



Aqueous Extraction of Phospholipids from Leftover Egg Yolk

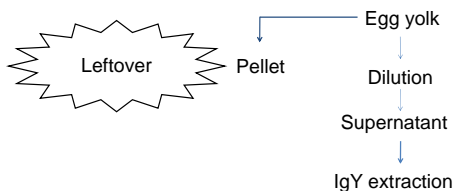
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Background

Egg yolk is a good source of bioactive compounds such as antibody and phospholipids. Phospholipids from egg yolk have superior advantages over phospholipids extracted from soy bean; for example, they have unique fatty acid composition rich in choline. Choline is an essential substance in neuron systems development and brain function. Therefore, egg yolk phospholipids are mainly used for pharmaceutical products. Egg yolk lipids will be separated by using a de-emulsification method, and phospholipids will be extracted from the lipid fraction by using supercritical fluid extraction.

Problem

Egg yolk antibody extraction from immunized hen eggs greatly increases the value of eggs, but generates a great deal of leftover egg yolk pellet. Egg yolk is a rich source of lipids and proteins. Phospholipids, which represent approximately 10% of the wet weight of the egg yolk, have broad applications in the pharmaceutical, cosmetic, and food industries either as an emulsifier or as a nutraceutical ingredient. However, current methods of extraction involve use of various organic solvents, which may carry safety concern, especially in the use of infant ingredient.



Approaches

Phospholipids in egg yolk are mainly bonded to proteins in complex structures named low density lipoproteins (LDL). LDLs are major constituents of egg yolk which contain more than 70% of lipids present in egg yolk.

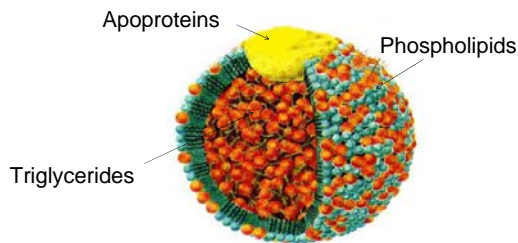


Fig 1. Schematic feature of LDL

Image is from : www.cholesterol-and-health.org.uk/hdl-ldl.html

To extract phospholipids from a yolk pellet, phospholipids will be extracted from leftover pellet by:

- Develop method of extraction LDL from leftover pellet by using diluted method in combination with chemical and physical treatments

- Digestion of the leftover pellet with food grade enzymes, a study of particle size distribution in the digested pellet and lipid and phospholipids recovery in fractions of digested pellet.

- Further purification of phospholipids by using supercritical fluid techniques to develop choline-rich ingredient to be used as infant ingredient.

Observations

Our study showed that 10 times water dilution at pH 6.0 resulted the highest content of lipid content in leftover pellet.

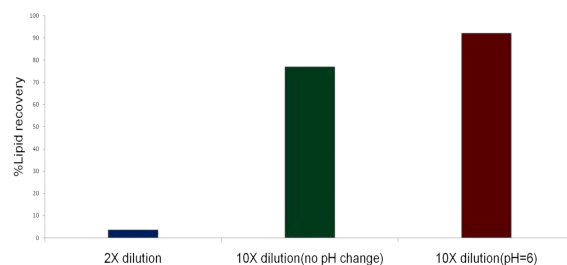


Fig 2. Effect of dilution factor on lipid content in pellet fraction

Our results also indicate that:

- Further protease digestion of leftover pellet could produce a creamy phase that contains most of lipids;
- Future study is to release phospholipids from lipid-rich creamy phase;
- Acoustic and electroacoustic spectrometer machine showed that pellet particle size considerably decreased following proteolytic digestion.

Conclusions

- ✓Our results showed that the diluted method is a promising approach to fractionate yolk into lipid-rich fraction;
- ✓Enzymatic digestion of leftover pellet could further separate lipid (and phospholipid)-rich fraction;
- ✓Future study is to purify phospholipid from the creamy phase.

Acknowledgement

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