Tackling chronic diseases: the potential of preventive medicine through improvements to diet

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A major challenge for Western societies over the next 50 years is to reduce the frequency of the major chronic diseases; cardiovascular disease, cancer and age-related degenerative diseases. These diseases are particularly exacerbated by the metabolic syndrome which is increasing in frequency associated with a general increase in obesity, linked to declining levels of exercise and increasingly poor diets. Numerous epidemiological studies have demonstrated the efficacy of diets high in fruit and vegetables in reducing the incidence of cardiovascular disease, cancer and age-related degenerative diseases. The importance of fruit and vegetables in the diet comes from them contributing a number of important phytonutrients or bioactives which often serve to promote antioxidant defence mechanisms. However, despite the specific recommendations of the “five-a-day” program of the National Cancer Institute of America (Launched 15 years ago and now adopted by many countries) which encourage consumption of at least five servings of fruit or vegetables a day, the most recent estimates are that only 23% of the US population reach these dietary targets and, even more worryingly, that the numbers of people that do reach them have declined in recent years. These figures argue strongly for strategies to increase the levels of health-promoting bioactive compounds, in the fruits and vegetables that people actually consume in significant amounts. Plant biotechnology can make a very significant contribution to exploring this option in a number of ways: developing model foods that test the importance of specific bioactives in promoting particular aspects of health, developing markers that allow molecular breeding for enhanced levels of bioactives in crops and genetic engineering that provides novel, health-promoting foods. Due mainly to the increasing cost of curative medicine, preventive medicine is becoming crucial for improving health in Western societies. Amongst non pharmacological interventions, nutritional improvements developed through plant breeding and plant genetic engineering represent a feasible means of developing preventive strategies against chronic degenerative diseases for the future.