

**Relationship of sialic acid and fatty acid composition of brain gangliosides:
Breast-fed vs formula-fed infant**

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Background- Gangliosides are hybrid molecules composed of a hydrophilic sialyl oligosaccharide and a hydrophobic ceramide portion, which consists of sphingosine and fatty acids (FA). In animal studies, sialic acid (SA) supplementation is associated with increases in brain gangliosides and learning ability. Supplementation of docosahexanoic acid (DHA) and arachidonic acid (AA) in formula milk improved visual activity and psychomotor performance in premature infants.

Objective – To investigate the association of feeding method with the levels of SA and FA, particularly DHA in the brain gangliosides.

Design - Samples of frontal cortex from 12 infants who had been breast-fed and 10 who had been formula-fed (age of death 1–38 wks) were collected as part of a previous study on infants dying of sudden infant death. From 1g samples, gangliosides were extracted and purified. SA and FA levels were determined using HPLC and GLC respectively according to published methods.

Outcomes - Significant correlation of gangliosides SA and LCPUFAs was found in breast-fed, but not formula-fed infants (Table).

	Ganglioside-bound sialic acid			
	Breast-fed (n=12)		Formula-fed (n=10)	
	R ²	P value	R ²	P value
DHA	0.814	0.001	0.320	0.368
AA	0.747	0.005	0.262	0.465
Total n-3	0.817	0.001	0.288	0.42
Total n-6	0.734	0.007	0.192	0.595
LCPUFA	0.807	0.002	0.222	0.537
MUFA	0.432	0.161	-0.076	0.834

Conclusions- Sialic acid and LCPUFAs are interdependent building blocks for gangliosides in neural tissues involved in higher cognitive function of human-fed infant than formula-fed.