate*) can lead to dangerous bleeding following delivery

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## Uterotonic Medications

Agent	Dose	Route	Dosing Frequency	Side Effects	Contraindications
<b>Oxytocin® (Pitocin)</b> *1st line agent	10-40 units per 500/1000mL, rate titrated to uterine tone. Mixed in NS or LR; avoid dextrose soln	<b>First Line:</b> IV infusion <b>Second Line:</b> -10 units IM if no IV access	Continuous Use pre-mixed solutions unless an emergency (TJC, 2008)	Usually none - N/V - Water Intoxication (hyponatremia) w/ prolonged IV use - IBP & THR w/ high dose or IVP	Hypersensitivity to drug
<b>Methylergonovine (Methergine®)</b> *Primary 2nd line agent	0.2 mg/mL 0.2 mg PO tab	IM (not given IV)	Every 2-4 hours: If no response after 1st dose, it is unlikely that add'l doses will benefit	S/E rare Most common is N/V	<b>Hypertension:</b> -Preeclampsia, CV disease, Hx. of migraines, Hypersensitivity to drug
<b>Carboprost 15-methyl PG F2a (Hemabate®)</b>	250 mcg 1mL ampule (0.25 mg)	IM or Intramyometrial ***May be fatal if given IV	Every 15-90 min. Not to exceed 8 doses of 0.25mg in 24hrs. (- 2mg)	N/V/D, fever, hypertension, bronchospasm	Caution in women w/active hepatic or cardiovascular disease. <b>Asthma or pulmonary disease</b>
<b>Misoprostol (Cytotec®)</b>	800mcg SL 800-1000mcg PR Available in 100 & 200mcg tablets	Sublingual Rectal PO *If Hemabate is ineffective, unlikely Cytotec will be effective	Single Dose At least 2hrs. between 1st & 2nd Dose	Shivering, fever, diarrhea, headache	Rare Known allergy to prostaglandin or hypersensitivity to drug.

CMQCC Hemorrhage Taskforce 2015

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## Physiological vs Active Management of 3<sup>rd</sup> Stage (AMTSL)

- The controversy surrounding 3<sup>rd</sup> stage management exists between authorities who advocate the: (2 philosophies)

✦ *physiological (expectant)*

-versus-

✦ *active management approach*

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## Physiological (Expectant) vs Active Management

	Physiological Management	Active Management (prophylactic approach)
<u>Uterotonic Pitocin®</u>	None; or After placenta delivered	With delivery of anterior shoulder, or after baby delivered
<u>Delayed Cord Clamping</u>	No clamping until after placenta is delivered	Early cord clamping & cutting
<u>Cord traction</u>	None; placenta delivered by gravity & maternal effort	Application of 'controlled cord traction (CCT)' with counter-traction on the fundus

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## Delayed Cord Clamping

- Provides continued placental exchange over a variable period of time after birth
- AHA & AAP (2015) & ACOG (2017) recommends it should occur for at least 30-60 seconds for most vigorous term & preterm newborns
- Provides increased initial blood volume which improves Hgb levels, cardiopulmonary adaptation, cerebral & GI blood flow; and iron stores which decreases risk of newborn anemia
- In the preterm newborn, it further decreases need for tx. of hypotension & hypovolemia improving cardiovascular stability; also leads to decreased intraventricular hemorrhage & late-onset sepsis

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## Delayed Cord Clamping

- Does not increase risk of bleeding post delivery; and facilitates immediate skin-to-skin contact which enhances extrauterine transition & bonding
- Early Cord Clamping may be indicated in order to facilitate newborn assessment or resuscitation

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## Cord Blood



- Cord blood is taken following cord clamping
- The emergence of fetal stem cell harvesting has created new issues in this area (Cord Blood Banking)
- Sometimes a segment of clamped cord is set aside for cord blood gas sampling

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## Cord Blood Gas Sampling



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## Placental Delivery

- The placenta usually presents with the cord insertion and the fetal (shiny) side of the placenta
- Assessment of the placenta and membranes as they are being delivered provides a good idea of whether they are intact, but delay detailed examination until it is clear that the uterus is well contracted and bleeding is minimal

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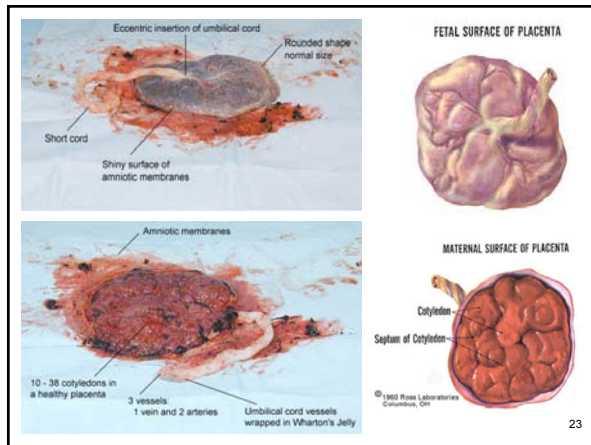
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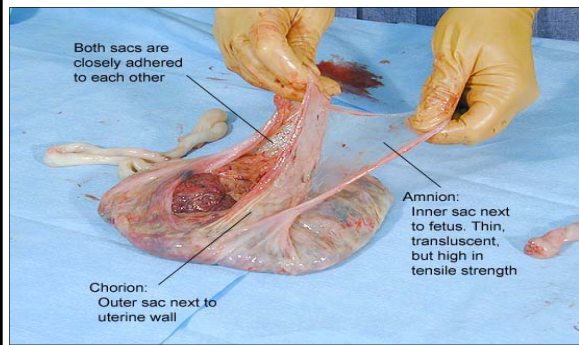
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## Separation of Amniotic and Chorionic Membranes




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## Placental Examination

- Examine the placenta looking for missing cotyledons suggestive of retained placental fragments
- The provider will consider whether pathological examination is warranted



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## Uterine Assessment

- The fundus is assessed immediately following delivery of the baby and given a baseline fundal height
- A uterotonic, preferably oxytocin (Pitocin®), is then administered usually IV
- Do not perform uterine massage before delivery of the placenta, and never apply downward fundal pressure (risk of uterine prolapse)

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## Fundal Exam in 4<sup>th</sup> Stage

**Note:**

that upper hand is cupped over the fundus; lower hand dips in above symphysis pubis & supports uterus while massaging it gently.



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## Uterine Exploration

- Routine exploration of the uterus is no longer recommended for normal deliveries or those following previous cesarean delivery
- The procedure increases the risk of complications, especially infectious morbidity

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## Fourth Stage

- 4<sup>th</sup> stage is the **Period of Recovery**. This stage usually lasts 1-2 hrs. after the placenta delivers
- The delivery of the placenta does not mark the end of risk for bleeding!!
- Encourage early breastfeeding to promote endogenous oxytocin release
- Once good, sustained uterine tone has been established, the presence of any bleeding from the lower genital tract can be assessed

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## Diagnosis of Vaginal Bleeding

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> <li>• Immediate PPH<sup>a</sup></li> <li>• Uterus soft and not contracted</li> </ul>	<ul style="list-style-type: none"> <li>• Shock</li> </ul>	<u>Atonic uterus</u>
<ul style="list-style-type: none"> <li>• Immediate PPH<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Complete placenta</li> <li>• Uterus contracted</li> </ul>	<u>Tears of cervix, vagina or perineum</u>
<ul style="list-style-type: none"> <li>• Placenta not delivered within 30 minutes after delivery</li> </ul>	<ul style="list-style-type: none"> <li>• Immediate PPH<sup>a</sup></li> <li>• Uterus contracted</li> </ul>	<u>Retained placenta</u>
<ul style="list-style-type: none"> <li>• Portion of maternal surface of placenta missing or torn membranes with vessels</li> </ul>	<ul style="list-style-type: none"> <li>• Immediate PPH<sup>a</sup></li> <li>• Uterus contracted</li> </ul>	<u>Retained placental fragments</u>
<ul style="list-style-type: none"> <li>• Uterine fundus not felt on abdominal palpation</li> <li>• Slight or intense pain</li> </ul>	<ul style="list-style-type: none"> <li>• Inverted uterus apparent at vulva</li> <li>• Immediate PPH<sup>b</sup></li> </ul>	<u>Inverted uterus</u>
<ul style="list-style-type: none"> <li>• Bleeding occurs more than 24 hours after delivery</li> <li>• Uterus softer and larger than expected for elapsed time since delivery</li> </ul>	<ul style="list-style-type: none"> <li>• Bleeding is variable (light or heavy, continuous or irregular) and foul-smelling</li> <li>• Anaemia</li> </ul>	<u>Delayed PPH</u>
<ul style="list-style-type: none"> <li>• Immediate PPH<sup>a</sup> (bleeding is intra-abdominal and/or vaginal)</li> <li>• Severe abdominal pain (may decrease after rupture)</li> </ul>	<ul style="list-style-type: none"> <li>• Shock</li> <li>• Tender abdomen</li> <li>• Rapid maternal pulse</li> </ul>	<u>Ruptured uterus</u>

<sup>a</sup> Bleeding may be light if a clot blocks the cervix or if the woman is lying on her back.

<sup>b</sup> There may be no bleeding with complete inversion.

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## Third Stage Complications

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### Postpartum Hemorrhage (PPH)

- The most common complication of the 3rd stage of labor is PPH
- PPH is defined as cumulative blood loss in a **SVD >500 mL in 1<sup>st</sup> 24 hrs. after delivery** or **C/S >1000 mL** or >15% VS changes or HR  $\geq$ 110, BP  $\leq$ 85/45, O<sub>2</sub> Sat <95%, or clinical signs & symptoms
- **Primary PPH:** occurring within 1<sup>st</sup> 24 hrs.  
**Secondary/Delayed:** occurring 24hrs. to 6-12wks.

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### Postpartum Hemorrhage

**GOAL:**  
*Correct hypovolemia & establish homeostasis*

- Identify patients at risk
- Recognize early
- Promptly initiate treatment
- Treat underlying cause
- If unresponsive to therapy, anticipate medical/surgical intervention

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## PPH Interventions

- Activate OB Hemorrhage Protocol or Checklist
- Fundal massage, uterotonics, additional IV line
- Notify Charge Nurse, Provider, and Anesthesia
- VS, O2 Sat Q 5min.
- Calculate cumulative blood loss Q 5-15min.
- Weigh bloody materials (**1gm=1mL**)
- Careful inspection with good exposure of vaginal walls, cervix, uterine cavity, placenta
- Possibly send additional labs (T&X-match, DIC panel)
- Provider possibly evaluating for medical interventions outside of pharmacological

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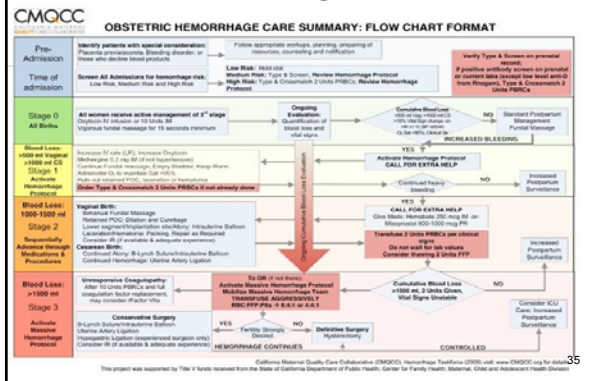
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## OB Hemorrhage Protocols




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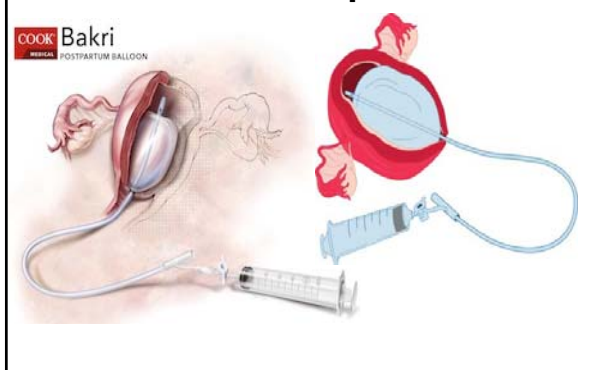
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## Balloon Tamponade




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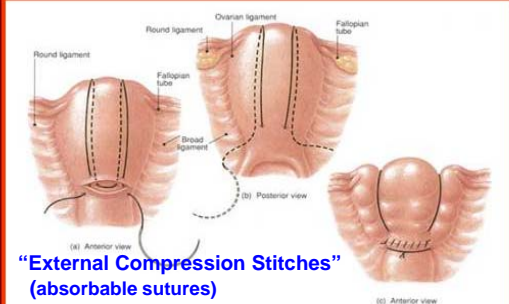
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## The B-Lynch Suturing

### Description of technique



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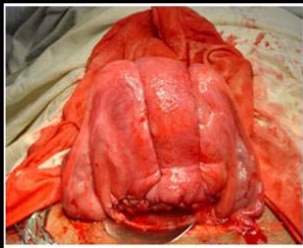
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## The B-Lynch Suturing

### Description of technique



8. The lower transverse uterine incision is now closed in the normal way, in two layers, with or without closure of the lower uterine segment peritoneum.

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## Other Medical Interventions

- Vaso-occlusive balloon insertion (arterial balloon occlusion)
- Uterine artery embolization
- Performed in Interventional Radiology in centers with radiologists experienced in these procedures
- Hysterectomy (last resort)

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## Uterine Inversion

*Incomplete*

*Complete*

*Prolapsed*

- The risk of uterine inversion is increased in abnormalities of placentation, such as accreta, fundal cord insertions, and any condition that predisposes patients to uterine atony and prolapse
- Cord traction should never occur without counter-traction or in the absence of uterine contraction
- Can occur with undiagnosed focal accreta when pulling too aggressively

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## Uterine Inversion

- If inversion is encountered, leave the placenta attached and promptly replace the uterus using the *"last out, first in"* principle



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## Uterine Inversion

### Management:

- Manual replacement to restore the uterus to its normal position, if possible replace without removing the placenta
- *b*-mimetic agents or Magnesium infusion
- Fluid therapy
- Blood replacement products
- Possible laparotomy (a surgical incision into the abdominal wall)

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## Uterine Inversion

- Following uterine replacement, vigorous massage and uterotonic administration should be undertaken
- Manual removal of the placenta may be performed when the mother's vital signs are stable unless concern exists regarding abnormal placentation
- Uterine relaxants, such as nitroglycerin, may be helpful

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## Questions???



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