



Indicators of Physical Development and Testes of Outbred Rats and Anatomical Parameters of the Testes

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Abstract: The article presents the parameters of physical development and testes of white rats up to 360 days of age.

Keywords: physical development, testicles, morphology.

Relevance. The importance of studying the structure and structural organization of the testes is determined by their participation in the performance of important functions for the body - the production of spermatozoa and the production of testosterone (male sex hormone) [1]. In addition, many authors consider the testes and the process of spermatogenesis itself as a universal biological test system that allows assessing the impact of various environmental factors [2-19]. Therefore, the study of the morphometric parameters of the testes and issues related to them remain unresolved or require clarification.

Purpose of the study. To study the parameters of the physical development of outbred rats in postnatal ontogenesis.

Materials and methods. A total of 69 rats were used in the experiments. Animals were slaughtered at the appropriate time in the morning, on an empty stomach by means of instantaneous decapitation under ether anesthesia. After opening the abdominal cavity, the testes were removed and their mass, length, width, volume and tissue density were studied. The mass of each of the testes was measured on an electric scale, the length and width were measured with a millimeter tape.

The volume of the testicles according to the formula:

$$V = 0.523 \times n \times c^2,$$

where: n, c - respectively, the length and thickness of the testicle 0.523 - a constant coefficient.

Results of own researches. In newborn rat pups, body weight ranges from 4.58 g to 5.86 g, on average $5.0 + 0.0928$ g. Body length (frontal-caudal size) from 3.83 to 4.82 cm, on average $4.4 + 0.0742$ cm. The testicles are located mainly in the abdominal cavity and in the inguinal-scrotal canal and have a round-oval shape. The weight of the testes ranges from 0.015 to 0.027 g, on average $0.02 + 0.0007$ g. The length of the testes varies from 0.27 to 0.39 cm, on average $0.34 + 0.078$ cm, and its thickness ranges from 0.17 to 0.26 cm, on average $0.21 + 0.0070$ cm. The volume of the testes is from 0.008 to 0.013 cm³, on average $0.01 + 0.0004$ cm³.

In 90-day-old male rats of the control group, body weight is 95.07-115.73 g (average - $106.8 + 1.229$ g). Growth 101.8 g (growth rate 2036%). The body length is 13.0-16.16 cm, on average $14.8 + 0.189$ cm. The growth rate is 236.4%. The absolute increase is 10.4 cm. The testicles are oval in shape and are located in the scrotum, less often in the inguinal-scrotal canal.

The mass of the testes varies individually from 0.65 g to 0.97 g, on average - $0.78 + 0.017$ g. The growth rate is 3800%, and the absolute increase is 0.76 g. The length of the testes is 1.02 - 1.64 cm, on average - $1.42 + 0.035$ cm. The growth rate is 317.6%, the absolute increase is 1.08 cm. The

thickness of the testes is in the range from 0.6 to 1.12 cm, on average - 0.91 ± 0.025 cm. The growth rate is 333.6%, the absolute increase is 0.7 cm. The volume of the testes individually ranges from 0.64 to 0.86 cm³, on average - 0.76 ± 0.013 cm³. The growth rate is 7500%. The absolute increase was 0.75 cm³. As microscopic examination of tissue sections of the testicles shows, at this age the diameter of the convoluted seminiferous tubules increases, a free lumen appears for the advancement of mature spermatozoa, therefore, the density of the testicular tissue decreases sharply.

In 180-day-old rats of the control group, body weight ranges from 210.69 to 225.03 g, on average - 218.3 ± 1.021 g. The absolute increase was 111.5 g, and the growth rate was 104.4%. The body length of rat pups was 16.19 - 19.3 cm, on average - 17.6 ± 0.280 cm, the absolute increase is 2.8 cm, the growth rate is 18.9%.

The mass of the testes ranges from 0.99 to 1.35 g, on average - 1.20 ± 0.023 g. The absolute increase was 0.42 g, the growth rate was 53.8%. The length of the testicles varies from 1.99 to 2.25 cm, on average - 2.18 ± 0.020 cm. The absolute increase is 0.76 cm, and the growth rate is 53.5%. The thickness of the testicles ranges from 1.33 to 1.40 cm, on average it was 1.36 ± 0.006 cm. The absolute increase was 0.45 cm, and the growth rate was 49.5%. The volume of the testicles is on average - 2.57 ± 0.015 cm³.

In 270-day-old rats of the control group, the body weight ranges from 248.24 g to 267.79 g, on average 255.7 ± 1.541 g. The growth rate is 17.1%, the absolute increase is 37.4 cm. The body length is from 17.05 to 21.38 cm, on average 19.8 ± 0.374 cm. Absolute increase - 2.2 cm, growth rate - 12.5%. Both testicles are oval in shape, no difference in size and weight was found. The mass of the testes ranges from 1.08 to 1.45 g, on average - 1.26 ± 0.032 g, the absolute increase was 0.06 g, the growth rate is 5.0%. The length of the testes ranges from 2.24 to 2.38 cm, on average - 2.29 ± 0.013 cm, the absolute increase is 0.11 cm, the growth rate is 5.0%. The thickness is from 1.32 to 1.57 cm, on average - 1.43 ± 0.023 cm. The growth rate is 5.1%, and the absolute increase is 0.07 cm. The average volume of the testicles is 2.95 ± 0.010 cm³.

In 360-day-old male rats of the control group, body weight ranges from 276.59 to 291.95 g, on average - 283.8 ± 1.596 g. The growth rate is 11.0%, the absolute increase is 28.1 g. Body length from 20.05 to 22.4 cm, on average 21.1 ± 0.273 cm, the growth rate is 6.6%, the absolute increase is 1.3 cm. The testicles are oval in shape, their weight is from 1.25 to 1.39 g, on average - 1.32 ± 0.015 g. The rate of growth in the weight of the testes is 4.8%, the absolute increase is 0.06 g. .29 to 2.5 cm, on average - 2.40 ± 0.018 cm. The growth rate is 4.8%, and the absolute increase is 0.11 cm. The thickness of the testicles is from 1.41 to 1.62 cm, on average - 1.50 ± 0.024 cm, the absolute increase is 0.07 cm, and the growth rate is 4.9%. The volume of the testicles individually is 3.17 - 3.38 cm³, on average - 3.32 ± 0.021 cm³, the absolute increase is 0.37 cm³. The growth rate is 12.5%.

In the control group, up to mature (360 days) age, body weight increases by 56.7 times, and body length by 4.8 times. The highest rate of body weight gain is observed at 90 (2036%) and 180 (104.4%) days of age, the lowest at 360 (11.0%) and 270 (17.1%) days of age. A high rate of increase in body length was also noted at 90 (236.4%) and 180 (18.9%) days of age, the lowest at 360 (6.6%) and 270 (12.5%) days of development. In newborn rats, the average weight of the testicles is 0.02 ± 0.0007 .

Conclusion. Until adulthood (360 days of age), this indicator increases by 66 times (1.32 ± 0.015). The length and thickness of the testicles increase by 7.06 and 7.14 times, respectively, and the volume by 332 times. Until puberty, the lumen of the convoluted seminiferous tubules is closed and filled with spermatogenic epithelium and trophic intercellular substance. At puberty, the lumen of the convoluted seminiferous tubules opens for the advancement of spermatozoa, so the density of the testicular tissue decreases. Comparison of the rate of increase in body weight of rats and testis weight, up to sexually mature age, shows that in animals of the control group, the weight of the testicles increases almost 1.16 times (66 times) faster than the body weight (56.7 times).

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