

## ADHD MEDICATION INFORMATION SHEET FOR PARENTS AND TEACHERS

Medication was first used to treat children with behavior disorders in 1937. Today, it is the most common treatment for children with attention-deficit hyperactivity disorder (ADHD). About 3.5 to 4.5% of all elementary-aged children in North America have received or are currently receiving medication for the treatment of ADHD. As many as 90% of children with ADHD receive medication at some time, mostly psychostimulant medication such as Ritalin or Adderall, which has led many people to describe stimulant medication as the treatment of choice for ADHD. The reason that medication is prescribed for so many children with ADHD is that many scientific studies have shown that medication — particularly the psychostimulants (e.g., amphetamine compounds, methylphenidate) — is effective in helping children with ADHD in the short-term. However, current recommendations are that medication be used as part of a comprehensive treatment plan that includes behavioral interventions at home and appropriate behavioral and psychoeducational programs at school. Whether medication should be used before, at the same time as, or after behavioral treatments has not been extensively studied.

### Stimulant Medications

Methylphenidate (e.g., Ritalin, Concerta, Daytrana, Metadate, Focalin) and amphetamine compounds (e.g., Dexedrine, Adderall, Vyvanse) are prescribed much more often than other approved drugs for ADHD (e.g., Strattera), with methylphenidate compounds being used most often. The behavioral effects of these drugs can be seen 30-60 minutes after ingestion, and the drugs are typically in effect for up to 4 hours (immediate-release methylphenidate), 8 hours (e.g., immediate-release amphetamine compounds, Metadate-CD, Ritalin-LA) or up to 12 hours (e.g., Vyvanse, Adderall-XR, Concerta, Daytrana). Due to the duration of the behavioral effects, Ritalin or generic methylphenidate is usually given two or three times a day, whereas the longer-acting formulations are given only once. Some formulations are given once in the morning to cover an entire school day (e.g., Adderall, Metadate CD, Ritalin-LA), and a lower dose of short-acting medication in the late afternoon can be given if necessary to help evening behavior. Some of these medications are available in generic forms, which are less expensive than the name brands (Ritalin is methylphenidate, for example). The generic forms work as effectively as the name brands.

### Beneficial Effects

For about two-thirds to three-quarters of medicated ADHD children, stimulants improve their daily classroom behavior and performance, including reduced class disruption, increased on-task behavior, increased compliance with teacher requests, improved peer interactions (e.g., decreased aggression), and improved academic productivity. For example, medication has been shown to improve the amount of assigned seatwork a child finishes, without loss of accuracy. Laboratory (e.g., computerized) tasks of attention and learning have also routinely shown positive immediate effects of medication. When a child responds positively to stimulants, these improvements are generally quite large and immediate. When medication is given for after-school hours and weekends, these beneficial effects extend to the home setting (for example, improving compliance with parent requests) and recreational settings (for example, improving behavior and attention in sports). However, there are individual differences in the amount of response ADHD children show to stimulants. Some children show large improvements, while others improve little or not at all. Thus, medication effects need to be carefully measured to make certain that each child receives the appropriate medication and the appropriate dose.

The majority of the benefit of stimulants for most children are obtained at low to moderate doses—5 to 10 mg of methylphenidate per dose. Most doctors will use the child's weight to determine the dose range for a child. Dexedrine, Focalin and Adderall are twice as potent as methylphenidate, so only half as much medication needs to be used. When doses are increased beyond these low to moderate amounts, less additional benefit is obtained for most children. For example, a child who has 15 non-compliances per day to teacher commands might drop to 5 non-compliances when taking .3 mg/kg methylphenidate. However, doubling the dose of the drug may only produce a further reduction of two non-compliances per day. Further, not all children respond the same to the different stimulants. A child who does not respond very well to methylphenidate may improve with Adderall, and vice versa. Thus, if a child does not respond well to one of the stimulants, most physicians will try an alternative stimulant. An ideal goal with these medications is to use the lowest possible dose that produces improved behavior without side effects.

Most of the studies that have documented these beneficial effects have been conducted with elementary-aged ADHD boys with the inattention/impulsivity/hyperactivity type of ADHD. The beneficial effects of psychostimulants that are seen with these boys are also seen in boys with predominately inattentive type ADHD, as well as with girls. The positive effects are also evident in preschoolers, adolescents, and adults with ADHD, although the effects for these age groups on average are somewhat smaller than with elementary-aged children. The fact that benefits from stimulant medications continue in adolescence and adulthood suggests that stimulants remain effective as long as an individual is symptomatic (that is, as long as the individual is having difficulties associated with ADHD).

Medication should be prescribed for the times of day and the days of the week when a child has problems. If a child has difficulties only in school, for example, then he or she needs medication only during school hours. If a child has difficulties after school or on weekends, (for example with peers around the neighborhood) medication can be used during these times in addition to school hours. If a child has no problems during vacations or summer activities, medication is not needed.

Importantly, behavioral and academic improvements last for only as long as the medication is given. There are no proven long-term benefits of stimulants after the patient stops taking them—that is, they do not cure ADHD. For example, studies have shown that if medication is the only treatment a child receives, he or she will not show any more improvement as a teenager or young adult than a child who never received treatment. The current prevailing professional belief is that psychosocial treatments like parent training and classroom behavioral treatment should be given with medication to maximize the chances of long-term improvement. This is one of the main reasons that medication is typically not recommended as the only treatment for ADHD. Instead, it is recommended as an additional treatment for children who are receiving behavior modification and/or educational interventions.

#### Adverse Effects

The benefits of medication must always outweigh any adverse effects that the medication causes. Loss-of-appetite and insomnia are the most common adverse reactions to stimulants. Other reactions that can occur include irritability, nausea, dizziness, stomachaches, headaches, skin rashes, anxiety, drowsiness, lip smacking, cheek biting, nail biting, muscle twitches or repetitive noises like a cough (otherwise known as tics), and social withdrawal (e.g., interacting less with other people). Rarely, hallucinations and psychotic episodes have been reported, but these side effects usually appear only at very high doses and in children already experiencing these problems. Some children may be more sensitive to stimulants than others and act overmedicated to the point that they are almost too subdued.

Many of these symptoms either disappear within a few days or can be controlled by reducing the dosage of medication or changing the timing of a dose. In more severe cases, stopping medication causes the side effects to disappear. A reduction in growth has been reported with long-term stimulant use. There is disagreement about the overall long-term effects, however, as some reports show that children have a period of catch-up growth if the medication is discontinued. If medication is continued for as long as a decade, then the child's adult height might be permanently reduced by a maximum of 2 inches. The medical practice of using relatively low dosages, giving medication only for school hours, and minimizing medication on weekends or vacations, is intended to reduce this problem.

There is some evidence that Ritalin at high doses lowers the seizure threshold in children with seizures or abnormal EEGs without seizure activity. However, scientific studies show no increased seizure activity on the dosages of stimulants that are usually used in treatment, and stimulants have been safely prescribed to children with a seizure disorder that is controlled by medication.

There has also been a suggestion that in rare cases stimulants can cause motor tics and Tourette's Syndrome (severe motor and vocal tics), or make these problems worse, in children with a history of these problems. However, careful studies have shown that moderate doses of stimulants do not cause increased motor tics in most children. Therefore, stimulant medication may be used with a child with tics, but the child's physician should monitor these symptoms very carefully as 25% of the time, the medication can make the tics worse. Less commonly, stimulants will bring out tics in children who had never before exhibited them. Generally, stopping the medication will make the tics disappear or go back to the pre-medication level. Occasionally, motor and verbal tics will persist for some time after the medication is stopped.

Some media claims about negative effects of these medications are untrue. For example, stimulants do not cause children to become suicidal or homicidal. Similarly, children with ADHD do not become psychologically reliant upon their medication or physically addicted to it. Whether stimulants might

increase an ADHD child's risk for later substance abuse is a hotly-debated topic although most studies have found no increased risk of drug or alcohol problems in young adults who used stimulants during their childhood. However, stimulants are potentially abusable drugs, and many adolescents think that these medications will make them smarter or feel high, so it is always advisable to keep the medications safely stored out of the reach of children. Most physicians have concern about prescribing stimulants to adolescents who may also have problems with drug or alcohol abuse.

Finally, stimulants cause increases in heart rate and blood pressure. There have been reports of increased risk of sudden death in children and adults on stimulant medications. However, children with pre-existing heart disease, recurrent fainting, or a family history of sudden death or heart attack in young people may be at higher risk and should take stimulants only with agreement of their heart specialist.

#### Other Medications

Strattera is a nonstimulant medication that has been approved for ADHD. Its effects are similar to those of the stimulants but not as strong. Unlike stimulants, it needs to build up in the child's system over 1-3 weeks and cannot be used for school days only. It is generally used when a child has not responded to stimulants or the family prefers not to use stimulants.

Besides the stimulant medications and Strattera, there are no medications that are approved by the FDA to treat ADHD. Although many other medications are used (for example, Clonidine, Tenex, Provigil, Wellbutrin), their effects on ADHD symptoms are considerably less than what is obtained with the stimulants, and they have been not studied as much in children, so it is harder to predict how any individual child will tolerate them. In addition, combinations of these medications with the stimulants are not approved, and the safe and effective use of combination drug approaches has not been demonstrated. Because these other medications do not have proven safety and because of their limited beneficial effects, it is widely recommended that an ADHD child be tried on multiple forms of stimulant medication before being treated with any other class of drugs. If a child fails to respond to all forms of stimulant drug or has prohibitive side effects to all stimulants, he or she may derive some benefit from another medication, but the risks associated with the other medications should be carefully evaluated against the benefits obtained.

#### Determining the Most Appropriate Medication and Dose

As noted above, there are large differences in the way individuals respond to stimulant medications. Approximately 20% of ADHD children do not show positive responses to stimulants. These children either have no response or have adverse responses to medication. Some children respond positively in all the areas that we highlighted above and show no side effects, while others may improve only in some areas and may have adverse effects that mean they cannot tolerate medication. Some children respond best to one of the stimulants, while others respond better to another, a reason why a child should be tried on all types of stimulants before it is assumed that he/she is a nonresponder to stimulants.

It would be helpful if there were a way to test children to tell how they would respond to medication before trying it. Unfortunately, there is currently no way to predict in advance which children will respond positively to these medications and which children will have adverse responses. To find out if a child should take stimulant medication as part of treatment, he or she should participate in a brief medication trial (e.g., 3 to 6 weeks) where its effects are carefully measured at school and, if necessary, at home. Objective measures (e.g., how many times a child disobeys the teacher) and parent and teacher ratings of improvement and side effects should be employed. If placebos are also used in the trial, the doctor can be confident that the actual medication effects, and not children's or adults' beliefs about medication, are being measured. It is important in such trials to measure precisely the area in which the child is having difficulties. For example, by using a child's Daily Report Card (see Psychosocial Treatment Fact Sheet for Parents and Teachers) target behaviors at school (e.g., finishes assignments within defined time with 80% accuracy) as a measure of improvement, parents can be certain that the medication is improving the behaviors that their child's teacher considers most important. At the end of the trial, the doctor can examine the information gathered and determine (a) whether the child improved in problem areas, (b) whether negative side effects were shown, and (c) the lowest dose that maximized improvement without side effects. If an assessment is done while the child is receiving concurrent behavioral treatment, then results will tell whether medication causes improvement above and beyond the current behavioral intervention and whether medication should be a part of the child's ongoing treatment. Typically, far lower dosages of medication are needed if concurrent behavioral treatments are being conducted with a child, compared to when a child is treated with medication alone.