Early determinants of cardiovascular diseases in the life course: a paradigm shift to prevention

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Recently, the Brazilian literature has shown an increase in the number of publications investigating the origins of atherosclerosis and its risk factors since the early stages of patients' life. This trend reflects a new way of thinking about heart disease as the result of complex interactions among multiple factors over the life course of an individual and not just as a result of genetic inheritance and behavior in adulthood. This model includes the study of possible mechanisms, such as biological, behavioral, and psychosocial, throughout life and also across generations. In addition, it incorporates the concept that noxious stimuli, occurring during periods seem as critical for development, may lead to permanent changes in metabolism and body structure[1]. The first critical period in that model would be the intrauterine phase. During this period, noxious stimuli, such as maternal malnutrition, could cause permanent changes in fetal metabolism. These modifications, according to the environment that the individual will face outside the womb, may predispose to the development of chronic diseases in adulthood[2,3], or even during childhood and adolescence[4-6]. After the intrauterine stage, the next critical periods are neonatal, childhood, and adolescence. Regarding cardiovascular disease, changes due to atherosclerosis can be identified long before the onset of disease symptoms. Autopsy studies of children and young adults have shown a correlation between the presence of coronary lesions and risk factors, such as dyslipidemia, hypertension, and smoking, highlighting the need to investigate the source of disease at the earliest stages of life[7]. Lifestyles that cause atherosclerosis may begin in childhood[8], which has resulted in the increased prevalence of traditional risk factors in this age group, with potential effects on the prevalence of chronic diseases in a not too distant future. The great importance of this paradigm shift lies in the emergence of new opportunities for prevention. Cardiovascular diseases are the leading cause of death in Brazil, and the WHO predicts a large overall increase over the next decade[9]. For the first time in human history, except for times of war, the current generation will have a shorter life than the generation of their parents[10]. This sad reality may be attributed to the increased prevalence of risk factors, particularly obesity. Therefore, the life course approach allows us to think about prevention as a process that begins even *in utero* with maternal nutrition and appropriate prenatal care, and continues throughout childhood and adolescence with the development of healthy habits and involvement of the whole family to prevent the occurrence of risk factors. Interventions in these early stages of life can have a significant impact in the future.

We could hypothesize that the prospects for the future can be even more obscure if we consider the differences in prevalence of cardiovascular risk factors in childhood between the current adult generation and the prevalence of these same factors in today's children, tomorrow's adults[11-13]. Evidence shows that Brazilian children have worrying levels of obesity[14,15-19], hypertension[20,21], sedentary lifestyle[22,23], dyslipidemia[24], inadequate dietary habits[25], and insulin resistance[26], usually presenting multiple risk factors.

There is a large group of researchers and professionals considering these issues in our country, which is reflected in the increase of qualified scientific production in this area. Now is the time to join forces, focusing on the identification of early risk markers[27] to develop more effective prevention strategies, avoiding the consequences of an epidemic of chronic diseases in the near future[28].

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