Cytogenetic Properties of Spleen Lymphoid Cells in Mice After Bilateral Nephrectomy

A. G. Babaeva and E. I. Gimmel'farb

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It is shown that mouse spleen lymphoid cells isolated 4 h after bilateral nephrectomy enhance mitotic activity of renal tubular epithelium in syngeneic recipients, but have no effect on hepatocytes and little effect on the proliferation of reticuloendothelial cells in these recipients. The cells isolated at the same times postoperation from sham-operated or unilaterally nephrectomized animals are ineffective.

Key Words: *bilateral nephrectomy; cytogenetic activity of lymphocytes; proliferation*

It was shown that after resection of some organs lymphocytes of operated animals enhance cell proliferation in homologous organs in syngeneic recipients [1]. This ability is proportional to the mass of resected tissue and at the early stages does not depend on the wound area [1,3]. However, it remains unclear whether the induction of cytogenetic activity of lymphocytes requires the presence of a tissue remnant of the operated organ. It was interesting to find out whether cytogenetically active lymphocytes enhance cell proliferation only in homogenous organ or cells of other organs are also sensitive to their action.

To answer this question we studied the effect of lymphoid cells from mice subjected to bilateral nephrectomy on proliferation of liver and kidney cells in nonoperated recipients.

MATERIALS AND METHODS

Experiments were performed on 150 male CBA mice weighing about 18 g. In some animals (donors) one or both kidneys were removed under Nembutal narcosis (60 mg/kg). Control recipients received cells from sham-operated mice. The donors were sacrificed by cervical dislocation 1 and 4 h postoperation. These periods were chosen on the basis of previous data on the immunoreactivity of spleen lymphocytes in various kidney operations [3]. Donor spleen was homogenized in medium 199, and cell suspension was injected into the retroorbital sinus of nonoperated recipients (70 mln cells/cm^3). The recipients were sacrificed 48 h after inoculation. Intact mice and mice injected with 1 cm^3 medium 199 served as additional controls. The mitotic activity was assessed as described previously [2,4].

The data were processed statistically using the Fisher—Student test.

RESULTS

In two independent experimental series, only splenocytes from bilaterally nephrectomized donors sacrificed 4 h postoperation considerably enhanced mitotic activity of the proximal tubular epithelium in the kidneys of nonoperated recipient (p=0.002 and 0.003 in comparison with intact controls and recipients of lymphocytes from unilaterally nephrectomized donors). Mitotic index of the tubular epithelium in the kidneys of control recipients (series I) receiving either medium or lymphocytes from bilaterally sham-operated animals practically did not differ from that of intact controls (Table 1). Cytogenetic activity of lymphoid cells from unilaterally nephrectomized mice appeared later. In previous studies these properties

Laboratory of Growth and Development, Institute of Human Morphology, Russian Academy of Medical Sciences, Moscow

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TABLE 1. Mitotic Index (‰) of Renal Tubular Epithelium and Liver Cells in Mice Receiving Lymphocytes from Operated Donors

Series	Cells	Surgery			Intact control	Injection of medium
		bilateral nephrectomy	unilaterally nephrectomy	bilateral sham-operation		
I	Renal epithelium	0.85±0.16	0.28±0.04	0.33±0.04	0.25±0.04	0.15±0.04
	Hepatocytes	0	0	0	0	0
	Reticuloendothelial cells	0.84±0.08	0.28±0.04	0.28±0.03	0.28±0.03	0.24±0.04
II	Renal epithelium	0.20±0.03	0.06±0.02	—	0.05±0.02	—

were observed 17-21 h postoperation, but the exact time was not determined [4]. None lymphoid cell changed the mitotic index in hepatocytes, while in reticuloendotheliocytes in series I it increased 3-fold.

Lymphocytes obtained 1 h postoperation did not change the mitotic activity of renal tubular cells and hepatocytes.

These experiments demonstrated cytogenetic activity of lymphoid cells even after total resection of the organ. This is very important for understanding the mechanisms of cytogenetic activity. The time of manifestation of this activity depends on the volume of resected tissue.

Cytogenetic activity of lymphoid cells is characterized by pronounced although not absolute organospecificity. Similar to our previous study [4], lymphocytes exerted cytogenetic effect not only on the renal tubular epithelium, but also on the liver reticuloendothelial cells. This is true only for the stimulating effect of lymphocytes on cell proliferation, while their suppressive effect on cell proliferation induced by surgical interventions in organs with weak regenerative potential is not organospecific [2].

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