

Exclusive Human Milk Pathway (Prolacta®) for Infants < 1000g Birth Weight OR < 29 Weeks GA

(Continue until CGA 32 weeks)

Patient Name

Birth Weight (grams)

Day of Pathway and Date ¹	Caloric Density of Human Milk ^{3,4,5} <i>(Kcal/30 mL)</i>	Total Enteral Intake <i>(per kg/day)</i>	Volume of Feeds ² <i>(mL/kg/day)</i>	Weight 1. BW (kg) 2. Current weight (If > BW) 3. Dosing weight	Total Daily Feeding Volume <i>Desired volume (mL/kg/day) x weight</i>	Individual Feeding Volume ⁶ <i>(Given every 3 hours) Total daily volume ÷ 8</i>	Total Fluids ² <i>(mL/kg/day)</i>	TPN / Fluid Changes ² <i>(assuming CENTRAL access - for MD/NP order)</i>	Comments <i>Colostrum should be used for Oral Immune Therapy (OIT) for the first week.</i>
Day 1 /	20	Kcal = 7 Protein = 0.1	10				80	Pro 2.5 - 3 g/Kg/d Lipid 0.5 g/Kg/d GIR 6 - 7	Consider contribution of arterial fluids providing protein
Day 2 /	20	Kcal = 13 Protein = 0.2	↑20				90	Pro 2.5 - 3 g/Kg/d Lipid 1-1.5 g/Kg/d GIR 7 - 8	Check TG levels every 48 hours for the first week of life
Day 3 /	20	Kcal = 13 Protein = 0.2	20				100 - 110	Pro 3 - 3.5 g/Kg/d Lipid 1.5-2 g/Kg/d GIR 8 - 9	
Day 4 /	20	Kcal = 27 Protein = 0.4	↑30 ↑40 @ 2300				110 - 120	Pro 3 g/Kg/d Lipid 2 g/Kg/d GIR 7 - 8	
Day 5 /	20	Kcal = 40 Protein = 0.6	↑50 ↑60 @ 2300				130 - 140	Pro 2.5 g/Kg/d Lipid 1.5 g/Kg/d GIR 6 - 7	Consider decreasing electrolytes Days 5-7 in anticipation of transition to clear IVF
Day 6 /	↑26 (Prolacta +6)	Kcal = 69 Protein = 2	↑70 ↑80 @ 2300				140 - 150	Pro 2 g/Kg/d Lipid 1 g/Kg/d GIR 5 - 6	Increase HM to 26 Kcal/oz using Prolacta +6 * Increase infusion time to 60 minutes
Day 7 /	↑28 (Prolacta +8)	Kcal = 93 Protein = 2.9	↑90 ↑100 @ 2300				150	Pro 1.5 g/Kg/d Lipid 1 g/Kg/d GIR 4 - 5	Increase HM to 28 Kcal/oz using Prolacta +8 * Increase infusion time of feeds to 90-120 min
Day 8 /	28	Kcal = 111 Protein = 3.5	↑110 ↑120 @ 2300				150 - 160	Clear IVF via PIV Max D12.5% GIR 2.5 - 3.5	Discontinue central line, if appropriate. Monitor glucoses as indicated.
Day 9 /	28	Kcal = 130 Protein = 4	↑130 ↑140 @ 2300					Discontinue IVF	Monitor glucoses as indicated.
Day 10 /	28	Kcal = 140/148 Protein = 4.3/4.6	↑150 ↑160 @ 2300						Add Poly-Vi-Sol 0.5 mL twice daily
Day 14 /									Add Iron 3 mg/kg/day divided twice daily
Day 28 /									Obtain Chem 10 and alkaline phosphatase

1. **DAY OF PATHWAY:** Day 1 is considered the day feedings were started. Specify the date in the box provided.
2. **Individualize initiation, advancement rates and total fluids based on patient's weight, age and clinical status.**
3. **CALORIC DENSITY OF HUMAN MILK:** Caloric density to be prepared for that day.
4. **FORTIFICATION:** Fortify human milk feeds feeds with Prolacta® Human Milk Fortifier.
5. *If parents decline donor human milk, use Yellow Pathway (NON-Prolacta® Feeding Pathway).*
6. **INDIVIDUAL FEEDING VOLUME:** This is calculated by dividing the daily volume by 8. *Round this volume to the nearest 0.5 mL.*

NEWBORN CRITICAL CARE CENTER (NCCC) FEEDING GUIDELINES

PURPOSE

The purpose of this guideline is to improve feeding tolerance in low birth weight infants and to reduce parenteral nutrition days by providing a consistent approach to feeding the ELBW and VLBW infant. ***This guideline does not replace clinical judgment.*** Also, reduced variability in practice will facilitate evaluating clinical outcomes.

BACKGROUND

- Prolonged fasting causes atrophy of the intestinal mucosa
- Human milk is well tolerated
- Intravenous access (and in particular central access) increases an infant's risk for infection and TPN increases the risk for cholestasis

INITIATION OF FEEDINGS

1. Begin feedings with the Exclusive Human Milk Pathway per physician order
2. Infants may feed with umbilical lines in place.
3. Human milk, especially mother's own milk, is preferred (colostrum for OIT and early feedings).
4. Gavage feedings are given by infusion pump over 60-120 minutes unless otherwise ordered.

PROGRESSION OF FEEDINGS

1. The bedside nurse will calculate the daily feeding volume and calories according to the appropriate feeding pathway.
2. **Daily total fluids per physician order should include all IV fluids and enteral feedings (including trophic feedings). TPN changes and total fluids listed in pathway are suggestions and do not replace clinical judgement.**
3. Avoid oral medications until full volume enteral feeds are tolerated.
4. Check OG/NG tube placement per nursing protocol. Check residuals when feeding volume is ≥ 30 mL/kg/day.
5. Clear, light yellow/green or partially digested residuals with a normal exam, are not an indication to hold feedings.
6. **Re-feed residuals** (per nursing protocol) **unless otherwise ordered.** Give current feeding volume in addition to re-fed residual volume.
7. Do not routinely check residuals for babies on continuous feedings.

WHEN TO NOTIFY MD/NP

1. An abnormal exam: Unstable vital signs, abdominal distention (\uparrow in abdominal circumference greater than 2 cm), visible bowel loops, large or bilious emesis, or visible blood in stool.
2. Significant residuals:
 - Dark green residuals
 - "Undigested" residuals if greater than 50% of total feeding

DISCONTINUATION OF FEEDINGS

1. A maximum of two consecutive feedings may be held by the intern or resident.
2. Discontinue feedings only after evaluation by Attending MD, Neonatal Fellow, or Nurse Practitioner.

FEEDING INTERVAL EXCEPTIONS

Consider continuous feedings (based on MD/NNP order) if infant exhibits persistent hypoglycemia, pathologic reflux, has GI motility/absorption issues (short gut, liver disease etc.) or doesn't appear to tolerate bolus feedings.

LABORATORY MONITORING

Obtain Chem 10 and alkaline phosphatase on day 28 of the protocol. If alkaline phosphatase > 600 U/L or phosphorous > 7 mg/dL, consult dietitian and consider increasing vitamin D supplement to 800 IU/d. Follow until resolved.

TRANSITION OFF EXCLUSIVE HUMAN MILK DIET

1. Begin transition at 32 weeks corrected gestational age (See Guidelines for Transition Off Prolacta[®] Fortification).
2. If available at the time of transition, use MBM fortified with LHMf to 24 Kcal/oz. If no MBM is available, use Similac Special Care 24 Kcal/oz.
3. After transition off Prolacta[®] **DECREASE** MVI supplement to 0.5 mL once daily and continue iron supplement at 3 mg/kg/day.

NCCC Feeding Pathway (NON-Prolacta®) for Infants < 1000g Birth Weight OR < 29 Weeks GA

Patient Name

Birth Weight (grams)

Day of Pathway and Date ¹	Caloric Density of Human Milk ^{3,4,5} <i>(Kcal/30 mL)</i>	Total Enteral Intake <i>(per kg/day)</i> <small>Protein reflects MBM 24 vs SSC 24</small>	Volume of Feeds ² <i>(mL/kg/day)</i>	Weight <small>1. BW (kg) 2. Current weight (If > BW) 3. Dosing weight</small>	Total Daily Feeding Volume <i>Desired volume (mL/kg/day) x weight</i>	Individual Feeding Volume ⁶ <i>(Given every 3 hours)</i> <i>Total daily volume ÷ 8</i>	Total Fluids ² <i>(mL/kg/day)</i>	TPN / Fluid Changes ² <i>(assuming CENTRAL access - for MD/NP order)</i>	Comments <i>Colostrum should be used for Oral Immune Therapy (OIT) for the first week.</i>
Day 1 /	20	Kcal = 7 Protein = 0.1/0.3	10				80	Pro 2.5 - 3 g/Kg/d Lipid 0.5 g/Kg/d GIR 6 - 7	Consider contribution of arterial fluids providing protein
Day 2 /	20	Kcal = 13 Protein = 0.2/0.5	↑20				90	Pro 2.5 - 3 g/Kg/d Lipid 1-1.5 g/Kg/d GIR 7 - 8	Check TG levels every 48 hours for the first week of life
Day 3 /	20	Kcal = 13 Protein = 0.2/0.5	20				100 - 110	Pro 3 - 3.5 g/Kg/d Lipid 1.5-2 g/Kg/d GIR 8 - 9	
Day 4 /	20	Kcal = 27 Protein = 0.4/1.1	↑30 ↑40 @ 2300				110 - 120	Pro 3 g/Kg/d Lipid 2 g/Kg/d GIR 7 - 8	
Day 5 /	20	Kcal = 40 Protein = 0.6/1.6	↑50 ↑60 @ 2300				130 - 140	Pro 2.5 g/Kg/d Lipid 1.5 g/Kg/d GIR 6 - 7	Consider decreasing electrolytes Days 5-7 in anticipation of transition to clear IVF
Day 6 /	↑22	Kcal = 58 Protein = 1.4/2.2	↑70 ↑80 @ 2300				140 - 150	Pro 2 g/Kg/d Lipid 1 g/Kg/d GIR 5 - 6	Increase HM to 22 kcal/oz using LHMF * Increase infusion time to 60 minutes
Day 7 /	↑24	Kcal = 80 Protein = 2.5/2.7	↑90 ↑100 @ 2300				150	Pro 2 g/Kg/d Lipid 1 g/Kg/d GIR 4 - 5	Increase HM to 24 kcal/oz using LHMF * Increase infusion time of feeds to 90-120 minutes
Day 8 /	24	Kcal = 96 Protein = 3/3.2	↑110 ↑120 @ 2300				150 - 160	Clear IVF via PIV Max D12.5% GIR 2.5 - 3.5	Discontinue central line, if appropriate. Monitor glucoses as indicated.
Day 9 /	24	Kcal = 112 Protein = 3.5/3.8	↑130 ↑140 @ 2300					Discontinue IVF	Monitor glucoses as indicated
Day 10 /	24	Kcal = 120/128 Protein = 3.8/4	↑150 ↑160 @ 2300						Add Poly-Vi-Sol 0.25 mL twice daily
Day 14 /	24								Add Iron 3 mg/kg/day divided twice daily

1. **DAY OF PATHWAY:** Day 1 is considered the day feedings were started. Specify the date in the box provided.
2. **Individualize initiation, advancement rates and total fluids based on patient's weight, age and clinical status.**
3. **CALORIC DENSITY OF HUMAN MILK:** Caloric density to be prepared for that day.
4. *If human milk is unavailable or parents decline to use donor human milk, use a premature 24 Kcal/oz formula (Similac Special Care 24) from Day 1.*
5. **FORTIFICATION:** Fortify human milk feeds feeds with liquid human milk fortifier.
6. **INDIVIDUAL FEEDING VOLUME:** This is calculated by dividing the daily volume by 8. *Round this volume to the nearest 0.5 mL.*

NCCC Feeding Pathway for Infants 1000-1250g Birth Weight AND ≥ 29 Weeks GA

Patient Name

Birth Weight (grams)

Day of Pathway and Date ¹	Caloric Density of Human Milk ^{3,4,5} (Kcal/30 mL)	Total Enteral Intake (per kg/day)	Volume of Feeds ² (mL/kg/day)	Weight 1. BW (kg) 2. Current (If > BW) 3. Dosing weight	Total Daily Feeding Volume Desired volume (mL/kg/day) x weight	Individual Feeding Volume ⁶ (Given every 3 hours) Total daily volume ÷ 8	Total Fluids ² (mL/kg/day)	TPN / Fluid Changes ² (assuming CENTRAL access - for MD/ NP order)	Comments <i>Colostrum should be used for Oral Immune Therapy (OIT) for the first week.</i>
Day 1 /	20	Kcal = 7 Protein = 0.1	10				80	Pro 3 g/Kg/d Lipid 1 g/Kg/d GIR 5.5 - 6	If arterial line in place, consider contribution of protein from fluids
Day 2 /	20	Kcal = 13 Protein = 0.2	↑20				90 - 100	Pro 3-3.5 g/Kg/d Lipid 2 g/Kg/d GIR 7 - 8	
Day 3 /	20	Kcal = 27 Protein = 0.4	↑30 ↑40 @ 2300				110 - 120	Pro 3 g/Kg/d Lipid 1.5 g/Kg/d GIR 7 - 8	Consider decreasing electrolytes Days 3-5 in anticipation of transition to clear IVF
Day 4 /	↑22	Kcal = 44 Protein = 1.1	↑50 ↑60 @ 2300				120 - 130	Pro 2.5 g/Kg/d Lipid 1 g/Kg/d GIR 7 - 8	Increase HM to 22 Kcal/oz using LHMF
Day 5 /	↑24	Kcal = 64 Protein = 2	↑70 ↑80 @ 2300				130 - 140	Pro 2 g/Kg/d Lipid - D/C GIR 5 - 6	Increase HM to 24 Kcal/oz using LHMF
Day 6 /	24	Kcal = 80 Protein = 2.5	↑90 ↑100 @ 2300				140 - 150	Clear IVF via PIV Max D12.5% GIR 3.5 - 4.5	Discontinue central line, if appropriate. Consider custom fluid with electrolytes.
Day 7 /	24	Kcal = 96 Protein = 3.5	↑110 ↑120 @ 2300				150 - 160	Clear IVF via PIV Max D12.5% GIR 2.5-3.5	Consider custom fluid with electrolytes
Day 8 /	24	Kcal = 112 Protein = 3.5	↑130 ↑140 @ 2300					Discontinue IVF	Monitor glucoses as indicated
Day 9 /	24	Kcal = 120-128 Protein = 3.8-4	↑150 ↑160 @ 2300						
Day 10 /	24	Kcal = 128 Protein = 4	160						Add Poly-Vi-Sol 0.25 mL twice daily
Day 14 /									Add Iron 3 mg/kg/day divided twice daily

1. **DAY OF PATHWAY:** Day 1 is considered the day feedings were started. Specify the date in the box provided.
2. *Individualize initiation, advancement rates and total fluids based on patient's weight, age and clinical status.*
3. **CALORIC DENSITY OF HUMAN MILK:** Caloric density to be prepared for that day.
4. *If human milk is unavailable or parents decline the use of donor human milk, use a premature 24 Kcal/oz formula (Similac Special Care 24) from Day 1.*
5. **FORTIFICATION:** Fortify human milk feeds feeds with liquid human milk fortifier.
6. **INDIVIDUAL FEEDING VOLUME:** This is calculated by dividing the daily volume by 8. *Round this volume to the nearest 0.5 mL.*

NCCC Feeding Pathway for Infants 1251 - 1500g Birth Weight

Patient Name

Birth Weight (grams)

Day of Pathway and Date ¹	Caloric Density of Human Milk ^{3,4,5} (Kcal/30 mL)	Total Enteral Intake (per kg/day)	Volume of Feeds ² (mL/kg/day)	Weight 1. BW (kg) 2. Current (If > BW) 3. Dosing weight	Total Daily Feeding Volume Desired volume (mL/kg/day) x weight	Individual Feeding Volume ⁶ (Given every 3 hours) Total daily volume ÷ 8	Total Fluids ² (mL/kg/day)	TPN / Fluid Changes ² (assuming PERIPHERAL access - for MD/ NP order)	Comments <i>Colostrum should be used for Oral Immune Therapy (OIT) for the first week.</i>
Day 1 /	20		20				80	Pro 1.5-2 g/Kg/d Lipid 1 g/Kg/d GIR 4 - 5	
Day 2 /	20		↑30 ↑40 @ 2300				100	Pro 1.5-2 g/Kg/d Lipid 1 g/Kg/d GIR 4 - 5	
Day 3 /	↑22	Kcal = 44 Protein = 1	↑50 ↑60 @ 2300				110 - 120	Pro 1.5-2 g/Kg/d Lipid 1 g/Kg/d GIR 3.5 - 4.5	Increase HM to 22 Kcal/oz using LHMF
Day 4 /	↑24	Kcal = 64 Protein = 2	↑70 ↑80 @ 2300				110 - 120	Clear IVF Max D12.5% GIR 2.5 - 3.5	Increase HM to 24 Kcal/oz using LHMF. Consider custom IV fluids with electrolytes.
Day 5 /	24	Kcal = 97 Protein = 2.5	↑90 ↑100 @ 2300				130 - 140	Clear IVF Max D12.5% GIR 2.5 - 3.5	Consider custom IV fluids with electrolytes. * If present, consider discontinuing central line.
Day 6 /	24	Kcal = 96 Protein = 3	↑110 ↑120 @ 2300					Discontinue IVF	Monitor glucoses as indicated
Day 7 /	24	Kcal = 112 Protein = 3.5	↑130 ↑140 @ 2300						
Day 8 /	24	Kcal = 120 Protein = 3.8	↑150						
Day 9 /	24	Kcal = 128 Protein = 4	150 - 160						Add Poly-Vi-Sol 0.25 mL twice daily
Day 14 /									Add Iron 3 mg/kg/day divided twice daily

1. **DAY OF PATHWAY:** Day 1 is considered the day feedings were started. Specify the date in the box provided.
2. *Individualize initiation, advancement rates and total fluids based on patient's weight, age and clinical status.*
3. **CALORIC DENSITY OF HUMAN MILK:** Caloric density to be prepared for that day.
4. *If human milk is unavailable, use a premature 24 Kcal/oz formula (Similac Special Care 24) from Day 1.*
5. **FORTIFICATION:** Fortify human milk feeds feeds with liquid human milk fortifier.
6. **INDIVIDUAL FEEDING VOLUME:** This is calculated by dividing the daily volume by 8. *Round this volume to the nearest 0.5 mL.*

NCCC Feeding Pathway for Infants > 1500g AND NOT Able to Orally (PO) Feed

Patient Name

Birth Weight (grams)

Day of Pathway and Date ¹	Caloric Density of Human Milk ^{3,4,5} <i>(Kcal/30 mL)</i>	Total Enteral Intake <i>(per kg/day)</i>	Volume of Feeds ² <i>(mL/kg/day)</i>	Weight <i>BW (kg)</i>	Total Daily Feeding Volume <i>Desired volume (mL/kg/day) x weight</i>	Individual Feeding Volume ⁶ <i>(Every 3 hours) Total daily volume ÷ 8</i>	Total Fluids ² <i>(mL/kg/day)</i>	IV Fluids ^{2,7} <i>(assuming PERIPHERAL access - for MD/ NP order)</i>	Comments <i>Colostrum should be used for Oral Immune Therapy (OIT) for the first week.</i>
Day 1 /	20	Kcal = 13-15 Protein = 0.2-0.4	20				80	D10% GIR 4.3	
Day 2 /	20	Kcal = 34-37 Protein = 0.5-1	↑35 ↑50 @ 2300				100	D10% - D12.5% GIR 3.5 - 4.5	Consider custom IVF with electrolytes if indicated
Day 3 /	↑22	Kcal = 59 Protein = 0.9-1.7	↑65 ↑80 @ 2300				110	D10% - D12.5% GIR 2 - 2.5	Increase HM to 22 kcal/oz with Neosure powder (If < 2000g, use HMF)
Day 4 /	22 or ↑24	Kcal = 81-88 Protein = 1.2-2.3	↑95 ↑110 @ 2300				130	D10% - D12.5% GIR 1.5 - 2	If < 2000g, increase HM to 24 kcal/oz with HMF or increase to Neosure 24
Day 5 /	22 or 24	Kcal = 96-112 Protein = 1.4-2.7	↑125 ↑140 @ 2300					Discontinue IV fluids	Monitor glucoses as indicated
Day 6 /	22 or 24	Kcal = 118-128 Protein = 1.8-3.4	↑150 ↑160 @ 2300						Consider increasing feeds to 160 mL/kg/d for infants < 2000g
Day 14 /									Consult dietitian for appropriate MVI and Fe supplementation

1. **DAY OF PATHWAY:** Day 1 is considered the day feedings were started. Specify the date in the box provided.
2. *Individualize initiation, advancement rates and total fluids based on patient's weight, age and clinical status.*
3. **IF < 2000g:** Fortify human milk to max 24 kcal/oz with liquid HMF. If human milk is unavailable or family declines the use of donor human milk, initiate feeds with premature 22 kcal/oz formula (Neosure) and fortify to max 24 kcal/oz.
4. **IF < 35 weeks and ≥ 2000g:** Fortify human milk feeds feeds with premature 22 kcal/oz formula (Neosure) powder to max 22 kcal/oz. If human milk is unavailable or family declines the use of donor human milk, initiate feeds with premature 22 kcal/oz formula (Neosure).
5. **IF ≥ 35 weeks and > 2000g:** If using this pathway for an infant ≥ 35 weeks whose clinical status precludes oral feeds, consider initiating/continuing feeds with unfortified human milk or term formula.
6. **INDIVIDUAL FEEDING VOLUME:** This is calculated by dividing the daily volume by 8. *Round this volume to the nearest 1 mL.*
7. If infant has a **CENTRAL LINE**, consider discontinuing when infant is tolerating at least 100 mL/kg/day of enteral feeds.

NEWBORN CRITICAL CARE CENTER (NCCC) FEEDING GUIDELINES

PURPOSE

The purpose of this guideline is to improve feeding tolerance in low birth weight infants and to reduce parenteral nutrition days by providing a consistent approach to feeding. ***This guideline does not replace clinical judgment.*** Also, reduced variability in practice will facilitate evaluating clinical outcomes.

BACKGROUND

- Prolonged fasting causes atrophy of the intestinal mucosa
- Human milk is well tolerated
- Intravenous access (and in particular central access) increases an infant's risk for infection and TPN increases the risk for cholestasis

INITIATION OF FEEDINGS

1. Begin feedings with the specified NCCC feeding guideline per physician order (based on weight and/or gestational age).
2. Infants may feed with umbilical lines in place.
3. Human milk, especially mother's own milk, is preferred (colostrum for early feedings).
4. Gavage feedings are given by infusion pump over 30-120 minutes depend on tolerance.
5. Oral feedings are initiated based on infant cues (see below).

PROGRESSION OF FEEDINGS

1. The bedside nurse will calculate the daily feeding volume and calories according to the appropriate feeding pathway.
2. **Daily total fluids per physician order should include all IV fluids and enteral feedings (including trophic feedings.)**
3. Avoid oral medications until full volume enteral feeds are tolerated.
4. Check OG/NG tube placement per nursing protocol. **Check residuals when feeding volume is ≥ 30 mL/kg/day.**
5. Clear, light yellow/green or partially digested residuals with a normal exam, are not an indication to hold feedings.
6. **Re-feed residuals** (per nursing protocol) **unless otherwise ordered.** Give current feeding volume in addition to re-fed residual volume.
7. Do not routinely check residuals for babies on continuous feedings.

WHEN TO NOTIFY MD/NP

1. An abnormal exam: Unstable vital signs, abdominal distention (\uparrow in abdominal circumference greater than 2 cm), visible bowel loops, large or bilious emesis, or visible blood in stool.
2. Significant residuals:
 - Dark green residuals
 - Residuals greater than 50% of total feeding

DISCONTINUATION OF FEEDINGS

1. A maximum of two consecutive feedings may be held by the intern or resident.
2. Discontinue feedings only after evaluation by Attending MD, Neonatal Fellow, or Nurse Practitioner.

FEEDING INTERVAL EXCEPTIONS

Consider continuous feedings (based on MD/NNP order) if infant exhibits persistent hypoglycemia, pathologic reflux, has GI motility/absorption issues (short gut, liver disease etc.), or doesn't appear to tolerate bolus feedings.

TRANSITION TO ORAL FEEDING

- Goals:**
- Transition to safe pleasurable feeding experience.
 - Transition to breast milk per the AAP guidelines, with a goal of 6 months of exclusive breast milk.
 - Establish direct breastfeeding prior to hospital discharge. (See [Breastfeeding Guidelines](#))

For infants who are not breastfeeding, begin cue based bottle feeding when appropriate (infant medically stable, alert periods for at least 10 minutes, respiratory support equal to or less than 2L HFNC).