Allotransplantation of Pituitary Cells to Rat Testicle

E. S. Dendeberov

Translated from *Byulleten' Eksperimental'noi Biologii i Meditsiny,* Vol. 131, No. 2, pp. 188-190, February, 2001
Original article submitted July 19, 2000

Fifty-three transplantations of pituitary tissue (intact and minced with scissors) under the tunica albuginea testis were carried out. In both series pituitary cells retained viability for up to 6 months. Transplantation of cell suspension was not accompanied by the formation of necrotic zone in the transplant; the adjacent testicular tubules and the entire testicular structure remained unchanged, while transplantation of large fragments of the pituitary tissue impaired of spermatogenesis in the adjacent testicular tubules, although most of them remained unchanged. Hence, cell suspension is preferable for transplantation of pituitary tissue into the testicle.

Key Words: *pituitary; testicle; hematotesticular barrier; pituitary transplantation; rats*

The testicle is a paired retrobarrier organ. Transplantation of various endocrine cells into the testicle improves their survival without any negative effects on the gonads. Pancreatic islet cells, parathyroid and pituitary cells, and Leydig cells can be successfully transplanted into the testicle [1,4].

Successful take of endocrine cells in the testicle is determined by peculiar morphological structure of the testicle (blood-testis barrier) and promoted by a variety of hormone-active substances produced by testicular cells: testosterone produced by Leydig cells possesses a pronounced immunosuppressive effect, Sertoli cells mediate paracrine and autocrine regulation [1,2]. Maturation of the spermatogenic epithelial cells and their functional activity are regulated by neurotrophic factors produced in the testicle. Cells in the testicular tubules are differentiated under the effect of neurotourine which plays the most important role in this process [3]. High level of hormones and neurotrophic factors in the testicle ensures additional protection of allogenic donor cells from immunocompetent recipient cells. Allogenic pituitary cells transplanted into testicular parenchyma and under the tunica albuginea survive fairly well [3].

Research and Clinical Center of Andrology and Transplantation of Endocrine Organs; Department of Operative Surgery and Surgical Anatomy, Russian University of Peoples' Friendship, Moscow. ***Address for correspondence:*** dend.urol@mtu-net.ru. Dendeberov E. S.

However grafting and survival of allogenic pituitary cells and pituitary tissue in the testicle and the relationship between the size of implanted fragments and the state of the blood-testis barrier after transplantation are not well studied. Here we investigated the state of rat testicle after transplantation of pituitary fragments of different size at different terms after transplantation.

MATERIALS AND METHODS

The study was carried out on male albino rats (180-220 g); pituitary for transplantation was taken from adult rats. In series I (n=21), free allotransplantation of donor pituitary under the tunica albuginea testis was carried out using microsurgical methods. In series II (n=23), pituitary tissue was minced with ophthalmic scissors and the resultant homogenous suspension was injected under the tunica albuginea testis. No immunosuppressive therapy was used. Contralateral testicles served as the control. Histological studies were carried 1 and 2 weeks, 1, 3, and 6 months after transplantation. Histological preparations were stained with hematoxylin and eosin, by Mallory, and by Van Gieson methods.

RESULTS

In series I, the volume of the testicle did not change in comparison with the control at all terms of obser-

0007-4888/02/1312-0153$25.00

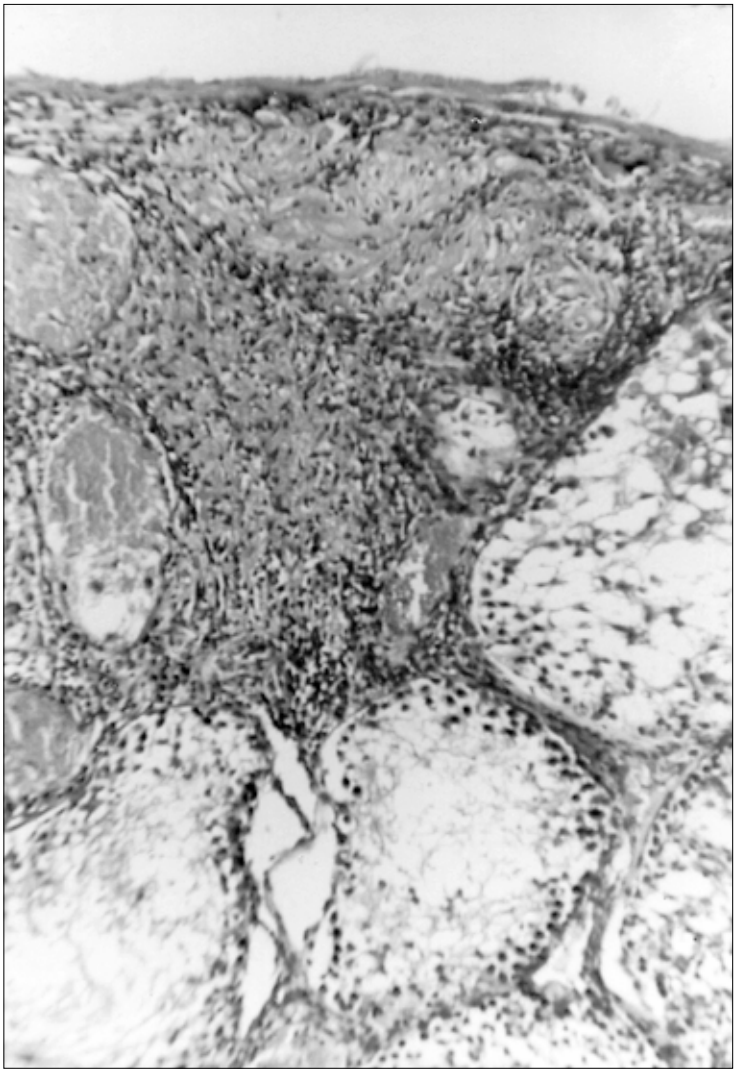

Fig. 1. Rat testicle 1 week after free allotransplantation of the pituitary under tunica albuginea. Hematoxylin-eosin staining, ×80. Large pituitary transplant under the tunica albuginea testis. Pituitary cells in a good state, some adjacent tubules are compressed, the structure of the testicle is generally intact.

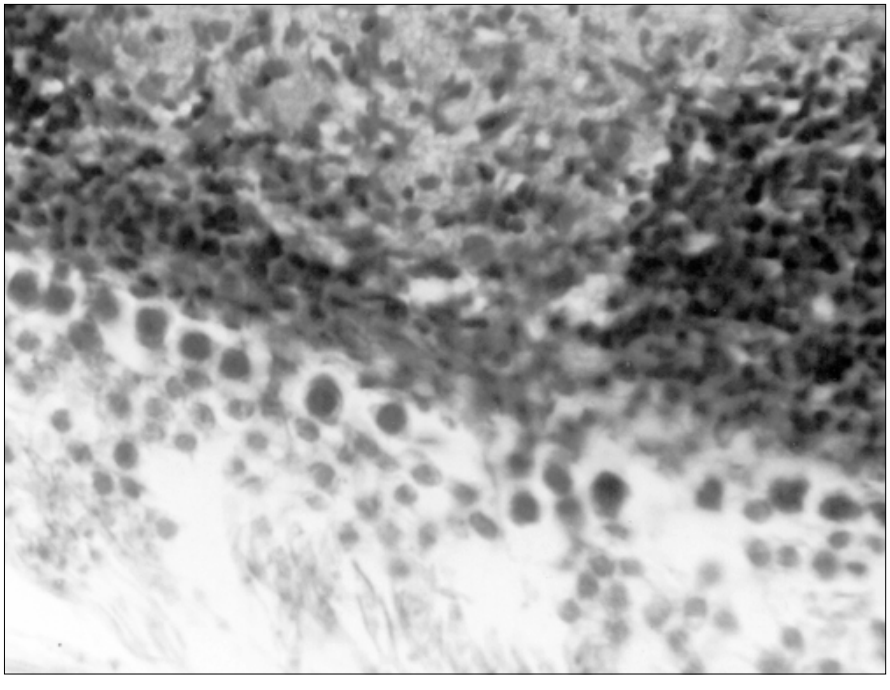

Fig. 2. Rat testicle 3 months after allotransplantation of pituitary cells under tunica albuginea. Hematoxylin-eosin staining, ×320. Pituitary cell nuclei are clearly differentiated, adjacent seminal tubules are intact and contain spermatozoa.

vation. One week after transplantation a large pituitary transplant was seen under the tunica albuginea testis (Fig. 1). A necrotic zone was seen in the center of the transplant; it gradually decreased in subsequent periods and was replaced with connective tissue fibers. Viable pituitary cells were observed at the periphery of the transplant; numerous newly formed capillaries were noted. Nuclei of allogenic cell were clearly differentiated; cells remained viable for at least 6 months. Atrophy of spermatogenic epithelial cells was observed in some seminal tubules adjacent to the transplant, some of which were devastated. Generally, testicular structure was not impaired and spermatogenic epithelial cells were intact.

In series II, histological analysis 1 week after transplantation showed pituitary cells loosely lying under the tunica albuginea testis. The necrotic zone was minimal or absent. In later periods (after 3 months) the transplant became more compact, numerous capillaries feeding allogenic pituitary cells appeared between cells. The adjacent seminal tubules were intact, and spermatogenic epithelial cells remained intact at all terms of observation (Fig. 2). The structure of the testicle was unchanged.

The absence of necrotic zone in series II of the experiments is apparently due to good contact of allogenic pituitary cells with interstitial fluid containing all necessary nutritives maintaining the viability of transplanted cells. Moreover, in series I large pituitary transplants compress the adjacent seminal tubules and disturb spermatogenesis.

Hence, cell suspension, but not tissue fragments, are preferable for allotransplantation of the pituitary tissue. These results can be used in clinical practice for the treatment of patients with secondary hypogonadism.

REFERENCES

1. I. D. Kirpatovskii and E. S. Dendeberov, *Vestn. Rossiisk. Akad. Med. Nauk,* No. 4, 42-46 (1994).
2. I. Goddard, M. Bouras, M. Keramidas, *et al., Endocrinology,* **141,** No. 6, 2068-2074 (2000).
3. J. P. Golden, R. H. Baloh, P. T. Kotzbauer, *et al., J. Comp. Neurol.,* **398,** No. 1, 139-150 (1998).
4. J. Ferguson and R. J. Scothorne, *J. Anat.,* **124,** 1-5 (1977).