Oscar Clinical Guideline: Vesicular Monoamine Transporter Type 2 (VMAT2) Inhibitors (PG144, Ver. 1)

Vesicular Monoamine Transporter Type 2 (VMAT2) Inhibitors

- Austedo (deutetrabenazine)
- Austedo XR (deutetrabenazine) extended-release
- INGREZZA (valbenazine)
- Tetrabenazine (Xenazine)

Summary

Huntington's disease is a progressive neurodegenerative condition primarily characterized by chorea, a type of abnormal involuntary movement. Chorea can impair functional capacity, lead to weight loss, and compromise safety. Tardive dyskinesia is another movement disorder, often resulting from long-term exposure to antipsychotic drugs, characterized by repetitive involuntary muscle movements. It can be debilitating and requires careful monitoring with tools like the Abnormal Involuntary Movement Scale (AIMS).

For both of these conditions, Austedo (deutetrabenazine), Austedo XR (extended-release deutetrabenazine), INGREZZA (valbenazine), and XENAZINE (tetrabenazine) are key therapeutic options:

1. Austedo and Austedo XR (Deutetrabenazine): These are approved for the treatment of chorea associated with Huntington's disease and tardive dyskinesia in adults. As VMAT-2 inhibitors, they modulate the levels of neurotransmitters in the brain, which can help alleviate involuntary movements.
2. INGREZZA (Valbenazine): This drug is another VMAT-2 inhibitor indicated for the treatment of chorea associated with Huntington's disease and tardive dyskinesia in adults. Like deutetrabenazine, it has strong evidence supporting its use as a first-line treatment option.
3. XENAZINE (Tetrabenazine): This medication is approved for the treatment of chorea associated with Huntington's disease. It may also be beneficial in managing tardive dyskinesia, but evidence is limited and it carries a greater risk of adverse events, including depression and suicidal thoughts. The American Academy of Neurology (AAN) guidelines consider it as possibly effective for the treatment of tardive dyskinesia.

Tourette's Syndrome (Gilles de la Tourette's syndrome) is another neurological disorder marked by involuntary tics, both motor and vocal. The Plan considers Vesicular Monoamine Transporter Type 2 (VMAT2) Inhibitors medically necessary for this condition, under specific conditions, which include diagnosis confirmation, symptom documentation, and lack of response or intolerance to other treatment options like alpha-2 agonists or antipsychotics.

Finally, in the management of hyperkinetic movement disorders such as hemiballismus, senile chorea, and tic disorders, the Plan recognizes tetrabenazine (Xenazine) as medically necessary under certain conditions. It is important to note that in all these conditions, the Plan emphasizes the non-concurrent use of any other VMAT2 inhibitors with these treatments.

Definitions

"**Abnormal Involuntary Movement Scale (AIMS)**" is a rating tool used by healthcare providers to monitor involuntary movements, especially in patients who are taking antipsychotic medications. The scale rates the severity of different types of abnormal movements, including those found in tardive dyskinesia. It consists of a series of items that evaluate different body regions, such as the face, extremities, and trunk, for the presence of specific involuntary movements. The scale also assesses the subjective distress caused by these movements and the functional impact on daily activities.

"**Antipsychotic Drugs**" are a class of medications primarily used to manage psychosis, including delusions, hallucinations, paranoia, or disordered thought, primarily in schizophrenia and bipolar disorder. They are often used in other conditions, including depression, anxiety disorders, and autism.

"**Chorea**" is a movement disorder that causes involuntary, irregular, quick, jerky movements. It's one of the primary symptoms of Huntington's disease, but it can be seen in other conditions as well.

"**Drug-Induced Extrapyramidal Symptoms Scale (DISCUS)**" is another rating scale used to evaluate extrapyramidal symptoms, including TD, that may arise as side effects of medications, particularly antipsychotic drugs. The scale encompasses a range of abnormal movements, including those affecting the face, neck, trunk, and limbs. DISCUS also evaluates other extrapyramidal symptoms like parkinsonism and akathisia. Similar to AIMS, DISCUS is administered by healthcare professionals to assess the severity and impact of TD symptoms in patients.

"**Huntington's Disease**" is a progressive, neurodegenerative genetic disorder that affects muscle coordination and leads to cognitive decline and psychiatric problems. The most common symptom is chorea.

"**Involuntary Movement**" are movements that you can't control, they can occur in any part of the body.

"**Neurotransmitters**" are chemicals found in the nervous system that transmit signals across a synapse, the small gap between nerve cells or neurons. They play a major role in shaping everyday life and functions.

"**Tardive Dyskinesia**" is a condition that involves involuntary movements, especially of the lower face. Tardive means "delayed" and dyskinesia means "abnormal movement." The condition is often associated with the long-term use of antipsychotic drugs.

Clinical Indications

The Plan considers **Vesicular Monoamine Transporter Type 2 (VMAT2) Inhibitors** medically necessary when **ALL** the following criteria are met for the applicable indication listed below:

For the treatment of Huntington's Chorea:

Medical Necessity Criteria for Initial Authorization

The Plan considers **Vesicular Monoamine Transporter Type 2 (VMAT2) Inhibitors** medically necessary when **ALL** of the following criteria are met:

1. The medication is prescribed by or in consultation with a specialist in neurology, psychiatry, or a practitioner who specializes in movement disorders; ***AND***
2. The member is 18 years of age or older; ***AND***

3. The member has a diagnosis of chorea associated with Huntington's disease, confirmed by appropriate clinical assessment, which may include family history, neurological examination, and genetic testing if necessary; ***AND***
4. The requested product is for **ONE** of the following:
    a. deutetrabenazine (Austedo, Austedo XR)***; or***
    b. tetrabenazine (Xenazine)***; or***
    c. valbenazine (INGREZZA), **AND** the member is unable to use, or has tried and failed deutetrabenazine (Austedo, Austedo XR)***; or***
    d. Xenazine (Brand), **AND** the member is unable to use, or has tried and failed **BOTH** of the following:
        i. generic tetrabenazine from two or more (≥ 2) manufacturers; ***and***
        ii. deutetrabenazine (Austedo, Austedo XR); ***AND***
5. The member does **NOT** have documentation indicating **ANY** of the following:
    a. the member is suicidal, or have untreated or inadequately treated depression; ***or***
    b. hepatic impairment; ***or***
    c. recent (within the past 90-days) claims history of a monoamine oxidase inhibitor (MAOI, such as phenelzine or tranylcypromine), unless documentation is provided indicating that MAOIs have been discontinued for more than 14 days; ***AND***
6. The requested medication will not be used concomitantly with any other Vesicular Monoamine Transporter Type 2 (VMAT2) Inhibitors.

If the above prior authorization criteria is met, the requested medication will be approved for 6 months.

Medical Necessity Criteria for Reauthorization

Reauthorization for 12 months will be granted if the member has clinical chart documentation demonstrating **ALL** of the following criteria:

1. The requested medication is prescribed by or in consultation with a specialist in neurology, psychiatry, or a practitioner who specializes in movement disorders; ***AND***
2. The member has experienced meaningful clinical improvement in control of chorea; ***AND***
3. The requested medication will not be used concomitantly with ANY other Vesicular Monoamine Transporter Type 2 (VMAT2) Inhibitors.

For the treatment of Tardive Dyskinesia:

Medical Necessity Criteria for Initial Authorization

The Plan considers **Vesicular Monoamine Transporter Type 2 (VMAT2) Inhibitors** medically necessary when ALL of the following criteria are met:

1. The medication is prescribed by or in consultation with a specialist in neurology, psychiatry, or a practitioner who specializes in movement disorders; ***AND***
2. The member is 18 years of age or older; ***AND***
3. The member has a diagnosis of moderate to severe tardive dyskinesia **AND** documentation of **ALL** of the following:
    a. The presence of abnormal involuntary movements; ***and***
    b. Baseline evaluation and score through the use of a structured evaluative tool (e.g., AIMS, DISCUS) for assessment and monitoring the severity of TD; ***and***
    c. The provider has evaluated and ruled out other conditions that could contribute to dyskinesia, including metabolic or neurological conditions; ***and***
    d. The member has a history of antidopaminergic drug (e.g., antipsychotics, metoclopramide) exposure for at least 3 months (or at least 1 month in patients 60 years of age and older); ***and***
    e. The member has undergone an antipsychotic medication review, with attempts to minimize use or switch to a medication with a lower risk of tardive dyskinesia, if feasible.

    For example:

        i. a gradual discontinuance of the precipitating drug or reducing its dosage, if possible; ***or***
        ii. switching from a conventional or first-generation antipsychotic agent to an atypical or second-generation antipsychotic agent; ***or***
        iii. switching to clozapine therapy.
4. The requested product is for **ONE** of the following:
    a. deutetrabenazine (Austedo, Austedo XR)***; or***
    b. tetrabenazine (Xenazine)***; or***
    c. valbenazine (INGREZZA), **AND** the member is unable to use, or has tried and failed deutetrabenazine (Austedo, Austedo XR)***; or***
    d. Xenazine (Brand), **AND** the member is unable to use, or has tried and failed **BOTH** of the following:
        i. generic tetrabenazine from two or more (≥ 2) manufacturers; ***and***
        ii. deutetrabenazine (Austedo, Austedo XR); ***AND***
5. The member does **NOT** have severe hepatic impairment (for deutetrabenazine and tetrabenazine) or severe renal impairment (for valbenazine); ***AND***

6. The requested medication will not be used concomitantly with any other Vesicular Monoamine Transporter Type 2 (VMAT2) Inhibitors.

If the above prior authorization criteria is met, the requested medication will be approved for 6 months.

Medical Necessity Criteria for Reauthorization

Reauthorization for 12 months will be granted if the member has clinical chart documentation demonstrating **ALL** of the following criteria:

1. The requested medication is prescribed by or in consultation with a specialist in neurology, psychiatry, or a practitioner who specializes in movement disorders; ***AND***
2. **ANY** of the following:
    a. The member has experienced meaningful clinical improvement in tardive dyskinesia symptoms (e.g., lip smacking or pursing, movement and/or protrusion of the tongue, chewing movements); ***or***
    b. Positive change (i.e., score improvement) measured using a structured evaluative tool (e.g., AIMS, DISCUS) for assessment and monitoring the severity of TD; ***AND***
3. The requested medication will not be used concomitantly with **ANY** other Vesicular Monoamine Transporter Type 2 (VMAT2) Inhibitors.

For the treatment of Tourette's Syndrome (Gilles de la Tourette's syndrome):

Medical Necessity Criteria for Initial Authorization

The Plan considers **Vesicular Monoamine Transporter Type 2 (VMAT2) Inhibitors** medically necessary when ALL of the following criteria are met:

1. The medication is prescribed by or in consultation with a specialist in neurology, or a practitioner who specializes in tic disorders; ***AND***
2. The member has a diagnosis of Tourette's syndrome (Gilles de la Tourette's syndrome) **AND BOTH** of the following:
    a. Documentation indicating **ALL** of the following:
        i. Several motor tics and at least one vocal (i.e., phonic) tics have been present at some time, although not necessarily concurrently; ***and***
        ii. The tics occur many times a day, nearly every day or intermittently, for more than a year; ***and***
        iii. The onset is before the age of 18; ***and***

iv. The symptoms are not attributable to the physiological effects of a substance (e.g., cocaine) or another medical condition (e.g., Huntington disease or post-viral encephalitis); ***and***

b. Documentation of **ONE** or more of the following:

i. movements and sounds are painful, bothersome, or impairing to the patient (i.e., tics are painful or distressing, interfere with daily functioning, or cause sustained social or emotional problems); ***and/or***

ii. lack of treatment would cause imminent self-harm (e.g., forceful motor tics of the neck); ***and/or***

iii. tics are clearly self-injurious; ***AND***

3. The member is unable to use, or has tried and failed at least **TWO** of the following:
   a. Alpha-2 agonists (clonidine and guanfacine); ***or***
   b. Antipsychotics, such as aripiprazole, haloperidol, pimozide, risperidone, or ziprasidone; ***AND***
4. The requested product is for **ONE** of the following:
   a. deutetrabenazine (Austedo, Austedo XR)***; or***
   b. tetrabenazine (Xenazine)***; or***
   c. valbenazine (INGREZZA), **AND** the member is unable to use, or has tried and failed deutetrabenazine (Austedo, Austedo XR)***; or***
   d. Xenazine (Brand), **AND** the member is unable to use, or has tried and failed **BOTH** of the following:
      i. generic tetrabenazine from two or more (≥ 2) manufacturers; ***and***
      ii. deutetrabenazine (Austedo, Austedo XR); ***AND***
5. The requested medication will not be used concomitantly with **ANY** other Vesicular Monoamine Transporter Type 2 (VMAT2) Inhibitors.

If the above prior authorization criteria is met, the requested medication will be approved for 6 months.

Medical Necessity Criteria for Reauthorization

Reauthorization for 12 months will be granted if the member has clinical chart documentation demonstrating **ALL** of the following criteria:

1. The requested medication is prescribed by or in consultation with a specialist in neurology, or a practitioner who specializes in tic disorders; ***AND***
2. **ANY** of the following:
   a. The member has experienced meaningful reduction in tics; ***and/or***

b. Positive change (i.e., score improvement) measured using a validated scale that measures current tic severity such as the Yale Global Tic Severity Scale (YGTSS); ***AND***

3. The requested medication will not be used concomitantly with **ANY** other Vesicular Monoamine Transporter Type 2 (VMAT2) Inhibitors.

For the treatment of Other Hyperkinetic Movement Disorders (also called hyperkinesias):

Medical Necessity Criteria for Initial Authorization

The Plan considers **tetrabenazine (Xenazine)** medically necessary when **ALL** of the following criteria are met:

1. The medication is prescribed by or in consultation with a specialist in neurology, psychiatry, or a practitioner who specializes in movement or tic disorders; ***AND***
2. The medication is being prescribed for the symptomatic management of **ANY** of the following hyperkinetic movement disorders:
    a. hemiballismus; ***and/or***
    b. senile chorea; ***and/or***
    c. tic disorder; ***AND***
3. The requested medication will not be used concomitantly with **ANY** other Vesicular Monoamine Transporter Type 2 (VMAT2) Inhibitors.
4. IF the request is for Xenazine (Brand), the member must be unable to use, or has tried and failed generic tetrabenazine from two or more (≥ 2) manufacturers.

If the above prior authorization criteria is met, the requested medication will be approved for 6 months.

Medical Necessity Criteria for Reauthorization

Reauthorization for 12 months will be granted if the member has clinical chart documentation demonstrating **ALL** of the following criteria:

4. The requested medication is prescribed by or in consultation with a specialist in neurology, psychiatry, or a practitioner who specializes in movement or tic disorders; ***AND***
5. The member has experienced meaningful clinical improvement since starting the requested medication; ***AND***
6. The requested medication will not be used concomitantly with **ANY** other Vesicular Monoamine Transporter Type 2 (VMAT2) Inhibitors.

Experimental or Investigational / Not Medically Necessary

Vesicular Monoamine Transporter Type 2 (VMAT2) Inhibitors for any other indication or use is considered not medically necessary by the Plan, as it is deemed to be experimental, investigational, or unproven. Non-covered indications include, but are not limited to, the following:

- Cerebral Palsy (CP) / Dyskinesia
- Cervical Dystonia
- Concurrent use with monoamine oxidase inhibitors (MAOI) (e.g., Emsam, Marplan, Nardil, Parnate, phenelzine, selegiline, tranylcypromine)
- Dual therapy with other VMAT2 inhibitors
- Primary Dystonia
- Schizophrenia
- Trichotillomania (Hair-Pulling Disorder)
- Use as a preventative agent for the development of tardive dyskinesia.

Appendix

The following summaries serve as an encapsulation of crucial evidence-based literature reviews, drawing from various reputable sources such as the American Academy of Neurology, the American Psychiatric Association, and others. These were integral to the development of the Plan's policy and criteria, offering insights into the treatment of Huntington's Disease and tardive syndromes, among other conditions. However, it is important to note that these summaries represent only a snapshot of the comprehensive body of research reviewed and should not be seen as exhaustive. Please refer to the full texts for a more comprehensive understanding of the findings and recommendations.

International Guidelines for the Treatment of Huntington's Disease.

Guidelines for managing chorea in HD are based on expert consensus and scientific literature up until 2018, with an additional literature review covering 2015 to 2019. Chorea is a distressing symptom for patients, and drug treatment should be considered to alleviate their discomfort.

1. Tetrabenazine, a first-line treatment (Grade A), is highly recommended unless the patient has poorly controlled depression or suicidal thoughts.
2. Second-generation neuroleptics (Grade B) are also effective, particularly when there are associated personality, behavioral or psychotic disorders.
3. Among the recent studies, only those on deutetrabenazine (Grade A) were considered to modify the existing recommendations. Deutetrabenazine is proposed as an alternative to tetrabenazine for treating chorea in countries where it is authorized, such as the USA.

4. Combination therapy is generally avoided due to increased risk of adverse effects and complexity in managing non-motor symptoms.

Historical Review: Pharmacologic Treatment of Chorea in Huntington Disease - An Evidence-based Guideline [DISCONTINUED]. *A report from the Guideline Development Subcommittee of the American Academy of Neurology.*

This was reviewed for historical reference only. It is a discontinued guideline and its recommendations and conclusions are no longer recognized as valid or endorsed by the AAN.

American Academy of Neurology. Evidence-based guideline: treatment of tardive syndromes: report of the Guideline Development Subcommittee of the American Academy of Neurology.

The American Academy of Neurology's guidelines for the treatment of tardive syndromes (published in 2013, reaffirmed in 2019) provides the following recommendations:

1. Clonazepam: Probably effective for short-term (approximately 3 months) treatment of tardive dyskinesia.
2. Ginkgo biloba: Also probably effective, based on a 3-month clinical trial involving inpatients with schizophrenia.
3. Amantadine and Tetrabenazine: Both are possibly effective, but the evidence is less robust. Amantadine can be considered for short-term use in patients on antipsychotic drugs. Tetrabenazine may reduce symptoms but can cause parkinsonism.
4. Risperidone and Olanzapine: Risperidone is probably effective and olanzapine possibly so, but they can mask tardive syndrome symptoms and possibly cause tardive syndrome. Therefore, caution is advised when using these medications.
5. Diltiazem: Not recommended because it probably doesn't reduce symptoms.
6. Galantamine and Eicosapentaenoic Acid: Not recommended due to possible ineffectiveness.
7. No definitive recommendation about discontinuing or switching antipsychotic medications for the treatment of tardive syndrome due to insufficient evidence.
8. Several other drugs, including acetazolamide, aripiprazole, baclofen, botulinum toxin type A, bromocriptine, buspirone, clozapine, haloperidol, levetiracetam, melatonin, methyldopa, nifedipine, olanzapine, pyridoxine, quetiapine, reserpine, selegiline, thiamine, vitamin E, and ziprasidone, do not have sufficient evidence to either support or refute their use in treating tardive syndrome.

The American Psychiatric Association Practice Guideline For The Treatment Of Patients With Schizophrenia, Third Edition

Statement 14 highlights the use of Vesicular Monoamine Transporter 2 (VMAT2) inhibitors in the treatment of moderate to severe tardive dyskinesia. It suggests that such treatment is recommended by the American Psychiatric Association (APA).

1. Evaluation tools like the AIMS and the DISCUS can aid in identifying and monitoring tardive syndromes, though there is no specific score threshold that suggests the need for intervention.
2. VMAT2 inhibitors, such as deutetrabenazine or valbenazine, are recommended for patients with persistent moderate to severe tardive dyskinesia when no other contributing etiology is identified. These inhibitors can also be considered for patients with mild symptoms based on factors such as patient preference and the impact of symptoms on functioning and quality of life. Choice of VMAT2 inhibitors can depend on several factors, including the patient's hepatic or renal function, concurrent medications, and potential side effects.
3. While VMAT2 inhibitors can significantly reduce symptoms of tardive dyskinesia, potential side effects include sedation, depression, and suicidal thoughts. However, in trials involving patients with tardive dyskinesia, deutetrabenazine and valbenazine did not show an increase in depression or suicidal thoughts. Despite these side effects, the benefits of treatment typically outweigh the potential harms.
4. In addition to VMAT2 inhibitors, other approaches such as the use of benzodiazepines, a change in antipsychotic therapy, and in rare cases, deep brain stimulation, may be beneficial in treating tardive syndromes. However, the potential benefits of these alternatives must be carefully weighed against their potential side effects and risks.

Ricciardi L, Pringsheim T, Barnes TRE, et al. Treatment recommendations for tardive dyskinesia.

A systematic review of studies on antipsychotic-induced movement disorders has provided the following recommendations for the management of tardive dyskinesia:

1. First-Line Management: Withdrawal of antipsychotic medication is suggested if clinically feasible. If not possible, switch from first to second-generation antipsychotics with lower dopamine D2 affinity (like clozapine, quetiapine) could reduce symptoms (grade B recommendation; level 1 evidence). VMAT-2 inhibitors, including valbenazine and deutetrabenazine, should be considered as first-line treatments due to good evidence and a favorable benefit-risk ratio. They are preferred over tetrabenazine, which has limited evidence and a greater risk of adverse events (grade A recommendation; level 1 evidence).
2. Second-Line Management: If patients do not respond to first-line management, short-term treatment with vitamin B6 may be considered (grade B recommendation; level 1 evidence). Vitamin E may not lead to significant improvements but might protect against symptom deterioration. Amantadine could be considered if more established treatments are contraindicated or ineffective (grade B recommendation; level 1 evidence).

3. Not Recommended: Routine use of benzodiazepines and nonbenzodiazepine GABA agonists (like baclofen, sodium valproate, levetiracetam) are discouraged due to lack of substantial supportive evidence and potential for harm (grade B recommendation; level 1 evidence). Cholinergic medications and several other agents, including melatonin, lithium, selegiline, estrogen, and diltiazem, are also not recommended due to lack of efficacy (grade B/C recommendation; level 1 evidence).
4. Limited Evidence: Discontinuation of anticholinergic medications, use of ginkgo biloba, levetiracetam, buspirone, dehydrogenated ergot alkaloids, hypnosis or relaxation, promethazine, insulin, branched chain amino acids, or isocarboxazid have insufficient evidence to be recommended for the treatment of tardive dyskinesia. Alpha-methyldopa and reserpine also have limited, low-quality evidence, and use of other dopamine depleters (valbenazine, deutetrabenazine) is advised instead.
5. Note of Caution: Limited long-term safety data for valbenazine and deutetrabenazine calls for further studies.

References

1. Anderson KE, Stamler D, Davis MD et al. Deutetrabenazine for treatment of involuntary movements in patients with tardive dyskinesia (AIM-TD): a double-blind, randomised, placebo-controlled, phase 3 trial. Lancet Psychiatry. 2017; 4:595-604.
2. Austedo (deutetrabenazine) tablets [prescribing information]. Parsippany, NJ: Teva Pharmaceuticals USA Inc; February 2023.
3. Bachoud-Lévi AC, Ferreira J, Massart R, Youssov K, Rosser A, Busse M, Craufurd D, Reilmann R, De Michele G, Rae D, Squitieri F, Seppi K, Perrine C, Scherer-Gagou C, Audrey O, Verny C, Burgunder JM. International Guidelines for the Treatment of Huntington's Disease. Front Neurol. 2019 Jul 3;10:710. doi: 10.3389/fneur.2019.00710. PMID: 31333565; PMCID: PMC6618900.
4. Bhidayasiri R, Fahn S, Weiner WJ, Gronseth GS, Sullivan KL, Zesiewicz TA; American Academy of Neurology. Evidence-based guideline: treatment of tardive syndromes: report of the Guideline Development Subcommittee of the American Academy of Neurology. Neurology. 2013;81(5):463-469. doi:10.1212/WNL.0b013e31829d86b6
5. Bhidayasiri R et al: Updating the recommendations for treatment of tardive syndromes: a systematic review of new evidence and practical treatment algorithm, J Neurol Sci 389:67, 2018.
6. Blackburn J., Parnes M.: Tics, tremors and other movement disorders in childhood. Curr Prob Pediatr Adolesc Health Care 2021; 51 (3): pp. 100983.
7. Cath DC, Hedderly T, Ludolph AG et al. European clinical guidelines for Tourette syndrome and other tic disorders. Part I: assessment. Eur Child Adolesc Psychiatry 2011;20(4):155-71.
8. Factor S.A., et al.: The effects of valbenazine in participants with tardive dyskinesia: results of the 1-year KINECT 3 extension study. J Clin Psychiatry 2017; 78: pp. 1344.
9. Fernandez HH, Factor SA, Hauser RA et al. Randomized controlled trial of deutetrabenazine for tardive dyskinesia: The ARM-TD study. Neurology. 2017; 88:1-8.
10. Hauser R.A., et al.: Kinect 3: a phase 3 randomized, double-blind, placebo-controlled trial of valbenazine for tardive dyskinesia. Am J Psychiatry 2017; 174: pp. 476.

11. Hersch SM, Schifitto G, Oakes D, Bredlau AL, Meyers CM, Nahin R, Rosas HD; Huntington Study Group CREST-E Investigators and Coordinators. The CREST-E study of creatine for Huntington disease: a randomized controlled trial. Neurology 2017;89;594-601.
12. Hirschtritt M.E., et al.: Lifetime prevalence, age of risk, and etiology of comorbid psychiatric disorders in Tourette syndrome. JAMA Psychiatr 2015; 72 (4): pp. 325.
13. Huntington Study Group, Frank S, Testa CM et al. Effect of Deutetrabenazine on Chorea Among Patients With Huntington Disease: A Randomized Clinical Trial. JAMA. 2016; 316:40-50.
14. Ingrezza (valbenazine) [prescribing information]. San Diego, CA: Neurocrine Biosciences Inc; August 2023.
15. Jankovic J., et al.: Treatment of tics associated with Tourette syndrome. J Neural Transm 2020; 127 (5): pp. 843-850.
16. Keepers GA et al: The American Psychiatric Association practice guideline for the treatment of patients with schizophrenia. Am J Psychiatry. 177(9):868-72, 2020
17. Marder SR, Singer C, Lindenmayer JP, et al. A phase 3, 1-year, open-label trial of valbenazine in adults with tardive dyskinesia. J Clin Psychopharmacol. 2019;39(6):620-627. doi:10.1097/JCP.0000000000001111
18. McIntyre RS, Calabrese JR, Nierenberg AA, et al. The effects of valbenazine on tardive dyskinesia in patients with a primary mood disorder. J Affect Disord. 2019;246:217-223. doi:10.1016/j.jad.2018.12.023
19. Niemann N., Jankovic J.: Real-world experience with VMAT2 inhibitors. Clin Neuropharmacol 2019; 42 (2): pp. 37-41.
20. Paton DM. Deutetrabenazine: Treatment of hyperkinetic aspects of Huntington's disease, tardive dyskinesia and Tourette syndrome. Drugs Today (Barc). 2017; 53:89-102.
21. Pringsheim T., et al.: Practice guideline recommendations summary: treatment of tics in people with Tourette syndrome and chronic tic disorders. Neurology 2019; 92 (19): pp. 896-906.
22. Ricciardi L, Pringsheim T, Barnes TRE, et al. Treatment recommendations for tardive dyskinesia. Can J Psychiatry. 2019;64(6):388-399. doi:10.1177/0706743719828968
23. Roessner V, Plessen KJ, Rothenberger A et al. European clinical guidelines for Tourette syndrome and other tic disorders. Part II: pharmacological treatment. Eur Child Adolesc Psychiatry 2011;20(4):173-96.
24. Scharf J.M., et al.: Population prevalence of Tourette syndrome: a systematic review and meta-analysis. Mov Disord 2015; 30 (2): pp. 221-228.
25. Solmi M, Pigato G, Kane JM, Correll CU. Treatment of tardive dyskinesia with VMAT-2 inhibitors: a systematic review and meta-analysis of randomized controlled trials. Drug Des Devel Ther 2018;12;1215-1238.
26. Verdellen C, van de Griendt J, Hartmann A et al. European clinical guidelines for Tourette syndrome and other tic disorders. Part III: behavioural and psychosocial interventions. Eur Child Adolesc Psychiatry 2011;20(4):197-207.
27. Xenazine (tetrabenazine) tablets [prescribing information]. Deerfield, IL: Lundbeck; June 2022.

Clinical Guideline Revision / History Information

Original Date: 9/21/2023
Reviewed/Revised: