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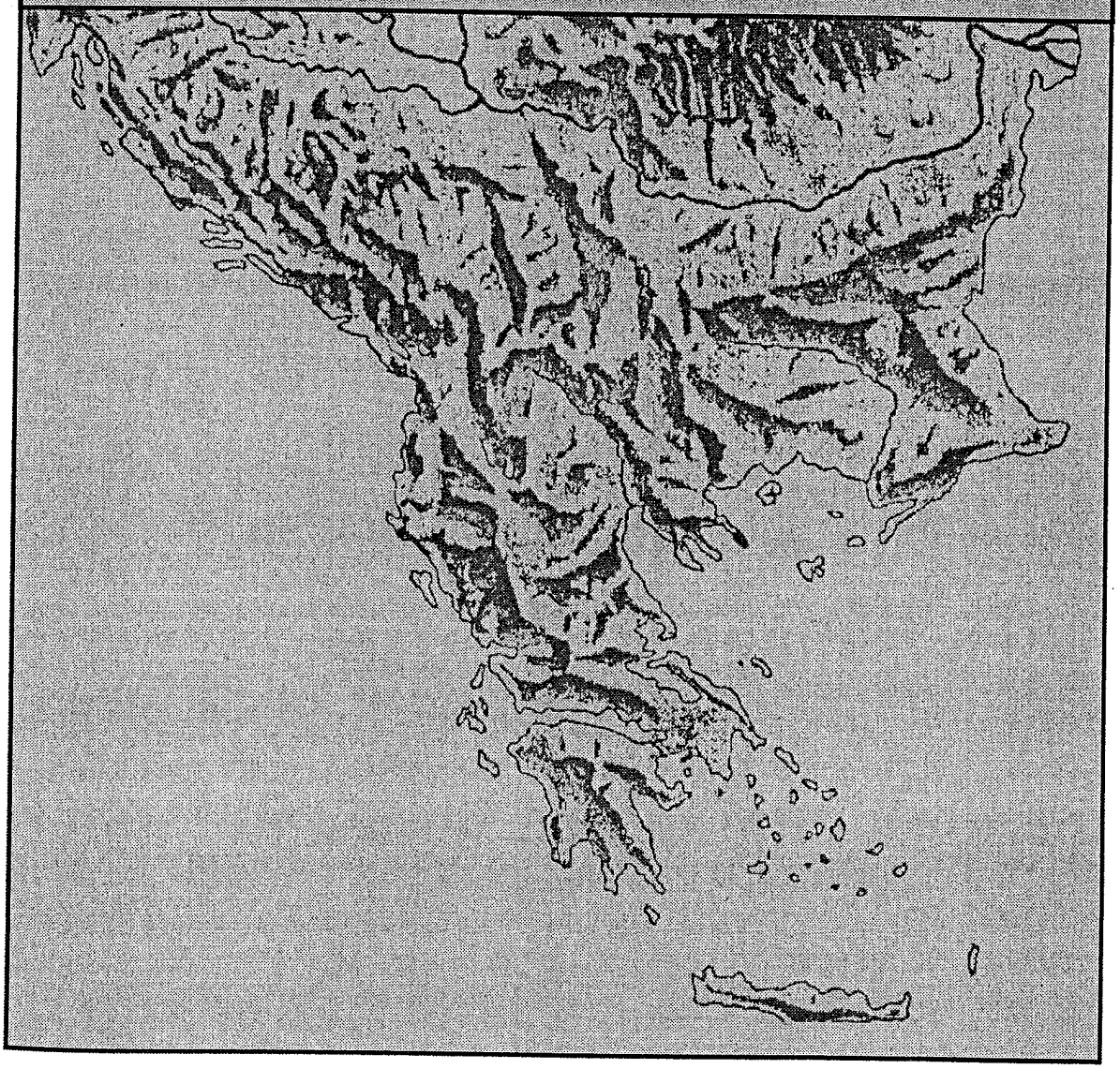

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Deciduous Dental Pulp Enzymatic Activity

SUMMARY

Deciduous teeth are a valid masticator organ during the period of their limited, genetically determined lifetime. They are formed in a much shorter period of time, compared with the permanent teeth. The aim of the present study was to examine the enzymatic activity of the dental pulp in the deciduous teeth, and to compare their activity in the phase of root resorption. The pulps used for this investigation were obtained from intact teeth of healthy children, aged 5 to 9 years, extracted for orthodontic reason (20 deciduous teeth without signs of physiological resorption, and second group - 20 deciduous teeth with physiological resorption). The enzyme activity was determined, according to spectrophotometric methods by: Mc Comb and Bowers for alkaline phosphatase activity; Bergmeyer and Bernt for lactate dehydrogenase activity; and Andersch, Szcypinski and Fishman for acid phosphatase.

The results obtained in this study showed specific enzymatic activity with high values in deciduous teeth, which certainly was an expression of large synthetic pulp ability. Values of activity decreased with the beginning of the resorption. Enzymes, which are actively participating in the metabolism (lactate dehydrogenase), as well as in synthesis (alkaline phosphatase), can increase their specific activity in conditions of progressive physiological root resorption, because of the discontinuity, in the periods when the reparatory component dominates. Enzymes are responsible for tissue destructive changes (acid phosphatase); they increase significantly with the development of the resorption.

Key Words: Deciduous Teeth; Root Resorption; Dental Pulp; Alkaline Phosphatase; Acid Phosphatase; Lactate Dehydrogenase

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Introduction

Deciduous teeth are a valid masticator organ during the period of their limited, genetically determined lifetime. Their role is complex, because it happens in the most sensitive period in the life of every person - the period of intensive growth and development of the organism. They are formed in a much shorter period of time, compared with the permanent teeth, and after a relatively short and functional duration they go though an early physiological age, which in the non-carious deciduous teeth is manifested with a diminished pulp ability to produce a secondary dentine.

The pulp is the carrier of tooth vitality. From its reactive ability - defensive function, manifested through production of protective - tertiary dentine, as well as from its non-specific and specific defensive mechanisms, its survival basically depends by some pathological conditions. From that point, defensive pulp power investigation of the deciduous teeth always is a challenge for the researchers in this field, and it is also of an enormous clinical significance for the practitioners.

The aim of the present study was to examine the reparatory pulp ability of deciduous teeth, i.e. to examine the enzymatic activity of the dental pulp in the fully matured deciduous teeth, and to compare it with the pulp enzymatic activity in the phase of root resorption.

Material and Methods

The pulps used for this investigation were obtained from intact teeth of healthy children, aged 5 to 9 years, extracted for orthodontic reason in local anaesthesia. The teeth were divided into 2 groups: The first group comprised 20 deciduous teeth without signs of physiological

resorption, aimed to investigate the functional phase of the dental pulp life cycle, when it is in a full hystomorphological and functional maturity; the second group comprised 20 deciduous teeth with physiological resorption, that is, the phase of remarkable involutive changes in the tooth pulp, but without massive inflammation in the sense of tooth rejecting and its decay.

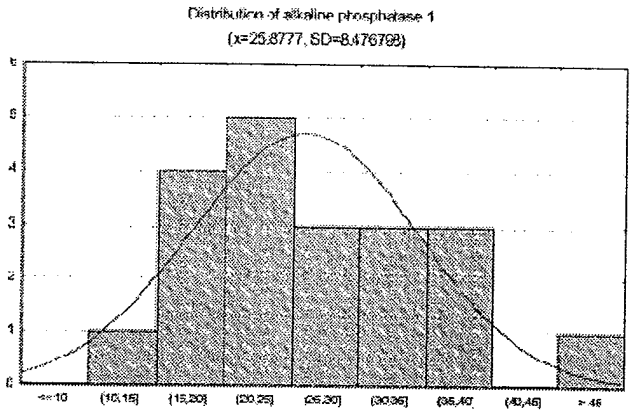
Immediately after the extraction, each tooth was cut perpendicularly to its long axis with rotating carborundum disc using water as a coolant. After that, the tooth was cracked, and the separated halves were parted with a plastic instrument. The tooth pulp was excavated completely, washed with sterile 0.08 mol/L NaCl, weighed, and frizzed to -18°C. The pulp tissue was transferred to a medium (phosphate buffer, pH = 7.4; 0.08 mol/L NaCl), and homogenized in a Potter-Elvehjem homogenizer[1].

After 10 minutes centrifugation with 3000 rpm and decantation, the enzyme activity was determined in supernatant, according to spectrophotometric methods: Mc Comb and Bowers for alkaline phosphatase activity[8,11]; Bergmeyer and Bernt for lactate dehydrogenase activity[2]; and Andersch, Szcypinski and Fishman for acid phosphatase[11].

Results

The results obtained in this study showed specific enzymatic activity[1] with high values in deciduous teeth, which certainly is an expression of large synthetic pulp ability[4]. Generally, values have decreased with the beginning of the resorption.

Specific alkaline phosphatase activity of deciduous teeth is high, which certainly is an expression of the large synthetic pulp ability, especially for calcification of dental hard tissues[3,6]. Dental pulp enzyme has a similar molecular structure to bone alkaline phosphatase[5]. In the control group the mean value was 27 U/g, SD 7.67. In the second group (the teeth with physiological resorption) it was 25.87 U/g, and SD 8.47.

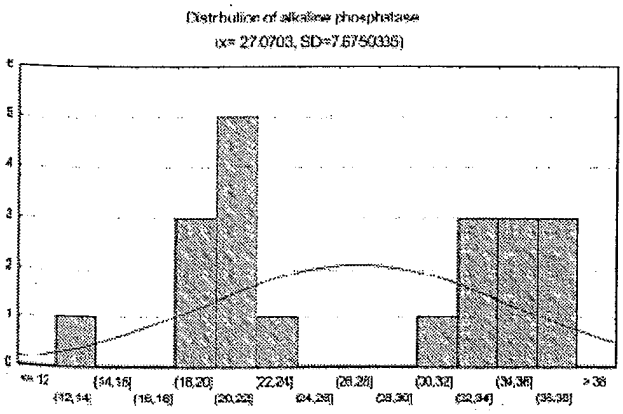


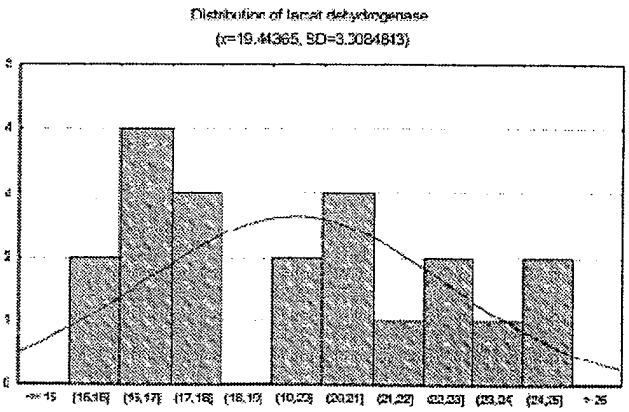
Student T test did not show statistical significance of the differences between the groups: t=0.45 and p=0.65.

T-test for Dependent Samples
Marked differences were significant at p < 0.05000

	Mean	Std. D.	N	t	df	p
AP	**27.07030**	**7.675034**				
AP1	25.87770	8.476798	20	0.450278	19	0.657606

Lactate dehydrogenase is the most thoroughly investigated of the enzymes that appear in multiple molecular forms, i.e. isoenzymes[2,7]. One explanation for this is its central role in cell metabolism, where it catalyses the reversible reduction of pyruvate to lactate. The specific lactate dehydrogenase activity of the deciduous tooth pulps showed insignificant variations regarding the degree of root resorption: non-resorbed in average – 19.44 U/g, and SD 3; those with initial resorption (second group) – 21.4 U/g, and SD 4.88.





and reparatory abilities are reduced to minimum. In this sense, there is no justification for application of biological therapeutic methods for deciduous teeth in the period of initiation of physiological root resorption, in the cases where they are usually indicated.

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