A CROSS-REACTING ANTIGEN COMMON TO STRATUM BASALE CELLS OF STRATIFIED EPITHELIUM AND GROUP A STREPTOCOCCAL POLYSACCHARIDE IN EMBRYOGENESIS

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Previous investigations by the immunofluorescence method revealed the existence of a cross-reacting antigen (CRA) common to cells of the stratum basale of epithelia of ectodermal origin and group A streptococcal polysaccharide [1, 2, 4-7]. This antigen is present in cells of tumors (transplantable strains of mouse squamous-cell carcinoma), histogenetically connected with the tissues carrying the antigen. It was suggested on the basis of these investigations that CRA has a possible role in the development of autoimmune reactions and in the pathogenesis of certain human pathological processes connected with streptococcal infection (rheumatic fever, erysipelas). Several reports of the discovery of antibodies reacting with antigen of stratum basale cells of stratified squamous epithelium in the sera of patients with certain skin diseases have now been published [9].

The object of this investigation was to study, by means of an immunofluorescence method, the localization of CRA in the cells of the cutaneous epithelium of animals in the neonatal and early postnatal periods.

EXPERIMENTAL METHOD

Wistar albino rat fetuses obtained at various times of pregnancy (from 6 to 23 days) and the newborn animals (24-72 h) were used. The stage of pregnancy was counted from the day of fertilization of the female, confirmed by the presence of spermatozoa in control films of the vaginal contents. The animals were killed by ethyl ether. The fetus or its fragments was immersed in petroleum ether (light paraffin), cooled with a mixture of dry ice and acetone to −76°C. Transverse sections through the embryos or through the skin from the spinal region of the fetuses and newborn animals, 4-5 μ thick, were cut in a cryostat at −20°C, placed on a slide, partially dried for 30 min at room temperature, and used in the unfixed state. The subsequent treatment of the sections was fully described previously [3]. Sections of material from adult rats served as the control. Preparations of antibodies against CRA characteristic of stratum basale cells of stratified squamous epithelium were obtained by degradation of a complex of antibodies with group A streptococcal polysaccharide in an acid medium (pH 2.8). A preparation of antibodies of batch No. 3, prepared by N. A. Borodiyuk in the Laboratory of Streptococcal Infections, N. F. Gamaleya Institute of Epidemiology and Microbiology, Academy of Medical Sciences of the USSR and by I. I. Rassokhina, in the Laboratory of Biochemistry, Institute of Rheumatism, Academy of Medical Sciences of the USSR, was used in this investigation. The method of isolation of antibodies against CRA from the serum of rabbits immunized with a streptococcal culture was described by Lyampert et al. [5, 6]. The investigation was carried out by the indirect immunofluorescence method, using the γ-globulin fraction of a serum against rabbit immunoglobulins, labeled with fluorescein isothiocyanate. Observations were made with the ML-2 microscope. The specimens were photographed with a × 40 objective (water immersion) and homal × 3 ocular, on RF-3 film.

EXPERIMENTAL RESULTS

When antibodies against CRA were applied to sections of a rat fetus aged from 6 to 12 days, no reaction could be observed with components of the embryonic tissue cells, including the simple epithelium of the skin. No reaction was observed with antigens of the cutaneous epithelium at the beginning of the stage of formation

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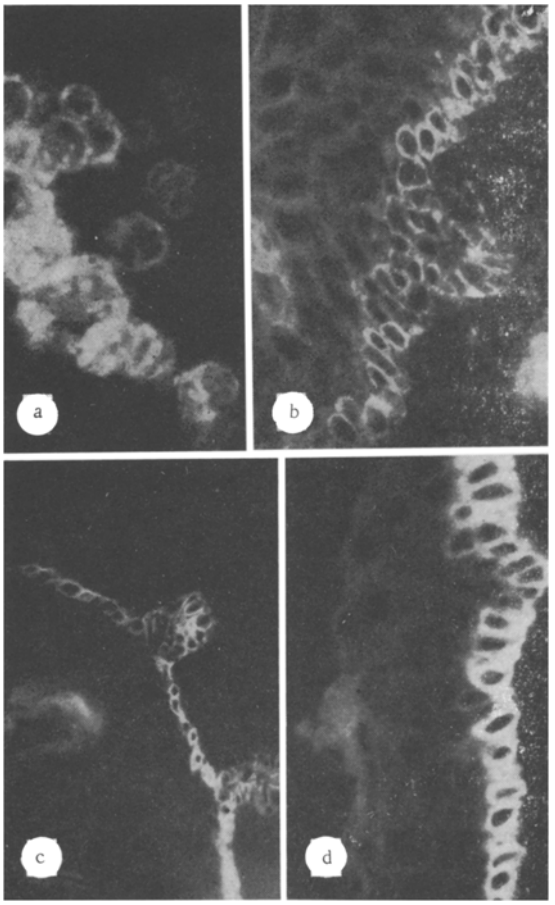

Fig. 1. Section through skin of fetal, neonatal, and adult rats. Treatment with antibodies against CRA, common to group A streptococcal polysaccharide and cutaneous epithelium of human and animal ectodermal origin. Indirect immunofluorescence method. Objective × 40 (water immersion), ocular homal × 3. a) Section through skin of 17-day rat fetus at stage of commencing formation of stratified squamous epithelium. Diffuse distribution of CRA in cytoplasm of large cells of embryonic epidermis; b) section through skin of 21-day rat fetus. Localization of CRA in outer zone of cytoplasm of stratum basale cells of stratified squamous epithelium and anlagen of skin appendages; c) section through skin of newborn rat. Localization of CRA in stratum basale of epidermis; d) section through skin of adult rat. Same localization of CRA – in stratum basale of epidermis.

of stratified squamous epithelium (13th-14th days). Investigation of sections through the skin of a 15-day rat fetus showed weak, diffuse fluorescence of the cytoplasm of the large cells of the embryonic epidermis. After the 17th day the reaction became much stronger (Fig. 1a). Fluorescence gradually disappeared from the cells of the more differentiated layers, and by the time of definitive formation of the stratified squamous epithelium it was concentrated entirely in cells of the germinative layers. The location of CRA in the epidermis of the fetus after the 21st day of development (Fig. 1b) and of the newborn animal was similar to that of the antigen in the cutaneous epithelium of the adult rat (Fig. 1c, d). In these cases the antigen was concentrated in the outer zone of the cytoplasm of the stratum basale cells of the epidermis. This topography of the reaction also was characteristic of the appendages of the skin, where the antigen was located in cells of the cambial layers of the anlagen of the developing hair follicles and sweat glands (Fig. 1b).

The times of appearance of a cross-reacting antigen characteristic of stratum basale cells of the cutaneous epithelia of human and animal ectodermal origin were thus established by the indirect immunofluorescence method. The appearance of the CRA in the neonatal period determines the formation of natural immunologic tolerance to this antigen. This conclusion is supported by the results of investigations by other workers [8], indicating that no antibodies against antigens of the stratum basale cells of cutaneous epithelium can be found in the serum of clinically healthy persons. Antibodies against antigens of the subject's own body tissues appear only in the case of development of a pathological state or of experimental surmounting of immunologic tolerance.

LITERATURE CITED

1. L. V. Beletskaya, É. V. Gnezditskaya, I. M. Lyampert, et al., Byull. Éksp. Biol. Med., No. 2, 212 (1976).
2. L. V. Beletskaya, É. V. Gnezditskaya, N. T. Raikhlin, et al., Vopr. Onkol., No. 10, 83 (1977).
3. L. V. Beletskaya and T. A. Danilova, in: Immunoluminescence in Medicine [in Russian], Moscow (1977), pp. 145-183.
4. I. M. Lyampert, N. A. Borodiyuk, L. V. Beletskaya, et al., in: Problems in Immunology [in Russian], No. 6, Moscow (1974), pp. 113-124.
5. I. M. Lyampert, L. V. Beletskaya, N. A. Borodiyuk, et al., Scand. J. Immunol., 4, 409 (1975).
6. I. M. Lyampert, L. V. Beletskaya, N. A. Borodiyuk, et al., Byull. Éksp. Biol. Med., No. 5, 570 (1976).
7. I. M. Lyampert, L. V. Beletskaya, N. A. Borodiyuk, et al., Immunology, 31, 47 (1976).
8. C. Ackermann-Schopf, R. Ackermann, P. Terasaki, et al., J. Immunol., 112, 2063 (1974).
9. P. Andersen and W. L. Hale, in: Immunopathology of the Skin: Labeled Antibody Studies, E. H. Beutner et al., eds., Stroudsburg, Pennsylvania (1973), pp. 271-286.

EFFECT OF ANTISERUM AGAINST ISOLOGOUS AGGREGATED IMMUNOGLOBULINS ON SYNTHESIS OF NONSPECIFIC IMMUNOGLOBULINS IN MICE IMMUNIZED WITH SHEEP'S RED BLOOD CELLS

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As has been demonstrated in experiments in vitro, aggregated immunoglobulins activate mouse B lymphocytes and induce polyclonal antibody formation [6]. A similar situation might be created in vivo on account of aggregated antibodies formed in the course of the immune response. After immunization of mice, B lymphocytes with aggregated antibodies adsorbed on their surface are known to accumulate in the spleen [1]; it might be suggested that such cells, detected by the rosette-formation test with specific antigen, after activation by aggregates of antibodies, take part in the production of nonspecific immunoglobulins (NIG).

The object of the present investigation was to test this hypothesis by a study of NIG synthesis in mice receiving antiserum against isologous segregated immunoglobulins; as previous investigations [5] showed, such an antiserum can eliminate rosette-forming cells (RFC) carrying aggregated antibodies in vivo, without having any significant effect on antibody-forming cells (AFC).

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