PROPAGATION OF TOXOPLASMA IN THE PERITONEAL MESOTHELIAL CELLS

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To prepare the antigen used in the complement fixation reaction and the allergen (toxoplasmin) used for the intradermal test for the diagnosis of toxoplasmosis, the peritoneal exudate of laboratory mice inoculated intraperitoneally with toxoplasmas is normally used as the raw material. On the 3rd-4th day after inoculation of mice with virulent strains of toxoplasmas (Toxoplasma gondii), many of these organisms accumulate in the exudate. At this time as many as 200 million toxoplasmas may be counted in 1 ml of the peritoneal exudate of the infected mice [2]. The source of the toxoplasmas discovered in the exudate is not quite clear: either these organisms are obligate intracellular parasites and propagate in the cells of the exudate itself, or they propagate in the cells of the tissues lining the internal surface of the peritoneum.

The object of the present investigation was to study the site of propagation of toxoplasmas in mice infected intraperitoneally.

EXPERIMENTAL METHOD

Albino laboratory mice were inoculated intraperitoneally with T. gondii, strain RH. Inoculation was carried out by means of exudate in a dose containing approximately 1-2 million cells of T. gondii per mouse.

After different intervals of time (20-72 h after inoculation), smears of peritoneal exudate were taken, fixed, and stained. The number of cells of T. gondii in the exudate (3) and the number lying intracellularly were counted. With a scalpel areas of the internal lining of the peritoneum of the mice (with the appearance of films) were removed, transferred to cover slips, fixed in Schaudin's fluid without allowing them to dry, and stained by the Romanovsky-Giemsa method (the colophony method as modified by Bray and Garnham). The preparations were dehydrated in acetone-xylol mixtures and mounted in Canada balsam.

Areas of the abdominal wall of the mice were excised at the same times after inoculation, fixed, embedded in paraffin wax by the usual method, and sections were cut. The histological preparations made from them did not prove suitable for the purposes of the investigation.

EXPERIMENTAL RESULTS

The results of counts of the T. gondii cells in the exudate itself, and in the cells of the exudate and of the peritoneal mesothelium (film preparations) are given in the table, and they show that following intraperitoneal inoculation the primary site of propagation of the toxoplasmas was the mesothelial cells of the peritoneum. Only slight proliferation of the toxoplasmas took place in the cells of the exudate.

Number of Cells of T. gondii in the Exudate, Its Cells, and the Peritoneal Mesothelial Cells

Material examined	Time after inoculation (in h)					
	20	25	44	49	68	71
	mean number of cells in 200 fields of vision of the microscope with magnification of: objective 90×, ocular 10×					
Exudate	2	3	8	10	59	94
Cells of exudate	1	1	2	4	6	6
Cells of peritoneal mesothelium	–	–	–	2	41	38

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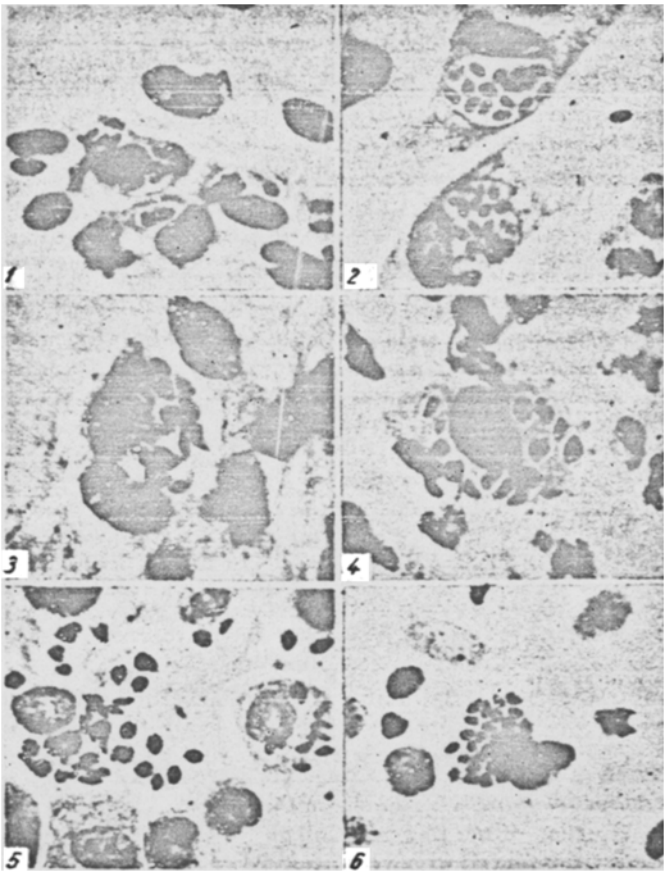

1, 4, and 5) toxoplasmas in the cells of the mesothelium; 2) pseudocysts of toxoplasmas; 3 and 6) cluster of toxoplasmas; at the site of disintegrated cells. Immersion, objective 90 ×.

The most intensive multiplication of toxoplasmas in the cells of the peritoneal mesothelium was observed between 49 and 72 h after inoculation of the mice with these organisms. The maximal number of T. gondii cells in the mesothelium was observed 68 h after inoculation. Film preparations made at this time show that nearly all the mesothelial cells contained toxoplasmas (see figure). The organisms were situated in the vacuoles in the cytoplasm of the mesothelial cells. Very often they were found close to the nucleus, deforming it. Some cells had several vacuoles, each containing 1–4 toxoplasmas, while others had only one vacuole containing a large cluster of parasites. The vacuole occupied nearly all the cell. The nucleus of the mesothelial cell was displaced to the periphery. These were typical pseudocysts of toxoplasmas. In preparations of the peritoneal mesothelium, disintegrated mesothelial cells shedding toxoplasmas were occasionally seen. In the exudate, however, such cells were very numerous. Evidently as a result of proliferation of toxoplasmas in them, the mesothelial cells separated from the general layer and were set free into the exudate, where they died. After destruction of the mesothelial cells the toxoplasmas were liberated, penetrated into new cells, and there the process was repeated.

The morphological pictures obtained by investigating the peritoneal mesothelium of a mouse infected with T. gondii resemble those obtained in tissue cultures [1].

As a result of the action of the toxoplasmas, the mesothelial cells become separated from the general layer of mesothelium and disintegrate, some of them entering the peritoneal exudate. Toxoplasmas from the disintegrated mesothelial cells also enter the exudate, where they accumulate in large numbers.

LITERATURE CITED

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