Spironucleus muris
formerly Hexamita muris - an intestinal flagellate

History:

Host species:

- There is evidence for a certain degree of host specificity: a mouse can obviously infect golden hamster and vice versa. A rat, however, can infect only another rat (Kouchakji 1985, Schagemann et al. 1990)
- Inbred mouse strains differ in susceptibility (Wagner et al. 1974; Schagemann et al., 1990).
- It is suggested that the major histocompatibility complex haplotype may influence susceptibility to S. muris (Baker et al. 1998). Minimal infectious dose is one fresh cyst which appears bright in phase contrast optics (Stachan & Kunstyr 1983)

Organotropism:

- Intestine (trophozoites, i.e. active stage of the parasite); in the caecum and colon, there are mainly cysts (Kunstyr 1978)

Clinical disease:

- Enlarged abdominal cavity (due to chronic enteritis), sometimes meteorism, diarrhoea and retarded growth in younger animals (Kunstyr 1978). Roughened hair coat, hunched position, isticky stoolî (Wagner et al, 1974)

Pathology:

- Enteritis, sometimes subepithelial edema, mononuclear inflammatory infiltrations in the submucosa, desquamation of the epithelia, proliferation and thickening of the intestinal wall (Matthiesen et al. 1976). Accumulation of catarrhal fluid in the small intestine, sometimes hyperplasia of the epithelium (Wagner et al, 1974). Liquid, yellow/ green and often foamy contents of the small and large intestines (Whitehouse et al. 1993)
- Damages of microvilli, reduction of their height, increase in crypt depth (Brett & Cox 1982 a). Marked crypt hyperplasia, occasional crypt abscesses and variable degree of villus atrophy (Whitehouse et al. 1993)
- Degeneration of enterocytes and even necrosis; in such areas, penetration of the intestinal barrier by individual trophozoites, exceptionally: invasion of plasma cells (Hofmeister 1993)
Morbidity and mortality:

- An opportunistic pathogen (feeding on intestinal bacteria) (Brugerolle et al. 1980)
- Some additional weakening / stressing factor(s), for instance athymic status (Boorman et al. 1973 a; Kunstyr et al. 1977), is / are necessary to elicit clinical disease
- Young animals are more sensitive (Sebesteny 1969), in older non-compromised animals a spontaneous recovery from the infection occurs (Kunstyr et al. 1977)
- Previously infected mice may show resistance to reinfection after recovery (Brett & Cox 1982 a)

Zoonotic potential:

Interference with research:

- Increased mortality in cadmium exposed mice (Exon et al. 1975), shortened life span in athymic mice (Boorman et al. 1973 a & 1973 b)
- Sometimes activation of the immune status (Ruitenberg & Kruyt 1975), sometimes weakened immune response to some agents (Keast & Chesterman 1972), depression to mount an immune response to a thymus dependent antigen (Brett 1983)
- Impairment of the RNA-synthesis and of enzyme synthesis of macrophages (Goodrum et al. 1984)
- Non-specific activation of macrophages and, hence, enhanced elimination of tumour cells (Keller 1973)
- Sometimes enhanced or impaired resistance to experimental infection with other agents (Ruitenberg & Kruyt 1975, Higgins-Opitz et al. 1990)
- Decreased immune response to tetanus toxoid and pneumococci antigen in infected mice (Ruitenberg & Kruyt 1975; Ruitenberg et al. 1975) but not in infected rats (Mullink et al. 1980). In contrast: enhanced resistance to experimental infection with Listeria monocytogenes (Ruitenberg et al. 1975)
- Concomitant infections with Babesia microti, Plasmodium berghei and P. yoelii decrease the output of trophozoites and cysts of S. muris (Brett & Cox 1982 b)
- Infected mice are unsuitable for immunologic studies (Sebesteny 1974)
- Increased sensitivity to X-irradiation (Myers 1973)

References:


Brett SJ, Cox FE (1982 b) Interactions between the intestinal flagellates Giardia muris and Spironucleus muris and the blood parasites Babesia microti, Plasmodium yoelii and Plasmodium berghei in mice. Parasitology 85, 101-110

Exon JH, Patton NM, Koller LD (1975) Hexamitiasis in cadmium-exposed mice. Archives of Environmental Health 30, 463-464


Higgins-Opitz SB, Dettman CD, Dingle CE, Anderson CB, Becker PJ (1990) Intestinal parasites of conventionally maintained BALAB/c mice and Mastomys coucha and the effects of a concomitant schistosome infection. Laboratory Animals 24, 246-252


Keast D, Chesterman FC (1972) Changes in macrophage metabolism in mice heavily infected with Hexamita muris. Laboratory Animals 6, 33-39


Kunstyr I, Ammerpohl E, Meyer B (1977) Experimental spironucleosis (hexamitiasis) in the nude mouse as a model for immunologic and pharmacologic studies. Laboratory Science 24, 782-788


Meshorer A (1969) Hexamitiasis in laboratory mice. Laboratory Animal Care 19, 33-37. Laboratory Animals 14, 127-128

Mullink JWMA, Ruitenberge EJ, Kruizinga W (1980) Lack of effect of Spironucleus (Hexamita) muris on the immune response to tetanus toxoid in the rat. Laboratory Animals 14, 127-128

Myers DD (1973) Sensitivity to X-irradiation of mice infected with Hexamita muris. 24th Annual Meeting of the American Association of Laboratory Animal Science, Abstract No.22

Ruitenberge EJ, Kruyt BC (1975) Effect of intestinal flagellates on immune response of mice. Parasitology 71, 30


Sebesteny A (1969) Pathogenicity of intestinal flagellates in mice. Laboratory Animals 3, 71-77

Sebesteny A (1974) The transmission of intestinal flagellates between mice and rats. Laboratory Animals 8, 79-81


Author: I. Kunystyr