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QUANTITATIVE CHARACTERISTICS OF BONE TISSUE OF THE HUMAN MAXILLA IN THE CONSTRUCTION CONTENT OF TRACE ELEMENTS (K, FE, CO, SR, ZN) IN THE DYNAMICS OF PRENATAL ONTOGENESIS

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The updated and substantiated understanding of the patterns of the upper jaw growth in prenatal ontogenesis contributes both to the diagnosis of congenital malformations and the prevention of prenatal injury to the maxillofacial area. In this regard, determining the density of bone tissue, that is, its mineralization, whose impairment forms the basis for the development of various defects, is as important as studying inter-tissue relations in the process of histo- and organogenesis, including epithelio-mesenchymal ones.This research was conducted to study the quantitative content of trace elements (K, Fe, Co, Sr, Zn) in the dynamics of prenatal ontogenesis as a fundamental material of bone tissue.

By means of atomic emission (AES) and atomic absorption (AAS) spectrometry and statistical processing, as well as variational and dynamic analysis programs, the relative values for each trace element were obtained while studying the bone tissue from abortion and sectional material of the upper jaw in 131 human fetuses (Ukrainians).

These results as the mean value of the studied parameter (M), standard deviation (m), paired student's t-test or reliability value (t), and the probability levelwhere the comparison values of the first and fourth groups are: for potassium (K) – 0.188 ± 0.006 in the first and 0.144 ± 0.019 in the fourth group ($t = 2.21$, $p<0.05$); for iron (Fe) – 0.348 ± 0.027 and 0.435 ± 0.057 ($t = 1.38$, $p>0.05$); for cobalt (Co) – 0.086 ± 0.006 and 0.059 ± 0.008 ($t = 2.70$, $p<0.01$); for zinc (Zn) –0.905 ± 0.035 and 0.303 ± 0.032 ($t = 12.81$, $p<0.001$), which substantiates the high reliability of the findings, the quantitative determination of the content of trace elements simultaneously reflects the quality of the bone tissue of the upper jaw of human fetuses in prenatal ontogenesis.

The dynamics of iron trace content (Fe) has a positive growth pattern in almost all age periods of prenatal ontogenesis; accordingly, there is a positive growth rate (%): between the second and third groups it increases by 34.62 %; between the third and fourth – by 52.15 %; between the first and the fourth – by 102.67 %, except for a moderate decline in the second group (17-24 weeks), therefore, the growth rate between the first and second groups has a significant but negative value(–1.05 %). A slight increase (%) of zinc (Zn) with the sign "+" is observed in the second experimental group (+3.99 %), and rapidly decreases in the third (–9.34 %) and the fourth (–42.43 %) groups, which is a positive reflection of the qualitative parameters of fetal bone tissue.

Our study have found that the age dynamics of all values of the trace elements content in the prenatal ontogenesis of the upper jaw of human fetuses significantly correlates with both the decrease and growth – in the first (11-16 weeks of IUD), the second (17-24 IUD) , the third (25-29 weeks of IUD) and the fourth (30-40 weeks of IUD) experimental groups, which is directly proportional to the re-distribution of trace elements for the construction of organs and systems in these age periods.The regularity of the dependence and ratio of the content of cobalt (Co) and iron (Fe) in the first, second and third experimental groups were studied. There was a slight correlation between dependence and direct correlation on the reduction of zinc (Zn) and iron (Fe) in all groups. Studying the patterns of dynamics of the density of bone tissue of the upper jaw in human fetuses, depending on the mineral composition and the presence of the revealed synchronism of these processes, suggests that the change in density is indicative of a change in the content of certain mineral elements. In our opinion, this provision may be the basis for the development of new techniques for early diagnosis of congenital anomalies of the maxillofacial area at the preclinical stages of its development and the methods of their prevention, through the correction of the mineral composition.