Editor: Informed Choice
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Dear Meryl

I read with interest the article on Baby Bacteria which accompanied the advertisement for the probiotic: Lifestart. And while it is apparent that the research shows definitive evidence that supplementing formula-fed babies with probiotics is a worthwhile practice, I was unconvinced by the generalisations made about breastfed babies and concerned that such generalisations would leave your readers with the impression that breastmilk is somehow lacking.

It is true that the pasteurization of human milk is necessary before commercial distribution as it may contain all known viruses and bacteria. However, in the situation of the individual infant maternal exposure to any known virus (and that includes the AIDS virus) results in antibodies to that virus being passed to her infant in her breastmilk as a consequence of the T and B lymphocytes contained in human milk. In fact, human milk has a raft of anti-bacterial and anti-viral attributes found mostly in the whey fraction which is 60% of mature milk (may go as high as 90% during the colostral phase). [NB Cow's milk has a whey fraction of only 20%].

Ruth Lawrence in her book Breastfeeding: A Guide for the Medical Profession cites the following specific anti-bacterial and anti-viral components which include: a bifid growth factor active against enterobacteriaceae and other enteric pathogens; and more than 30 different immunoglobulins of which sIgA (found in breast milk in levels 5 times that of maternal serum)is particularly known to be active against *E coli; Clostridium tetani; Corynebacterium diphtheriae; Streptococcus pneumoniae; Salmonella* and *Shigella.* Also, sIgA has known anti-viral activity against Polio virus types 1, 2 and 3; Coxsackie virus types A9, B3 and B5; Echo virus types 6 and 9; Semliki Forest virus; Ross River virus and rotavirus.

Human milk also contains complement thought to be associated with bacterial lysis (breakdown) and Lactoferrin which binds iron and is known to be active against *E coli* and *Candida albicans.* In addition the Lactoperoxidase fights *Streptococcus; Pseudomonas; E coli* and *Salmonella typhimurium* and the Lysozyme is known to destroy the cell walls of *E coli; Salmonella* and *M lysodeikticus.*

Depending on maternal diet the fatty acid profile of human milk lies between 2-5% and the unsaturated fatty acids are active against *Staphylococcus aureus* and a range of viruses including: Herpes simplex; Semliki forest virus; influenza; dengue fever; Ross River virus; murine leukemia virus and Japanese B encephalitis virus. Human milk also contains bile salt stimulated lipase which assists in the generation of fatty acids and monoglycerides that inactivate *Gardia Lamblia, Entamoeba histolytica* and *Trichomonas vaginalis.*

There are 20 different enzymes in human milk. They have various functions and do play an anti-infective role as do some of the hormones especially gastrin. The cytokines in human milk initiate and stimulate the host defense system and prevent auto-immunity. Interleukins are a specific sub group of cytokines which are known to augment the newborn's immune system by increasing antibody production, enhancing phagocytosis, activating T cells and increasing α 1-antiprypsin production which is known to protect against rotavirus.

The milk cells themselves have distinct phagocytic activity and are known to be specifically protective against *E coli; Candida albicans* and their ability to induce interferon activity is thought to militate against Sendal virus. Antioxidants such as vitamin C, uric acid, α-tocopheral and β-carotene are well-known anti inflammatory agents and scavengers of free radicals; both functions playing a part in protecting against infection, and the epidermal growth factor helps to keep gut epithelium healthy.

Gangliosides are thought to help protect the baby from toxin induced diarrhoea caused by *E coli* and *V.cholerae*; and low molecular weight glycosides and the oligosaccharides (of which there are over 80) also protect against *E coli* in various ways including the prevention of bacterial adhesion to epithelial cells by acting as receptor analogues. Low molecular weight peptides display antiviral activity by interfering with virus attachment onto target cells, while the macrophages synthesise complement, lactoferrin and lysozyme and perform a variety of other functions including phagocytosis of fungi and bacteria.

In addition to that human milk contains the full range of vitamins and minerals (including trace minerals) which perform a range of immune modulating and developmental roles.

As a Lactation Consultant I do prescribe probiotics for breastfed babies following a course of antibiotics. However, I do not consider breastfed babies need such supplementation in the normal course of events, breastmilk itself providing more than enough protection against a host of pathogens in the fully breastfed baby.

Yours sincerely
Patricia Hatherly