signs. Brain activity, guided by sensory control, can in higher vertebrates change the pattern of coordination; but the human case described above does not encourage the view that it can also break down the unfailing obedience of a muscle (or its nerve) to its appropriate central discharges, as would be required in order to dissociate between 2 identical muscles innervated from the same level and the same side of the cord.

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Alterations in Serum Proteins as an Index of Liver Failure.

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For the past two years we have been interested in the study of the blood proteins in known or suspected cases of liver injury. That there is an alteration in the blood proteins in liver injury has been known since Glenet[1] showed a reduction of the total protein and numerous studies established that there was an elevation of the serum globulin (Felinski[2]) and a reversal of the albumin globulin ratio in cirrhosis of the liver with ascites (Abrami and Wallach[3]). Wiener and Wiener[4] obtained a reversal of the A/G ratio in cirrhosis and a hyperglobulinemia in acute infections. Meyers and Keefer[5] and Snell,[6] in cases of decompensated cirrhosis could not attribute the depletion of the serum albumin to its loss in the ascitic fluid.

Serum albumin, serum globulin and total serum protein determinations were made according to the hypobromite gasometric method of Van Slyke in cases of decompensated cirrhosis, cases with choluric jaundice, both intrahepatic and extrahepatic, without ascites, cases of ascites without clinical cirrhosis, a miscellaneous contrast group as well as a control group of normals. These normals served as a check on our technique and established values comparable to the accepted normal values of Peters and Van Slyke.

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1 Grenet, *Mem. Soc. de Biol.*, 1907, **63**, 532.

2 Felinski, *La Presse Medicale*, 1922, **30**, 236.

3 Abrami, P., and Wallech, Robert, *Comp. Rendes Soc. de Biol.*, 1930, **101**, 291.

4 Wiener, H. J., and Wiener, R. E., *Arch. Int. Medicine*, 1930, **46**, 236.

5 Meyers, W. K., and Keefer, C. S., *Arch. Int. Medicine*, 1935, **55**, 349.

6 Snell, A. M., *Proc. Staff, Mayo Clinic*, 1935, **10**, 481.

In 21 cases of decompensated cirrhosis there was a constant hypoalbuminemia and a hyperglobulinemia with a consequent reversal of the A-G ratio, with an average ratio of 0.55 instead of the normal average of 2.48. In no case was paracentesis performed prior to the serum protein determinations. Of particular interest as evidence of the prognostic significance was the duration of life after the serum proteins had undergone these changes. In one instance, for example, in which the serum albumin was 2.3 g. the globulin 5.46, the A-G ratio 0.4, the duration of life was 5 days. The maximum duration of life with pronounced reversal was 70 days.

There were 3 cases of extrahepatic jaundice due to stone impacted in the common bile duct which showed an elevation of the globulin fraction with a corresponding reversal of the A-G ratio. In these cases in spite of careful preoperative care, conservative surgery and postoperative treatment including intravenous glucose and buffer solution, decholin and duodenal drainage, death occurred, while in a similar case in which there was no reversal the operation was followed by recovery. In malignant obstructive jaundice the serum protein findings were not striking though there was a tendency for the globulin to be elevated.

In severe intrahepatic jaundice there was a marked depletion of the serum albumin and elevation of the globulin with extreme reversal, while in 7 cases of catarrhal jaundice the protein values were approximately normal.

In 8 cases of ascites, due to carcinoma of the peritoneum, tuberculous peritonitis, congestive heart failure and in which cirrhosis was not clinically apparent, no reversal of the A-G ratio occurred. The contrast cases consisted of 3 cases of starvation in which there was a marked decrease in the protein intake. Low total blood proteins were obtained in these cases but with a normal ratio of albumin and globulin. Also included in this group were cases of hepatosplenomegaly and compensated cirrhosis of the liver and in these there was no significant change in the serum proteins.

From this study it would seem that in grave liver injury there is a disturbance of the blood proteins consisting of a lowering of the serum albumin and an elevation of the serum globulin with a reversal of the A-G ratio. This further offers clinical indication that the liver is an important site of serum albumin formation and that alterations in the serum proteins are an index of liver failure.