**What is ADD?**

ADD stands for Attention Deficit Disorder and it is quickly infecting the children of America; or at least that is what one could easily assume from the current craze to medicate this problem. The search for a drug that would control hyperactive children with behavior problems is, in retrospect, a new idea. It first began in the 1920s, with the first drug trials in the 1930s. In the article "The Behavior of Children Receiving Benzedrine" published in the American Journal of Psychiatry (1937), Charles Bradley wrote:

"Possibly the most striking change in behavior during the week of Benzedrine therapy occurred in the school activities of many of these patients... There appeared a definite 'drive' to accomplish as much as possible during the school period, and often to spend extra time completing additional work. Speed of comprehension and accuracy of performance were increased in most cases... It appeared promptly on the first day Benzedrine was given and disappeared on the first day it was discontinued."

The idea of turning unruly kids into studious students delighted parents and teachers alike, and triggered the new craze of searching for this miracle drug. Their prayers were answered in the 1950s when the FDA started approving such stimulants as Dexedrine and Ritalin to be used to settle down obnoxious children. However, popularity of these new drugs also brought along with them the general conception that if your child was not well- mannered and did not thoroughly enjoy school, something must be medically wrong with them. And if the answer is a drug, then the "problem" at hand must be a disease.

The symptoms of ADD include some or all of the following:

* Attention Disorder
* Oppositional Defiant Disorder/ Conduct Disorder
* Anxiety and/ or Depression
* Impulse Control Problem: Anger Aggression
* Family Dysfunction
* Problematic Peer Interactions
* Problematic School Functioning/ Failure in School

With these warning signs of ADD it is easy to see why so many parents feel that their children may be in need of professional help. However, according to the National Institute of Mental Health (NIMH), only 3- 5 % of all children should really be diagnosed with ADD or its subset ADHD (Attention Deficit Hyperactivity Disorder). In America, though, about 2 million children take some sort of medication for ADD; with 2 to 3 times more occurrences in boys than in girls. With all these cases of ADD, there are as many as 22 different drugs being used to treat it, according to an article in Advance magazine. This report suggests that there is little information of these various drugs, and therefore one does not know what is truly best for individual cases.

A lot of evidence can be found that medication can improve several important areas of function in children with ADD symptoms. These include:

* Behavior and adjustment in the classroom and at home
* Academic performance and learning
* Self- confidence and self- esteem
* Mood problems such as anxiety
* Social functioning

There have been over 150 controlled studies that have shown a positive result from the use of drugs to treat ADD. As well, there are also doctors like Dr. Edward Hallowell, who uses medications to treat his own ADD, and believes that medication is

"a good- news diagnosis because there's a lot of positive treatment available. The great tragedy is when this is undiagnosed. That's where the real pain occurs."

**Isn't Behavior Part of Personality?**

The debate about medication for the ADD individuals is a popular topic among mental health specialists and parents. ADD is defined as a case in which the child has behavior problems. Couldn't this suggest that the parents, teachers, friends, etc. do not approve of the child's personality?

In the United States, there are 2 to 3 times more cases of ADD in boys than in girls. Ironically, disciplinary problems have always been greater in boys than in girls. Boys are more likely to have discipline problems at school, are more likely to end up in jail, commit more violent crimes, go through with suicide, and become alcoholics. They are more likely to be diagnosed with ADD than are girls, not because they truly have ADD, but because they are more physically active and aggressive. Their behaviors are partly due to the higher levels of testosterone and the lower levels of the neurotransmitter seratonin. Seratonin helps to minimize aggression and impulsivity, and levels of testosterone are especially high while boys are going through puberty (which is when most of them are "diagnosed" with ADD). Some researchers feel that ADD is more a biological imbalance in neurotransmitter secretion than a psychological/ emotional dysfunction.

Before the term ADD came about children with the same characteristics of those who take medication for ADD were thought of as rotten, bratty, unruly, inattentive, underachievers, but overall, normal kids. Unlike now- a- days in which they are rushed to the doctors and given a drug to fix their problems. Society has come to favor "quick fixes" instead of dealing with the problem, and as far as ADD goes, they have created another label to throw around and to associate each other with. According to Dr. Thomas Armstrong in his book The Myth of the ADD Child,

"The ADD label is the product of a short- attention- span culture," "a bad fit between parent and child," "a boring classroom," or "the result of an individual's need for a different way of learning."

Perhaps using medication but in smaller doses and over a longer period of time would not be as bad. This way the drug can be better monitored and not used as a "quick fix." It would also remove the idea of curing a disease but rather help an individual grow mentally. Stanley Turecki, a family psychiatrist, suggests,

"We shouldn't be looking as ADD as a medical illness or a condition that you have or don't have. We should be looking at it as a spectrum involving issues of compatibility and fitting in for the child. Obviously, the more you look at it as a medical illness, the more you think of it in terms of using medication to treat it."

**Dexedrine:**

Now for a closer look at the drugs used to treat ADD. The most common are Ritalin, Cylert, and Dexedrine. These stimulants have been around for about 50 years and according to statistics, they work pretty well. Cylert has worked for about 50% of those who have used it for ADD, and Ritalin and Dexedrine have worked 65- 75% of the time.

The reason why I find Dexedrine much more interesting that the other options is mainly because of two factors: One being that Dexedrine is highly addictive, and the other that although it is used as a behavior modifier in children, it is used in diet pills for adults. These two concepts greatly interested me and made me ask the obvious question, "Why would anyone give that to their kids?"

The description of Dexedrine on the bottle is as follows:

"Dexedrine (dextroamphetamine sulfate) is the dextro isomer of the compound d,l-amphetamine sulfate, a sympathominetic amine of the amphetamine group. Chemically, dextroamphetamine is d- alpha- methylphenethylamine, and is present in all forms of Dexedrine as the neutral sulfate". The molecular formula is CH2CHCH3NH2 + H2SO4.

Just like all drugs, Dexedrine has its side effects. The more common ones are:

* agitation/ irritability
* insomnia
* dry mouth/ unpleasant taste
* headache
* nausea/ dizziness
* weight loss/ suppression of appetite

Less common side effects are:

* reduced stature
* stomach aches
* moodiness
* elevation of blood pressure
* diarrhea
* constipation

Dexedrine pills come in both long turn and short-term versions. The long-term pills are available in 5 mg, 10 mg, and 15mg sizes (I used the 10 mg size for my experiment). These pills are swallowed with water and should not be taken on an empty stomach.

**How the Experiment Got Started:**

After reading about ADD and its treatments, I began to doubt that ADD really existed. To me it seems like merely an excuse parents use for their unruly kids. To change one's behavior, in my opinion, is equivalent to changing one's personality. Some people don't like school; some people don't like to do homework. That doesn't necessarily mean anything is wrong with them, and drugs may not be the answer to these behavior patterns.

But I wasn't about to totally disregard all the accounts of doctors who prescribe medications for their ADD patients or the parents and kids who say that the medication has worked. I had to find out for myself, and not having ADD (or at least I don't believe I have ADD), I needed to test the medicine on someone else: Mice.

**Why Mice?**

Among all the animals used by scientists, the majority of them are mice. They are remarkably similar to humans on the genetic level as well as extremely convenient. Their short life span and rapid reproductive rates make it easy to follow diseases as they grow in the mouse's body. Using mice for tests is not anything new and, in fact, many new drugs are required by an array of federal regulations to be tested on mice before they can go on the market.

**Learning How to Care for my Subjects:**

Although I have had many pets in my life, I have never had mice. This was not much of a problem, but it did require me to research how to properly care for them. I decided early on that it would be difficult to have all white mice because I wanted them to live together. If they were all white it would be difficult to tell them apart. So Fancy Mice seemed to be the right choice to buy because they come in many different colors and coat patterns.

Fancy Mice are categorized as follows:

Order: Rodentia

Family: Muridae

Sub Family: Murinae

Genus: Mus

Specie: musculus

Their average statistics are as follows:

Size: 9-10 cm, excluding tail

Weight: 0.5-1.5 grams (birth), 20-40 grams (adult)

Body temperature: 97-100F

Heart rate: 325-780 beats per minute

Respiratory rate: 94-163 per minute

Adult Food consumption: 10-15 grams per day

Adult water consumption: 15 ml per day

Chromosomes: 40

Gestation period: 21 days

Captive Lifespan: 1.5 to 2 years although 4 years has been known

As you can see from my journal, I did not start off with all males. I originally had an even mix of males and females. My reason for doing this was to slowly introduce the different groups of mice to each other. When I would buy more mice, I would buy several at one time. The ones that came together already were familiar with each other and did not fight. I had little problems introducing the groups to each other, but I did monitor them closely so that I could remove any problematic mice before it was too late. I gradually separated the mice by gender until all the males were together and all the females were together. By the time I did this the males all got along (this was a concern of mine because I had read from multiple resources that males will fight with each other if not properly introduced).

While I had female mice, Spot had seven babies. Four of them were males and so I kept them for the experiment. After the babies were weaned I took all the girls back to the pet store (more details are provided in my journal). I only wanted males for my experiment because the majority of ADD cases are males.

My mice have turned out to be very interesting animals. They are very social with each other and with myself. They will sleep together, groom each other, and make chattering noises at each other. They do appear to have social ranks. They demonstrate this by mounting each other. The more dominant mouse will smell the other's privates and often groom the lower ranked mice as they grovel in front of them. The female mice become very interested with the pregnant mouse's privates when she is in her last week of pregnancy. It's almost as if the other females are anxious for the new arrivals.

Spot had her babies shortly after Raccoon had lost hers. However, Raccoon seemed to think the new babies were hers. She would help Spot groom her babies and add bedding to their nest. At least one of them was with the babies at all times. When the babies got a little bigger and started to adventure out of the nest Raccoon would help Spot carry them back to the nest where they belonged. Ironically, the babies even looked more like Raccoon than Spot, their real mother.

As I mentioned before, the mice chatter at one another and at me as well. They tend to do this the most when I am holding them or new food has been put in their bowls. They use their tails as if it were a fifth hand. They will wrap it around my hand (for example) when they are walking on it to keep their balance. They are actually a lot like cats in their behaviors. They are primarily nocturnal (although they can be found running around during the day as well), they are very clean (despite their bad smell), they use their tails for balance, and they all have their own unique personalities. It amazes me that such small mammals can have such huge personalities.

Now that I had done research on ADD, medication to treat ADD, and knew how to care for my mice and what to expect from them, I was ready to move on with my experiment.

**And so, the Real Question:**

How will Dexedrine, a drug commonly used on children with ADD, effect the activity levels and growth rates of male mice compared to those who do not receive any medication? And is it a positive or negative effect?