

account for the normal stools since if this existed there could hardly have been steatorrhea for 3 weeks prior to operation, as was the case. It might be stated that no final evidence of occlusion of pancreatic juice obtains in this patient since he is still alive. However, the operation performed in this case was identical with that performed in the other two patients, namely, removal of the lower 4 cm of the stomach, entire duodenum, upper 3 cm of jejunum with transection of the neck of the pancreas at the level of the superior mesenteric vessels. The upper loop of jejunum was anastomosed to the stomach and farther along with the common duct. It thus appears that re-establishment of pancreatic ducts with the bowel could not be rapidly accomplished, if at all, bearing in mind the anatomical relationships in man. Furthermore, as previously stated, the return of normal appearing stools occurred very promptly after operation, within two weeks. It is hardly probable that under these conditions re-establishment of ducts between transected and ligated neck of pancreas with jejunum, several centimeters away could have occurred so promptly.

The above studies fail to afford a clue to any profound disturbance in the general physiologic economy of man resulting from occlusion of external pancreatic secretion, other than

failure of appreciable fat absorption and incomplete digestion of raw meat in some instances. Theoretically inability to absorb fat would in time impair general nutrition if fat is an indispensable food by virtue of essential fatty acids. Furthermore, the absorption of fat soluble vitamins might be prevented and thus eventually lead to some type of avitaminosis. On the other hand, the administration of pancreatin, when necessary, could quite conceivably permit the absorption of sufficient fat, and this provided for, no other significant disturbances might be anticipated.

Conclusion. No general physiologic disturbances are observed in a patient who has survived occlusion of the external pancreatic secretion for 11 months. Previous weight loss was regained. The blood, stools, and fat absorption are normal and heavy physical labor is possible. In 2 other patients with similar occlusion, bulky fatty stools immediately developed and fat absorption was radically reduced. No other general physiologic disturbance was detected during their period of survival (5½ and 5 months respectively) except for some impairment in digestion of raw meat, death resulting from carcinomatosis. The basis for the marked variation in fat absorption following occlusion of the pancreatic juice in man remains obscure.

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Effect of Calcium Pantothenate and Para-Aminobenzoic Acid on the Gray Hair of Humans.

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It has been reported that a deficiency of the filtrate factors of the vitamin B complex may be accompanied by graying of fur in rats and dogs. The administration of the filtrate factors and, in addition, other vitamin B factors appeared also to darken the fur in some animals.¹⁻⁵ Morgan^{1,3} was the first to

observe that the active substance is in the filtrate fraction of vitamin B₂, *i.e.*, it is found in the water extract of yeast, lime, or rice bran

² Oleson, J. J., Elvehjem, C. A., and Hart, E. B., *Proc. Soc. Exp. Biol. and Med.*, 1939, **42**, 283.

³ Morgan, A. F., and Simms, H. D., *J. Nutrition*, 1940, **19**, 233.

⁴ Lunde, G., and Kruegstad, H., *J. Nutrition*, 1940, **19**, 321.

⁵ Morgan, A. F., *Science*, 1941, **93**, 261.

¹ Morgan, A. F., Cook, B. B., and Davison, H. G., *J. Nutrition*, 1938, **15**, 27.

after thiamine, pyridoxine, and riboflavin have been removed. This investigator also found that supplying the filtrate fraction of B₂ cured grayness of fur induced in animals by withholding the filtrate fraction. Ralli⁶ found that animals with a low salt intake developed graying of fur much sooner than those on high salt intake.

There have been reports which indicate that pantothenic acid protects the fur of animals from turning gray and that its administration is followed by a return of normal color to hair that has turned gray.^{3,5} Quite recently, some studies have suggested that administration of para-aminobenzoic acid and pantothenic acid to men and women with gray hair is frequently followed by return of the color of hair toward normal.⁷ The wide publicity which has followed these reports made it seem desirable to plan studies of rather long duration in order to quantitate more carefully the degree of change to be expected after use of pantothenic acid and para-aminobenzoic acid.

Studies. Twenty-one elderly men and women with white or graying hair were selected from the wards of Goldwater Memorial Hospital, Third Medical Division, where they were confined with chronic diseases such as rheumatoid arthritis, general arteriosclerosis, with and without hemiplegia, and Parkinsonism. Of the 21 who began the experiment, 19 completed it; one woman refused the medication and one man left the hospital. Significant changes in the state of the disease for which the patients were admitted to the hospital were not noticed during the course of study.

Of the group of 19 patients, 7 received 100 mg calcium pantothenate, 200 mg para-aminobenzoic acid and approximately 50 g brewer's yeast daily; 5 received yeast and para-aminobenzoic acid, and 7, yeast and calcium pantothenate.* The medication was

continued for 8 consecutive months; there were no apparent ill effects from any of the drugs save mild, occasional nausea probably due to the yeast.

Results. Three methods for judging change in color of hair were used: first, photographs were taken before, during, and at the end of medication; second, samples of hair were clipped from a given area at the time photos were taken; third, all patients were seen by the same 2 observers at least twice a month and notes taken of any change observed.

At the end of the study, photographs, hair samples and notes for each patient were assembled. It was found that the photographs were useless; slight changes in distance or lighting made large differences in the apparent color of hair. Hair samples were valuable in discrediting many subjectively favorable notes: a very definite color change must occur before it is apparent in the clippings. Subjective opinions are more accurate than photos and less discouraging than hair samples.

Several changes were noted. The most common was the appearance of a yellow or greenish cast to the gray hair, most often observed during the first few months, which did not always persist. Secondly, growth of scattered wiry black hairs became apparent. In several patients there was thought to be greater luster without actual change in color. In one man whose hair was sparse, there was an increase in the number of hairs. In only 2 patients was there unequivocal change in color. Both of these patients suffered from rheumatoid arthritis. Both were men, both had brown hair—the one a red-brown, the other a yellow-brown. The change in color which was observed tended toward a return to the original color. Both men noticed the change themselves. It became apparent after the drugs had been administered for a period of 2 or 3 months, thereafter increasing slowly in intensity until the drugs were stopped.

A similar study in younger individuals is under way.

Conclusions. In a group of 19 elderly individuals with gray hair, a significant color change was noted during a period of intensive vitamin therapy in only 2 individuals; these subjects received both calcium pantothenate

⁶ Ralli, E. P., Clarke, D. H., and Kennedy, E., *J. Biol. Chem.*, 1941, **141**, 105.

⁷ Sieve, B. F., *Science*, 1941, **94**, 257.

* We are indebted to Merck & Co., Inc., through the offices of Dr. D. F. Robertson for furnishing us with the rather large quantities of calcium pantothenate and para-aminobenzoic acid necessary for this study and to the Vitamin Food Co., Inc., for the brewer's yeast.

and para-aminobenzoic acid, together with brewer's yeast. Both were men. The fact that the only 2 substantiated results occurred in the group receiving both calcium panto-

thenate and para-aminobenzoic acid may be of importance. Some questionable changes were noted when one or the other drug was given alone.

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Transmission of West Nile Virus by Infected *Aedes albopictus*.

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The West Nile virus,¹ a neurotropic agent related immunologically to the viruses of St. Louis and Japanese encephalitis,² has apparently caused human infection in widely scattered communities in equatorial Africa.³ Comparatively little is known about the natural mode of transmission of this agent;¹⁻³ however, the importance of arthropod vectors in the spread of other neurotropic viruses (see references cited in ⁴) warranted an investigation of their role in West Nile encephalitis. Young hamsters have been shown recently to be suitable for use in experiments dealing with the insect transmission of West Nile virus.⁴ The results presented at this time indicate that *Aedes albopictus* can become infected by feeding on hamsters with West Nile encephalitis and that following an incubation period such mosquitoes can transmit the virus to hamsters by biting. Further tests of transmission with this and other species of mosquitoes and with certain argasid ticks and triatomid bugs are in progress.

Three hamsters, weighing 30 to 40 g, were injected intraperitoneally with a suspension of mouse brain containing 10^8 mouse cerebral lethal doses (CLD) of virus. Twenty-four hours later the animals were anesthetized with sodium barbital given intraperitoneally in doses of 50 mg per 100 g body weight. During

the succeeding 2 hours 76 *Aedes albopictus* were fed on the shaven abdomens of the hamsters. Pooled plasma obtained from the hamsters immediately after the meal contained $10^{4.6}$ CLD of virus; the donors died on the 6th, 7th, and 8th days respectively after intraperitoneal inoculation. Ten insects were killed with tobacco smoke at the end of the donor meal and triturated in 2 cc of saline solution containing 2% normal guinea pig serum; this suspension was centrifuged at 3,000 r.p.m. for 10 minutes after which the clear, claret-colored fluid of the midzone was removed with a capillary pipette. All 6 of the mice injected with this suspension succumbed in 5 to 8 days; suspensions of brain tissue from 2 of these were bacteriologically sterile and were infectious for mice when injected intracerebrally.

The average weight of an adult *A. albopictus*, determined by weighing groups of 40 insects of the same stock and of about the same age as those used in the present experiment, was 2.31 mg when engorged and 1.31 mg when without blood. Therefore, suspensions of the type just described containing mosquito tissue and donor blood were considered as being 10^{-2} dilutions of either insect material or blood depending on which substance was being tested. Although the titration of virus in this lot of mosquitoes was not carried higher than 10^{-2} it was assumed that its titer was the same as that of the donor plasma, namely $10^{-4.6}$.

Forty-three mosquitoes of this lot, after storage for 10 days at 90°F, bit 2 baby hamsters which weighed 25 and 30 g, respec-

¹ Smithburn, K. C., Hughes, T. P., Burke, A. W., and Paul, J. H., *Am. J. Trop. Med.*, 1940, **20**, 471.

² Smithburn, K. C., *J. Immunol.*, 1942, **44**, 25.

³ Smithburn, K. C., and Jacobs, H. R., *J. Immunol.*, 1942, **44**, 9.

⁴ Watson, D. W., and Smael, J. E., *Proc. Soc. Exp. Biol. and Med.*, 1943, **52**, 101.