C57BL/6

C57BL/6JOlaHsd, C57BL/6NHsd, C57BL/6JRccHsd

Developed in 1921 by Little from brother - sister pair (female 57 x male 52) of Miss Abby Lathrop's stock. The same cross gave rise to strains C57L and C57BR. Female 58 mated with the same male gave rise to strain C58. Strains 6 and 10 separated prior to 1937. In 1946, to the Jackson Laboratory, Bar Harbor.

C57BL/6JOlaHsd

In 1974, from the Jackson Laboratory to Laboratory Animals Centre, Carshalton. To OLAC (now Inotiv) in 1983. In 1997 to Harlan Nederland (now Inotiv). Harlan became Envigo in 2015, then Envigo was acquired by Inotiv in 2021.

C57BL/6NHsd

In 1974, from the Jackson Laboratory to the National Institutes of Health, Bethesda, Maryland. Harlan Sprague Dawley, Inc., derived the strain from this breeding nucleus. Harlan became Envigo in 2015, then Envigo was acquired by Inotiv in 2021.

C57BL/6JRccHsd

In 1973, from the Jackson Laboratory to the Biological Research Laboratories-RCC Ltd. Füllinsdorf, Switzerland. In 2005, Harlan obtained a breeding nucleus after acquisition of RCC Ltd. Harlan became Envigo in 2015, then Envigo was acquired by Inotiv in 2021.

RESEARCH APPLICATIONS

Behavior, learning, atherosclerosis, metabolism, alcohol preference anatomy, irradiation, carcinogenesis, immunology, infections.

CHARACTERISTICS

The C57BL is easily the most widely used of all inbred strain. Used as a genetic background for many mutants e.g. obese, diabetes and beige. This is a long-lived strain with few tumors, some spontaneous congenital abnormalities.

Anatomy

Small kidney/body weight ratio (Schlager, 1968). Large thyroid (Mendoza *et al*, 1967). High total leukocyte count, low erythrocyte count (Russell *et al*, 1951). Small hippocampus (Wimer *et al*, 1969). Accessory spleens in about 32% of mice and low number of Peyer's patches (Hummel *et al*, 1966). Higher bone mass than A/J (Kaye and Kusy, 1995). Hematopoietic stem cell pool 11-fold lower than in DBA/2. This is largely due to loci on chromosome 1 (Muller-Sieburg and Riblet, 1996). Less susceptible to the development of micronuclei than BALB/c following treatment with clastogenic base analogues and nucleosides (Sato *et al*, 1993). High level of spontaneous sister chromatid exchange (Nishi *et al*, 1993). A detailed staging of these mice between gestation days 11 and 13 (Theiler's stages 18 and 21) has been published by Miyake *et al*, (1996a). Low bone density of femur (Beamer *et al*, 1996; 2001). The timing of onset and duration of condensation and onset of matrix formation of first arch cartilages has been described by Miyake *et al* (1996a). A detailed staging table to facilitate study of cranial skeletal development every two hrs between days 11 and 13 of gestation has also been described (Miyake *et al*, 1996b)

Behavior

High alcohol (ethanol) preference (Fuller, 1964; Rodgers, 1966). The mean maximally preferred concentrations of ethanol were 17,9% for C57BL/6 and 6,8% for ICR mice. The consumption of ethanol represents a preferred source of calories for the C57BL/6 mouse (McMillen *et al*, 1998).

Achieve blood alcohol levels of 60 mg% when access to alcohol is restricted to 60 min per day (Le *et al*, 1994). Alcohol preference may be associated with strain differences in mesolimbic enkephalin gene expression (Ng *et al*, 1996). A quasi-congenic QTL introgression strain carrying a low alcohol consumption gene from BALB/c has lower voluntary alcohol consumption than C57BL/6, with 96% of loci in common (Vadasz *et al*, 1996).

Low severity of ethanol withdrawal symptoms compared with DBA/2, possibly associated with differences in neuroactive steriod sensitivity (Finn *et al*, 1997). Alcohol preference is due to at least

two recessive quantitative trait loci that are sex-restricted in expression (Melo *et al*, 1996). Low `emotionality', high open-field exploration (Thompson, 1953). High spontaneous locomotor activity (Nikulina *et al*, 1991). Short time of immobility in a forced swimming test (Nikulina *et al*, 1991). Low shock-avoidance learning (Bovet *et al*, 1966). Low shuttle-box avoidance, high wheel activity (Messeri *et al*, 1972). Rapid shock-avoidance learning and slow extinction (Schlesinger and Wimer, 1967). High shock-avoidance learning (Wahlsten, 1973). High radial-arm maze learning (Ammassari-Teule *et al*, 1993). High locomotor activity (Davis and King, 1967). High locomotor activity when grouped and single (Davis *et al*, 1967). Resistant to audiogenic seizures (Fuller and Sjursen, 1967). Relatively insensitive to the primary odorant isovaleric acid (contrast seven other strains) and may provide an animal model of specific anosmia (Wysocki *et al*, 1977). Low balsa-wood gnawing activity (Fawdington and Festing, 1980). High preference for sweet tasting substances (saccharin, sucrose, dulcin and acesulfame, averaged) (Lush 1988). Rejects saline at moderate concentrations (contrast 129) (Beauchamp and Fisher, 1993, Gannon and Contreras, 1995). Feed restriction for nine days failed to cause stereotypic cage cover climbing (contrast DBA/2) (Cabib and Bonaventira, 1997). In C57BL/6 mice self-grooming and allo-grooming is observed (Militzer and Wecker, 1986)

Drugs

Susceptible to skin ulceration by DMBA (Thomas *et al*, 1973). Susceptible to induction of subcutaneous tumors by 3-methylcholanthrene (Kouri *et al*, 1973; Whitmire *et al*, 1971). High incidence of lymphomas after methylcholanthrene administration by gavage (Akamatsu and Barton, 1974). Susceptible to toxic effects of DMBA (Schmid *et al*, 1966). Pre-treatment with beta-naphthoflavone 48 hr. before administration of N-nitrosoethylurea (ENU), once weekly for four weeks caused a significant doubling in the number of lung tumor bearers (contrast 4 strains) (Anderson *et al*, 1990). Phenobarbitone in the diet to give an intake of 85 mg/kg per day resulted in 4% of animals developing basophilic nodules by 91 weeks of age (contrast 70% in C3H/He), but no increase in liver carcinomas (Evans *et al*, 1992). However, there was a two-fold lower level of DNA synthesis in C57BL/6 mice relative to C3H mice after partial hepatectomy, though partial hepatectomy is a tumor promoter in C57BL/6 but not in C3H mice (Bennett *et al*, 1995). Sensitive to teratogenic effects of acetazolamide (Green *et al*, 1973). Resistant to teratogenic effect (cleft palate) by cortisone acetate (Kalter 1981). Hepatic epoxide hydrase activity induced by pentobarbital i.p. (Oesch *et al*, 1973).

Resistant to teratogenic effects of cortisone acetate (Dostal and Jelinek, 1973). Resistant to lethal effects of ozone (Goldstein *et al*, 1973), but susceptible to ozone-induced decreases of tracheal potential (Takahashi *et al*, 1995) and to airway inflammation (contrast C3H/He) (Kleeberger *et al*, 1993). Susceptible to ozone-induced lung inflammation, which is exacerbated by vitamin A deficiency (Paquette *et al*, 1996). High incidence of convulsions induced by flurothyl (Davis and King, 1967). Susceptible to hyperbaric oxygen (Hill *et al*, 1968). Resistant to chloroform toxicity (Hill *et al*, 1975; Deringer *et al*, 1953). Resistant to toxic effects of isoniazid (Taylor 1976). Sensitive, as judged by eosinophil response, to cortisone acetate (Wragg and Speirs, 1952). High (89%) ovulatory response to three I.U. of PMS in immature mice, but only a 56% response to 7 I.U. No facilitation by exposure to males at these doses (Zarrow *et al*, 1971). High locomotor activity after treatment with D-amphetamine (Babbini *et al*,, 1974). Nicotine increases learning ability (Bovet *et al*, 1966). Resistant to colon carcinogenesis by 1,2-dimethylhydrazine (Evans *et al*, 1977). Low ED50 to behavioral effects of nicotine (Marks *et al*, 1989). High self-selection of nicotine which is inversely correlated with sensitivity to nicotine-induced seizures (Robinson *et al*, 1996). Low bronchial reactivity to methacholine and serotonin (Konno *et al*, 1993). Resistant to daunomycin-induced nephrosis (Kimura *et al*, 1993).

Low neural sensitivity to pentylenetetrazol convulsions (Kosobud *et al*, 1992). Susceptible to biliary tract injury following oral dosing with 500 micrograms of the fungal toxin sporidesmin (Bhathal *et al*, 1990). Low histamine release from peritoneal mast cells induced by compound 48/80, a calcium dependent histamine releaser (Toda *et al*, 1989). Low histamine release from peritoneal mast cells induced by Ca2+ ionophore A23187, (contrast BALB/c, C3H/He, DBA/2 etc.) (Toda *et al*, 1989). Carries gene (Tpmt) for low levels of thiopurine methyltransferase activity, catalyzing the S-methylation of 6-mercaptopurine and other heterocyclic and aromaticthiol compounds (like AKR, unlike DBA/2) (Otterness and Weinshilboum 1987a;b). More sensitive to acute toxic effects of aflatoxin B-1 than strains CBA/J or BALB/c (Almeida *et al*, 1996). Airways hyporeactive to acetylcholine (Zhang *et al*, 1995). High voluntary consumption of morphine in two-bottle choice situation (Belknap *et al*, 1993). Estrogen induces

an increase in VLDL and LDL-cholesterol (like C57L, contrast BALB/c and C3H) (Srivastava, 1995). Nine-fold higher ED50 for haloperidol-induced catalepsy than DBA/2, but this is not associated with numbers of cholinergic neurons (Dains *et al*, 1996). Accumulates three to five-fold lower levels of mercury in liver and blood than DBA/2 or A.SW after four weeks exposure to mercuric chloride, but higher levels in spleen following 8-12 weeks of exposure (Griem *et al*, 1997).

Genetics

Coat color genes

- *a, B, C, D* : black.

Histocompatibility

- *H-1^{c}, H-2^{b}, H-3^{a}.*

Biochemical markers

- *Apoa-1^{a}, Car-2^{a}, Es-1^{a}, Es-2^{b}, Es-3^{a}, Gpd-1^{a}, Gpi-1^{b}, Hba^{a}, Hbb^{s}, Idh-1^{a}, Ldr-1^{a}, Mod-1^{b}, Mup-1^{b}, Pep-3^{a}, Pgm-1^{a}, Pgm-2^{a}, Trf^{b}.*

Four major substrains A, GrFa, 6 and 10 appear to be quite similar, and any differences are consistent with what might be expected from the accumulation of new mutations and a small amount of residual heterozygosity, though McClive *et al* (1994) have found that B6 and B10 differ at multiple loci on chromosome 4 including the microsatellite markers D4Mit69, D4Mit71 and D4Mit72. Additional microsatellites, which distinguish between B6 and B10 are given by Slingsby *et al* (1996). Substrains 6 and 10 differ at the *H-9, Igh-2* and *Lv* loci. All Envigo C57BL/6 sublines still carry the Nnt (nicotinamide nucleotide transhydrogenase) gene, which is missing in the original C57BL/6J from Jackson Laboratories.

C57BL/6JOlaHsd mice lack α-synuclein due to a small deletion of the locus (Specht and Schoepfer, 2001). a-Synuclein belongs to a family of structurally related proteins expressed highly in the brain. However, a-synuclein is not essential for spatial learning tasks (Chen *et al*, 2002). This deletion isn't present in the C57BL/6JRccHsd subline!

Description of the difference between FVB/N and C57BL/6J for 272 microsatellites (Neuhaus *et al*, 1997). A probe designated B6-38 to the pseudoautosomal region of the X and Y chromosome has a characteristic Pst I pattern of fragment sizes which is present only in the C57BL family of strains (Kalcheva *et al*, 1995). C57BL/6 mice carry the Mus musculus musculus Y-chromosome, while others have the M. m. domesticus type (Nishioka, 1987).

The C57BL/6NHsd subline carries a retinal degeneration 8 mutation - rd8 (Caspi *et al*, 2012)

Immunology

High susceptibility to induction of amyloid by casein (Willerson *et al*, 1969). Poor immune response to type III pneumococcal polysaccharide (Braley and Freeman, 1971). Poor immune response to synthetic double- stranded RNA (Steinberg *et al*, 1971). Good immune response to cholera A and B antigens (Cerny *et al*, 1971). Resistant to induction of anaphylactic shock by ovalbumin (Tanioka and Esaki, 1971). Rapid rejection of about 76% of male skin isografts by females by 25 days (Gasser and Silvers, 1971). Poor immune response to GAT (random terpolymer of Glu^{60}, Ala^{30}, Tyr^{10}) (9/10) (Dorf *et al*, 1974). Good immune response to *Salmonella senftenberg* and *S. anatum* lipopolysaccharide (Di Pauli, 1972). Non-responder to synthetic polypeptide Glu^{57}, Lys^{38}, Ala^{5} (Pinchuck and Maurer, 1965). High sporadic occurrence of natural hemagglutinins to sheep red blood cells (Brooke, 1965). Discriminator between `H' and `L' sheep erythrocytes (McCarthy and Dutton, 1975).

Poor immune response to Pro-Gly-Pro-ovalbumin and (Pro^{66}, Gly^{34})n but good immune response to (Pro-Gly-Pro)n (Fuchs *et al*, 1974). High PHA- stimulated lymphocyte blastogenic response (Hellman and Fowler, 1972). Erythrocytes have low agglutinability (Rubinstein *et al*, 1974). High immune response to ferritin in B6-*Tla* (Young *et al*, 1976). Low responder to dextran (Blomberg *et al*, 1972). Low responder to E. coli ß-D-galactosidase, with "memory" developing in absence of antibody formation (De Macario and Macario 1980). Precipitating and skin sensitising antibodies have slow electrophoretic mobility (Fahey, 1965). Resistant to anaphylactic shock (Treadwell, 1969). Susceptible to induction of autoimmune prostatitis (contrast BALB/c) (Keetch *et al*, 1994). High expression of neutral glycosphingolipid GgOse(4)Cer in concanavalin A stimulated T lymphoblasts (Muthing, 1997). Anti-BPO IgE monoclonal antibody produced potent systemic sensitization sufficient for provocation of lethal shock in most aged (6 to 10 months) mice (Harada *et al*, 1991). Susceptible to immunosuppression of contact hypersensitivity by ultraviolet B light (Noonan and Hoffman, 1994). The potential influence of circadian changes and laboratory routine on some immune parameters has been described by Kolaczkowska *et al* (2000).

Infection

Develops a slowly progressing parasitosis ("low responder") after infection with the Cornell strain of *Toxoplasma gondii* (Macario *et al*, 1980). Did not support sustained growth of six strains of *Leishmania mexicana* mexicana (contrast BALB/c) (Monroy-Ostria *et al*, 1994). Resistant to *Leishmania major* (contrast BALB/c) (Laskay *et al*, 1995; Scott *et al*, 1996). Susceptible to L. major mexicana, and vaccination against the parasite using liposomes with parasite membrane antigens was effective (cf CBA/Ca but contrast C57BL/10) (Lezama-Dávila, 1997). Susceptible to Salmonella typhimurium strain C5 (Robson and Vas, 1972). 100-fold more resistant to *Listeria monocytogenes* than A/J when measured by median lethal dose (Sadarangani *et al*, 1980). This seems to be associated with increased levels of gamma interferon and granulocyte-macrophage colony stimulating factor compared with susceptible A/J mice (Iizawa *et al*, 1993). Resistant to *Mycoplasma fermentens* (Gabridge *et al*, 1972). Resistant to *Mycoplasma pulmonis* infection (Cartner *et al*, 1996). Resistant to infection by *Mycobacterium marinum* (Yamamoto *et al*, 1991). Resistant to infection by liver fluke *Opisthorchis felineus* (Zelentsov, 1974). Resistant to infection with the helminth worm *Angiostrongylus costaricennsis* (Ishii and Sano 1989). Relatively susceptible to infection with *Helicobacter felis* (contrast C57BL/6) (Mohammadi *et al*, 1996). Susceptible to infection by Helicobacter felis with moderate to severe chronic active gastritis in the body of the stomach, which increased over time (Sakagami *et al*, 1996). H. felis induces hypertropic gastropathy (Fox *et al*, 1996). Highly resistant to the mammary tumor virus which is thought not to be carried by the strain (Murray and Little, 1967). Resistant to *Herpes simplex* virus (Lopez, 1975). Resistant to herpes

simplex virus-1 (contrast BALB/c) (Brenner *et al*, 1994). Susceptible to mouse hepatitis virus type 3 infection (Le Prevost *et al*, 1975).

Develops antibodies to mouse hepatitis virus which can be reliably detected by the complement fixation test, in contrast to five other strains (Kagiyama *et al*, 1991). Low mortality in a natural epizootic of ectromelia (Briody, 1966). High expression of RNA tumor virus group-specific antigen in some substrains but low in others (Whitmire and Salerno, 1972). Resistant to development of leukemia on infection by Friend virus (Dietz and Rich, 1972). Resistant to diabetogenic effects of encephalomyocarditis virus, but treatment with carrageenan to compromise macrophage function makes the mice susceptible (Hirasawa *et al*, 1995). Susceptible to measles virus induced encephalitis, which correlates with a high cytotoxic T-lymphocyte response (like C3H, contrast BALB/c) (Niewiesk *et al*, 1993). Resistant to the development of tumors following inoculation with polyoma virus, in contrast with C3H/Bi (Freund *et al*, 1992). Resistant to the development of chronic Chagas' cardiomyopathy in postacute *Trypanosoma cruzi* infection (Rowland *et al* 1992). Resistant to infection with *Trypanosoma congolense* with an initial peak of parasitemia on day six, followed by rapid apparent clearance in an average of three days (contrast BALB/c) (Ogunremi and Tabel, 1995). Infection with larval *Echinococcus multilocularis* by transportal injection of hyatid homogenate results in a multivesiculation form of hyatid development (Nakaya *et al*, 1997). Susceptible to mouse adenovirus type 1 which causes a fatal hemorrhagic encephalomyelitis (contrast BALB/c) (Guida *et al*, 1995). Less susceptible to *Streptococcus suis* type 2 including the type strain, two isolates from meningitis in pigs and two isolates from tonsils of clinically healthy pigs (Kataoka *et al*, 1991). Resistant to carditis on infection with Lyme borreliosis (*Borrelia burgdorferi*) (contrast C3H, SWR, BALB/c) (Barthold *et al*, 1990). Thymectomized C57BL/6 mice that were intravenously infused with monoclonal antibody to selectively deplete CD4+ T cells are susceptible to disseminated *Mycobacterium avium* infection. The increased susceptibility is comparable to that of C57BL/6-bg. The course of such infections can be markedly restrained and in some cases the infections can be sterilized by treatment over a 120-day period with the antimycobacterial agent rifabutin (Furney *et al*, 1990). Susceptible to infection with *M. avium strains* 101 and 2-151, and can be used to test anti-mycobacterial agents (Furney *et al*, 1995). Susceptible to infection with M. paratuberculosis (contrast C3H/HeJ) (Tanaka *et al*, 1994). Resistant to infection with *Yersinia enterocolitica* associate with a good interferon gamma response (contrast BALB/c) (Autenrieth *et al*, 1994). Susceptible, with high amylase response to the fungus *Paracoccidioides brasiliensis* (Xidieh *et al*, 1994). Mouse mammary tumor proviral loci have been identified by Lee and Eicher (1990). Resistant to infection with *Ehrlichia risticii* (Williams and Timoney, 1994). Highly susceptible to *Plasmodium berghei* with all mice developing erythrocytic infection following intravenous injection of 50 sporozoites. The same level of infection could only be established in BALB/c with 10,000 sporozoites (Scheller *et al*, 1994). Infection with *P. berghei* results in low blood parasitemia and death with neurological symptoms within eight-ten days, in contrast with the more resistant BALB/c (Moumaris *et al*, 1995).

Resistant to chronic weakness and inflammation following infection with Tucon strain of coxsackie virus B1, in contrast with C57BL/10 and B10 congenic strains (Tam and Messner, 1996).

Life-span and spontaneous disease

Primary lung tumors 1% in males, 3% in breeding females and zero in virgin females. Lymphatic leukemia less than 2%, mammary adenocarcinomas less than 1% (Hoag, 1963). Leukemia 7% (Myers *et al*, 1970). Rare "lipomatous" hamartomas or choristomas have been noted (Adkison *et al*, 1991). Susceptible to the development of atheromatous lesions on wall of aorta after 20 weeks on a high-fat diet (Thompson, 1968; Roberts and Thompson, 1976). Develop fatty streak-like lesions in the valve sinus region of the ascending aorta after 10-20 weeks on a diet enriched in saturated fat and cholesterol. After a further 15 weeks fibro-fatty lesions with many of the characteristics of human atheromatous plaques are found (Stewart-Phillips and Lough 1991).

Exhibit aortic cartilaginous metaplasia (contrast C3H) (Qiao *et al*, 1995). Susceptible to diet-induced aortic fatty streak lesions which correlates with a low level of paroxinase mRNA (contrast C3H) (Shih *et al*, 1996). Develops non-insulin-dependent diabetes mellitus and hypertension when fed a high fat-high simple carbohydrate diet, whereas A/J mice do not (Mills *et al*, 1993). Susceptible to the development of atherosclerosis on a semi-synthetic high fat diet (Nishina *et al*, 1993). Blood glucose levels and insulin insensitivity in crosses between

diet-induced type II diabetes sensitive C57BL/6 and resistant A/J are genetically independent (Surwit *et al*, 1991). High simple carbohydrate diet for five months induced hyperglycemia, hyperinsulinemia and hypercholesterolemia and non-insulin-dependent diabetes mellitus which appeared to be associated with the metabolic characteristics of visceral fat (Rebuffe-Scrive *et al*, 1993). Gain more weight on high fat diets without consuming more calories than A/J mice and develop adipocyte hyperplasia. However, animals fed a low fat, high sucrose diet were leaner than those fed a high-complex-carbohydrate diet. These results suggest that genetic differences in metabolic response to fat are more important in the development of obesity and diabetes than caloric intake (Surwit *et al*, 1995). Loci on chromosomes 1, 3, 5 and 11 are associated with variation in high density lipoprotein levels with coordinate expression of cholesterol-7-alpha hydroxylase in a cross involving atherosclerosis resistant C3H/HeJ mice (Machleder *et al*, 1997). Hepatic stearoyl CoA desaturase mRNA levels significantly elevated compared with atherosclerosis-resistant BALB/c mice, and was reduced in mice fed a high fat diet (Park *et al*, 1997). Congenital abnormalities 10%, including eye defects, polydactyly and otocephaly (Kalter, 1968). Microphthalmia and anophthalmia 8-20% and hydrocephalus 1-3% (Dagg, 1966). Occular defects appear to be due to defects in development of the lens (Robinson *et al*, 1993). Develop spontaneous auditory degeneration with onset during young adulthood, with enhanced susceptibility to acoustic injury and delayed effects of toluene (contrast CBA/Ca) (Li, 1992, Willott *et al*, 1993; Li *et al*, 1993; Li and Borg, 1993). This is associated with early hair cell changes including bent and fused stereocillia, bulging of the cuticle plates, hair cell loss and swelling of affected dendrites (Hultcrantz and Li, 1993).

C57BL/6 mice carry a single recessive gene different from that found in BALB/cBy and WB/ReJ, causing age-related hearing loss (Willott *et al*, 1995). Hearing loss is caused by degeneration of the organ of Corti, originating in the basal, high frequency region and then proceeding apically over time. This results in a severe sensorineural hearing loss by 14 months of age (Walton *et al*, 1995). More susceptible to noise-induced hearing loss than CBA/J (Erway *et al*, 1996).

Median life-span 22.4 months in C57BL/6 males and 23.6 months in C57BL/6 females (Storer, 1966). Median life-span 24.7 and 29.6 months in C57BL/6 males and 23.6 and 29.8 months in C57BL/6 females (Les, 1969). Median life-span 27.6 months in C57BL/6 males and 27.3 months in C57BL/6 females (Goodrick, 1975). Median life-span 29.3 months in C57BL/6 males and 26.5 months in C57BL/6 females (Kunstyr and Leuenberger, 1975). Median life-span 20.0 months (Curtis, 1971). Gross tumor incidence 70%, maximum life-span about 40 months in SPF conditions (Mewissen, 1971).

Dermatitis with intense pruritis leading to self-mutilation and death, and sometimes associated with the mite *Myobia musculi* appears to be more severe in this strain than others (Csiza and McMartin, 1976). Impaired axonal regeneration involving multiple genetic loci (Lu *et al*, 1994)

Miscellaneous

High degree of genetic distinctiveness (Taylor, 1972). Recommended host for the following transplantable tumors: mammary adenocarcinoma BW 10232 melanoma B16, myeloid leukemia C 1498 and preputial gland carcinoma ESR586 (Kaliss, 1972). Embryonic stem cell lines have been established (Kawase *et al*, 1994). High rate of spontaneous mutations at the agouti and W loci (Schlager and Dickie, 1967). Characteristics of the A strain have been described by Festing (1997) and Lyon *et al*, (1996).

Physiology and biochemistry

Low plasma cholesterol at 12 and 24 weeks (Weibust, 1973). Low plasma triglyceride levels (in By and in J substrains) and low plasma cholesterol (in By and in J substrains) (Jiao *et al*, 1990). Low serum ceruloplasmin levels in males but intermediate in females (Meier and MacPike, 1968). High blood sugar (Nishimura, 1969). Low serum cholesterol in C57BL/6-a^{t}a (Bruell *et al*, 1962). Arterial blood has a low pH (Bernstein, 1966). Low concentration of prostaglandin F in epididymis (Badr, 1975). High liver tyrosine aminotransferase in fasted mice but low in C57BL/6-ob (Blake, 1970). Low brain $_L$-glutamic acid decarboxylase (GAD) and acetylcholinesterase activity but high catechol-O-methyltransferase activity(Tunnicliff *et al*, 1973). Low calcium uptake by the heart (Mokler and Iturrian, 1973). Low sensitivity to thyrotropin (Levy *et al*, 1965). High brain sulphatide (Sampugna *et al*, 1975). High hepatic benz (alpha) pyrene hydroxylase activity (Kodama and Bock, 1970). Low hepatic delta-aminolaevulinate dehydratase activity (Doyle and Schimke, 1969). High aldehyde dehydrogenase and alcohol dehydrogenase activity compared with DBA/2 (Sheppard *et al*, 1968). High metabolism of ^{131}I with low 48 h retention (Chai *et al*, 1957). High liver arylsulphatase activity (Daniel, 1976). Low porphyrin content of Harderian gland (Margolis, 1971). Low hepatic urokinase activity but high hepatic histidine ammonia-lyase activity (Hanford *et al*, 1974).

Low basal levels of kidney catalase, superoxide dismutase and renal glutathione reductase (Misra *et al*, 1991). Iron overload causes inhibition of hepatic uroporphyrinogen decarboxylase and uroporphyria in C57BL/10ScSn but not DBA/2 mice. This was not correlated with the Ah locus in a study involving 12 mouse strains (Smith and Francis, 1993). Low levels of apoA-IV messenger RNA in liver compared with 129/J (Reue *et al*, 1993). Low susceptibility to audiogenic seizures (Deckard *et al*, 1976). Long tau DD, the endogenous (free-running) period of the circadian pacemaker measured in constant environmental darkness (Schwartz and Zimmerman 1990). Has defective secretory group II phospholipase A2 gene (cf strains 129/Sv and B10.RIII) (Kennedy *et al*, 1995). Susceptible to severe hypercapnia with hypoxia assessed by elevated minute ventilation rate (Tankersley *et al*, 1994). Has a rapid and shallow breathing pattern phenotype (contrast C3H) (Tankersley *et al*, 1997). Susceptible to cerebral ischemia following bilateral carotid occlusion with 90% of mice showing typical neurological signs such as torsion of the neck and rolling fits with selective neuronal death in the hippocampus and caudoputamen after 20 minutes of ischemia (Yang *et al*, 1997).

Reproduction

Good reproductive performance. Litter size 6.2, sterility 8% (Nagasawa *et al*, 1973). Large litter size, mean 6.2 (Verley *et al*, 1967). Good breeding performance, 2.5 young/female/ month (Hansen *et al*, 1973). Has longer and more regular estrus cycles than DBA/2 and C3H/HeJ (Nelson *et al*, 1992). Late opening of vagina and first cornification, but early onset of cyclicity compared with C3H (Nelson *et al*, 1990). The cleavage of preimplantation embryos is faster in C57BL/6 mice than in CBA/Ca mice (McElhinny *et al*, 1996).

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