# Medications for Stuttering

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Vitamins

Vitamin B-1 (Thiamin)

Two studies suggest that thiamin (vitamin B-1) may reduce stuttering. One study was of children; the other study investigated adults who stutter. Interestingly, both studies found that thiamin was “all or nothing”: for most people, thiamin dramatically reduces or even eliminates stuttering; and for a minority of stutterers the vitamin does nothing. But with no side effects, minimal cost, and no time spent in therapy, etc., I can’t see any reason not to recommend that all stutterers try vitamin B-1.

The Hale Study

A 1951 study investigated thiamin with an unspecified number of children.

Each child received either 30 mg of thiamin (vitamin B-1) or a placebo for one month, and then the opposite for a second month. In four cases in which a child started on thiamin, and then stuttering returned when the child went on the placebo, thiamin was given in a third month, with the results that all four of these children’s speech improved.

The study was double-blind. “In most cases follow-up observations continued beyond the two-month control period.”

Stuttering wasn’t measured. The previous article in the same issue of the journal was titled, “Measuring the Severity of Stuttering,” in which the authors investigated ways of measuring stuttering. In other words, in 1951 measuring stuttering was just beginning.

The results of the Hale study were:

- 80% of the two- and three-year olds had “observably improved” speech.
- 50% of the four-year-olds “were definitely improved.”
- Little improvement was seen in the five-year-olds.
- No improvement was seen in the seven- and eight-year-olds.

As noted above, four children did an ABA design study, with thiamin switching off their stuttering, stuttering returning on the placebo, and then thiamin switching off the stuttering again.
Except for one child, all of the children who responded to thiamine did so within two weeks.

The first four results are similar to what we now know is the spontaneous recovery rate for children, that is, 80% of pre-schoolers recovery from stuttering without therapy, and after a child is about five years old spontaneous recovery becomes unlikely. I.e., the number of children who responded to thiamin was unimpressive.

The interesting results of the Hale study are in the last two: the effects were seen within two weeks of starting thiamine, and in four children thiamin appeared to switch stuttering on and off. Without treatment, most spontaneous recovery occurs 31 to 36 months (two-and-a-half to three years) after onset. The 80% spontaneous recovery rate takes five years. In other words, the Hale study found that thiamin was effective for about the same number of children who would have spontaneously recovered without treatment; but thiamin speeded up recovery time from two-and-a-half to five years to two weeks. It would be interesting to investigate if the children who don’t respond to thiamin are the same children who don’t spontaneously recover from stuttering; perhaps these children have some neurological abnormality, or perhaps they don’t absorb B vitamins well?

The diminishing effect with older children could be because two- and three-year-olds typically weigh about 30 pounds; when seven- and eight-year-olds typically weigh about 60 pounds, so the older children were getting about half the dosage. I.e., the young children received about one milligram of thiamine per pound of body weight, when the older children received half a milligram per pound.

How does this study measure up to modern studies? The biggest problem is the lack of measurement of stuttering, not disclosing the number of subjects, and the lack of statistics. This doesn’t invalidate the study; rather, it limits the results to either dramatic or nothing. In contrast, a modern study of a medication can measure subtle changes in speech. Hale observed dramatic changes in the children’s speech; more accurate measurements wouldn’t have changed the results of the study.

Modern trial quality standards have five parts:

- Random ABA design.
Medications for Stuttering  
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- Blind collection of data.
- Data collected before and after the treatment.
- Data from beyond-clinic observations.
- Data about stuttering frequency or severity, with observer agreement.

The Hale study meets items #1 (for four children, and random AB design for the rest), #2, #3 (a follow-up was done, but pre-study data wasn’t collected), and #4, as parent observations were included. #5 wasn’t met. That’s four out of five, but I’m taking a point off because the data collection wasn’t up to modern standards, so I’ll rate the Hale Study as a three on a five-point scale.

Of 31 more recent studies of pharmaceutical treatments of stuttering, only 11 scored a 3 or higher on the 5-point scale. The Hale study rates as above-average scientific quality for pharmaceutical treatments of stuttering. A better study could be done now, but the Hale study can’t be dismissed as unscientific.

The article also referred to an unpublished study of 17 adults in which “the greatest speech improvement was observed during the periods of thiamin consumption as compared to those periods during which a placebo was administered.”

The Schwartz Study

In a recent unpublished double-blind study of 38 adult male stutterers, half received 300 milligrams of vitamin B-1 (three 100 mg pills, one with each meal, plus a daily B-complex pill). The others received a placebo. Of the 19 men who received the vitamin, stuttering was “largely eliminated” in six of the men. For the other 13 men no effect was seen. The six men were then followed for seven months and “their speech has remained essentially free of stuttering.”

Adult men typically weigh about 190 pounds so these men received more than one milligram per pound of body weight, or a little more than was effective for the young children in the Hale study.

The study was rejected by Nature because it didn’t follow formal procedures for registering human subjects and because a news release with the results had been released. The study wasn’t rejected for scientific reasons. The author didn’t submit his study to any
other journals because he is continuing the study with the men whose speech wasn’t affected, with a combination of 1000 mg thiamin, B-complex, and magnesium orotate.

Magnesium supplements were added because a study\(^7\) that tested minerals in the blood of 53 stuttering children aged 5-12, and a control group of 22 non-stuttering children aged 6-16. Sodium, potassium, calcium and magnesium were tested. The only significant difference was found in magnesium. 47% of the stuttering children were low in magnesium. One of the functions of magnesium is in metabolizing B vitamins.

How scientific is the Schwartz study? The study had:

- No random ABA design. It would have been better to switch the medications for all 38 men after a month, then switch the meds a second time after two months. Switching stuttering off is impressive but switching stuttering on and off repeatedly (as Hale did) is more impressive. (Dr. Schwartz has told me that data he has collected over the past two years is ABA design.)
- Blind collection of data.
- Data was collected before the treatment, and for seven months afterwards for the men for whom thiamin was effective.
- Data from beyond-clinic observations (telephone calls).
- Data about stuttered syllables with interjudge reliability checks.

The Schwartz study rates as a four on a five-point scale. This is one of the better studies of a pharmaceutical treatment for stuttering. This is all the more impressive because Dr. Schwartz did the study himself, without a grant.

**How Important Is Evidence Quality With Thiamin?**

Evidence standards can be lower for treatments that have no side effects, are inexpensive, require no time, etc. If all you have to do is pick up a $5 bottle of vitamins at the drug store, the evidence we have is good enough to recommend trying thiamine.

In contrast, medications with harmful side effects, brain surgery (yes, this has been suggested!), or lengthy, expensive therapy programs should be proven in large, high-quality studies before they are recommended.
The StutterSense Poll
An informal poll on the StutterSense blog found that of 22 stutterers who had tried thiamine, 36% said that it didn’t help, 36% said that it helped somewhat, and 27% said that they experienced a dramatic improvement in their speech.

A Double-Blind Study on Myself
A year and a half ago I tried 300 mg thiamine. My speech greatly improved within a few days. Then two months later my speech deteriorated. It wasn’t as bad as before using thiamine, but it wasn’t much better. I was disappointed that the effect had “worn off” over time. Then I remembered that I’d finished the first bottle of sixty tablets and gone to the drugstore to bought a new bottle. I looked and saw that the new bottle was 100 mg tablets! I went back to 300 mg and my fluency immediately returned. I’d done a double-blind study on myself!

Over the past year sometimes I’ve been fluent but sometimes I wasn’t. A few months ago I increased my dosage to 1200 mg and my speech improved, almost to complete fluency. I backed down the dosage to 900 mg and I started stuttering again. I then added the magnesium orotate, stayed at 900 mg, and my speech has been excellent.

I get a micronutrient analysis every year, i.e., my blood is tested for twenty vitamins and minerals. I’ve never been low on anything, but my B vitamins are always just barely into the normal zone. I don’t absorb B vitamins well. (My magnesium levels are fine.) It would be interesting to get a B-vitamin shot and see if my speech improves; on the other hand, there are reports of adverse side effects of B-vitamin injections.

Safety of Thiamine
The Recommended Daily Allowance (RDA) of vitamin B-1 is 1.4 mg, i.e., the minimum amount needed for health. The maximum safe dosage is 7000 milligrams per day, which is more than twenty times a 300 mg dosage, or seven times a 1000 mg extreme dosage.

What Thiamine Does in the Brain
Thiamine’s role in the brain is beyond my area of expertise, but I'll quote Paul Brocklehurst. Dr. Brocklehurst studied medicine for two years but had to drop out due to
severe stuttering. Twenty-five years later he returned to university, earned a degree in speech therapy, and then in 2011 earned his Ph.D. with a dissertation on stuttering. He writes:

Of particular interest is the role that thiamine plays in maintaining cerebellar function and structure. Thiamine deficiency contributes to a reduction in the number and size of Purkinje cells in parts of the cerebellar vermis (Philips et al. 1987). Thus, thiamine deficiency can lead to clinical and subclinical manifestations of ataxia (poor spatial and temporal muscle co-ordination). The most common example of this (in adults) is related to excess alcohol consumption (alcohol can lead to thiamine deficiency). Also of interest, is the fact that thiamine plays a role in the production of and enzyme pyruvate dehydrogenase (PDH), which is needed for the production of myelin. Imaging studies have shown that some PWS have myelin deficiencies and/or impaired cerebellar function, so both myelin deficiency and cerebellar impairment could play a role in predisposing to stuttering.8

The following is from a paper about thiamine deficiency in alcoholics:

Thiamine is a helper molecule (i.e., a cofactor) required by three enzymes involved in two pathways of carbohydrate metabolism. Because intermediate products of these pathways are needed for the generation of other essential molecules in the cells (e.g., building blocks of proteins and DNA as well as brain chemicals), a reduction in thiamine can interfere with numerous cellular functions, leading to serious brain disorders.9

And there’s always Wikipedia:

the nervous system is particularly sensitive to thiamine deficiency, because of its dependence on oxidative metabolism...The brain requires a much greater amount of thiamine than in other cells of the body. Much of ingested thiamine never reaches the brain because of passive diffusion and the blood brain barrier.
Medications That Reduce Stuttering

A journal article reviewed 31 studies of 19 pharmacological treatments for stuttering published between 1970 and 2005. The medications with any effect on stuttering are detailed below. The medications without any effects on stuttering are in the table below.

<table>
<thead>
<tr>
<th>Medications With No Effects on Stuttering</th>
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<tr>
<td><strong>Category</strong></td>
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<td>Anticonvulsants</td>
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<td>Antidepressants, tetracyclic</td>
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<td>Antidepressants, tricyclic</td>
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<td>Calcium channel blocker</td>
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<td>Cholinergic</td>
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<td>Dopamine antagonists</td>
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<td>Combination antianxiety and SSRI antidepressant</td>
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A second journal article, published in 2011, reviewed seven studies of pharmacological treatments for childhood stuttering (subjects under 18 years old). Only one study was found with strong study design (i.e., the study met seven scientific standards), and this study found that clonidine did not reduce stuttering. The other six studies did not meet the scientific standards. These studies investigated risperidone, olanzapine, clonidine, tiapride, haloperidol, and chlorpromazine.11

**Haloperidol (Haldol)**

Haloperidol (Haldol) is a dopamine antagonist (blocks D2 receptors). It is widely used to treat Tourette syndrome and schizophrenia. Ten studies of haloperidol have been done with stutterers; of these, five studies were considered of sufficient trial quality (i.e., the studies were done scientifically) to be reviewed. Haloperidol was ineffective in four of the five studies; one study found more than a 50% reduction in stuttering.

The side effects of haloperidol can be severe, including tardive dyskinesia. One stutterer wrote this about his experiences with haloperidol:

*I understand that Haldol has long ceased being prescribed for people who stutter, as far more sophisticated drugs have been developed. My experience with it back in 1970 (when I was a teenager) was horrible. A neurologist prescribed it for my very severe stuttering. I took it several times daily for two weeks. I felt that my speech did improve a little, but that could have been simply due to the natural ebb and flow of stuttering cycles. After a few weeks, my head started moving around from side to side - and I was not the one moving it. Not drawing a connection, I naively took the medication one more day. Then I began to lose control over every muscle in my body - my head and neck violently twisted around; my hands fluttered up and down; my whole body was shaking. It took a combination of three drugs to finally quiet the symptoms. Afterwards the neurologist tried again, combining Haldol with its antidote. This time there were no effects at all, neither positive nor negative.*12

**Risperidone (Risperdal)**

Risperidone (Risperdal) is a dopamine antagonist (blocks D2 receptors). It is FDA-approved for treating manic bipolar disorder and schizophrenia. A study with 16 adult stuttersers over six weeks found that stuttered syllables decreased 51% in the subjects taking the medication, and 27% for the subjects taking a placebo.13 Side effects include
weight gain. Many other side effects are listed for risperidone, but the side effects are usually much less severe than with haloperidol.

A stutterer wrote about his experiences with risperidone:

*Risperdal can cause a situation called hyperprolactinemia. For guys, what this can translate into is impotence, loss of libido, an inability to achieve spontaneous erections, weak erectile quality, and difficulty maintaining an erection. The situation can lead some men to lactate, and, supposedly, can lead to hypogonadism (your testicles stop producing testosterone) and azoospermia (your body stops producing viable sperm). All of the anti-psychotics seem to cause some kind of sexual dysfunction (in women and in men), but the sexual side effects of Risperdal seem to be the most severe, because of the receptors Risperdal targets. I’ve been on Risperdal for two months and am going to get off as soon as possible. Ask your doctor for something else if he suggests putting you on Risperdal. Also, research the web...you’ll see what I’m talking about. Pretty scary stuff.*

**Olanzapine (Zyprexa)**

Olanzapine (Zyprexa) blocks serotonin and dopamine receptors. It is FDA-approved for the treatment of schizophrenia and bipolar disorder. A study with 24 adult stutterers over twelve weeks found that stuttered syllables decreased 33% in the subjects taking the medication, and 14% for the subjects taking a placebo. Subjects averaged eight pounds of weight gain. (One of the researchers took the medication for ten years and gained 20 pounds.) Many other side effects are listed for risperidone, but the side effects are usually much less severe than with haloperidol.

**Pagoclone**

Pagoclone is a GABA agonist. It is not FDA-approved for any disorder. 132 stutterers were given either pagoclone or a placebo for eight weeks. Those who received pagoclone had an average 19.4% reduction stuttering, compared with 5.1% reduction for those who received the placebo. 55% of the subjects taking pagoclone had improved speech, compared to 36% of the subjects taking the placebo. Some of the subjects then continued using pagoclone, with a 40% reduction stuttering after 1 year. Stuttering was only assessed in a clinical setting. Side effects were minimal, with 12.5% of pagoclone patients reporting
headaches.\textsuperscript{16} Endo, the manufacturer of Pagoclone, stopped clinical trials with stutterers, apparently because the Phase II trials didn’t go well.

\textbf{Clomipramine (Anafranil)}

Stager (1995)\textsuperscript{17} investigated two tricylic antidepressants and found that clomipramine reduced stuttering about 5-10\%, but side effects were severe. Desipramine was not effective.
Medications That Increase Stuttering

Many medications make stuttering worse. Some even cause stuttering. No research has been done on this important subject, but the following anecdotal reports may help you or your child to avoid certain medications.

Methylphenidate (Ritalin)

Methylphenidate (Ritalin) increases the levels of dopamine and norepinephrine in the brain through reuptake inhibition of the monoamine transporters. It is a dopamine agonist, the opposite of the above medications (haloperidol, risperidone, olanzapine) that reduce stuttering.

A speech-language pathologist asked on an Internet forum:

I’m treating an 8-year-old diagnosed ADHD and who suddenly began stuttering (advanced core and secondary behaviors) without any prior history of disfluency, as a side effect of the medication Ritalin. He’s had a whole neuro work-up which revealed nothing.

Another speech-language pathologist responded that many of the children he treated for stuttering were on Ritalin for ADHD.

Pharmacist and stutterer Richard Harkness advises against Ritalin for children who stutter:

Ritalin increases dopaminergic neurotransmission and is contraindicated for use in those with Tourette’s disorder. Ritalin has also, in rare cases, brought on symptoms of Tourette’s disorder. Tourette’s disorder has been likened to stuttering in that it involves a flaw in dopaminergic neurotransmission.

If you suspect that your child’s medication contributes to his or her stuttering—especially if your child is on several medications—I suggest that you hire Richard Harkness (rharkn@aol.com) for a consultation.
SSRI Anti-Depressants

A study of the selective serotonin reuptake inhibitor (SSRI) paroxetine (Paxil) on stutterers was terminated due to severe side effects.\textsuperscript{18} SSRI medications can increase stuttering in stutterers, apparently by boosting dopamine. In a few cases, these drugs caused non-stutterers to stutter. Stutterers taking SSRI anti-depressants report feeling less depression, but their increased stuttering makes them feel worse:

\begin{quote}
I was sitting in the hallway, in the dark. I had been crying and hitting my head on the wall, screaming to God, why me? I hated my stuttering and I suppose hated myself as well. From that point on it was as if when I remembered that incident all the feelings came back to me and wouldn’t leave. Those angry, hurt, frustrating feelings from so long ago wouldn’t go away. I was hiding my feelings from everyone around me, pretending to be super mom and super wife. I decided to seek professional help.

We decided that I would try Wellbutrin [bupropion, a norepinephrine and dopamine reuptake inhibitor]. As my doctor put it, kill two birds with one stone, since Wellbutrin is also prescribed to help you quit smoking. The first week I felt like I had so much anxiety that I could explode. The second week I noticed my stuttering getting worse. By the third week the controls that I had learned in speech therapy were virtually unusable. It was so frustrating to not be able to control my stuttering at all. Needless to say we all agreed to flush the Wellbutrin and never go back on anything like that. Prozac, Trazadone and Effexor did not effect my speech at all.
\end{quote}

Another stutterer wrote:

\begin{quote}
I have tried 3 antidepressants: Prozac, Wellbutrin, and Zoloft. All increased my stuttering noticeably. The anti-depressants that I have tried make me more able to get out of bed in the morning and restore my “get up and go”; however, they have caused me to go from being a person with a barely noticeable stutter to a more pronounced stutter.

I went in to my psychiatrist yesterday and explained that the current antidepressant is making my stutter significantly worse. However, in the 10 minutes we talked I was practically perfectly fluent. He then concludes that obviously “it’s not that unmanageable.”

He prescribed 10mg Propanolol to take before I have to be in a difficult speaking presentation. It is supposed to “reduce performance anxiety.” I don’t feel like I have a tremendous amount of performance anxiety; stuttering just isn’t very fun. I think he doesn’t believe me about the severity of the stuttering.
\end{quote}
Related Topics of Interest

Botulinum Toxin

Botulinum toxin (Botox, the toxin in botulism) has been injected into stutterers’ vocal folds. The toxin partially paralyzes your vocal folds so you can’t get into hard blocks. You also can’t talk loudly or forcefully. The toxin reduces stuttering somewhat. It wears off in a few months, and you get a second shot. The second shot reduces stuttering less than the first. By the third shot, the toxin usually has no effect on stuttering.

Tranquilizers

Some doctors prescribe tranquilizers to stutterers on the erroneous belief that nervousness causes stuttering. Julia Boberg, the wife of the stutterer and speech-language pathologist Einer Boberg, wrote about their wedding day:

A psychiatrist had some pills he thought might help. Einer was to take one per day during the week remaining before the great day, and one extra big super pill on the morning of the wedding. The pills made him feel somewhat relaxed but had no noticeable effect on his speech. The wedding arrived, Einer took his super pill, and went off to London on the train to meet his relatives who had come for the ceremony. An hour before the wedding Einer had still not returned. I kept the smiling calm that I had learned to assume in the face of all our difficulties and began dressing. Half an hour later I stood in white satin complete with veil and bouquet, looking out of the bedroom window towards the railway station, wondering what could have happened and preparing myself mentally for a last minute cancellation of the wedding. Had he thrown himself under a train, unable to continue life as a stutterer? Had he run back to Canada as a supreme act of avoidance? The minutes ticked by. Finally another train pulled in, and up the hill walked Einer, a lazy smile on his face, apparently unaware of the panic that he had caused. He had forgotten to take pencil and paper and so was unable to ask for guidance and had become hopelessly lost. However, the super pill had kept him smiling. I am glad to say that thanks to the kindly vicar in reading along with Einer, the wedding vows were the first and only fluent words my family heard Einer speak that summer.

Alcohol

No researchers have investigated the effects of alcohol on stuttering. (Finding volunteers wouldn’t be a problem at most universities!)
Anecdotally, alcohol reduces stutterers’ fears and anxieties (e.g., about talking to persons of the opposite sex) and so reduces stuttering. But alcohol reduces one’s ability to use therapy techniques, and so increases stuttering.

**Placebos**

The Stager (1995)\(^1\) study of clomipramine and desipramine also included placebos. They found that placebos had no effect on stuttering. But placebos had the greatest side effects. The average placebo subject reported three side effects—including constipation, sexual dysfunction, dizziness, sweating, tremors, etc. The placebo was 50% more powerful than clomipramine, and six times more powerful than desipramine, in producing side effects. The placebo was the most powerful drug in the study — but not for reducing stuttering!

**Foods That Affect Stuttering**

Stuttering is a dopaminergic disorder, as evidenced by dopamine antagonist medications such as haloperidol (Haldol), risperidone (Risperdal), and olanzapine (Zyprexa); by genetic studies associating stuttering to genes that control dopamine; and because stuttering increases in stressful situations, i.e., the more you try not to stutter the harder it is not to stutter, which is a characteristic shared with other dopaminergic disorders including Tourette’s syndrome and obsessive-compulsive disorder (OCD).

Tyrosine is dopamine’s precursor. Tyrosine is an essential amino acid. It is found in many high-protein food products such as chicken, turkey, fish, peanuts, almonds, avocados, milk, cheese, yogurt, cottage cheese, lima beans, pumpkin seeds, sesame seeds, bananas, and soy products.\(^2\)

Hypothetically, high-protein foods should increase stuttering, and a low-protein diet should reduce stuttering. Personally, one evening I was invited to a free all-you-can-eat dinner at one of the best sushi bars in Chicago. I chowed down on great sushi, and soon I couldn’t get a word out. (Raw fish is one of the best protein sources.)

A few years later I tried a low-protein diet. I stuttered less, but my brain felt sluggish. I remember that week as dark and overcast, although such weather is rare where I live. I’d rather stutter than feel like that so I returned to my usual high-protein diet.

On the other hand, a customer sent me this e-mail:
I have discovered that my ketogenic type of diet where I eat lots of fat: oils, butter, cream, high-fat meats makes me calmer and I stutter way less while if I eat lean meats that are high in protein my stuttering is worse.

Ketogenic diets are high-fat, adequate-protein, low-carbohydrate diets that are used to treat epilepsy in children. Perhaps some stutterers would benefit from a low-protein diet.
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