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Mini Review

Biological Comparison Between Mice and Rats

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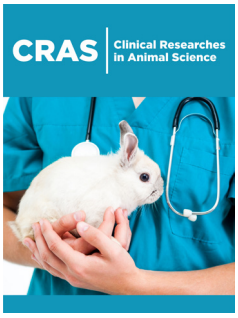

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Introduction

Laboratory animals are important tools in scientific discovery since early times, and they are still indispensable today in medical research that helps in our understanding of the functions of genes and the causes of various diseases, and the effect of the toxicity of various chemicals [1]. Mice are the first laboratory animal, and then rats are the second laboratory animal, and the most used types of laboratory animals in medical research are BALB/c mice, C57BL/6 mice, Wistar rats, and Sprague-Dawley rats. Laboratory animal models (mice and rats) are used in oncology, physiology, immunology, neuroscience, and pathology [2]. Laboratory rodents are white and responsible for the white color is a mutation in the tyrosinase gene, and this enzyme reduces the production of the melanin pigment [3,4]. The use of laboratory animals (mice and rats) has increased in medical research, and the reason for this is that these animals do not require expensive care and speed of reproduction, and they have many similarities with humans in terms of anatomy and physiology [5]. Humans, mice, and rats each have approximately 30,000 genes, about 95% of which are common to these three species [6-8]. A range of advantages for laboratory animals (mice and rats) have made these animal models important in medical research and increased their use in laboratory studies. Among these advantages, the gestation period is about 19-21 days in mice and weaning is after 3-4 weeks and then sexually after 5-7 weeks, thus large numbers are born within a short period [9].

Taxonomy

The word rodent is a derivative of the Latin word rodere, it means "to gnaw." This refers to the most distinguished advantage of this group, rats, and mice the two of the most iconic species of rodents [10].

Mice

The mice are affiliated to the family Muridae and subfamily Murinae, most pet mice are domesticated animals from the overland house mouse (Mus musculus). The weight of adult mice is about 30g [11].

Rats

Rats also be affiliated with the family Muridae and subfamily Murinae, Pet rats are derivatives of brown rats or Norway rats (Rattus norvegicus) [11].

General Properties

Mice and rats have the typical rodent body type, which includes a long tail, little legs with four anterior toes and five posterior toes, and a body that tapers toward the head. Rodents' capacity to resist high temperatures is constrained since they cannot sweat and do not pant. The ears and tails are used to dissipate heat [11].

Normal Physiologic and Biodata for Mice and Rats

The weight of mice is about 20-60 g, the average life of mice is about three years, the duration of the estrous cycle in mice is about 4 days, the gestation period is three weeks, and weaning is three weeks old, the number of chromosomes is 40, the heart rate per minute is about 400-800, the respiratory rate per minute is about 7000, the temperature 37 °C is shown as in (Table 1) The weight of rats is about 200-500g, the average life of rats is about four years, the duration of the estrous cycle in rats is about 4-5 days, the gestation period is three weeks, and weaning is three weeks old, the number of chromosomes is 42, the heart rate per minute is about 300-500, the respiratory rate per minute is about 150, the temperature 37.7 °C is shown as in (Table 1), these values may vary depending on age, gender, fasting, and methodology [11-16].

Table 1: It shows physiological information and biological data in laboratory mice and rats.

Value	Mice	Rats
Medium age span, months	12-36	26-40
Maximal reported age span, months	48	56
Medium mature weight (male) (g)	20-40	267-500
Medium mature weight (female) (g)	22-63	225-325
childbirth weight (g)	0.75-2	5-6
Estrogen circle length, days	4-5	4-5
Estrus circle duration, days	4-5	4-5
Gestation duration, days	19-21	21-23
Eye opening, days	12-14	12-15
Ear opening, days	10	3-4
Hair coating starts, days	10	7-10
Start to eat dryish feed, days	12	14
weaning life, days	18-21	21
Average of maturation of male, weeks	6	5
Average of maturation of female, weeks	6	5
Breeding average, weeks	8	9
Chromosomes numbers, diploid	40	42
Milk Composition	12%fat, 9%protein, 4%lactose	13% fat, 10%protein, 4%lactose
Heart average beats for every minute	450-800	300-500
Respiratory average, breaths for every minute	106-7230	71-146
Tidal size, mL	0.15-0.29	0.6-1.5
Minute size, mL	24	220
Rectum temperature(°C)	37.1	37.7
About daily food consumption of adult (g)	3-5	15-20
About daily water consumption of mature (mL)	5-8	22-33
About daily feces production, (g)	1-1.5	9-15
Suitable environment temperature (°C)	24-25	21-24
Suitable environment relative humidity (%)	45-55	45-55
Total blood size, mL/kg	70-80	50-65

Hematological Parameters

The number of white blood cells in mice is about 5-11 x 103/µL, the number of red blood cells is 8-106/µL, the hemoglobin is about 12-16g/dL and the number of platelets is 100-1000 x 103/µL. The number of white blood cells in rats is about 4-9 x 103/µL, the number of red blood cells is 6-86/µL, the hemoglobin is about 11-16g/dL and the number of platelets is 400-600 x 103/µL, As shown in (Table 2), this data varies with the animal's age, sex, breed, and breeding, as well as according to the method of collecting blood samples [11,12].

Table 2: Hematological parameters of mice and rats.

Value	Mice	Rats
White blood cells (WBC), $\times 10^3/\mu L$	5.1-11.6	4.7-9.4
Red blood cells (RBC), $\times 10^6/\mu L$	8.7-10.5	6.4-8.2
Hemoglobin (HGB), g/dL	12.2-16.2	11.2-15.9
Hematocrit (HCT), %	42-44	33.0-47.0
Platelets (PLT), $10^3/\mu L$	100-1000	411-626

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