

Rosalind Wulzen(6) on the basis of chemical and biological evidence other than infra-red spectroscopy, also concluded that the anti-

stiffness factor obtained from sugar cane wax is stigmasterol.

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Effect of Fecal Bacterial Activity on Rectal Temperature of Man. (18507)

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Claude Bernard(1) called attention to the fact that the rectal temperature was one of the highest to be found in the body. This observation has been confirmed by other investigators(2). It seemed possible that this elevation in rectal temperature might be due, in part at least, to bacterial activity in the rectum and rectosigmoid. Bazett(3) suggested such a possibility. If this hypothesis were true, reduction of the intestinal bacteria, as by an orally administered, poorly absorbed sulfonamide, might be expected to result in a decrease in rectal temperature. Ravdin *et al.*(5) and others have shown that the technic of succinylsulfathiazole administration such as was employed here will result in a marked reduction in the number of organisms present in the feces.

Methods. Five normal young adult males served as subjects. Each subject received, in 4 divided daily doses, succinylsulfathiazole orally, 25 mg per kilo of body weight per 24 hours. The drug was given in this manner for 7 days. The subjects' diets and physical activity remained approximately constant for the periods before, during, and after the drug administration. With the subjects supine, rectal temperatures were recorded for 30 minutes preceding the noon meal and in a constant relationship to the subjects' physical activity and bowel movements. Rectal temperature determinations were made by copper-constantan thermocouples inserted 8

cm into the rectum. Measurements were made 8 hours before the drug administration was begun and were continued throughout the course of the drug. Temperatures were recorded at 2-minute intervals by a modified Brown automatic recording potentiometer whose accuracy was within 0.05°C. The temperatures of the final 6 minutes of the daily observation periods were averaged to obtain the temperature of the individual for any one day.

In some instances, smears from fecal specimens were obtained at the time of the temperature measurements. From these smears gross estimates of the number of fecal bacteria present were made in the manner described by Dearing and Heilman(4).

Results. Although the fecal bacterial content decreased markedly following the succinylsulfathiazole ingestion, no significant changes in rectal temperatures were seen (Tables I and II).

Discussion. It is apparent that exothermic reactions associated with the fermentation processes of microorganisms in the lower colon and rectum are of minor importance in modifying the level of the rectal temperature in man. Since the metabolism of this portion of the gastro-intestinal tract is considered to be quite low the obvious factor involved in maintaining the temperature of the organ must be the temperature of the perfusing blood. The chief arterial supply of the lower 12 cm of the large intestine is derived from mesenteric branches of the aorta, all of which are within the abdominal cavity. The venous

1. Bernard, C., *Lecons sur la chaleur animale*, Paris, 1876.

2. Horvath, S. M., Rubin, A., and Foltz, E., *Am. J. Physiol.*, 1950, v161, 316.

3. Bazett, H. C., personal communication.

4. Dearing, W. H., and Heilman, F. R., *Proc. Staff Meeting of the Mayo Clinic*, 1950, v25, 87.

TABLE I. Effect of Succinylsulfathiazole on Level of Rectal Temperature in °C, as Recorded Daily in Adult Men.*

Sub- ject	Day					
	0	1	2	3	4	7
E.	37.71	37.50	37.62	37.63	37.56	37.52
F.	37.66	37.60	37.53	37.54	37.38	37.60
H.	37.40	37.40	37.53	37.41	37.33	37.59
B.	37.56	37.45	37.36	37.55	37.72	37.31
S.	37.20	37.48	37.28	37.39	—	37.26
Avg	37.51	37.49	37.48	37.50	37.50	37.47

* Day 0 is 8 hr before beginning of oral administration of succinylsulfathiazole 25 mg per kg body wt per 24 hr. This level of drug dosage was continued throughout days 1 to 7, inclusive.

TABLE II. Organisms Present in Feces.*

Sub- ject	Days of drug admin.	Smears		
		g +	g —	Yeasts
F.	0	4+	4+	1+
	7	2+	2+	1+
B.	0	4+	4+	2+
	7	3+	2+	1+
E.	0	4+	4+	0
	7	1+	1+	0

* Films were made directly from the feces and stained by Gram's method. Their numbers were estimated on a basis of 1+ to 4+ (4). Days of drug administration refers to number of days subjects had been taking succinylsulfathiazole orally before the fecal smears were made.

drainage of the rectum and anal canal is effected by the superior, middle, and inferior hemorrhoidal veins. The superior belongs to the portal system; the middle and inferior being a part of the caval network. As in the case of the arteries, the rectal veins are also within the body cavity. While there appears to be a gradient of temperature within the rectum, this is usually of the order of magnitude of 0.1 to 0.2°C in the lower 6 inches of the alimentary canal(6). A very localized site on the posterior wall of the colon some 8

inches above the anal orifice may be as much as 0.5°C cooler than the rest of the organ. The cooling of this small portion of the intestine could be attributed to the presence nearby of veins draining certain areas of the body surface.

Eichna(7) suggested that the femoral arterial temperature provided a better index of deep body temperatures (left ventricle blood temperature) than the rectal temperature. However, Eichna(7) consistently found a lower temperature in the femoral artery as compared with that measured in the rectum. This would indicate that the blood in the femoral had been cooled somewhat during its exit from the abdominal cavity and that it therefore did not represent deep body temperature. That this cooling of the arterial blood in its departure from the more central parts of the body is real is suggested by the investigation of thermal gradients in dogs by Horvath *et al.*(2). These workers found a consistent fall in arterial temperature as the blood passed from the iliacs into femoral. It is possible that the rectal temperature may lag behind simultaneously observed blood temperature but it is doubtful that this lag is of much significance, particularly in resting states. Even in very dynamic states such as in individuals riding vigorously on a bicycle ergometer, the rectal temperature did not differ appreciably from simultaneously recorded central vascular temperatures(8).

Summary. 1. Succinylsulfathiazole was administered orally to 5 normal adults and resulted in a marked decrease in the number of bacteria present in their feces. 2. There were no significant changes in the rectal temperatures of the subjects concomitant with the fall in their fecal bacterial content.

7. Eichna, L. W., *Arch. Phys. Med.*, 1949, v30, 584.

8. Mellette, H. C., unpublished observations.

5. Ravdin, I. S., Bender, D. H., and Zintel, H. A., *Ann. Surg.*, 1944, v126, 463.

6. Mead, J., and Bonmarito, C. L., *J. Applied Physiol.*, 1949, v2, 97.

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