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Abstract

1) The contents of sialic acid in patients of various diseases sera were determined and increases of it were noticed in several diseases. 2) Sialic acid contents ranged between 50 and 100 mg./dl. in the normal serum. 3) But in the pathological serum, it ranged between 90 and 170 mg./dl. in cancer patients, between 80 and 110 mg./dl. in peptic ulcer, between 75 and 135 mg./dl. in arachnoiditis, and between 90 and 120 mg./dl. in epilepsy. 4) In other several diseases, sialic acid contents were determined.

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CLINICAL APPLICATION OF SIALIC ACID (I) ON SERUM SIALIC ACID CONTENTS IN PATIENTS

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In 1936, BLIX¹ isolated from submaxillary mucin a crystalline which produces with BIAL's orcinol reagent violet pigment soluble in amylalcohol. Lately, it was given the name 'Sialic acid' by WERNER and ODIN.

Recently many kinds of similar substances were isolated from different sources. All these substances possess the common characteristics of forming purple color not only with BIAL's orcinol reagent but also with EHRLICH's aldehyde and DISH's diphenylamine reagents. These substances have been classified and reviewed by YAMAKAWA².

NAIAZI and STATE³ demonstrated increased color intensity of serum of malignant tumor patients with diphenylamine reagent. WERNER and ODIN supposed it to be due to sialic acid.

YAMAKAWA et al.⁴ isolated sero-lactamic acid as a Bial-chromogen from horse serum mucoprotein in crystalline form, and reported the contents of it in various kinds of animal sera and a patients sera of various diseases.

On the other hand, BÖHN^{6,7,8} isolated methoxyl-neuramic acid in crystalline form, and reported the neuramic acid contents in many kinds of patients sera.

SAITO et al.⁹ also reported the sialic acid contents in patients sera. In their report, determination was carried out according to WERNER and ODIN's principle, using p-dimethylaminobenzaldehyde and diphenylamine reagents.

In our department likewise sialic acid contents in the various patients sera, mainly in surgical diseases, were determined. We present also a report on blood counts and blood chemistry in these cases.

EXPERIMENTAL METHOD

Sialic acid standard sample: Sialic acid from human serum was generously contributed by Dr. YAMAKAWA. Method of determination: YAMAKAWA, SUZUKI and AKITA's^{4,5} method modifying WERNER and ODIN's original method using BIAL's reagent was used, i.e., 0.05 ml. of serum was

No.	Name	Sex	Age	Diagnosis	Sialic acid mg/dl	B. S. R. 1-2 hours	Erythrocyte counts	Leucocyte counts	Bleeding time	Hb contents %	Specific gravity	Protein contents g/dl
1	T. M.	♀	24	Normal	67							
2	K. M.	♀	21	"	99							
3	T. F.	♀	22	"	64							
4	Y. Y.	♀	23	"	96							
5	K. S.	♀	20	"	65							
6	H. O.	♀	24	"	51							
7	Y. Y.	♂	28	"	90							
8	Y. S.	♂	30	"	75							
9	S. M.	♂	26	"	82							
10	I. E.	♂	48	Stomach carcinoma	120	45-97	270×10 ⁴	6500	2'	60	1022	6.3
11	R. H.	♂	39	"	140	37-62	252	6200	2'30"	63	1024	6.35
12	T. A.	♂	55	"	108	50-85	368	9000	3'	75	1024	6.4
13	R. H.	♂	39	"	151	22-45	324	9800	1'30"	78	1026	7.0
14	J. N.	♂	65	Rectal carcinoma	112	2-10	414	5400	2'	84	1024	6.1
15	T. H.	♂	53	Liver carcinoma	110	100-107	414	9800	2'	68	1025	6.7
16	K. S.	♂	63	Carcinoma of gallbladder	158	70-110	375	9400	2'30"	85	1024	5.8
17	R. Y.	♀	50	Carcinoma of left maxilla	90	15-30	375	5800	1'30"	54	1023	6.0
18	A. K.	♂	73	Bronchiogenous carcinoma	102	72-122	304	6200	2'	62	1022	6.3
19	M. S.	♀	50	Intestinal obstruction due to retroperitoneal tumor	156	5-12	365	6500	3'	75	1026	7.1
20	K. A.	♂	20	Susp. of phaeochromocytoma	94	2-14	513	6700	2'15"	68	1029	7.8
21	K. S.	♀	40	Brain tumor	158	12-31	364	5800	2'	68	1028	7.8
22	M. T.	♀	37	"	135	75-98	405	7400	2'	76	1028	7.8
23	Y. S.	♂	40	"	100	5-10	392	6800	2'30"	80	1028	7.8
24	I. H.	♂	41	"	100	19-20	380	7600	2'	82	1028	7.8
25	K. I.	♀	43	"	122	5-10	343	5600	5'	72	1028	7.85
26	M. Y.	♂	48	"	90	10-29	370	5600	3'30"	75	1027	7.5
27	K. K.	♂	39	"	113	23-49	350	7000	2'30"	60	1028	7.8
28	H. A.	♀	37	"	164	66-90	310	5300	2'30"	65	1026	7.0
29	K. M.	♂	25	Gastric ulcer	141	136-150	270	8000	2'	45	1027	7.4
30	Y. S.	♀	57	"	105	35-60	282	4200	1'30"	62	1026	7.2

No.	Name	Sex	Age	Diagnosis	Sialic acid mg/dl	B. S. R. 1-2 hours	Erythrocyte counts	Leucocyte counts	Bleeding time	Hb contents %	Specific gravity	Protein contents g/dl
31	T. M.	♀	49	Gastric ulcer	80	22-44	304 × 10 ⁴	5200	2'	66	1024	6.4
32	K. H.	♂	66	"	108	20-43	100	3000	3'30"	25	1022	5.4
33	T. N.	♂	32	"	103	18-26	378	4800	3'	70	1024	6.4
34	K. T.	♂	29	"	97	12-25	412	5600	2'	80	1025	6.4
35	W. S.	♂	32	"	96	10-24	420	5800	2'30"	80	1028	7.8
36	Y. N.	♂	28	"	95	3-10	440	6400	2'	86	1028	7.8
37	I. T.	♂	34	Chronic gastritis	60	12-40	430	5600	2'	81	1026	7.2
38	H. O.	♂	26	Genuine epilepsy	99	1-3	375	6800	3'30"	83	1022	5.5
39	H. S.	♂	15	"	90	1-3	352	7200	3'	80	1028	7.8
40	Y. M.	♀	23	Residual epilepsy	88	20-40	319	8000	3'	72	1026	7.2
41	I. F.	♂	8	"	114	8-13	420	8200	3'	80	1026	7.2
42	N. H.	♂	12	"	96	7-17	520	6700	2'	80	1027	7.4
43	S. N.	♀	56	Arachnoiditis cerebri	104	7-10	319	6200	4'30"	78	1026	7.2
44	K. K.	♂	19	"	130	12-38	412	8400	3'	80	1028	7.8
45	J. M.	♂	33	Arachnoiditis cisterna lateralis sinistra	133	30-75	412	5600	2'	81	1024	6.4
46	K. S.	♀	43	Arachnoiditis optochiasmatica	75	28-62	477	8400	3'30"	78	1028	7.2
47	K. K.	♂	17	Arachnoiditis posttraumatica	118	12-25	420	5800	2'30"	80	1028	7.8
48	K. W.	♂	51	Arachnoiditis spinalis	62	5-14	532	6100	3'	75	1026	7.2
49	R. O.	♀	26	Appendicitis acuta	92	44-72	380	8400	3'	78	1029	8.2
50	H. I.	♂	46	Colitis ulcerosa	113	9-21	495	9200	2'30"	85	1029	8.2
51	T. H.	♂	20	Postoperative adhesion	124	20-31	475	8200	3'	78	1028	7.8
52	T. K.	♂	56	"	123	18-40	362	10200	2'30"	85	1025	6.25
53	S. Y.	♂	34	Hemolytic jaundice	131	20-42	302	5600	2'30"	68	1026	7.2
54	K. I.	♂	53	Obstructive jaundice due to choledocusstone	141	72-41	471	7200	4'30"	65	1020	5.5
55	J. K.	♂	52	Parkinsonismus	80	17-41	485	8200	2'30"	95	1028	7.8
56	J. H.	♂	10	Infantile hemiplegy	96	15-35	465	8000	4'	92	1025	6.8
57	M. W.	♀	23	Osteoma of clavacula	162	80-110	385	6200	3'	77	1029	8.3
58	Y. K.	♀	37	Banti's disease	165	17-25	350	8200	3'	65	1028	7.8
59	T. N.	♀	31	Thyreotoxicosis	92	11-35	365	6700	2'30"	75	1026	7.1
60	N. Y.	♀	30	Thrombosis of right femoral vein	116	13-27	390	5900	2'30"	72	1024	6.4
61	N. M.	♂	29	Peripleural abscess	140	25-55	511	6400	2'	63	1025	6.5

pipetted in glass-stoppered tube, to which 4.95 ml. of water, 3.5 ml. of orcinol reagent and FeCl_3 reagent were added and mixed, and heated exactly for 10 minutes in saturated NaCl solution at 108°C . After cooling in running water, 5 ml. of pure iso-amylalcohol was added and the mixture was vigorously shaken in an ice-bath. After centrifugation, the clear supernatant was removed with a pipette to a cuvette and the optical density was measured against blank with a BECKMAN's electrophotometer using $570\text{ m}\mu$.

RESULTS AND DISCUSSION

Sialic acid contents ranged between 50 and 100 mg./dl. in normal sera, but between 90 and 170 mg./dl. in the sera of cancer patients. In peptic ulcer, it ranged between 80 and 110 mg./dl.

In the SAITO's report, sialic acid contents level in serum seems to be too high. On this point, AKITA¹⁰ reports the determination by BIAL's reagent is more stable and correct than the other methods.

In epilepsy, sialic acid contents ranged between 90 and 120 mg./dl., and it is quite interesting, while very few chemical changes have been found in the epileptic diseases.

Generally it is already known that the high sialic acid values are obtained in the inflammatory diseases. In our experiences, it ranged between 75—135 mg./dl. in arachnoiditis.

In other diseases, the cases are too few to draw any definite conclusion.

On the other hand, no special relation with blood counts or other blood chemistry could be recognized in our determination.

CONCLUSIONS

1) The contents of sialic acid in patients of various diseases sera were determined and increases of it were noticed in several diseases.

2) Sialic acid contents ranged between 50 and 100 mg./dl. in the normal serum.

3) But in the pathological serum, it ranged between 90 and 170 mg./dl. in cancer patients, between 80 and 110 mg./dl. in peptic ulcer, between 75 and 135 mg./dl. in arachnoiditis, and between 90 and 120 mg./dl. in epilepsy.

4) In other several diseases, sialic acid contents were determined.

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