## The hexosemonophosphate oxidative pathway in alloxan diabetes

During an investigation of the hormonal control of glycolytic and nonglycolytic pathways of carbohydrate metabolism, a striking decrease in the levels of enzymes of the hexosemonophosphate (HMP) oxidative pathway was observed in rat liver in experimental diabetes.

Following preliminary starvation for 48 hours, young adult male rats (180 g) were rendered diabetic by the subcutaneous injection of alloxan[1] and killed 10 days after the injection. The control and experimental groups of animals were pair fed. Glucose-6-phosphate (G-6-P) and 6-phosphogluconate (6-PG) dehydrogenase activities of liver were determined as described previously by following the rate of reduction of TPN spectrophotometrically[2]. Preliminary results, shown in Table I, indicate that the levels of activity of both dehydrogenases are significantly reduced in diabetes.

TABLE I

INFLUENCE OF ALLOXAN DIABETES ON THE ACTIVITY OF RAT LIVER GLUCOSE-6-PHOSPHATE AND 6-PHOSPHOGLUCONATE DEHYDROGENASES

| | *Control rats* | *Alloxan diabetic rats* | *P* |
|---|---|---|---|
| Number of animals | 6 | 6 | |
| Average daily sugar excretion | — | 5.9 g | |
| Units* enzyme/g liver | | | |
| G-6-P dehydrogenase pH 7.6 | 149 ± 9 | 58 ± 6 | < 0.001 |
| 6-PG dehydrogenase pH 9.0 | 187 ± 13 | 82 ± 4 | < 0.001 |
| 6-PG dehydrogenase pH 7.6 | 111 ± 4 | 40 ± 4 | < 0.001 |
| Total liver enzyme/100 g body wt | | | |
| G-6-P dehydrogenase pH 7.6 | 636 ± 62 | 263 ± 36 | < 0.001 |
| 6-PG dehydrogenase pH 9.0 | 794 ± 77 | 370 ± 33 | < 0.001 |
| 6-PG dehydrogenase pH 7.6 | 469 ± 28 | 181 ± 20 | < 0.001 |

* A unit of enzyme activity is defined as the quantity of enzyme which reduced 0.01 μmole TPN/min at 20° C.

This investigation is being extended to include an evaluation of the relative significance of the glycolytic and hexosemonophosphate oxidative pathways in normal and diabetic liver slices by the use of G-1-$^{14}$C and G-6-$^{14}$C [3].

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## The denaturation of desoxypentose nucleic acid

A number of observations[1–5] have shown that agents which generally produce only physical changes alter the structure of native, biologically active DNA in a manner analogous to that occurring in the denaturation of proteins. An earlier investigation[6] of the effect of acid had shown that the highly extended DNA particle contracted substantially as the pH was lowered to 2.6 but was unchanged in molecular weight. We wish to report here that a similar situation exists in regard to the effect of heat: moreover, some observations we have made on the characteristics of the denaturation process and the denaturated product seem to be relevant to the problem of the structure of DNA and the validity of the proposal[7] that there are numerous interruptions in the polynucleotide strands.

The intrinsic viscosity (at 25°) extrapolated to zero gradient, $[\eta]$, was measured as a function of the temperature to which the DNA solution had been heated for one hour. In the most stable DNA preparations the $[\eta]$ maintained its room temperature value of 72 until 85° C. At higher temperatures $[\eta]$ decreased rapidly reaching a limiting value of 4.3 near 100°. In the presence of 8 *M* urea the pattern of viscosity decay was the same except that it was shifted to temperatures about 17° lower. The energy of activation in both cases was 93 kcal. We interpret this as the energy