



---

**Short communication**

## Antidepressant-like effect of chromium chloride in the mouse forced swim test: involvement of glutamatergic and serotonergic receptors

Anna Piotrowska<sup>1</sup>, Katarzyna Młyniec<sup>1</sup>, Agata Siwek<sup>1</sup>, Małgorzata Dybała<sup>1</sup>, Włodzimierz Opoka<sup>2</sup>, Ewa Poleszak<sup>4</sup>, Gabriel Nowak<sup>1,3</sup>

<sup>1</sup>Laboratory of Pharmacobiology, Department of Cytobiology and Histochemistry, <sup>2</sup>Department of Inorganic Chemistry, Collegium Medicum, Jagiellonian University, Medyczna 9, PL 30-688 Kraków, Poland

<sup>3</sup>Laboratory of Trace Elements Neurobiology, Department of Neurobiology, Institute of Pharmacology, Polish Academy of Sciences, Smętna 12, PL 31-343 Kraków, Poland

<sup>4</sup>Department of Pharmacology and Pharmacodynamics, Medical University of Lublin, Staszica 4, PL 20-081 Lublin, Poland

**Correspondence:** Gabriel Nowak, e-mail: nowak@if-pan.krakow.pl

---

**Abstract:**

Chromium (Cr) (III), an essential microelement of living organisms, was reported to exhibit potential antidepressant properties in preclinical and clinical studies. The aim of the present study was to examine the effect of CrCl<sub>3</sub> *ip* administration in the forced swim test (FST) in mice and the involvement of glutamatergic and serotonergic receptors in the antidepressant-like activity of chromium. CrCl<sub>3</sub> in a dose of 12 mg/kg, but not in doses of 6 or 32 mg/kg, reduced the immobility time in the FST. The locomotor activity was reduced by CrCl<sub>3</sub> in a dose of 32 mg/kg. Moreover, the reduction of the immobility time induced by the active dose (12 mg/kg) of CrCl<sub>3</sub> was completely abolished by NBQX (10 mg/kg; an antagonist of the AMPA receptor) pretreatment and partially inhibited by ritanserin (4 mg/kg; an antagonist of 5-HT<sub>2A/C</sub> receptor), WAY 1006335 (0.1 mg/kg; an antagonist of 5-HT<sub>1A</sub> receptor) and N-methyl-D-aspartate (75 mg/kg; agonist of NMDA receptor) administration. The present study demonstrates the antidepressant-like activity of chromium in the mouse FST and indicates the major role of the AMPA receptor and participation of NMDA glutamatergic and 5-HT<sub>1A</sub> and 5-HT<sub>2A/C</sub> serotonin receptors in this activity.

**Key words:**

chromium (III) chloride, NMDA, AMPA, 5-HT<sub>1A</sub>, 5-HT<sub>2A/C</sub>, receptors, forced swim test, mice

---