



RESEARCH UPDATE

AECL Research Update March 2013

EGG HYPERSENSITIVITY IN REVIEW

Source: Hasan SA, Wells RD, Davis CM. Egg hypersensitivity in review. *Allergy Asthma Proc* 34:26-32, 2013; doi: 10.2500/aap.2013.34.3621

This paper is a summary of current knowledge and understanding of egg hypersensitivity. It includes information regarding current understanding of the allergens involved, natural history, clinical presentation, diagnostic strategies, treatment options, egg-containing vaccine guidelines and future therapies for health care providers in managing egg hypersensitivity. Five allergens in eggs are considered of most importance in relation to their impact of egg allergy and are named *Gallus domesticus* 1-5 (Gal d 1-5). They include: ovomucoid (Gal d 1) (the major allergen in egg white); ovalbumin (Gal d 2); ovotransferrin (Gal d 3); lysozyme (Gal d 4) and chicken serum albumin (alpha-livetin) (Gal d 5) which is the main one in egg yolk. Evidence suggests that food processing can alter the allergenicity of egg proteins. For example, baked or well-cooked egg ingestion has the potential to speed tolerance in egg-allergic patients. Typically, most children outgrow their egg allergy by school age. Factors that may delay resolution include a history of asthma, allergic rhinitis and other food allergies. The vast majority of people with egg allergy have mild to moderate reactions and anaphylactic reactions are very rare. The majority of patients present with skin disturbances, gastrointestinal symptoms and/or respiratory complaints. Egg avoidance remains the mainstay in the prevention of the reactions, however evidence for inducing tolerance through oral immunotherapy (where the immune system is exposed to small amounts of the allergenic protein over time) is growing but currently not generalisable for routine clinical practice.

KEY FINDING: Overview of current knowledge and understanding regarding egg hypersensitivity.

APPLICATION: This paper provides a good overview of where the current knowledge regarding egg allergy is.



HIGH PROTEIN EGG BREAKFAST FOR “BREAKFAST SKIPPING” ADOLESCENTS

Source: Leidy HJ, Ortinau LC, Douglas SM, Hoertel HA. Beneficial effects of a higher-protein breakfast on the appetitive, hormonal, and neural signals controlling energy intake regulation in overweight/obese, “breakfast-skipping,” late-adolescent girls. First published February 27, 2013, doi: 10.3945/ajcn.112.053116 Am J Clin Nutr April 2013 ajcn.053116

In this study, 20 overweight or obese breakfast skipping adolescent girls consumed a normal protein (13g protein) cereal-based breakfast, a high protein egg and beef rich (35g protein) breakfast or continued breakfast skipping for 6 days. On day 7, a range of appetite and food intake measures were taken over a 10 hour period. The consumption of breakfast reduced daily hunger compared with breakfast skipping. Breakfast also increased daily fullness compared with breakfast skipping with the high protein breakfast causing greater increases than the normal protein breakfast. The high protein breakfast also reduced daily ghrelin (hunger hormone) and increased daily peptide YY (satiety hormone) levels compared with breakfast skipping. A high protein breakfast also reduced evening snacking of high-fat foods compared with breakfast skipping. Although no differences in overall energy intake were observed, these results suggest the addition of breakfast, particularly a high protein one, might be a useful strategy to improve satiety and improve diet quality in overweight or obese teenagers.

KEY FINDING: High protein egg breakfast improved satiety and diet quality in overweight teenagers who commonly skip breakfast.

APPLICATION: Continues to support eggs as a valuable breakfast option.

[Suitable for eDM]

HEAT TREATMENT EFFECTS EGG WHITE ALLERGENICITY

Source: Shin M, Han Y, Ahn K. The influence of the time and temperature of heat treatment on the allergenicity of egg white proteins. *Allergy Asthma Immunol Res.* 2013 Mar;5(2):96-101. doi: 10.4168/air.2013.5.2.96.

This study investigated whether either the duration or the temperature of heat treatment influenced the composition and allergenicity of egg white proteins. Raw egg white and 4 heated egg whites (fried egg white, boiled egg white (for 10 mins), boiled egg white (for 30mins), baked egg white (20mins @ 170°C) were investigated for their allergenicity using sera from 7 egg allergic patients. The immune response to a particular allergen (ovotransferrin) almost disappeared for all heated egg whites except the one boiled for 10 minutes. Overall the immune response decreased most significantly for the boiled egg white for 30 minutes. Amongst the 4 kinds of heated egg whites, the boiled egg white for 30minutes showed the most significant changes in both composition and reduction in allergenicity. While this study was not a direct feeding study in humans, the results suggest that heating egg white does elicit changes to the allergic potential of the proteins.

KEY FINDING: Boiling egg white for 30 minutes caused a significant decrease in the allergenicity of the protein.

APPLICATION: Builds on research suggesting that how eggs are processed and/or cooked changes their allergenicity.

Levels of Evidence: In-vitro

MACRONUTRIENT INTAKE AND RISK OF TYPE 2 DIABETES

Source: Alhazmi A, Stojanovski E, McEvoy M, Garg ML. *Macronutrient intakes and development of type 2 diabetes: a systematic review and meta-analysis of cohort studies. J Am Coll Nutr J Am Coll Nutr August 2012 vol. 31 no. 4 243-258*

This systematic review and meta-analysis investigated the current evidence (up to July 2012) regarding the relationship between macronutrient (carbohydrate, fat and protein) intake and the risk of developing type 2 diabetes. The review included 22 studies. Overall, high intake of total dietary carbohydrate was associated with an increased risk of type 2 diabetes, however this effect was not observed when the results were analysed by gender. High vegetable fat intake was associated with a reduced risk of type 2 diabetes in females. Other macronutrients were not significantly associated with type 2 diabetes risk.

KEY FINDING: High intake of total dietary carbohydrate was associated with an increased risk of type 2 diabetes.

APPLICATION: Suggests carbohydrate intakes need to be balanced with nutrient dense protein and healthy fat containing foods.

[Suitable for eDM]

Levels of Evidence: III-2

VEGETARIAN DIET LOWERS HEART DISEASE RISK

Source: Crowe FL, Appleby PN, Travis RC, Key TJ. *Risk of hospitalisation or death from ischemic heart disease among British vegetarians and nonvegetarians: results from the EPIC-Oxford cohort study. Am J Clin Nutr, March 2013 ajcn.044073*

This UK study examined the association of a vegetarian diet with risk of heart disease. The researchers followed 44,561 men and women (34% of which consumed a vegetarian diet at the beginning of the study) and the incidence of heart disease was tracked over approximately 11 years. Compared with non-vegetarians, vegetarians had a lower average BMI, and systolic blood pressure. They also had a 32% lower risk of heart disease than non-vegetarians. After adjusting for weight the finding was only slightly weakened. Other factors including sex, age, smoking and heart disease risk factors did not significantly affect the result. Overall, consuming a vegetarian diet was associated with a lower heart disease risk which authors suggest maybe related to the diet's impact on non-HDL cholesterol and blood pressure.

KEY FINDING: Vegetarians have a 32% lower risk of heart disease compared to non-vegetarians which is only slightly accounted for by their lower weight status.

APPLICATION: Builds upon evidence that a vegetarian diet and lifestyle is generally associated with a decreased risk of chronic disease. Eggs can play an important role as part of an ovo-vegetarian eating plan.

[Suitable for eDM]

Levels of Evidence: III-2

PROTEIN INTAKE AND GESTATIONAL DIABETES

Source: Bao W, Bowers K, Tobias DK, Hu FB, Zhang C. *Prepregnancy Dietary Protein Intake, Major Dietary Protein Sources, and the Risk of Gestational Diabetes Mellitus A prospective cohort study. Published online before print February 1, 2013, doi: 10.2337/dc12-2018 Diabetes Care February 1, 2013*

This study examined the relationship between dietary protein intake and risk of gestational diabetes. The researchers followed 21, 457 pregnant women with no history of gestational diabetes and who were free of chronic disease before pregnancy. After adjusting for several factors (dietary and non-dietary) that might influence the outcome, the highest intake of animal protein was associated with increased risk of gestational diabetes compared to the lowest level of intake. In comparison, the highest vegetable protein intake was associated with a decreased risk of gestational diabetes when compared with the lowest intake. The substitution of 5% energy from vegetable protein for animal protein was associated with a 51% lower risk of gestational diabetes. Total red meat, in particular was associated with an increased risk and substitution of red meat with poultry, fish, nuts, or legumes showed a significantly lower risk of gestational diabetes.

KEY FINDING: Higher animal protein, particularly red meat, is associated with an increased risk of gestational diabetes. Substitution of red meat with poultry, fish, nuts, or legumes showed a significantly lower risk of gestational diabetes.

APPLICATION: Intake of animal protein, particularly red meat should be balanced with protein intake from plant sources.

[Suitable for eDM]
Levels of Evidence: III-2

VITAMIN D AND FOOD ALLERGIES – LOW LEVELS IN AUSTRALIA INCREASE RISK

Source: Allen KJ, Koplin JJ, Ponsonby AL, Gurrin LC, Wake M Vitamin D insufficiency is associated with challenge-proven food allergy in infants. *J Allergy Clin Immunol.* 2013 Feb 27. pii: S0091-6749(13)00154-1. doi: 10.1016/j.jaci.2013.01.017. [Epub ahead of print]

This Australian study investigated the role of vitamin D levels in food allergy in infants. More than 5000 one-year-old infants underwent skin prick testing to a range of common allergens including egg. Those with a positive skin prick and a sample of those who didn't react then underwent a hospital-based food challenge. Vitamin D levels were tested (577 infants) and researchers found that infants of Australian-born parents, but not of parents born overseas, who had low levels of vitamin D were more likely to be allergic to peanut and/or egg compared to those with adequate vitamin D levels. These infants were also more likely to have multiple food allergies rather than a single food allergy. This trial is the first direct evidence that adequate vitamin D levels may be an important protective factor for food allergy in the first year of life.

KEY FINDING: Low vitamin D levels in one-year old infants (of Australian-parents) increased the likelihood of a food allergy to peanuts and/or eggs.

APPLICATION: Suggests adequate vitamin D may play a role in the prevention of food allergies but more research is required.

[Suitable for eDM]
Levels of Evidence: III-2

VITAMIN D AND FOOD ALLERGIES – HIGH LEVELS IN GERMANY INCREASE RISK

Source: Weisse K, Winkler S, Hirche F, Herberth G, Hinz D et al. Maternal and newborn vitamin D status and its impact on food allergy development in the German LINA cohort study. *Allergy* 68 (2013): 220-228

Since the role of vitamin D in allergy development is controversial this study aimed to investigate whether maternal and cord blood vitamin D levels are associated with allergy in early infancy. This German study included 378 mother-child pairs during pregnancy and at birth and tracked the development of allergy for the first 2 years of life. Maternal and cord vitamin D levels were positively associated with children's risk for food allergy within the first 2 years. Higher maternal vitamin D levels increased the risk for food allergy at 2 years of age. This study found high vitamin D levels in pregnancy and at birth may contribute to a higher risk for food allergy and therefore does not support the idea that vitamin D supplementation might protect against allergy.

KEY FINDING: High levels of vitamin D during pregnancy is associated with an increased risk of food allergy in the first 2 years of life.

APPLICATION: While the study design and population is quite different to the Australian study above, this finding supports the need for more research to better understand the role vitamin D may play in allergy development.

[Suitable for eDM]

Levels of Evidence: III-2

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