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Differences Between the Normal Serum Protein Patterns of American Indian, Negro and Caucasian Subjects. (27773)

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Several investigators using salt fractionation or electrophoretic methods have reported on the differences observed between the normal serum protein fractions of Negroes as compared to Caucasians(1,2,3,4,5). They found that the albumin fraction was lower and the gamma globulin fraction higher in Negro subjects as compared to Caucasian subjects. The purpose of the present investigation was to compare the normal serum protein patterns of American Indian subjects with those of Negro and Caucasian subjects.

Materials and methods. The Indian subjects were high school students from 3 Indian Agency Schools located in Oklahoma and all were full-blooded Indians. The majority was Navajo, but other tribes were also represented. They live at the schools during the school term and return to their homes for the summer. Most of them reside in New Mexico and Arizona. The Negro subjects consisted of food handlers, students, and laboratory technicians, residing in Oklahoma City. The Caucasian subjects were recruits for the National Guard and reside in Oklahoma City. The subjects of all three groups were young males who appeared to be in good health.

Blood was collected by venipuncture from 45 subjects of each racial group (total 135 subjects). The serum was separated from the clotted blood and stored in the deep freeze at −20°C until used. Paper electrophoresis was carried out on the Spinco model RB apparatus following the procedure outlined in the Spinco Instruction Manual(6). Serum samples (0.006 ml) were placed on Schleicher and Schuell 2043-A mgl. paper strips which had been saturated with 0.075 ionic strength veronal buffer (pH 8.6). A current of 2.5 milliamps per cell was applied for 18 hours. The strips were stained with 0.1% bromphenol blue and scanned in a Spinco Analytrol B. The serum protein fractions are expressed as mean percentages. The data were subjected to an analysis of covariance using the method of Snedecor(7) to test for the effect of age. Duncan's(8) multiple range test was used to test for significant differences between the groups.

Results. The serum protein fractions, as determined by paper electrophoresis, are presented in Table I. There was no significant difference ($p>0.1$) between Indian and Negro groups in relation to mean percentages of serum albumin, beta globulin and gamma globulin fractions; however, these fractions were significantly different (albumin, higher; beta globulin and gamma globulin, lower) in the Caucasian group. The percentages of alpha 1 and alpha 2 globulins were similar ($p>0.1$) in the Negro and Caucasian groups, but significantly different in the Indian group. The percentage of alpha 1 fraction was higher and the alpha 2 fraction lower in the Indian group as compared to the Negro and Caucasian groups. The only significant difference between the serum protein patterns of the

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TABLE I. Mean Percentage Values of Serum Protein Fractions of 3 Ethnic Groups.

Ethnic group	Age, yr	Albumin	Globulins			
			Alpha 1	Alpha 2	Beta	Gamma
Caucasian, 45 subjects	23.68	68.75* ± 2.64 p <.001	2.60 ± .43	8.70 ± 1.25	8.44* ± 1.16 p <.001	11.45* ± 1.83 p <.001
Indian, 45 subjects	17.46	62.66 ± 3.73	3.55* ± .84 p <.001	6.42* ± 4.70 p <.01	10.40 ± 1.45	16.88 ± 3.09
Negro, 45 subjects	22.06	61.32 ± 5.21	2.62 ± .66	8.74 ± 1.56	10.83 ± 1.81	16.42 ± 3.60

* Significant difference. ± = Stand. dev.

Indian group and the Negro group occurred in the alpha globulin fractions. Also, the only similarity between the patterns of the Negro group and the Caucasian group was found in the alpha globulin fractions.

An analysis of covariance failed to reveal that the difference in ages of the groups had an effect on the results. The p values reported are those obtained after adjusting for age.

Discussion. These results demonstrate that the normal serum protein patterns of 3 distinct ethnic groups differ significantly from one another. The Indian and Negro patterns are similar in that they have a lower percentage of albumin and a higher percentage of beta and gamma globulin fractions than the Caucasian patterns. The Indian patterns differ from the Negro and Caucasian patterns in the percentage of alpha globulin fractions. The difference in albumin levels may be due, in part, to diet. Stanier and Holmes(9) reported that the albumin levels of malnourished Negro adults increased when they were fed a high protein diet. Bronte-Stewart, *et al.*(1), suggest that not only the amount but also the type of protein in the diet influences the percentage of albumin in the serum protein pattern. Most of the protein in the diet of their Bantu subjects was of vegetable origin. When the diet was supplemented with animal protein the percentage of albumin increased, but never equalled that of the Caucasian subjects. It is not certain whether diet was responsible, in part, for the differences observed between the albumin levels of the Negro and Caucasian subjects because this information was not available for these 2 groups. However, it is not likely that diet influenced the albumin patterns of the Indian subjects because they had a well-balanced diet containing adequate animal protein. More frequent exposure to infectious disease has been suggested as an explanation for the higher gamma globulin levels found in Negro serum as compared to Caucasian serum. However, Comens(2) found an increased level of gamma globulin in Negro subjects who had been screened to rule out infection, malnutrition or hepatic dysfunction.

Heritable variants of the serum proteins have been demonstrated in fractions of alpha 2(10,11), beta(12) and gamma(13) globulins. Some of these variants are found predominantly in certain ethnic groups. The haptoglobulin variant, Hp 2-1 modified, is found almost exclusively in the Negro population(14). Another alpha 2 globulin, the fast 1-1 variant of Gc (group-specific component), was found in 95.43% of the Navajo Indians, 81.67% of the Negroes and 55.82% of the whites tested(15). Transferrin D, a beta globulin variant, has been found to occur predominantly in Negroes, whereas the greatest incidence of transferrin B, C has been found in Navajo Indians(14). The gamma globulin variant, Gm^{ax}, has been found only in whites and the Gm-like variant has been found only in Negroes(16). It may be that the differences observed between the serum protein patterns of the 3 ethnic groups in our study are genetically controlled. Regardless of the reasons, genetic and/or environmental, for the differences found in the serum protein patterns of these ethnic groups, the fact remains that these differences do exist and should be considered when evaluating the serum protein pattern in various disease states. Investigators employing serum protein patterns in their studies should always designate

the ethnic group of the subjects being reported on.

Summary. Serum protein analyses of 3 ethnic groups (American Indian, Negro and Caucasian) revealed the following differences: 1. Indian and Negro subjects have a lower percentage of albumin and a higher percentage of beta and gamma globulins than do Caucasians. 2. Indian subjects have a higher percentage of alpha 1 globulin and a lower percentage of alpha 2 globulin than do Caucasians and Negroes.

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Utilization of Vitamin B_{12} by Rats With Pantothenic Acid Deficiency. (27774)

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The interrelationship between the metabolic roles of Vit. B_{12} and pantothenic acid has been recognized. Livers of chicks deficient in Vit. B_{12}(1) have high pantothenic acid contents. Vit. B_{12}(2) can spare the amount of pantothenic acid needed to restore the growth rate of chicks with pantothenic acid deficiency and vice versa. The same investigators found higher Vit. B_{12} contents in the liver of pantothenic acid deficient chicks and postulated that the lower Vit. B_{12} levels in pantothenic acid treated chicks are the result of rapid exhaustion of Vit. B_{12} from the stores due to growth requirements. In our laboratory, however, it was found that the newborn and young growing rats actually have lower liver Vit. B_{12} stores than the adult. It appears that growth with its accompanying requirement for Vit. B_{12} cannot account for such a difference in liver Vit. B_{12} levels. Therefore, some other mechanism in metabolism or utilization of this vitamin in pantothenic acid deficient rats must be explored. A study, therefore, was undertaken to investigate in rats the effect of Vit. B_{12} on pantothenic acid deficiency, and Vit. B_{12} levels in liver and plasma as well as the pattern of absorption and excretion of Vit. B_{12} in pantothenic acid deficient rats. The results of such a study are now presented.

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Methods. Preparation of pantothenic acid deficient rats: Pregnant rats were removed