GV-SOLAS
Gesellschaft für Versuchstierkunde
Society for Laboratory Animal Science

# Expert Information

## from the Working Group on Hygiene

# Implication of infectious agents on results of animal experiments

## *Spironucleus muris*

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# *Spironucleus muris*

## Background

- *Hexamita muris* is used as synonym for *Spironucleus* (*S.*) *muris*.

## Prevalence

- Rare infections in Europe mice
- Present in 7.14% of laboratory mice in Brasil.[1]

## Host species

- Mouse, rat[2,3,4], European hamster[5,6], Syrian hamster[7,8,9], *Mastomys coucha*[10], Macaques (*Macaca mulatta*)[11]
- There is evidence for a certain degree of host specificity: a mouse isolate can obviously infect golden hamster and vice versa. A rat isolate, however, can infect only another rat.[8,12]

## Properties

- Transmission is oro-fecal with cysts.
- Minimum infective dose is one cyst.[13]
- Dirty bedding transmission to mice with non-functional T and B cells seems to be insufficient.[14]
- The cysts resist to high and low temperatures, low pH, most usual disinfectants, high osmotic pressure and centrifugation.[15]

## Susceptibility

- Inbred mouse strains differ in susceptibility.[5,6]
- Classified as opportunistic pathogen, trophozoites can damage the microvilli and penetrate into the epithelium.[16]
- Previously infected mice may show resistance to reinfection after recovery.[17]
- It is suggested that the major histocompatibility complex haplotype may influence susceptibility to *S. muris*.[18]

## Organotropism

- Intestine (trophozoites, i.e., active stage of the parasite); in the caecum and colon there are mainly cysts.[19]

## Clinical disease

- Enlarged abdominal cavity (due to chronic enteritis), sometimes meteorism, diarrhoea and retarded growth in younger animals[19]
- Roughened hair coat, hunched position, sticky stool[5]
- Enhanced mortality, shortened life span in athymic mice[20,21]
- In athymic mice, severe enteritis and weight loss, sporadic deaths by 4 weeks of age[22]
- Liquid, yellow / green and often foamy contents of the small and large intestines[22]

- Some additional weakening/stressing factor(s), for instance athymic status, are necessary to elicit clinical disease.[20,23]
- Shortened life span in athymic mice[18,19]

**Pathology**

- Enteritis, sometimes subepithelial edema, mononuclear inflammatory infiltrations in the submucosa, desquamation of the epithelia, proliferation and thickening of the intestinal wall7[0]
- Accumulation of catarrhal fluid in the small intestine, sometimes hyperplasia of the epithelium[5]
- Damages of microvilli, reduction of their height, increase in crypt depth[17]
- Marked crypt hyperplasia, occasional crypt abscesses and variable degree of villous atrophy[22]
- Degeneration of enterocytes and necrosis; in such areas, penetration of the intestinal barrier by individual trophozoites, exceptionally: invasion of plasma cells[8]

**Morbidity and mortality**

- Young animals are more sensitive[3], in older non-immunocompromised animals a spontaneous recovery from the infection occurs.[24]
- Increased mortality in cadmium exposed mice[25]
- Increased sensitivity to X-irradiation[26]

**Zoonotic potential**

- No data

**Interference with research**

***Oncology***

- Nonspecific activation of macrophages and, hence, enhanced elimination of tumour cells[27]

***Teratology***

- No data

***Infectiology / Interactions with other infectious agents***

- Sometimes enhanced or impaired resistance to experimental infection with other agents[10]
- Concomitant infections with *Babesia microti*, *Plasmodium berghei* and *Plasmodium yoelii* decrease the output of trophozoites and cysts of *Spironucleus muris*.[28]
- There is a temporary decrease of flagellate cyst output coincident with the peak of the blood parasite infections, followed by a rapid return to normal levels in mice infected with the intestinal flagellates *Giardia muris* or *Spironucleus muris*, together with the blood parasites *Babesia microti* or *Plasmodium yoelii*. This decrease in cyst output is correlated with decreased numbers of trophozoites in the small intestine. The effect on *Spironucleus muris* is more marked than that on *Giardia muris*.[28]
- Enhanced resistance to experimental infection with *Listeria monocytogenes*[29,30]

### *Immunology*

- Infected mice are unsuitable for immunologic studies.[24]
- Sometimes weakened immune response to some agents[29], depression to mount an immune response to a thymus dependent antigen[30]
- Decreased pneumococci antigen in infected mice but not in infected rats[31]

### *Toxicology*

- No data

### *Physiology*

- Microscopically, acute disease is associated with distension of crypts and intervillous spaces by pear-shaped trophozoites and inflammatory edema of the lamina propria.[32]
- During overt infestation, organisms are seen extracellularly in crypts and intervillous spaces associated with blunting of intestinal villi, epithelial degeneration and mucin depletion, reactive epithelial hyperplasia, edema and leukocyte infiltration.[33]

### *Cell biology*

- Impairment of the RNA-synthesis and of enzyme synthesis of macrophages[34]

### *Assisted reproductive technology*

- No data

### Special considerations

- No data

Ivo Kunstyr, actualized by Brunhilde Illgen-Wilcke, Liestal Suisse, September 2022

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