



Protective effects of glutathione and lipoic acid against cadmium-induced oxidative stress in rat's liver

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Introduction

Cadmium is a widespread, toxic industrial pollutant, which is introduced into the organs through food, air and tobacco smoke. Cd poisoning leads primarily to damage of the liver tissue and testes in laboratory animals

Aim

We analyzed the effects of cadmium exposure on the model system of experimental animals, the thiobarbituric acid (TBA)-reactive substance (TBARS) level, and the activity of xanthine oxidase (XO) and catalase in kidney of rats, with and without glutathione and lipoic acid (LA).

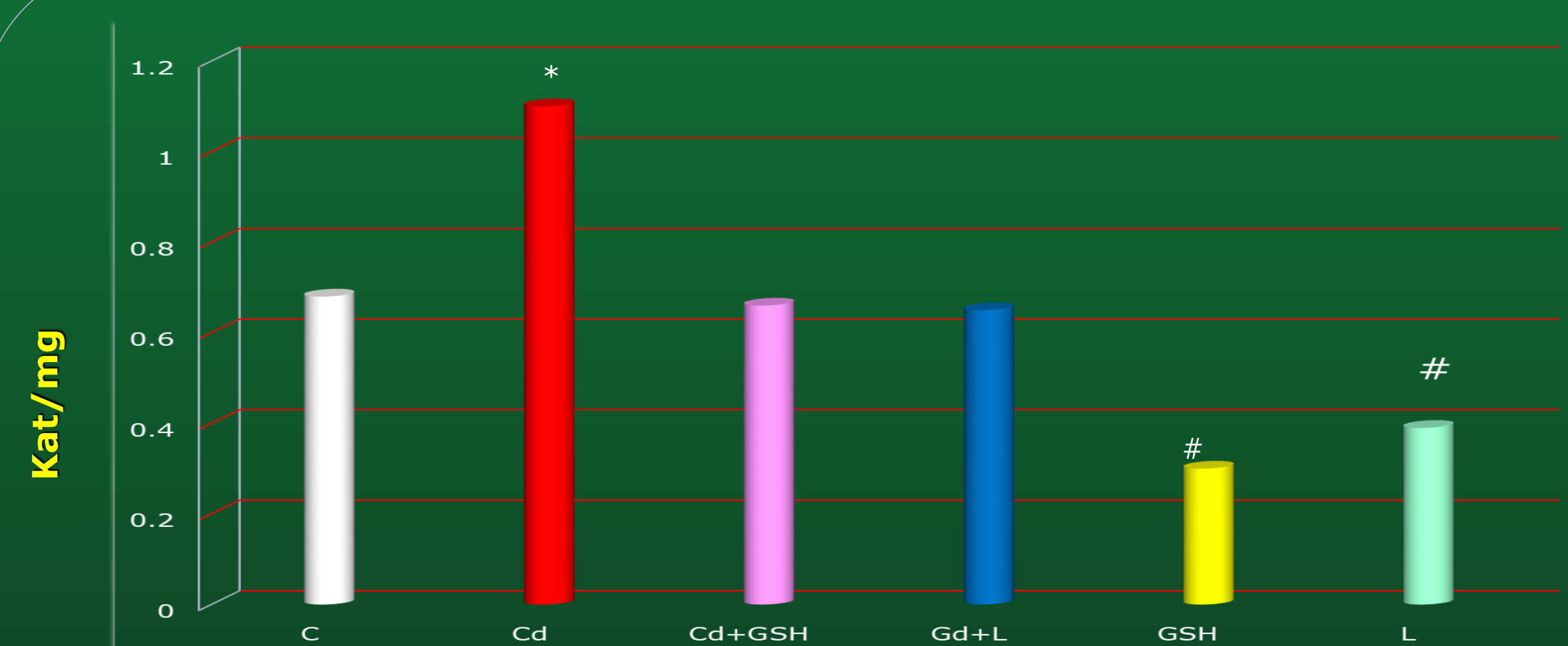
Materials and methods

The experimental animals were divided into six groups, regarding cadmium, glutathione, and LA intake. The concentration of TBARS in the homogenate was determined by spectrophotometric method according to Andreeva et al. The specific activity of XO was determined spectrophotometrically by the method of Hashimoto et al. Catalase activity in tissues was determined by spectrophotometric method according to Goth.

Results

The increased level of TBARS and the increased activity of XO in rat liver in cadmium poisoning are statistically significant compared to control ($p < 0.001$).

Glutathione and LA applied along with cadmium lowered TBARS level and reduced XO activity ($p < 0.001$). Catalase activity in the liver tissue was increased in the group, which was administered cadmium ($p < 0.001$).

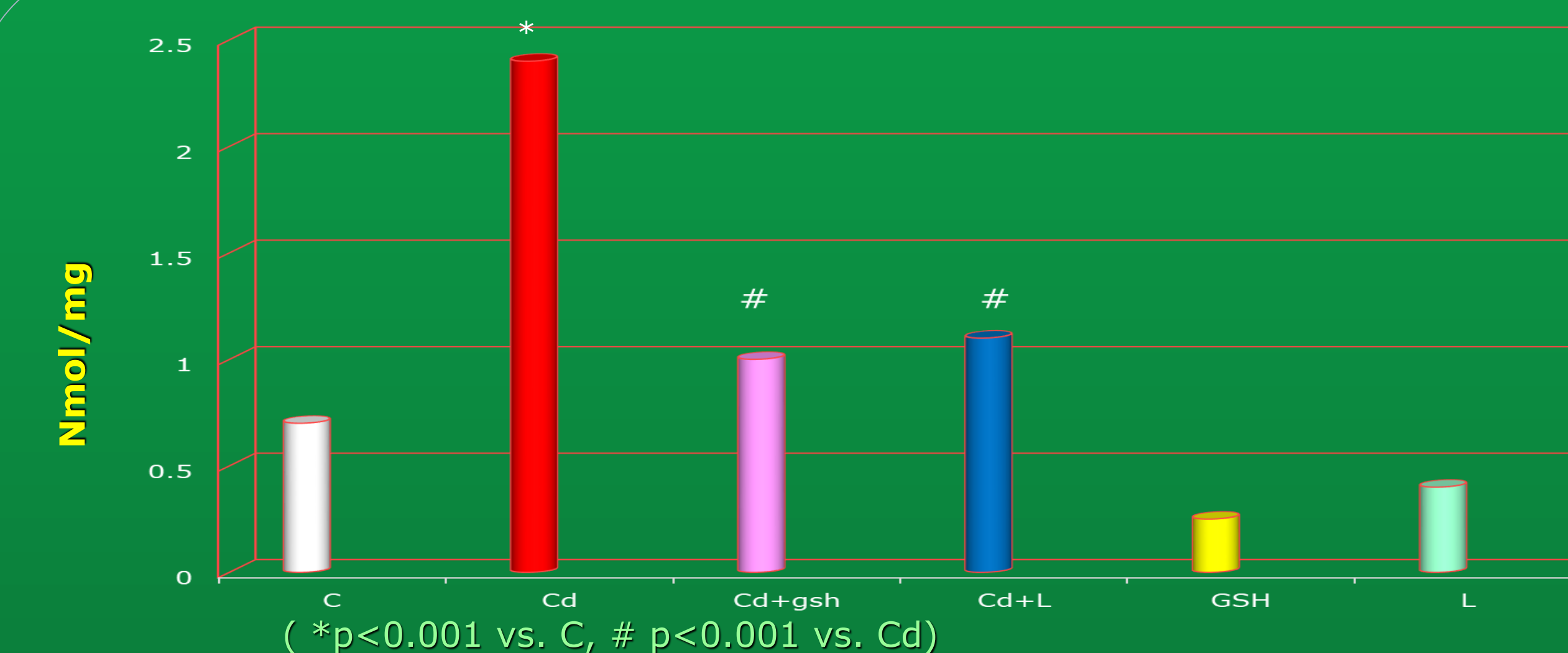


(* $p < 0.001$ vs. C, # $p < 0.001$ vs. Cd)

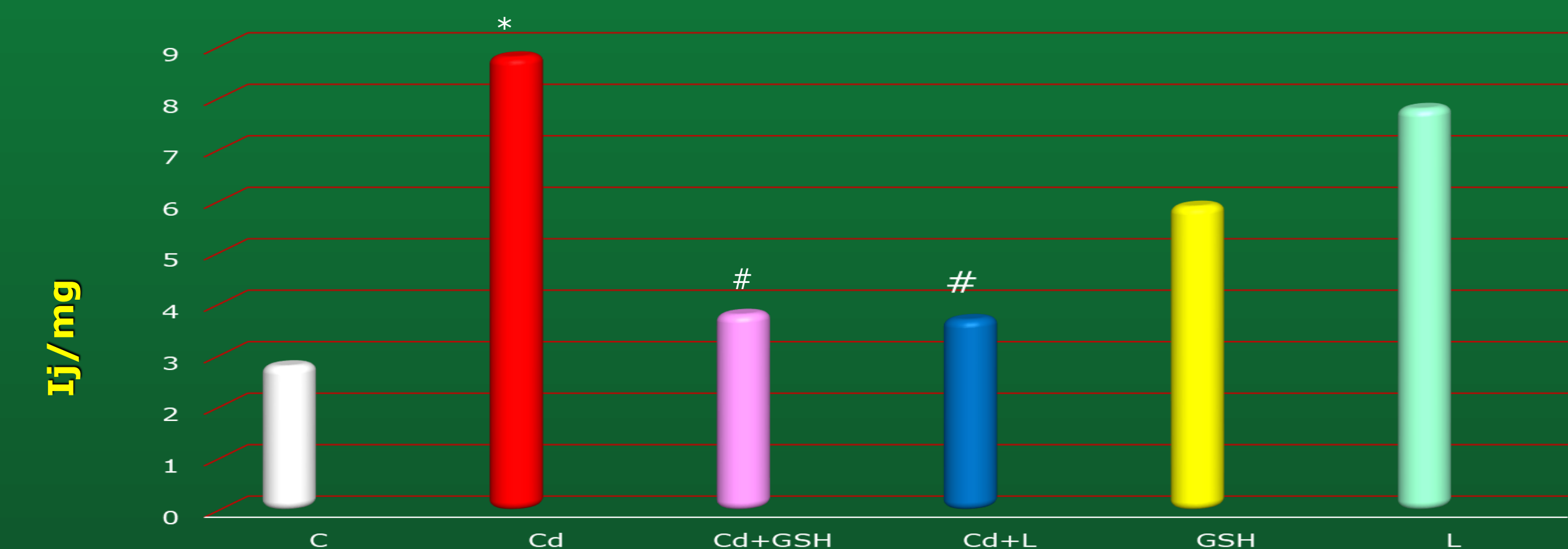
Graph 3. Catalase activity in liver tissue in experimental groups with cadmium, glutathione and lipoic acid

References

1. Efficacy of α -lipoic acid against cadmium toxicity on metal ion and oxidative imbalance, and expression of metallothionein and antioxidant genes in rabbit brain. *Environ Sci Pollut Res Int.* 2017 ;24(31):24593-24601
2. Yuan Xu, Xue Zhou, Chunli Shi, Jiachun Wang & Zhigang Wu α -Lipoic acid protects against the oxidative stress and cytotoxicity induced by cadmium in HepG2 cells through regenerating glutathione regulated by glutamate-cysteine ligase, *Toxicology Mechanisms and Methods*, 2015 ;25:8, 596-603



Graph 1. The level of TBARS in liver tissue in experimental groups with cadmium, glutathione and lipoic acid



(* $p < 0.001$ vs. C, # $p < 0.001$ vs. Cd)

Graph 2. Xanthine oxidase activity in liver tissue in experimental groups with cadmium, glutathione and lipoic acid

Conclusion

Glutathione and LA, as physiological antioxidants have reduced the level of lipid peroxides and the activity of XO, in conditions of cadmium poisoning, and can be used as protectors.

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