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Asymmetry of the a-b ridge count in low-back pain sufferers

Fluctuating asymmetry of paired morphological structures is regarded as a measure of developmental stability. To test whether poorly canalized individuals are highly sensitive to postnatal environmental influence, we accepted the exogenous disease low-back pain as an example of such sensitivity. Asymmetry of the palmar a-b ridge count was examined in 217 males suffering from low-back pain against 300 healthy controls. Low-back pain patients showed significantly higher values of asymmetry indices indicating lower developmental stability. The results suggest that dermatoglyphic asymmetry can mark phenotypes weakly adapted to postnatal stress.

Key words: asymmetry, dermatoglyphics, low-back pain

Introduction

It is common knowledge that the strategy of fetal development and postnatal life of an organism is determined both by genetic control and exogenous impact. Susceptibility to developmental noise depends on genotype properties, and precisely on its buffering capacity. Waddington (1957) introduced the term "canalization" to describe the ability of a genotype to resist random environmental accidents and to direct development along an adaptive pathway. One of the manifestations of disability of the genotype to maintain a developmental program properly is asymmetry. As genetic information is identical for both sides of the body, the degree of departure from perfect symmetry shows how accurately the process of development is controlled. There are three types of bilateral asymmetry, distinguished from each other by the combination of mean and variance of signed right-minus-left (R-L) differences (Van Valen, 1962; Palmer & Strobeck, 1986). 1) Antisymmetry, which is diagnosed when either body side shows greater development, with an equal incidence of the more developed side (bimodal distribution of R-L with mean of zero); 2) Directional asymmetry, which is characterized by a consistently greater development of a particular side (normal distribution of R-L with mean significantly different from zero); 3) Fluctuating asymmetry, which is described as a greater development of either side, random in direction (normal distribution of R-L with mean of zero). Just the latter type of asymmetry is a result of environmentally induced perturbations in morphogenesis and is regarded as a measure of the regulatory capacity of a developmental system. The relationship between fluctuating asymmetry and the ability of the genotype to produce an adaptive phenotype is the subject of the present study. Our working hypothesis was based on two assumptions: 1) poorly canalized organisms are less resistant to stress not only in early fetal life, but also after birth; 2) susceptibility to postnatal environmental influence manifests itself in liability to exogenous diseases. In other words, if individuals prone to such a disease show signs of decreased developmental stability (i.e., high asymmetry levels) it may be indirect evidence that the poorly buffered genotype does create a non-adaptive phenotype. We accepted low-back pain as an example of an exogenous disease. Although few studies

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