FRACTAL ORGANIZATION IN HUMAN DENTAL SYSTEM

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Summary

On the basis of the analysis of literature data and own research are presented scientific facts about the regularity of the spiral biosymmetry manifestations in nature and in the organization and shaping of the structural elements of the human dentition. This feature of the structure, particularly the teeth and periodontal allows them to perform optimally their physiological functions based on their biomechanical properties.

Key-words: Fractals, spiral biosymmetry, enamel, вутешт lines of Retzius

Fractals (from lat. fractus - broken) are objects that have two important features: the affectation and self-similarity (or scale invariance). Fractals can be seen most clearly in the shaping of nature: seashells, trees, leaves and petals of flowers, human lung, the outlines of the clouds. Fractal geometry is elegant and compact way of information and description of the complex. Fractals reveal the complex simplicity. N. A. Zarenkov (2009) gives the following definition of fractals. Fractals are called lines, shapes (square, triangle, etc.) and the body, with the following properties: 1) symmetry of the self-similarity – “part is like a whole”, 2) a fractional dimension, and 3) other than the usual figures, the ratio of perimeter to area or other than normal bodies, the relative magnitude of the surface. Fractals are very diverse and perform the functions of the modules [1].

It is known that a logarithmic spiral with an angle of 22-25° is a typical circuit, which is implemented in many natural objects: the structure of galaxies, sea shell, the protein molecules, DNA, and others, including the structure of the heart [2].

The triangle of the Bonneville and the occlusal plane have a common point of intersection, and the angle formed between the planes is 20-25° (average 22,5°). According to other authors, this angle is an average of 22° [3].

Enamel prisms begin at the enamel-dentin border and go to the enamel surface, repeatedly twisting in a spiral. In the longitudinal section of the tooth, as is commonly believed, the lines of Retzius are at an angle of 15-30° (average 22,5°), and the transverse sections are arranged in a line of concentric circles, some authors compared with annual growth rings in cross sections of tree trunk. Toward the chewing surface of the tooth Retzius lines change their direction, becoming longer, and some of them, starting at the enamel-dentin border on the lateral surface of the tooth, arched round the chewing cusp region and ends at the enamel-dentin border, but on the chewing tooth surfaces. As the enamel prisms, dentin collagen fibers in the crown of the tooth are parallel to

the longitudinal axis of the tooth-shaped and eight spirally curved and provide functional stability under the vertical load. In the trenches of enamel prisms are located throughout the next coming prisms, which meander along, providing a spiral moves in a horizontal direction. On the basis of own studies V. G. Vasiliev (1974, 1982) revealed some peculiarities in the structure of the fibrous structures of periodontal that were not previously described in scientific literature. He found additional groups of fibers; one of them on different sides and levels creates a spiral course of beams, making two curls around the tooth root. The angle of the spiral from the neck of the tooth to the tip of the root consistently increased from 10° to 35° [4]. As noted by Professor A. I. Betelman (1956), the lower jaw in the corner has a S-shaped form. [5]. On this particular configuration of contact surfaces mentions S. V. Radlinsky in the article “Restoration of the contact surfaces of the lower front teeth” (2008): “frontal profile of the contact surfaces of the lower front teeth, both upper and have an S-shape, consisting of convex and concave crown cervical parts” [6].

From the presented scientific evidence that at different levels of morphological and histological structure of the tissue dentition shows a general trend of tissue organization on the basis of helicity.

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