

Effects of Prenatal Drug Exposure - Long Term Studies

Part A: Does FLORATRYP affect brain development?

Babies at Risk?

Effects of Prenatal Exposure: A simulated long-term study

As the use of “FLORATRYP” (a new, illegal drug) increases, scientists are concerned that mothers’ use of FLORATRYP during pregnancy will harm their developing babies. Scientists know that prenatal exposure to drugs like nicotine and alcohol harms developing babies. They are concerned that FLORATRYP use during pregnancy might have similar effects on developing babies.

Scientists are conducting a long-term research study to determine the effects of prenatal exposure to FLORATRYP. Hundreds of women have agreed to participate in this study. Approximately half of the women in this study had used FLORATRYP (but no other drugs) while they were pregnant. The other women in the study had not used FLORATRYP or any other drugs when they were pregnant.

The researchers have asked you to assist with collecting data for a part of this study by:

- **Conducting urine tests on samples from ten women (mothers).**
- **Recording mental development test scores from the children (age 2 years).**
- **Interpreting the brain scan results of the children (age 8 years).**

Note: To maintain confidentiality, each of these women and their children has been assigned an identification number.

1. Testing Mothers’ Urine for Drugs

Samples of each woman’s urine were collected on the day that their baby was born. You will need to test the urine samples to determine which of the mothers have the drug FLORATRYP present in their urine.

1. Your lab kit contains 10 tubes of urine samples that were collected from the mothers who are participating in this study. These tubes are labeled with the mothers’ identification numbers.
2. Dip a different FLORATRYP Test Strip into each of the urine samples. If the test paper turns dark green or blue, FLORATRYP is present in the mother’s urine.
3. Record the results of the FLORATRYP tests on the Research Data Table on the last page of this lab activity. You may tear this data table off to make recording of data easier.
4. Use a highlighter or light colored marker to color the entire row for the mothers who had FLORATRYP in their urine.

2. Mental Development Tests at Two Years

When the children were two years old, a psychologist administered a test called the Mental Development Index (MDI) to each of the children. An ideal score on the Mental Development Index is 100.

The envelope labeled “Mental Development Index Tests” contains the psychologist’s reports for each of the children. The psychologists did not know whether the children’s mothers were or were not FLORATRYP abusers.

1. Enter the scores from the Mental Development Index tests into the Research Data Table.

2. Determine the average Mental Development Index test scores for:

- Babies born to women who used FLORATRYP: _____
- Babies born to women who did not use FLORATRYP: _____

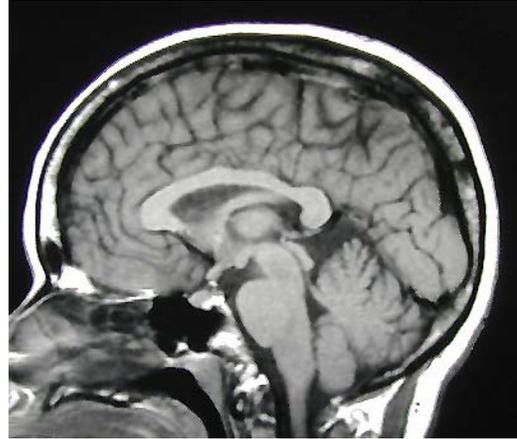
3. Does the data support the hypothesis that prenatal FLORATRYP exposure interferes with normal mental development? Explain why or why not.

4. What factors, other than prenatal FLORATRYP exposure, could cause decreased scores on the Mental Development Index test?

3. Brain Studies at Eight Years

When the children were eight years old, researchers used magnetic resonance imaging (MRI) to examine the brains of the children. The researchers looked at both the brain structure and the biochemicals present in different brain regions.

1. The envelope labeled “Magnetic Resonance Imaging Results” contains the MRI images of the brains of each of the children. Examine the MRI images for differences in the structure (size and shape, NOT color) of the different parts of the brain.
 - If there are no structural differences, record “normal” in the Research Data Table.
 - If there are structural differences, write “abnormal” and identify the part of the brain that is abnormal in the Research Data Table.



Normal Brain Structure

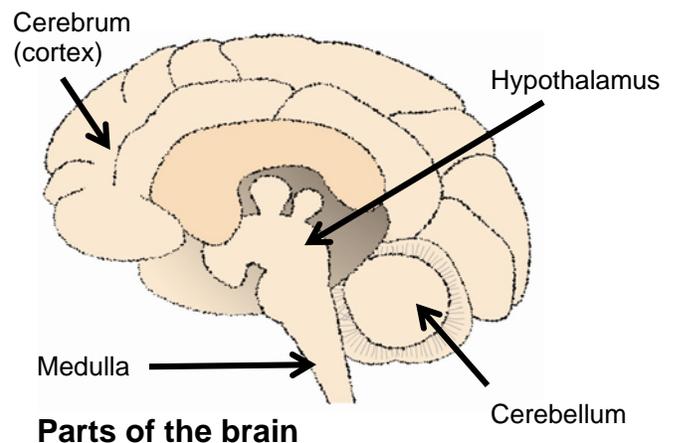
2. Do the MRI images provide evidence that prenatal FLORATRYP exposure causes structural changes in the brain?

One biochemical measurement included in the MRI scans was creatine level. All brain cells require creatine for normal energy functions. Creatine helps supply energy to tissues. Increased concentrations of creatine can indicate either damage to nerve cells or changes of brain cell function.

3. Look closely at the MRI's. Some of the MRI's have yellow areas. Yellow areas indicate that these parts of the brain are producing higher than normal levels of creatine.

4. In the Research Data Table, indicate whether the creatine levels in each of the children's brains are normal (not yellow) or high (yellow).

5. If the creatine levels are high, also write the part of the brain that shows high creatine levels.



6. Do the MRI creatine tests show that prenatal FLORATRYP exposure interferes with normal brain biochemistry?

| <i>Part of Brain</i> | <i>Function Associated with Part of Brain</i> |
|-----------------------------|---|
| Cerebrum (cortex) | Higher brain functions such as thought, memory, and action. |
| Hypothalamus | Sleep and emotions |
| Cerebellum | Balance and coordination of muscle activity |
| Medulla | Regulation of breathing and heart rate |

7. Explain what problems might be associated with high creatine levels in the cerebrum (cortex).

8. Based on all the information in your Research Data Table, do you think that prenatal exposure to FLORATRYP causes changes to the brain? Support your answer with evidence from the data table.

Part B: Does prenatal FLORATRYP exposure lead to changes in adolescents or adults?

Does prenatal FLORATRYP exposure lead to changes in adolescents or adults?

Some researchers are concerned that the effects of prenatal exposure to FLORATRYP, an illegal drug, may appear or become worse during adolescence or adulthood.

The researchers would like you to design a long-term controlled study to investigate the effects of prenatal FLORATRYP exposure on the behavior or learning of adolescents and adults.

1. List at least three possible effects that prenatal FLORATRYP exposure might have on the behavior or learning of adolescents or adults.

2. Select one of the potential effects (from your list above) that you would like to investigate in your research study.

3. Explain how you could collect data related to this effect.

4. What is the hypothesis that you will be testing in your research study? State your hypothesis as an If....., then.....statement.

Hypothesis: The prediction that could be tested in an experiment. The hypothesis is stated as an "Ifthen....." statement.

If _____,

(Independent variable)

then _____

(Dependent variable)

Control group does not receive a treatment. The control group serves as a basis for comparison.

Experimental group receives the treatment.

5. Describe how the experimental group and the control group in your study should be different.

6. List five characteristics or factors that must be kept the same in both the experimental group and control group.

- _____
- _____
- _____
- _____
- _____

7. What type of data should be collected to support or refute (disprove) the hypothesis.

8. What is the **independent variable** in your study?

9. What is the **dependent variable** in your study?

10. What are the **controlled variables** in your research study?

Independent variable (or manipulated variable) is the variable (factor) you change on purpose in the experiment.

Dependent variable (or responding variable) is the variable that may change as a result of a change in the independent variable. The dependent variable is the data that is observed and measured in a controlled experiment.

Controlled variables are factors that are kept the same in the control group and the experimental group so that your experiment is a fair test.

11. Prepare a data table that you could use to organize the data collected for your research study.

12. Describe the results of your research study that would lead to the conclusion that your hypothesis was supported.

13. Explain why it would be important to include a large number of participants in the control group and experimental group for your research study.

14. Explain two reasons why doing this type of research study would be difficult.

- ---

- ---

Research Data Table

| Mother's ID Number | Baby's ID Number | FLORATRYP in Mother's Urine? (YES or NO) | Two Year Mental Development Index score | Eight Year Brain Structure | Eight Year Creatine Levels |
|---------------------------|-------------------------|---|--|-----------------------------------|-----------------------------------|
| M 98 | B 22 | | | | |
| M 07 | B 34 | | | | |
| M 23 | B 63 | | | | |
| M 56 | B 71 | | | | |
| M 11 | B 85 | | | | |
| M 35 | B 19 | | | | |
| M 62 | B 38 | | | | |
| M 77 | B 76 | | | | |
| M 90 | B 91 | | | | |
| M 74 | B 92 | | | | |