Abstract

Cleft lip is one of the most common human birth deffects. Its etiopathogenesis is multifactorial and many aspects of its occurrence remain unknown in the fields of both genetics and teratology. One of the set of known negative external factors causing cleft lip is chemical hydrocortisone. Its effect on cell proliferation is highly heterogeneous and depends on attributes of a specific cell population. In this work we studied the cleft beak origin after the hydrocortisone treatment on the basis of Chick Embryotoxicity Screening Test (CHEST). Our main aim was to detect cell cycle changes in the chick frontonasal process after hydrocortisone injection via flow cytometry analysis. Hydrocortisone caused S phase arrest within a minor subpopulation of highly granular cells with specific cell cycle. This sensitive subpopulation was localized in the areas of previously defined proliferative centers within the frontonasal process using immunohistochemistry of frozen sections. Quantitative analysis of cells in these areas revealed significant decrease of M phase portion in the hydrocortisone treated samples in comparison with the control samples. The TUNEL staining of histological sections was used to determine the apoptotic rate in the frontonasal process. The comparison between the control and the hydrocortisone treated samples didn´t reveal any differences.

Our results show that cells in the areas of the proliferative centers in the chick frontonasal process are slowed down in the S phase of the cycle after the hydrocortisone treatment. This is reflected in lower proliferation of these cells. Apoptosis isn´t part of the negative effect of hydrocortisone in the frontonasal process. It can be therefore excluded as the substantial agent in the ethiopathogenesis of a cleft beak after hydrocortisone treatment.

Key words: Cleft lip, hydrocortisone, cell cycle, S phase, CHEST, flow cytometry, immunohistochemistry, TUNEL, apoptosis