



Position Statement for Healthcare Professionals

Eggs, Cholesterol and Heart Health

Updated April 2017

The most recent Australian Health Survey¹, found one in three Australians aged 18 years and over have abnormal or high total cholesterol and/or LDL cholesterol levels. Since high plasma cholesterol levels, in particular high LDL cholesterol levels, are an important traditional risk factor for heart disease it is vital to understand the dietary and lifestyle factors which negatively impact these lipid levels.

Historically, research has focused on individual dietary components such as nutrients or single foods when it comes to assessing the factors that impact on blood cholesterol levels. More recently, however increasing attention has been given to dietary patterns and how the combination of foods, as well as the overall context of consumption influences lipid levels and overall heart disease risk^{2,3}. To lower lipid levels and heart disease risk, the most recent advice from national and international heart associations emphasises an overall healthy eating pattern and a reduction in saturated and trans fat intake as the primary effective dietary changes²⁻⁵. Any specific limits or restrictions on dietary cholesterol intake are seldom included given a lack of evidence for a clear relationship between serum LDL cholesterol and dietary cholesterol intake^{2,6}.

National and International recommendations

The most recent American Heart Association (AHA) guidelines for the prevention of cardiovascular disease⁷ emphasise the need for individuals to: "limit saturated fat, trans fat, sodium, red meat, sweets and sugar-sweetened beverages" with no specific guidelines given relating to egg or dietary cholesterol consumption⁷.

The Heart Foundation (Australia) states saturated fat intake is associated with coronary heart disease, and that dietary cholesterol increases total cholesterol and LDL-cholesterol but substantially less so than saturated and trans fats⁴. They recommend regular egg consumption within a cardio-protective, reduced saturated fat eating pattern⁵.

Dietary cholesterol, serum cholesterol and heart disease risk

It is known that individuals vary in their response to dietary cholesterol intake. Approximately 25% of the population have been defined as "hyper-responders", a term used to describe those who experience an increase in serum LDL and HDL-cholesterol following intake of dietary cholesterol. Importantly, approximately 75% of the population experience moderate to no difference in serum cholesterol levels following intakes of dietary cholesterol, and are therefore described as "normal responders" or "hypo-responders"⁸⁻¹¹.

The potential mechanism by which the majority of the population regulates serum cholesterol levels is that when dietary cholesterol intake increases, there is a subsequent decrease in cholesterol absorption and/or endogenous cholesterol synthesis¹².

Overall, evidence to date suggests the impact of dietary cholesterol intake on blood lipids is modest, particularly with respect to increasing LDL cholesterol levels¹³. Furthermore, even in hyper-responders when LDL-cholesterol is increased in response to dietary cholesterol intake, due to the simultaneous rise in serum HDL cholesterol levels, the overall LDL:HDL ratio is maintained. A 2015 systematic review and meta-analysis



of evidence demonstrated dietary cholesterol intake increased the LDL:HDL ratio and failed to find an association between higher intakes of dietary cholesterol and CVD risk¹⁴.

Eggs, cholesterol and heart disease risk

Eggs are relatively low in saturated fat (3.4g per serve) and while they do contain cholesterol (398mg per serve), a number of studies have demonstrated they can be incorporated into a healthy dietary pattern without significant impact on cholesterol levels¹⁵⁻¹⁸.

The most recent scientific evidence indicates no association between egg intake and increased risk of coronary heart disease in the general population^{14,19,20,21}. This corroborates the 2013 Australian Dietary Guidelines review of scientific literature which concluded that the *"consumption of eggs daily is not associated with increased risk of coronary heart disease"*²².

Evidence of a possible association between egg consumption and heart disease risk appears to be limited to individuals with type 2 diabetes. In three meta-analyses, subgroup analysis of adults with diabetes found an association between higher egg consumption and increased risk of coronary heart disease^{20,21,23}. The authors did however caution the interpretation of these results given the small number of studies and small sample sizes included. [For more information on Eggs and Diabetes see the Egg Nutrition Council *Eggs and Diabetes Position Statement*].

Clinical Trials

As well as data from cohort studies, a number of clinical trials have been conducted investigating the effect of short term egg consumption on various markers of heart disease and metabolic health. The majority of these trials have been conducted in at-risk populations such as individuals who are overweight or who have the metabolic syndrome, prediabetes or type 2 diabetes²⁴⁻²⁹.

In these studies, 2-3 eggs per day over 6-12 week study periods showed either no effect or in some cases improvements in blood lipids, particularly when they were consumed as part of a weight loss intervention or carbohydrate restricted diet²⁵⁻²⁷. Taken together, these results indicate that eating eggs fails to negatively affect some markers of cardiovascular disease risk and may have some favourable effects on other markers when consumed in appropriate dietary contexts.

Possible cardio-protective benefits of eggs

Meta-analyses^{14,30} to date show a small but significant increase in HDL cholesterol with increasing cholesterol intake from eggs. The Heart Foundation and the American Heart Association recognise low HDL as a risk factor for coronary heart disease^{31,32} with higher levels suggested to be cardio-protective³³.

Eggs also provide nutrients that may be associated with protection from heart disease or its risk factors. For example, eggs provides folate and long chain omega-3 fatty acids³⁴, as well as arginine, a precursor to nitric oxide, which in turn plays a central role in endothelial function³⁵. They also contain the carotenoids lutein and zeaxanthin which have been associated with improved cardiometabolic health^{36,37} potentially by providing protection against lipid oxidation³⁸ and inflammation³⁹.

While definitive mechanisms by which eggs may provide some possible cardio-protection are limited, research increasingly suggests that the consumption of eggs does not increase the risk of CVD.

Conclusions

Scientific evidence shows little association between egg intake, serum cholesterol levels and coronary heart disease, particularly in the general population.



The Egg Nutrition Council therefore concludes the following:

- Eggs may be consumed daily as part of a healthy diet which is in line with the National Heart Foundation of Australia's recommendations, as well as the NHMRC's Australian Dietary Guidelines.
- Eggs should be considered in a similar way as other protein rich core foods and selected as part of a varied diet that is low in saturated fat and contains a variety of cardio-protective foods such as fish, wholegrains, fruit, vegetables, legumes and nuts.
- Reducing saturated fat intake is the primary dietary strategy recommended for reducing serum cholesterol levels.
- In individuals at high risk, such as people with diabetes, there is limited data based on a small number of studies to guide specific recommendations for egg consumption. However, prudent advice is that the inclusion of eggs in the context of a healthy eating pattern low in saturated fat and containing known cardio-protective foods is not associated with increased risk. Diabetes Australia recommends individuals with diabetes follow the Australian Dietary Guidelines which allows for the consumption of eggs daily. [Refer to the Egg Nutrition Council's position statement on *Eggs and Diabetes* for more details in this area.]

This statement is for healthcare professionals only.

**One serve = 2x60g eggs (104g edible portion)*

As diet-induced changes in total cholesterol and lipoproteins vary considerably between individuals, the Egg Nutrition Council recommends individual discussion of the recommendations regarding egg intake with their healthcare professional.

Useful links:

Heart Foundation

www.heartfoundation.org.au

Australian Dietary Guidelines

www.eatforhealth.gov.au/guidelines



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