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Prediction of acute toxicity of biologically active substances of Adonis Vernalis

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Relevance. Nowadays pre-experimental researches in silico are gaining increasing use. Using in silico methods can be obtained pre-experimental

analysis of biologically active substances of both synthetic and natural origin. They give an opportunity to save time of research, to emphasize the areas of experimental tests and to identify the best ways to achieve the objectives. The *GUSAR Acute Rat Toxic* program provides an opportunity to predict acute toxic effects on rats by the in silico method, which is more humane than the classic method.

The aim is to determine the acute toxic effect of the biologically active substances of the medicinal plant Adonis Vernalis by in silico methods.

Materials and methods of research. Computer forecasting was carried out by the GUSAR Acute Rat Toxicity program to obtain LD_{50} values for rats, which was done by four types of administration (oral, intravenous, intraperitoneal, subcutaneous, inhalation). The following biologically active substances of Adonis Vernalis are selected for research: Vitexin, Cymarine, Adonitoxin, Vernadigin, Strophanthidin, Strophadogenin, Adonivernith, Phytosterin, Orientin and Isoorientine. The GUSAR Acute Rat Toxicity program contains information taken from the SYMYX MDL Toxicity Database.

Results. After the computer screening, we have obtained the following data: 1. Vitexin: intraperitoneal route of administration in rats *(IP)* LD_{50} *= 668,3 mg/kg; intravenous route of administration in rats (IV)* LD_{50} *= 1731 mg/kg; oral route of administration in rats (Oral) LD50 = 5531 mg/kg; subcutaneous route of administration in rats (SC) LD50 = 3089 mg/kg. 2.* Cymarine: *Rat IP* LD_{50} *= 18,91 mg/kg; Rat IV* LD_{50} *= 16,38 mg/kg; Rat Oral* LD_{50}*= 29,09 mg/kg; Rat SC* LD_{50} *= 16,25 mg/kg. 3.* Adonitoxin: *Rat IP* LD_{50} *= 28,74 mg/kg; Rat IV* LD_{50} *= 18,4 mg/kg; Rat Oral* LD_{50}*= 31,72 mg/kg; Rat SC* LD_{50} *= 39,26 mg/kg. 4.* Vernadigin: *Rat IP* LD_{50} *= 29,43 mg/kg; Rat IV* LD_{50} *= 10,09 mg/kg; Rat Oral* LD_{50}*= 30,94 mg/kg; Rat SC* LD_{50}*= 43,11 mg/kg. 5.* Strophanthidin: *Rat IP* LD_{50}*= 293,6 mg/kg; Rat IV* LD_{50} *= 10,2 mg/kg; Rat Oral* LD_{50} *= 33,16 mg/kg; Rat SC* LD_{50}*= 113 mg/kg. 6.* Strophadogenin*: Rat IP* LD_{50} *= 151,8 mg/kg; Rat IV* LD_{50} *= 13,77 mg/kg; Rat Oral* LD_{50} *= 502,9 mg/kg; Rat SC* LD_{50} *= 141,1 mg/kg. 7.* Adonivernith*: Rat IP* LD_{50} *= 256,6 mg/kg; Rat IV* LD_{50} *= 1988 mg/kg; Rat Oral* LD_{50} *= 2914 mg/kg; Rat SC* LD_{50} *= 2440 mg/kg. 8.* Phytosterin*: Rat IP* LD_{50} *= 896,7 mg/kg; Rat IV* LD_{50} *= 5,876 mg/kg; Rat Oral* LD_{50} *= 1280 mg/kg; Rat SC* LD_{50} *= 838,7 mg/kg. 9.* Orientin*: Rat IP* LD_{50} *= 659,5 mg/kg; Rat IV* LD_{50} *= 1819 mg/kg; Rat Oral* LD_{50} *= 2754 mg/kg; Rat SC* LD_{50} *= 1047 mg/kg. 10.* Isoorientine*: Rat IP* LD_{50} *= 682 mg/kg; Rat IV* LD_{50} *= 1642 mg/kg; Rat Oral* LD_{50} *= 3837 mg/kg; Rat SC* LD_{50} *= 2086 mg/kg.*

According to the results, all compounds belong to grades 3, 4 and 5 according to the classification of K.K. Sidorova

Conclusions. The obtained data on acute toxicity in rats was carried out in silico methods, which is more economically, ecologically and more humane than the classical method. The obtained values LD_{50} for rats will be used in the future to create new medical and cosmetic medicines.