

## A survey of rats and mice for latent toxoplasmosis in Croatia: a case report

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**ABSTRACT:** Brain tissues of 142 rats and 86 mice were bioassayed for toxoplasms. Each tissue was homogenized and subcutaneously injected into 4 SPF mice. Six weeks later, the mice were euthanatized and their brains were examined microscopically for *Toxoplasma gondii* tissue cysts. Two (1.4%) of the rats but none of the mice were positive. This is the first isolation of *T. gondii* from rats in Croatia.

**Keywords:** rats; mice; *Toxoplasma*; bioassay; Croatia

In a previous study of the epidemiology of toxoplasmosis in Croatia we surveyed chickens for viable toxoplasms (Kuticic and Wikerhauser, 2000). Latent toxoplasmosis in synanthropic rodents is of public health importance. Cats who prey on them may contaminate the environment with *T. gondii* oocysts. If such rodents are eaten by pigs, the undercooked or unfrozen meat of the latter may infect also human consumers. The prevalence of latent toxoplasmosis in rats and mice was studied by Frenkel and Ruiz (1981) in Costa Rica and Dubey et al. (1995) in the U. S. A., and that of rats only, by Shen et al. (1990) in the P. R. of China and by Jackson et al. (1986) and Webster (1994) in the U. K. The aim of the present study was to assess the prevalence of latent toxoplasmosis in wild rats and mice in Croatia.

### MATERIAL AND METHODS

Dubey and Frenkel (1998) showed that the mouse inoculation test was the most reliable method for iso-

lation of toxoplasms from tissues of rats. Concerning the tissues to be examined the brain tissue was bioassayed as it was found by Dubey (1997) to be a regular site of toxoplasms in rats. For the isolation of viable toxoplasms the mouse inoculation test, as originally described by Dubey et al. (1984) and successfully reproduced in our previous studies (Kuticic and Wikerhauser, 1996, 2000), was applied. The brains of rats were collected from animals killed on 3 different pig farms during deratisation. The brains of mice were collected from mice individually killed with mouse traps on 2 farms and in 4 households. The rodents were obtained from farms and households on which there was no record of *Toxoplasma* infection either in animals or in humans. All brains were tested within 3 days after the death of rodents. Each brain was homogenized with sterile sand and saline and subcutaneously injected into 4 SPF mice at a dose of 1ml/mouse. Six weeks later the mice were euthanatized with chloroform and fresh preparations of their brains were examined microscopically for *T. gondii* tissue cysts. A total of 142 rats and 86 mice were examined.

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## RESULTS

By the mouse inoculation test, performed with brain tissues of 142 rats and 86 mice, toxoplasms were isolated from 2 (1.4%) of rats but from none of the mice. Both positive rats were collected on the same farm. From the two positive samples 3 and 2 test mice, respectively, out of the 4 inoculated, harboured *T. gondii* tissue cysts. This is the first isolation of *T. gondii* from rats in Croatia.

## DISCUSSION

In the present study the *Toxoplasma* infection rate of rats was low, similar to that reported by Dubey et al. (1995). Shen et al. (1990) reported that they did not isolate any toxoplasms from rats at all. On the other hand, high infection rates in rats were reported by Frenkel and Ruiz (1981), Jackson et al. (1986) and Webster (1994). It can be stated that in general rats had a higher infection rate than mice, which is probably due to their frequently omnivorous and carnivorous feeding habit.

## REFERENCES

- Dubey J.P. (1997): Distribution of tissue cysts in organs of rats fed *Toxoplasma gondii* oocysts. *Journal of Parasitology*, 83, 755–757.
- Dubey J.P., Frenkel J.K. (1998): Toxoplasmosis in rats: a review with considerations of their value as an animal model and their possible role in epidemiology. *Veterinary Parasitology*, 77, 1–32.
- Dubey J.P., Murrell K.D., Fayer R. (1984): Persistence of encysted *Toxoplasma gondii* in tissues of pigs fed oocysts. *American Journal of Veterinary Research*, 45, 1941–1943.
- Dubey J.P., Weigel R.M., Siegel A.M., Thulliez P., Kitron U.D., Mitchell M.A., Manelli A., Mateus-Pinilla N.E., Shen S.K., Kwok O.C.H., Todd K.S. (1995): Sources and reservoirs of *Toxoplasma gondii* infection on 47 swine farms in Illinois. *Journal of Parasitology*, 81, 723–729.
- Frenkel J.K., Ruiz A. (1981): Endemicity of toxoplasmosis in Costa Rica. *American Journal of Epidemiology*, 113, 254–269.
- Jackson M.H., Hutchison W.M., Siim C.J. (1986): Toxoplasmosis in a wild rodent population of central Scotland and a possible explanation of the mode of transmission. *Journal of Zoology*, 209, 549–557.
- Kuticic V., Wikerhauser T. (1996): Studies of the effect of various treatments on the viability of *Toxoplasma gondii* tissue cysts and oocysts. *Current Topics in Microbiology and Immunology*, 219, 261–265.
- Kuticic V., Wikerhauser T. (2000): A survey of chickens for viable toxoplasms in Croatia. *Acta Veterinaria Hungarica*, 88, 183–185.
- Shen L., Zhichung L., Biaucheng Z., Huayuan Y. (1990): Prevalence of *Toxoplasma gondii* infection in man and animals in Guangdong, Peoples Republic of China. *Veterinary Parasitology*, 34, 357–360.
- Webster J.P. (1994): Prevalence and transmission of *Toxoplasma gondii* in wild brown rats, *Rattus norvegicus*. *Parasitology*, 108, 407–411.

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