~~PROCESS FOR PRODUCING~~ PHOSPHOLIPID~~S CONTAINING~~ INCLUDING LONG-~~ ~~~~CHAIN~~ POLYUNSATURATED FATTY ACID~~S~~ AS CONSTITUENT~~S,~~ ~~THEREOF AND UTILIZATION~~ USE OF ~~THE~~ SUCH ~~SAME~~ PHOSPHOLIPIDS

TECHNICAL FIELD

The present invention relates to a producing method of phospholipids including long-chain polyunsaturated fatty acids as constituents, and use of such phospholipids. The invention particularly relates to a method for efficiently and stably producing phospholipids, and to phospholipids produced by the method, and representative use of such phospholipids.

BACKGROUND ART

Phospholipids (PL) are known to possess various physiological functions, including brain function improving effect, anti-stress effect, and cholesterol reducing action. PL occur in various forms, well-known examples of which include phosphatidylcholine (PC), phosphatidylserine (PS), phosphatidylethanolamine (PE), and phosphatidylinositol (PI). These different forms of PL have different functions and properties.

Among these different types of PL, phospholipids whose constituents are long-chain polyunsaturated fatty acids

bean lecithin, from 1.5% to 2.5% of phospholipids is contained in the raw oil indeed, but the content of phospholipids in the purified oil is no more than 0.05%. Consequently, it becomes apparent that the phospholipids are removed mainly through gum-removing process (see Non-Patent Publication 6).

[Patent Publication 1]

Japanese Laid-Open Patent Publication No. 48831/2003 (Tokukai 2003-48831) (published on Feb.~~ruary~~ 21, 2003)

[Patent Publication 2]

Japanese Laid-Open Patent Publication No. 35587/1999 (Tokukaihei 11-35587) (Published on Feb.~~ruary~~ 9, 1999)

[Patent Publication 3]

Japanese Laid-Open Patent Publication No. 59678/1996 (Tokukaihei 08-59678) (Published on Mar.~~ch~~ 5, 1996)

[Non-Patent Publication 1]

G. Toffano et al., Nature Vol.260 p331-333 (1976)

[Non-Patent Publication 2]

G. Toffano et al. Clinical Trial Journal Vol.24 p18-24 (1987)

[Non-Patent Publication 3]

Katsumi Imaizumi, Clinical Nutrition (Rinsho Eiyo), Vol.

Claims:

1. Phospholipids (LCPUFA-PL) including a long-chain polyunsaturated fatty acids (LCPUFA) as constituents,

wherein the LCPUFA-PL includes at least phosphatidylcholine and phosphatidylserine, and the LCPUFA includes at least arachidonic acid, and

wherein a proportion of arachidonic acid with respect to total fatty acids contained as constituents of total phosphatidylcholine is 40 percent by weight or greater, and a proportion of arachidonic acid with respect to total fatty acids contained as constituents of total phosphatidylserine is 20 percent by weight or greater.

2. The phospholipids as set forth in claim 1,

wherein the LCPUFA-PL includes phosphatidylcholine that at least includes dihomo-γ-linolenic acid as LCPUFA, and

wherein a proportion of dihomo-γ-linolenic acid with respect to total fatty acids contained as constituents of total phosphatidylcholine is 3 percent by weight or greater.

3. The phospholipids as set forth in claim 1~~ or 2~~,

wherein the LCPUFA-PL includes phosphatidylserine that at least includes dihomo-γ-linolenic acid as LCPUFA, and

wherein a proportion of dihomo-γ-linolenic acid with respect to total fatty acids contained as constituents of total phosphatidylserine is 1 percent by weight or greater.

4. A lipid composition containing phospholipids of ~~any one of~~ claim~~s~~ 1 ~~through 3~~.

5. The lipid composition as set forth in claim 4 which is used as a nutritional composition.

6. The lipid composition as set forth in claim 4 ~~or 5~~, which is processed into a capsule or tablet.

7. Food containing the lipid composition of ~~any one of~~ claim~~s~~ 4 ~~through 6~~.

8. The food as set forth in claim 7, which is an oil-in-water dispersion liquid in the form of a liposome formed by the phospholipids.

9. The food as set forth in claim 7 ~~or 8~~, which is a nutriment.