

## Histological Analysis of the Influence of Nicotine on the Digestive System of Rats

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**Abstract.** This article describes the effects of smoking on the body and the effect of nicotine alkaloids on the digestive system. Nicotine alkaloid affects almost all organs. In particular, food has a harmful effect on the organs of the digestive system, causing organ dysfunction, cell necrosis, and changes in the amount of organic substances in the organs.

**Key words:** nicotine model, nicotine alkaloid, tobacco smoke, smoking, intestinal homogenate, liver, protein, triglyceride, cholesterol, carbohydrate.

**Abstract.** Smoking is the inhalation of smoke from some tobacco products. Tobacco smoke contains carcinogenic substances, especially the nicotine contained in tobacco smoke is very toxic to the human body. Nicotine is one of the strongest poisons. Nicotine entering the body through smoke reaches the brain after 7 seconds. According to the World Health Organization, more than 25 diseases develop as a result of smoking, and about 6 million people die of these diseases every year. The saddest thing is that 12% of them are non-smokers, i.e. passive smokers [1,8]. The negative effect of smoking on the digestive organs is a violation of the release of hydrochloric acid, pepsin, enzymes, changes in peristalsis, narrowing of the gastrointestinal vessels, and causes inflammatory diseases - gastritis, colitis [2]. As a result of the effect of nicotine contained in tobacco smoke on the body, cancer occurs. The liver is the main site of nicotine biotransformation, which has a number of negative physiological effects on the liver [3,7]. When smoking tobacco, nicotine is absorbed through the lungs and rapidly metabolized in the liver, which has a direct or indirect toxic effect on the liver, an immunological effect and an oncogenic effect [4]. In addition to damaging liver cells, smoking has a genotoxic effect on the liver of rats [5]. Nicotine administration damages the liver in mice and induces metabolic dysfunction leading to decreased liver weight [6].

**The purpose of the research.** Studying changes in the digestive system of rats exposed to nicotine and comparing them with internal organs of healthy rats. Observing the changes in the digestive system under the influence of nicotine. To theoretically prove how harmful smoking is to the human body by analyzing the results.

**Research methods and materials.** The experiments were carried out on 2-3 month old sterile white rats of both sexes, weighing 165-200 grams, based on the experiments conducted by American scientists on mice [10] published in the scientific journal Proceedings of the National Academy of Sciences. The rats were divided into three groups. The rats in the first group were exposed to clean normal air. The rats of the second group were exposed to 4 cigarettes for 2 hours, and the rats of the third group were exposed to 8 cigarettes for the same period of time.

After 2 hours, all the rats were taken, the protein, triglyceride, cholesterol and carbohydrate content of their intestinal homogenate was determined, the liver and intestinal mucosa were separated from the body, and their histological and morphofunctional condition was studied, and all the indicators were healthy. was compared with the analysis of rats and statistically analyzed. A significant difference appeared between the internal organs of healthy and nicotine-infected rats. Based on the difference, it was explained how much nicotine damages the digestive system. Determination of intestinal homogenate parameters was carried out using Human (Germany) reagents on the "KT-1904 C Semi-auto Chemistry Analyzer" analyzer. Numerical results were statistically processed using Student's t test. During histological analysis, preparations were viewed and photographed with a digital binocular microscope DN-M model.

**Research results and their analysis.** According to the results of our experiments, since all organisms are not the same physiologically, the nicotine contained in tobacco smoke affects them in different degrees. During the experiment, among the rats that breathed tobacco smoke for 2 hours, there were also those that died. When they were taken separately and their internal organs were studied, it was seen that their gastrointestinal tract was 2-3 times larger than normal.

When the results were analyzed, the average amount of protein in the first group increased sharply by 140.3% compared to the control group, and by 619.34% in the second group (Table 1). It was concluded that when the dose was increased by 2 times, an increase in the amount of protein in the blood was observed due to the occurrence of apoptosis in cells, the increase of immunological reactions.

The content of triglyceride in the intestinal homogenate of the first group of rats increased by 123.5% compared to that of healthy rats, and by 168.7% in the second group (Table 1).

Cholesterol content in the intestinal homogenate of rats of the first group decreased by 90.4% compared to that of healthy rats, and by 82.8% in the second group (Table 1). Nicotine alkaloid is a strong base, and when it enters the intestinal cavity through the blood vessels, as a result of the destruction and hypoplasia of the intestinal mucosa, the amount of cholesterol decreases.

Sucrose content in the intestinal homogenate of rats of the first group increased sharply by 333.3% compared to that of healthy rats, and by 533.3% in the second group (Table 1).

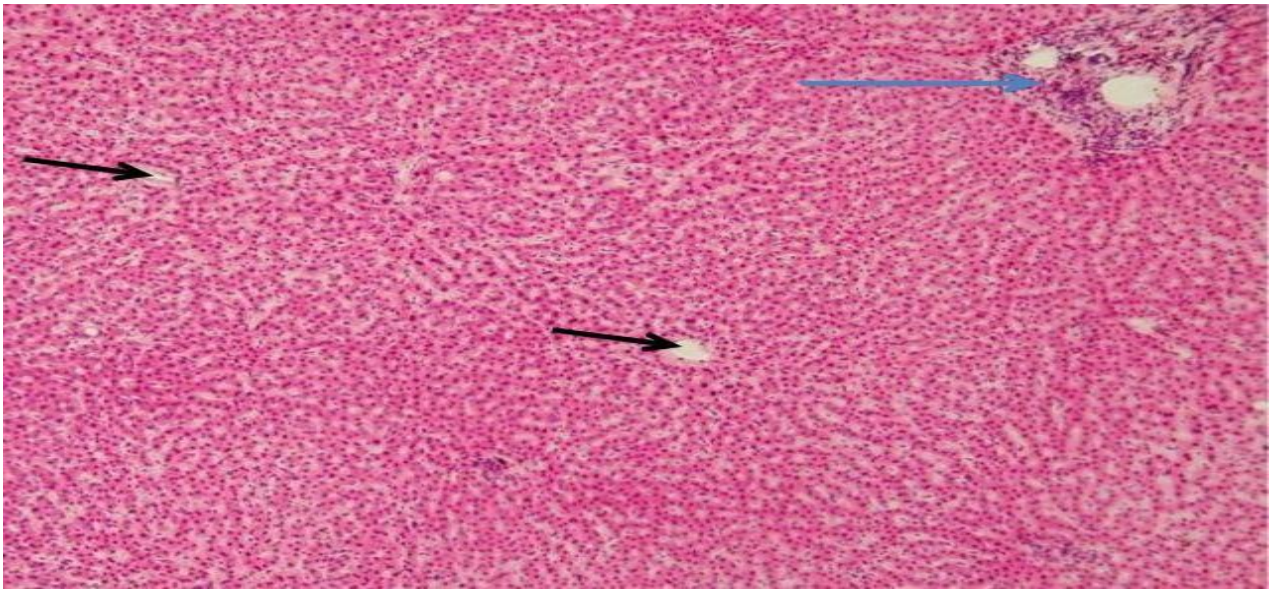
The content of maltose in the intestinal homogenate of the first group of rats increased by 341.86% compared to that of healthy rats, and by 472% in the second group (Table 1).

**Table 1. Analysis of the amount of protein, triglyceride, cholesterol and carbohydrates determined in the rat intestine homogenate in an experimental model**

Group	Protein (g/l)	Trigliserid (mmol/l)	Xolestirol (mmol/l)	Saxaroza (mmol/l)	Maltoza (mmol/l)
Healthy (control)	35,21±0,68	1,814±0,02	10,4±0,36	0,18±0,008	0,43±0,03
The first group	49,4±1,006**	2,24±0,06	9,4±0,076**	0,6±0,006*	1,47±0,06*
The second group	218,07±0,39***	3,06±0,02**	8,61±0,08*	0,96±0,002*	2,03±0,07*

-\* P<0,05; \*\*-P<0,01; \*\*\*-P<0,001

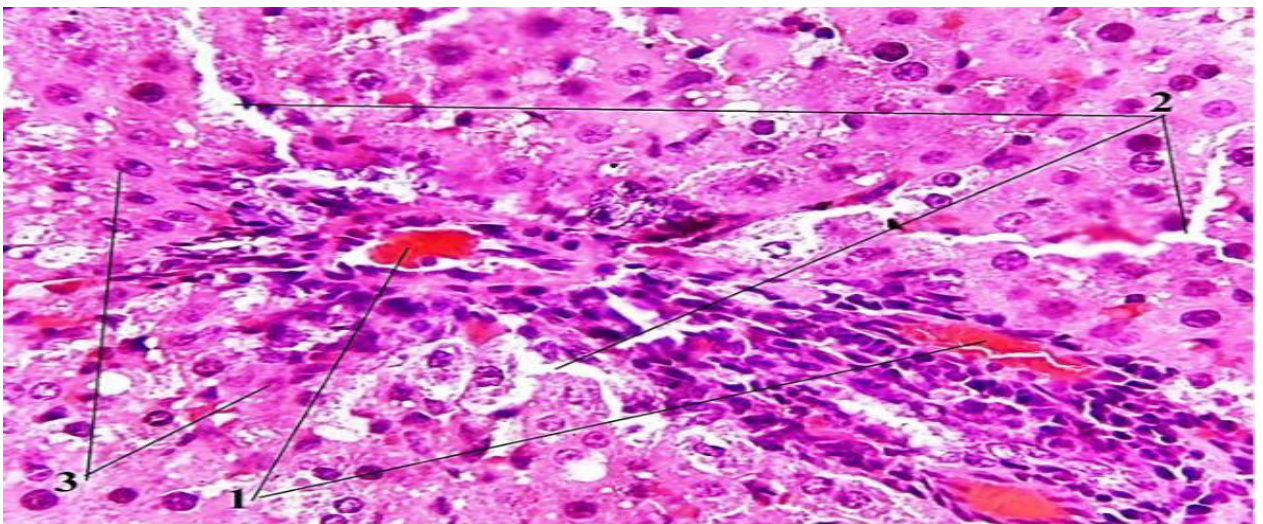
When the intestines and livers of healthy rats and those exposed to tobacco smoke were taken separately, the drug was prepared and observed under a microscope, the differences in their histological and morphofunctional conditions were clearly visible.



**Fig. 1. Histology of healthy rat liver tissue.**

**Dye hemotoxylin-eosin. X: 10x10**

As shown in Figure 1, the histology of healthy rat liver tissue shows no venous congestion in blood vessels (shown by a black arrow). Cytoarchitectonics of the hepatic triad, characteristic of a healthy liver, were also seen (indicated by the blue arrow).

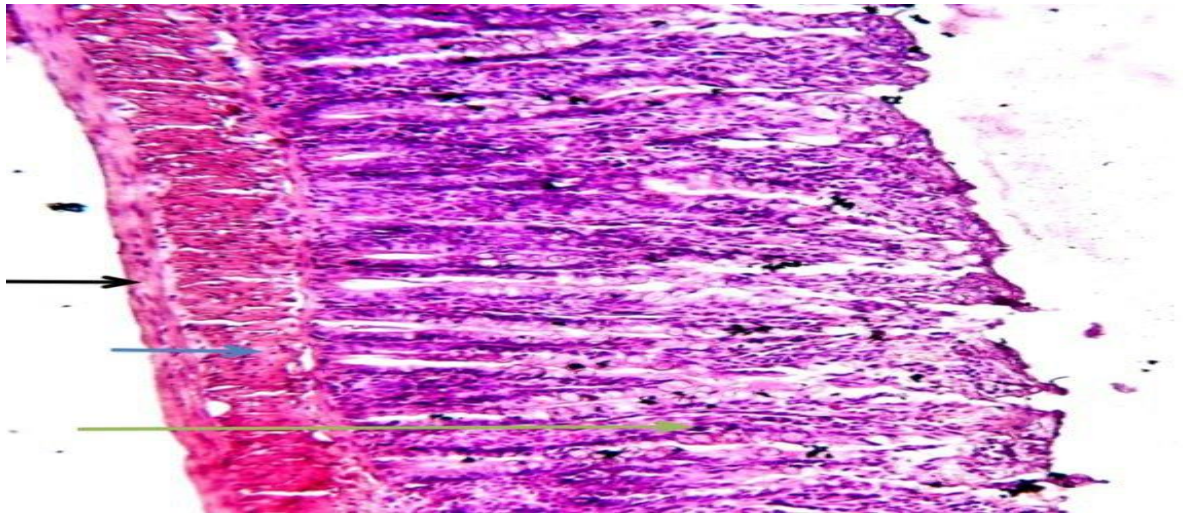


**Fig. 2. Histology of diseased rat liver tissue.**

**Dye hemotoxylin-eosin. X: 10x40**

When the liver of a poisoned rat is seen in the smoking model (Fig. 2), hemostasis and fullness of blood in the blood vessel (1), expansion of sinusoidal spaces due to hypoxia and intoxication (2) and cell wall integrity violation, various locations of nuclei are observed. it was found that the histocytoarchitectonics of hepatocytes was severely disturbed as a result of their irregular arrangement and lysis of some nuclei (3).

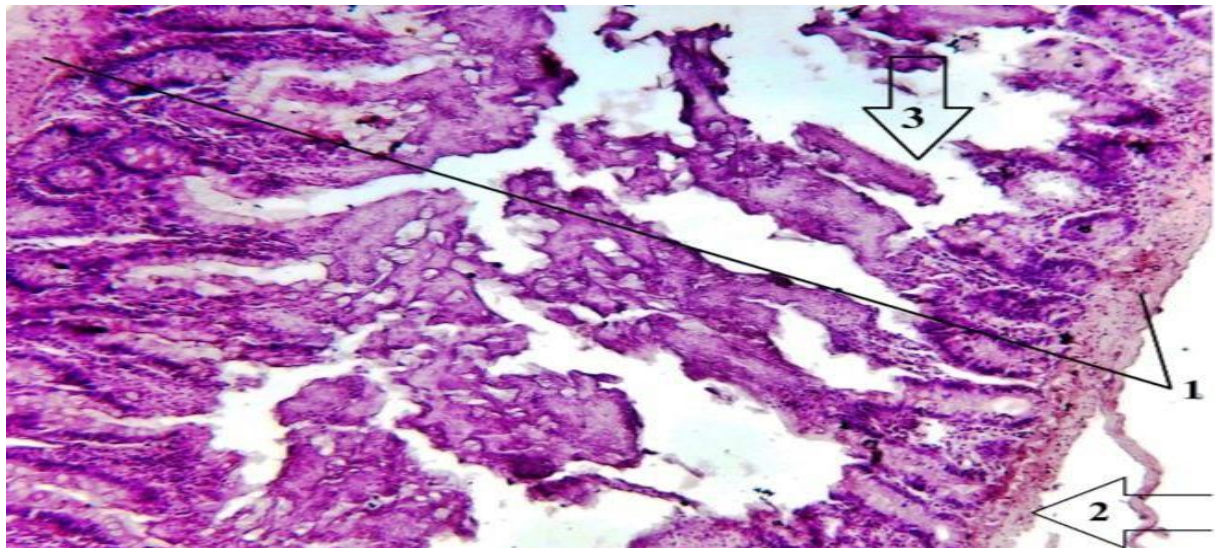




**Fig. 3. Histology of a healthy rat intestine.**

**Dye hemotoxylin-eosin. X: 10x10**

When the histology of a healthy rat intestine is seen, the intestine has a normal appearance: A - mucous layer (black); B - muscle layer (blue); The presence of V-villi (indicated by a green arrow) was determined.



**Fig. 4. Histology of the diseased rat intestine.**

**Dye hemotoxylin-eosin. X: 10x40**

In the histology of the rat intestine poisoned by nicotine smoke (see Fig. 4), it was found that there are cases of asymmetry of the mucous membranes(1) and destruction (erosion) and hypoplasia (reduction of cells) of the mucous membrane(2) as a result of which the intestinal villi atrophy and disintegrate into the intestinal cavity.

**Conclusion.** In short, nicotine has a negative effect on the members of the digestive system, blood hemostasis in the blood vessels of the liver, expansion of the sinusoidal spaces to various degrees as a result of hypoxia and intoxication, the integrity of the cell wall in the tissues is damaged, and the nuclei are different. it causes irregular arrangement in size, atrophy of intestinal villi and disintegration into the intestinal cavity. In the gastrointestinal system of tobacco smokers, the digestive process is disturbed, decay and inflammatory diseases occur.

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