

## Quail's egg anaphylaxis with tolerance to hen's egg: a work-related case

Ferreira C<sup>1</sup>, Ferreira A<sup>1</sup>, Bartolome B<sup>2</sup>, Lopes I<sup>1</sup>

<sup>1</sup>Allergy and Clinical Immunology Department, Centro Hospitalar Vila Nova de Gaia/Espinho, EPE, Vila Nova de Gaia, Portugal

<sup>2</sup>R & D Department. Roxall, Bilbao, Spain

### Corresponding authors:

Cristiana Ferreira

Allergy and Clinical Immunology Department,  
Centro Hospitalar Vila Nova de Gaia/Espinho,  
EPE, Vila Nova de Gaia, Portugal

E-mail: [cristianascferreira@gmail.com](mailto:cristianascferreira@gmail.com)

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.18176/jiaci.0507

**Key words:** Anaphylaxis. Food hypersensitivity. Occupational quail egg hypersensitivity. Case report.

**Palabras clave:** Anafilaxia. Hipersensibilidad alimentaria. Hipersensibilidad ocupacional a huevo de codorniz. Caso clínico.

Occupational exposures to egg's proteins through cutaneous contact or inhalation may lead to IgE-mediated sensitization. Allergy to egg's proteins has been described in the food industry and research workers and symptoms can be topical or systemic. This is a phenomenon found predominantly in hen egg. Allergy to quail's egg (QE) in patients who tolerate hen egg (HE) is very rare. The authors present the first case of quail egg's anaphylaxis with tolerance to hen's egg, work-related.

**CASE REPORT:** A 54-year-old male reported one episode of anaphylaxis following the intake of quail's egg (QE). He has been poultry worker for seventeen years and during that time he was exposed repeatedly to hen's and quail's feathers, feces and eggs. Ten years after starting work in the poultry farm, he developed dyspnea and wheezing exclusively in the workplace. Three years later, thirty minutes after eating cooked quail's egg, he developed generalized urticaria, severe oropharyngeal pruritus, dysphagia, dyspnea and stridor. Prior to this anaphylactic reaction, he tolerated hen egg's and quail's egg. Since then, he avoided HE and QE, but he tolerated quail, turkey and chicken meat. Skin prick tests for hen's egg (white, yolk, ovalbumin and ovomucoid) and chicken meat were performed using commercial extracts (Roxall®, Spain) and were negative. Skin prick-prick tests were positive for raw QE's white (17x9 mm) and yolk (9x9 mm), boiled QE white and yolk (4x4 mm), raw and boiled HE white (4x4 mm) and yolk (4x4 mm). Specific IgE assays (ImmunoCap, Thermo-Fisher) were negative to hen meat, hen egg yolk and white, and ovomucoid and ovalbumin from hen. An oral food challenge (OFC) was performed with pasteurized egg white (total dose of

48ml, corresponding to a one natural raw egg) without any reaction. OFC with QE was not performed due to anaphylaxis risk.

Sodium dodecyl sulphate–polyacrylamide gel electrophoresis (SDS–PAGE) and immunoblotting were performed using Laemmli's method, carried out in reducing conditions (with 2-mercaptoethanol), with 20 µg protein extracts per lane from quail egg white and yolk, hen egg white and yolk and alpha-livetin (Albumin chicken. Sigma Chemical Company P.O. Box 14508 St Louis MO 63178 USA). Patient serum was diluted 1/3 and 1/8. The immunoblot assay revealed two IgE-binding bands of 97 kDa and 60 kDa; and a zone between 32-45 kDa (two bands) in the white of the quail's egg; the molecular weight of these bands matches with those of ovotransferrin, ovalbumin and ovomucoid respectively (Figure 1). No bands were detected with patient serum and extracts from hen eggs and hen alpha-livetin; and no bands were detected with control serum (pool of sera from non-atopic subjects) and all the studied extracts. A considerable antigenic variability between the different species of birds, and consequently between the white of their respective eggs, indicates that the patients with allergy to quail's egg could tolerate the eggs of different birds. He currently tolerates hen's eggs and quail, turkey and chicken meat.

Egg sensitization prevalence in adults ranges from 0.35 to 1.9% and it has been previously reported among workers in the bakery and confectionary industries exposed to egg protein aerosols like in glazing of bakery products and also in research egg workers, suggestive of an inhalational and/or cutaneous route of sensitization [1–3]. Symptoms reported by sensitized workers include those of occupational asthma and rhinoconjunctivitis [2–4]. Symptoms reported on ingestion have been immediate, consistent with an Immunoglobulin E (IgE) associated response including urticaria, oesophageal itching, dysphagia and asthma.

Allergy to egg from other birds species, namely quail's egg (QE), in patients without HE allergy is very rare. The literature on QE allergy in HE tolerant patients is limited to one case report and a case series [5-6]. The main QE allergen is ovalbumin but other allergens were also identified, namely ovomucoid and ovotransferrin. These proteins did not cross-react with proteins of hen's egg. The authors report the first case of QE allergy with tolerance to HE, work-related.

IgE-mediated sensitization to quail egg's was demonstrated by positive skin prick-to-prick test to quail's egg. SDS-PAGE immunoblotting assay pointed to sensitization to quail egg ovotransferrin, quail egg ovalbumin and quail egg ovomucoid as allergens in this case, and no cross-reactive serum IgE with its homologues in hen's egg was detected. Quail egg is different from other bird eggs, particularly in its egg white, quail egg is richer in proteins that have anti-allergic and anti-inflammatory effects [7]. A considerable antigenic variability between the different species of birds, and consequently between the white of their respective eggs, indicates that the patients with allergy to quail's egg could tolerate the eggs of different birds.

In this case, quail egg's sensitization may be cause due to chronic occupational exposure. The previous onset of respiratory symptoms in the workplace and the quail egg systemic reaction following months of daily contact with quail products suggest sensitization to quail egg allergenic proteins through contact and/or inhalation. It has also been described how allergic patients with respiratory sensitization to bird feathers, with time have presented sensitization to egg yolk and eventually to the bird's meat as the same protein appears in these allergenic sources, which is known as the bird-egg syndrome. This syndrome was discarded since sensitization to alpha-livetin was excluded [8].

Our patient was expose to both HE and QE in the workplace with sensitization just to QE. It was speculated that this might be due to the irregular consumption of quail eggs which began after started work in the poultry farm in contrast of hen egg that were regularly consumed and well tolerated since childhood. Another possibility is anecdotally report, is that quail eggs are more difficult to 'window', which may ultimately lead to greater exposure to egg allergens [3].

In conclusion, the chronic exposure in occupational settings may cause *de novo* sensitization through inhalation or skin contact, to quail's egg proteins. Severe reaction by ingestion following sensitization can occur. Food allergy by the non-ingestant route is probably under-recognized and under-reported. Specific studies would be interesting to demonstrate occupational exposure and the sensitization by the inhaled route.

Conflict of Interest (COI): All authors have no conflicts of interest to declare.

Financial Resources: none.

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Figure 1. SDS-PAGE Immunoblotting. A- Alpha-livetin from hen ; B- Hen's feathers extract; C- Quail egg white extract, D- Quail egg yolk extract; E- Hen egg white extract; F- Hen egg yolk extract. Lane P, P': patient serum (two different dilutions); Lane C: Control serum (pool of sera from non-atopic subjects); Lane M: Molecular mass standard.

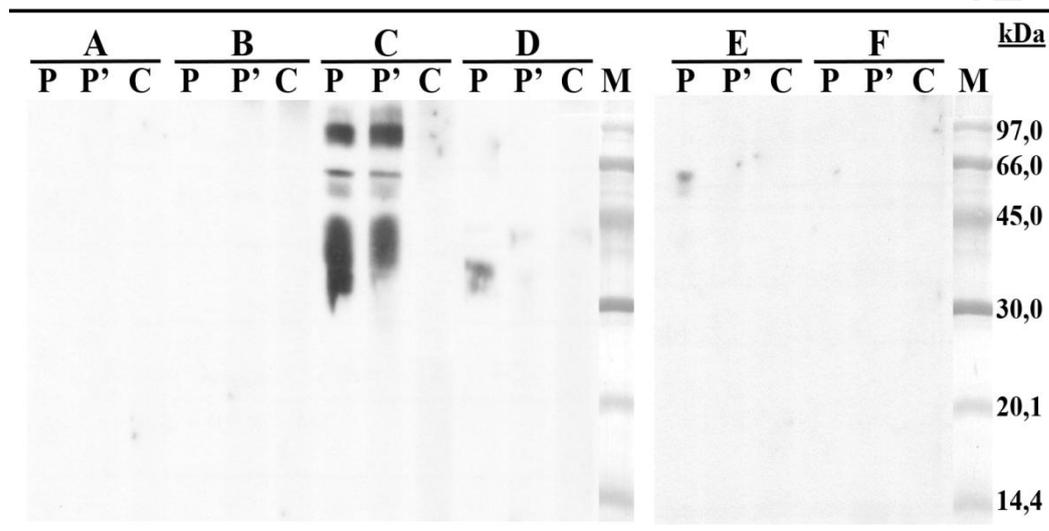


Figure 1: SDS-PAGE Immunoblotting