

NEUPULSE

PERIPHERAL NERVE STIMULATION FOR TOURETTE SYNDROME

AN UPDATE

ABOUT THIS INFORMATION SHEET

This information sheet provides an impartial summary of the current evidence relating to the Neupulse medical device. It has been prepared by the Tourettes Action Board of Trustees' Research Subcommittee using research available at the time of writing.

At Tourettes Action, our aim is to improve the lives of people affected by Tourette syndrome and tic disorders. We recognise that not everyone with tics needs treatment and that no single treatment works for everyone. Our aim is to provide our service users with the latest information, backed by research, which will enable them to make an informed decision about their care. Our hope is that, in the future, there will be a broad range of safe and effective evidence-based options available, allowing individuals and families to choose the approaches that best meet their needs and wishes.

Tourettes Action provided a charitable grant to fund the initial research that contributed to the development of the Neupulse device. Further details can be found in the Declaration of Interest and Transparency section below.

WHAT IS NEUPULSE?

Neupulse is a watch-style device worn on the wrist.

The device was developed to help reduce symptoms in people with Tourette syndrome and persistent tic disorders.

There are currently two versions of the Neupulse device:

- **Neupulse-C**, which is available as a consumer wellness device.
- **Neupulse-M**, which is intended to be marketed as a medical device specifically for the treatment of tics and Tourette syndrome, but has not yet received regulatory approval for this purpose.

Importantly, both versions use the same underlying technology but they have different regulatory status. Neupulse-C is available as a consumer wellness device, while Neupulse-M has not yet received approval as a medical device for the treatment of tics and Tourette syndrome. The evidence described in this

factsheet relates to the technology used in both versions.



WHY WAS NEUPULSE DEVELOPED?

Current treatments for Tourette syndrome typically include behavioural therapies and medication. These approaches can be very effective for many people, but they do not suit everyone. Some people find that the engagement and motivation needed to complete behavioural therapy is too much for them and some of the medicines used can cause unwanted side effects. Because of this, there has been ongoing interest in finding more accessible and better treatment options.

Researchers at the University of Nottingham spent around a decade investigating whether gentle rhythmic stimulation of a nerve in the wrist could help reduce tics. They also spoke with people living with Tourette syndrome about what they would like from future treatment options. People with Tourette syndrome highlighted that they wanted treatment options that were more flexible, work quickly, can be used when symptoms are particularly problematic and avoided some of the limitations of existing treatments. This work led to the development of the Neupulse device.

HOW DOES NEUPULSE WORK?

Neupulse uses a technique known as peripheral nerve stimulation (a method that sends mild electrical signals to nerves through the skin), it stimulates a nerve in the wrist called the median nerve.

Researchers in Nottingham and the United States have studied median nerve stimulation in people with tics. Their findings suggest that stimulation can influence areas of the brain involved in movement control and may help reduce tics in some people.

Researchers are still studying exactly how the device works and who may benefit most.

WHAT IS PERIPHERAL NERVE STIMULATION (PNS)?



This is a picture of the Neupulse device currently and an example of how it is worn on the wrist

Peripheral nerves are the nerves in our bodies, like in our arms and legs, that control movement and sensation. Peripheral nerve stimulation (PNS) works by sending small, controlled electrical signals through the skin to activate the nerves.

PNS is *not* a new treatment approach and has been used for many years in different conditions. For example, it is similar in principle to other devices, such as a TENS machine, which uses electrical stimulation to help manage pain and

other nerve stimulation devices have been used for the treatment of migraine, sleep problems and some other movement disorders.

Neupulse uses gentle electrical stimulation, but it has been designed specifically for Tourette syndrome. Rather than broadly stimulating nerves it targets a specific nerve in the wrist called the median nerve using a stimulation pattern developed through research into tics and movement control. The **median nerve** connects to brain networks involved in movement control. Research has shown that stimulating the median nerve at particular rhythms may temporarily reduce tics in some people. The Neupulse device uses this specific research informed stimulation pattern rather than a broad, non-specific stimulation used in devices such as TENS machines.

It is important to note that the research evidence discussed in this factsheet relates specifically to this approach to median nerve stimulation. The findings cannot automatically be assumed to apply to other wrist-worn stimulation devices that →



use different nerves, stimulation patterns or treatment approaches.

Importantly, this approach does not involve surgery and it does not permanently change the nerves. This is very different from treatments like deep brain stimulation, which require an operation to place electrodes inside the brain. It is a watch-style device that sits on the wrist and can be taken on or off whenever the person chooses.

HOW MIGHT PERIPHERAL NERVE STIMULATION HELP IN TOURETTE SYNDROME?

Researchers are still studying exactly how PNS works. Current evidence suggests that stimulating the median nerve may influence areas of the brain involved in movement control, which may help reduce tics in some people.



NEUPULSE AT A GLANCE – QUICK SUMMARY



WHAT IT IS

A wrist-worn device that delivers gentle electrical stimulation to a nerve in the wrist (the median nerve). It was developed to help reduce tics in people with Tourette syndrome.



WHAT DOES RESEARCH SHOW?

The main clinical trial involved 121 people aged 12 years and over. Participants used the device for around 15 minutes each weekday for four weeks. Around 60% of people using the active device experienced a meaningful reduction in tic severity.



IS IT SAFE?

The device was generally well tolerated. The most commonly reported side effects were mild tingling sensations, brief thumb movement and temporary skin redness. No serious side effects were reported.



WHAT ARE THE LIMITATIONS?

The device does not work for everyone, researchers cannot yet predict who will benefit most and larger studies are needed to better understand long-term effects.



IS IT AVAILABLE?

Neupulse-C is available as a consumer wellness device but is not currently available on the NHS. A medical device version (Neupulse-M) is undergoing regulatory review.



IMPORTANT

The evidence described in this factsheet relates specifically to the stimulation approach used by Neupulse and cannot automatically be applied to other nerve stimulation devices.



WHAT DOES THE RESEARCH TELL US SO FAR?

Participants used the device for around 15 minutes each weekday for four weeks.

During the trial researchers measured tic severity by looking at factors such as the number, frequency and intensity of tics. People were considered to have a meaningful improvement in their tics if their severity score improved by more than 25%.

The study found:

- About 60% of people using the active device experienced a meaningful improvement in their overall tic severity. In other words, their tic severity score reduced by more than 25%.
- Around 33% of people using a placebo device also improved.
- Improvements were seen in both motor and vocal tics. Motor tics showed the greatest improvement, with 77% of people achieving meaningful improvement in tic severity, whilst vocal tics improved in 54% of people.
- Benefits appeared to continue beyond the period when the device was being used.

- The device also appeared to help people who had co-occurring conditions such as ADHD and OCD.

Researchers have also explored the impact of Neupulse on premonitory urges, the sensations many people feel before a tic. Some improvements have been reported, but further research is needed to understand this fully.

Researchers later looked at a smaller group of participants three months after treatment. They found that improvements in motor and vocal tic severity were still present in those who took part in the follow-up. This is encouraging and suggests that some benefits may continue beyond the initial treatment period. However larger, long-term studies are needed to understand how long benefits may last.

The improvements seen in the Neupulse trial falls within the range of those reported in studies of behavioural therapy and medication. However, Neupulse has not yet been directly compared with these treatments, so it is not possible to say whether it is more or less effective overall.

IS IT SAFE?

The clinical trial found that the device was generally safe and well tolerated. Reported side effects were usually mild and included:

- Tingling sensation in the wrist or hand
- Brief thumb movement during stimulation
- Mild redness of the skin where the device was worn

Importantly, no serious side effects were reported and the stimulation did not appear to make tics worse.

IMPORTANT SAFETY INFORMATION

According to the manufacturer's guidance at the time of writing, Neupulse may not be suitable for certain groups of people, including:

- Children under 12 years of age
- People who are pregnant
- People with epilepsy or a history of seizures
- People who use implanted or electrical medical devices such as pacemakers, insulin pumps or neurostimulators
- People with metal implants in the arm or wrist
- People with reduced sensation in the hands or arms
- People with a brain tumour
- People with cuts, wounds or broken skin where the device would be worn

This list is based on information provided by the manufacturer and may change over time. Individuals should always check the latest manufacturer guidance and consider discussing suitability with an appropriate healthcare professional before purchasing or using the device.



WHAT ARE THE LIMITATIONS OF THE CURRENT EVIDENCE?

While the results are encouraging, there are still some important unanswered questions. Some of these challenges are common across many treatments for Tourette syndrome.

- Neupulse does not work for everyone.
- Researchers cannot yet predict who is most likely to benefit.
- The device has not been studied in children under the age of 12.
- Some people continued to experience benefits three months after treatment, but further research is needed to understand long-term effects.
- Larger studies are needed to confirm the findings and better understand who benefits most.

IS IT AVAILABLE AND IS IT ON THE NHS YET?

Neupulse-C became available as a consumer wellness device in June 2026 and is expected to become more widely available from September 2026.

The device is not currently available on the NHS.

Neupulse-M, is still going through the regulatory approval process. Neurotherapeutics hopes that, if regulatory approval is obtained, the device will be considered for NHS use. NICE, the organisation that evaluates new treatments for the NHS, has identified the technology as promising and has requested further evidence on its long term benefits before making any recommendations about NHS adoption.

DECLARATION OF INTEREST AND TRANSPARENCY STATEMENT

In 2017 and 2018, Tourettes Action provided funding for initial research undertaken by the University of Nottingham, which contributed to the development of the Neupulse device. The charitable grants were given as part of a broader 3-year funding program supporting a number of research projects or enabling studies to advance knowledge into and treatment of Tourette syndrome. More information about the grant program generally and the specific grants to the University of Nottingham can be found [here](#).

Under Association of Medical Research Charities (AMRC) guidance, when a charity funds research that leads to a new invention or technology, it can receive a share of any money made from it. Tourettes Action may therefore receive a small share of any income generated by the Neupulse device. This means the charity may benefit financially from the sale or use of this product. However, any funds received are used solely to further the charity's objectives.

In line with Charity Commission guidance, this interest is actively managed to ensure that it does not influence decisions about services or recommendations provided by Tourettes Action. This statement and the contents of this factsheet have been developed through Tourettes Action's research governance processes, including review by the charity's Research Subcommittee, none of whom have any personal financial interest in the device, Neurotherapeutics Ltd. or any income generated from the product. It has also been independently reviewed by an external clinical advisor to support accuracy and balance. The information given is based on research studies conducted to date and does not give personal views or opinions and aims to give a balanced summary of the evidence available at the time of writing.

This factsheet is intended to provide information about the current evidence relating to Neupulse and should not be taken as a recommendation to purchase or use the device.



You are under no obligation to purchase or use Neupulse and alternative treatment approaches may be available. As with any treatment or medical device, we encourage individuals to consider their personal circumstances carefully and to discuss new treatment options with an appropriate healthcare professional. We have information on our website which covers treatment options available to

those with Tourette syndrome, which will help individuals make a more informed decision.

If you have questions about purchasing, eligibility, device operation or safety requirements, you should consult the latest information provided by Neurotherapeutics and/or seek advice from an appropriate healthcare professional.

REFERENCES AND FURTHER INFORMATION

MAIN CLINICAL TRIAL

Morera Maiquez B, Smith C, Dyke K, Chou CP, Kasbia B, McCready C, et al. A double-blind, sham-controlled trial of home-administered rhythmic 10-Hz median nerve stimulation for the reduction of tics and suppression of the urge-to-tic, in individuals with Tourette syndrome and chronic tic disorder. *Journal of Neuropsychology*.

Jackson, S. R., Maiquez, B. M., & Jackson, G. M. (2026). Double-blind, sham-controlled, trial of rhythmic 10 Hz median nerve stimulation for the reduction of tics in Tourette syndrome: Analyses of 3-month follow-up data for those receiving active stimulation. *Journal of Neuropsychology*, 00, 1–11. <https://doi.org/10.1111/jnp.70080>

NICE (UK NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE)

Early Value Assessment: Neupulse Peripheral Nerve Stimulation Device: <https://www.nice.org.uk/guidance/hte25/chapter/2-The-technologies> (See NICE Digital Health Guidance, Draft Recommendations, 2023–2024)

NEUPULSE DEVICE INFORMATION

Neupulse (official website): <https://neupulse.co>

BACKGROUND RESEARCH STUDIES

Morera Maiquez B, Sigurdsson HP, Dyke K, Clarke E, McGrath P, Pasche M, et al. Entraining movement-related brain oscillations to suppress tics in Tourette syndrome. *Current Biology*. 2020;30:2334–2342.

Houlgreave MS, Maiquez BM, Brookes MJ, Jackson SR. The oscillatory effects of rhythmic median nerve stimulation. *NeuroImage*. 2022;251:118990.

Iverson AM, Arbuckle AL, Ueda K, Song DY, Bihun EC, Koller JM, et al. Median nerve stimulation for treatment of tics: randomized, controlled, crossover trial. *Journal of Clinical Medicine*. 2023;12(7):2514.

Iverson AM, Arbuckle AL, Song DY, Bihun EC, Black KJ. Median nerve stimulation for treatment of tics: a 4-week open trial with ecological momentary assessment. *Journal of Clinical Medicine*. 2023;12(7):2545.

Houlgreave MS, Dyke K, Berrington A, Jackson SR. Investigating neurometabolite changes in response to median nerve stimulation. *Brain and Behavior*. 2025;15(1):e70250.

