

Diet-Related Chronic Diseases: Nutritional Determinants, Mechanisms and Prevention Strategies

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DESCRIPTION

Diet-related chronic diseases have emerged as one of the most significant public health challenges worldwide, driven largely by changes in dietary patterns, urbanization and lifestyle transitions. These diseases, which include obesity, cardiovascular disease, hypertension and certain cancers, contribute substantially to morbidity, mortality and economic burden. Nutrition and food science research has increasingly emphasized the critical role of diet quality, nutrient composition and eating behaviors in both the development and prevention of these chronic conditions. Understanding the mechanisms linking diet to disease and implementing effective interventions are central to reducing their global impact.

Poor dietary habits are among the leading contributors to chronic disease risk. Diets high in energy-dense, nutrient-poor foods that are rich in added sugars, saturated fats and sodium but low in fiber, vitamins and minerals promote the development of metabolic imbalances. Excess caloric intake, when combined with physical inactivity, results in overweight and obesity, which are major risk factors for insulin resistance, cardiovascular complications and certain cancers. Conversely, diets emphasizing fruits, vegetables, whole grains, legumes, lean proteins and healthy fats are associated with reduced risk of chronic disease and improved long-term health outcomes.

The mechanisms linking diet to chronic disease are multifactorial and complex. Excessive consumption of saturated and trans fats contributes to dyslipidemia and atherosclerosis, increasing the risk of cardiovascular events. High dietary sodium is strongly associated with elevated blood pressure, a major risk factor for stroke and heart disease. Diets low in dietary fiber impair glucose regulation and reduce satiety, promoting overeating and insulin resistance. Additionally, inadequate intake of micronutrients such as magnesium, potassium and antioxidants can exacerbate oxidative stress and inflammation, further increasing chronic disease risk. Emerging evidence also highlights the role of gut microbiota in mediating the effects of diet on metabolic health, suggesting that prebiotics, probiotics and fiber-rich foods may play a protective role.

Obesity and overweight are central contributors to the global burden of diet-related chronic diseases. Excess adiposity is associated with chronic low-grade inflammation, insulin resistance and altered lipid metabolism. These metabolic disturbances increase the likelihood of developing cardiovascular disease and certain hormone-related cancers. Childhood and adolescent obesity are of particular concern, as early-onset overweight often persists into adulthood, amplifying lifetime disease risk and reducing quality of life. Public health strategies aimed at preventing excessive weight gain through healthy dietary patterns and physical activity are therefore important.

Type 2 diabetes and cardiovascular disease represent some of the most prevalent and preventable diet-related chronic conditions. High intake of refined carbohydrates, added sugars and saturated fats contributes to hyperglycemia, insulin resistance and dyslipidemia, all of which increase disease risk. Conversely, adherence to dietary patterns such as the Mediterranean diet, which emphasizes vegetables, fruits, whole grains, legumes, nuts, olive oil and moderate consumption of fish and poultry, has been consistently associated with lower incidence of cardiovascular disease and improved glycemic control. Dietary fiber, antioxidants and polyphenols in such diets exert protective effects through improved lipid profiles, reduced inflammation and enhanced endothelial function.

Cancer is another major category of diet-related chronic diseases. Diets high in red and processed meats, low in fruits and vegetables and deficient in fiber and protective micronutrients have been linked to increased risk of colorectal, gastric and other cancers. Conversely, bioactive compounds such as carotenoids, flavonoids and other phytochemicals may help neutralize free radicals and modulate cell proliferation, contributing to cancer prevention. Nutritional strategies for cancer prevention focus on promoting diverse, plant-rich diets while limiting processed and energy-dense foods.

Preventing diet-related chronic diseases requires a multifaceted approach that integrates individual, community and policy-level interventions. Nutrition education, food labeling and behavior change programs can empower individuals to make healthier dietary choices. Public health policies that regulate food

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marketing, improve access to affordable nutritious foods and encourage reformulation of processed foods to reduce sugar, salt and unhealthy fats are critical for population-level impact. Additionally, promoting food environments that support healthy choices, such as school meal programs and workplace wellness initiatives, can further reduce chronic disease risk.

In conclusion, diet-related chronic diseases represent a major global health challenge with far-reaching consequences for individuals and societies. Unhealthy dietary patterns, combined

with sedentary lifestyles and other risk factors, drive the development of obesity, cardiovascular disease, hypertension and certain cancers. Evidence from nutrition and food science highlights the protective effects of nutrient-rich, balanced diets and underscores the importance of public health strategies that promote healthy eating. Addressing these diseases requires a coordinated effort involving research, policy, education and community engagement to improve dietary behaviors, reduce disease risk and enhance overall health outcomes worldwide.