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On a Peculiar Serum Protein, Precipitated by Hayem's Solution, Occurring in Multiple Myeloma.

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During the estimation of the erythrocytes in the blood of a patient suffering from multiple myeloma, the author observed that immediately after the mixing of the blood with the Hayem's solution a coarse, white precipitate formed. This precipitate, when viewed under the microscope, consisted of amorphous, translucent masses. The same precipitate came down when either plasma or serum were mixed with Hayem's solution. Mixed with equal volumes of the diluent, dilutions of serum as high as 1:250 gave the same reaction. Sodium sulphate, which is present in Hayem's solution in a concentration of 2.5%, yielded, in aqueous solution, no precipitate with this serum, while bichloride of mercury, in a concentration of 0.25%, brought down the abundant precipitate.

Since the original observation, the writer has examined the bloods of 6 additional cases of multiple myeloma and has noted the above phenomenon in 3 instances, yielding a total of 4 cases, out of 7, which exhibited material in the blood that was precipitated by Hayem's solution.

In Tables I and II are presented data concerning some of the properties of the sera of 3 cases, and in addition of the serum of one case of myeloma in which the Hayem precipitate was absent.

TABLE I.

Results of the Fractionation of Myeloma Sera.

	Gm. of Protein per 100 cc. of Serum							
Patient No.	2	1				3	4	
Serum No.		3	4	5	Pericardial fluid		5	8
Total Protein	10.5	11.6	11.4	11.1	12.7	8.6	11.5	12.7
Albumin	1.6			2.2	3.6	2.0	0.0	0.0
Globulin	8.9			8.9	9.1	6.6	11.5	12.7
Euglobulin	3.1			7.9	7.9	4.8	9.7	10.0
Pseudoglobulin I and II	5.8			1.0	1.2	1.8	1.8	2.7
½ sat. $(NH_4)_2SO_4$ precipitate						7.0	11.5	
Sat. NaCl "						4.7		
CO_2 "	2.1			0.4	0.6	0.0		0.4
Sat. $MgSO_4$ "						6.2		

TABLE II.
Distribution Among Protein Fractions of the Hayem-Precipitable Material.

		Gm. of Protein per 100 cc. of Serum						
Patient No.	2	1*				3	4	
Serum No.		3	4	5	Pericardial fluid		5	8
Whole Serum	0	+	+	+	+	5.2	9.6	9.9
14% Na_2SO_4 Filtrate				±	±	0	0	0
18% " "				±		0	0	0
22% " "				0		0	0	0
½ sat. $(NH_4)_2SO_4$ Filtrate					0	0	0	0
Sat. NaCl Filtrate						0		
CO_2 "						4.4		9.9
Sat. $MgSO_4$ "						0		

*Only qualitative tests, for Hayem-precipitable material, were performed on the sera of this patient.

For the fractionation of the serum proteins the method of Howe[1] was followed: all determinations were performed in duplicate or triplicate.

From the data of Table I, it is apparent that in the sera of the 3 positive cases, the bulk of the globulin consisted of euglobulin, in contrast with the predominance of the pseudoglobulin fraction in the serum of the negative case, patient No. 2. Separation of globulin yielded, by means of ½ sat. $(NH_4)_2SO_4$, sat. NaCl, and sat. $MgSO_4$, values not far removed from those furnished by 22% Na_2SO_4, but practically none of the globulin in the 3 positive cases was brought down by CO_2. A study of the distribution of the material precipitated by Hayem's solution (Table II) demonstrates that it is brought down completely by globulin precipitants, with the exception of CO_2, and that it is almost completely confined to the 14% Na_2SO_4 precipitate, that is, to the euglobulin fraction.

It is evident, from the precipitation reactions, that the material which is brought down by Hayem's solution is not Bence-Jones protein, for the latter protein is not brought down by Hayem's solution or by sat. Na_2SO_4; nor is it precipitated by sat. NaCl or by sat. $MgSO_4$.[2]

Further study of the nature of this peculiar protein that is brought down by Hayem's solution must await the acquisition of a large amount of material.

[1] Howe, P. E., *J. Biol. Chem.*, 1921, **49**, 109.

[2] Magnus-Levy, A., *Z. physiol. Chem.*, 1900, **30**, 200.