



## NMRI (Naval Medical Research Institute)

### Origin

The original colony of Swiss mice in the US started from nine mice brought from Lausanne, Switzerland, in 1926 by Clara Lynch. In 1937 from Lynch to Poiley. Inbred by Poiley known as NIH/PI. At F51 to US Naval Medical Research Institute and known as NMRI. In 1955, to Bundes-Forschungsanstalt für Viruskrankheiten. In 1958, to Central Institute for Laboratory Breeding, Hannover.

### HsdWin:NMRI

In 1981, from Central Institute for Laboratory Breeding, Hannover to Winkelmann. In 1998, from Harlan Winkelmann to Harlan Laboratories. Harlan became Envigo in 2015.

### Research applications

General biology, toxicology, pharmacology.

### Characteristics

The NMRI mouse is a Swiss mouse and used as a general-purpose stock in many fields of research, such as pharmacology and toxicology.

### Behavior

Average avoidance performance in the shuttle-box (Schwegler and Lipp, 1983). Age-related changes in spontaneous behavior and learning have been described by Lamberty and Gower (1992).

### Genetics

Coat colour genes - c : albino

Other genes are variable (outbred stock).

### Immunology

Good primary immune response to bacteriophage fd (Kölsch *et al*, 1971). Good immune response to lymphocytic choriomeningitis virus (Moskophidis *et al*, 1983).

### Infection

Sensitive to infection with Herpes simplex virus (Schneeweis *et al*, 1982). Resistant to infection with eggs from *Taenia taeniaeformis* (Conchedda *et al*, 1984). The growth and distribution of *Echinostoma caproni* is different between NMRI and ICR (Hosier *et al*, 1991).

### Life-span and spontaneous disease

Crystalloid material was found in macrophages of the bone marrow (Hudson and Shortland, 1974). Spontaneous ovarian tumors have been described by Rehm *et al* (1983). Six different types of pulmonary tumors were identified (Deerberg *et al*, 1974). Nonneoplastic gastric lesions were mainly ulcers of the glandular portion partly due to food restriction (Rehm *et al*, 1987). Spontaneous nonneoplastic lesions in the thyroid of female mice have been described by Rehm *et al* (1985a). Spontaneous nonneoplastic lesions in the respiratory tract of female mice have been described by Rehm *et al* (1985b). Low incidence of osteomas (Höger *et al*, 1994). Relative high incidence of spontaneous glomerulonephritis (Deerberg and Müller-Peddinghaus, 1970). Increased proteinuria is seen in animals with this disease (Deerberg and Gleichmann, 1980). Spontaneous tumors in NMRI mice from carcinogenicity studies have been described by Bomhard and Mohr, 1989).

## Normal physiology and biochemistry

The influence of age and sex on epidermal metabolism and histology has been described by Kietzmann *et al* (1990). Brain glutamic acid decarboxylase is increased (Gaitonde *et al*, 1976). Short sleeping time of females after anaesthesia with hexobarbital (Lovell, 1976). Short of sleeping time after anaesthesia with pentobarbitone (Lovell, 1986).

## Nutrition

The number of male pups within a litter is associated with the dam's food preferences late in pregnancy (Moles *et al*, 2003).

## Reproduction

Foetal growth and development has been described by Griem (1975). Litter intervals in permanently mated monogamous mice have been described by Rapp and Kluge (1988). Significant correlations were observed between  $\alpha$ -fetoprotein (m-AFP) and foetal weight, and pregnancy-associated murine protein-2 (PAMP-2) and placental weight. These markers may therefore be useful in the monitoring of foetal growth and placental growth respectively (Hau and Skovgaard Jensen (1987).

## Parameters

HsdWin:NMRI – Envigo

PARAMETER	Unit	6 weeks old male			12 weeks old male			6 weeks old female			12 weeks old female		
		mean	±	sd	mean	±	sd	mean	±	sd	mean	±	sd
<b>Weights</b>													
Body weight	g	29.9	±	1.8	41.0	±	1.6	23	±	1.9	32.8	±	2.7
Heart	g	0.167	±	0.022	0.225	±	0.038	0.127	±	0.015	0.189	±	0.030
Lungs	g	0.184	±	0.016	0.220	±	0.025	0.160	±	0.009	0.203	±	0.026
Liver	g	1.842	±	0.174	2.027	±	0.122	1.145	±	0.126	1.443	±	0.151
Kidney	g	0.419	±	0.042	0.575	±	0.043	0.257	±	0.027	0.363	±	0.033
<b>Hematology</b>													
Erythrocytes	*10 <sup>12</sup> /l	8.08	±	0.25	8.36	±	0.45	7.93	±	0.33	8.80	±	0.45
Thrombocytes	*10 <sup>9</sup> /l	1115	±	166	1123	±	284	864	±	220	820	±	127
Leukocytes	*10 <sup>9</sup> /l	6.3	±	1.7	7.3	±	3.0	6.0	±	1.3	6.1	±	2.5
Lymphocytes	%	85.0	±	2.9	73.5	±	11.4	81.7	±	7.3	85.0	±	4.9
Neutrophiles	%	9.5	±	4.1	16.4	±	13.0	6.9	±	2.2	7.2	±	1.3
Monocytes	%	3.3	±	3.4	7.5	±	4.4	8.0	±	6.4	4.8	±	2.7
Eosinophiles	%	2.0	±	1.6	2.0	±	1.1	2.8	±	2.7	3.0	±	2.9
Basophiles	%	0.0	±	0.0	0.0	±	0.0	0.0	±	0.0	0.0	±	0.0
<b>Biochemistry</b>													
Sodium	mmol/l	148	±	2	148	±	1	148	±	1	149	±	1
Potassium	mmol/l	3.8	±	1.1	3.8	±	0.3	3.2	±	0.2	3.7	±	0.6
Calcium	mmol/l	2.59	±	0.23	2.46	±	0.04	2.62	±	0.07	2.56	±	0.05
Phosphate	mmol/l	2.19	±	0.14	1.50	±	0.20	2.16	±	0.10	1.31	±	0.30
Urea	mmol/l	7.7	±	0.7	9.4	±	1.5	6.3	±	0.9	6.7	±	0.9
Creatinine	µmol/l	27	±	2	28	±	2	28	±	2	32	±	3
Bilirubine	µmaol/l	<10			<10			<10			<10		
Cholesterol	mmol/l	4.3	±	0.5	3.9	±	0.5	3.2	±	0.4	3.8	±	0.5
Triglyceride	mmol/l	1.07	±	0.16	1.67	±	0.22	1.46	±	0.43	2.58	±	1.16
Glucose	mmol/l	12.8	±	1.3	11.0	±	1.2	11.3	±	1.2	11.4	±	1.1
AP	U/l	193	±	20	71	±	13	211	±	45	125	±	24
ASAT	U/l	73	±	21	76	±	13	80	±	19	82	±	18
ALAT	U/l	40	±	5	43	±	15	38	±	20	38	±	5
LD	U/l	532	±	130	568	±	139	485	±	62	518	±	170
Hemoglobin	mmol/l	8.5	±	0.2	8.3	±	0.4	8.3	±	0.3	8.9	±	0.5
Hematocrite	l/l	0.46	±	0.01	0.46	±	0.01	0.45	±	0.02	0.46	±	0.02

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