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Plasma Protein Shifts During Diuresis.

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In a previous communication[1] changes were described in the plasma volume after the injection of salyrgan, aminophyllin, and digoxin. This report deals with the plasma protein changes under these conditions. Total proteins were determined by the Kjeldahl technic; albumin by the method of Campbell and Hanna;[2] plasma volumes by the method of Gregerson, Gibson and Stead[3] as modified by Gibson and Evelyn.[4]

After the injection of salyrgan, as the plasma volume drops there is a concentration of proteins, with a rise in the percentage of total protein and a relatively greater increase in albumin, leading to an increase in the albumin:globulin ratio. When the plasma volume is markedly lowered following diuresis the percentage of plasma protein increases persist, but the total amount of circulating protein is conspicuously lowered.

Paralleling the increase in plasma volume after aminophyllin there is a fall in percentage of plasma protein, but an absolute increase in the amount of total circulating protein. The latter is largely accounted for by an increase in circulating albumin, resulting in an increase in the albumin:globulin ratio. During the subsequent drop, usually marked, in blood volume[1] there is a definite rise in percentage of total protein and albumin, though the amount of each in the total circulating plasma shows a striking drop.

When digoxin was used, the shifts in plasma protein were less regular, but in general as the plasma volume dropped there was a rise in the percentage of total protein and albumin, with little early change in the total amounts of each in the circulating plasma. When however the decrease in the plasma volume became marked, though the percentage values were maintained there was a large loss of protein from the circulating plasma.

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1 Calvin, D. B., Decherd, George, and Herrmann, George, PROC. SOC. EXP. BIOL. AND MED., 1940, **44**, 529.

2 Campbell, W. R., and Hanna, M. I., *J. Biol. Chem.*, 1937, **119**, 15.

3 Gregerson, M. I., Gibson, J. G., and Stead, E. A., *Am. J. Physiol.*, 1935, **113**, 54.

4 Gibson, J. G., and Evelyn, K., *J. Clin. Invest.*, 1938, **17**, 153.

TABLE I.

Drug	Hr after injection	Plasma volume, cc	Total protein		Albumin		A/G ratio
			g%	g total circulating	g%	g total circulating	
Salyrgan	0	5140	5.74	295	3.13	162	1.20
MV	½	5110	5.91	302	3.26	166	1.23
	1	4620	6.02	279	3.45	159	1.34
	2	4620	6.11	283	3.46	161	1.31
	5	3280	6.20	205	3.63	119	1.42
Aminophyllin	0	6120	6.10	373	3.38	207	1.24
AO	½	6488	6.05	393	3.34	223	1.22
	1	6383	5.94	380	3.32	212	1.27
	2	6500	hemolysis				
	3	6697	6.01	402	3.39	227	1.30
	5	7202	5.87	423	3.43	242	1.41
	7	6278	6.25	393	3.63	228	1.39
	9	4913	6.39	314	3.62	178	1.40
	11	4072	6.44	263	3.81	156	1.45
Digoxin	0	3890	5.76	224	3.24	126	1.29
HB	1	4130	5.62	232	3.24	134	1.36
	2	3640	6.00	218	3.50	127	1.40
	3	3682	5.87	216	3.36	124	1.34
	5	3800	5.63	214	3.22	122	1.34
	7	3790	hemolysis				
	9	3060	5.94	182	3.63	111	1.57
	11	2505	6.06	152	3.65	92	1.51

Whenever there is an increase in the plasma volume after the injection of aminophyllin, there is noted an increase in the total circulating protein, chiefly albumin, similar to the changes observed[5] in experimental hydremia in the dog. On the other hand, with each type of diuretic a drop in plasma volume is associated with moderate increase in the percentage of total plasma protein due largely to an increase in plasma albumin. The marked drop in the total circulating proteins under these circumstances seems explicable only on the assumption of plasma protein storage in the tissues.

5 Calvin, D. B., *Proc. Am. Physiol. Soc.*, in press.