

## ***Pneumocystis spp.***

- Small unicellular fungus *Ascomycota*
  - (Historically misclassified as a protozoan)
- Family – *Pneumocystidaceae*
  - Mice: *Pneumocystis murina*
  - Rats: *P. carinii* and *P. wakefieldiae*
  - Rabbits: *P. oryctolagi*

### **Prevalence**

- Rare in well-managed immunodeficient mouse colonies.
- Infectious Interstitial Pneumonia (IIP), previously known as Rat Respiratory virus, could be common in rat colonies.

### **Significance**

- Usually low however, could be seen in immunodeficient and immunocompromised animals.
- May be present in immunocompetent animals' respiratory tracts.
- *P. carinii* causes Infectious Interstitial Pneumonia (IIP) in immunocompetent rats
- Immunodeficient colonies may suffer with morbidity and mortality
- Infected animals are not suitable for research.

### **Disease**

- Chronic progressive pneumonia
  - Dyspnoea, cyanosis
- Scaly skin (nude mice) or ruffled fur or dry skin (immunodeficient rats)
- Hunching
- Weight loss
- Cachexia
- Sex disparity: In mice, females have recently been shown to have higher *Pneumocystis* burdens compared to the males, several weeks into an infection study<sup>2</sup>
- Transient peri-weaning pneumonitis may be seen in rabbits.

### **Transmission**

- Horizontal transmission: intraspecies contact, fomites or aerosol.
- The infection is eliminated due to an immune response in immunocompetent animals after 3-8 weeks<sup>1</sup>
- Immunocompetent mice clear the infection and no lesions are found
- Immunocompromised mice may have persistent infection and pneumonia.
- Transmission could also be possible through spores that have been found in the environment, yet their perseverance and the facilities being at a risk due to their environmental presence is unspecified.

### Screening and Diagnosis

- The disease is generally diagnosed through necropsy of immunodeficient animals indicating typical symptoms of chronic pneumonia.
- Histopathology with silver stains (GMS) or PAS allows cyst detection in tissue alongside *Pneumocystis* typical pneumonia
- Immunohistochemistry
- PCR of lung tissue
- Serology for routine screening of immunocompetent animals.

### Prevention, Treatment and Control

- Supportive care and Sulfa antimicrobials
  - Risk of antibiotic resistance exists.
- Rederivation through caesarean or embryo transfer for infected lines.

### Reading

1. **Charles River Technical Sheet.** Pneumocystis. [Cited 12 April 2023]. Available at: [https://www.criver.com/sites/default/files/resources/doc\\_a/PneumocystisP.murinaP.cariniiP.wakefieldaeP.oryctolagiTechnicalSheet.pdf](https://www.criver.com/sites/default/files/resources/doc_a/PneumocystisP.murinaP.cariniiP.wakefieldaeP.oryctolagiTechnicalSheet.pdf)
2. **Macioce-Tisdale NL, Ashbaugh A, Hendrix K, Collins MS, Porollo A, Cushion MT.** The Effects of Sex and Strain on *Pneumocystis murina* Fungal Burdens in Mice. *J. Fungi* 2022, **8**, 1101.
3. **University of Missouri Comparative Medicine Program and IDEXX-BioAnalytics.** Diseases of research animals – DORA. [Cited 12 April 2023]. Available at: <http://www.dora.missouri.edu/>
4. **Barthold SW, Griffey SM, Percy DH.** 2016. Pathology of Laboratory Rodents and Rabbits. 4th ed. Ames: Wiley Blackwell.