

Akonino[®] ELIP
Phospholipid bound
LCP solutions

The Co-Development Company

AAK

Akonino[®] ELIP Phospholipid-bound LCPs

– A part of the magic in human milk

AAK's active lipid solution Akonino[®] ELIP mimics the golden standard of human milk while meeting new requirements in the upcoming EU regulations for infant formula. The secret behind the solution: egg yolk.

The dry matter of the brain is made up of 60 percent fat, and the important omega-3 fatty acids are found in all brain and nerve structures. 97 percent of these omega-3 long-chain polyunsaturated fatty acids (LCPs) in the brain are DHA (docosahexaenoic acid), and all are bound in phospholipid (PL) form, resulting in so called PL-bound LCPs. Current research is recognizing that the DHA amount available during infancy and childhood are correlated to brain function/cognition. Coming into force in 2020, EU has updated infant regulation 2016/127, with a mandatory and increased DHA level.

Egg yolk – a natural source for PL-bound components

In human milk, 10–20 percent of the total LCPs – both the omega-3 DHA and the omega-6 ARA (arachidonic acid), respectively – is bound in a phospholipid. One of few possible natural sources for these PL-bound LCPs, which can be used to mimic mother's milk, is the egg yolk. AAK's solution Akonino[®] ELIP offers an active lipid mixture of both ARA and DHA, these PL-bound LCPs, gently retrieved from egg yolk. A proper balance of DHA and ARA is needed for optimal cognitive performance in infants, as too much DHA may suppress the benefits from ARA. This balance is provided by Akonino[®] ELIP.

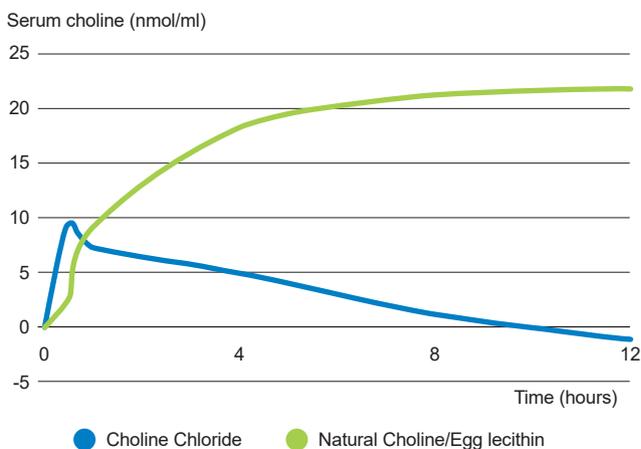
There are different types of phospholipids, and in human milk about one third of the phospholipids carry the nutrient choline. Choline is a vitamin like nutrient and needed for normal development of infants, as they cannot produce choline themselves. Infant formulas contain a wide range of choline concentrations, of which some are very low and should be considered when formulating. 75 percent of the phospholipids in the ELIP solution carries choline, making it optimal for sourcing this essential nutrient.

Akonino[®] ELIP includes the active lipids DHA and ARA, as well as choline in its PL-bound form. It is a high performance 3-in-1 package, all originating from nature.

Higher bioavailability

Enhancing the bioavailability of vital components such as DHA and ARA in infant formula is key. It has clinically been shown (Carnielli, V.P. et al.) that, in infant formula, DHA bound to phospholipids has higher bioavailability than the DHA bound to triglycerides.

Recent studies* verify that the digestion and reach into tissue, including crossing of the DHA through the blood brain barrier is more efficient as PL-DHA than the DHA in triglyceride form. Similarly, higher levels of ARA (Wijendran V., et al.) and choline (see figure) is found in tissue when bound to phospholipids.



PL-choline from natural Egg lecithin vs choline salts. Absorption of natural choline from egg estimated to 130 h*nmol/ml more efficient
Source; Hirsch, M.J., et al, *Relations between dietary choline or lecithin intake*

*Liu, L., et al., Higher efficacy of dietary DHA provided as a phospholipid than as a triglyceride for brain DHA accretion in neonatal piglets, and Subbaiah, P.V., et al., Enhanced incorporation of dietary DHA into lymph phospholipids by altering its molecular carrier.

Same structure as in human milk → PL-bound DHA, ARA, Choline



Tailormade formulation



High quality with excellent sensory performance



High bioavailability Passage through both intestinal and blood-brain barrier.





Tailor made and oxidation stable

AAK Akonino® ELIP solutions can be customized to meet regionally regulatory and your special requirements. The ratio between omega 3 (DHA) and omega 6 (ARA), may be

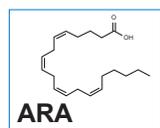
designed with additional algae or fish/tuna oil, example of tailored blends see below table. Furthermore this solution has shown to have several benefits, including improved sensory quality with increased oxidation stability.

	PL-DHA (g/100g ELIP)	DHA total (g/100g ELIP)	PL-ARA (g/100g ELIP)	ARA total (g/100g ELIP)	Choline content (g/100g ELIP)	g ELIP/100g IFP meeting EU2016/127 120mg DHA
Akonino ELIP 3020	0.80	0.8	1.60	1.6	4.0	N/A. add separate
Akonino ELIP DHA	0.70	5.5	1.40	1.4	3.5	2.2
Akonino ELIP LCP1:1	0.47	8.9	0.94	9.3	2.4	1.3
Akonino ELIP LCP1:2	0.54	4.8	1.1	9.6	2.7	2.5

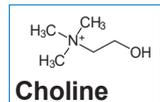
AAK's ELIP range – natural and unique PL package



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PL-bound DHA

- ◆ Closer to human milk, 10–20% of DHA is PL-DHA
- ◆ Essential for brain development

- ◆ **All DHA in the brain is bound to PL**
- ◆ More efficient absorption and reach to brain

PL-bound ARA

- ◆ Closer to human milk, 10–20% of ARA is PL-ARA

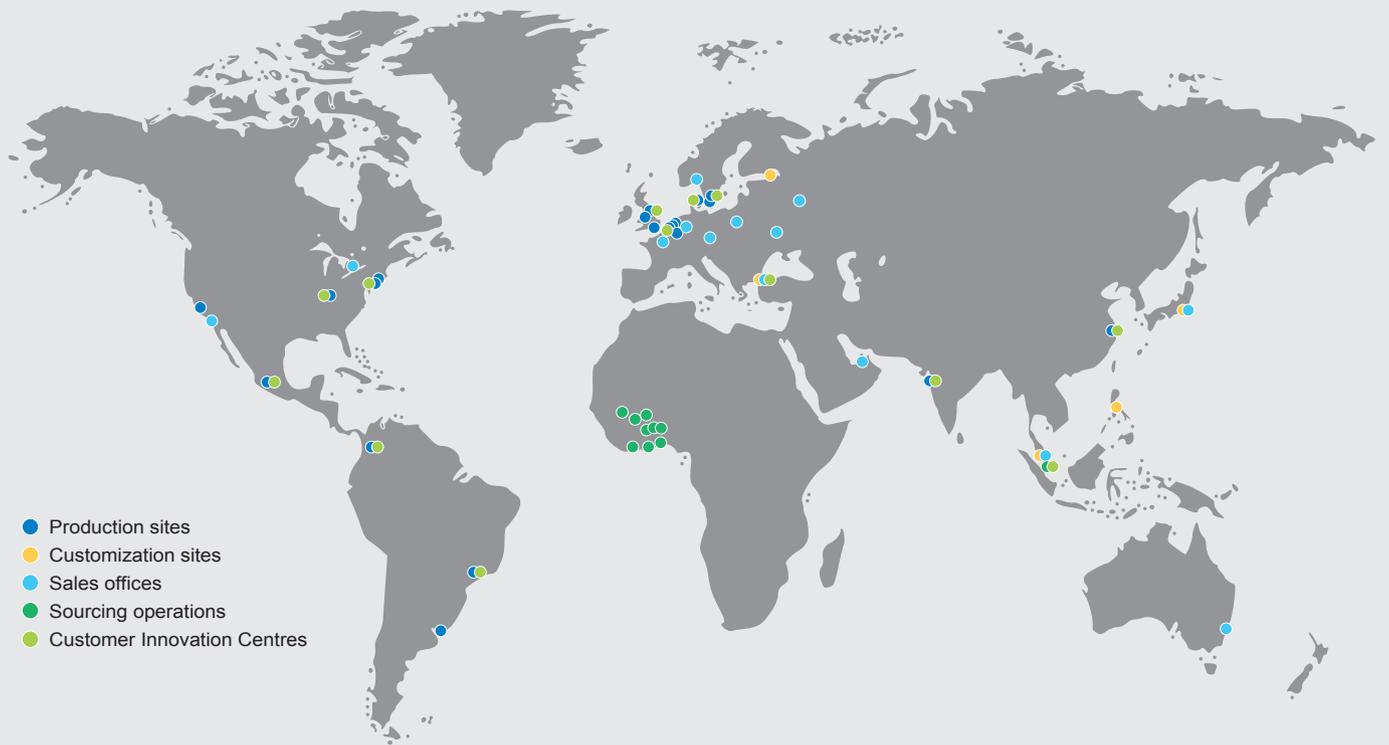
- ◆ Advice ARA>DHA, like ELIP 3020

PL-bound choline

- ◆ Closer to human milk
- ◆ Essential for infant development

- ◆ Natural form and more bio-efficient than salts
- ◆ Optimal source of natural choline

20% of phospholipids (PL) are directly absorbed in vivo without digestion



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