IMMUNOCHEMICAL DETECTION OF EGG-WHITE ANTIGENS IN PROCESSED FOOD PRODUCTS

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Background.
Food allergy is of major concern for the consumers. The detection of the allergenic constituents in modern food products can be uneasy due to their low concentration or to treatments involved in their preparation (Méret *et al.*, 1998). The main allergenic food ingredients are milk (whey and caseinate), egg (especially egg-white), soybean, wheat (gluten), and peanut (Smith, 1997). These ingredients are also very useful for specific applications, such as jellification, thickening. ELISA (Enzyme-Linked ImmunoSorbent Assay) kits are available to detect these ingredients in processed food products, except for egg. Prevention of food allergic disorders needs improved methods of analysis and a complete information of the consumers on the product labels.

Objectives.
To develop an anti-egg white ELISA able to detect the presence of egg-white ingredients incorporated in all kinds of meat products: raw, pasteurized, and sterilized products.

Materials and methods
Experimental meat products were prepared in the CTSCCV experimental processing laboratory. A control product was prepared without addition of egg-white (C). Another meat product (E) contained 12% of frozen pasteurized egg-white. This concentration corresponds to 2% dry powder, an amount often used in meat products. Frozen pasteurized and dry powder egg-white are similarly used as binding agents. Meat products containing 50% of binary mixtures of meat from different animal species were also prepared. Binary mixtures were composed of poultry (turkey or chicken) and beef; percentages of animal species ranged from 0% to 50%. Each product was prepared as following: raw, pasteurized (70°C for 2 h), or sterilized (115°C for 70 min).
Experimental products and commercialized canned meat products were assayed for the presence of egg-white. Antigens were easily solubilized in a phosphate buffered saline (PBS) solution. Direct ELISA was performed using an anti-egg white antiserum (Demeulemester and Guizard, 1996; Leduc *et al.*, 1999). Immunodetection of milk proteins was performed according to Demeulemester and Guizard (1996).

Results and discussions
Soluble extracts from raw, pasteurized, and sterilized E (12% liquid egg-white) products were diluted 4-fold respectively in soluble extracts from raw, pasteurized, and sterilized C (0% egg-white) products. Results of immunodetection of egg-white on these extracts were reported in figure 1. Egg-white antigens were detectable in all products whether they were raw, pasteurized, or sterilized. The limits of detection were 0.15%, 0.17%, and 1.10% liquid egg-white respectively in raw, pasteurized, and sterilized products. These values correspond respectively to 0.025%, 0.028%, and 0.183% dry egg-white powder.
Results presented in figure 2 showed that there were slight crossreactions between poultry (chicken and turkey) meat and egg-white in raw products when they contained high amounts of poultry meats. The anti-egg-white antibodies did not crossreact with poultry meats in pasteurized and sterilized products.
Table I showed the results of identification of animal ingredients (milk and egg-white) in commercialized canned meat products. Milk proteins was found in three products: liver paste, fricadelles and sausages. Egg-white was found in the luncheon meat (containing pork meat), in the fricadelles (containing beef and poultry meats), and in the quenelles (containing beef meat).

Conclusions
Results showed that egg-white antigens were detectable with a high sensivity in meat products.
The anti-egg-white antibodies did not crossreact with poultry meat in pasteurized and sterilized products. There were slight crossreactions with poultry in raw products when high amounts of turkey or chicken meat were present.
Results demonstrated a good protein extraction with PBS, which is easy to perform. It also showed that certain epitopes are heat-stable; thus, they could represent a potential risk for allergic patients.
Therefore, the anti-egg-white antibodies used in the present study are appropriate for assays performed by health boards concerned with food safety. An assay using these anti-egg-white antibodies will soon be available and commercialized by R-BIOPHARM.

References
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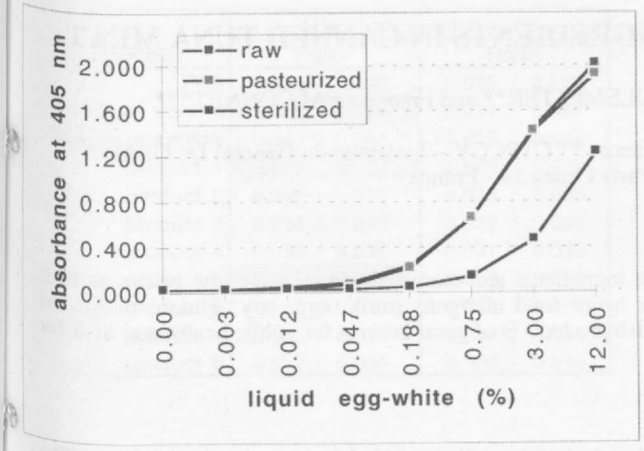

Figure 1. Immunodetection of egg-white antigens in beef meat products (raw, pasteurized and sterilized) containing various amounts of liquid egg-white. The threshold was set at an absorbance of 0.200.

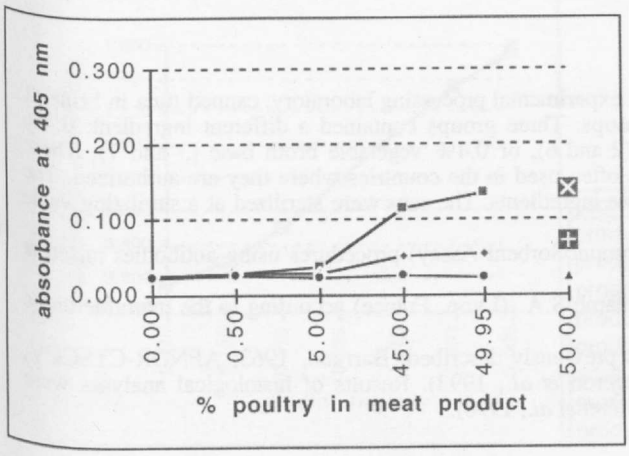

Figure 2. Immunodetection of egg-white antigens in meat products containing various amounts of poultry meat. Products contained 50% beef meat, or 0.05%, 0.50%, 45% and 49.95% turkey meat, or 50% chicken. These products were raw, or pasteurized, or sterilized. ▪ : turkey meat in raw product; ◆ : turkey meat in pasteurized product; ● : turkey meat in sterilized product; ✕ : 50% chicken in raw product; + : 50% chicken in pasteurized product; ▲ : 50% chicken in sterilized product.

N°	Product	Origins of meat	Animal ingredients
1	Luncheon meat	pork	egg
2	Liver paste	beef / poultry	
3	Liver paste	pork	milk
4	Ravioli	beef	
5	Fricadelles	beef / poultry	milk / egg
6	Quenelles	beef	egg
7	Sausages	pork / poultry	milk

Table I. Immunodetection of animal ingredients (milk and egg-white) in canned meat products.