Knipple Knowledge
Presented by Diana West, BA, IBCLC

NIPPLE
Derived from the Old English word *neb*, meaning “beak,” “nose,” or “face”

Almost infinite nipple variations (Montagna, 1974)
- “Genetic expression”

Sir Astley Cooper (1840)
- Almost infinite nipple variations (Montagna, 1974)
  - “Genetic expression”

NIPPLE PURPOSE
- “Handle” infant to grasp breast
- Point of interaction between breast and infant
- Conduit through which milk passes
- Look cute

Nipple = Mammal Characteristic
- Most animals have specialized skin areas to interface with environment (Eastwood, 2007)
- Characterized by:
  - Reduced hair/feathers/scales
  - Specific patterns of cell differentiation
  - Adaptation to changing states
  - Distinctive keratins to withstand mechanical strain

Nipple = Mammal Characteristic
- Total number of nipples = maximum litter size
- Half the total number = average litter size

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Nipple Growth and Development
- Fetal
  - 4th week gestation: Formation of symmetrical ectodermal thickening along embryo’s ventral lateral sides
  - 6th week gestation: Milk lines develop

Tanner Stages of Nipple Development
- Can vary between breasts
- Pregnancy and nursing can increase size, often permanently

Nipple/Areola Pigment
- Contains melanin
  - Protection from ultraviolet rays
  - Resists abrasion

Nipple/Areola Pigment
- Melanin increases (darkens) during pregnancy to increase resistance to UV rays and abrasion
**Nipple/Areola Pigment and Pain**

- No research has shown a relationship between nipple sensitivity or pain and amount of melanin.
- **BUT** redheads have melanocortin-1 receptor gene (MC1R) that makes them more sensitive to pain (Delaney, 2010).

**Nipple Tips**

- Tips have dense clusters of protrusions and crevices.

**Drupelet**

The small sections of a raspberry or blackberry fruit, each containing a seed.

Kay Hoover, MS, IBCLC


**Nipple Sides**

- Sides have intersecting grooves for expansion when not erect.

**Nipple Muscles**

- Muscles converge toward nipple in radial, circular pattern.
- Longitudinal muscles most prominent in center where they meet ducts.

**Nipple Muscles**

- Connective tissue has extensive elasticity.
  - Particularly near tip and around ducts.
- Variation in muscle peptides = Variation in leaking.
**Nipple Muscles**
- Erection of nipples NOT due to erectile tissue
- Due to contraction of smooth muscle under control of autonomic nervous system
  - Like hair follicle standing on end
  - NOT like sexual erection
- Same pilomotor reflex that causes goose bumps

**Nipple Nerves**
- Location of nerves can vary by women and by breasts (Sarhadi, 1996)
- Nerves inside the nipple run along milk ducts
- Few nerves on nipple side or base

**Wax cast of Human Breast**
Prepared by Sir Astley Cooper (1840)

**Nipple Ducts**
- Most ducts branch at 2mm below surface (Ramsay, 2005)
  - Closer than previously thought

**Geddes Ultrasound Study**
*International Breastfeeding Journal, 2009*

**Nipple Ducts**
- Number of ducts IN the nipple is greater than number of ducts ON the nipple (Going and Moffat, 2004)
  - Converge
  - # greater than 0.5mm (sonogram limit)
    - 5-9 (Love and Barisky, 2004)
    - 4-18, avg 9 (Ramsay, 2005)
## Nipple Variations

**Problematic for Latching or Milk Removal**

### Flat Nipples
- Short shank
- NOT retracted, but no or very little protrusion
  - 9% Day 1 pp
  - 7% Day 7 pp

### Edema
(Cotterman, 2004; Miller, 2004)

- **Creates traction on areola**
- **Can be caused by:**
  - Excess IV labor fluids
    - Dilutes plasma proteins
  - Pitocin (labor or pp)
    - Chemically close to vasopressin (antidiuretic hormone)
  - Preeclampsia
    - Renal (kidney) clearance impaired
  - Breast pump
    - Pulls fluids into areola

### Flat Nipples
- **Typically improve with nursing**
- **Dose dependent**

### Flat Nipples
- Ducts and fibrous tissue stretch

### Other Causes of Flat Nipples
- **Obesity** (Jevitt, 2007)
  - Adipose tissue (fat) expands and creates traction on areola
Inverted Nipples

- AKA: tied, invaginated, tethered, non-protractile
- Caused by short ducts or fibrous adhesions
- 3-10% of all nipples

Han & Hong Inverted Nipple Classification System

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>Nipple is easily pulled out manually, maintains protrusion</td>
</tr>
<tr>
<td>Grade 2</td>
<td>Nipple can be pulled out manually, but does not maintain protrusion</td>
</tr>
<tr>
<td>Grade 3</td>
<td>Nipple can pulled out manually with difficulty</td>
</tr>
</tbody>
</table>

Other Causes of Inverted Nipples

- Fat necrosis
  - Benign inflammatory condition
  - Secondary to:
    - Breast injury or trauma
    - Surgery or biopsy
    - Radiation
  - Common in very large breasts

Other Causes of Inverted Nipples

- Cancer
  - Timing is very important
    - If it happened recently and spontaneously:
      - Could be from scar tissue in or around lesion or duct
    - Unilateral, even slight, is more suspicious

Inverted Nipples

- 50% congenital
- 50% from trauma, disease, surgery

FLN

- Funny Looking Nipple
Other Causes of Inverted Nipples

- Breast abscess
- Duct ectasia
  - Plug and inflammation when NOT lactating
  - Benign

Inverted Nipple Surgeries

- Inverted due to adhesions

Inverted Nipple Surgeries

- Inverted due to short ducts

Positional Modifications for Flat or Inverted Nipples

- Laid-Back/Biological Nurturing

Nipple Nudge for Flat or Inverted Nipples

- Can be excellent tool if baby cannot otherwise latch (Wilson-Clay, 2003)
- Does not affect prolactin levels or reduce milk transfer (Chertok, 2006)
- Extended use has not been shown to be detrimental (Bodley, 1996)

Nipple Shield for Flat or Inverted Nipples
Nipple Shield for Flat or Inverted Nipples
MUST be applied correctly

Nipple Shield for Inverted or Flat Nipples
Baby MUST be latched deeply

Supple Cup for Flat or Inverted Nipples

Reverse Pressure Softening (RPS) for Flat Nipples Due to Edema

Pumping to Evert Flat or Inverted Nipples

Other Suction Devices for Flat or Inverted Nipples
Avent Niplette (McGeorge, 1994)
Other Suction Devices for Flat or Inverted Nipples

Maternal Concepts Evert-It

Other Suction Devices for Flat or Inverted Nipples

Lansinoh LatchAssist

Other Suction Devices for Flat or Inverted Nipples

Modified Syringe
(Thorley, 1997)

What’s NOT EFFECTIVE for Flat or Inverted Nipples

- Hoffman’s exercises
  - No permanent effect
    (Alexander, 1991; MAIN Trial, 1994)
- Breast shells
  - No permanent effect
    (Alexander, 1991)

Retracted or Dimpled Nipples

- Unilateral or bilateral
- Sides normal
- Center area pulled inward

Retracted or Dimpled Nipples

- Interior retains moisture
  - Susceptible to infection
Nipple Tags

Bulbous Areola

- May indicate hypoplasia (insufficient glandular tissue)

Supernumerary Nipples

- "Polythelia"
- Accessory nipple
  - May or may not include glandular tissue
  - May or may not include areola
  - May or may not include hair patch

Can Have Accessory Breast Tissue

Supernumerary Nipples

- Can appear on areola (Abramson, 1975; Arranz López, 2005; Onesti, 2010)
- Most common location: on milk line just below breast

Supernumerary Nipples

- Can form anywhere along milk lines
Kajava’s 1915 Supernumerary Nipple Classification System

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Polymastia + nipple, areola, glandular tissue</td>
</tr>
<tr>
<td>2</td>
<td>+ nipple, glandular tissue</td>
</tr>
<tr>
<td>3</td>
<td>+ glandular tissue, areola</td>
</tr>
<tr>
<td>4</td>
<td>+ nipple only</td>
</tr>
<tr>
<td>5</td>
<td>+ glandular tissue only</td>
</tr>
<tr>
<td>6</td>
<td>Polythelia + nipple only</td>
</tr>
<tr>
<td>7</td>
<td>Polythelia areolaris + areola only</td>
</tr>
<tr>
<td>8</td>
<td>Polythelia pilosa + hair patch only</td>
</tr>
</tbody>
</table>

Supernumerary Nipples

- 0.22-6% population
  - Ethnic, geographic variance

Distribution of Supernumerary Nipples Among Selected Populations

<table>
<thead>
<tr>
<th>Population</th>
<th>Prevalence</th>
<th>Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caucasian Europeans</td>
<td>0.22%</td>
<td>Mathes, 2006</td>
</tr>
<tr>
<td>Caucasian Americans</td>
<td>0.6%</td>
<td>Kenny, 1997</td>
</tr>
<tr>
<td>African Americans</td>
<td>1.6%</td>
<td>Rahbar, 1982</td>
</tr>
<tr>
<td>Israelis</td>
<td>2.5%</td>
<td>Mimouni, 1983</td>
</tr>
<tr>
<td>Arabs</td>
<td>4.7%</td>
<td>Jaber, 1988</td>
</tr>
<tr>
<td>Japanese</td>
<td>5%</td>
<td>Johnson, 1986</td>
</tr>
</tbody>
</table>

Supernumerary Nipples

- 14.5% have kidney and urinary tract malformations (Varano, 1984; Kenney, 1967; Mimouni, 1988; Femara, 2009)
- Tend to run in families (Casey, 1996; Cellini, 1988)
  - Incidence of kidney and urinary tract malformations ↑ 30% (Casey, 1996)

Bifurcated or Double Nipples

- Actually two nipples
  - “Intra-Areolar Polythelia”
  - May or may not be fused together
  - Each nipple has own duct system (Onesti, 2008)
Bifurcated or Double Nipples

- Usually hereditary (Abramson, 1975)
- Often unilateral
  - Affected breast may have larger areola (Lopez, 2006)

Surgery for Bifurcated or Double Nipples

Very Large Nipples (OBD → Oral-Boobular Disproportion)

Nipple Reduction

Very Long Nipples

Very Small Nipples
Nipple and Areola Conditions Problematic for Latching or Milk Removal

Nipple Galactocele

Nipple Candida (Yeast) Infection
- Usually C. albicans
- Red skin, shiny
- Burning/stabbing pain
- Can be passed back and forth with nursling

Nipple Candida (Yeast) Infection
- May have white crusting
- Pacifier and bottle use greatly increases risk (Morrill, 2005)

Eczema on Nipple
- Usually have a prior history of allergies (Barankin, 2004)
- Can include erythema (redness), fluid-filled blisters, crusts, fissures, scaling, friable skin (Rago, 1988, Ward, 1997)
- Burning and itching are common

Eczema on Nipple
- Can occur after introduction of solids
- Inflammation creates opportunity for staph infection
  - Common
- Not contagious
- NO FLAKING
- If unilateral, refer to rule out Paget’s Disease (Oster, 1990)
Malignant Tissue on Nipple

- Paget’s Disease (Oster, 1990, Jamali, 1996)
  - Unilateral
  - Looks like eczema
  - 1-3% of all breast cancers

Paget’s Disease

Psoriasis on Nipple

- Thick, red skin with flaky, silver-white patches (scales) (Islam, 2000)
- Itchy
- Not contagious

Psoriasis on Nipple

Nipple S. aureus (Staph) Infection

- Common nipple infection (Livingstone, 1999)
- Can cause impetigo vulgaris
- Daily water and soap cleansing helps destroy biofilm (staph’s protective barrier) (Ryan, 2007)

Nipple S. aureus (Staph) Infection

↑ Risk of mastitis
↑ Risk of abscess

Nipple S. aureus (Staph) Infection

Story of my client...
Nipple and Breast Abscess

Infection within Nipple

Nipple Vasospasm
- Intermittent ischemia (lack of blood supply)
- Can be very painful
- Often secondary to trauma
- Biphasic or triphasic

Nipple Squeeze for Vasospasm

Lisa Amir’s Color Chart

- **Pink / Red**
  - Candida
- **Yellow**
  - Bacteria
- **Bright Red**
  - Eczema / Dermatitis
- **White**
  - Vasospasm

Nipple Bleb
- Blocked nipple pore
- Leading edge of plugged duct
- Pinpoint pain, may radiate deep in breast
- TX:
  - Lancing with sterile needle
  - Hydrocortisone cream with occlusive dressing (plastic wrap)
  - Massage

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**Herpes Virus on Nipple**
- Discrete lesions at juncture of nipple and areola (Amir, 2004)
- Usually herpes simplex type 1
- VERY painful

**Herpes Virus on Nipple**
- Can be transmitted TO baby (Sullivan, 1983)
  - Can be fatal to baby under 1 month old
- Can be transmitted FROM baby (Sealander, 1989)
- Direct breastfeeding on affected breast should be suspended until lesions are healed
  - Safest to pump and “sacrifice”

**Congenital Poland’s Syndrome**
- Absent nipple on one side
- Absent chest muscle
  - Chest often concave on affected side
  - Usually missing breastbone (sternal) portion of the pectoralis muscle
- Breast tissue missing or hypoplastic
  - May be missing nipple/areola on absent breast

**Congenital Poland’s Syndrome**
- Incidence 1:10,000 - 1:100,000 births
- 3x more common in boys than girls
- Affects right side twice as often as left

**Nipple Warts**
- Nevoid hyperkeratosis of the nipple and areola (NHNA)
- Unilateral or bilateral
- Asymptomatic
- Unknown etiology, may be related to estrogen levels
  - (Verma, 2011)
After Wart Removal

(Verma, 2011)

Neurofibromatosis
Type I

- Also known as von Recklinghausen disease
- Genetically-inherited disorder
- Nerve tissue grows benign tumors (neurofibromas)
- May compressing nerves and other tissues

Nipple Procedures
Problematic for Latching or Milk Removal

Nipple Piercings

- Recommended by doctors in Victorian England to improve breastfeeding
- Pregnancy does not affect (Armstrong, 2006)
- High potential for scar tissue
  - Can block ducts

Nipple Piercings

- Milk may leak through openings
  - No muscle to close
- Potential for nerve damage (Garbin, 2009)
  - Reduced milk ejection → reduced milk production

Areola Piercings

- HIGH Potential for nerve damage
**Breast Tattoos**

- Milk banks will not accept if tattoo is less than 1 year old
  - Risk of infection
- Ink molecules too large to pass into milk

**Nipple/Areola Injuries**

**Nipple/Areola Breast Burns**

**It's Up to the Baby**

Open, connected milk ducts +

Anatomical Fit +

A Determined, Capable Baby

= Nipple Problem Solved!

**THE END**

Questions?

Thoughts?

Comments?

Thank you for helping mothers and babies breastfeed!

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**Bibliography**


