



An Easy Method to Separate Low Density Lipoprotein From Egg Yolk

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Background

Some people avoid eating egg because of its high cholesterol content. Cholesterol and other egg yolk fats are mainly bound in low density lipoproteins (LDL) of egg yolk. LDLs are very small spherical particles and comprise about 70% of egg yolk dry matter. LDLs float in the egg yolk's viscose liquid structure. We can separate the LDL and use it for high technology purposes in the medical and pharmaceutical industries. After LDL isolation, the remaining part, which contains high density lipoproteins (HDL) and other good proteins, can be used directly in food products.



Figure 1 represents dilemma about egg yolk consumption and heart diseases

Our goal?

In this work we tried to separate LDL from fresh egg yolk for use in other industries using different gums and use the remaining proteins in food applications.

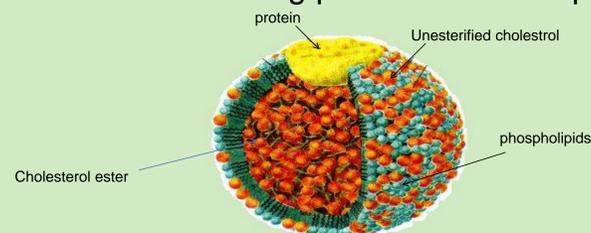


Figure 2 represents egg yolk LDL structure and the location of cholesterol and other fats

How it can happen?

It is amazing to discover that some gums, from different plant or sea sources, can bond with proteins; therefore, they can separate specific proteins from a mixture of proteins. We tested few gums to find which ones could separate LDL from egg yolk. Different pHs and concentrations of gums were tested in this study.

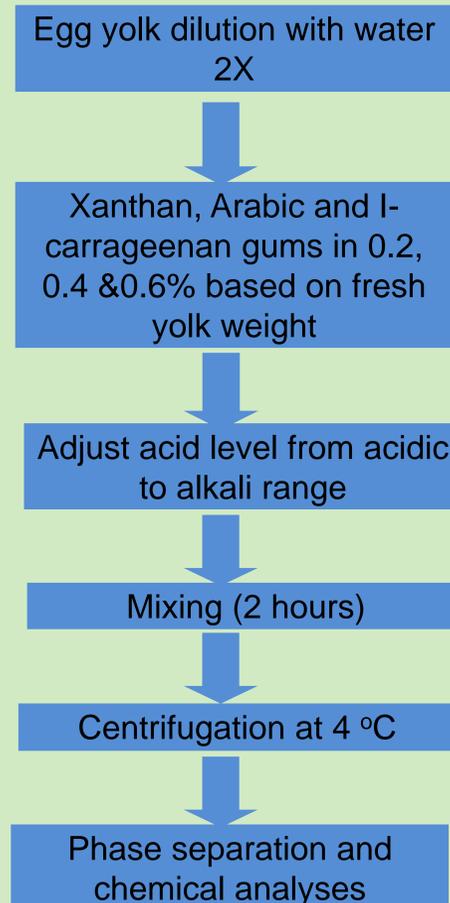


Figure 3. A schematic view of LDL isolation using different gums.

Our findings:

LDL can be separated by xanthan gum but not with I-carrageenan and gum arabic. Egg yolk, after mixing with xanthan gum and centrifugation, could form a creamy layer on top of the tube that is rich in fat. Further protein and fat analyses showed the cream is mostly LDL.

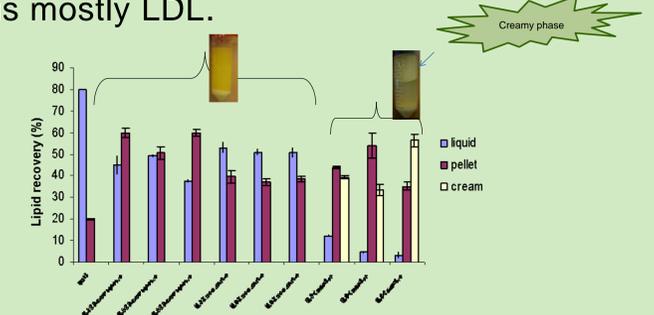


Figure 4. Lipid yield in each fraction of egg yolk separated after centrifugation.

Comparison showed the cream generated through the process was high in LDL (Figure 5).

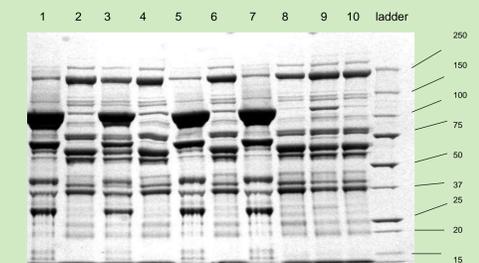


Figure 5. Protein profile of different fractions of egg yolk after mixing with xanthan, arabic and I-carrageenan. 1- LDL 2- cream (xanthan) 3- liquid (xanthan) 4- pellet (xanthan) 5- liquid (gum arabic) 6- pellet (gum arabic) 7- liquid (I-carrageenan) 8- I-carrageenan (pellet) 9- liquid (control) 10- pellet (control)

Conclusion:

LDL, containing high cholesterol, was successfully separated from egg yolk using simple dilution method. The separated LDL can be further processed for use in the medical and pharmaceutical industries as drug delivery system for cancer treatment.