ENVIGO

Research Models and Services

Inbred Mice

SAMP8/TaHsd (Senescence Accelerated Mouse Prone 8)

Origin

The SAMP8 Mouse is developed by Dr. Toshio Takeda, Kyoto University, from AKR/J mice and crossed with mice from an unknown strain, followed by sib mating since 1975.

SAMP8/TaHsd

In 2002 from Takeda Chemical Ltd to Harlan Laboratories. Harlan became Envigo in 2015.

Characteristics

Behavior

SAMP8 mice showed impairments in passive avoidance tasks (Miyamoto *et al*, 1986; Yagi *et al*, 1988), one-way (Miyamoto *et al*, 1986), T-maze (Flood and Morley, 1993) and Sidman (Ohta *et al*, 1989) active avoidance tasks and an impairment of their spatial memory task ability (Miyamoto, 1997). SAMP8 mice had age-related emotional disorders characterized by reduced anxiety-like behavior (Miyamoto *et al*, 1992). The SAMP8 and SAMP10 showed a profound disorder of their circadian rhythms of spontaneous motor activity and drinking behaviors (Miyamoto, 1997).

Immunology

SAMP8 mice also showed a more rapid decline in the lymphoproliferative response to concanavalin A, but cytotoxic T lymphocyte responses did not change with age. Natural killer cell activity was reduced with age in both SAMR1 and SAMP8, but no strain difference was observed (Powers *et al*, 1995).

Genetics

Coat colour gene - *c* : albino.

All SAMP mice have been identified at approximately 20 loci. There is only minor variation among the strains, restricted to *Idh-1*, *Mod-1* and *Car-2* loci.

Life-span and spontaneous disease

The SAMP8 mouse showed accelerated ageing (Takeda *et al*, 1991). They had age-related emotional disorders characterized by reduced anxiety-like behavior (Miyamoto *et al*, 1992). SAMP8 showed a profound disorder of the circadian rhythm of spontaneous motor activity and drinking behavior (Miyamoto, 1997). The SAMP8 showed age-related appearances of spongiform degeneration in the brain stem (Yagi *et al*, 1989), and of PAS-positive granular structures in their hippocampal formation (Akiyama *et al*, 1986), and astrogliosis in their brain stem (Yagi *et al*, 1989), hippocampus, pyriform cortex, brain stem nuclei and white matter (Kawamata *et al*, 1997). Clusters of activated microglia were also seen around the vacuoles in the brain stem (Amano *et al*, 1995). A monoamine-oxidase-B-positive granular structure was found in hippocampus of old mice (Nakamura *et al*, 1995). Beta/A4 protein-like immunoreactive granular structures were observed in various regions, including the medial septum, cerebral cortex, hippocampus, cerebellum, and some cranial nerve nuclei and roots and increased markedly in number with age (Takemura *et al*, 1993).

Other age-dependent histological changes included cortical atrophy in the pyriform cortex, neuronal cell loss in the locus ceruleus and lateral tegmental nucleus, intraneuronal accumulation of lipopigment in Purkinje cells, and eosinophilic inclusion bodies in thalamic neurons (Kawamata *et al*, 1997; Akiguchi *et al*, 1994). Similar changes were also observed to a lesser degree in SAMP10.

Blood-brain barrier function was impaired with advancing age in the olfactory bulb and medial hippocampus in SAMP8 (Ueno *et al*, 1993; Ueno *et al*, 1996; Ueno *et al*, 1997; Vorbrodt *et al*, 1995).

SAMP8 mice have a median survival time of 12.1 months.

Miscellaneous

Characteristics of the SAMP8 strain have been described by Festing (1997) and Lyon *et al*, (1996).

Physiology and biochemistry

Hippocampal glutamic acid content is higher than in SAMP1 (Nomura *et al*, 1991). Muscarinic acetylcholine receptors, alpha 2-adrenoreceptors, N-methyl-D-aspartate (NMDA) receptor channels and L-type Ca^{2+}channels were all changed in the cerebral cortex and hippocampus in aged SAMP8 (Kitamura *et al*, 1989). High levels of K^+ - and NMDA induced L-[^{3}H] noradrenalin release in brain slices, and this release was significantly lower in SAMP8 than in SAMR1 (Zhao and Nomura, 1990). Damage to the central histaminergic neurons (Meguro *et al*, 1992), synaptic dysfunction in the glutamatergic (Kitamura *et al*, 1992) and cholinergic systems (Ikegami *et al*, 1992; Zhao *et al*, 1992) seem to be present in SAMP8. The SAMP8 retained a higher concentration of GM3 than SAMR1 throughout their life span (Ohsawa and Shumiya, 1991). The endogenous levels of the beta-subunit of NGF in these mice was already elevated in the thymus, adrenal gland, testes and hypophysis during the early period of life as compared to SAMR1 (Katoh-Semba *et al*, 1991; Katoh-Semba *et al*, 1993). Neurotrophin-3 (NT-3) mRNA in the cortex was higher in SAMP8 than in SAMR1, whereas in the midbrain, hippocampus and forebrain, NT-3 expression levels were lower in SAMP8 than in SAMR1 during early development (Kaisho *et al*, 1994). Brain glucose metabolism was also impaired, as indicated by reductions in 2-deoxyglucose uptake (Kurokawa *et al*, 1996; Ohta *et al*, 1996) and in hexokinase activity (Kurokawa *et al*, 1996) in aged SAMP8. The binding of [^{3}H]phorbol-12,13-dibutyrate to protein kinase C in both cytosol and membrane fractions in the hippocampus of aged SAMP8 was reduced (Nomura *et al*, 1997).

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