



European Respiratory
Society

ERS response to the Commission Green Paper on healthy diets and physical activity

The European Respiratory Society (ERS) www.ersnet.org is a not-for-profit, international medical organisation with over 7,000 members from 100 countries and was founded in 1990. It is the largest society in Europe in its field. The main objective of the Society is to promote respiratory health in Europe in order to alleviate suffering from respiratory disease. This is accomplished by promoting basic epidemiological and clinical respiratory research, collecting and disseminating scientific information, organising congresses and conferences, producing scientific publications, supporting training and continuous education in respiratory medicine and collaborating with organisations representing patients.

Its sister organisation the *European Lung Foundation (ELF)* www.european-lung-foundation.org was created by the ERS in 2000 with the mission of helping the European scientific community share its expertise in respiratory medicine with the public. The *ELF* is the only pan-European foundation dedicated to lung health.

General comments

In Europe, respiratory disease ranks second in terms of mortality, incidence, prevalence and cost after cardiovascular disease (1). Recent changes in lifestyle with increases in the consumption of unhealthy foods, obesity and a decrease in physical activity, affect the health of both individuals and populations.

The ERS welcomes the Commission initiative to consult stakeholders on promoting healthy diets and physical activity across the EU. The impact of lifestyle risk factors on the incidence and severity of a number of respiratory diseases has been studied in a variety of settings; however, further studies are needed in order to understand the link between respiratory diseases and diet.

Nevertheless, there is evidence that a healthy diet, maintenance of normal weight, not smoking and being physically active contribute to the prevention of chronic respiratory diseases. To tackle these problems EU wide policy decisions and measures are necessary.

Specific comments

1. Health across EU policies

- **Research**

It is important to recognise that diet, obesity and physical activity impact on respiratory diseases. A public health message, which is consistent and practical, needs to be developed encompassing the relationship between these lifestyle factors. Further longitudinal and interventional studies demonstrating that improvements of diet, weight management and physical activity improve respiratory health will provide further justification for promoting these lifestyle choices.

Diet and respiratory diseases

Scientific studies show that a balanced diet has the potential to reduce the prevalence and severity of respiratory disease, especially asthma and chronic obstructive pulmonary disease (COPD). However, intervention studies will be required to clarify the role of diet on respiratory disease.

Increased intake of fruit and vegetables, antioxidants, flavonoids, fish and omega-3 (n-3) fatty acids are all associated with higher lung function.

High fruit intake (24); higher intake of cruciferous vegetables such as broccoli and cabbage in individuals with a specific genotype (25); and a diet high in phytoestrogens have all been shown to be associated with a lower risk of lung cancer

Despite this scientific evidence, more research is needed as the clinical potential of nutrients is still not clear and not fully understood. More studies should be carried out in order to determine whether diet influences the severity of respiratory diseases and, if there is any effect, whether there is a reversible component.

Much of the evidence evaluating the relationship between diet and asthma focuses on the associations between dietary antioxidants and the prevalence of asthma. In general, the evidence suggests **a diet higher in either antioxidants (vitamin C, vitamin E, vitamin A/beta-carotene and flavonoids) or fruit and vegetables reduces the risk of asthma** (2-5). However, clinical trials of single nutrients have not demonstrated a reduction in severity of disease or incidence of disease (6-8), and although there is evidence from children living in an urban environment that supplementation with both vitamin C and E reduces bronchoconstriction as a result of ozone exposure (9), the clinical implications of this observation are unclear.

In addition, **a higher intake of fish is associated with a lower prevalence of asthma**, possibly as a consequence of the increased intake of omega-3 (n-3) fatty acids, although intervention studies have demonstrated no effect on asthma control (10). Other potentially important nutrients for asthma that may reduce the prevalence of asthma if consumed in higher quantities include **magnesium and selenium** (2;3;11), although the clinical potential of these nutrients remains to be clarified.

As with asthma, **increased intake of fruit and vegetables, antioxidants, flavonoids, fish and omega-3 (n-3) fatty acids are all associated with higher lung function** (2;4;5;13-15). There is evidence from prospective studies which suggest that a diet rich in vitamin C (16) or fruit intake (17) reduces the rate of decline of forced expiratory volume in one second (FEV₁) over time. However, three large intervention trials, each lasting at least 5 years, using beta-carotene with; vitamin E (18); vitamin A (19); or vitamins C and E (20) failed to demonstrate an effect on a variety of symptoms related to COPD and lung function indicating that it is unlikely that these nutrients modify the natural history of COPD.

The potential importance of adequate nutrition on pulmonary health is supported by the observation that adults with anorexia nervosa have changes consistent with emphysema on CT scanning (21). As weight loss is common in established COPD, adequate nutritional levels especially of carbohydrates to avoid weight loss are considered important (22). However, a recent systematic review of caloric nutritional supplementation for COPD demonstrated no significant effect on anthropometric measures, lung function or exercise capacity (23), and further investigation is required on this topic.

Diet is potentially important for other lung diseases, and biological mechanisms can be identified that permit the generation of hypotheses that diet may impact on the incidence and severity of a variety of lung diseases such as lung cancer, acute respiratory infections and cystic fibrosis.

The epidemiological studies on the effect of diet on the risk of lung cancer are conflicting, possibly reflecting the heterogeneous nature of the methodology and populations studied. The following have all been demonstrated to be associated with a lower risk of lung cancer; high fruit intake (24); higher intake of cruciferous vegetables such as broccoli and cabbage in individuals with a specific genotype (25); and a diet high in phytoestrogens (26). **It has been estimated that low fruit and vegetable intake may account for up to 8% of airway and lung cancers in high-income countries** (27). However, the few intervention studies carried out using large study populations have been disappointing, with two randomised controlled trials demonstrating that beta-carotene given with (28) or without (29) vitamin E is associated with a 18-28% excess risk of developing lung cancer.

Vitamin A adjunctive therapy has no benefits in effect on children with pneumonia (30;31), although it has been found to reduce secondary morbidity in children with measles (32).

The observation that children with cystic fibrosis (CF) have increased energy requirements, but reduced gastrointestinal absorption of nutrients, and that poor nutrition is associated with worse outcomes, has stimulated much interest in the use of dietary manipulation in CF. People with CF are often given calorie-fortified drinks, although this has not been systematically evaluated in clinical trials and their benefits remain uncertain (33). The use of omega-3 fatty acid supplements in people with CF is attractive in view of their potential anti-inflammatory activity and limited adverse effects. However, a Cochrane review concluded that there is insufficient evidence to draw firm conclusions or recommend their routine use in CF, and that trials carried out over a longer period of time are required to determine their clinical benefits (34).

Current evidence from intervention studies suggests that **a diet high in salt may increase the severity of disease in those with asthma (3), and pulmonary function may improve in people with asthma who adopt a low salt diet (12)**; however larger trials are needed to clarify the clinical significance of these observations. In addition, an increase in the dietary intake of both n-6 fatty acids and the *trans*-fatty acids has been identified as potentially contributing to the increases in incidence and severity of asthma in recent decades, although little direct evidence from clinical studies exists as yet to support this hypothesis (2-5).

Obesity and respiratory diseases

Obesity is associated with an increased risk of asthma and obstructive sleep apnoea (OSA). The potential for weight loss to improve the severity of these diseases is unclear and needs further study.

The effect of obesity on respiratory disease, both in terms of incidence of disease in the obese, as well as the impact of increased weight in childhood on subsequent risk of disease in adulthood also needs further examination.

A variety of studies have demonstrated that **obese people have a greater risk of developing asthma, have increased airway hyper-responsiveness, and have decreased lung function** - although it remains uncertain if obesity is the factor responsible for increasing asthma risk (rather than an associated factor eg low levels of physical exercise). This is an important area for further study, since one estimate from the USA indicated that **15-38% of asthma in adults might be caused by obesity** and thus may be considered preventable if the relationship between obesity and asthma is causal (35).

Obesity is also an important risk factor for obstructive sleep apnoea (OSA), a common condition in middle age that affects up to 5% of middle-aged adults (36). However, a recent Cochrane review highlighted the absence of any randomised controlled trials demonstrating the benefits of weight loss on OSA (37), despite this being a standard component of the lifestyle advice routinely given to overweight patients with this disease (36).

Obesity may be important with regard to susceptibility to respiratory infections in children (38). Although body mass index is inversely associated with lung cancer, and waist-hip ratio is positively associated with this disease, these effects are probably secondary to smoking and not an independent effect (39).

Physical activity and respiratory diseases

Physical activity reduces the severity of COPD, although the functional effect on other respiratory diseases remains unclear.

There is evidence suggesting that breathing exercises for asthma may improve asthma severity, although more studies of the benefit of physical activity for asthma are needed.

There is also evidence suggesting that increased physical activity is associated with a reduction in the risk of lung cancer of up to 30%.

More studies are needed to understand the relationship between physical activity and respiratory diseases, notably asthma

In the absence of a clear explanation for the increase in the prevalence of asthma in Western countries, **a decrease in levels of physical activity in children has been proposed as a factor that may contribute to asthma aetiology**, and data testing this hypothesis are required (40). A recent Cochrane review of the effect of physical training on asthma severity concludes that **physical training leads to an improvement of cardiopulmonary fitness**, although no effect was observed on lung function or number of days with wheeze, and the impact on quality of life is unclear (23). The review concluded that more studies of the benefits of physical activity for asthma were needed. In addition, **there is evidence suggesting that breathing exercises for asthma, may improve asthma severity as assessed by a variety of outcome measures including quality of life (41).**

An increase in physical activity also has been shown to be related to a decreased rate of decline of lung function over 25 years of follow-up (42). As well as potentially delaying the onset of COPD, physical activity is also important for reducing severity of disease. **A recent meta-analysis of people with COPD who attend a programme of pulmonary rehabilitation for at least 4 weeks, demonstrated an improvement in terms of quality of life and exercise capacity (43).** In view of the high prevalence of COPD (1), access to these programmes should be considered a priority for the provision of healthcare.

Physical training programmes combining aerobic and anaerobic training improves exercise capacity in people with cystic fibrosis and may have other health benefits (44).

While it is likely that the benefits of physical training for people with bronchiectasis are similar to those with COPD, individuals with this disease have not been specifically recruited in many studies. Breathing muscle training may improve breathing, capacity for exercise and quality of life for people with bronchiectasis although data are only available from two reports including a total of 43 patients who received the intervention for a maximum of eight weeks (45). **There is also evidence suggesting that increased physical activity is associated with a reduction in the risk of lung cancer of up to 30% (46).**

- **Education and training**

Health professionals play an important role in improving patients' understanding of the relation between diet, physical activity and health, and in promoting changes in lifestyle. Improved understanding of the link between respiratory diseases and diet would help support the evidence base for this health promotion.

Postgraduate courses and training seminars should be organised in order to provide health

professionals with nutritional information that can be used to encourage patients' to change dietary behaviours. Courses would aim to disseminate knowledge on the role played by diet in respiratory diseases, and could focus on topics such as mechanisms by which diet influences lung health as well as evidence on the role of diet in the development and the course of respiratory diseases.

Furthermore, and as mentioned elsewhere in this paper, physical activity and breathing muscle training may reduce asthma severity and decreased rate of decline of lung function. Courses on specific exercises that can contribute to reduction of disease prevalence and severity should also be organised for healthcare professionals.

Finally, it should be noted that patterns of physical activity and life-style is laid down in childhood and adolescence thus information on the benefits of healthy lifestyles, physical activity and better diet should be included in school programs.

- **Agriculture and Common Agriculture Policy**

As noted by the World Health Organisation, in its global strategy on diet, physical activity and health, the collaboration between the health and agricultural sectors is essential in the implementation of national strategies on diet and physical activity. Agricultural policy plays an important role in determining the quality of food available to consumers in the EU. Production of healthy crops, such as vegetables and fruits, should be encouraged and health programmes to raise awareness of risks associated with a poor diet should be promoted.

The Council decision to phase out tobacco subsidies linked to production was a welcome step forward in this direction.

2. Consumer information and education

A public health message, which is consistent and practical, needs to be developed and disseminated through a number of channels. The general public should be aware that eating a healthy diet, maintaining an appropriate weight, being physically active and not smoking contributes to prevent diseases. Health organisations should be involved in developing policies.

Public knowledge on the relationship between diet and physical activity should be improved and changes in dietary behaviours should be promoted.

3. Building overweight and obesity prevention and treatment into healthcare services

Health professionals play a key role in delivering clear and practical messages to patients and in encouraging changes in dietary behaviour. Practical advice to patients and families on the benefits of diet as a protective risk factor can be provided during routine contacts. Patients should also be made aware of the benefits of physical activity to improve quality of life.

Member States should be encouraged to promote education and training across all health care disciplines and to commit more resources to prevention. The European Respiratory Society is currently developing a European-wide postgraduate curriculum for respiratory specialists (HERMES) and is looking at how best to incorporate training on diet and physical activity into this project.

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