



## Red meats: Time for a paradigm shift in dietary advice



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### ABSTRACT

Recent evidence suggests dietary advice to limit red meat is unnecessarily restrictive and may have unintended health consequences. As nutrient-rich high quality protein foods, red meats can play an important role in helping people meet their essential nutrient needs. Yet dietary advice to limit red meat remains standard in many developed countries, even though red meat intakes appear to be within current guidelines. Meanwhile, energy intakes from processed foods have increased dramatically at the expense of nutrient-rich foods, such as red meat. Research suggests these food trends are associated with the growing burden of obesity and associated diseases in recent decades. It is time for dietary advice that emphasizes the value of unprocessed red meat as part of a healthy balanced diet.

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### 1. Introduction

A growing body of research suggests dietary advice to limit red meat is unnecessarily restrictive and not supported by current evidence. Historically, studies that have explored associations between red meat consumption and health outcomes have reported conflicting results (Micha, Wallace, & Mozaffarian, 2010; Wynness et al., 2011). Recently, researchers have begun to recognize that it is important to distinguish between unprocessed red meats such as beef, veal, pork and lamb and processed meats such as bacon, bologna, sausages and salami.

Large population studies both in Europe and North America have recently reported no association between intakes of unprocessed red meat and any cause of death, including cardiovascular disease (CVD) or cancer (Kappeler, Eichholzer, & Rohrmann, 2013; Rohrmann et al., 2013). This is consistent with the findings of the largest meta-analyses of the worldwide evidence showing no association between unprocessed red meat and coronary heart disease (CHD) (Micha et al., 2010). Randomized controlled trials (RCT) have also demonstrated that, within the context of heart healthy diets, the effect of lean red meats on LDL-cholesterol is no different than white meats (Davidson, Hunninghake, Maki, Kwiterovich, & Kafonek, 1999; Maki et al., 2012; Roussel et al., 2012). These findings are in line with evidence that

lean red meats have a relatively neutral fatty acid profile with respect to blood cholesterol levels (Wynness et al., 2011).

Recent advances in our understanding of human requirements for key essential nutrients such as high quality protein throughout the lifecycle also provide good reasons to emphasize the value of nutrient-rich foods such as lean red meats as part of a healthy diet (Elango, Ball, & Pencharz, 2012; Elango, Humayun, Ball, & Pencharz, 2010; FAO, 2013). Red meats contain an array of important micronutrients such as iron, zinc, selenium, potassium and a range of B-vitamins including niacin, riboflavin, thiamine and vitamin B<sub>12</sub> (Wynness et al., 2011). These nutrients are all essential for optimal health throughout the lifecycle.

Recommendations to limit red meat intakes date back several decades and were originally intended to reduce saturated fat intakes. Recent meta-analyses have concluded that there is no clear evidence to support decades of dietary guidelines to cut saturated fat intake (Chowdhury et al., 2014; Siri-Tarino, Sun, Hu, & Krauss, 2010). Meanwhile such guidance may have inadvertently contributed to dietary changes associated with the rapid rise in the prevalence of obesity since the 1970s as well as other risk factors for heart disease (Danaei et al., 2009; Slater et al., 2009). A decline in energy from nutrient-rich foods such as beef, milk and eggs has been accompanied by an excessive increase in energy from fats (including *trans* fats) and refined carbohydrates found in many processed convenience foods (Slater et al., 2009). The resulting energy gap has likely contributed to obesity and chronic disease.

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This discussion highlights the need for a paradigm shift in dietary guidance regarding nutrient-rich foods such as lean red meats. It is critical to recognize that a focus on limiting red meat distracts from more effective strategies to improve dietary patterns. In an era when people in developed nations are increasingly overfed, but undernourished, emphasizing the value of eating a healthy balance of nutrient-rich minimally processed foods, including lean red meats, is likely to better serve public health.

## 2. Red meats and health outcomes

A growing body of evidence from epidemiological studies and randomized controlled trials calls into question recommendations to limit red meat intake. Based on this current evidence, unprocessed red meats eaten in amounts recommended by dietary guidelines do not appear to be associated with chronic disease.

### 2.1. Population studies on red meat and health

Two large population studies in Europe (Rohrmann et al., 2013) and the United States (Kappeler et al., 2013) found no association between unprocessed red meat and any cause of death, including CVD or cancer. Unlike many earlier studies, these more recent studies explored health outcomes associated with unprocessed and processed meats separately. The findings from these studies provide good support for recommending both unprocessed red and white meats as part of a healthy balanced diet.

The European Prospective Investigation into Cancer and Nutrition (EPIC) followed close to half a million people in 10 European countries for more than 12 years (Rohrmann et al., 2013). The EPIC study found no significant association between unprocessed red meat intakes and all-cause mortality or death due to CVD, cancer or other causes. A particular strength of this study was that it examined unprocessed red meat (such as beef, pork and lamb), unprocessed white meat (such as chicken, turkey and poultry) and processed meat (such as sausages, bacon and luncheon meats) separately. Although a moderate positive association between high intakes of processed meat (greater than 160 g/day) and mortality was noted, higher intakes of unprocessed red meat and unprocessed white meat did not increase risk. Researchers also reported that those who consumed the most processed meat generally ate fewer vegetables and fruit and were more likely to smoke. Furthermore, a higher risk of all-cause mortality was observed among participants with very low or no red meat consumption.

A recent analysis of data from the United States National Health and Nutrition Examination Survey (NHANES) concluded that meat consumption was not associated with mortality (Kappeler et al., 2013). Researchers reported no significant association between red meat intake including beef, pork, ham, and organ meats and total mortality or cause-specific mortality due to CVD or cancer. This analysis included 17,611 men and women (18 years and older) from NHANES (1986–2010) which is representative of the United States population.

This analysis, which also examined overall diet quality, found that adults who ate red meat more often also tended to eat vegetables more often compared to those who ate red meat less often. In addition, those who ate red meat more often tended to have lower body mass index and a smaller waist circumference. Furthermore, those who ate red meat more often were less likely to have hypertension than those who ate red meat less often. This is consistent with other research that indicates higher protein intakes may help promote satiety and body weight management (Westerterp-Plantenga, Lemmens, & Westerterp, 2012).

### 2.2. Large systematic reviews and meta-analyses

The largest systematic review and meta-analysis of worldwide evidence to date, examining unprocessed red meats and processed meats separately, concluded that consuming 100 g/day of unprocessed red meat was not associated with CVD risk (Micha et al., 2010). This analysis

pooled data for over 1.2 million study participants spanning more than 20 countries. This finding calls into question reports from previous studies that did not distinguish between unprocessed red meats (such as beef, pork and lamb) and processed meats (such as hot dogs, bacon, salami, sausages, and luncheon meats).

Another systematic review categorized the causal evidence for various dietary exposures and their associations with primary and secondary coronary heart disease (CHD) outcomes as strong, modest or weak (Mente, de Koning, Shannon, & Anand, 2009). This analysis pooled prospective cohort data on meat intake and CHD outcomes for 236,414 individuals and concluded the evidence for an association between meat and CHD is weak. This study concluded that there is strong evidence to support valid associations of several protective factors for CHD, including intakes of vegetables and nuts, as well as, high-quality dietary patterns such as a “Mediterranean” diet. *Trans* fatty acids and foods with high glycemic index or high glycemic load were identified as the only harmful dietary factors with strong evidence to support associations with CHD.

### 2.3. Evidence from randomized controlled trials

Randomized controlled trials (RCT) provide further evidence that diets including lean red meats can be as effective for improving total and LDL cholesterol as diets with mostly lean white meat (poultry and/or fish). In a recent meta-analysis of eight RCTs ( $n = 409$ ) the fasting cholesterol and triglycerides levels of adults with borderline hypercholesterolemia were not significantly different after consuming beef and poultry and/or fish (Maki et al., 2012). Total and LDL cholesterol were slightly reduced in subjects consuming beef and did not differ significantly from changes observed following similar intakes of poultry and/or fish.

In one long-term RCT, hypercholesterolemic adults ( $n = 191$ ) were counselled to follow a cholesterol-lowering diet including 6 oz. (170 g) of lean meat per day, 5 to 7 days per week, for 9 months (Davidson et al., 1999). Based on random assignment, subjects were instructed to consume at least 80% of their meat in the form of either lean red meat (beef, veal, pork) or lean white meat (poultry and fish). There were no significant differences in the mean concentrations of total and LDL cholesterol between the lean red meat and the lean white meat groups during the 9 months. The authors of this study suggest that giving patients the permission to choose lean red and white meats may improve their acceptance of and long-term dietary adherence to a heart healthy cholesterol-lowering diet.

The BOLD RCT found that heart healthy diets that include lean beef as the primary protein are as effective in lowering total and LDL cholesterol as the DASH diet that emphasizes white meat and plant protein (Roussel et al., 2012). Participants following the BOLD and BOLD + diets (with 113 g and 153 g of beef per day, respectively) experienced a 10% decrease in LDL cholesterol. These reductions in LDL cholesterol were of the same magnitude as those observed with the DASH diet, recognized as a “gold standard” for heart health.

RCTs also suggest that Paleolithic (Old Stone Age) type diets based on lean meat, fish, eggs, nuts, fruit, vegetables and root vegetables, may benefit patients with heart disease and diabetes as well as obese patients with metabolic risk factors for these diseases (Jönsson et al., 2009, 2010, 2013; Lindeberg et al., 2007; Mellberg et al., 2014). In patients with type 2 diabetes, advice to follow a Paleolithic diet improved several CVD risk factors and glycemic control compared to a diabetes diet consumed over two consecutive 3-month periods (Jönsson et al., 2009). The Paleolithic diet was higher in fruits, vegetables, meat and eggs, and lower in cereals and dairy products compared to the diabetes diet. The Paleolithic diet resulted in lower HbA1c, triglycerides, blood pressure, weight, BMI and waist circumference and higher HDL cholesterol. A follow-up study found the Paleolithic diet was also more satiating per calorie than the diabetes diet designed according to dietary guidelines (Jönsson et al., 2013). Mellberg et al. (2014) concluded that a

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