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A NOTE ON CUTANEOUS VENOUS BLOOD SUGAR DIFFERENCE IN NORMAL MALES AND FEMALES AND IN THYROID DISEASE

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It has been well known since the publications of Foster (1) and of Hagedorn (2) that cutaneous blood obtained from a deep finger prick approximates arterial blood rather than venous blood in sugar concentration. The deeper the prick and the more freely the blood flows from the finger the more closely the cutaneous values approximate arterial values.

TABLE 1

Arterial, cutaneous and venous blood sugar values one hour after administration of 100 grams of glucose orally or 1 cc. of 1 : 1000 epinephrine subcutaneously

	Arterial	Venous	Difference arterial-cutaneous
	mgm. per 100 cc.	*mgm. per 100 cc.*	*mgm. per 100 cc.*
After glucose	270	248	−3
	160	108	2
	149	118	2
	160	123	14
After epinephrine	165	157	−2
	142	134	1
	172	146	14

Table 1 shows the comparison of arterial, cutaneous and venous blood sugar values with our technique one hour after ingestion of 100 grams of glucose or after injection of 1 cc. of 1 : 1000 epinephrine in subjects without evidence of circulatory or metabolic disorder. Arterial blood was obtained from a brachial artery. Cutaneous blood was taken from a finger tip following a puncture with a pen point deep enough to give a free flow. Venous blood was drawn from the arm with only slight transient compression of the vein. Blood sugar was measured by the method of Hagedorn and Jensen (3). In two out of seven comparisons considerable discrepancy is noted between arterial and cutaneous values. The sugar content of cutaneous blood is not in our hands a reliable

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measure of that of arterial blood in individual determinations, although tending toward agreement with it in most instances. In the course of measurements of blood sugar concentration in cutaneous and venous blood at ½, 1 and 1½ hours following ingestion of 100 grams of glucose by normal subjects we have noted a tendency toward higher cutaneous-venous differences in the females than in the males at the crest of the sugar curve.

TABLE 2

Cutaneous blood sugar value and cutaneous-venous difference after ingestion of 100 grams of glucose at the examination showing highest sugar value

	Males			Females	
	Cutaneous	Difference cutaneous-venous		Cutaneous	Difference cutaneous-venous
	mgm. per 100 cc.	*mgm. per 100 cc.*		*mgm. per 100 cc.*	*mgm. per 100 cc.*
Normals	198	48	Normals	203	61
	211	32		135	42
	173	26		135	39
	159	25		137	38
	148	24		144	36
	182	22		135	33
	190	20		172	32
	179	18		201	31
	182	13		124	28
Hyperthyroid	281	49	Hyperthyroid	174	49
	239	0		219	37
				355	30
				262	30
				133	27
				217	27
				230	22
				274	21
				232	15
				234	10
				189	−4
			Hypothyroid	223	89
				206	80
				171	49
				220	46
				181	40

This is shown in Table 2. It includes as "normals" the values on 9 male and 9 female medical students or members of the laboratory staff who, with the exception of one male who was 40, varied in age between 18

and 30. The cutaneous and venous blood, taken fasting, contained nearly the same concentration of sugar. The cutaneous-venous difference became definite as the blood sugar rose. The tendency toward greater cutaneous-venous difference at the crest of the curve in the females than in the males was associated with lower rather than higher sugar values in cutaneous and venous blood in the females.

In Table 2 are shown also the cutaneous-venous differences at the crest of the curve following ingestion of 100 grams of glucose in 11 female and 2 male patients with hyperthyroidism and in 5 females with hypothyroidism. In about half the patients with hyperthyroidism the cutaneous-venous differences are lower than normal. In most of the hypothyroid patients the cutaneous-venous difference is high. No consistent difference in the cutaneous sugar values is to be noted in the two groups.

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