

## REVIEW OF THE PALEOLITHIC DIET

The paleolithic (paleo) diet is a modern diet trend that has been endorsed by the fitness industry and wellness bloggers who purport many associated health benefits. This article explores the validity of these claims and discusses dietary implications for those considering or following the diet.

### What is the paleo diet?

The paleo diet is based on the premise that modern day chronic metabolic disorders have resulted due to a mismatch of the modern diet and the human body's inability to adapt from Palaeolithic times, a concept termed the discordance hypothesis (1). The diet is based on foods identified as being available to hunter-gatherer groups, i.e. meat, fish, fruits, vegetables, nuts and seeds; with grains, legumes and dairy products prohibited. Essentially, the diet promotes a high protein, low carbohydrate model with an emphasis on whole foods and avoidance of processed foods.

### Historical accuracy?

The paleo diet, as it has been predicated, has questionable anthropological validity. It has been argued that a comprehensive prescription for an evolutionary diet is not possible as dietary intake would have varied considerably depending on geography (2). Whilst the consumption of grains may have substantially increased following the agricultural revolution, carbohydrate would have likely come from a wide range of other food sources based on location and season.

As an adaptive and evolving species, homo-sapiens developed the ability to consume starch and milk with the introduction of farming practices, evidenced through genes coding for amylase and lactase persistent after weaning. The recent media hype demonising wheat and dairy has fuelled the paleo argument suggesting our adaptation to these food groups has been inadequate, however true intolerance's are rare: coeliac disease (affects 1% of the population), non-coeliac gluten sensitivity (1-6%), wheat allergy (>0.2% in adults) (3,4); lactose intolerance is low in populations with a history of exposure to milk products and is around 5% among northern Europeans (5).

Hence, whilst the diet advocates some positive principles, the high protein/low carbohydrate model is not well supported by historical evidence and the basis for the elimination of all grains and dairy is questionable, as well as potentially problematic (see nutritional analysis).

### Research

In order to suggest the efficacy of a nutrition approach there needs to be a consensus drawn from a broad and robust evidence base. There is simply not enough research on the Paleo diet to officiate its purported health benefits, with the limited number of trials being short term, varied in design and under-powered (6,7,8,9,10). There is some evidence for improved metabolic outcomes (i.e. reduction in blood cholesterol) on the paleo diet (6,7,8), however the findings are not independent of weight loss, therefore cannot be attributed to the diet directly. Over-hyped media claims suggesting the paleo diet can treat or prevent conditions such as autism or dementia are not supported by clinical research. Ultimately, the Paleo diet is a concept based on theory and until more research is conducted, it is incorrect and unethical for supporters to promote the diet as 'evidence-based'.

### Relevance to modern man

The paleo diet appeals to modern man through its references to nature and our ancient past. However, our environment and food system has changed dramatically since the paleolithic era and trying to recreate this diet is near impossible in the modern world. Even the fresh fruits and vegetables we purchase have been selectively cultivated over hundreds of years, so the apples in our shopping basket today would be very different to those plucked by our ancestors. Avoiding all processed foods today is extremely difficult, and not always beneficial as it is important to consider the context. For example, preserving nutrients through freezing,

fortifying products with essential nutrients and improving food safety are all positive outcomes of processing food. However much one may like to identify with a pre-agricultural diet, the food we eat now is inescapably different to what would have constituted a paleolithic diet.

The modelling of the cost of the paleo diet suggests that it is 10% more expensive than an essential diet of similar nutritional value (11). Like many popular diet trends, it is only accessible to those of higher socio-economic status. However, taking the positives from the approach, minus the pretentiousness, we can identify principles applicable to a wider demographic which may be beneficial at a population level: Reducing overall energy intake and focusing on whole foods, in addition to moving more (remember we had to hunt our food not order it online)!

### **Nutritional analysis**

Any diet that restricts foods or entire food groups increases the risk of nutritional deficiencies. Therefore, if considering Paleo careful consideration is required to ensure nutritional adequacy of the diet.

**Low carbohydrate:** Whilst the reduction of highly refined carbohydrates and free sugars (those found in sugar sweetened beverages, confectionery etc) is beneficial, there is unequivocal evidence to show wholegrain and high-fibre carbohydrates are beneficial to health (12,13,14,15).

**Grains:** Grain-based foods, particularly whole-grains, are an important source of nutrients and dietary fibre for gut health. When they are displaced from the diet, they inevitably must be replaced with something else, and it is the replacement foods which are paramount in determining the health impact. It has been observed that when carbohydrates are displaced from the diet they are often replaced with animal-based proteins (16) which has been linked with an increase in all-cause and cardiovascular disease mortality, largely attributed to the increase in saturated fat intake (17,18,19).

Therefore, if going grain-free it is vital that you include large amounts of vegetables to increase your fibre intake and minimise saturated fats (non-lean-red meats, coconut oil, etc) to reduce the risk of an adverse nutritional effect. **Legumes** are great plant-based protein source and high in fibre, therefore should not be excluded from the diet.

**Dairy:** Dairy is a nutrient dense food source providing high quality protein, B vitamins and important minerals including calcium and iodine. Despite recent media hype there is no valid evidence supporting the link between dairy and negative health outcomes in a normal balanced diet, and in fact there is growing body of evidence to suggest that milk and dairy products may reduce the risk of colorectal cancer and heart disease (20,21), however more research is needed.

**Calcium:** Essential for a myriad of functions including bone health, muscle function and nerve transmission. The best non-dairy sources of calcium are soya products; however, soya products are also absent in the paleo diet. Whilst green leafy vegetables are often portrayed as a good source, they also contain high levels of oxalates that block absorption of calcium. Other sources include sardines (with bones), dried figs, broccoli, tahini, almonds and fortified plant-milks. Be mindful that if not consuming dairy or soya products you will have to eat high quantities of these foods to reach your daily requirement, i.e. a handful of almonds provides approximately 60mg and a serving of broccoli 70mg, with the recommended daily target for adults being 700mg/day.

**Iodine:** Important for thyroid function and vital in foetal development thus iodine requirements increase for pregnant and breastfeeding women. Dairy is the main source of iodine in the UK. Other sources include iodised salt, seafood (cod, haddock) and seaweed (recommended to consume with caution, particularly in pregnancy as can contain excessive amounts of iodine).

## Summary

There is currently not enough research on the paleo diet to support the purported health claims. Due to the vast changes in our environment the interpretation could be considered a figment of the modern brain and as such seen cynically as a commercial opportunity. However, an approach advocating increased consumer awareness and an overall dietary pattern emphasising fruits, vegetables, nuts, fish, lean meats and whole versus highly processed foods is beneficial. Yet, eliminating whole-grains and dairy is not advisable as a blanket prescription, and if implemented must be done with careful consideration to ensure nutritional adequacy of the diet.

**Jessica Neil, Registered Associate Nutritionist at The Movement-Menu**

**Instagram: [themovement.menu](https://www.instagram.com/themovement.menu)**

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