

THE STRUCTURE OF THE SPONGY SUBSTANCE OF THE FEMORAL BONE OF THE RATS FOR EXPERIMENTAL FUMONIZINOTOXYCOSIS

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Fumonisin are strongly toxicity metabolites of *Fusarium proliferatum* and *Fusarium verticillioides* commonly present in corn and corn-based feed, but still little is known about the possible disturbed effect of fumonisins on bone homeostasis. The aim of the study was to evaluate bone homeostasis in experimental fumonisin intoxication of rats, a vertebrate animal model of toxicological studies. Adolescent (5-weeks-old) male Wistar rats were randomly assigned into a control group (the C group; n=20) not intoxicated with fumonisins and a group intoxicated with fumonisins (the FB group; n=20). Clinically visible fumonisin toxicosis (based on liver testes) was induced by daily intra-gastric administration of fumonisins B1 and B2 at the dose of 90 mg/kg of body weight per animal in the FB group for 21 days. Then, selected animals (n=6 in each group) were euthanized and femora were isolated and analyzed. The fumonisin intoxication did not affect body and bone weight, although the mechanical and geometric properties were decreased in fumonisin-intoxicated rats.

Also the negative structural alterations in growth plate and articular cartilages were observed, while fumonisin intoxication improved almost all histomorphometrical parameters of trabecular bone. Concluding, the dose of fumonisins used in the present study caused hepatotoxic effect, which were sufficient to trigger the disturbance in mineral homeostasis resulting in altered bone metabolism and decreased mechanical endurance.

A diagnosis of fumonisin toxicosis is difficult and could be based only on clinical signs, histopathology examination, or the presence of fumonisins at toxic levels in the feed. The treatment of fumonisin toxicosis also is difficult due to the lack specific treatment or antidote. The best way is to avoid fumonisin toxicosis. For this, both the European Commission in EU and FDA in USA have issued guidance levels for total fumonisins in human foods and animal feed (EC, 2006; 2016; FDA, 2001). Despite this, many studies have shown the potential impact of FBs exposure in the incidence of toxicosis and the mechanisms involved in their toxic effects, but mainly concerning liver or renal, less bone homeostasis. Despite the fact that feed toxicities has been identified as one of the main factors affecting bone homeostasis (Tomaszewska et al., 2017a), to the best of our knowledge, only two studies on the effect of FBs intoxication on bone quality have been conducted previously (Wu et al., 1995 Lebepe-Mazur et al., 1995).

But on the other hand, it is as important as unexpected, FB intoxication improved almost all histomorphometrical parameters of trabecular bone in our rats. The femoral

trabeculae increments found in our FB exposed rats could be interpreted as a bone compensatory mechanism for the loss of cortical bone, trying to adapt the bone structure to the mechanical loads (Ferretti et al., 2003). However, once again these results could indicate that FB intoxication disturbed bone metabolism mainly affecting the mineral balance. The FB intoxication resulted in decreased serum Ca and P concentrations and decreased bone mineral status, which was shown by both densitometry and by ICP-OES analysis.

The article presents the data and were analyzed the results, which indicate that intoxication with fumonisins in rats, despite the improvement of trabecular histomorphometry data, leads to violations of bone homeostasis and we have proved that fumonisins can affect the proliferation of cells in the growth plate. and the synthesis of proteoglycans in the articular cartilage. Due to intoxication with fumonisins there were negative structural changes in the growth of articular cartilage plates, while control animals almost all histomorphometric parameters of trabecular bone have improved. It has been found that the doses of fumonisins used in this search caused a negative effect, which was sufficient to induce bone homeostasis, which led to changes in bone metabolism and reduced strength. The information provided in the present search may increase knowledge about the effect of fumonisins on the structure and bone homeostasis.

Keywords: SPONGY SUBSTANCE, WISTAR LINE RATS, FEMORAL BONE, FUMONISINS, TRABECULAE, CARTILAGE.