Effect of Placental Cryoextract on Morphofunctional State of Kidneys in Heymann Nephritis

A.M. Vaskovich, I.I. Kondakov, N.V. Repin
Institute for Problems of Cryobiology and Cryomedicine
of the National Academy of Sciences of Ukraine, Kharkiv, Ukraine

When assessing the blood flow in kidney it is important to consider the difference between functional and morphometric parameters of blood circulation in nephrons. Normally the sizes of cortical glomeruli are known to exceed those of juxtamедullary ones, since there are two circulations in kidney, and the cortical one is principal [Tareyev E.M., 1983].

The research aim was to study the effect of introduction of allogeneic placental cryoextract (PCE) on functional and morphometric indices of rat kidneys in experimental Heymann nephritis (HN).

Studies were performed in 35 4-month-old outbred male rats weighing 220–250 g. The animals were treated intraperitoneally with renal homogenate (1 ml of homogenate per 100 g of weight) under local anesthesia to simulate HN. Animals were divided into 3 groups: group 1 comprised the intact animals; group 2 consisted of those with experimental HN; group 3 included those with experimental HN injected with 0.5 ml of PCE intramuscularly 3 times within a week starting from day 28 after immunization. The animals of groups 2 and 3 were sacrificed to days 45 and 60.

To day 45 after PCE administration, the functional indices in animals of group 3 were improved as compared to group 2: creatinine level in blood decreased from (62.3 ± 6.1) down to (47.5 ± 5.2) μmol/l; urine creatinine increased from (3.2 ± 0.4) up to (3.95 ± 0.3) mmol/l and glomerular filtration rate (GFR) changed from (0.42 ± 0.04) up to (0.92 ± 0.05) ml/min. To day 60 we revealed a decrease in blood creatinine level from (63 ± 0.5) down to (28 ± 2.5) μmol/l and urine creatinine from (3.75 ± 0.9) down to (2.9 ± 0.32) mmol/l, as well as the GFR augmentation from (0.49 ± 0.06) up to (0.98 ± 0.05) ml/min as compared with animals of group 2.

Morphometric analysis demonstrated significant differences in glomerular sizes in the course of HN development. Prior to PCE introduction the area of cortical glomeruli was (9,462 ± 1,845) mm² while the norm was (8,887 ± 1,679) mm². After PCE introduction to day 45 of the experiment we observed a significant reduction in sizes of juxtamedullary glomeruli from (9,049 ± 1,972) down to (7,700 ± 1,582) mm², that did not differ from the norm. To day 60 of the experiment the animals of group 3 had an increase in sizes of cortical and juxtamedullary glomeruli up to (8,456 ± 1,605) and (8,977 ± 1,890) mm², respectively, as compared with the animals of group 2 with the indices of (8,050 ± 889) and (8,346 ± 1,566) mm².

Thus, the cryoextract administration during the HN may slow down its further progress, as well as eliminate the disorder of renal blood flow in cortical glomeruli.