The Bioscan AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES 20(2): S2: 313-315, 2025 www.thebioscan.com

STUDY OF ACUTE TOXICITY, LOCAL IRRITANT AND ALLERGIZING EFFECTS OF THE SUBSTANCE "GLAUCONITE-NEO"

Umaraliyeva Nilufar Ravshan kizi, Maksudova Firuza Khurshidovna, Fayzullayeva Nodira Sultanovna, Gulyamov Shokhid Sharafutdin ugli

Tashkent Pharmaceutical Institute, numaralieva711@gmail.com

DOI: 10.63001/tbs.2025.v20.i02.S2.pp313-315

KEYWORDS
Enterosorbent, detoxification, Glaukonit-Neo, in vitro, acute toxicity, adsorption activity.

Received on:

01-03-2025

Accepted on:

07-04-2025

Published on

13-05-2025

ABSTRACT

Based on the research results, the substance "Glauconite-Neo" (TashPharma, Uzbekistan) does not exhibit toxicity in the dose range of 2000–4000 mg/kg according to acute toxicity indicators. Even at maximum doses, it does not lead to animal death, does not have a local irritant effect when applied, and does not have an allergenic effect.

INTRODUCTION

Currently, various enterosorbents are widely used in clinical practice for detoxifying the body from exogenous and endogenous toxins. These include medicinal activated charcoal, natural plant-based polymers (lignin, pectins, alginates), ion-exchange materials, synthetic polymers, sorbents based on highly dispersed silicon dioxide (HDSD), and others. The choice of sorbent depends on the specific therapeutic objectives, the route of administration, patient tolerance to the therapy, and other conditions. Enterosorption therapy is one of the promising and essential directions in the treatment of exogenous and endogenous poisonings, based on the ability of enterosorbent drugs to bind and remove toxic substances from the body.

Enterosorbents are medicinal agents with various structures, aimed at binding exo- and endotoxins in the gastrointestinal tract through mechanisms such as adsorption, ion exchange, complex formation, and facilitating their elimination from the body. Compared to alternative invasive detoxification methods, enterosorption is a more effective, safer, and less costly method [1, 2].

On the pharmaceutical market of our republic today, various enterosorbent agents are available, differing in their mechanism of action and dosage forms. When taking these drugs, patients can choose an enterosorbent suitable for their condition and age. However, many of these agents are imported from abroad; therefore, the current demand for enterosorbent drugs in our republic is not fully met.

In the conducted studies, a natural highly dispersed powder of the mineral glauconite of variable composition (chemical formula – $(K,Na)(Fe^{3+},Al,Mg)_2(Si,Al)_4O_{10}(OH)_2$) was used, provided by LLC "Fati-Derm" (Changi quarry, Parkent district, Republic of Uzbekistan). Also used were samples of stepwise purified and activated glauconite, named "Glauconite-Neo," developed at the "Scientific Laboratory of Innovative Pharmaceutical Compounds" (under the supervision of Doctor of Pharmaceutical Sciences, Professor A.T. Sharipov), recommended for oral use as an encapsulated enterosorbent named "Fatifiltrum."

Materials and Methods of the Study. All studies were conducted on healthy animals that had undergone a quarantine period of no less than 10–14 days [1–4].

Acute toxicity was studied using standard methods on white outbred mice of both sexes, weighing 18–22 grams. Each group consisted of 6 animals, with a total of 18 mice used.

The substance was administered once orally to the experimental animals in a volume of 0.4 ml/20 g in solution form at doses of 2000 mg/kg (10%) and 4000 mg/kg (20%). Animals in the control group received a single oral dose of distilled water in the same volume of 0.4 ml/20 g.

After administration of the substance, the animals were placed in separate cages according to their groups and observed continuously during the first hour. Subsequently, observations were carried out hourly during the first day and once daily for the following 13 days (the total observation period was 14 days). The following parameters were assessed: general condition of the animals, behavioral characteristics, intensity and nature of motor activity, presence and type of convulsions, coordination of movements, skeletal muscle tone, response to external stimuli, respiratory rate and depth, heart rate, condition of fur and skin, color of mucous membranes, tail position, quantity and consistency of feces, food and water intake, as well as other indicators reflecting toxic effects. Additionally, the onset time of signs of intoxication was recorded [1, 2].

During the experiment, all animals were kept under standard vivarium conditions and were provided with a complete diet and free access to water.

Research Results. After oral administration of the substance, a number of symptoms of intoxication, changes in general condition, and other effects characterizing the toxic action of the substance were observed (Table 1).

Table 1

Results of the registration of the toxic effects of the substance "Glauconite-Neo", TashPharma, Uzbekistan

Dose	Result
0 mg/kg (control)	After administration of the substance, no signs of intoxication were observed in the animals.
2000 mg/kg	After administration of the substance, no signs of intoxication were observed in the animals.
4000 mg/kg	Ten minutes after administration of the substance, animals showed reduced motor activity and clustering behavior, which lasted for the first 50 minutes, after which their condition returned to normal.

Calculation of acute toxicity indicators was not possible due to the absence of animal deaths after oral administration of the substance, which indicates a lack of toxicity in the dose range of 2000–4000 mg/kg. Therefore, it is assumed that LD_{50} > 4000 mg/kg (Table 2).

Table 2

Results of the study on acute toxicity indicators of the substance

"Glauconite-Neo", TashPharma, Uzbekistan	
Dose (mg/kg)	Number of mice deceased / total
0 mg/kg	0/6
2000 mg/kg	0/6
4000 mg/kg	0/6
LD_{50}>4000 mg/kg	

Materials and Methods of the Study. The study of the local irritant effect of the substance "Glauconite-Neo", TashPharma, Uzbekistan, was conducted on 3 albino rabbits (both sexes), weighing 2–2.5 kg, in accordance with GOST R ISO 10993.10-99 [5]. One day before the experiment, the fur on the animals' backs was carefully shaved over an area of 10×15 cm. The test sample was applied to the left side of the shaved area on the rabbit's back using 0.5 ml of a 10% solution of "Glauconite-Neo" (TashPharma, Uzbekistan), followed by fixation of the application site. The exposure time was 4 hours, after which the location of the sample was noted.

Observation of the application sites on the back was conducted at 1, 24, 48, and 72 hours after exposure. Skin reactions were assessed using the scale specified in the skin condition classification system (Table 3).

Table 3

Skin Condition Classification System

Reaction Description	Score
Erythema and Eschar Formation	
No erythema	0
Very slight erythema (barely noticeable)	1
Noticeable erythema	2
Moderate erythema	3
Severe erythema (bright red with eschar formation)	4
Edema Formation	
No edema	0
Very slight edema (barely noticeable)	1
Noticeable edema	2
Moderate edema	3
Severe edema	4

Evaluation of Results. After exposure, the primary irritation index (PII) was determined by summing the scores characterizing the primary irritation (edema and erythema) in each animal at different observation intervals, and dividing the obtained value by the total number of observations.

The data obtained at 24, 48, and 72 hours were taken into account in the calculations. To calculate the PII, the scores of all animals were summed and divided by their number (3).

The primary irritation index was compared with the values presented in Table 4 and recorded in the report.

Table 4

Degrees of Response to Irritation in Rabbits

Response	Score Range
None	0 to 0.4

Slight	0.5 to 1.9
Moderate	2.0 to 4.9
Severe	5.0 to 8.0

Research Results. In the study of the local irritant effect of the substance "Glauconite-Neo", TashPharma, Uzbekistan, it was found that no signs of erythema or edema were observed in any of the rabbits throughout the experiment. Based on the obtained data, the primary irritation index (PII) was calculated (Table 5). The irritation index was 0, indicating the absence of a local irritant effect of the substance "Glauconite-Neo", TashPharma, Uzbekistan.

Table 5

Results of the Study on the Skin Reaction of Animals After Application of the Substance "Glauconite-Neo", TashPharma, Uzbekistan

PII		Conclusion
0		No reaction

Materials and Methods of Research. The study of the allergenic effect of the substance was conducted according to GOST R ISO 10993.10-99 [5]. In the experiment, white mice (both sexes) weighing 20-24 g were used, with a total of 6 animals.

For this, a single subcutaneous injection of a 5% egg albumin solution (prepared in physiological saline) at a dose of 1 ml/20 g was administered to the animals in the cervical fold.

On the 8th day, the substance "Glauconite-Neo", TashPharma, Uzbekistan, in the form of a 5% aqueous solution at a dose of 1000 mg/kg was administered orally. The reaction was assessed at 15 minutes (rapid reaction) and after 24-48 hours (delayed-type hypersensitivity) according to the following scale (in points):

0 – No visible changes;
1 – Discrete or focal erythema;
2 – Moderate and uniform erythema;
3 – Intense erythema and swelling.

Research Results. In the study of the allergenic effect of the substance "Glauconite-Neo", TashPharma, Uzbekistan, it was found that no signs of erythema were observed in any of the animals throughout the experiment (Table 6). The obtained data indicate the absence of an allergenic effect of the substance "Glauconite-Neo", TashPharma, Uzbekistan.

Table 6

Results of the Study on the Allergenic Effect of the Substance "Glauconite-Neo", TashPharma, Uzbekistan

Response	15 min	24 hours	48 hours	Total
	Erythema	Erythema	Erythema	
Ball	0	0	0	0

Discussion of the Results. Based on the obtained results, it can be concluded that the substance "Glauconite-Neo", TashPharma, Uzbekistan, does not have an allergenic effect.

CONCLUSION

The investigated substance "Glaukonit-neo" (TashFarmi, Uzbekistan) does not exhibit toxicity within the dose range of 2000–4000 mg/kg based on acute toxicity parameters, and even at the maximum doses, it does not lead to animal death. The substance "Glaukonit-neo," TashFarmi, Uzbekistan, does not cause local irritation upon application. The allergenic effect of the substance "Glaukonit-neo," TashFarmi, Uzbekistan, was studied, and it was found that the substance does not possess allergenic properties.

REFERENCES

- Rukovodstvo po eksperimentalnomu (doklinicheskomu) izucheniyu novih farmakologicheskih veshestv / [pod obщ. red. R. U. Xabriyeva]. – 2-e izd., pererab. i dop. – M.: OAO Izd-vo «Meditsina», 2005. – 83s
- Rukovodstvo po provedeniyu doklinicheskih issledovaniy lekarstvennih sredstv. Chast pervaya / [pod red. A.N. Mironova]. – M.: Grif i K, 2012.–944s
- Organisation for Economic Co-operation and Development. (2008). Test No. 425: Acute Oral Toxicity – Up-and-Down Procedure (UDP). OECD Publishing. https://doi.org/10.1787/9789264071049-en
- Morton, D. B., Jennings, M., Buckwell, A., Ewbank, R., Godfrey, C., Holgate, B., Inglis, I., James, R., Page, C., Sharman, I., Verschoyle, R., Westall, L., Wilson, A. B., & Joint Working Group on Refinement (2001). Refining procedures for the administration of substances. Report of the BVAAWF/FRAME/RSPCA/UFAW Joint Working Group on Refinement. British Veterinary Association Animal Welfare Foundation/Fund for the Replacement of Animals in Medical Experiments/Royal Society for the Prevention of Cruelty to Animals/Universities Federation for Animal Welfare. Laboratory animals, 35(1), 1–41. https://doi.org/10.1258/0023677011911345
- GOST R ISO 10993.10-99. Otsenka biologicheskih deystviy meditsinskih izdeliy. Issledovaniye razdrajayushego i sensibiliziruyushego deystviya. – Moskva: Izd-vo standartov, 1999. – 38 s.
- "Handbook of Laboratory Animal Science" by Jann Hau and Steven J. Schapiro.
- Peterson P.L. Hematological and biochemical reference values for laboratory rats // Toxicology Research. – 2020. – 39(4): 522–531.
- Kaplan M. & Wolf P. Liver function tests in rodent models of toxicology // Journal of Hepatic Studies. – 2019. – 45(2): 178–191.
- Smith C. Laboratory rat biochemistry: Normal ranges and variations // Veterinary Clinical Pathology. – 2021. – 50(3): 289–302.