

Bukovinian State Medical University

**STATE OF POTASSIUM METABOLISM
DURING PHARMACOLOGICAL ACTIVATION
OF ATP-DEPENDENT POTASSIUM
CHANNELS**

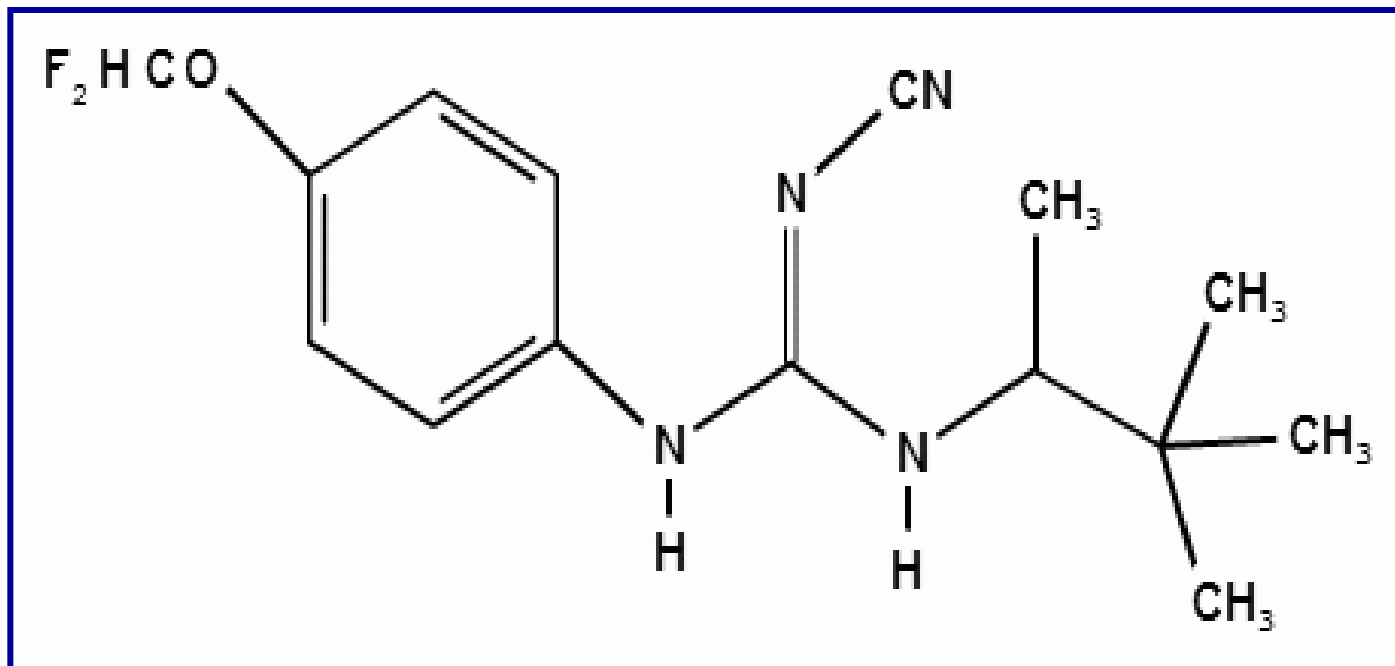
**Nataliia FILIPETS
Olena FiLIPETS**

FLUORINE-CONTAINING ACTIVATOR OF ADENOSINTRIPHOSPHATE-DEPENDENT POTASSIUM CHANNELS FLOCALIN



Institute of
Organic Chemistry
NAS of Ukraine

ORGANOFLUORINE COMPOUNDS
CHEMISTRY DEPARTMENT
Professor Lev Yagupolskii



EFFECTS OF FLUORINE-CONTAINING ACTIVATOR OF ADENOSINTRIPHOSPHATE-DEPENDENT POTASSIUM CHANNELS FLOCALIN

- **Cardioprotective, vasodilating, antianginal, antiarrhythmic, antihypertensive effects** [*R.B. Strutynskyi, O.O. Moybenko, 2003-2012*];
- **Antispasmodic effect** [*I. Samarskaya, 2007, T. Boychuk and al., 2012, M. Mokhort, 2012*];
- **Cerebroprotective effect** [*O. Denisyuk, 2011*];
- **Nephroprotective effect** [*N. Filipets, A. Gozhenko, 2016*].

The purpose of the work – the study of potassium balance under the influence of activator of adenosine triphosphate-dependent potassium channels Flocalin depending on the frequency of administration and functional status of the kidneys.

Materials and methods

The experiments were performed on laboratory white rats 0.15-0.17 kg under physiological conditions, as well as on models of the initial stage of development and chronicity of sublimate nephropathy (HgCl₂, 5 mg/kg, SC). After a single and sevenfold injections of Flocalin (i/gastric, 5 mg/kg) we performed 5% water load, recorded diuresis for 2 h, determined the level of potassium and the concentration of potassium ions in the urine with photometric method, calculated kaliuresis.

THE INFLUENCE OF FLOCALIN ON THE PARAMETERS OF POTASSIUM BALANCE IN RATS DEPENDING ON MULTIPLICITY OF ADMINISTRATION UNDER PHYSIOLOGICAL CONDITIONS ($\bar{x} \pm S_x$, n=9)

Index	Research under physiological conditions			
	Single injection		Prolonged introduction	
	Intact rats (Control)	Flocalin	Intact rats (Control)	Flocalin
Concentration of K ⁺ in blood plasma, <i>mmol / l</i>	5.0±0.19	5.0±0.12	6.1±0.33	8.2±0.61*
Concentration of K ⁺ in urine, <i>mmol / l</i>	5.2±0.87	3.9±0.53	7.3±1.05	4.9±0.21*
Excretion K ⁺ , <i>μmol / 2 h</i>	22.1±3.17	14.6±1.58*	29.8±1.12	21.8±1.22
Diuresis, <i>ml / (2 h·100 g)</i>	4.2±0.25	3.8±0.12	4.0±0.15	4.5±0.12*

THE INFLUENCE OF FLOCALIN ON THE PARAMETERS OF POTASSIUM BALANCE IN RATS DEPENDING ON MULTIPLICITY OF ADMINISTRATION IN INITIAL STAGE OF SUBLIMATE NEPHROPATHY ($\bar{x} \pm S_x$, n=9)

Index	Research under the conditions of the initial stage of development sublimite nephropathy					
	Single injection			Prolonged introduction (7 days)		
	Intact rats (Control)	Sublimate nephropathy	Flocalin	Intact rats (Control)	Sublimate nephropathy	Flocalin
Concentration of K ⁺ in blood plasma, <i>mmol / l</i>	6.2±0.30	5.9±0.69	6.6±0.58	6.3±0.23	5.2±0.41*	6.8±0.25#
Concentration of K ⁺ in urine, <i>mmol / l</i>	9.4±0.77	16.6±0.53*	18.7±0.73*#	4.2±0.72	5.4±0.16	3.4±0.63#
Excretion K ⁺ , <i>μmol / 2 h</i>	22.8±3.46	32.7±3.55	58.5±3.56*	16.7±3.78	15.9±1.48	8.3±2.85#
Diuresis, <i>ml / (2 h·100 g)</i>	3.5±0.52	2.0±0.20*	3.1±0.12#	3.7±0.11	2.9±0.25*	3.2±0.46

THE INFLUENCE OF FLOCALIN ON THE PARAMETERS OF POTASSIUM BALANCE IN RATS IN CONDITIONS OF CHRONICITY OF SUBLIMATE NEPHROPATHY ($\bar{x} \pm S_x$, n=9)

Index	Research under the conditions of chronic sublimate nephropathy, prolonged introduction (7 days)		
	Intact rats (Control)	Chronic sublimate nephropathy	Flocalin
Concentration of K ⁺ in blood plasma, <i>mmol/l</i>	12.6±0.23	11.4±0.27	13.7±0.48
Concentration of K ⁺ in urine, <i>mmol / l</i>	4.5±6.21	6.2±0.79	4.3±0.19#
Excretion K ⁺ , <i>μmol / 2 h</i>	12.7±2.52	18.6±2.98	9.6±0.65#
Diuresis, <i>ml / (2 h·100 g)</i>	3.4±0.26	4.1±0.07*	2.3±0.27*#

CONCLUSIONS

1. After a single activation of KATP channels in rats under physiological conditions, kaliuresis decreased, while on the background of repeated (7 days) use of flocalin the excretion of potassium ions did not change.
2. Flocaline with a single injection two hours after the modeling of sublimite nephropathy increased the concentration of potassium ions in the urine and cation excretion.
3. After seven days of flocalin use in models of the initial stage of development and chronicity of sublimite nephropathy in rats, the concentration of potassium ions in the urine decreased and kaliuresis decreased.
4. The concentration of potassium ions in blood plasma increased only after multiple (7 days) activation of KATP channels in healthy rats.

CONCLUSIONS

Thus, the lack upward trend in tubular secretion of potassium ions and, consequently, in increase of kaliuresis after the opening of ATP-dependent potassium channels under physiological conditions precludes excessive reaction of the renin-angiotensin system in response to the vasodilating effect of Flocalin.

Maintenance of normal potassium levels after the course of Flocalin in the initial stage of sublimate nephropathy and in the development of chronic toxic renal damage indicates a lower risk of side effects of dyskalaemia in a new activator of ATP-dependent potassium channels and justifies further research on more prolonged impact of Flocalin on potassium metabolism.



Thank you for your attention!