

# THE OUTCOME OF POTASSIUM DICHROMATE PREPUBERTAL EXPOSURE ON CHROMIUM LEVEL AND SEXUAL HORMON DYNAMICS IN MALE RATS

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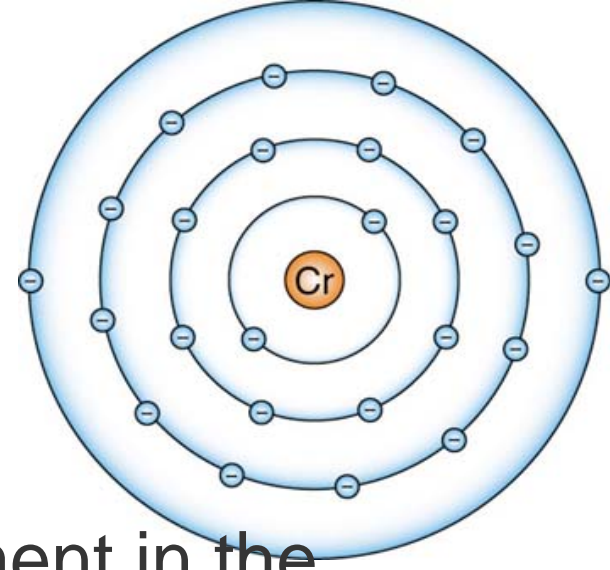


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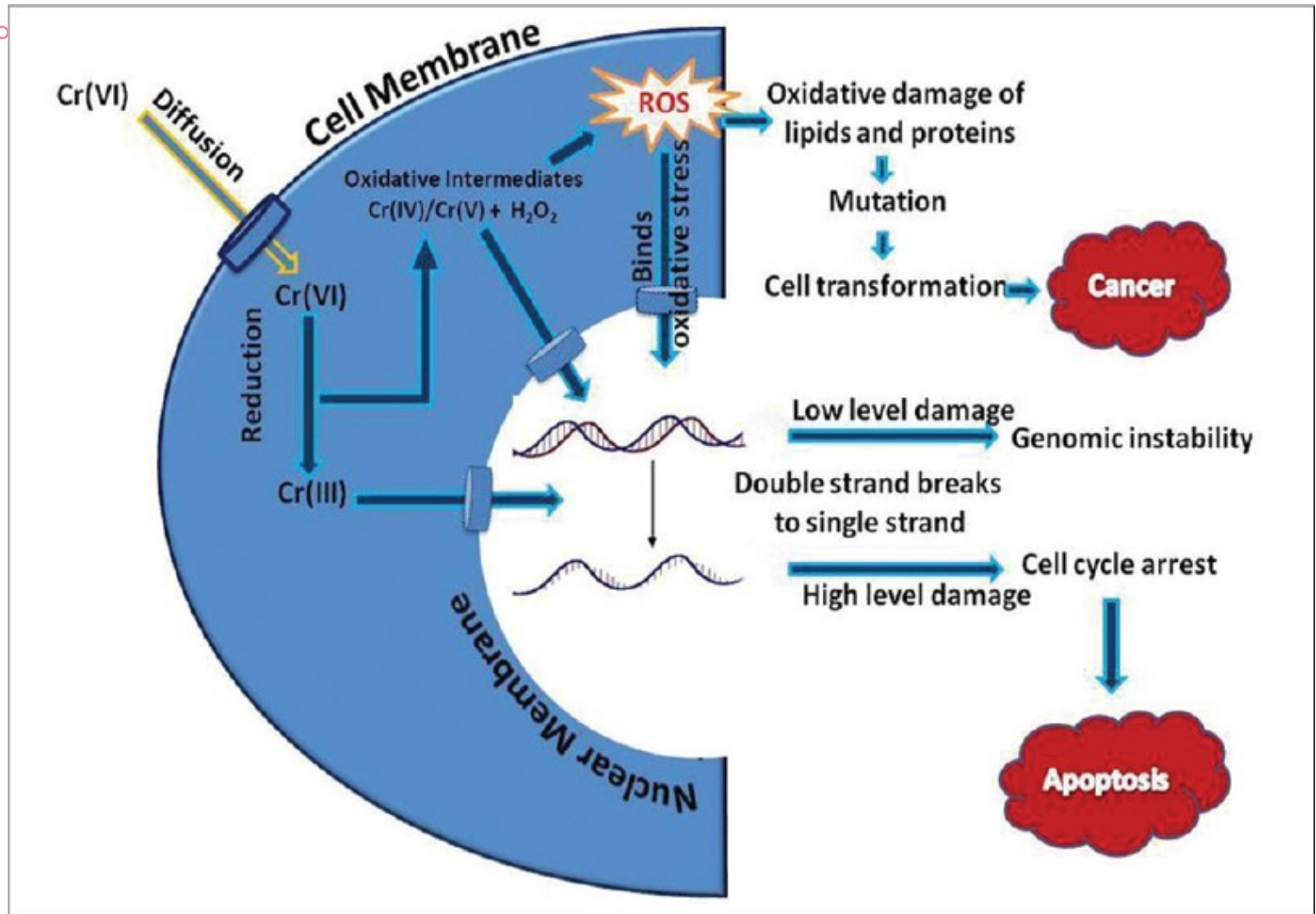


# Chromium



- ◉ The sixth most abundant element in the earth's crust.
- ◉ Ubiquitous in the environment, occurring generally as Cr 0, Cr III and Cr VI.
- ◉ Cr 0 is found **only** in metallic form, as component of iron-based alloys (stainless steel).
- ◉ Cr III is an essential nutrient, but with **poor toxicity**.

● Cr VI - Group I known human carcinogen by IARC



Potassium dichromate is the most toxic compound of hexavalent chromium





# Chromium sources



# Importance

- Because of wide utilization in industry Cr VI represents environmental risk nowadays, too

- Blacksmith Institute – “Top 10 world’s polluted places”

Bangladesh, China, India – drinking water pollution

California – 30% of drinking water

- Environmental and occupational exposure may have dramatic effects on health - male reproductive function

# Objectives




Impact of hexavalent chromium compound intake on some biological markers of reproductive function in male rats:

- *biological marker of exposure* – chromium level in genital organs (testis and epididymis) and sexual accessory gland (seminal vesicles, prostate and bulbo-urethral glands),
- *biochemical markers of testicular function* – LH and testosterone seric levels.

# Materials

- 8 white Wistar female rats purchased from Faculty of Medicine and Pharmacy Biobase Cluj-Napoca, Romania.
- Female rats were mated and after weaning 28 male pups were distributed in four groups, three experimental and one control.
- Individuals from experimental groups were exposed via **drinking water** to potassium dichromate **after weaning and until sexual maturity**.
- Control group received only tap water, which has no chromium content.





Treatment schedule was selected to determine the effect of relative low chromium levels, doses indicated by **EPA** to be **LOAEL** for male reproductive function:

$E_1$  - **25 ppm** Cr VI (LOAEL);

$E_2$  - **50 ppm** Cr VI (2xLOAEL);

$E_3$  - **75 ppm** Cr VI (3xLOAEL).

- All biomarkers were assessed at sexual maturity.
- The study was performed in compliance with national and international law regarding animal welfare and ethics in animal experiments: 143/400/2002; 471/2002; 205/2004; 206/2004; 9/2008; 86/609/CEE.

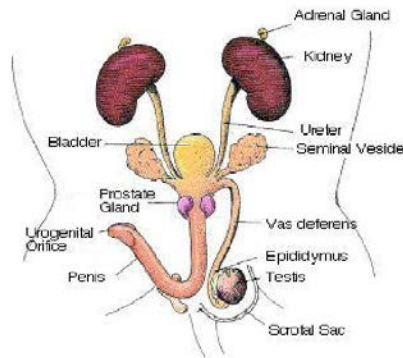


- The results were statistically analyzed by Anova method (two ways) and Student test.

# Methods



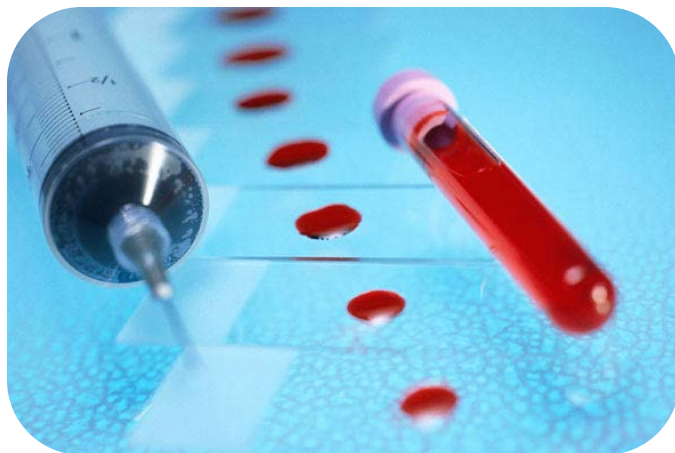
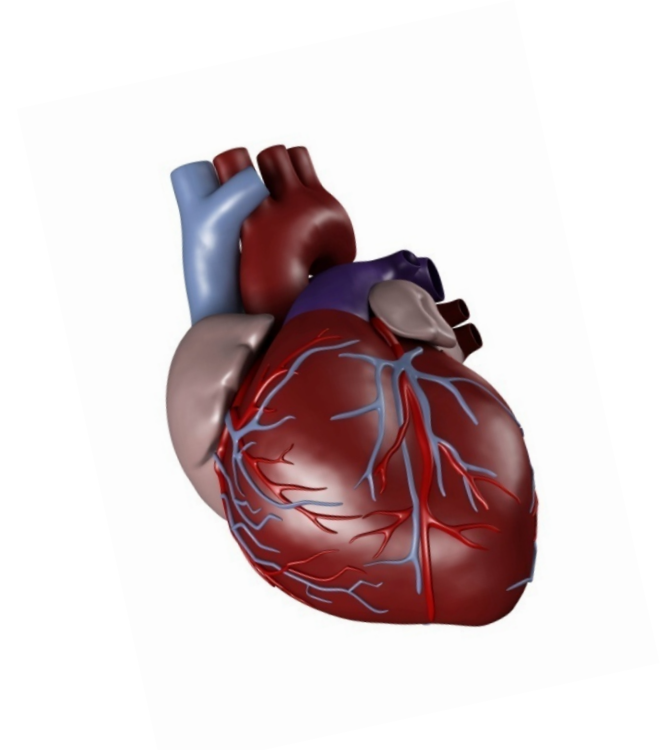
Ketamine  
50mg/kg  
Xylazine 5  
mg/kg  
i.p.



atomic absorption spectrometry  
(AAS – 6650 Shimadzu)



University of Politehnica Timisoara, Industrial  
Chemistry and Environmental Engineering



ISO 17025

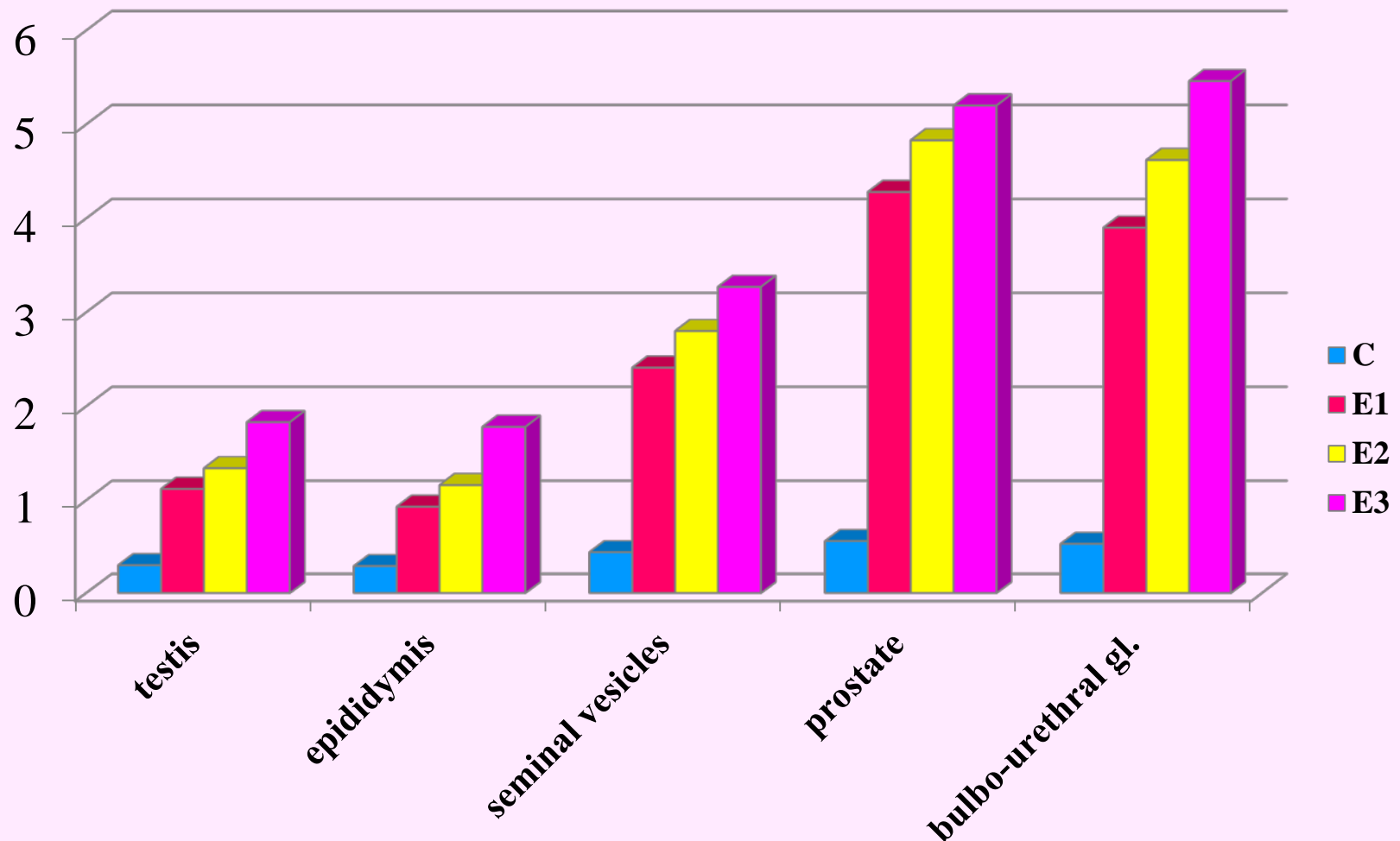
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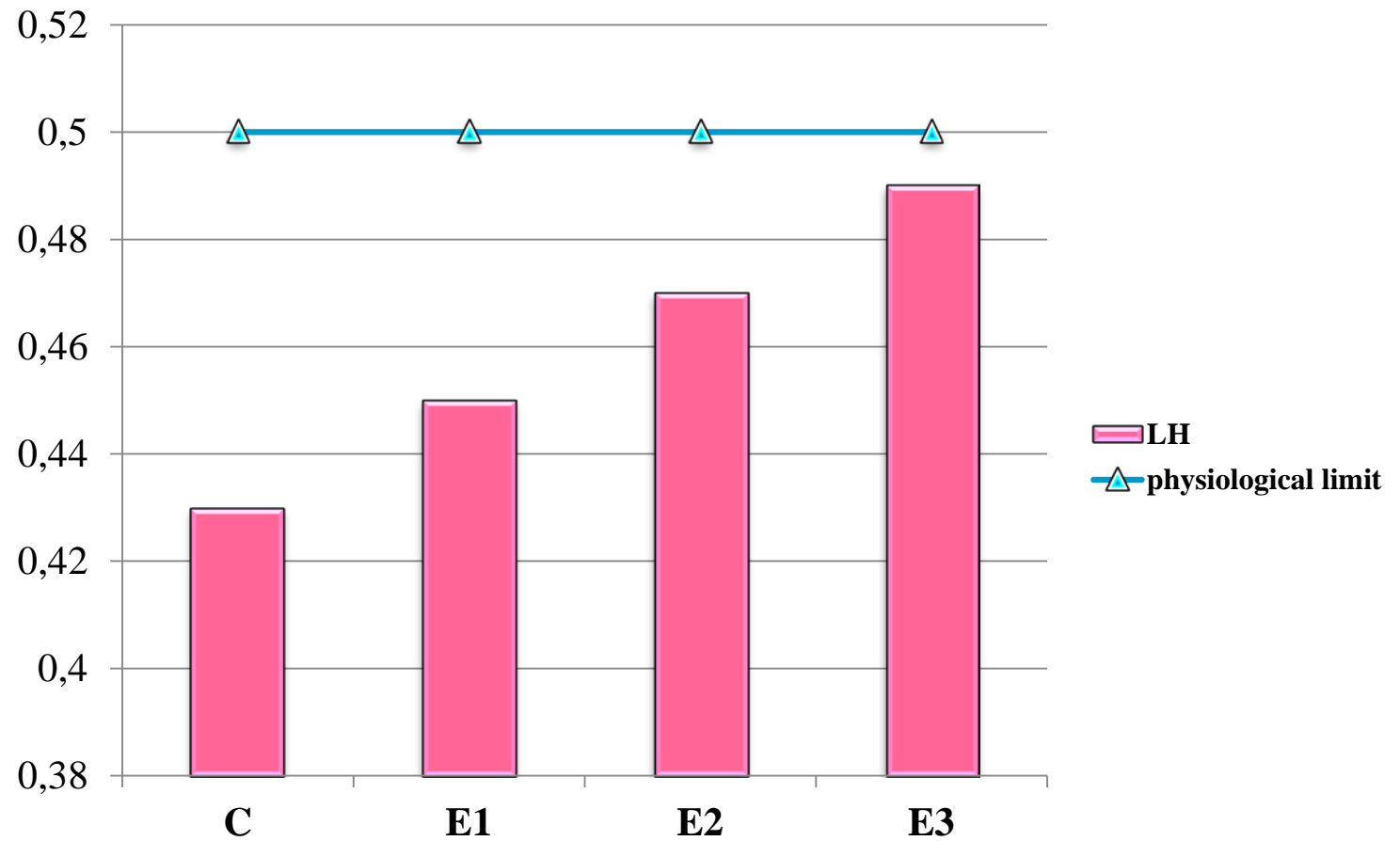




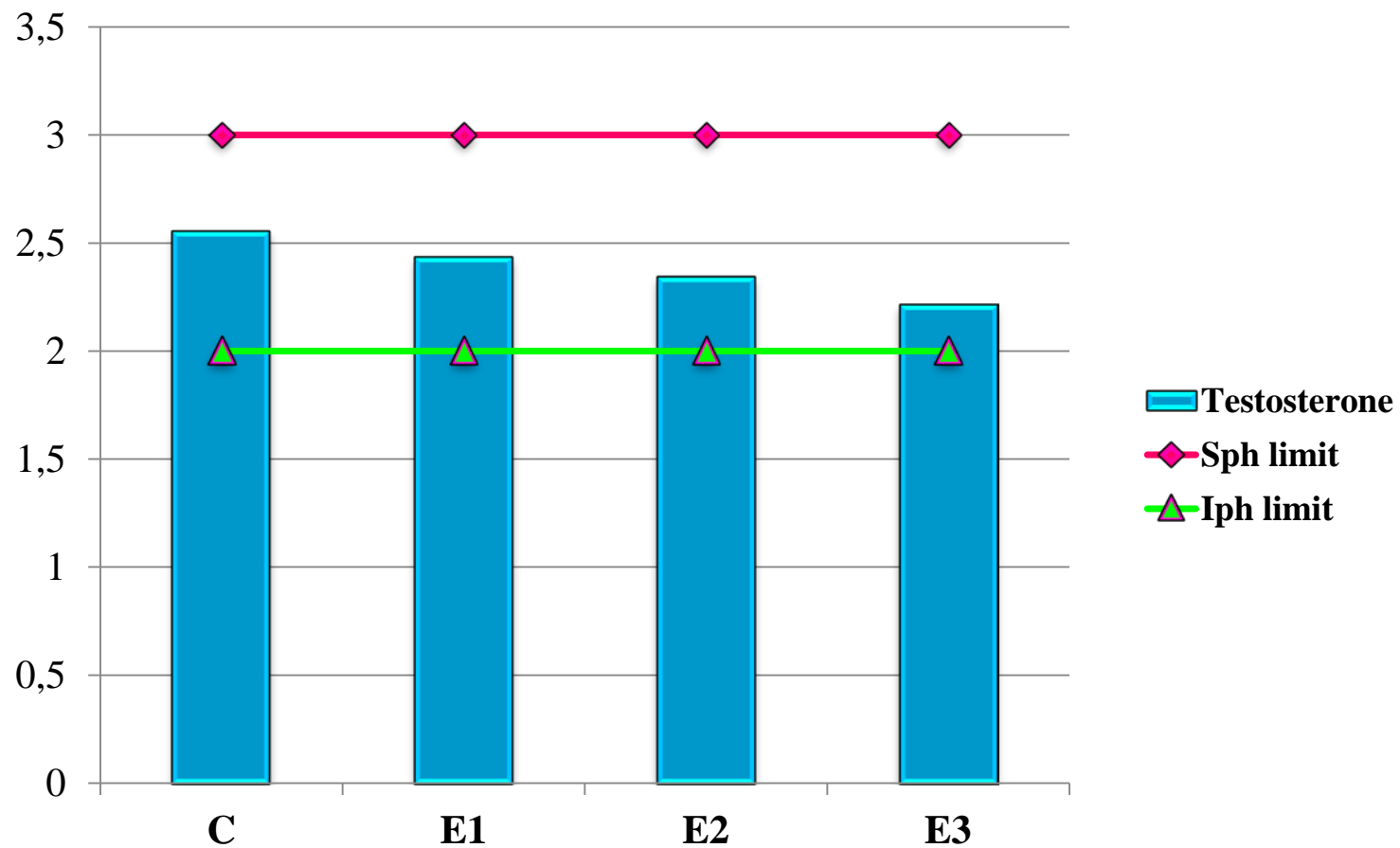
# *Chromium concentration dynamics in genital organs and sexual accessory glands after prepubertal exposure*



# LH seric level



# Testosterone seric level








# Conclusions

Exposure to potassium dichromate via drinking water produced:

- ❑ Accumulation of chromium in sexual organs, significant comparative to control group and directly correlated to exposure level;
- ❑ Hierarchy, based on average of experimental groups, was: prostate, bulbo-urethral glands, seminal vesicles, testis, epididymis.




□ Decrease of testosterone seric levels in exposed groups, significantly only when tripling the dose, and indirectly correlated to exposure level;

□ All the values were within the physiological limit (between 2-3 ng/ml).

□ Increase of LH seric level in individuals treated with Cr VI, significantly only when tripling the dose, and directly correlated to exposure level;

□ Physiological limit of 0.5 ng/ml hasn't been exceeded.

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- ❑ Chromium accumulation → structure and function of sexual organs are disturbed (as we observed in our other studies)
  - ❑ Production of sexual hormones is affected, too.
  - ❑ Hormonal imbalance will lead to impairment of reproductive function (as seen in studies published by our team and by other authors)
  - ❑ Cr VI is toxic for male reproductive function when is introduced in the body through drinking water



**Thank you  
for your  
attention!**