

Exploring the effects of glyphosate on the male reproductive system through *in vivo* studies on *Podarcis siculus* and *in vitro* studies on PNT1A cells

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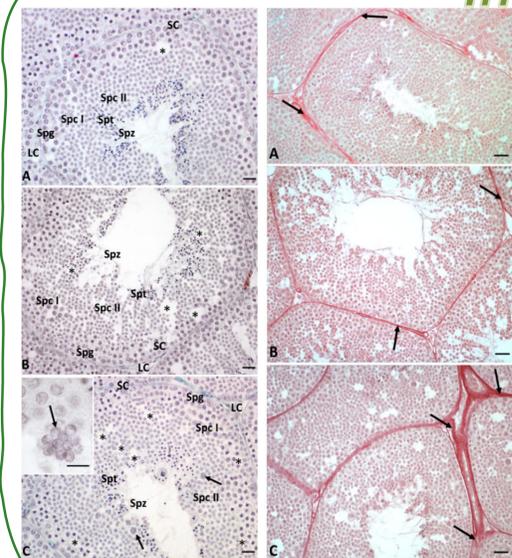
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INTRODUCTION & AIM

The intensification of agricultural practices has led to the widespread use of glyphosate, a herbicide suspected to act as an endocrine disruptor with potential impacts on environmental and human health. Reptiles, highly sensitive to hormonal imbalances, represent valuable ecotoxicological models. This study investigated the effects of glyphosate on the male reproductive system through an integrated *in vivo* and *in vitro* approach, assessing testicular alterations in adult males of *Podarcis siculus* and cytotoxic, mitochondrial, and endocrine effects in human prostate epithelial **PNT1A cells**, in order to clarify its potential role as an endocrine disruptor and its impact on reproductive function.

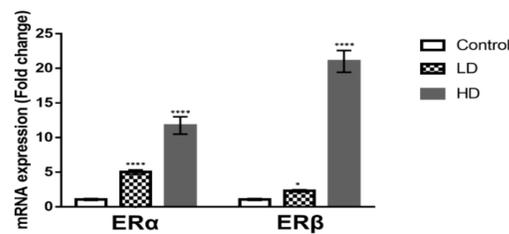
RESULTS & DISCUSSION

In vivo

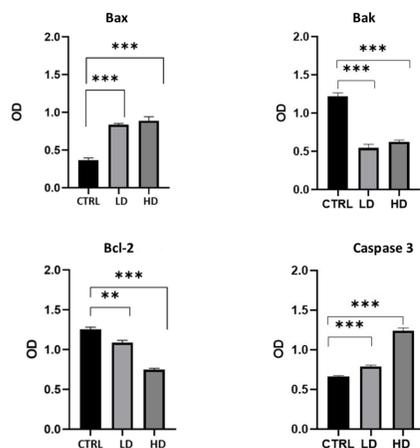
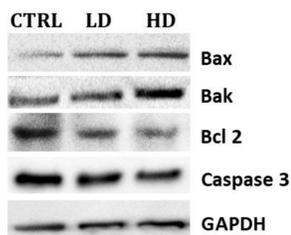


Real-time PCR shows a level of estrogen receptor expression.

Does glyphosate behave as an endocrine disruptor?

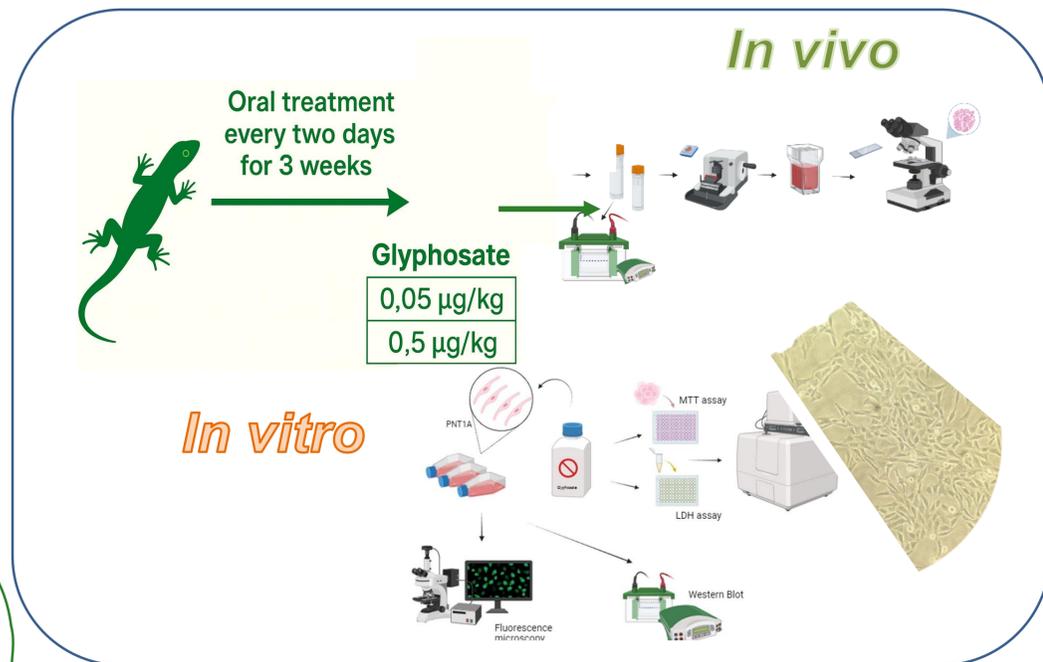


Apoptotic pathway

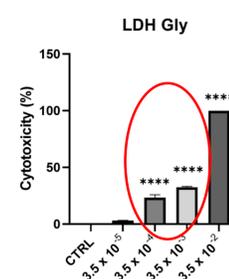
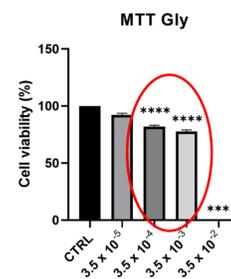


Western blot analysis showing the levels of proteins involved in the **apoptotic pathway** extracted from whole lysate of PNT1A exposed for 24 h to low-(LD) and high-doses (HD) of Gly.

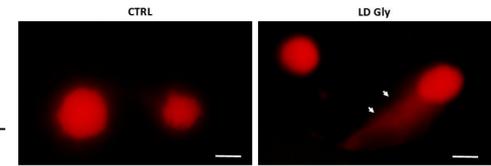
METHOD



In vitro

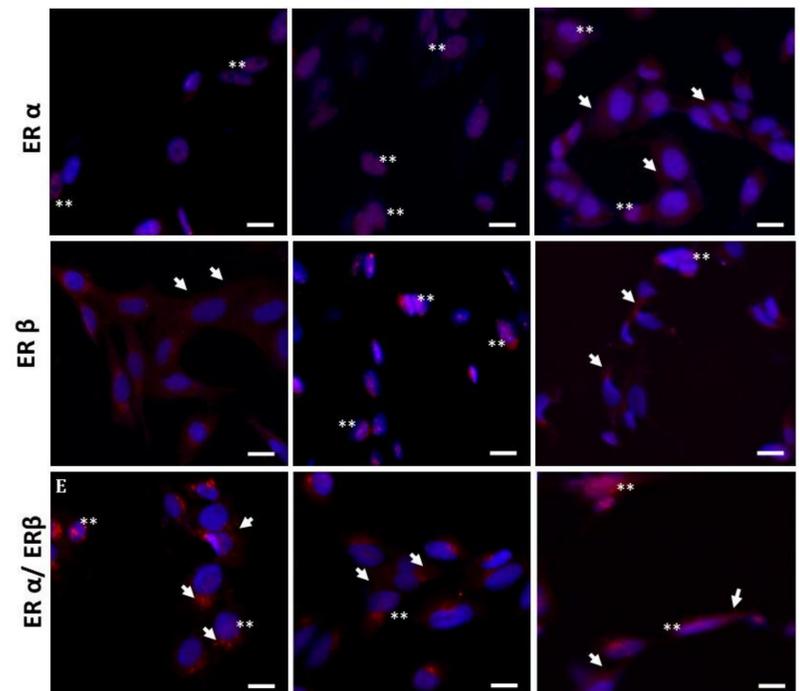


The tail of the comet (arrow) indicates damage



Immunofluorescence ER α and ER β

30' 2h 4h



Immunolocalization of ERα and ERβ after exposure to Gly 3.5 × 10⁻⁴ M (LD), E2 (10⁻⁶ M). The fluorescent signal appears red in color. The nuclei were stained with nuclear staining (Hoechst, blue signal). Scale bars correspond to 10 µm.

CONCLUSION FUTURE WORK

Our findings show that glyphosate induces dose-dependent cytotoxic effects, causing apoptosis at higher concentrations and mitochondrial dysfunction associated with oxidative stress. Moreover, it acts as an endocrine-disrupting chemical by mimicking estrogen and activating estrogen receptors. Future studies will clarify the molecular targets and signaling pathways involved.

