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**Seafood provides significant health benefits for men.**

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## **Abstract**

Evidence supports the regular consumption of Omega-3 polyunsaturated fatty acids found (Omega 3s) with positive effects to men's health. The best source of these essential fatty acids are seafood, particularly oily fish. This article summarises evidence pertaining to the benefits associated with regular dietary intake of fish on men's health.

Methods: An extensive review of international academic libraries, databases and published literature was conducted. Quality assessment ratings were applied and thematic classifications based on major health issues relevant to men constructed.

Results: A total of 168 articles from peer reviewed journals were identified with 60 studies providing moderate to high level evidence of an association between the consumption of Omega 3s and health benefit for men. The majority of the studies showed a positive link between the intake of Omega 3s and the prevention and management of chronic disease in men. Evidence also shows a reduced risk of prostate cancer and lower lung cancer mortality in men who consume a high seafood diets.

Conclusion: There is conclusive evidence of an association between the dietary intake of Omega 3s and health benefits for men. However, men are less likely to consume fish when compared to red or white meats. Health promotion interventions should consider: the attitudes of men toward food and the impact of these attitudes on food choices; the association between seafood and other protein sources within the male psyche; and the role that particular foods play for males in social situations.

## **Background**

Omega 3 long chain poly unsaturated fatty acids (eicosapentaenoic acid-EPA and docosahexaenoic acid-DHA) are essential to human health however they cannot be produced by the body [1]. The best dietary source of Omega 3s are seafood, particularly oily fish such as sardines, salmon and tuna. A growing body of evidence associates the regular consumption of Omega 3s with positive health effects in the treatment of chronic diseases such as cardiovascular disease (CVD), type 2 diabetes, some cancers, and overweight and obesity [12-13]. These conditions together with respiratory diseases account for 46% of the global burden of disease [14]. The importance of the link between Omega 3s, health and chronic disease led the World Health Organization (WHO) to hold an expert consultation on the risks and benefits of fish consumption in January 2010 [15].

Many risk factors associated with chronic conditions are widespread among men despite being modifiable through lifestyle changes [16]. The incidence of these risk factors is largely a product of men being less likely to take action to improve their own health compared to women [16, 17]. One of the most prevalent preventable risk factors directly associated with chronic illness in men is poor diet [14]. Therefore men are at high risk of nutrition-related health conditions. Overweight and obesity, for example, are important modifiable risk factors for chronic conditions in men but due to a low self-perception of overweight there is reduced likelihood of adoption of a healthy lifestyle [17]. Men are also less likely to choose fish as their preference source of protein.

This article provides an overview of current evidence of the benefits associated with regular dietary intake of oily fish on men's health. It will also explore some of the complex inter-related factors that may impact on seafood consumption by men.

## **Methods**

### *Search strategy*

The following describes the methodology used to source literature relating to the relationship between seafood and human health. A comprehensive search was conducted of

evidence utilising the following databases for credible sources of original research, reviews and commentaries: Archive of Life Sciences; Proquest; PubMed; Science Direct; Taylor and Francis; The Cochrane Collaboration; Web of Knowledge; Web of Science; and Wiley Interscience. For this study, Boolean expression terms included keywords: omega-3 PUFAs; *n*-3; chronic illness; cardiovascular disease; cardiac conditions; stroke; cancer; diabetes; gender; men; diet; physical activity; overweight; and obesity. Other published literature reviewed was sourced from: national and international seafood-based databases, seafood industry websites or databases, major national and international academic libraries; electronic sources of information (eg. Google; Google Scholar; international health websites), Departments of Health within Australia, and educational institutions.

#### *Data synthesis*

Quality assessment ratings were based on the level of evidence and were classified as: A = High; B = Moderate; C = Low; D = Very Low. Studies having low (C) or very low (D) levels of evidence were excluded (see Table 1).

INSERT TABLE 1 HERE

Of the 168 articles from peer reviewed journals identified, only 60 met the criteria of high (A) or moderate (B) levels evidence linking consumption of Omega 3s with health benefit in men. Thematic analysis was conducted on these articles which were then grouped the studies by major health issues emerging from the data relevant to men.

## **Results**

The strongest evidence linking the benefits of seafood consumption in men relates to arthritis, cardiovascular diseases, some cancers, diabetes, overweight/obesity and mental health.

#### *Rheumatoid arthritis and inflammatory conditions*

There is strong evidence supporting the role of marine Omega 3s in the prevention and treatment of rheumatoid arthritis (RA) and a number of other inflammatory conditions [18,

21]. An increase of 30g oily fish (8g fat/100g fish) consumption per day has been associated with a 49% risk reduction of RA [19]. Dietary fish oil supplementation has demonstrable benefits for RA and other inflammatory conditions (eg. bowel disease and immunoglobulin A nephropathy) and may also reduce pharmacological dosages required to treat RA [18].

### *Cardiovascular diseases*

Coronary heart disease (CHD) is the most common underlying cause of death for Australian men accounting for 18.5% of male deaths [16]. An inverse relationship exists between fish consumption and death from CHD in men; men who consume 35 grams or more of fish daily are identified as having a relative risk of death from CHD and myocardial infarction of 0.62 and 0.56 respectively [20]. Fish consumption in men is also strongly linked to the risk of incident cardiac heart failure (CHF). Consumption of broiled or baked fish one or two times a week is associated with greatly reduced risk factors: 20% lower risk of CHF, 36% of coronary death and 17% in total mortality [21].

### *Cancer*

Research into the protective effects of Omega 3s and cancer has had varied results [10]. A lack of strong evidence may be due to small sample sizes, differing methodologies and the need for longitudinal clinical studies. Careful consideration is required in interpreting research results.

In 2003, the most common cancer deaths amongst Australian men were lung cancer (4,506 deaths), prostate cancer (2,837) and colorectal cancer (2,382) [16]. There is some evidence to suggest an association between the consumption of fish and reduced risk of rectal [22] and prostate cancer [8, 23] and reduced mortality in those with lung cancer [24]. The strongest association is with metastatic cancer [8, 23].

Little is known about the mechanism by which Omega 3s offer protection against these cancers. There is some research indicating Omega 3s may have a role in the conversion of androgen precursors in males to active metabolites thus producing a protective effect

against prostate cancer [25, 26]. It should be noted that whilst evidence supports Omega 3s as being protective against prostate cancer, it is not clear if the benefits relate to fish alone or the effect of fish in combination with other nutrients [25, 26].

### *Diabetes*

Diabetes is a global problem with significant human, social and economic cost. The WHO estimates that more than 250 million people worldwide are currently living with diabetes with an additional 7 million people developing the disease each year [27]. In 2003, diabetes was conservatively attributed with 6% of Australia's total burden of disease; males had higher rates than females with the highest prevalence in the 65 to 74 age group [16].

A significant reduction in type 2 diabetes has been associated with high fish and seafood consumption [28]. A lower risk of albuminuria, an indicator of damage to the kidneys, has been identified with higher levels of fish consumption [24]. Additionally a higher intake of oily fish has a positive effect on triglyceride levels in Type 1 diabetes, also promoting kidney efficiency and health [7].

### *Overweight and obesity*

Whilst obesity itself is a chronic disease [29], it is also a risk factor directly related to other chronic conditions [14, 30]. In Australia, around 70% of men aged 35-44 years have been categorised as overweight or obese [31]. Fish and seafood form a valuable part of a healthy diet and present a low fat, high quality protein source also contributing Omega 3s, iodine and selenium. Weight reduction among overweight younger men has been associated with the inclusion of fish as part of an energy-restricted diet [32]. However several studies have identified that overweight men tend to underestimate their weight and are less likely to attempt weight loss [17, 33, 34].

### *Mental health and cognition*

The incidence of mental disorders (anxiety, affective and substance use disorders) over the lifetime of Australian men is 48.1% [35]. Evidence from epidemiological, laboratory and clinical studies support the positive role of Omega 3s in the treatment of depression [36,

37]. Additionally, several observational studies have reported a positive association between Omega 3s and the arresting of cognitive decline [38] and depression [37, 39].

Approximately 65% of men over the age of 60 years suffer from Alzheimer's disease, with this figure expected to significantly increase over the next two decades [40]. Alzheimer's disease is the underlying cause of the majority of dementia cases currently affecting an estimated 37 million people globally. A dose-dependent relationship between fish intake and cognition has been identified in male subjects with those who consumed fish scoring significantly higher on cognitive tests compared to non-consumers [41]. Higher plasma Omega 3s have also been associated with reduced decline in sensorimotor speed and complex speed [42].

#### *Male fertility*

Several studies have looked at the role of lipid composition of spermatozoa and male fertility. Positive associations have been identified between high DHA concentrations in ejaculate and spermatozoa and sperm motility [43-44]. Dietary intake of Omega 3s is a factor in the production and function of normal spermatozoa [45].

### **Discussion**

Extensive review of the literature revealed strong associations between dietary intake of Omega 3s and health benefits for men. Oily fish species such as salmon, herring, trevalla, mackerel and sardines, are considered to be optimal sources of Omega 3s (EPA and DHA) and should feature in strategies designed to increase dietary Omega 3 intake [46].

The majority of literature and research on the health benefits of Omega 3s relate to the prevention and management of chronic diseases. Although chronic diseases affect both genders, men are at greater risk as they are less likely to take action to improve their own health unless they are faced with a health scare [47]. Furthermore, they are more likely to increase their risk of preventable health conditions due to their high level of risk taking behaviours and less health promoting behaviours [48]. It has been suggested that traditional constructs of masculinity actually facilitate risk taking behaviours and that men do not make food choices based on healthy outcomes rather on male habitual behaviour or learned



socialisation [48, 49]. For example, men are more likely to regularly consume red meat than fish due to perceptions that red meat are a more ‘manly choice’ that is traditionally associated with male dominance and power [49]. Therefore any initiative that seeks to increase seafood consumption in males should consider current gender attitudes towards particular food and the influence of socialisation on food choices [50]. Strategies should also focus on encouraging men to be proactive about their dietary intake rather than wait until an adverse health issue emerges before taking action [47].

The importance of gender equity in health and health policy was highlighted in 2002 by the release of the Madrid statement by the WHO [31]. In 2009, the Australian government recognised the importance of men’s health by developing a specific men’s health policy. This policy supports a holistic approach to health, acknowledging the significant effect of social, environmental and behavioural risk factors that lead to chronic illness most prevalent amongst men [51]. The development of the men’s health policy in Australia is a positive step toward encouraging men to be more proactive about their health. It is also a significant step in combating stereotypical ‘norms’ common in Australian society that link unhealthy diets with male dominance, prowess and power. Health promotion interventions or campaigns should be supportive of current health policies that encourage men to consider factors that impact on poor nutritional status such as: habitual consumption of unhealthy foods; traditional roles of males that include unhealthy dietary practices; diet and development of chronic conditions; and the importance about being proactive about their own health rather than wait for adverse health issues to arise before taking action [46].

## **Conclusion**

There is conclusive evidence of an association between the dietary intake of Omega 3s and health benefits for men. However, men are less likely to consume fish as a main protein source in preference to traditional diets high in red meats. Health promotion interventions should consider: the attitudes of men toward food and the impact of these attitudes on food choices; the association between seafood and other protein sources within the male psyche; and the role that particular foods play for males in traditional social situations.

Tailored initiatives must be development, implementation and evaluation to support men to adopt healthy eating practices. However, is it essential to acknowledge the complex and inter-related factors that impact upon current dietary status in order to encourage men to adopt healthier dietary behaviours.

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