

NUCLEO-CYTOPLASMIC AND NUCLEOLO-NUCLEAR RATIOS  
IN EPITHELIAL PRICKLE CELLS OF THE REGENERATING  
GINGIVAL MUCOUS MEMBRANE

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The nucleo-cytoplasmic and nucleolo-nuclear ratios were studied in the epithelial prickle cells of the mucous membrane of the regenerating gum in adult rats 12 h and 1, 3, 5, 14, 28, 45 days after removal of the upper three molars. The changes in these indices differ from those in the epithelial basal cells of the mucous membrane of the regenerating gum.

A previous investigation [1] revealed a similarity between changes in the nucleo-cytoplasmic and nucleolo-nuclear ratios in epithelial basal cells of the injured mucous membrane of the gum in adult rats and during regeneration of the internal organs [2-4].

The object of the present investigation was to study the course of inflammatory processes in the prickle cells of the injured mucous membrane of the gum by analysis of the of the nucleo-cytoplasmic and nucleolo-nuclear ratios.

EXPERIMENTAL METHOD

Male albino rats weighing 110-150 g were used in the investigation. The three left upper molar teeth were removed from 35 animals and the same number of animals were used as controls. The rats were killed in groups of five 12 h, and 1, 3, 5, 14, 28, and 45 days after the operation. Material was fixed by Bouin's method and paraffin sections stained with hematoxylin-eosin. The outlines of the nucleoli, and cytoplasm of the epithelial prickle cells were drawn from sections of the mucous membrane of the gum and the area of the outlined shapes determined gravimetrically. The number of nucleoli per nucleus was counted and the nucleolo-nuclear and nucleo-cytoplasmic ratios were calculated in these cells.

EXPERIMENTAL RESULTS

The results given in Table 1 show that the nucleo-cytoplasmic ratio increased during the first 5 days of the experiment. This increase was due entirely to an increase in area of the nucleus. The nucleo-cytoplasmic ratio was unchanged 14, 28, and 45 days after the operation. However, the size of the nucleus continued to remain increased during the first 2 days after the operation.

The nucleolo-nuclear ratio was increased 12 h and 1 day after operation. This increase was due to an increase in area of the nucleolus. At subsequent times of observation the nucleolo-nuclear ratio was unchanged, but analysis of the sizes of nucleolus and nucleus separately 3 days after the operation showed an increase in the area both of the nucleolus (by 9%) and of the nucleus, and 5, 14, and 28 days after operation both nucleolus and nucleus still remained increased in area. Only the area of the nucleolus was still increased 45 days after the operation, this time by 4%. It is interesting to note that the number of nucleoli

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TABLE 1. Nucleo-Cytoplasmic and Nucleolo-Nuclear Ratios in Epithelial Prickle Cells of Gingival Mucous Membrane in Rats after Extraction of Several Teeth

Time of observation (in days)	Group of animals	Mean area (in $\mu^2$ )			Ratio		No. of nucleoli per nucleus
		of nucleolus	of nucleus	of cytoplasm	nucleolo-nuclear	nucleo-cytoplasmic	
12h	Experimental	2,6+	51,4+	99,3+	0,05+	0,51+	1,16
	Control	2,2	33,4	93,2	0,06	0,35	1,18
1	Experimental	3,7+	40,3+	114,1	0,09+	0,36+	1,15+
	Control	2,5	34,3	104,0	0,07	0,32	1,09
3	Experimental	9,4+	49,4+	92,8	0,04	0,53+	1,15+
	Control	2,2	44,2	92,8	0,04	0,47	1,05
5	Experimental	2,3+	48,9+	92,2	0,04	0,52+	1,10+
	Control	2,2	45,0	92,1	0,04	0,48	1,06
14	Experimental	2,3+	48,3+	92,0	0,04	0,51	1,09+
	Control	2,2	45,7	91,2	0,04	0,50	1,04
28	Experimental	2,3+	47,1+	92,1	0,04	0,51	1,08+
	Control	2,2	45,8	91,9	0,04	0,49	1,03
45	Experimental	2,3+	47,2	91,5	0,04	0,51	1,06+
	Control	2,2	46,3	91,7	0,04	0,50	1,03

+Differences between experiment and control statistically significant.

per nucleus increased throughout the experiment except 12 h after the operation. This index reached its maximum 3 days after the operation (an increase of 10%).

These results show that, just as in the basal epithelial cells of the mucous membrane of the regenerating gum [1], changes in the nucleo-cytoplasmic ratio in the prickle cells are due mainly to an increase in area of the nucleus, and in order to determine the characteristics of this parameter completely it is necessary to analyze the state of the nucleus and cytoplasm separately. A similar approach is also required to the study of the nucleolo-nuclear ratio. Unlike in the basal cells [1], in the prickle cells the nucleo-cytoplasmic ratio was not reduced at the beginning of the experiment (12 h after the operation) but instead was increased fairly considerably. The change in the nucleo-cytoplasmic ratio in the prickle cells took place as the result of a marked preferential increase in area of the nucleus, whereas in the basal cells it was attributable to a marked increase in area of the cytoplasm. The increase in area of the nucleus in the prickle cells took place at the beginning of the experiment and lasted longer than in the basal cells. The nucleolo-nuclear ratio in the basal cells was unchanged, whereas in the prickle cells this index was considerably increased at the beginning of the experiment. The increase in number of nucleoli per nucleus in the prickle cells was observed throughout the experiment, whereas in the basal cells it was found only 3 and 14 days after the operation. All these findings suggest that regeneration in the prickle cells follows a much more intensive course than in the basal cells.

The study of the nucleo-cytoplasmic and nucleolo-nuclear ratios in the epithelial prickle cells of the mucous membrane of the regenerating gum thus reveals some differences in the course of their regenerative processes.

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