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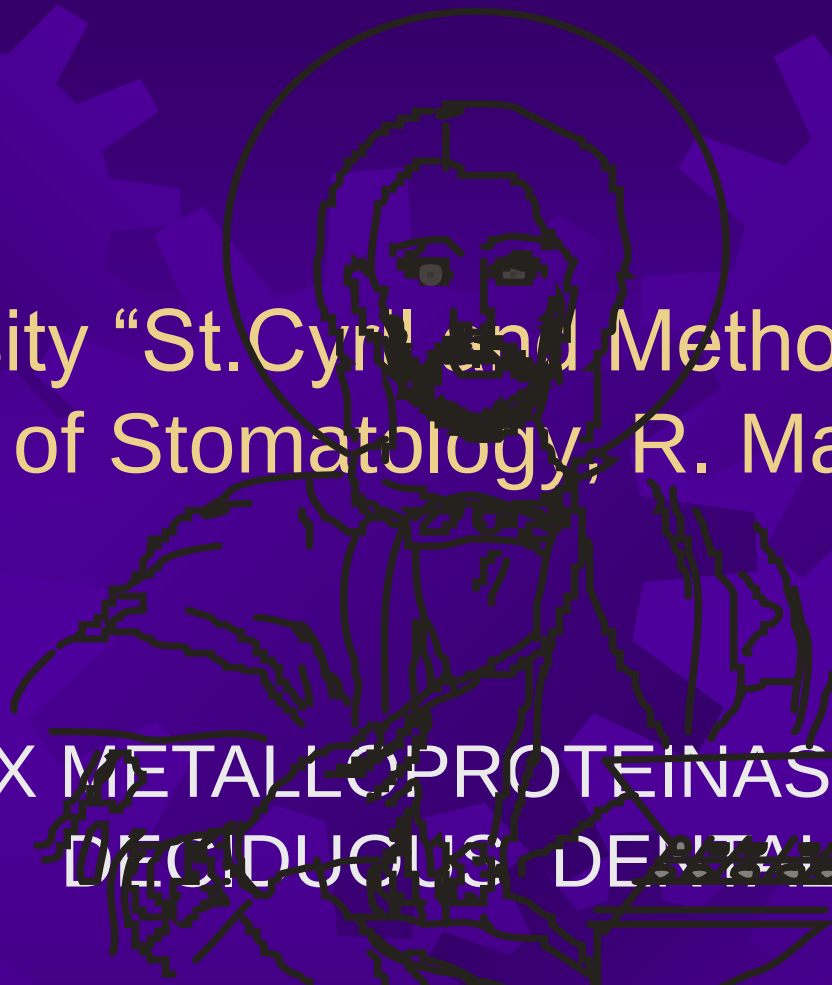

MATRIX METALLOPROTEINASE ACTIVITY IN DEGRADED DENTAL PULP

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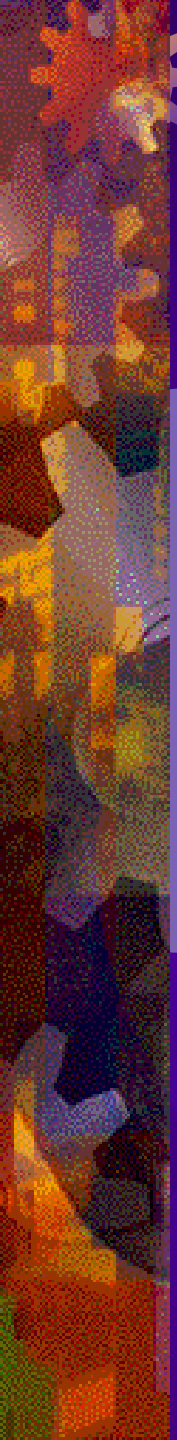


The extracellular matrix components, including collagens, fibronectin and proteoglycans are major tissue proteins, they are responsible for the structural integrity.

Extracellular matrix turnover is an event that is tightly regulated, and initiated at least in part, by the regulated secretion of members of a family of matrix metalloproteinases.

Much of the coordinate – physiological, or discoordinate - pathological degradation of the extracellular matrix is catalyzed by a class of proteases known as the matrix metalloproteinases.

Matrix metalloproteinases are an important group of zinc enzymes responsible for degradation of the extracellular matrix components such as collagen and proteoglycans in normal embryogenesis and remodeling and in many disease processes such as arthritis, cancer, periodontitis, and osteoporosis.

The aim of the present study was to examine the matrix metalloproteinase activity of the deciduous dental pulp in the normal conditions, and conditions of physiological resorption of the root.

Methods and materials: To examine the matrix metalloproteinase activity in the phase of root resorption, a biochemical - enzymatic study is performed consisting of 40 clinical intact deciduous teeth, grouped according to the degree of resorption in two groups: 20 deciduous teeth without signs of physiological resorption, and second group - 20 deciduous teeth with physiological resorption.

The pulps used for this investigation were obtained from intact teeth of healthy children, aged 5 to 9 years, extracted for orthodontic reason.

Immediately after the extraction, every tooth is cut perpendicularly to its long axis with rotating carborundum disc under a water jet, 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 and 0,08 mol/L NaCl), and homogenized in a Potter-Elvehjem homogenizer.

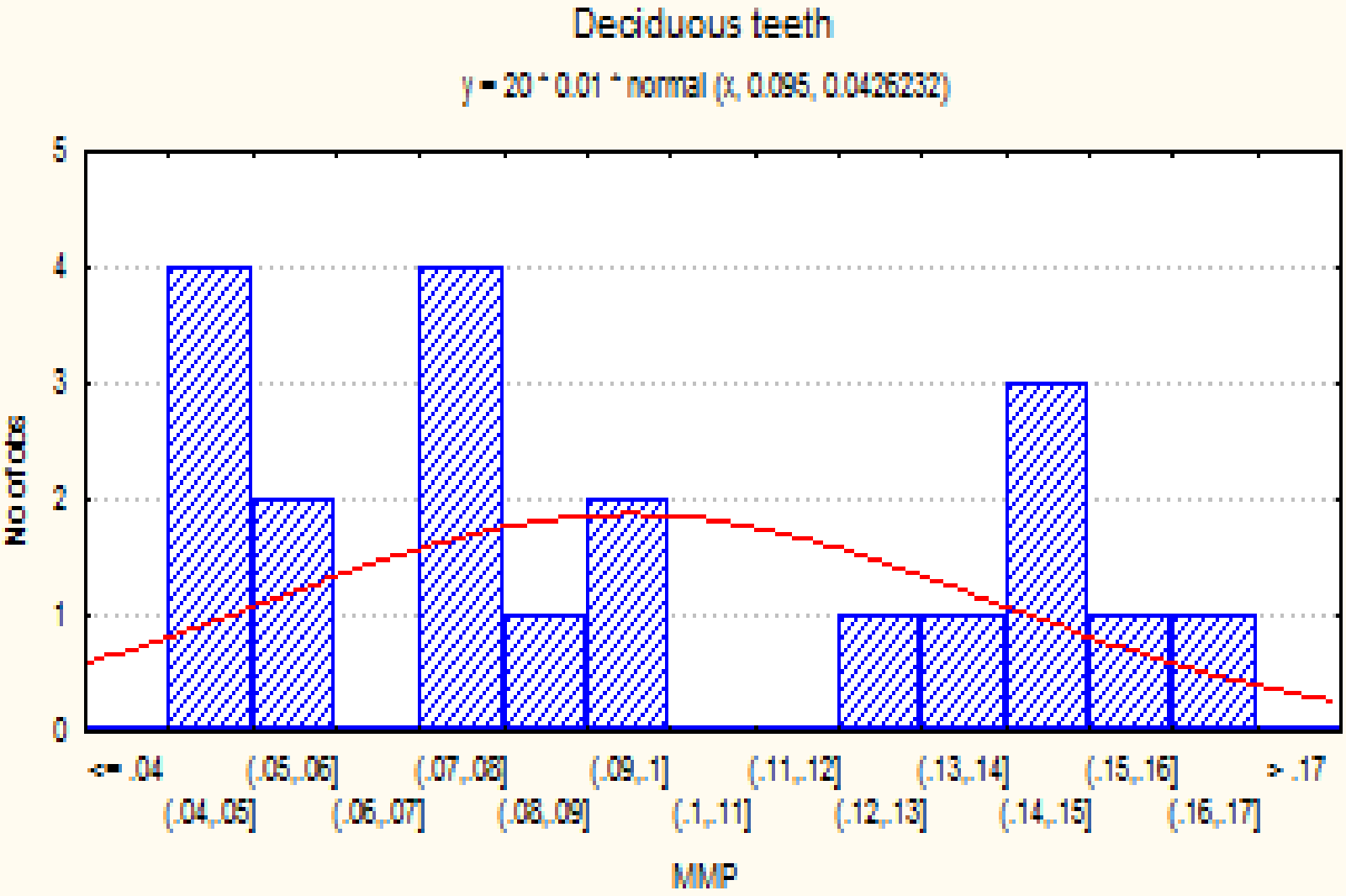
The enzyme activity was determined in supernatant, after incubation at 37° C for 18 hours, with collagen as a substrate, in phosphate buffer containing 1 mmol/L 4-amino phenyl mercuric acetate.

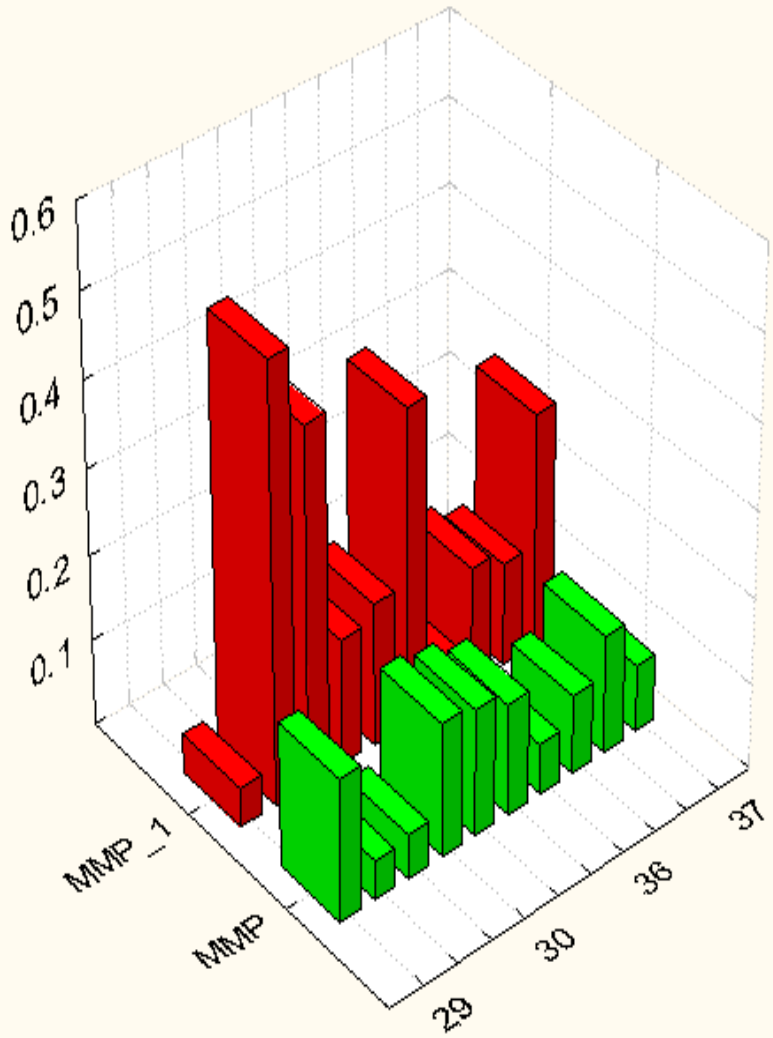
Matrix metalloproteinase digestion products were demonstrated using ninhydrin reagent, prepared according Moore & Stein, and spectrophotometric measured at 600 nm.

One unit (U) of matrix metalloproteinase activity is defined as the quantity of enzyme which in test condition liberates 1 micromole of ninhydrin - positive amino acids (calculated as leucine).

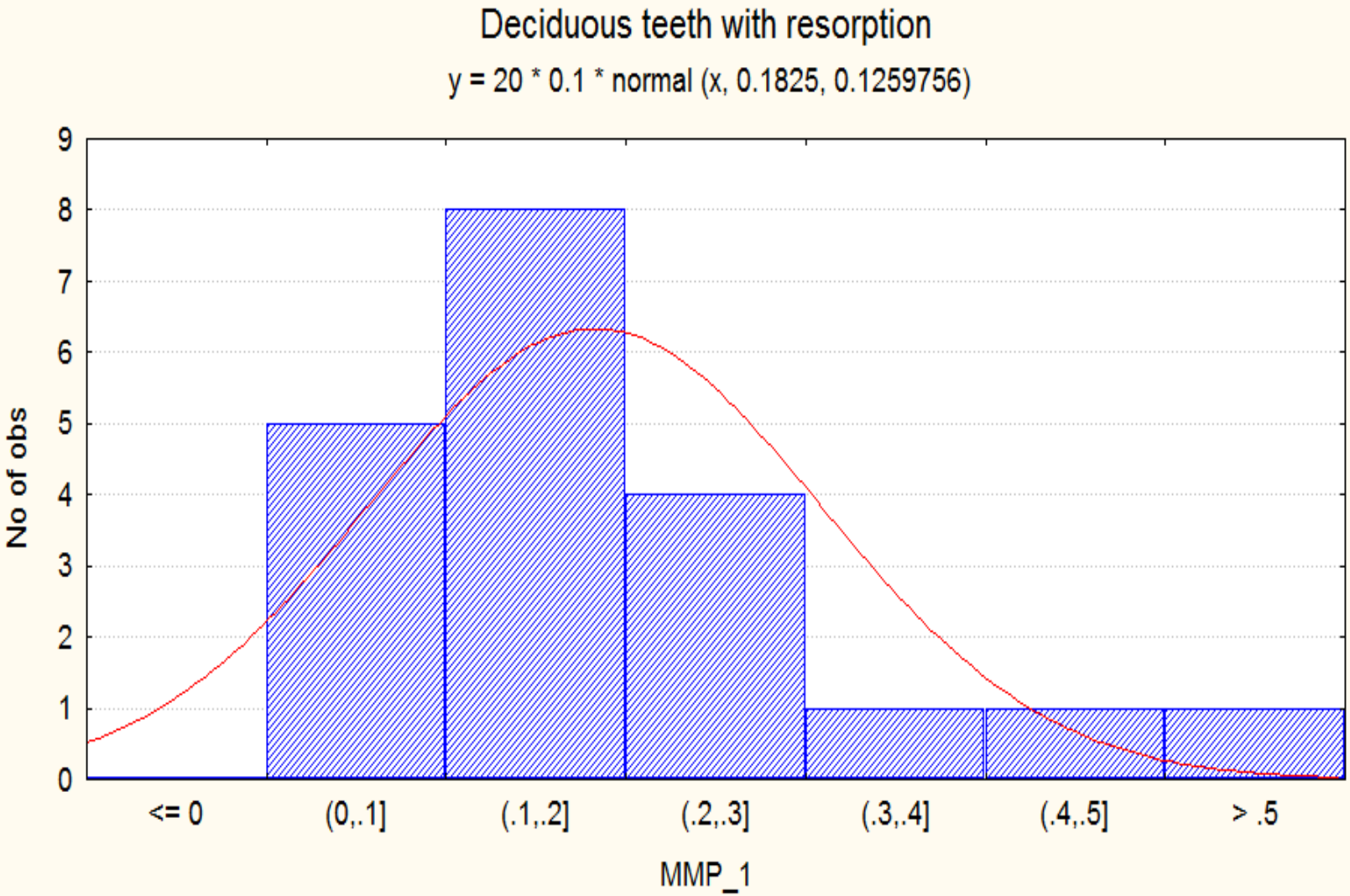
Presentation of one unit (U) per gram native tissue is called – specific enzymatic activity – U/g.

Distribution of specific enzymatic activity in first group




0.6
0.5
0.4
0.3
0.2
0.1
MMP_1
MMP
29
30
36
37

Distribution of specific enzymatic activity in second group



T-test for Dependent Samples
Marked differences are significant at p < .05000

	Mean	Std.Dv.	N	Diff.	Std.Dv. Diff.	t	df	p
MMP	0.095	0.0426						
MMP_1	0.182	0.1259	20	-0.087	0.141	-2.756	19	0.0125

Specific collagenase activities of the deciduous teeth pulp tissue is minimal - in the first group the average is 0,1 U/g; in the second 0,18 U/g.

T-test for dependent samples show statistical significant relevance of the differences between the groups – $p = 0,0125$.

The neutrophils are the major cells responsible for MMP release at the infected site, specifically for MMP-8 (collagenase-2) and MMP-9 (gelatinase-B). Although MMP-8 is able to potently degrade interstitial collagens, MMP-9 degrades several extracellular matrix proteins.

MMP-1, MMP-2, MMP-8, and MMP-9 were preferentially expressed in mononuclear and fibroblastic cells with low expression noted as in polymorphonuclears, and more than 50% of fibroblasts expressed MMP-1, MMP-2, and MMP-8 in healthy teeth.

Generally total pulp enzymatic activity of the deciduous teeth decreases with the beginning of the processes of physiological resorption of the root.

But enzymes responsible for tissue destructive changes - like matrix metalloproteinases, by initiation and progression of physiological resorption increases significantly.

Key words: deciduous teeth, root resorption, dental pulp, enzymes, matrix metalloproteinases