GROUP ANTIGENS M AND N IN HUMAN TISSUES

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A study of the antigens of various human tissues it is not only interesting theoretically, but it also has great practical significance. It is known that from an analysis of the group antigenic properties of tissues of the different organs incontravertible legal evidence may be obtained of the individual to which they belong. Naturally the evidence will be more extensive when tests are made for the greatest possible number of group antigens.

Without a precise knowledge of the antigenic structure of tissues, it is impossible to determine the compatibility or incompatibility of tissues and organs for autografting. A knowledge of the antigenic structure of tissues is also essential in order to interpret those changes in their antigenic properties which occur during the development of malignant tumors.

On account of technical difficulties, the antigenic properties of the tissues of the viscera have been less studied than those of erythrocytes. In particular, the question as to the presence of group antigens M and N in normal human tissue has not yet been finally settled. Thus, Zacho [11] reported that only the tissues of malignant tumors (cancer, sarcoma) contain the group antigens M and N, whereas the tissues of normal organs and of benign tumors contain none. Clausen [9] also failed to find antigens M and N in human renal tissue, and Boyd [8] found none in muscle.

P. N. Kosyakova and G. P. Tribuleva [2, 5] were more successful, and by a special method which they developed were able to demonstrate the presence of the group antigens M and N in human liver, kidneys, spleen, muscles and brain. It was found that the tissues of some individuals, like their erythrocytes, contain antigen M, and those of others antigen N, while those of other individuals contain both.

The English workers Boorman and Dodd [6] completely confirmed these results. However, Krah [10] reported that he was unable to demonstrate the presence of antigens M and N in tissues. Boyd [8] then pointed out that antigens M and N occur only in erythrocytes, i.e. the antigens are erythrocytic. This result was, however, not borne out by subsequent experiments. The group antigens M and N were found in leucocytes [4] and in thrombocytes, and they had previously been found in malignant tumor tissue [1].

METHODS

The work was done on the tissues from organs of 12 subjects. Initially, the specific antigens in the erythrocytes were determined, and it was found that in four cases they belonged to group M, in six to group MN, and in two to group N. Studies were then made of the liver and spleen, and in some instances of the kidney. The tissues were triturated with tap water in a high speed homogenizer. The suspension was then poured into tubes as used in bacteriology, and left for 20 - 30 minutes to settle, the liquid portion was decanted, and water was added to the residue. Washing was repeated until the sediment was completely free from erythrocytes, it was then washed again three times with physiological saline and centrifuged at 2,000 revs/minute for 30 minutes. The supernatant fluid was removed, and to the residue was added an equal volume of physiological saline. One ml of the 50% suspension obtained in this way was poured into a test tube and centrifuged, the supernatant fluid again poured off, and anti-M iso-immune serum diluted 1:10 was added to the residue. After having been mixed thorougly, the tissue and serum was left in a refrigerator at 4° for 18 hours. After centrifuging at 2,000 revs/minute for 30 minutes, the serum was tested for completeness of absorption. Then 2 drops of serum, undiluted, and diluted 1:2, 1:4, and 1:8 times were

Agglutinating Properties of Anti-M Serum after Absorption by Tissues

No. of experiment	Organ studied	Group and type of organ	Dilution of serum			
				1:2	1:4	1:8
1	Liver	BM	+	—	—	—
	Spleen		+	—	—	—
2	Liver	AM	—	—	—	—
	Spleen		+	±	—	—
3	Liver	BM	+	±	—	—
	Spleen		+(+)	+	—	—
4	Liver	ABM	+	±	—	—
	Spleen		+(+)	±	—	—
5	Liver	BM	+	±	—	—
6	Liver	OM	—	—	—	—
	Spleen		—	—	—	—
7	Liver	OM	+(+)	+	±	—
	Spleen		+	+	—	—
8	Liver	ABM	+	±	—	—
	Spleen		—	—	—	—
9	Liver	OM	+	±	—	—
	Kidneys		—	—	—	—
10	Liver	OM	+	—	—	—
	Spleen		+	±	—	—
	Kidneys		+(+)	±	—	—
11	Liver	ABN	+++	++	++	+
	Spleen		++	+(+)	+(+)	+
12	Liver	AN	+++	+(+)	+(+)	+
	Spleen		+++	+(+)	+	+
	Kidneys		+++	+(+)	+	+
Control (serum) anti-M, before absorption	—		+++	+++	++	+

Indications: +++, ++, +(+) different degrees of positive reaction; ± doubtful reaction; — negative reaction.

added to agglutination tubes. To each portion of serum was added 1 drop of a 2% suspension of standard group M erythrocytes, and the mixture was centrifuged at 1500 revs/minute for 1 minute. The result of the reaction was assessed after shaking the tubes.

RESULTS

The results are shown in the table.

It can be seen from the table (experiments No. 1 - 10) that the tissues of the liver and spleen of individuals belonging to erythrocyte group M removed the specific anti-M antibody from iso-immune serum, indicating the presence of antigen M in these tissues.

By contrast, tissues taken from subjects of group N (see table, experiments Nos. 11 and 12) did not absorb anti-M antibody, i.e. they contained no antigen M.

Our experiments showed further that boiled tissue was just as effective in removing anti-M antibody from serum as was unboiled tissue, thus indicating the thermal stability of the antigen M (this result had previously been established for erythrocytes [3]).

Therefore, the use of iso-immune specific anti-M serum enabled us to demonstrate in a new way the differentiation of normal human tissues with respect to the group antigens M and N.

These experiments showed that not only the blood cells-the erythrocytes, leucocytes and thrombocytes, but also the stationary tissue cells of normal organs, as well as those of malignant tumors are differentiated with respect to antigens M and N. The negative results obtained by Krah [10] and by other authors must be attributed to imperfections in their methods.

SUMMARY

M and N antigens were determined by the method of absorption in human liver, kidney, and spleen. The difference from previous investigations was that anti-M human immune serum was used. The results obtained show that normal human tissues are differentiated with respect to the M and N antigens. The failure of other authors to obtain these results is attributed to their imperfect methods.

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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.
