

# THE BREASTFEEDING ANSWER BOOK



## BREAST ANATOMY

March 2012 | To download electronic version  
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## Milk or lactiferous sinuses do not exist

For many years our understanding of the anatomy of the breast was based on intricate dissections of the ductal system in the breast of lactating women after death. Hot colored wax was injected into the duct openings on the nipple surface. The rest of the breast was dissected away and a colored model of the ductal system was left (Cooper 1845).

Much, but not all of what was first demonstrated about breast anatomy is still true today. One significant difference relates to the milk sinuses. In the wax models there were dilated ducts just below the surface of the nipple. This dilated space was thought to be a storage reservoir for milk (Cooper 1845). We now know that the concept of dilated milk ducts, also called lactiferous sinuses, is incorrect (Ramsey 2005 and Geddes 2009). The ducts are distensible and expanded when Cooper injected the wax creating an artificial space or sinus.

Improvements in sonography have revolutionized our understanding of breast anatomy and function. Three-dimensional ultrasound imaging of the breasts of lactating women confirms that there is no dilation of milk ducts below the areola (Gooding 2010). The area just below the areola is filled with glandular tissue just like the rest of the breast (Ramsey 2005, Geddes 2009). The ducts begin to branch very close to the nipple, within 8 mm (0.3 inch) of the areola (Ramsey 2005). Sonography also informs us that more than two thirds of the milk making apparatus can be found within 3 cm (1.2 inches) of the base of the nipple (Ramsey 2005).

A good way to visualize and discuss the breasts glandular tissue is by comparing it to the roots of a tree (Ramsey 2005). The milk is produced in the alveoli at the very tips of the tree roots. The milk is transported via the ductal system to the surface of the breast from the tree roots up to the nipple represented by the tree stump.

## There are fewer milk ducts than previously thought

The number of ducts that open at the nipple is another significant change in our understanding of breast anatomy. Using ultrasound it has been determined that the average number of ducts that open on the surface of the breast is between five (Love and Barsky 2004) and nine (Ramsey 2005). This is less than the 15–25 quoted in many texts (Lawrence 2005 and LLLI 2003).

There are many more ducts within the nipple that do not open to the surface. There are several different reasons that could explain why there are more ducts present in the nipple than open on the nipple surface. One explanation is that the ducts branch within the nipple. Another explanation is that some ducts lead to skin appendages such as sebaceous and sweat glands (Goings 2004). Perhaps redundancy was built into a system that was critical for the nourishment and survival of our species.

The fact that not all ducts communicate with the nipple surface was noted by Cooper when he could find 22 ducts, but could only inject 12 from the nipple surface (Cooper 1845). We do not understand why this happens. The fact that there are fewer ducts than previously thought increases the importance of preserving the integrity of each duct. Surgical disruption of even one duct could be significant if a woman has only five especially since the amount of glandular tissue that drains into each duct varies.

## Ducts dilate with the milk ejection reflex

Ultrasound has also allowed us to see the ductal distension and the change in the infant's sucking pattern that occurs with the milk ejection reflex (Ramsey 2004).

## Ducts transport milk

The diameter of ducts is between 2–3 mm (0.1 inch) at rest (Ramsey 2004). The duct size increases by 40–70% with the milk ejection reflex and decreases when the milk ejection reflex is over. Milk left in the ducts at that time is transported back deeper into the breast for storage (Ramsey 2004). We currently understand that the ducts transport milk, but do not store it (Ramsey 2005).

## The milk line

Extra nipples and breast tissue can occur anywhere along the milk line from the armpit (axilla) to the groin in 2–6% of women (Lawrence 2005). They can look like a freckle, a dimple or a complete nipple. Accessory breast and nipple tissue can lactate (Lawrence 2005). Mothers can be reassured that accessory tissue will not interfere with breastfeeding, although occasionally this tissue may develop mastitis. (Wilson-Clay and Hoover 2008).

## Breast shape changes not caused by breastfeeding

Around the world women have fears about breastfeeding causing negative changes in breast shape. In Indonesia this was more common among educated women (Hull 1990). In the Dominican Republic concerns about negative effects on breast shape was the second most common cause for weaning (McClennan 2001).

In a study of 500 Italian mothers at 18 months after delivery of their first baby, 70 percent of the mothers noticed breast changes after pregnancy (Pisacane 2004). Changes included increases or decreases in breast and bra size and sagging breasts. Thirty percent of the mothers described breast enlargement and loss of firmness. Despite maternal concerns, no relationship was found between breastfeeding and changes in breast size, shape or consistency.

In a review of plastic and reconstructive breast surgery patients, 85 percent of women who had been pregnant reported breast changes (Rinker 2010). Approximately 30 percent reported increase and 30 percent reported a decrease in breast size. Breastfeeding was not a risk factor for breast ptosis (drooping or sagging). Risk factors for breast ptosis were older age, larger bra cup size, larger body mass index, significant weight loss not associated with pregnancy, more pregnancies and smoking daily for more than a year.

The data do not support the popular notion that breastfeeding causes negative changes in breasts. Instead it is pregnancy that has been implicated as the cause.

## Breast fat and glandular tissue are intermixed

There has been a shift in the thinking about the relationship between adipose (fat) and glandular (milk producing and transporting) tissue in the breast. In the past it was believed the fat and glandular tissue was relatively separate. Most descriptions and depictions of the breast detailed little fat mixed in with the glandular tissue. A prominent exception was Netter who showed fat and glandular tissue in close proximity throughout the breast (Netter 1948 and 2010).

We now know from looking at breast tissue removed during surgery that the glandular tissue is intermingled with the fat tissue throughout the breast (Nickell 2005). Ultrasonography also

allows us to see the fat intermixed between the milk producing parts of the breast (Geddes 2009). The ratio of fat to glandular tissue based on mammography (breast radiographs or 'x-rays') is 1:1 in the non-lactating breast, although larger breast size is associated with a higher amount of fat (Geddes 2007). Lactation is associated with an increase in glandular tissue (Geddes 2009 and Ramsey 2005). The problems some women face with lactation after breast reduction surgery can be better understood when we know that attempts to remove adipose tissue will also result in removal of both milk production and transport tissue (Nickell 2005).

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