

**PATHOMORPHOLOGICAL AND PATHOHISTOLOGICAL CHANGES DUE TO
OCHRATOXICOSIS A IN PIGS**

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The paper presents the results obtained after experimentally induced ochratoxicosis A in pigs. Five different experiments were performed with pigs of 2,5 months average age. The pigs were fed for 28 days with diets which contained ochratoxin A at 12.3, 5.97, 3.10, 1.06 and 0.29 mg/kg of feed. The kidneys, liver, stomach and small intestine of the pigs were examined for pathomorphological and pathohistological changes.

The results showed ischemia of the kidney and catarrh of the stomach and intestine. Pathohistologically, dystrophic changes in the form of opaque swellings were found in kidney tubules and in hepatocytes together with an accumulation of serous exudate. Desquamation of glomerular epithelial cells of the kidneys were seen, as well as infiltration of the gastric propria and small intestine with eosinophil leucocytes.

The observed pathomorphological and pathohistological changes were correlated with the amount of ochratoxin A consumed in the feed.

Key words: ochratoxin A, pig feeding, pathomorphological changes, pathohistological changes

INTRODUCTION

Ochratoxicosis occurs in pigs as the results of intake of feed contaminated with ochratoxin. The best known producers of ochratoxins are moulds belonging to species of *Aspergillus* and *Penicillium*. Among the ochratoxins, the most toxic is ochratoxin A. The first cases of the so-called "mouldy porcine nephrosis" described in 1928 (Larsen, 1928), occurred as a result of intoxication of pigs with mould produced toxins. Ochratoxicosis in pigs is manifested by characteristic clinical symptoms, polydipsia, polyuria and typical pathomorphological and pathohistological changes such as ischemia of the kidneys and glomerulonephritis, as described in several papers (Szemerédi and Aguero, 1983, Mašić and Rajić, 1985, Bak et al., 1992).

The aim of this work was to study the pathomorphological changes in the kidneys, liver and digestive tract of pigs by imitating natural conditions of feed contamination and by experimentally feeding the pigs with diets containing exactly determined concentrations of ochratoxin A.

MATERIAL AND METHODS

Five experiments were performed with 5 to 7 pigs of 2,5 months of age in each experiment. The pigs were given different amounts of ochratoxin A in the feed for 28 days. They were slaughtered at the end of the experiments.

A detailed pathomorphological examination of the parenchymatous organs, digestive tract, urogenital tract and lymph nodes was performed.

Sections of kidneys, liver, stomach and small intestine were taken for pathohistological examinations. Sections were fixed for 48 hours in 8-10% formalin, placed in paraffin, cut and stained with hematoxylin eosin. Preparations were observed by light microscopy.

RESULTS AND DISCUSSION

Table 1 shows the average concentrations of ochratoxin A which the pigs received in the diet in each experiment.

Table 1. The amount of ochratoxin A (mg/kg) in the diets

E X P E R I M E N T S				
One	Two	Three	Four	Five
12,30	5,97	3,10	1,06	0,29

In all experiments, the most pronounced pathoanatomical changes in the organs of the slaughtered pigs were observed in the kidneys. The changes included more or less expressed ischemia. The shape and size of the kidneys remained unchanged and a vertical section of the kidneys showed no aberrations in the ratio between the cortex and marrow. In some cases ischemic areas were present in small portions of the kidneys, while other parts seemed unchanged. Figure 1 shows normal and ischemic kidneys.

The most marked pathoanatomical changes of the digestive tract of swine were observed in the stomach and in the small intestine. The stomach was hyperemic and had a more or less pronounced catarrh with dark pigmentation of the fundal mucous membrane. A mild catarrh of the mucous membrane of the duodenum, jejunum and ileum was seen in the small intestine.

Microscopic changes were not observed in other viscera and lymph nodes. Moreover, the sporadic changes seen could not be directly connected with ochratoxin A contamination.

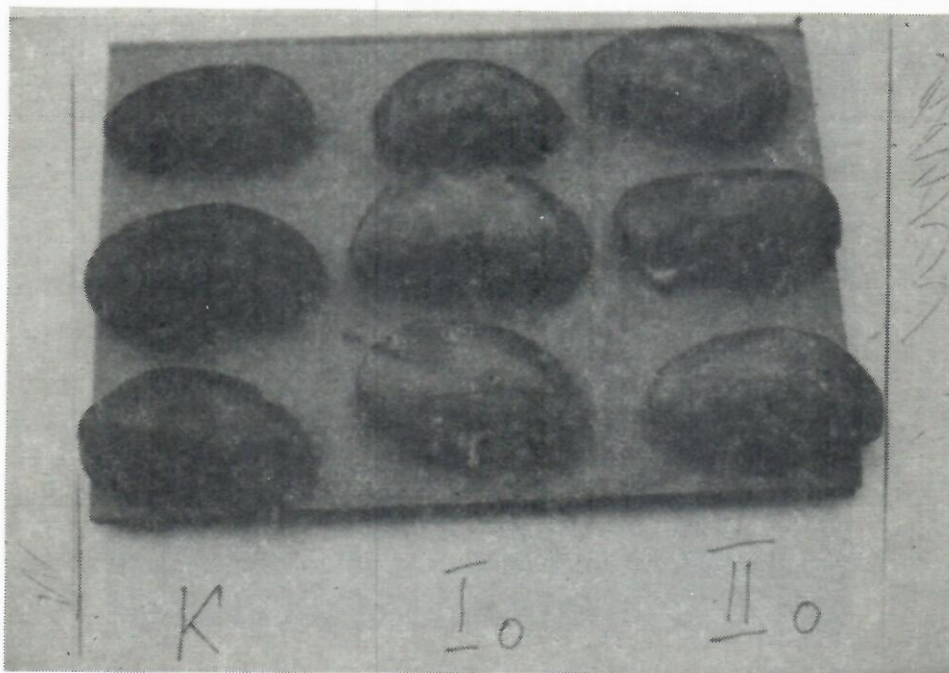


Figure 1. Macroscopic appearance of a normal and an ischemic kidney

Similar pathomorphological changes in the kidneys and other organs in swine were reported by Krogh et al., (1973). Krogh, (1979). and Elling, (1977).

Pathohistological changes were most markedly expressed in porcine kidneys, primarily in the tubules and glomerules. Dystrophic changes of epithelial cells in the form of opaque swelling were found in the tubules. In groups of glomerules serous exudate with desquamation of the epithelial cells was found, which suggests acute focal glomerulonephritis.

Apart from the kidneys, pathohistological changes were also noticed in the liver, stomach and small intestine of the pigs. In the liver, occasional dystrophic changes were seen in the form of swelling of hepatocytes. Hyperemia and desquamation of the epithelial cells on the surface of the stomach and small intestine were observed with cell infiltration of the propria with eosinophil leucocytes.

Several authors describe similar pathohistological changes in pig kidneys (Rutquist et al., 1977; Elling, 1983; Golinski et al., 1984; Tapia and Seawright, 1985; Šoštarić et al., 1988. Sandor et al., 1991).

Figures 2,3 and 4 show dystrophic changes of the kidney epithelium, focal glomerulonephritis and opaque swelling of hepatocytes.

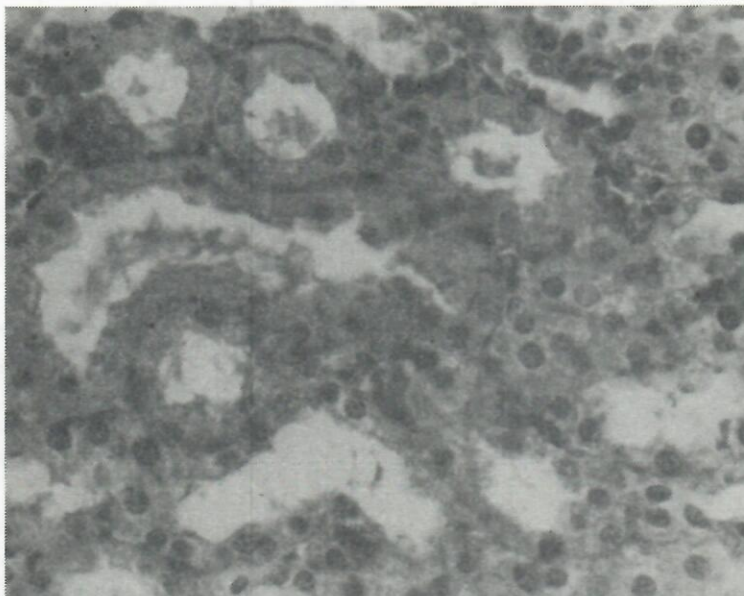


Figure 2. Dystrophic changes in the kidney epithelium

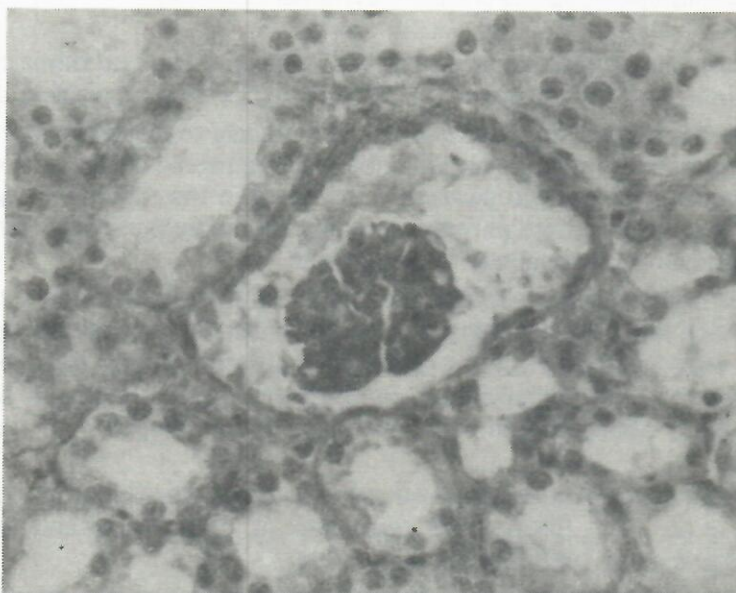


Figure 3. Glomerulonephritis acuta focalis

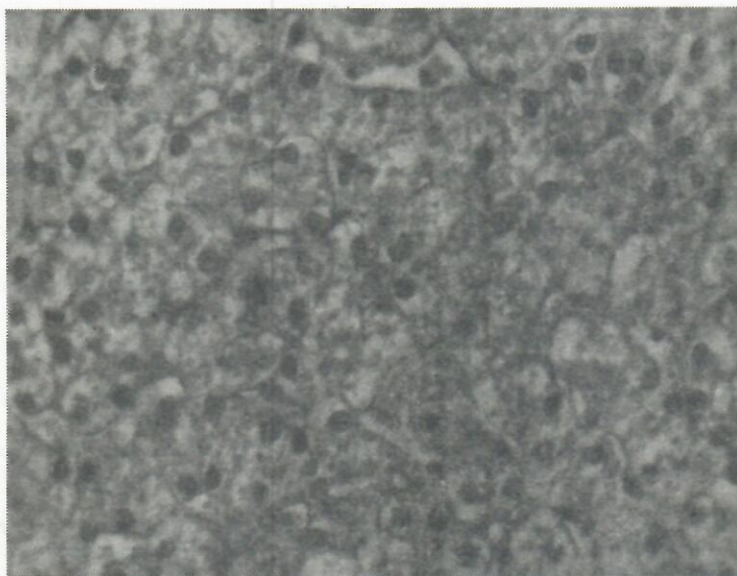


Figure 4. Intumescentia opaca hepatis

The pathomorphological and pathohistological changes found in the kidneys, liver, stomach and small intestine were in direct correlation with the amount of ochratoxin A consumed. The changes were most markedly expressed in pigs from the first and second experiment, somewhat less expressed in the third, even less in the fourth, while the least expressed changes were noticed in pigs from the fifth experiment.

CONCLUSION

In experimentally induced porcine ochratoxicosis A, ischemia of the kidneys and catarrh of the stomach and small intestine were found in all the experimental groups. Pathohistologically, dystrophic changes of the kidney tubules and hepatocytes in the form of opaque swellings were found, including an accumulation of serous exudate and cell infiltration of the stomach propria and small intestine with eosinophil leucocytes.

The detected pathomorphological and pathohistological changes were correlated with the amount of ochratoxin A consumed in the feed.

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PATOMORFOLOŠKE I PATOHISTOLOŠKE PROMENE KOD OHRATOKSIKOZE A SVINJA

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SADRŽAJ

U radu su prikazani rezultati eksperimentalno izazvane ohratoksikoze A u svinja. Svinje prosečne starosti 2,5 meseca u pet različitih oglada hranjene su 28 dana krmnim smešama u kojima je bilo sadržano 12,30, 5,97, 3,10, 1,06 i 0,29 mg/kg hrane ohratoksina A. Izučavane su patomorfološke i patohistološke promene bubrega, jetre, želuca i tankih creva svinja.

U svim ogledima utvrđena je ishemija bubrega i katar želuca i creva. Patohistološki, utvrđene su distrofične promene u tipu mutnog bubrenja ćelija bubrežnih tubula i hepatocita, kao i nakupljanje seroznog eksudata i deskvamisanih ćelija u bubrežnim glomerulima i ćelijska infiltracija proprije želuca i tankih creva eozinofilnim leukocitima.

Intenzitet izraženosti patomorfoloških i patohistoloških promena bio je u korelaciji sa konzumiranim količinama ohratoksina A u hrani svinja.