STAGE-SPECIFIC ANTIGENS IN HUMAN EMBRYONIC KIDNEY AND HEART TISSUES

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Animal experiments [1, 2, 3, 5, 7, 10, 11, 12] have shown that stage-specific antigens are present in embryonic tissues. The question of whether stage-specific antigens are present in human embryonic tissues has not been answered, because only fragmentary and usually indirect information is available on this subject [1, 4].

Our problem was to determine in a direct experiment whether stage-specific antigens are present in kidney and heart tissues of human embryos at different stages of their development.

METHODS

As in previous publications [8, 9], we have used the anaphylaxis-desensitization reaction in guinea pigs [6, 10].

In the first series of experiments we have determined the presence of stage-specific antigens in the tissues of the developing human kidney, in the second series that in the developing human heart, in the third series in the adult human kidney and in the fourth series in the adult human heart tissue.

Guinea pigs were sensitized subcutaneously with tissue suspensions in 32 mg doses from kidneys and hearts of human embryos at different stages of development (before placentation—six to nine weeks or pregnancy, after placentation-fifteen to nineteen and thirty-five to forty weeks of pregnancy) and with tissue suspensions from adult humans. The methods for the preparation of suspensions have been described previously [8]. On the twenty-first day after the sensitizing injection all the animals were desensitized to the species-and organo-specific antigens by means of injection of serum and kidney and heart extracts of adult humans [9]. In our experiments desensitization to organo-specific antigens of kidney and heart took place very slowly. Because of this in a number of cases it was necessary to inject intravenously into the animals 3-4 times extracts of adult human kidney and heart. These animals became desensitized to the organo-specific antigens only following this treatment. Two hours after a check for the completeness of desensitization to these antigens [intravenous injection of extracts of adult human kidney and heart in 0.6 ml doses (15 mg of protein determined by Kjedahl's micro-method)] the animals received intravenously the same antigens which had been used for their sensitization. The difference was that tissue extracts instead of suspensions were injected.

Extracts were prepared by the following method. Kidney and heart tissues washed free of blood were rapidly fragmented with scissors in a sterile mortar and then thoroughly ground with sand with gradual addition of normal saline in the amount of 9 ml saline to 1 g of tissue. The tissue suspension was refrigerated for 24 h, then it was shaken and centrifuged for 20 min at 3000 rpm.

RESULTS

Table 1 shows the results of experiments on the study of stage-specific antigens in embryonic human kidney tissues, and Table 2 the results of similar experiments with embryonic heart tissues.

TABLE 1. Anaphylaxis Reaction in Guinea Pigs Sensitized with Suspensions of Embryonic Human Kidney Tissues and Desensitized to Species- and Organo-Specific Antigens, in Response to the Introduction of Extracts from Kidney Tissues of Embryos at Different Stages of Development

Subcutaneous sensitization		Challenge intravenous injection after complete desensitization to species- and organo-specific antigens		
antigen	dose in mg	antigen	dose in mg	Reaction
Kidney tissue suspension of human embryos at the stages of development (in weeks);		Extract of embryonic human kidney tissues at the following stages of development (in weeks):		
6-9	32	6-9	0.6	+
6-9	32	6-9	0.6	+
6-9	32	6-9	0.6	+
6-9	32	6-9	0.6	+
6-9	32	6-9	0.6	+
6-9	32	6-9	0.6	+
15-19	32	15-19	0.6	+
15-19	32	15-19	0.6	+
15-19	32	15-19	0.6	+
15-19	32	15-19	0.6	+
15-19	32	15-19	0.6	+
15-19	32	15-19	0.6	+
35-40	32	35-40	0.6	++
35-40	32	35-40	0.6	++
35-40	32	35-40	0.6	++
35-40	32	35-40	0.6	++
35-40	32	35-40	0.6	++
35-40	32	35-40	0.6	++
Adult human kidney tissue suspension	32	Extract of adult human kidney tissues	0.6	-
the same	32	the same	0.6	-
the same	32	the same	0.6	-
Control (without sensitization)		Extract from kidney tissues at 6-9 weeks of development	0.6	-
" " "		the same	0.6	-
" " "		Extract from kidney tissues at 15-19 weeks of development	0.6	-
" " "		the same	0.6	-
" " "		Extract from kidney tissues at 35-40 weeks of development	0.6	-
" " "		the same	0.6	-

Legend for Tables 1 and 2: + tremor, rubbing of nose and ears, ruffling of fur, panting, slight fall of the temperature; ++ same symptoms but more pronounced, frequent sneezing; - no symptoms of anaphylaxis.

In all guinea pigs sensitized with suspensions of kidneys and hearts of embryos at 6-9, 15-19, and 35-40 weeks of development there occurred a positive anaphylaxis reaction following the injection of extracts from human embryo kidney and heart tissues from corresponding stages of development. However, guinea pigs sensitized with adult human kidney and heart tissues and not desensitized (controls) did not suffer anaphylactic shocks after the challenge injections.

The data obtained show that in the tissues of the developing kidneys and hearts of human embryos at the stages of development mentioned above, there are stage-specific antigens for these periods of development.

TABLE 2. Anaphylaxis Reaction in Guinea Pigs Sensitized with Suspensions of Embryonic Human Heart Tissues and Desensitized to Species- and Organo-Specific Antigens, in Response to the Introduction of Extracts from Heart Tissues of Embryos at Different Stages of Development

Subcutaneous sensitization		Challenge intravenous injection after complete desensitization to species- and organo specific antigens		
antigen	dose in mg	antigen	dose in mg	Reaction
Heart tissue suspension of human embryos at the stages of development (in weeks):		Extract of embryonic human heart tissues at the following stages of development (in weeks):		
6-9	32	6-9	0.6	+
6-9	32	6-9	0.6	+
6-9	32	6-9	0.6	+
6-9	32	6-9	0.6	+
6-9	32	6-9	0.6	+
6-9	32	6-9	0.6	+
15-19	32	15-19	0.6	++
15-19	32	15-19	0.6	++
15-19	32	15-19	0.6	++
15-19	32	15-19	0.6	++
15-19	32	15-19	0.6	++
15-19	32	15-19	0.6	++
35-40	32	35-40	0.6	++
35-40	32	35-40	0.6	++
35-40	32	35-40	0.6	++
35-40	32	35-40	0.6	++
35-40	32	35-40	0.6	++
35-40	32	35-40	0.6	++
Adult human heart tissue suspension	32	Extract of adult human heart tissues	0.6	-
the same	32	the same	0.6	-
the same	32	the same	0.6	-
Control (without sensitization)		Extract from heart tissues at 6-9 weeks of development	0.6	-
" " "		the same	0.6	-
" " "		Extract from heart tissues at 15-19 weeks of development	0.6	-
" " "		the same	0.6	-
" " "		Extract from heart tissues at 35-40 weeks of development	0.6	-
" " "		the same	0.6	-

Legend (see Table 1).

Thus, these experiments have shown the presence in embryonic human kidney and heart tissues of three groups of antigens [3]: species-specific antigens (group I), organo-specific antigens (groups II) and stage-specific antigens (group III).

SUMMARY

With the aid of anaphylaxis reaction and desensitization in guinea pigs it was shown that, apart from the species and organ antigens, kidney and heart tissues of developing human embryo (6-9, 15-19, 35-40 weeks embryo) contained stage-specific antigens; in the corresponding organs of adults the latter were absent.

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All abbreviations of periodicals in the above bibliography are letter-by-letter transliterations of the abbreviations as given in the original Russian journal. ***Some or all of this periodical literature may well be available in English translation.*** **A complete list of the cover-to-cover English translations appears at the back of this issue.**
