

Exploration of why it would appear that an increase of lecithin in the diet reduces the incidence of blocked ducts in breast-feeding women.

A major component of lecithin is the phospholipid known as phosphatidylcholine (PC), the level of PC being about 10-90%¹ depending on the quality. A phospholipid is a molecule made up of two long fatty acids and a water loving head see Figure 1. As it is a phospholipid it is incorporated into cell membranes, and PC forms the major constituent of human cell membranes. This fact sheet will explore the possible role of PC in blocked duct prevention.

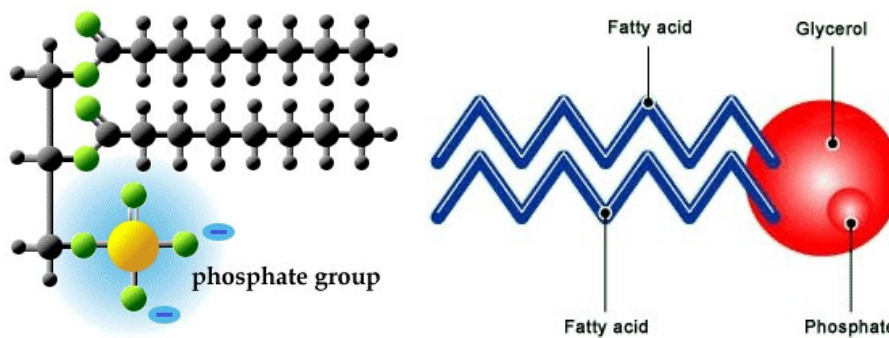


Figure 1: Illustration of phospholipid, Atomic model on right, and diagrammatic model on left. Note they the two long fatty acids and water loving head².

The literature was searched for any scientific studies looking at PC or lecithin intake and blocked ducts or mastitis, there were no bovine or human studies found. Therefore we can conclude that the statements regarding lecithin intake and reduction of blocked ducts most probably originated from conference papers, or personal observation. This fact sheet will assume that the well trained midwives and lactation consultants have used their observational skills and experience to deduce that lecithin helps with blocked ducts and will explore theoretical reasons that could account for this observation.

Firstly the phospholipid content of breast milk is low being about 1% of the total milk fat content. However PC makes up a large proportion of this phospholipid content at about 25%. This level can be as low as 4.75% and as high as 38.7%³. Therefore it is highly likely that consuming more PC will lead to higher breast milk PC level, up to a maximum point. This assumption can be made as this is observed with essential fatty acids.

Lecithin is concentrated up from soybeans which are made up of about 20% PC, its is also found in egg yolks (70% w/v)⁴, beef liver (0.8% w/v), brown bread (0.02% w/v),

¹ http://www.gnc.com/health_notes/healthnotes.aspx?ContentID=2873001&lang=en and http://www.pdrhealth.com/drug_info/nmdrugprofiles/nutsupdrugs/pho_0288.shtml

² I lifted these pictures from some web sites. Unfortunately I didn't record which sites, so if you recognize then happy to add correct reference or remove if they are copyrighted.

³ Hensen, R (ed), Handbook of milk Composition, Academic Press, 1995 pg 502-04

⁴ http://www.pdrhealth.com/drug_info/nmdrugprofiles/nutsupdrugs/pho_0288.shtml

cabbage and cauliflower (0.18% w/v)⁵. Therefore having lecithin at a PC level of 10-90% could dramatically increase a women's intake of PC. PC can be purchased in America as a further refined supplement, so may be available in NZ. The length of two fatty acids, and their chemistry is dependant upon their source, this fact does not seem to be discussed in the literature. Suggested mechanisms of action for the reduction in blocked ducts due to increased PC intake are:

- **Detergent effect.** The PC may exhibit a detergent like effect that solublizes deposited fat in the ductal system. This theory comes from the fact that PC as of late has been successful used to remove subcutaneous deposits of fat⁶, mainly for cosmetic reasons. An injection of PC is made into the fat deposit, the PC then breaks down the fat, and it is removed from the body. There is little research into this area, however it is thought that this effect could be due to PC's detergent like action⁷
- **Non-optimal fat membrane.** Milk fat globules are held in suspension by a very thin membrane. This membrane traps the fats (triglycerides) on the inside, yet makes the fat globule water-soluble. PC makes up about 30% of the human milk fat membrane.⁸ PC is also the major donor choline (the C, part of PC) to another phospholipid group sphingomyelin⁹ (S), this phospholipid group makes another 30% of the milk fat globule membrane. Therefore if the milk fat membrane does not have the optimal level of PC or S, it is highly likely that there would be an increased probability of the milk fat globule coming out of suspension and adhering to the duct walls, causing a blocked milk duct.
- **Liver health.** PC is known to be essential to liver health and have liver protecting properties¹⁰. The liver is a major body organ that is responsible for detoxification and creation of many immune responses. Therefore it could be hypothesized that the liver plays an important role in protecting the breast from inflammation and possibility infection. It is very interesting to note that cows with a sick liver have an increased risk of mastitis from days 32-150 postpartum¹¹.

In conclusion there would appear to be theoretical justification for the hypothesis of increased dietary intake of phosphatidylcholine (PC) through intake of lecithin causes a

⁵ USDA: Composition of Foods. USDA handbook # 8. Washington DC, ARS, USDA, 1976-1986

⁶Hexsel D, Serra M, Mazzuco R, Dal'Forno T, Zechmeister D. Phosphatidylcholine in the treatment of localized fat. *J Drugs Dermatol.* 2003 Oct;2(5):511-8.

⁷ Rotunda AM, Suzuki H, Moy RL, Kolodney MS. Detergent effects of sodium deoxycholate are a major feature of an injectable phosphatidylcholine formulation used for localized fat dissolution. *Dermatol Surg.* 2004 Jul;30(7):1001-8.

⁸ Berger, Alvin; Fleith, Mathilde; Crozier, Gayle Nutritional Implications of Replacing Bovine Milk Fat With Vegetable Oil in Infant Formulas *Journal of Pediatric Gastroenterology and Nutrition: Volume 30(2) February 2000 pp 115-130*

⁹ http://www.pdrhealth.com/drug_info/nmdrugprofiles/nutsupdrugs/pho_0288.shtml

¹⁰ *ibid*

¹¹ Bobe, G et al. Health and Reproductive Performance of Lactating Dairy Cows with Mild Fatty Liver Receiving Exogenous Glucagon, Iowa State University Animal Industry Report 2004, Dairy, A. S. Leaflet R1904.

Created specifically for EIT: Human Lactation, breastfeeding and Infant Nutrition,

reduced probability of blocked ducts. This could be due to PC's detergent effect mopping up any deposited fat in the duct, or optimal fat globule membrane composition thus keeping the milk globules in suspension. It may also be due to a non-direct impact due to PC being associated with liver health.