

TABLE II  
HORMONAL EFFECTS ON TPN-DIAPHORASE ACTIVITY\*

Condition of rats	Number of rats	TPN diaphorase Specific activity**
Normal	10	37.0 ( $\pm$ 10.0)
Thyroidectomized	3	34.3 ( $\pm$ 7.0)
Hypophysectomized	4	31.9 ( $\pm$ 6.3)
Thyroidectomized- thyroxin treated***	4	33.5 ( $\pm$ 1.8)

\* Conditions of assay were essentially as described in footnote to Table I, except that  $3.6 \cdot 10^{-5} M$  2,6-dichlorophenol-indophenol was substituted for cytochrome *c* as an electron acceptor.

\*\* Specific activity =  $\frac{\mu\text{moles 2,6-dichlorophenol-indophenol reduced}}{\text{g protein} \times \text{minute}}$

\*\*\* 1 mg DL-thyroxin injected intraperitoneally daily for 1-4 days.

dition, in no previous case has evidence been obtained to indicate that variation in enzymic activity was not due to variation in the concentration of the protein moiety of the enzyme being studied.

In summary, the activity of hepatic TPN-cytochrome *c* reductase appears to be under thyroid control, and it is suggested that control of the activity of this enzyme may represent a primary site of action of the thyroid hormone.

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## Effect of hypophysectomy on dehydrogenase activity of rat tissues

High levels of activity of glucose-6-phosphate (G6P) dehydrogenase have been reported for the adrenal cortex and lactating mammary glands<sup>1,2</sup>. Measurements of the activities have also been made in a variety of mammalian tissues. It was suggested that the direct oxidative pathway might play a significant role in adrenal metabolism since the cortex showed high activity<sup>2</sup>.

Selected tissues from control and hypophysectomized (postoperative 7 days) rats\* were assayed for G6P dehydrogenase and 6-phosphogluconate (6PG) dehydrogenase activities. The two-substrate method of GLOCK AND MCLEAN<sup>4</sup> was used. Each cell contained 0.24 mM tris (hydroxy methyl) amino methane buffer pH 7.45, 0.4  $\mu M$  triphosphopyridine nucleotide and suitable aliquots of the supernatant from tissue homogenates to a total volume of 3.0 ml. The

\* Control and hypophysectomized rats were purchased from Hormone Assay Laboratories, Chicago, Ill.

first cell contained  $5 \mu M$  of 6 PG<sup>5</sup>, the second cell  $5 \mu M$  of G6P and  $5 \mu M$  of 6PG, while the third cell contained no substrate and served as a blank.

The data (Table I) show that the G6P dehydrogenase activities per gram of tissue of the secondary sex glands were reduced seven days after hypophysectomy, while the gonads and adrenals showed little change. The G6P dehydrogenase activity of the kidney was increased in the operated group from 122 to 155 units for females and 198 to 248 units for males. The enzyme activities of the liver, brain, and heart were not changed by the removal of the pituitary; the average levels were 83, 154, and 29 units respectively.

Activities of 6PG dehydrogenase of the hypophysectomized groups were lower in the adrenals, with little change observed for the gonads and secondary sex glands. The activity in kidney was increased from 82 to 120 units for females and 130 to 150 units for males following hypophysectomy. Liver, brain, and heart showed little or no change in levels of enzyme activity, average values being 125, 39, and 33 units respectively.

TABLE I

G6P- AND 6PG-DEHYDROGENASE ACTIVITIES IN UNITS PER GRAM TISSUE  
FROM CONTROL AND HYPOPHYSECTOMIZED RATS

(One unit is the amount of enzyme which will reduce  $0.01 \mu M$  of TPN per minute at  $25^\circ C$ ).  
The values are expressed as means with standard deviations. The numbers in parentheses are the number of animals.

	Female		Male	
	Control	Hypox	Control	Hypox
Glucose-6-phosphate dehydrogenase				
Uterus	$217 \pm 80$ (3)	$150 \pm 15$ (6)	—	—
Prostate	—	—	$175 \pm 52$ (4)	$89 \pm 18$ (4)
Sem. Vesicles	—	—	$109 \pm 45$ (4)	$62 \pm 13$ (5)
Adrenal	$794 \pm 77$ (4)	$842 \pm 145$ (6)	$791 \pm 86$ (4)	$769 \pm 271$ (5)
Gonads	$493 \pm 55$ (3)	$584 \pm 348$ (6)	$55 \pm 4$ (4)	$45 \pm 12$ (5)
6-phosphogluconate dehydrogenase				
Uterus	$80 \pm 20$ (3)	$62 \pm 11$ (6)	—	—
Prostate	—	—	$59 \pm 14$ (4)	$51 \pm 21$ (4)
Sem. Vesicles	—	—	$69 \pm 21$ (4)	$45 \pm 16$ (5)
Adrenal	$356 \pm 54$ (4)	$267 \pm 79$ (6)	$425 \pm 104$ (4)	$256 \pm 78$ (5)
Gonads	$113 \pm 25$ (3)	$102 \pm 28$ (6)	$60 \pm 15$ (4)	$79 \pm 18$ (5)

The levels in the various tissues from normal rats are in general agreement with those found by others<sup>1,2</sup>. Hypophysectomy did not change the G6P dehydrogenase activity per unit weight in the primary target organs (gonads and adrenals) even though these tissues were atrophied; the secondary sex glands also decreased in weight while the activity of the enzyme decreased. The activity of 6PG dehydrogenase of the adrenals decreased while that of the gonads and secondary sex glands showed no appreciable change. This may indicate that the oxidative pathway for glucose metabolism may be important in the accessory sex glands and under the control of estrogens and androgens.

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