ENVIGO

Research Models and Services

Inbred Rats

LEW (Lewis)

Origin

Inbreeding of the Lewis rat is begun by Dr. Margaret Lewis from a Wistar stock. In 1924, at F20 to Aptekman and Bogdon. In 1958, at F31 to Silvers, who distributed this strain subsequently.

LEW/Han®Hsd

To Central Institute for Laboratory Animal Breeding, Hannover, in 1973 at F58. In 1994, to Harlan Netherlands through acquisition of Central Institute for Laboratory Animal Breeding. Harlan became Envigo in 2015

LEW/SsNHsd

From National Institute of Health, Bethesda, Maryland, to Harlan Sprague Dawley, Inc. (now Envigo).

Characteristics

The Lewis rat is used as the inbred partner for a number of congenic strains at the major histocompatibility complex (Stark and Kren, 1969). The Lewis rat is sensitive to the development of a number of autoimmune diseases, including adjuvant-induced arthritis (Perlík and Zideck, 1974), experimental allergic encephalomyelitis (EAE) (Perlík and Zideck, 1974; Gasser *et al*, 1975; Willenborg, 1979), induced autoimmune myocarditis (Friedman *et al*, 1970), allergic adrenalitis (Andrada *et al*, 1968), allergic orchitis (Levine and Sowinsky, 1970), experimental autoallergic sialadenitis (a model of Sjogren's disease) (Cutler *et al*, 1987), and experimental autoimmune myasthenia gravis (Lennon *et al*, 1975). The LEW/HanHsd is very susceptible to the induction of EAE, while the LEW/SsNHsd is not susceptible to the induction of EAE. Neonatal and weanling rats susceptible to *Borrelia burgdorferi*-induced arthritic lesions resembling those found in human Lyme disease (Barthold *et al*, 1988). High hepatic metabolism of ethylmorphine in females (Page and Vesell, 1969). Low blood pressure, reaching 119 mmHg at ten weeks of age (Tanase *et al*, 1982).

Liver gangliosides are of the a-type (Kasai *et al*, 1993). Glomerular filtration rate and renal plasma flow described by Hackbarth (1981). Haematological parameters and their relation to diet have been described by Hackbarth (1983). Short gestation period: 22.43 ± .22 days (Peters, 1986).

Genetics

Coat colour genes	- *a, B, c, h* : albino.
Histocompatibility	- *RT1^{l}, RT2^{a}, RT3^{a}, RT7^{a}, RT8^{b}.*
Biochemical markers	- *Acon-1^{b}, Acp-2^{a}, Ahd-2^{c}, Akp-1^{a}, Alb^{a}, Amyl^{a}, Cryg-1^{a}, Es-1^{a}, Es-2^{d}, Es-3^{d}, Es-4^{b}, Es-6^{a}, Es-7^{b}, Es-8^{a}, Es-9^{c}, Es-10^{b}, Es-14^{b}, Es-15^{b}, Es-16^{b}, Es-18^{a}, Fh-1^{a}, Gc^{a}, Glo-1^{a}, Gox-1^{a}, Hbb^{b}, Igk-1^{a}, Lap-1^{b}, Mgd-1^{b}, Mup-1^{b}, Pep-3^{a}, Pg-1^{a}, Pgd^{b}, Svp-1^{b}.*

Reproduction

High rate of sterility.

References

1. Andrada JA, Skelton FR, Andrada EC, Milgrom F, Witebsky E (1968) Experimental autoimmune adrenalitis in rats. Lab. Invest. 19, 460-465.
2 Barthold SW, Moody KD, Terwilliger GA, Jacoby RO, Steere AC (1988) An animal model for Lyme arthritis. Ann. N.Y. Acad. Sci. 539, 264-273.
3. Baum A, Pohlmeyer G, Rapp KG, Deerberg F (1995) Lewis rats of the inbred strain LEW/Han – life expectancy, spectrum and incidence of spontaneous neoplasms. Experimental and Toxicologic Pathology 47, 11-18.
4. Bender K, *et al.* (1994) Genetic characterization of inbred strains of the rat (Rattus norvegicus). J. Exp. Anim. Sci. 36, 151-165.
5. Biesecker G, Koffler D (1988) Resistance to experimental autoimmune myasthenia gravis in genetically inbred rats. J. Immunol. 140, 3406-3410.
6. Boylan CJ, Current WL (1992) Improved rat model of Pneumocystis carinii pneumonia: Induced laboratory infections in Pneumocystis-free animals. Infect. Immun. 60, 1589-1597.
7. Cutler LS, Bullis D, Greiner DL (1987) Experimental autoallergic sialadenitis in the LEW rat: A reproducible animal model of Sjogren's syndrome. Transpl. Proc. 19, 3196-3198.
8. Dahbhar FS, McEwen BS, Spencer RL (1993) Stress-response, adrenal-steroid receptor levels and corticosteroid-binding globulin levels – a comparison between Sprague Dawley, Fischer-344 and Lewis rats. Brain Res. 616, 89-98.
9. Esber HJ, Menniger FF Jr Bogdon AE (1974) Variation in serum hormone concentrations in different rat strains. Proc. Soc. Exp. Biol. Med. 146, 1050-1053.
10. Friedman I, Ron N, Laufer A, Davies AM (1970) Experimental myocarditis: Enhancement by the use of pertussis vaccine in Lewis rats. Experientia 26, 1143-1145.
11. Gasser DL, Palm J, Gonatas NK (1975) Genetic control of susceptibility to experimental allergic encephalomyelitis and the Ag-B locus of rats. J. Immunol. 115, 431-433.
12. Goverman J, Brabb T (1996) Rodent models of experimental allergic encephalomyelitis applied to the study of multiple sclerosis. Lab. Anim. Sc. 46, 482-492.
13. Gould KE, Stepaniak JA, Swanborg RH (1994) Variable susceptibility of Lewis rats to experimental autoimmune encephalomyelitis. J. Neuroimmunol. 54, 145-146.
14. Greenhouse DD, Festing MFW, Hasan S, Cohen AL (1990) Catalogue of inbred strains of rats. In: Genetic monitoring of inbred strains of rats (Hedrich HJ, ed). Stuttgart, New York: Gustav Fischer Verlag, pp. 410-480.
15. Hackbarth H, Baunack E, Winn M (1981) Strain differences in kidney function of inbred rats: 1. Glomerular filtration rate and renal plasma flow. Lab. Anim. 15, 125-128.
16. Hackbarth H, Burow K, Schimansky G (1983) Strain differences in inbred rats: influence of strain and diet on haematological traits. Lab. Anim. 17, 7-12.
17. Hoenig EM, Hirano A, Levine S, Ghatak NR (1970) The early development and fine structure of allergic adrenalitis. Lab. Invest. 22, 198-205.
18. Kasai N, Kamimura A, Miyoshi I, Ariga T 1993 Ganglioside distribution in the liver of inbred strains of rats and the cancerous liver of LEC rats. J. Biochem. 113, 251-257.
19. Lennon VA, Lindstrom JM, Seybold ME (1975) Experimental autoimmune myasthenia: A model of myasthenia gravis in rats and guinea pigs. J. Exp. Med. 141, 1365-1375.
20. Levine S, Sowinsky R (1970) Allergic inflammation, infarction and induced localization in the testis. Am. J. Pathol. 59, 437-451.
21. Linington C, Berger T, Perry L, *et al.* (1993) T cells specific for the myelin oligodendrocyte glycoprotein mediate an unusual autoimmune inflammatory response in the central nervous system. Eur. J. Immunol. 23, 1364-1372.
22. Page JG, Vesell ES (1969) Hepatic drug metabolism in ten strains of Norway rat before and after pre-treatment with phenobarbital. Proc. Soc. Exp. Bio. Med. 131, 256-261.
23. Perlík F, Zideck Z (1974) The susceptibility of several inbred strains of rats to adjuvant induced arthritis and experimental allergic encephalomyelitis. Z. Immunitäts-forsch. 147, 191-193.
24. Pertwee RG (1997) The therapeutic potential of cannabis and cannabinoids for multiple sclerosis and spinal injuries. J. Int. Hemp Assoc. 4, 4-8.
25. Peters AG (1986) Length of gestation period on eight inbred strains and three outbred strains of rats. Animal Technology 37, 109-112.
26. Schemmel R, Mickelson O, Gill JL (1970) Dietary obesity in rats: Body weight and body fat accretion in seven strains of rats. J. Nutrit. 100, 1041-1048.
27. Siebert U, Wollnik F (1991) Wheel-running activity rhythms in 2 inbred strains of laboratory rats under different photoperiods. Physiol. Behav. 50, 1137-1143.
28. Stark C, Kahrmann B, Walzel E (1995) Epi- and metaphyseal morphology in the long bones of BDIX/Han rats. Lab. Anim. 30, 35-41.
29. Stark O, Kren V (1969) Five congenic resistant lines of rats differing at the Rt. H-1 locus. Transplant. 8, 200-203.
30. Stenglein B, Thoenes GH, Günther E (1975) Genetically controlled autologous immune complex glomerulonephritis in rats. J. Immunol. 115, 895-897.
31. Stepaniak JA, Gould KE, Sun D, Swanborg RA (1995) A comparative study of experimental autoimmune encephalomyelitis in Lewis and DA rats. J. Immunol. 155, 2762-2769.
32. Sun B, Sun SH, Chan CC and Caspi RR (2000) Evaluation of in vivo cytokine expression in EAU-susceptible and resistant rats: a role for IL-10 in resistance? Exp. Eye Res. 70, 493-502.
33. Swanberg RH (1988) Experimental allergic encephalomyelitis. Methods Enzymol. 162, 413-421.
34. Tanase H, Yamori Y, Hansen CT, Lovenberg H (1982) Heart size in inbred strains of rats. Part I. Genetic determination of the development of cardiovascular enlargement in rats. Hypertension 4, 846-872.
35. Wasowska BA, Zheng XX, Strom TB, Kupiec-Weglinski JW (2001) Adjunctive rapamycin and CsA treatment inhibits monocyte/macrophage associated cytokines/ chemokines in sensitised cardiac graft recipients. Transplantation 70, 1179-1183.
36. Wilder RL, Calandra GB, Garvin AJ, Wright KD, Hansen CT (1982) Strain and sex variation in the susceptibility to streptococcal cell wall-induced polyarthitis in the rat. Arthritis Rheum. 25, 1064-1072.
37. Willenborg DO (1979) Experimental allergic encephalomyelitis in the Lewis rat: Studies on the mechanism of recovery from diseases and acquired resistance to reinduction. J. Immunol. 123, 1145-1150.
38. Zhu J, Bai XF, Hedlund G, Björk J, Bakhiet M, Van der Meide PH, Link H (1999) Linimide suppresses experimental autoimmune neuritis in Lewis rats by inhibiting myelin antigen-reactive T and B cell responses. Clin. Exp. Immunol. 115, 56-63.

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