

Are Nutrition-Induced Epigenetic Changes the Link Between Socioeconomic Pathology and Cardiovascular Diseases?

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The prevalence of cardiovascular diseases (CVD) and diabetes mellitus type 2 (DM 2) is decreasing in developed countries despite the increase in the percentage of subjects with obesity and other well-recognized cardiovascular risk factors. In contrast, the recent transition of the economic model experienced by developing countries, characterized by the adoption of a Western lifestyle, that we have named “socioeconomic pathology,” has led to an increase in the burden of CVD. It has been demonstrated that conventional cardiovascular risk factors in developed and developing countries are the same. Why then does the population of developing countries currently have a higher incidence of CVD than that of developed countries if they share the same risk factors? We have proposed the existence of a higher susceptibility to the development of systemic inflammation at low levels of abdominal obesity in the population of developing countries and the consequent endothelial dysfunction, insulin resistance, DM 2, and CVD. In contrast, an important percentage of obese people living in developed countries have a healthy phenotype and low risk of developing CVD and DM 2. Human epidemiologic studies and experimental dietary interventions in animal models have provided considerable evidence to suggest that nutritional imbalance and metabolic disturbances early in life may later have a persistent effect on an adult’s health that may even be transmitted to the next generations. Epigenetic changes dependent on nutrition could be key in this evolutionary health behavior, acting as a buffering system, permitting the adaptation to environmental conditions by silencing or increasing the expression of certain genes.

Keywords: obesity, metabolic syndrome, epigenetic, adaptive response, socioeconomic pathology

INTRODUCTION

Worldwide, cardiovascular diseases (CVD) are the leading cause of death. It is calculated that 3.8 million

men and 3.4 million women die each year of this cause.¹ Moreover, an increase from 47 million disability-adjusted life years in 1990 to 82 million is globally projected for 2020.² Although age-adjusted cardiovascular death rates have declined in several developed countries, rates of CVD have greatly risen in low- and middle-income countries, with approximately 80% of the burden now occurring in the latter.³ It has been estimated that 5.3 million deaths attributable to CVD occurred in developed countries in 1990 in contrast with 8 to 9 million in developing countries.⁴ In the United States between 1972 and 2002, the CVD death rate declined by 54%, especially because of the decline in coronary heart disease (CHD) and stroke mortality (62%).⁵

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