

## Effects of TCDD on motor activity of TCDD-susceptible and TCDD-resistant rat strains

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### Introduction

One of the striking effects of tetrachlorodibenzo-*p*-dioxin (TCDD) is wasting syndrome, in which animals reduce strongly their feed intake within days. After lethal doses animals lose weight until they die within a few weeks. After sublethal doses feed intake starts to recover but remains at a subnormal level. The mechanism of this syndrome is not known.

Much attention has been paid to biochemical and histological effects of TCDD. However, very little is known about the possible behavioural changes after TCDD administration. Behaviour of rats was examined with plus-maze test and some other tests (Sirikka et al., 1992). No major differences between TCDD and control group, could be demonstrated. Thus, the only behavioural change reported so far is the change in feeding.

In this study we followed spontaneous motor activity of rats after TCDD administration. We used two different rat strains, Long-Evans (L-E) and Han/Wistar (H/W). The former is very sensitive to TCDD ( $LD_{50} = 17 \mu\text{g}/\text{kg}$ ) and the latter very resistant ( $LD_{50} > 7200 \mu\text{g}/\text{kg}$ ).

### Materials and methods

32 male L-E rats and 16 male H/W rats were purchased from the National Laboratory Animal Centre, Kuopio, Finland. The rats weighed  $301 \pm 11$  g and  $308 \pm 27$  g, respectively. The animal room had 12 hr light rhythm with lights on at 7.00 am. The rats were divided into groups of eight and placed into plastic cages with pressure sensitive electrothermomechanical film plates on the floors. The method was described previously in detail (Räsänen et al., 1992). The pressure changes on the floors of each cage were monitored continuously with a microcomputer.

One group of both rat strains were given ip.  $50 \mu\text{g}/\text{kg}$  TCDD, dissolved in corn oil.

# TOX

In one group of L-E rats the amount of feed consumption was restricted to the level known to be consumed by rats that are given TCDD. The three remaining groups were control groups for those described.

The activity was continuously recorded from one day before to nine days after the injection of TCDD. The data were packed into units of 10 minutes and the average of the group of eight rats was calculated at each time point. Because of large variation in activity between time points, the value of each data point was recalculated as an average of 20 neighbouring data points. In this way it was possible to see the trends in the motor activity instead of the highly variable actual level of activity of different time points.

Due to sensitivity differences between cages we measured the L-E group with restricted feed and its control group twice for the first five days. The data turned out to be comparable. In figure 1C the 9th day is from the first measurement.

## Results and discussion

The motor activities are shown in figure 1. Trends were quite similar from day to day in control groups. This suggests that in this way it was possible to filter the daily rhythm from the original data, which was highly variable. It is also easy to see that there is a clear strain difference in the patterns of daily motor activities of L-E and H/W rats. H/W rats are active continuously when it is dark, but L-E rats seem to have a triphasic activity rhythm.

There is practically no difference between TCDD and control H/W groups (figure 1A). The activity of L-E TCDD group is clearly decreasing after some days (figure 1B). However, also the L-E rats with restricted feeding behave in the same manner (figure 1C). This suggests that the decrease of motor activity is not a primary effect but more likely a result of wasting and starvation due to either TCDD or feed restriction, respectively.

These results did not show any primary change in the motor activity of rats. Thus, the strong change in feeding behaviour does not seem to be secondary to changes in other kinds of activity.

## References

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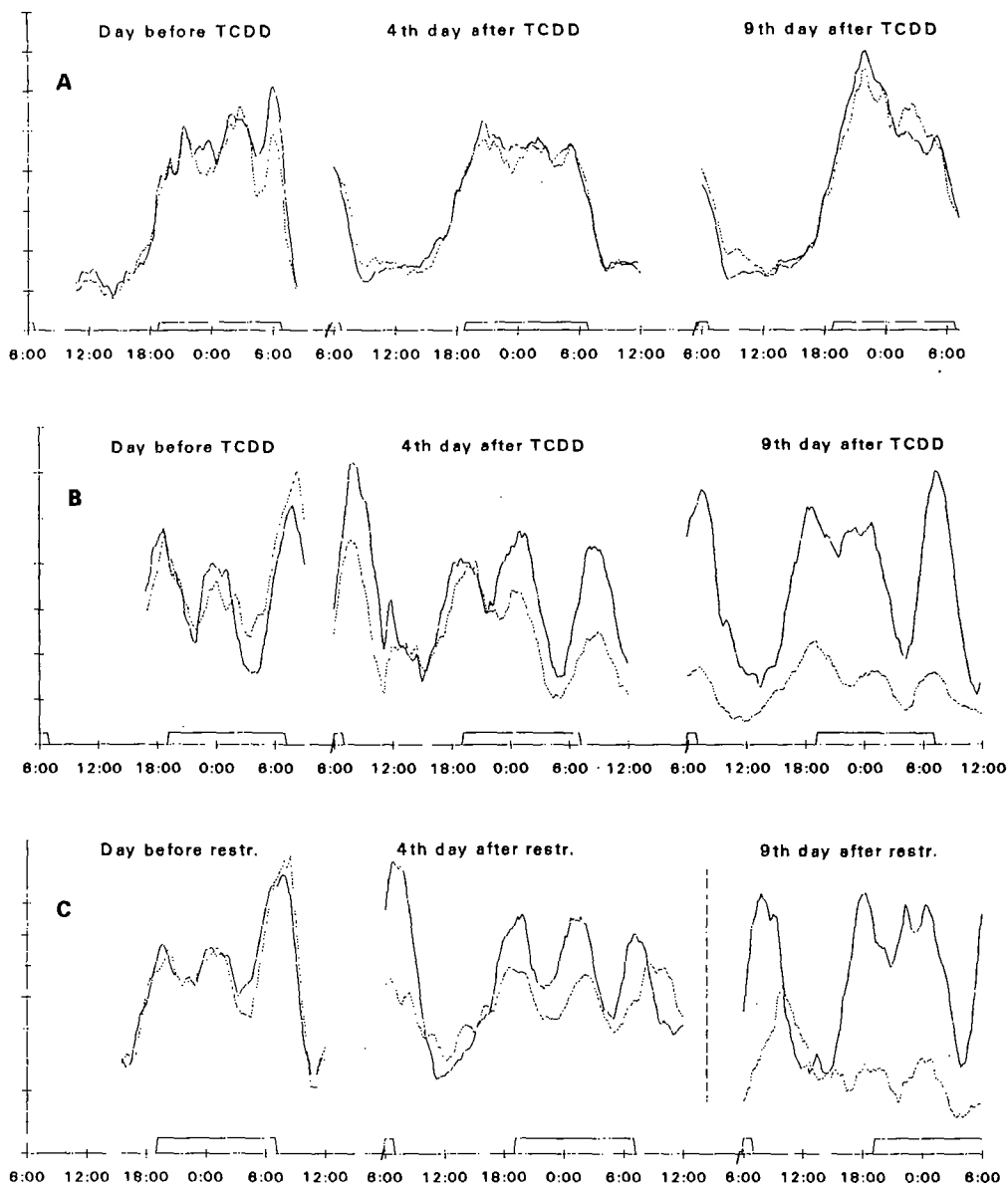


Figure 1. Daily activities of rats. A. H/W rats (dashed line: TCDD, solid line: control). B. I-F rats (dashed line: TCDD, solid line: control). C. L-E rats (dashed line: restricted feed, solid line: control). The dark phase is indicated at the bottom of figures with horizontal bar. Note that in C the 9th day is monitored from a different group of rats than the previous days.