

## **Position Statement for Healthcare Professionals**

### ***Eggs and Diabetes***

***Updated April 2017***

The 2011-2012 Australian Health Survey reported 5.1% of adult Australians have diabetes and a further 3.1% are at high risk of developing diabetes<sup>1</sup>. The survey also found that for every 4 cases of diagnosed diabetes there was one case that goes undiagnosed. For type 2 diabetes, the increased prevalence is likely driven by rising obesity, the ageing population, dietary changes, and sedentary lifestyles<sup>2</sup>. Body mass index (BMI), alcohol consumption and physical activity have been specifically identified as significant lifestyle risk factors impacting the development of type 2 diabetes in Australian adults<sup>3</sup>. Previously thought to only occur in adulthood, type 2 diabetes is now increasingly being identified in younger age groups.

#### **Eggs and Serum Cholesterol levels**

Serum cholesterol levels are an important risk factor and are aggressively treated in people with diabetes. While saturated and trans fat intake impact serum cholesterol significantly<sup>4</sup>, dietary cholesterol intake effects serum cholesterol levels substantially less so<sup>4</sup>. 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 levels<sup>5-8</sup>.

#### **Eggs and Coronary Heart Disease (CHD) in individuals with type 2 diabetes**

While the most recent scientific evidence indicates no association between egg consumption and risk of coronary heart disease in most people<sup>9-11</sup>, a number of epidemiological studies and meta-analyses have reported an association between high egg consumption (>7 eggs/week (in most studies)) and increased risk of cardiovascular disease among people with diabetes<sup>10,12-14</sup>. Alongside these findings, however, caution has been called for regarding the interpretation and application of these associations due to factors such as inadequate control of confounding variables and small sample sizes.

Clinical findings to date do not support the epidemiological findings indicating that additional research is essential to further establish the role of eggs and/or dietary cholesterol in relation to the risk of heart disease in people with diabetes.

A number of clinical investigations have been carried out in people with diabetes (or insulin resistance/prediabetes) and these studies have found varying results regarding the effect of egg consumption on CVD risk factors<sup>15-21</sup>. Furthermore, research in adults with the metabolic syndrome has shown some favourable effects of egg consumption on lipid profiles and insulin resistance<sup>22-25</sup>. The results of the intervention studies to date do vary, however many have found no significant impact of egg consumption on total and LDL cholesterol levels in at risk populations and in some cases improvement in lipid profiles when consumed in the context of a weight loss diet<sup>26</sup> or reduced carbohydrate diet<sup>22-25</sup>.

Further research has been carried out with the aim of determining if there is a relationship between egg consumption and risk of developing type 2 diabetes.

### **Summary of Epidemiological Studies involving Egg Consumption and Risk of Diabetes (T2DM)**

A 2016 meta-analysis of twelve prospective cohort studies examined the risk of developing type 2 diabetes based on levels of egg consumption<sup>27</sup> and found no overall association between egg consumption and risk of developing type 2 diabetes (HR for a 3 times per week increase in egg consumption = 1.03 [95% CI 0.96-1.10]). Egg consumption was positively associated with type 2 diabetes risk in US studies but no overall association was observed in non-US studies. This isolation to US populations suggests that egg consumption may be a marker of a broader dietary pattern in which the studies were conducted. For example in one of the US studies which found a significant association between egg consumption and type 2 diabetes (the Physicians' Health Study I)<sup>28</sup> egg consumption was related to the Western dietary pattern characterised by a high consumption of red or processed meat, French-fries, sweets and dessert, snacks and refined grains. Whereas, in the study conducted in Japan<sup>29</sup> which found no association, egg consumption was strongly associated with prudent, traditional dietary patterns rather than a western dietary pattern.

Overall there is a lack of consistency in the findings across the epidemiological studies relating to egg consumption and incidence of type 2 diabetes. The current body of evidence highlights the importance of consuming eggs in the context of an overall healthy dietary pattern as recommended by the current Australian Dietary Guidelines<sup>30</sup> as well as Diabetes Australia<sup>31</sup> and the Heart Foundation<sup>32</sup>.

### **Summary of Intervention Studies involving Egg Consumption and Individuals with/or at risk of Diabetes (T2DM)**

A small number of clinical intervention trials have investigated the effect of egg consumption on glycaemic control in individuals with type 2 diabetes. This research includes the Australian DIABEGG study which found no difference in glycaemic control when individuals consumed 2 eggs per day or less than 2 eggs per week as part of a weight maintenance diet<sup>19</sup>. Furthermore a 2016 trial found no effect of the short term consumption of 2 eggs per day on glycaemic control in individuals with type 2 diabetes<sup>21</sup>. In the context of a 12 week weight loss diet, consumption of 2 eggs per day showed similar weight loss and improvements in glycaemic control as consuming 100g lean meat per day<sup>26</sup>. Another small study showed no significant differences on blood sugar levels or HbA1C when 1 egg per day for 5 weeks were consumed compared to an oatmeal and milk breakfast<sup>20</sup>. Overall clinical evidence to date shows a "*lack of detrimental effects of eggs on lipoprotein or glucose metabolism*"<sup>33</sup>.

### **Gestational Diabetes**

An analysis of two studies<sup>34</sup> examined the effect of egg consumption before or during the first trimester of pregnancy on the risk of gestational diabetes. After adjusting for confounding factors, researchers in both studies found a 2.4-2.5 fold increased risk of developing gestational diabetes with the consumption of 10 or more eggs per week. However both studies found little to no effect on gestational diabetes risk for those who consumed less than seven eggs per week<sup>4</sup>. Including eggs in the diet of pregnant women can contribute a range of important nutrients to the diet [*For more information on the value of eggs in pregnancy see the Egg Nutrition Council Eggs and Pregnancy Position Statement.*].

### **Conclusions**

Epidemiological evidence regarding egg consumption and its effect on people with diabetes is inconsistent and positive associations appear to be isolated to US based studies. Caution with



interpretation is warranted particularly given evidence from clinical studies conducted to date do not support an association between egg consumption and risk of type 2 diabetes.

### **Recommendations**

Further research is required to fully assess the effect of egg consumption in people with diabetes. It is well established that lipid control is an important part of management for people with diabetes, which includes diet, physical activity, and, where needed, pharmacotherapy. Prudent advice is that eggs may be included in the context of a diet low in saturated fat, containing known cardio-protective foods and meeting the guidelines for diabetes management. Research supports the regular inclusion of eggs as part of a healthy diet. Furthermore, Diabetes Australia recommends individuals with diabetes follow the Australian Dietary Guidelines which support the consumption of eggs daily and conclude that "*there do not appear to be any increased health risks associated with consumption of eggs*".<sup>30</sup>

This statement is for healthcare professionals only.

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

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

### **Useful Links**

Australian Dietary Guidelines

[www.eatforhealth.gov.au/guidelines](http://www.eatforhealth.gov.au/guidelines)

Australian Diabetes Council

<http://www.australiandiabetescouncil.com/>

Diabetes Australia

<http://www.diabetesaustralia.com.au>

American Diabetes Association

<http://www.diabetes.org/>

Joslin Diabetes Center

<http://www.joslin.org/>

## References:

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