

# Relative Uniformity of Locomotor Activity of Mice Treated with $\beta$ - $\beta'$ -Iminodipropionitrile (IDPN)

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A series of experiments were conducted to determine the relative efficiency of IDPN as a possible tool in standardizing locomotor activity in mice. A comparison of the uniformity of activity of IDPN mice was made with the activity of mice receiving saline. Frequency distribution studies showed that with IDPN mice the S.D. of activity measurements was 10 per cent or less of the mean in 90 per cent of the runs, whereas with the normal control mice the S.D. ranged between 15 and 35 per cent of the mean in 81 per cent of the runs. In the groups tested, activity counts over a 30-min. period dropped off between 1.0 and 8.3 per cent with the IDPN mice and between 22.8 and 30.7 per cent with the normal mice.

THE CHARACTERISTIC changes in motor activity induced in mice by  $\beta$ , $\beta'$ -iminodipropionitrile (IDPN) have been reported in the literature a number of times. The drug is described as producing hyperactivity and circling movements or the so-called turning syndrome (1-3). The syndrome has recently been described as the ECC syndrome (4) characterized by excitation, choreiform, and circular movements. IDPN has also been shown to produce neurological reactions similar to those produced by the *Lathyrus odoratus* seed which manifests its action in spastic paraplegia and tremors termed lathyrism (5). Other symptoms of IDPN include retropulsion and inability to swim (6). Attempts have been made to find drugs which prevent or antagonize the effect of IDPN. Certain CNS depressants (7, 8) and various other drugs (4, 9-12) proved partly or temporarily effective.

The present investigation deals principally with the evaluation of the uniformity of activity of mice treated with IDPN as compared to the relative inconsistency of activity in control mice.

## EXPERIMENTAL

**Production of Circling IDPN Mice.**—Male albino mice (Swiss-W), weighing 20-30 Gm., were used for the study. The IDPN syndrome was produced by intraperitoneal injections of IDPN in the following manner (13): first day, 1.0 Gm./Kg. IDPN; second day, 1.0 Gm./Kg. IDPN; third day, no injection; fourth day, 1.0 Gm./Kg. IDPN.

Some animals display the characteristic syndrome after the third injection. Others required a fourth or fifth injection on succeeding days. Once established, the syndrome is permanent.

The IDPN was diluted with distilled water. Control animals received 0.9% saline intraperitoneally in a volume equivalent to that administered to the IDPN mice.

Locomotor activity was measured in actophotometers (Metro Industries, Long Island City, N. Y.). After a 30-min. equilibration period, counts were taken at 5-min. intervals over a 30-min. period. At all times the temperature was maintained at approximately 22°.

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All statistical analyses were performed on the IBM 1410 computer.

## RESULTS AND DISCUSSION

**Frequency Distribution of Standard Deviations.**—The frequency distribution of the standard deviations of mean activity of IDPN and normal mice are depicted in Fig. 1. Eighty runs (four mice per run) and 160 runs (four mice per run) are considered, respectively, in the analysis. Standard deviations are expressed as per cent of the mean.

The frequency distribution of the standard deviations (Fig. 1) demonstrates the consistency in gross activity of IDPN mice in comparison to the activity of normal mice. The mean locomotor activity  $\pm$  S.D. for all runs with IDPN ( $N = 480$ ) was  $1080 \pm 275$  counts per 5 min., and the standard deviations in 90% of the runs were 10% or less of the mean. In four instances the standard deviation was greater than 15%, and only in one run was it greater than 20% of the mean.

With the control mice, receiving saline only, the standard deviations were between 15-35% of the mean in 81% of the runs and greater than 35% of the mean in 11.2% of the runs.

**Changes in Mean Activity Over a 30-min. Period.**—A comparison of the typical decrease in mean activity counts for IDPN and normal mice over a 30-min. period is shown in Table I. The number of runs at each time interval is 20 for the IDPN mice and 60 for the normal mice.

Table I depicts the results of one of the studies conducted on an individual cage basis. It can be seen that the decrease in activity over a 30-min. period was far greater in the normal mice than in IDPN mice. In two other studies the mean activity decreased in a similar manner. In three separate analyses the activity counts dropped 1.3, 8.3, and 1.0% with the IDPN mice over the 30-min. period. The decrease in activity with the normal mice over the same time period was 23.8, 30.7, and 22.8%.

Our results indicate that IDPN mice display consistent locomotor activity.

## SUMMARY

Experiments were conducted to compare the general consistency of locomotor activity of mice receiving IDPN with that of mice receiving normal saline.

The IDPN mice exhibited a gross activity pattern consistently less variable than the untreated group.

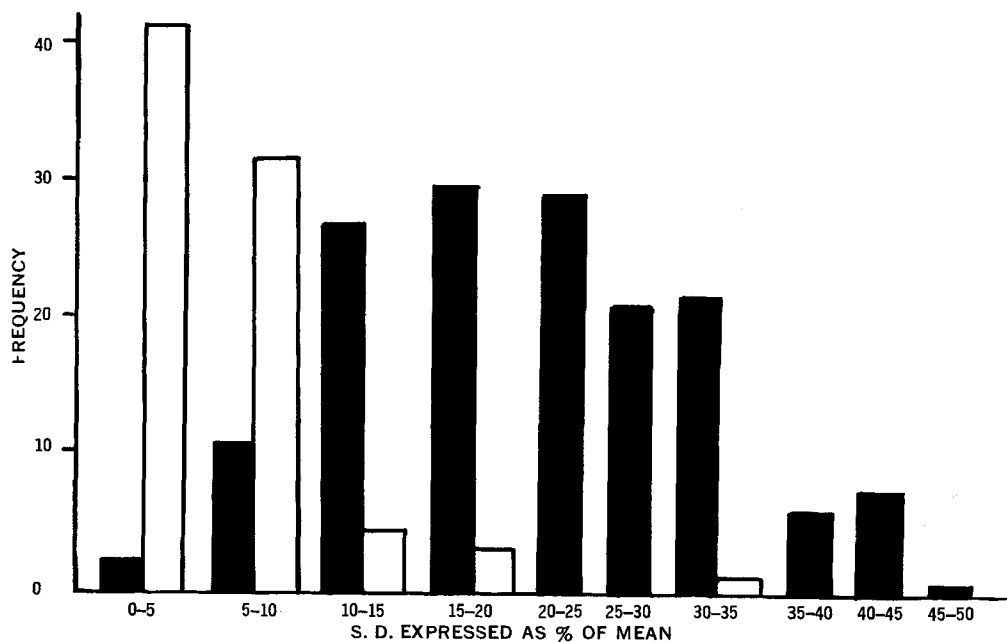


Fig. 1.—Frequency distribution of standard deviation expressed as per cent of the mean. Key: □, IDPN; ■, normal.

TABLE I.—CAGE A. COMPARISON OF DECREASE IN MEAN ACTIVITY OVER A 30-MIN. PERIOD

IDPN <sup>a</sup>		Normal <sup>b</sup>	
Min.	Mean ± S.D. <sup>c</sup>	Min.	Mean ± S.D.
5	954 ± 159	5	408 ± 116
10	949 ± 173	10	391 ± 120
15	944 ± 198	15	364 ± 121
20	952 ± 193	20	355 ± 119
25	944 ± 188	25	333 ± 122
30	941 ± 152	30	311 ± 120
Total change	-1.3%		-23.8%

<sup>a</sup> Twenty runs (four mice per run) for each time interval.  
<sup>b</sup> Sixty runs (four mice per run) for each time interval.  
<sup>c</sup> Actual counts (5-min. intervals).

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