2. Ya. L. Karaganov and V. V. Banin, Arkh. Anat., No. 11, 5 (1978).
3. N. Ya. Kovalenko and A. M. Chernukh, Byull. Éksp. Biol. Med., No. 3, 367 (1981).
4. G. P. Konradi, Regulation of Vascular Tone [in Russian], Leningrad (1973).
5. V. V. Kupriyanov, Ya. L. Karaganov, and V. I. Kozlov, The Microcirculatory System [in Russian], Moscow (1975).
6. A. M. Chernukh, P. N. Aleksandrov, and O. V. Alekseev, The Microcirculation [in Russian], Moscow (1975).
7. B. Altura, Microvasc. Res., 16, 91 (1978).
8. B. Ehinger, B. Falck, and B. Sporrong, Bibl. Anat., 8, 33 (1966).
9. J. Gero and M. Gerova, Experientia, 24, 811 (1968).
10. G. Hauck, Angiologica, 8, 236 (1971).
11. J. Furness, J. Anat. (London), 115, 347 (1973).
12. J. Furness and M. Marshall, Br. J. Pharmacol., 45, 193 (1972).
13. J. Rusznyak, M. Földi, and G. Szabo, Lymphatics and Lymph Circulation, New York (1967).
14. B. Zweifach, Microvasc. Res., 5, 363 (1973).

MYOID CELLS OF THE THYMUS IN PATIENTS WITH MYOPATHY

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A number of studies of heteroorganic antigens of the thymus, i.e., antigens of such highly specialized tissues as muscle tissue, the tegumentory and secretory epithelium of ectodermal origin, etc., represented in the thymus, have recently been published [1-3, 6-8]. It has been suggested that the possible function of these antigens is to inform the lymphocytes of the organ about the structure of their own antigens during the formation of a state of natural immunologic tolerance to them [1, 3, 4]. Among the heteroorganic structures of the thymus, those which have been studied the most are the myoid cells, whose cytoplasm contains antigens common with those of muscle tissue [2, 7, 13, 14]. A strong connection has been shown to exist between the state of the myoid cells and the lymphoid tissue of the thumus [7]. If muscle tissue is involved in a pathological process, such as in autoimmune diseases of myasthenia and rheumatic fever type, profound changes are observed in the myoid cells; these changes, moreover, have a specific character for the particular disease [9, 10]. More recently it has been suggested that yet another disease affecting muscle tissue, namely progressive muscular dystrophy, is autoimmune in nature and, by analogy with myasthenia, attempts have been made to treat this myopathy by thymectomy [11, 12]. Data on changes in the thymus in this disease could not be found in the accessible literature. Hence the interest of a comprehensive (including immunomorphologic) study of the thymus of patients with this disease.

The object of this investigation was to undertake an immunofluorescence study of the myoid cells of the thymus in patients with progressive muscular dystrophy.

EXPERIMENTAL METHOD

Sections of the thymus from children with Duchenne's myopathy (age 5-10 years, 15 cases) and Erb's myopathy (age 6-25 years, five cases) were studied. The thymus of children undergoing operations for congenital heart defects (seven cases) and of persons aged 8-23 years

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dying as a result of acute trauma (12 cases) served as the control. Sera from patients with myasthenia, containing high titers of antibodies against myoid cell antigens, common with antigens of skeletal muscle, and not reacting in high dilutions with other antigens of thymus tissues, served as the source of antibodies against myoid cell antigens. Cryostat sections of the thymus were fixed for 10 min in cold acetone, treated for 2 h with serum from a myasthenia patient at room temperature, rinsed for 10 min in 0.85% NaCl solution (pH 7.5), and incubated with antibodies against human IgG, labeled with fluorescein isothiocyanate (FITC). Antibodies were isolated from rabbit antiserum by means of an immunosorbent, consisting of human IgG treated with glutaraladehye. The number of myoid cells was estimated by the coefficient K-X/A, where X is the number of myoid cells in A (usually 300) fields of vision. To detect bound immunoglobulins in the cytoplasm of the myoid cells, sections of the thymus of patients with myopathy were treated for 18 h at 4°C with FITC-labeled rabbit immunoglobulin fraction against human IgM, IgA, and IgG (N. F. Gamaleya Institute of Epidemiology and Microbiology) and against the C_3-component of complement (from Hyland, USA). To remove any possible contamination with heterophilic antibodies, these preparations were first adsorbed (1 h at 37°C and 18 h at 4°C) by a tissue homogenate of human thymus and myocardium.

EXPERIMENTAL RESULTS

On treatment of sections of the thymus of children undergoing operations for congenital heart disease and also of the victims of acute trauma, with serum from a patient with myasthenia with a high antibody titer against muscle tissue antigens, single diffusely fluorescent myoid cells, oval or round in shape and 15-20 μ in diameter were found in the medullary zone of the lobules of the gland. The myoid cells under these circumstances had low secretory activity and were rarely combined into Hassall's corpuscles. The number of myoid cells counted in sections of the thymus from the two control groups was the same, on average 0.4 ± 0.038 per field of vision. The number of myoid cells in the thumus of patients with Duchenne's myopathy was about half the normal value, on average 0.23 ± 0.026 per field of vision. Besides the smaller number of myoid cells, their size also was reduced to 8-15 μ as a result of which many of the myoid cells in the thymus of patients with Duchenne's myopathy resembled large granules (Fig. 1a). The myoid cells in these cases had the usual oval or round shape, they were detected not only in the medullary zone, as normally, but also in the cortical zone, they were distributed singly, possessed marked secretory activity, and were attached to Hassall's corpuscles much more frequently than normally (Fig. 1b). Many myoid cells had an uneven surface because of shrinking.

Changes in the myoid cells in the thymus of patients with Erb's myopathy were completely different in character. The first point to note was that the number of myoid cells in this form of the disease was sharply increased in all patients and averaged 1.05 ± 0.194 per field of vision. Myoid cells in this disease were found not only in the medullary zone, but also in the cortex of the thymus lobules, and sometimes they were found directly beneath the capsule, i.e., in the outermost, least differentiated layers of the cortical epithelium (Fig. 2a). The population of myoid cells in Erb's myopathy was very heterogeneous and polymorphic on account of fluctuations in their size, changes in their shape, and differences in their functional state. In Erb's myopathy, for instance, the numerically predominant type of myoid cell in the thymus was elongated, as a result of which they came to resemble muscle fibers (Fig. 2a, b). Most of the myoid cells in these cases were enlarged and, in the case of round cells, their diameter could reach 30-40 μ, whereas the elongated cells measured 60-70 μ. Heterogeneity of the population also was manifested as an appreciable variation in the content of myoid antigens in the cytoplasm of the myoid cells. In sections of the thymus myoid cells with an increased content of myoid antigens, reacting more strongly with serum of a patient with myopathy than myoid cells of the control organs, could be detected simultaneously in sections of the thymus with myoid cells with a reduced content of antigens, giving weaker fluorescence than normally, and in which antigens were detected only at the periphery of the cytoplasm. Evidence of functional activity of the myoid cells in Erb's myopathy also was given by the presence of secretory activity in many of them, manifested as the removal of granules containing myoid antigens from their surface (Fig. 2a, b). Further evidence of activation of the myoid cells in Erb's myopathy is the frequently observed division of the myoid cells by budding or by the formation of constriction bands (Fig. 2a, b). Besides functionally active cells, hypertrophied cells undergoing disintegration or attachment to Hassall's corpuscles also were present in the thymus of patients with this form of myopathy. No bound immunoglobulins or complement could be found by the direct immunofluorescence method in the cytoplasm of the myoid cells from patients with Duchenne's or Erb's myopathies.

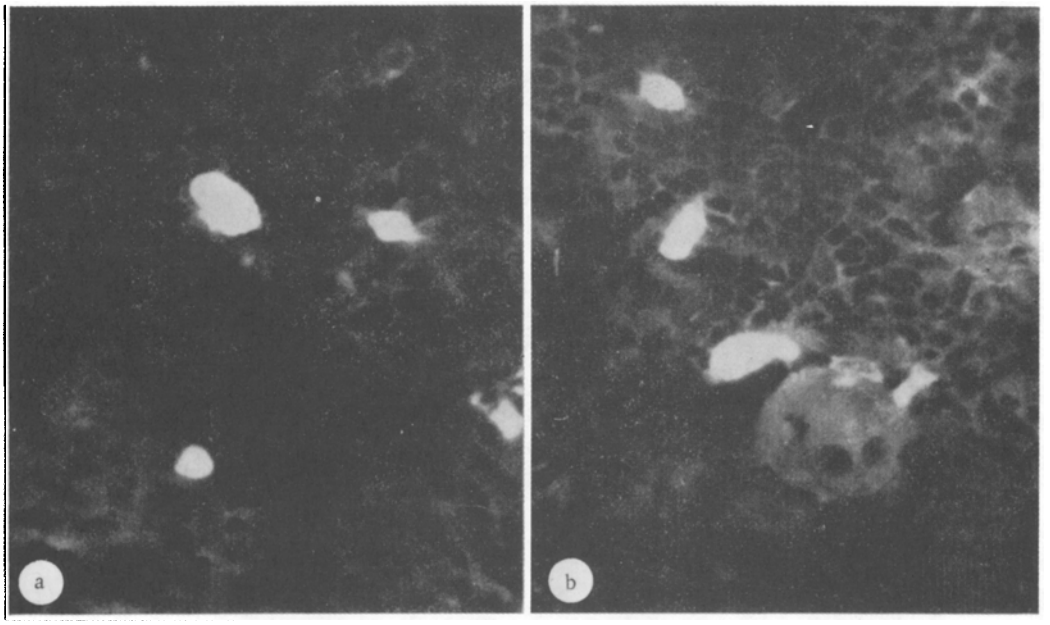

Fig. 1. Myoid cells in thymus of patients with Duchenne's myopathy: a) myoid cell of normal size (about 15 μ) and smaller cells resembling large granules; b) attachment of myoid cells to Hassall's corpuscle.

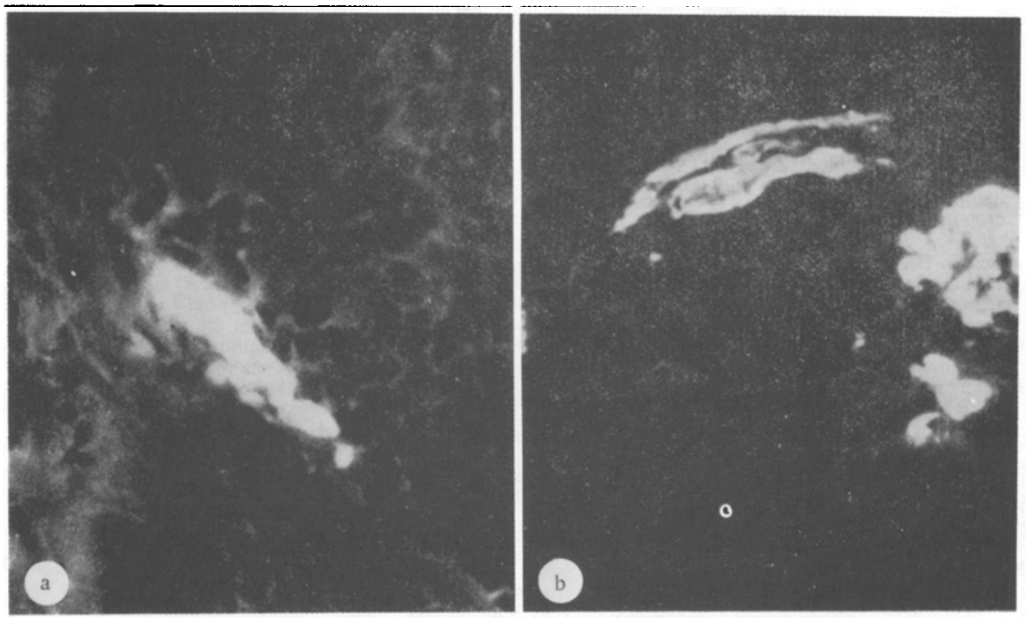

Fig. 2. Myoid cells in thymus of patients with Erb's myopathy: a) elongated myoid cell secreting granules of myoid antigens in outer layer of cortical zone of lobule. It is separated by a constriction band from a smaller myoid cell; b) group of elongated and round myoid cells; numerous small elements have separated from a round myoid cell as a result of budding. Indirect immunofluorescence method, magnification 40 (water immersion), ocular homal 3.

In progressive muscular dystrophy the myoid cells in the thymus thus undergo profound changes which affect the processes of their formation, differentiation, and maturation. The observation that changes in the myoid cells in the two forms of myopathy are relatively specific in character is important toward the evaluation and understanding of the data; in conjunction with other particular features the result is that the content of myoid antigens in Erb's myopathy is sharply increased whereas in Duchenne's myopathy there is a deficit of myoid antigens in the interior of the gland. It will be recognized, however, that it is

difficult at present to explain this fact and to link it with differences in the course of the two forms of myopathy. It can only be suggested that the fundamentally different character of the changes in the myoid cells may affect in different ways the ability of the thymocytes to react with muscle tissue antigens, and in turn, this could evidently be one of the many factors responsible for differences in the pathological process in the two forms of muscular dystrophy.

LITERATURE CITED

1. L. V. Beletskaya and É. V. Gnezditskaya, Usp. Sovrem. Biol., 79, No. 1, 128 (1975).
2. L. V. Beletskaya and É. V. Gnezditskaya, Arkh. Anat., No. 2, 5 (1977).
3. L. V. Beletskaya and É. V. Gnezditskaya, Immunologiya, No. 4, 89 (1980).
4. F. M. Burnet, Cellular Immunology [Russian translation], Moscow (1971).
5. É. V. Gnezditskaya and L. V. Beletskaya, Byull. Éksp. Biol. Med., No. 4, 89 (1974).
6. É. V. Gnezditskaya and L. V. Beletskaya, Byull. Éksp. Biol. Med., No. 1, 60 (1977).
7. É. V. Gnezditskaya and L. V. Beletskaya, Byull. Éksp. Biol. Med., No. 11, 616 (1978).
8. É. V. Gnezditskaya, L. V. Beletskaya, and N. A. Zakharova, Byull. Éksp. Biol. Med., No. 12, 580 (1980).
9. É. V. Gnezditskaya, L. V. Beletskaya, I. Kh. Ippolitov, et al., Byull. Éksp. Biol. Med., No. 2, 197 (1981).
10. É. V. Gnezditskaya, L. V. Beletskaya, et al., Byull. Éksp. Biol. Med., 1982 (in press).
11. A. Ya. Shiyanevskii, V. V. Pekarskii, et al., in: Rehabilitation of Nervous and Mental Patients [in Russian], Tomsk (1977), pp. 285-288.
12. A. Ya. Shlyanevskii, V. V. Pekarskii, et al., in: Current Problems inPediatric Neurology and Chemical Genetics [in Russian], Tashkent (1978), pp. 244-247.
13. J. A. Hammar, Quat. Anz., 27, 23 (1905).
14. A. J. Strauss, H. W. Van der Geld, P. G. Kemp, et al., Ann. N.Y. Acad. Sci., 124, 744 (1965).

HEALING OF ACUTE GASTRIC BLEEDING POINTS COAGULATED BY LASER RADIATION

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Lasers, used as a "light scalpel," are nowadays being employed on an ever-increasing scale during surgical operations [3, 4, 6-8]. The laser incision is characterized by the formation of a narrow layer of coagulation tissue necrosis along the line of section, which ensures complete hemostasis [5]. A peculiarity of the healing of laser wounds, as several workers have found [1-3], is the absence of leukocytic inflammatory infiltration in tissues bordering on those which have been injured. Galankin and Botsmanov [2], who have studied the healing of several organs resected by CO_2 laser beam, concluded that this phenomenon is linked with the character of tissue necrosis induced by the laser beam and is not tissue-specific.

Reports have also been published on the successful arresting of acute gastroduodenal hemorrhages through an endoscope by means of laser radiation without the need to perform an emergency operation at the height of bleeding [9-12]. This widens the opportunities for solution of the problem of arresting acute hemorrhages from the proximal part of the gastrointestinal tract.

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