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**Abstract**

Tyrosine metabolism of toxohormone-treated mice and acatalasemic patient was not disturbed. These facts do not concur with the report of Zannoni and Bert who stated that catalase was an essential factor for the oxidation of p-hydroxyphenylpyruvic acid.

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# TYROSINE METABOLISM OF AN ACATALASEMIC PATIENT AND OF THE TOXOHORMONE TREATED MICE

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Recently, Zannoni and BERT[1] have reported that catalase was an essential component for the oxidation of p-hydroxyphenylpyruvic acid to homogentisic acid in the liver. If this is the case, animals which contain reduced amount of catalase in the liver should have a disturbed tyrosine metabolism. Among such animals, a human acatalasemic patient and the toxohormone treated mice were used for testing their tyrosine metabolism.

Acatalasemic patient was at first found to have no catalase in his blood by TAKAHARA[2] of Okayama University, and has also proved to contain no catalase in his liver by YOSHIYA[3]. Toxohormone prepared from cancer tissues is well known to be capable of reducing liver catalase of mice when it is injected[4].

In the present experiment, tyrosine was loaded to such animals and the urinary p-hydroxyphenylpyruvic acid was determined, and no differences were detected between normal and reduced catalase groups.

## MATERIAL AND METHODS

Toxohormone was prepared from human gastric cancer* by the method of Ono et al.[8]. D, L-Tyrosine used was commercial product. Catalase was assayed by a modified method of BONNICHSEN, CHANCE, and THEORELL[6]. p-Hydroxyphenylpyruvic acid was estimated by two different methods. One is Millon's reaction[7] which is specific to the phenol group, and the other is Penrose and Quastels' reaction[8] which is characteristic of the ketone group.

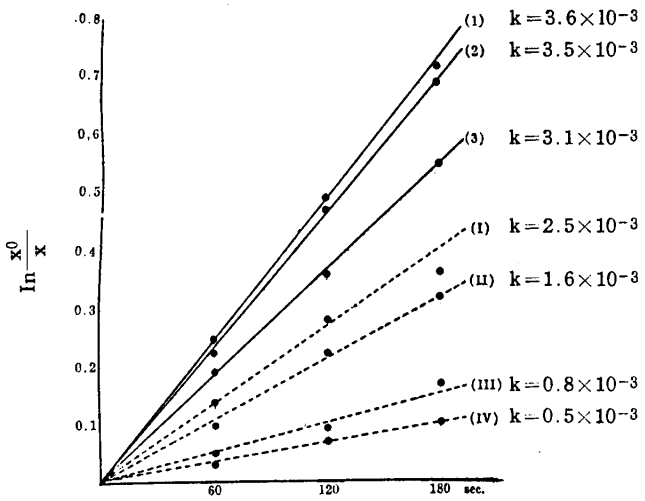
## RESULTS

i. *Liver catalase activity of normal and toxohormone treated mice :*

* These materials were kindly supplied by Dr. M. SHIMIZU of St. Maria Hospital in Himeji.

Mice were fed by the synthetic diet[9]. Toxohormone was dissolved in the minimum amount of dilute hydrochloric acid and the solution was injected intraperitoneally into mice after adjusting to pH 6 by alkali. Twenty-four hours after toxohormone injection, mice were killed by exsanguination and the liver catalase activity was determined. As shown in Fig. 1, the

Fig. 1. Liver Catalase Activity of Normal and Toxohormone Treated Mice.




Straight Line : Normal Mice.
Dotted Line : Toxohormone Treated Mice

toxohormone used was quite effective for liver catalase depression.

ii. *Urinary p-hydroxyphenylpyruvic acid of normal and toxohormone treated mice :* Table 1 shows the amount of p-hydroxyphenylpyruvic

Table 1. p-Hydroxyphenyl pyruvic acid excreted in the urine of normal mice (expressed in mg. per day)

| Exp. No. | Penrose & Quastels' R. | Millon's R. |
|---|---|---|
| 1 | 1.30 | 0.56 |
| 2 | 0.84 | 0.27 |
| 3 | 1.20 | 0.28 |
| 4 | 1.30 | 0.50 |

acid excreted per day in the urine of normal mice. The urine of toxohormone

treated mice was collected for 24 hours after injection of toxohormone. Table 2 shows the amount of urinary p-hydroxyphenylpyruvic acid excreted by toxohormone treated mice per day. No appreciable difference was observed between two groups.

Table 2. p-Hydroxyphenylpyruvic acid excreted in the urine of toxohormone treated mice (expressed in mg. per day)

| Exp. No. | Penrose & Quastels' R. | Millon's R. |
|---|---|---|
| 7 | 1.20 | 0.42 |
| 8 | 1.00 | 0.29 |
| 10 | 1.10 | 0.36 |
| 12 | 0.62 | 0.45 |
| 13 | 1.50 | 0.52 |

iii. *Effects of tyrosine administration on the urinary excretion of p-hydroxyphenylpyruvic acid of normal and toxohormone treated mice :* Mice fed by the synthetic diet which was loaded by 1 mg. of tyrosine per day and the same experiments were performed as described in II. Results are shown in Table 3. No difference between normal and toxohormone treated mice were demonstrated either.

Table 3. p-Hydroxyphenylpyruvic acid excreted in the urine of mice loaded by tyrosine (expressed in mg. per day)

| | Exp. No. | Penrose & Quastels' R. | Millon's R. |
|---|---|---|---|
| Normal | 15 | 0.15 | 0.13 |
| | 16 | 0.58 | 0.29 |
| Toxohormone treated mice | 18 | 0.14 | 0.14 |
| | 20 | 0.44 | 0.31 |

iV. Effects of tyrosine on the urinary excretion of p-hydroxyphenylpyruvic acid of normal and acatalasemic patient : Twenty-four hour's urine of two normal women and a female acatalasemic patient before and after tyrosine administration was collected in the morning for three days. In the morning of the second day, 2 g. of tyrosine was administered orally. As shown in Table 4, the urinary excretion of p-hydroxyphenylpyruvic acid was not affected by tyrosine administration in both cases.

Table 4. p-Hydroxyphenylpyruvic acid excreted in the urine of normal and acatalasemic women (expressed in mg. per day)

| | Date | Penrose & Quastels' R. | Millon's R. |
|---|---|---|---|
| Patient | 1st | 181 | 196 |
| | 2nd | 170 | 225 |
| | 3rd | 174 | 178 |
| Normal | 1st | 233 | 223 |
| | 2nd | 265 | 310 |
| | 3rd | 182 | 280 |
| Normal | 1st | 162 | — |
| | 2nd | 178 | — |
| | 3rd | 110 | — |

## DISCUSSION

Results obtained in the present experiments did not agree with the report of Zannoni and BERT[1] cited in the preface of this paper. By using tumor bearing mice Dr. SUDA[10] has also shown that catalase is not an essential factor for the oxidation of p-hydroxyphenylpyruvic acid. Furthermore, while the present paper work was in preparation for press, HARGER et al.[11] have reported that catalase was required only under certain assay conditions to avoid inactivation of p-hydroxyphenylpyruvic acid oxidase during its reaction. These facts indicate that catalase does not participate in the oxidation of p-hydroxyphenylpyruvic acid.

## SUMMARY

Tyrosine metabolism of toxohormone-treated mice and acatalasemic patient was not disturbed.

These facts do not concur with the report of Zannoni and Bert who stated that catalase was an essential factor for the oxidation of p-hydroxyphenylpyruvic acid.

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