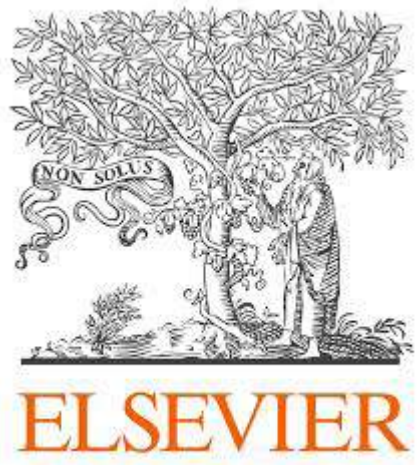

"Fundamental and Applied Studies in the Modern World"

The XV International Academic Congress

(United Kingdom, Oxford, 06-08 September 2016)

PAPERS AND COMMENTARIES

VOLUME XV

"Oxford University Press"

2016

Proceedings of the XV International Academic Congress "Fundamental and Applied Studies in the Modern World" (United Kingdom, Oxford, 06-08 September 2016). Volume XV. "Oxford University Press", 2016. - 718 p.
Proceedings of the Congress are located in the **Databases Scopus.**

Source Normalized Impact per Paper **(SNIP): 3.557**
SCImago Journal Rank **(SJR): 3.787**

ISBN: 978-0-875-86396-7

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Lectinochemical characteristics of rat normal masticatory oral mucosa

Abstract: Lectinochemical method of study has established the features of receptors' allocation in the lectins' panel on the cells and basal lamina of the epithelial mucous lamina of the alveolar gingiva and glandular area of the hard palate. It has been found that the level of lectin receptors' expression in the gingival epithelium for galactose-specific lectins in the hard palate carbohydrate determinants is almost absent, though a layer of horny scales is the most sensitive. The largest number of receptors has been found for sialo-specific lectins. Higher degree of expression of carbohydrate determinants, especially for mannose- and

sialo-specific lectins has been detected in the epithelial lamina of the hard palate, as compared with gums.

Keywords: lectins, carbohydrate receptors, rats, oral mucosa.

Introduction

Carbohydrate structures of varying complexity are the ligands for binding with lectins on the surface of cells, thereby affecting the processes of functioning of the cells, tissues and organs [1, 3]. Lectins are typically involved in cell recognition, for example, some pathogenic microorganisms use lectins to be attached to the cells of the affected organism. Lectins can be of selective activity relative to multiple subpopulations of the cells [2, 9]. Method of lectin sounding is more effective than the conventional methods of histochemical detection of carbohydrate determinants due to its sensitivity and selectivity of determination of the specified molecular structures [8].

Purpose

The paper was aimed at comparison of the nature of lectin receptors' expression in the epithelial lamina of normal gingival mucosa and hard palate mucosa.

Material and Methods 10 white outbred rats were involved into the investigation. The animals were killed under 25 mg/kg thiopental anesthesia overdose. Pieces of gingiva and palatal mucosa were embedded into paraffin according to standard procedure [5].

Detection of carbohydrate residues of galactose has been carried out using Peanut agglutinin (PNA), Helix pomatia agglutinin (HPA) and soybean agglutinin (SBA) lectins. Reduced residues of fucose were determined using Laburnum anagyroides lectin (LABA) and reduced residues of mannose by Concanavalin A lectin (ConA). The nature of receptors' expression to sialic acid was defined using Sambucus nigra (SNA) and Wheat germ agglutinin (WGA) lectins.

The specimens were treated with standard sets of "Lectinotest" (Lviv, Ukraine) in 1:50 lectin dilution [4]. Visualization of the reaction with lectin conjugates was performed by the semiquantitative method in the Biorex - 3 VM – 500 microscope immersion magnification: 0 – No reaction; 1 - a reaction expressed very little (light color); 2 – the reaction is weak (light - brown); 3 – strong reaction (brown); 4 – very strong reaction (dark brown).

Animal housing and experiments on them have been carried out in compliance with the "General Ethic Rules for Conducting Experiments on Animals", adopted by the I National Congress on Bioethics [6] and the requirements of international principles of the "European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes" [7].

Results and Discussion. Sounding of the epithelial lamina of the mucous membrane of the intact rats' alveolar gingiva with β-galaktose-specific PNA-lectin detected poorly pronounced degree of conjugation with receptors on the surface of horny scales and very weak – with cells of granular, spinous and basal layers, and basal lamina. A strong degree of binding was detected in the squamous layer of the hard palate glandular area epithelium, whereas granular, spinous and basal layers showed very weak reaction, and poorly pronounced reaction was detected in the basal lamina (Table 1).

HPA–lectin is specific to α-galactose. The resulting sounding of the epithelial lamina of the mucous membrane of intact rats' alveolar gingiva detected very weak HPA-binding in all layers, and with basal lamina, too. Moderate bindings have been detected with sialo-specific receptors on the surface of the horny scales of the hard palate epithelium and reaction with receptors of cells of other layers of the epithelial lamina and basal lamina was very weak (Table 1).

Study of the glicoconjugates, specific to SBA-lectin has established poor relationship with α-galactose of horny scales of gingival epithelial lamina, whereas other components showed negative reaction. Sounding of the hard palate epithelium detected low degree of receptors' expression on the surface of horny scales and very low degree was detected in the other epithelial layers and basal lamina (Table 1).

Table 1

Expression of lectin receptors panel in the epithelium of the alveolar gingival and palatal glandular area mucosa in normal rats

Lectins Layers		PNA	HPA	SBA	LABA	Con A	SNA	WGA
Squamous	G	2	1	2	2	3	2	3
	P	3	2	2	3	4	3	4
Granular	G	1	1	0	1	1	3	3
	P	1	1	1	1	1	3	2

Spinous	G	1	1	0	1	1	3	3
	P	1	1	1	1	1	3	2
Basal	G	1	1	0	1	1	3	3
	P	1	1	1	1	1	3	2
Basal lamina	G	1	1	0	2	2	2	3
	P	2	1	1	3	1	3	1

Note: G –gingival epithelia, P – palatal epithelia

Study of the glicoconjugates of the LABA fucose-specific lectin has found low degree of binding with horny scales and basal lamina in the alveolar gingiva epithelium and very low binding has been detected in the granular, spinous and basal layers. Strong reaction with receptors of horny scales and basal lamina of hard palate has been found. Other epithelial layers showed very weak expression of receptors to α-fucose (Table 1).

Study of specificity of ConA-lectin binding with components of epithelial lamina of intact rats' alveolar gingiva has shown strong reaction of horny scales plasmalemma. Surfaces of epithelial cells of granular, spinous and basal layers showed very poor ConA-binding. Structural components of basal lamina showed weak receptor expression to mannose-specific lectin.

SNA-lectin is specific to sialic acid. The resulting SNA-lectin conjugation with receptors of horny scales and basal lamina of the intact rats' alveolar gingiva epithelium was weak. The reaction with plasmalemma of cells of granular, spinous and basal layers was strong. Sounding of hard palate epithelial lamina detected strong reaction with all studied components (Table 1).

Sounding of epithelium of mucous membrane of intact rats' alveolar gingiva with the WGA-lectin has found strong congeniality of plasmalemma of epithelial cells and basal lamina. The layer of horny scales on the hard palate showed very strong reaction, whereas the other layers of the epithelial cells showed weak reaction and basal lamina showed very poor conjugation (Table 1).

Conclusions

Study of the level of receptors' expression to lectins in the gingival epithelium has shown that carbohydrate determinants are almost absent for galactose-specific lectins in the hard palate, though a layer of horny scales is the most sensitive. The largest number of receptors has been found for sialo-specific lectins. Higher degree

of expression of carbohydrate determinants, especially for mannose- and sialo-specific lectins has been detected in the epithelial lamina of the hard palate, as compared with gums.

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