CRANIOFACIAL DEVELOPMENTAL INSTABILITY AND MASTICATORY BEHAVIOR

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Environmental stress related to changes in dietary behavior or composition may alter the course of growth, manifesting in the phenotype as developmental instability. Two potential measures of instability, morphological integration (MI) and fluctuating asymmetry (FA), vary ontogenetically and may indicate exposure to stressful conditions during an individual's lifetime. These parameters may provide insight into altered behaviors, such as food choice, affected by environmental conditions. To evaluate the effect of dietary properties and correlated masticatory stress on facial integration and asymmetry, sibling groups of weanling white rabbits (*Oryctolagus cuniculus*) were divided into two dietary treatment groups for 3.5 months until subadult. The 'over-use' cohort (n=10) was raised on a fracture-resistant diet of intact rabbit pellets and hay blocks. The 'under-use' cohort (n=10) was raised on a soft diet of powdered pellets. Bootstrap analyses (1000 nonparametric resamples; $p \leq 0.05$) of 378 linear distance pairs revealed significant differences in MI of the facial skeleton between cohorts with appreciable differences in the directions of many linear distance pair correlations. Accounting for directional asymmetry, 'over-use' rabbits also exhibit significantly greater FA ($p \leq 0.05$) between 48 bilateral landmark distances versus 'under-use' rabbits. Therefore, long-term variation in masticatory behavior linked to differences in dietary physical properties may result in differential growth of the facial skeleton within individuals. Indicators of developmental instability such as MI and FA thus warrant further consideration as measures of the impact of juvenile environmental factors on adult morphology and performance. Such information has implications for understanding the phenotypic correlates of epigenetic influences on human development.