A Guide to Tourette Syndrome Medications

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This publication is intended to provide information about Tourette Syndrome, its management and medications currently in use. Families are advised to consult a physician concerning all treatments and medications.

Tourette Syndrome (TS) or Tourette's disorder (DSM IV-TR) is a childhood onset, brain-based disorder characterized by persistent motor and vocal tics that last for more than one year. Tics are brief, meaningless movements or sounds, but can be more complex and appear purposeful. In addition, many people with TS have other problems that might include one or more of the following: difficulties with attention, learning, compulsive behavior, anxiety, irritability, depression, impulsivity and aggression. The challenge of living with tics and co-occurring problems can often lead to poor functioning in school, in the work place and difficulty with social adjustment. For many, medication treatment for tics and these co-occurring problems can be very helpful in reducing symptoms and improving functioning.

Does Everyone with TS Need Medications?

Even though medications can be helpful in reducing tic severity, most people with TS will not require prescription medications for their tics. The need for medication depends on the severity of tic symptoms, the presence of co-occurring problems and the person's overall functional capacity. For example, those with very frequent tics, but who are not distressed by them, may not want or require medication. On the other hand, some with less severe symptoms may experience impairment in social, school or work functioning and elect to pursue medication treatment. Ultimately, the decision about whether or not to start a medication should take these realities into account. Even though not everyone may need medication for their tics, it is important for everyone to know what the treatment options are.

General Principles of Medication Treatment

Prior to starting medication it is important to find a qualified clinician (e.g. physicians, nurse practitioners and psychologists) for an evaluation. Although many clinicians can provide evaluation and treatment services, it is important to identify a clinician who has the expertise and the time to do the evaluation and be able to start and monitor medication treatment. The evaluation should at minimum identify problems related to tics and any co-occurring conditions. Other important components of a good evaluation include the patient's general health, family history of any medical and psychiatric problems, treatment history including which medications the person is taking currently or might have taken in the past. A thorough evaluation is a critical first step for making good medication choices.

The next step is a discussion with the clinician about the results of the evaluation, the plan for treatment and available treatment options. This discussion should focus on the problems identified and the reasons for deciding on a particular treatment plan. Although people with tics tend to pursue treatment when symptoms are significant, it is important not to be in too much of a hurry. Some tic exacerbations may resolve in time and therefore may not require treatment with medication (e.g. tic increases due to excitement during holidays or vacations). It is worth the time it takes to make a good decision about whether or not to begin taking medication.

The final step is the actual treatment trial — a process of finding the best dose with the fewest side effects. Most clinicians begin medication with a low dose and increase the dose over time in order to reduce tic severity while keeping medication side effects to a minimum. It is extremely important when beginning medication to report both the benefits and side effects to the clinician so that the best and safest dose of medication can be found.

Although everyone would like to take the lowest possible effective dose of medication, sometimes higher doses may be necessary and should not, in principle, be avoided or cause undue concern. Finding the best dose of medication for a child can be more complicated than for adults. Although children often use lower doses than adults, parents should not automatically assume that children always require low doses of medication. Actually, children sometimes require doses similar to those of adults or even higher. It is advisable to work

with clinicians experienced in treating children and who are aware of such differences and take them into account when prescribing medication. With the right clinician a medication trial can be accomplished -- even in young children.

Because most medications do not show benefit immediately, the pacing of dose adjustments is also important. Taking too long to increase the dose of a medication may unnecessarily prolong suffering; increasing doses too quickly may inadvertently overshoot the effective dose and increase the risk of side effects. Once an optimal medication dose is identified, ongoing monitoring is required to assess for continuing benefit, side effects and adherence to the medication plan.

After a period of successful treatment, the clinician may suggest reducing the dose of medication in order to identify the lowest dose that is necessary to maintain good tic control. Because tic symptoms routinely wax and wane and improve over time, periodically reducing the dose of medication is an important part of tic treatment. Almost all tic suppressing medications should be reduced slowly to find the lowest effective dose. A slow reduction in medication is particularly important for those who have been on tic suppressing medications for an extended period of time. The same goes for discontinuing medication; the dose should be reduced slowly and then stopped, **and never stopped abruptly.** Stopping tic suppressing medications abruptly can actually cause tics to worsen in a way that would not otherwise occur with a more gradual reduction in dose. Some patients actually develop transient motor movements called "withdrawal dyskinesia" from discontinuing medication too quickly. Your clinician will prescribe a safe step-by-step program for decreasing dosage until the medication is discontinued completely.

Problems that co-occur with TS may also respond to medication. At the end of the evaluation, it is not uncommon for people with TS to become more aware of just how these co-occurring problems have been impacting their lives. If co-occurring problems are more impairing or distressing than the tics, clinicians may suggest that the co-occurring problems be treated first rather than treating the tics. For example, a child with mild to moderate tics may have more significant problems with attention and concentration at school, or anxiety and fears at home. Treating these other problems first may be helpful in ways that the child and family hadn't initially considered. By addressing these problems first, functioning at school and at home might improve and make it less likely that the tics will require treatment.

Those coping with both tics and another co-occurring problem may require treatment for both conditions. Sometimes addressing two (or more problems) may require a treatment plan that includes two (or more) medications. While it is always simplest to use one medication, taking two medications to treat two or more problems is routine practice, and should not cause undue concern. That said, while careful monitoring and good communication are important when on a single medication, these precautions are critically important when medication combinations are prescribed.

Some people with TS lead very difficult lives. At times their difficulties are caused by their symptoms, sometimes by how others treat them, and sometimes their problems are due to the decisions and choices they make for themselves. Although this brochure focuses on medication treatment, it is very important to note that not all the problems a person with TS faces can be resolved by taking medication or reducing tic symptoms. Actually, psychological treatments may be the most important and valuable first treatment step for many with TS.

Where Can One Get Good Information about Medications?

For information about specific medications, there are quite a few helpful resources. Perhaps the easiest way to access information about medications is from reputable sources on the Internet. A drug manufacturer's website provides specific product information that has been reviewed and approved by the U.S. Food and Drug Administration. This is the same information that is in the Physicians' Desk Reference (PDR) and is the basis of the information provided by pharmacists with every prescription. A medication's product information is usually of very high quality, but not always easy to read and understand. MedlinePlus website http://medlineplus.gov is a public service provided by the U.S. National Library of Medicine and the National

Institutes of Health. This website provides basic information about prescription and over-the-counter medications as well as some herbs and supplements. The information is presented in a straightforward, easy-to-read manner and is prepared by the American Society of Health-System Pharmacists based on information from the U.S. Pharmacopea and MedMaster® drug information database. Because most medications used for tic suppression are marketed for other medical conditions, there is usually limited information about how these medications work in TS. Therefore, textbooks on TS and review articles about TS in the medical literature can be very helpful in clarifying how medications are specifically used in TS.

Although other websites may be helpful as well, it is important to "consider the source" and not be unduly influenced by websites that are less than reputable. It is important to remember that there are some people and organizations that have very strong opinions about using medications to address medical and behavioral problems. Some of these websites provide information that is not necessarily based on scientific evidence and the information posted may even employ "scare tactics" to influence people about the safety and efficacy of specific medications.

Which Medications are used in TS?

The medications used for reducing tic severity or treating co-occurring conditions come from different drug classes. Within each class there are a number of medication options a clinician and patient might choose. That is why, individuals with TS and their families should discuss with their clinicians the specific symptoms to be targeted for medication treatment and the specific medication to be used. The following section is organized by class of medication and then within each class are the specific medication options.

Tic Suppressing Medications

There is no medication that has been discovered or developed specifically for the purpose of reducing tic severity. Rather, medications developed to treat other medical and psychiatric conditions have been later found to be helpful in reducing tics. As a result, most of the published information about medications for tic suppressing will refer to their use for other conditions without mentioning their usefulness in treating TS. The information below describes basic information about how these medications are commonly prescribed and how they are used in treating TS.

Antipsychotics

Antipsychotics are the most effective group of medications for reducing tic severity. They are classified as major tranquilizers or antipsychotic medications because they are generally prescribed for hallucinations, delusions and problems with thinking and organization in people with psychosis. These medications have also been categorized as antiemetics because they can be effective in reducing severe nausea and vomiting. There are a number of medications considered to be part of the antipsychotic class, and most of these have been tried in people with TS.

Antipsychotic medications are thought to be helpful for TS symptoms because of their ability to decrease dopamine function in the brain. Dopamine is a neurotransmitter--a brain chemical--which is involved in nerve cells communicating with each other. Some antipsychotics have a lot of specific power to reduce dopamine functioning and some have less power. Antipsychotics also differ in their impact on other brain neurotransmitters (e.g. serotonin, norepinephrine, acetylcholine). The effect of a specific antipsychotic on dopamine and other neurotransmitters will impact the medication's possible benefits as well as its side effects.

Antipsychotic medications with proven efficacy for reducing tic severity include the typical antipsychotics haloperidol (Haldol®), pimozide (Orap®), and the atypical antipsychotic risperidone (Risperdal®). Others antipsychotics may also be helpful [e.g. fluphenazine (Prolixin®)] even if they have not been specifically studied in TS. In general, antipsychotics with the greatest dopamine blocking activity are the most effective for reducing tics. However, the decision about which medication a person should take depends on which medication may benefit the specific patient best. Clinicians may suggest using a medication other than one with a long track record because balancing the benefit and side effects may fit the individual better than medications more commonly prescribed.

Reducing dopamine function is helpful for reducing tic severity, but reducing dopamine function may also result in unwanted effects on motor control such as stiffness, slowed movements and unwanted muscle contractions (i.e dystonic reactions, tremor and restlessness).These side effects are common enough that people should be aware of them and understand the best way to manage them. They are all reversible either by reducing the dosage, or in some cases by discontinuing the medication. Moreover, some of these motor side effects can be controlled by taking anticholinergic medications such as benztropine (Cogentin®), diphenhydramine (Benadryl®) and trihexyphenidyl (Artane®). Anticholinergic medications may be started with a antipsychotic to prevent the development of unwanted motor side effects, or given after motor side effects develop to reduce discomfort. Similarly, because antipsychotics are tranquilizers and reduce agitation for people with psychosis, they may be too tranquilizing for people with TS, resulting in sedation or reduced cognitive efficiency.

In general, the dose of antipsychotic used to treat psychosis is considerably higher than doses used for tic suppression. A dose of antipsychotic for tic suppression may range from 5-30% of the daily dose required for psychosis. There are always exceptions to such general statements, but usually, high doses of antipsychotics for tic suppression are not more helpful than lower doses, cause more side effects and therefore are not recommended.

To improve the treatment for psychosis and to decrease the risk for motor side effects, atypical antipsychotics were developed. Atypical antipsychotics have relatively less impact on dopamine and more impact on other neurotransmitter systems. Because of the lesser effects on dopamine, atypical antipsychotics may be a better choice for people with TS who are sensitive to motor side effects caused by the typical antipsychotics. In addition, atypical antipsychotics may impact other neurotransmitter systems as well, resulting in a broader range of benefits (e.g. improved mood or impulse control) for people with TS. Although atypical antipsychotics may have less risk for motor side effects, some appear to increase appetite and cause weight gain. Recently there has been increasing concern about antipsychotic-induced weight gain being associated with the development of metabolic problems including non-insulin dependent diabetes (i.e. type II diabetes) and elevated cholesterol.

In addition to the common side effects of antipsychotics described above, it is important to know about two **very uncommon,** but significant complications of antipsychotic treatment--tardive dyskinesia and antipsychotic malignant syndrome. Discussing these complications of antipsychotic treatment in this brochure does **not** mean that they are likely to occur; rather they are described here to put the risk of these side effects into perspective and allay concerns of individuals who may be considering antipsychotic treatment.

Tardive dyskinesia is a motor side effect of chronic antipsychotic treatment which is rare in individuals with TS, but more common in individuals treated chronically with antipsychotics for psychosis. Tardive dyskinesia tends to be a more continuous movement problem than tics which tend to be brief and episodic. Features of tardive symptoms can include the inability to hold the tongue or mouth still (i.e. chronic worm-like or chewing movements). Writhing movements of the arms, legs, and trunk may also occur. When the hands are affected, the person may appear to be playing an invisible guitar or piano. Tardive dyskinesia may emerge during extended treatment with antipsychotics or may occur when the antipsychotic dosage is reduced after long term treatment. There is no specific treatment for tardive dyskinesia. When symptoms are identified, medication discontinuation is recommended unless the medication is absolutely critical to maintain functioning. Because it can be difficult to distinguish some complex tics from symptoms of tardive dyskinesia, a movement disorder specialist should be consulted when it is suspected that a person with TS has developed tardive dyskinesia after treatment with antipsychotics.

Antipsychotic malignant syndrome (NMS) is a **very rare** and potentially serious complication of antipsychotic treatment. Although the cause is unknown, the symptoms of NMS are consistent with nearly complete blockage of dopamine function that leads to severe muscle rigidity, fever, seizures, muscle breakdown and kidney failure. When identified early, NMS can be effectively treated. If NMS symptoms are not recognized and not addressed appropriately, they can result in death. It must be emphasized that NMS is **extremely rare** in individuals with TS and that clinicians are specifically trained to observe for the signs of NMS. Therefore, concerns about NMS should not result in rejecting a trial of antipsychotics for tic suppression.

Alpha Adrenergic Agonists

Another class of medications commonly used for tic suppression are the Alpha Adrenergic Agonists — clonidine and guanfacine (Catapres® and Tenex® respectively). These medications are marketed to control high blood pressure, but have been prescribed for a number of other conditions, including drug withdrawal syndromes and tics. Exactly how alpha adrenergic agonists reduce tic severity is not known, but it may be related to decreased central nervous system arousal.

Dosages of alpha agonists for tic symptoms are usually lower than those used in the treatment of high blood pressure. Because alpha agonists are short acting, for optimal tic control multiple doses throughout the day (2-4 doses) may be required. Although some people with TS may have a fairly dramatic response to alpha agonists, most experience more modest benefit than what is usually observed when taking antipsychotic medications. On the other hand, the side effect profile of the alpha agonists is milder than that of the antipsychotics. The most common side effect is sedation which can occur even at fairly low doses. Some children on alpha adrenergic medications have exhibited increased irritability.

As described below, alpha agonists can also be helpful in treating Attention Deficit Hyperactivity Disorder (ADHD). The combination of modest benefit for tics and ADHD plus a better side effect profile than antipsychotics is why some clinicians choose alpha agonists first when prescribing medication to treat children with TS.

Both clonidine and guanfacine come in a patch form. When attached to the skin, the patch releases the medication into the blood stream more gradually than pills thus providing more convenient dosing and consistent medication effects. The patch option decreases the need for pill taking multiple times each day, and may have fewer side effects than the pill form. However, some people develop a skin rash at the site of the patch prompting discontinuation.

Medications Not Well-Studied for Reducing Tic Severity

Many other medications have been prescribed to individuals with TS to reduce tic severity. However, these medications are less well established and therefore less commonly used. One problem with evaluating whether a medication is effective in reducing tics is the fact that tics wax and wane over time. As most people tend to seek treatment when their symptoms are at their worst (people don't go to the clinician when all is well), it is not uncommon for people to experience some decrease in tic symptoms right after visiting their clinician--even when no treatment has been prescribed. Therefore, a person beginning medication may falsely attribute the reduction in tics to the effects of the medication, rather than to the natural course of the disorder. For this reason most clinicians are skeptical of reports about a single person doing very well on a newer or less established treatment. Understandably, clinicians are more confident about treatments that have proved effective in well-designed scientific studies.

Clonazepam (Klonopin®) is a minor tranquilizer used in the treatment of anxiety, seizures and bipolar disorder and has been studied and found to be helpful for tic suppression. Reducing anxiety in people with TS may in and of itself reduce tic severity.

Early studies of nicotine in the form of a skin patch or chewing gum and nicotine blocking medications such as mecamylamine (Inversine®) were both found to be to be helpful in reducing tics. However, subsequent definitive studies have not borne out the initial enthusiasm for these treatments. Baclofen (a muscle relaxant), tizanidine (used to treat muscle spasticity), and topiramate (used for seizures) may be helpful for tics, but further, more definitive evaluation is required.

Table 1. Medications used in the Treatment of Tics

Typical Antipsychotics			
Medication	***Usual Starting Dose***	***Usual Treatment Dose***	***Comments***
haloperidol **Haldol®**	0.25-0.5 mg	1-5 mg	The standard treatment for many years for tics. Often not used as the first medication for tic suppression due to side effects.
pimozide **Orap®**	0.5-1.0 mg	1-6 mg	Risk for drug interactions and cardiac effects make pimozide a second choice for tic suppression.
fluphenazine **Prolixin®**	0.5-1.0 mg	1.5-10 mg	Similar to haloperidol, but some believe it has a milder side effect profile. A good first choice typical antipsychotic for tic suppression.
tiapride **Tiapridex** **Tiapridal** (Belgium, France, Spain, Holland, Switzerland)	50-150 mg	150-500 mg	Not marketed n the United States. May have fewer motor side effects than haloperidol.
sulpiride **Dogmatil** **Sulpital** **Sulparex** (UK, Europe)	100-200 mg	200-1000 mg	Not marketed in the United States. May have fewer motor side effects than haloperidol.
Atypical Antipsychotics			
risperidone **Risperdal®**	0.125-0.5 mg	1-3 mg	Probably the best atypical antipsychotic for tic suppression. May have less risk for motor side effects than haloperidol and fluphenazine. May also benefit impulse control and aggression. Weight gain can be a significant problem in some patients.
paliperidone **Invega®**			Metabolite of risperidone. Too early to know what the dosing might be.
ziprasidone **Geodon®**	20 mg	20-100 mg	A newer antipsychotic with less chance for the development of weight gain. Unclear how helpful it is for tic suppression. Lowest available dose is 20 mg. Studies of ziprasidone had other dose preparations available that are not available currently.
olanzapine **Zyprexa®**	2.5-5 mg	5-20mg	Not well-studied in TS; registered weight gain is greater than risperidone.

quetiapine **Seroquel®**	50-100 mg	100-400 mg	Another new antipsychotic. Not well studied in TS and unclear on how effective it is for tics. Dosing is not established.
aripiprazole **Abilify®**	1-2.5 mg	5-20 mg	An antipsychotic with a unique mechanism of action. Studies are currently underway. Appears promising as a tic-surpressing medication but dosage is not yet established.
tetrabenazine **Xenazine®** **Nitoman®**	25 mg	37.5-150 mg	Recently available in the United States.
Adrenergic Agonists			
clonidine **Catapres®**	0.025-0.05 mg	0.1-0.3 mg	First non-antipsychotic to be tried for tic suppresion. Not consistently as effective as antipsychotics for tic suppression. Also helpful for ADHD.
clonidine patch **Catapres® patch**	TTS-TTS1	TTS1-TTS3	Same as clonidine tablets, localized skin rash.
guanfacine **Tenex®** **Tenex CR®**	0.25-0.5 mg	1-3 mg	Longer acting and perhaps less sedating than clonidine. May be a good first choice fo tic suppression in children with ADHD.
Benzodiazepines			
clonazepam **Klonopin®**	0.025-0.5 mg	0.5-6 mg	Some potential for developing tolerance. Slow tapering may be required for discontinuation.

Stimulants for TS Plus Attention Deficit Hyperactivity Disorder

The most commonly used medications for Attention Deficit Hyperactivity Disorder (ADHD) are central nervous system stimulants which contain the chemical compounds methylphenidate (e.g. Ritalin®, Concerta®, Metadate® and Methylin®), dextroamphetamine (Dexedrine® and Dextrostat®) and mixed amphetamine salts (Adderall®). Stimulants have proved effective for ADHD symptoms in children with and without TS. Common side effects of stimulants include appetite suppression and difficulty falling asleep. One of the greatest drawbacks of stimulant medications is their short duration of action. To have maximum benefit, children with ADHD may have to take medication multiple times each day including at school. To address this drawback the pharmaceutical industry has developed new longer acting preparations to extend the duration of benefit thus making stimulants more useful for people over the course of a day.

In the late 1970's and 1980's there were numerous published reports that children taking stimulants developed new onset tics or experienced worsening tics. One confounding factor regarding stimulants "causing" new or worsening tics is the fact that ADHD symptoms often emerge before the development of tics. So if stimulants are begun for ADHD and then tics appear, it is difficult to know whether the tics are "caused" by the stimulant, or whether the onset of tics would have occurred anyway as part of the natural course of the tic disorder. Whether stimulants actually cause tic worsening can be determined in a research study by comparing the rates of tic worsening in subjects on medication vs. placebo. In such studies, tic worsening has not occurred more commonly in those on stimulant medication compared to placebo. Interestingly, the Tourette Syndrome Study Group's study comparing methylphenidate to clonidine and placebo showed similar rates of tic worsening (approximately 20-25%) in each group. The lack of a difference between methylphenidate and placebo suggests there is no risk for tic worsening that can be specifically attributed to taking the stimulant methylphenidate. It is important for the clinician, parents and the child to pay attention to how frequently tics worsen after starting medication treatment. All should be aware that tic worsening is something that might occur during any treatment with any medication, even placebo, and to be careful about attributing such worsening to having begun to take a medication. Although it appears that stimulants can be used safely in people with tics and ADHD, the product labeling of methyphenidate and amphetamine products discourages using stimulants in people with tics or people with a family history of tics. Although scientific studies do not necessarily support this concern, it is highly unlikely that the labeling will change. As you can imagine it is difficult for a pharmaceutical company to remove warnings from their labeling as it may make them more vulnerable to lawsuits. For children with tics and ADHD whose clinician has recommended a stimulant, it is important to know that the evidence base for safety and the product information for stimulants don't completely match up.

Lastly, recent media reports and U.S. Food and Drug Administration hearings have alerted all to the risk of stimulants in children with known heart defects and also to the worsening of symptoms of other psychiatric disorders. It is important before beginning to take stimulants that the prescribing clinician be aware of the patient's personal and family history of cardiac problems.

Non-Stimulant Medication for ADHD Treatment

Because of past concerns about the association of stimulants with the emergence of new tics or the worsening of current tics, clinicians have sought alternative medications to treat ADHD symptoms. Perhaps the most common alternatives are clonidine and guanfacine. Both have proved effective in reducing both tic severity and ADHD symptoms. Common side effects of these two medications include sedation and irritability. Another medication with an FDA indication for ADHD is atomoxetine (Strattera®). Atomoxetine is a norepinephrine reuptake inhibitor that has demonstrated efficacy for ADHD in children with tics. Common side effects of atomoxetine include sedation, gastrointestinal upset and irritability. In the past, tricyclic antidepressants were found useful for ADHD in children with and without tics. A number of case reports of sudden death in children taking desipramine in the early 1990's has had a significant negative impact on the number of clinicians prescribing this medication for ADHD. While there are theories about why tricyclic antidepressant might have been a contributing factor in these deaths there is no proven causal link.

Table 2. Medications used in the treatment of co-occurring ADHD and TS

Medication	*Usual Starting Dose*	*Usual Treatment Dose*	*Comments*
Antidepressants			
imipramine **Tofranil®**	25-50 mg	50-300 mg	A tricyclic antidepressant less commonly used today due to poor tolerability and risk for electrocardiogram changes especialy in children. May have benefits for ADHD, anxiety and depression. Helpful for sleep problems in depression and anxiety
desipramine **Norpramin®**	10-25 mg	50-200 mg	Shown to be effective in children with ADHD and TS, but risk for electrocardiogam changes remain a concern
nortriptyline **Pamelor®**	10-25 mg	50-150 mg	Similar to desipramine, but less well studied
bupropion **Wellbutrin®** **Wellbutrin XR®** **Wellbutrin SR®**	50-75 mg	75-450 mg	A novel antidepressant with a unique mode of action. Effective in ADHD, but benefit is smaller than stimulants Risk for seizures if dose is increased rapidly.
Stimulant medications			
methylphenidate **Ritalin®** **Ritalin SR®** **Ritalin LA®** **Methylin®** **Methylin ER®** **Concerta®** **Metadate®** **Metadate ER®** **Metadate CD®**	2.5-10 mg	10-60 mg	Commonly used stimulant available in short and long-acting preparations. Short acting preparations may require midday and late afternoon dosing. Longer acting compunds may require 1-2 doses per day depending on the preparation. Common side effects include decreased appetite, insomnia and irritability.
dexmethylphenidate **Focalin®**	2.5 mg	5-30 mg	Similar to methylphenidate.
dextroamphetamine **Dexedrine®** **DexePatch®** **Dextrostat®** **Dexedrine® spansules**	2.5-5 mg	5-60 mg	Commonly used stimulant with both short and long acting preparations. Similar to methylphenidate in efficacy and side effects.

amphetamine salts **Adderall®** **Adderall XR®**	2.5-5 mg	5-60 mg	A combination of four different d-amphetamine and l-amphetamine compounds. Similar to dextroamphetamine and methylphenidate in efficacy and side effects.
lisdexamfetamine Vyvanse ®	30 mg	30-70 mg	Not well-studied for TS.
Norepinephrine reuptake inhibitors			
atomoxetine **Strattera®**	10-18 mg	36-100 mg	A unique medication for ADHD based on its effects on norepinephrine. Dosing in chldren is based on weight. Common side effects include sedation, stomach upset, vomiting and irritability. May require several weeks for dose adjustment to maximize benefit and minimize side effects.

SSRIs and other Antidepressants

A class of antidepressant medications found useful when treating Obsessive Compulsive Disorder (OCD), other anxiety disorders and depression are the Selective Serotonin Reuptake Inhibitors (SSRIs). Most of these are approved for use or have demonstrated safety and benefit in children and adults with OCD down to as young as age 6 years. Unlike stimulant medications that work almost immediately, antidepressant medications often take from 2-4 weeks of treatment to begin to be effective. To maintain benefit over time requires that the person take the medicine consistently at an effective dose. Extended treatment with antidepressants 9-12 months minimum may be necessary for ongoing control of symptoms. Too low a dose and/or too short a duration of treatment are the primary reasons for poor outcomes with antidepressants.

The various SSRIs differ both in their half-life (i.e. how long it takes for the body to reduce the blood level by half) as well as their potential for drug interactions. Long half-life SSRIs take longer to leave the body after discontinuation, but they are also more stable when doses are missed. Short half-life SSRIs clear from the body more quickly if side effects develop, but may be less effective when doses are missed. Clinicians often weigh these factors when recommending an SSRI. For example, short acting SSRIs with a low risk for drug interaction are better for someone sensitive to side effects and are already on other medications. While SSRIs are generally well tolerated some people early in the course of treatment may feel activated or agitated, have gastrointestinal side effects or headaches. These side effects can be managed by reducing the dose and in some cases, discontinuing the medication. Clomipramine is a tricyclic antidepressant that is also useful in treating OCD in children and adults because of its serotonin reuptake properties.

Although not common, antidepressants, including the SSRIs, can also induce manic reactions (e.g. euphoria, grandiosity, decreased need for sleep and increased interest and involvement in high risk activities). This worrying complication may require management by a psychiatrist experienced in treating people with bipolar disorder. More recently the Food and Drug Administration has warned that about 2% of young people treated with antidepressants may experience an emergence or worsening of suicidal thoughts and behaviors. Your clinician is the best person to help you understand whether the potential benefit of medication outweighs this small potential risk. Clinicians, patients and their families need to know about all risks, including the risk of not treating anxiety and depression, and be vigilant early in the course of treatment for the unexpected emergence or worsening of depression or suicidality.

Table 3. Antidepressants for OCD, Anxiety and Depression

Medication	*Usual Starting Dose*	*Usual Treatment Dose*	*Comments*
Serotonin reuptake inhibitors			
fluoxetine **Prozac®**	2.5-20 mg	10-60 mg	The SSRI with the longest half-life and highest potential for interacting with other drugs. Only SSRI approved by the FDA for use in children with depression.
paroxetine **Paxil®**	5-10 mg	10-60 mg	The half-life of paroxetine gets longer with repeated dosing. Similar to fluoxetine in benefits, side effects and drug interactions. Paroxetine may be more often associated with sedation, weight gain and withdrawal reactions than other SSRIs.
sertraline **Zoloft®**	12.5-25 mg	50-200 mg	A SSRI with a short half-life and fewer potential drug interations than fluoxetine. However, the product labeling advises against combining sertraline and pimozide.
fluvoxamine **Luvox®**	25 mg	50-300 mg	One of the first SSRIs with demonstrated efficicacy in childhood and adult OCD. A short acting SSRI with a different drug interaction profile than fluoxetine, paroxetine and sertraline.
citalopram **Celexa®**	10-20 mg	10-60 mg	A medium duration half-life with similar side effect profile to the other SSRIs. Lower likelihood for drug interactions than fluoxetine and paroxetine.
escitalopram **Lexapro®**	5-10 mg	5-20 mg	Citalopram consists of two mirror image compounds called isomers. Escitalopram is the medicinally active form of the two compounds. Escitalopram has a medium half-life and a side effect profile similar to the other SSRIs.
clomipramine **Anafranil®**	25-50 mg	50-200 mg	A tricyclic antidepressant with serotonin enhancing properties. Useful in OCD. It is not as selective for serotonin as the SSRIs and has more side effects, but may be useful for those with OCD who have trouble sleeping. Combining clomipramine with some SSRIs may increase risk for side effects and decrease its efficacy.
Norepinephrine reuptake inhibitors			
venlafaxine **Effexor®** **Effexor XR®**	25 mg	25-225 mg	Has both serotonin and norepinephrine enhancing properties useful in severe depression. Side effects similar to the SSRIs but may increase blood pressure especially at higher doses.
duloxetine **Cymbalta®**	10-20 mg	40-60 mg	Has both serotonin and norepinephrine effects. New to the market and no information about use in children.

Are Generics Effective?

Modern technology and high quality control in the generic pharmaceutical manufacturing industry guarantee that generic medications are effective. However, generic medications may not be exactly the same as their brand name counterparts. Some individuals switching to generics from brand name products or switching from one generic to another have reported experiencing no problems. And yet, others have found the generics to be less effective than the brand name products. In general, it is recommended to be consistent when taking either the brand name medication or generic. In other words, it is not advisable to switch back and forth between brand name medications and generics or even among generics. Individuals are encouraged to discuss this issue carefully with their clinicians and pharmacists.

To Summarize

To meet the pharmacological treatment needs of adults and children with TS requires a very careful assessment, identification of the most impairing condition — be it tics or co-occurring conditions or behaviors — and a careful matching of the medication treatment to the specific problems identified. A good doctor-patient relationship is critical to the success of any pharmacological treatment effort. People are encouraged to become knowledgeable about the medication they take and communicate fully with their clinicians. They should become active participants in their own treatment and follow-up so as to maximize benefit and minimize any adverse consequences of medication treatment. Lastly, it is important to understand that any medication not taken surely cannot be very effective. Taking medication as it is prescribed is critical to optimal outcomes.

Final Thoughts

Tic symptoms range from mild to severe with most people experiencing mild symptoms; many individuals never require medication treatment for their tics. However, people with tics may have other problems that can benefit from medication treatment. Sometimes treating the co-occurring conditions is more helpful than treating the tics. Lastly, not all problems faced by people with TS require medications and may actually be better addressed with psychological interventions. Before starting any treatment a good evaluation is key to maximizing the chance that a treatment plan will be successful. The TS research community is working actively to discover new and better treatment programs. Until that time, the currently available medications can be helpful to many individuals with Tourette Syndrome.

In this brochure the author has made every effort to provide the best available information about medications commonly used to reduce tic severity and treat conditions commonly co-occurring in Tourette Syndrome. This information is not meant to be exhaustive and does not reflect the rapidly changing nature of medical treatment for TS and co-occurring conditions. Rather the goal has been to provide a basic introduction to medication treatment in general, stimulate readers to learn more about medication treatment, and to enhance communication among physicians and the people with TS whom they treat. Readers are cautioned against taking and/or changing medications based on information in this pamphlet (or any other source) without first consulting their physicians.

TSA Medical Advisory Board

TSA gratefully acknowledges the counsel and guidance of its Medical Advisory Board. Members of the TSA Medical Advisory Board welcome queries from colleagues and other professionals and can be reached by contacting the Tourette Syndrome Association, Inc.

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Additional TSA resources - Videos & Vignettes

HBO Documentary "I have Tourette's But Tourette's Doesn't Have Me"

HBO documentary originally aired November 12, 2005. Childen with TS. 27 min. plus 30 min. extras.

AV-9 After the Diagnosis . . . The Next Steps

Produced expressly for individuals and families who have received a new diagnosis of TS. This video was developed to help clarify what TS is, to offer encouragement, and to dispel misperceptions about having TS. Features several families in excerpts from the Family Life With TS A Six-Part Series who recount their own experiences as well as comments from medical experts. Narrated by Academy Award Winner Richard Dreyfuss. 35 min.

AV-10 The Complexities of TS Treatment: A Physicians' Roundtable

Three internationally recognized TS experts, Drs. Cathy Budman, Joseph Jankovic and John Walkup provide colleagues with valuable information about the complexities of treating and advising families with TS. Emphasis is on different clinical approaches to patients with a broad range of symptom severity. Co-morbid and associated conditions are covered. 15 min.

AV-10a Clinical Counseling: Towards an Understanding of Tourette Syndrome

Targeted to counselors, social workers, educators, psychologists and families, this video features expert physicians, allied professionals and several families summarizing key issues that can arise when counseling families with TS. Includes valuable insights from the vantage point of those who have TS and those who seek to help them. 15 min.

AV-11 Family Life With Tourette Syndrome . . . Personal Stories . . . A Six-Part Series

Adults, teenagers, children, and their families . . . all affected by Tourette Syndrome describe lives filled with triumphs and setbacks . . . struggle and growth. Informative and inspirational, these stories present universal issues and resonate with a sense of hope, possibility, and love. 58 min.

An up-to-date Catalog of Publications and Videos
can be downloaded from our website.

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