

# Infection with *Echinococcus granulosus* (Batsch, 1786) and expression of superoxide dismutase gene at mRNA level in hepatocytes

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**ABSTRACT.** Superoxide dismutase (SOD) plays an important role in detoxication of the organism. Its function is to protect the organism against the cytotoxic action of free radicals. The highest expression of superoxide dismutase was observed in the hepatocytes adjacent to the hydatid cyst. The expression of this gene in the hepatocytes of infected livers 5 cm apart from the infection site was slightly lower.

**Key words:** *Echinococcus granulosus*, pigs, superoxide dismutase.

## Introduction

Superoxide dismutase (SOD) plays an important role in detoxication of the organism. Its function is to protect the organism against the cytotoxic action of free radicals. SOD occurs in numerous tissues in which the metabolic reactions take place in oxygen conditions. This biochemical antioxidant forms a natural system of metabolism regulation and protection against toxic effects of superoxides and molecular oxygen.

The synthesis of antioxidative enzymes at the high level and their expression in the host-parasite system may be a kind of adaptation to stress [1]. There are only a few studies concerning the SOD activity in tapeworms, including those concerning parasite isolates from different hosts in various geographical regions which characterized this activity in *Taenia taeniaeformis* [2] and *Echinococcus granulosus* [3].

## Material and methods

The examined material, obtained from the Meat

Plant in Lublin, included 40 uninfected pigs (control group) and 142 pigs infected with *Echinococcus granulosus*.

The livers were collected during the partition of carcasses. The paraffin sections were prepared by standard method from the livers of both examined groups. The deparaffined liver sections were used to hybridization reactions which were carried out in the thermocycler (Eppendorf). The sequences of specific probes conjugated with fluorescein were used:

5' Fluo TTG TGC GGC CAA TGA TGG AAT G 3'  
5' FluoCTG GGC AAT GTG ACT GCT GGC A 3'

The results were observed using confocal microscopy (Zeiss).

## Results

The highest expression of SOD gene was observed in the hydatid cyst area of infection liver sections, slightly lower expression was found in the tissue distant from the infection site and in the livers of control, uninfected pigs (Figs 1, 2).

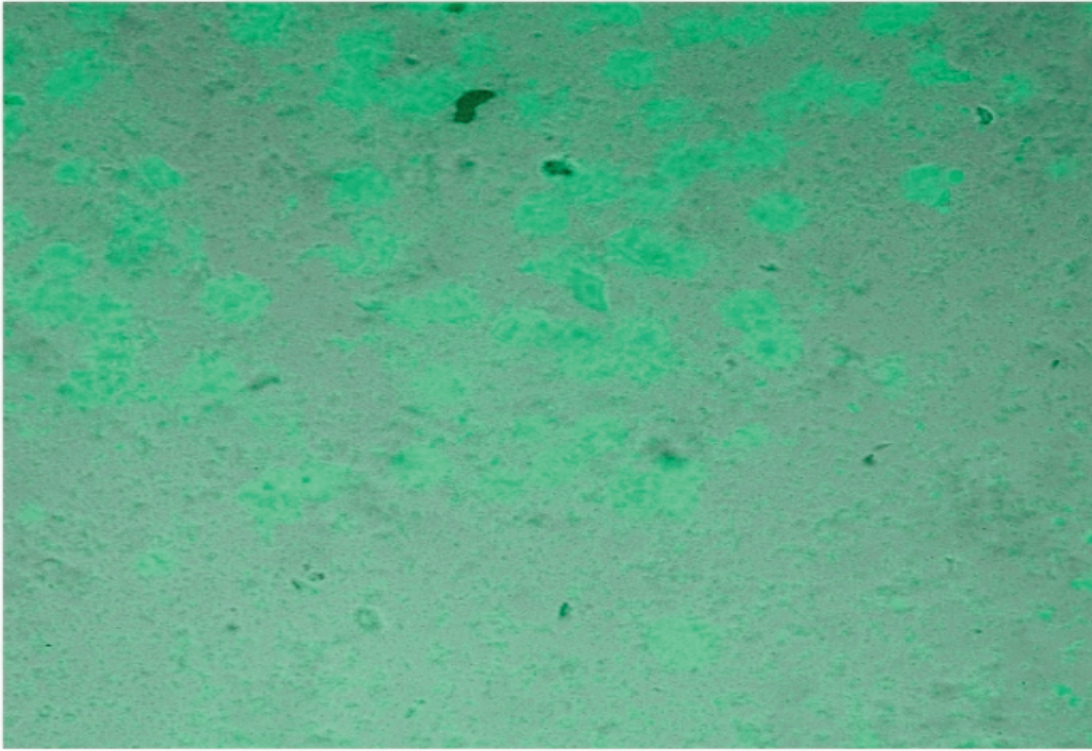


Fig. 1. The expression of mRNA of superoxide dismutase gene in hepatocytes of uninfected pigs. Magn. x 200

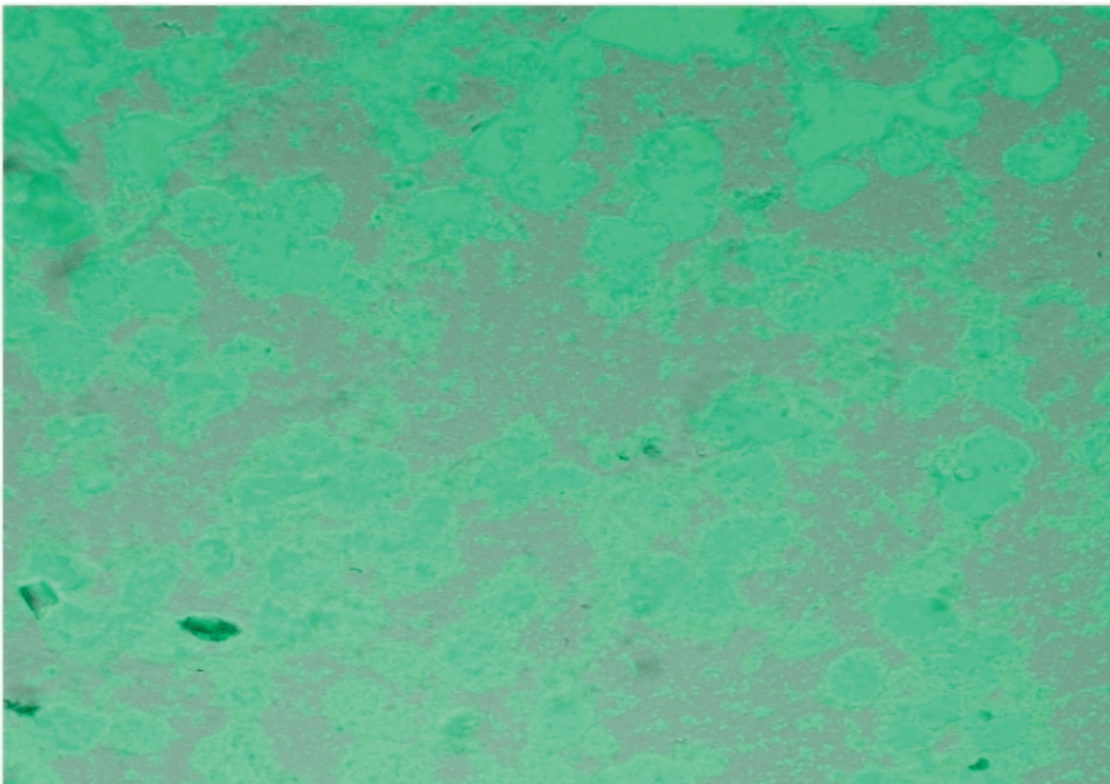


Fig. 2. The high expression of SOD gene in hepatocytes adjacent to the *E. granulosus* cyst in infected pigs. Magn. x 200

## Discussion

Superoxide dismutase (SOD) is an essential antioxidative enzyme protecting the organism against cytotoxic effects of free radicals and oxygen. It occurs in organelles of the cells and in extracellular fluids [4].

In our study the highest expression of SOD gene was observed in the liver tissue adjacent to hydatid cyst; slightly lower expression was detected in the tissue distant from the infection site.

Salinas et al. [5] demonstrated high activity of SOD gene in *E. granulosus*, which was regulated depending on the developmental stage of the parasite and release of protoscolex. The activity of this enzyme was found to be lower in the cyst fluid. The differentiated expression of SOD at the biochemical and molecular level was observed in nematodes and trematodes [1, 4, 6].

The expression of SOD was found to be slightly lower in the blood than in the hepatocytes of infected animals. The literature data indicate that some protective mechanisms develop during echinococcosis. The parasite invasion induces immune and inflammatory response mediated by lymphokines released by Th2 lymphocytes. Increased immunization of the host's organism is reflected in physiological dysfunctions [6, 7].

## Conclusions

- The highest expression of superoxide dismutase is observed in the liver tissue adjacent to *Echino-*

*coccus* cyst.

- The expression of the enzyme gene in the hepatocytes 5 cm apart from the infection site is slightly lower

## References

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Wpłynęło 10 lipca 2006

Zaakceptowano 4 sierpnia 2006