FLOW
NEUROSCIENCE

The Flow Data Pack

Welcome to the Flow Data Pack!

The Flow tDCS device – medically approved for MDD

Using electric currents to treat ailments is not exactly modern technology. For example, Scribonius Largus describes how ancient Romans used electric discharges from the torpedo fish to treat nerve pain.

However, the packaging and procedure has been improved quite a lot since then.

The specific technique used in Flow Neuroscience's brain stimulation device is called transcranial Direct Current Stimulation (tDCS). There is class A evidence (definite effect) for the ability of tDCS to improve depressive symptoms.

The research behind tDCS technology indicates a link between depression and hypoactivity in the left dorsolateral prefrontal cortex of the brain (the DLPFC). The Flow tDCS device uses the neurons' favourite tool of communication – electricity – to restore brain function in the area.

The device delivers a gentle electric current to the left DLPFC, which significantly increases the neurons' ability to reach action potential.

In contrast to Transcranial Magnetic Stimulation (TMS) or Electroconvulsive Therapy (ECT), the tDCS technique offers sub-threshold stimulation. The extremely mild current of 2 mA does not force neurons to fire, but rather *encourages* them to do so.

Over time, neurons in the targeted brain area are more likely to fire together and increase activity, thereby relieving depressive symptoms.

The gentleness of this treatment ensures that it's completely non-invasive and that side effects remain unusually rare and mild in comparison to other treatments. It also means that patients may need to wait 1-4 weeks to notice an improvement in their depression.

For a majority of patients, it's well worth the wait.

A 2023 RCT (the Empower study) showed that the Flow tDCS device offered full remission for 57.5% of the 174 depressed participants at 10 weeks. 63.0% of the patients reported a 50% or more reduction of symptoms.

The National Institute for Health and Care Excellence (NICE) has developed a medtech innovation briefing (MIB) on the Flow tDCS treatment stating that:

"There is high-quality, comparative evidence from the UK that Flow can improve symptoms of depression and lead to remission."

Read more about the effectiveness of the Flow treatment below.

Quality control of the Flow tDCS device

In the past, tDCS treatment was only available in-clinic under the direct supervision of a trained professional. Consequently, the treatment required time and resources.

To help clinicians meet the demands of a constantly growing depressed population, Flow Neuroscience has made tDCS available for patients to use at home.

Today, clinics can monitor more patients in less time thanks to the thorough review processes which ensure that the Flow tDCS device is completely safe and effective for at-home use.

The Flow tDCS device is currently approved as a medical device for at-home depression treatment in:

- **The EU, the UK and Switzerland (since 2019)**
- **Brazil (since 2020)**

An FDA approval for at-home use in the USA is in progress.

The British Standards Institution (BSI) evaluates the safety and efficacy of the Flow tDCS device. The BSI review is supported by several large-scale RCTs demonstrating the effectiveness and impact of tDCS. See the clinical trials below.

The Flow tDCS device is CE-marked as a Class IIa medical device. In contrast to Class I devices, the BSI has thoroughly reviewed clinical studies and published safety reports in order to conclude that the Flow tDCS device treats depression effectively and safely.

Thanks to a unique safety system, the Flow tDCS device has proven safe to use. It has been tested according to IEC 60601 for electrical medical device safety.

The Flow tDCS device received **FDA Breakthrough Device Designation** for at-home depression treatment in 2022. It's the first and only tDCS device to do so.

The National Institute for Health and Care Excellence (NICE) has developed a medtech innovation briefing (MIB) on the Flow tDCS

treatment. It includes a review of published evidence and expert statements about the usefulness and cost saving potential of Flow.

"There is high-quality, comparative evidence from the UK that Flow can improve symptoms of depression and lead to remission."

After-market data. Since receiving the CE-marking, the Flow tDCS device has been used by over 20 000 people in Europe. As part of the certification, Flow collects extensive data from these patients and reports it to the BSI annually. The procedure ensures that the real-world effects of using the Flow tDCS device align with the effects reported in the literature.

Pending approvals

Flow Neuroscience is targeting full FDA approval before the end of 2024.

The scientific board

The Flow tDCS treatment is supported by a scientific board of experts in psychiatry and neuromodulation:

Andrew Nierenberg

Professor of Psychiatry, Harvard University
Published > 500 papers, ranked top 1% of researchers for most cited papers in psychiatry worldwide.
Listed in Best Doctors in America in every edition since 1994.
Three-time listed in World's Most Influential Scientific Minds.

Allan Young

Professor of Psychiatry, King's College
Chair of Mood Disorders & Director of Centre for Affective Disorders (Psychiatry).
Listed as World's Most Influential Scientific Minds.

Joan A. Camprodon

Associate Professor of Psychiatry, Harvard University
Leads Lab for Neuropsychiatry & Neuromodulation at Harvard University.
Founding director of TMS service at Massachusetts General Hospital.

Corey Keller
Assistant Professor of Psychiatry, Stanford University
Leads the Stanford Laboratory for Personalized Neurotherapeutics.
Former CMO of Alto Neuroscience.

Andre Brunoni
Associate Professor, USP School of Medicine
Leading researcher in Neuromodulation.
Recognized as one of the most cited, influential researchers globally 2019-21.

NHS programmes

Flow Neuroscience is working with the NHS to offer Flow in Primary Care via GPs, Community Mental Health, NHS Practitioner Health and Postnatal Services. The NHS has several programmes live across Primary and Secondary Care.

The NICE Medtech Innovation Briefing

The Flow treatment is not yet included in the NICE guidelines (National Institute for Health and Care Excellence). However, NICE has developed a medtech innovation briefing (MIB) on the Flow treatment. It includes a review of scientific evidence and statements from clinical experts. They highlight the usefulness and cost saving potential of Flow.

According to the NICE briefing:

“There is high-quality, comparative evidence from the UK that Flow can improve symptoms of depression and lead to remission.”

All of the clinical experts agreed that:

“ … Flow would particularly benefit people whose symptoms have not responded to existing interventions or who experience side effects with commonly prescribed medication, such as antidepressants”

All of the clinical experts found that the treatment would easily integrate into the NHS general practice.

“None of the clinical experts were aware of any issues that could prevent this technology or procedure being adopted in the NHS. They also advised that no change in facilities is needed for adopting Flow, but a short training session is needed for clinicians”

In addition, two of the clinical experts predicted:

“ … that some people may not need secondary care if tDCS is prescribed in primary care. This would mean that Flow is used as a first treatment for people with depression. The one-off cost for purchasing the Flow headset is likely to be cheaper than antidepressants, which are not effective for some people. Because Flow is intended to be used at home, it is likely to reduce the number of secondary care appointments needed, which could further reduce the costs of treating depression.”

Effectiveness of tDCS and the Flow treatment

– Clinical trials and real-world results

There are over 9000 peer-reviewed publications on tDCS, including numerous large-scale studies and meta-analyses. And the number increases each year.

tDCS’s popularity surge is probably due to four main factors:

1. **Efficacy**
2. **Tolerability**
3. **Affordability**
4. **Ease of use**

Since 2020, there has been class A evidence (definite effect) for the ability of tDCS to improve depression.

Though it would be nearly impossible to mention all significant publications, below are a few important ones:

2013 – Brunoni et al: Clinical trial with 120 patients demonstrated that tDCS was significantly superior to placebo and even more effective when combined with an SSRI (Sertraline).

2016 – Bikson et al: An ambitious study found tDCS to be absolutely safe to use across a variety of populations and over 33 000 tDCS sessions. The team concluded:

"The use of conventional tDCS protocols in human trials (≤40 min, ≤4 milliamperes, ≤7.2 Coulombs) has not produced any reports of a Serious Adverse Effect or irreversible injury across over 33,200 sessions and 1000 subjects with repeated sessions. This includes a wide variety of subjects, including persons from potentially vulnerable populations."

2019 – Mutz et al: Systematic review, including a combined group of 6,750 patients, demonstrated that tDCS is comparable to TMS in efficacy. The authors concluded:

"Given that tDCS tends to be a less expensive treatment than transcranial magnetic stimulation, ECT, or psychotherapy, this finding is particularly relevant for policy makers who might consider tDCS as a clinical therapy outside the research setting."
Indeed, TMS devices are typically priced at a significantly higher cost than the Flow tDCS device.

2020 – Razza et al: Meta-analysis of 1,092 patients demonstrated that tDCS is superior to placebo.

2020 – Fregni et al: tDCS was classified as definitely effective for depression (Level A evidence). In addition, tDCS reached Level B evidence (probably effective) for a wide range of other conditions, such as:

- Neuropathic pain
- Fibromyalgia
- Migraine
- Epilepsy
- Parkinson's disease
- Schizophrenia
- Alcohol addiction

Please note: *The careful process behind the CE marking of the Flow tDCS device ensures that the effects of using Flow align with the effects seen in the literature.*

2020–2023: Flow Neuroscience conducted its own pilot studies and RCT to investigate the safety and efficacy of the Flow tDCS treatment.

The Empower Study Results

June 2023 – Flow Neuroscience finished enrollment for one of the largest randomised, double-blind, placebo-controlled tDCS trials ever conducted for depression.

It showed that active stimulation with the Flow tDCS device was superior to sham stimulation for the treatment of Major Depressive Disorder (MDD).

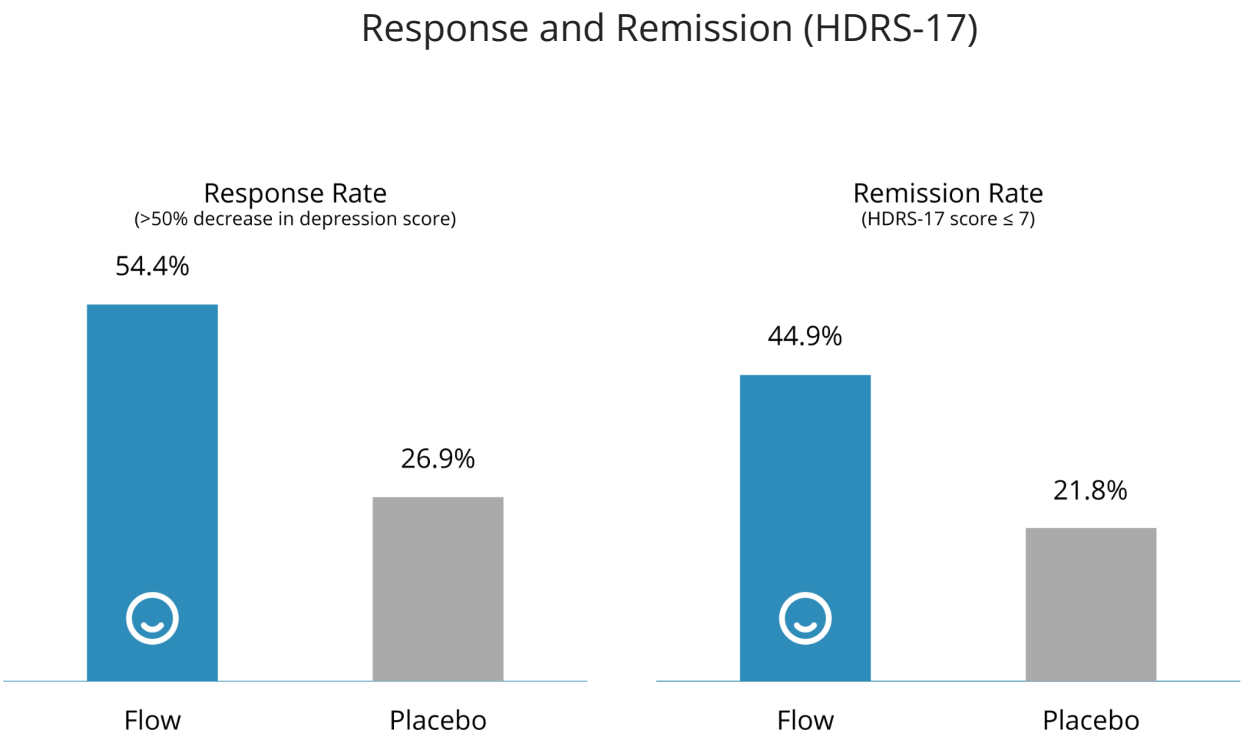
The study involved two research centres – the University of East London (UK) and the University of Texas (US).

174 participants with moderate to severe depression used the Flow tDCS device at home. The treatment protocol included 10 weeks of treatment with 3-5 stimulation sessions a week. Each session was 30 minutes long.

Outcomes were measured using the HDRS-17 and MADRS depression surveys.

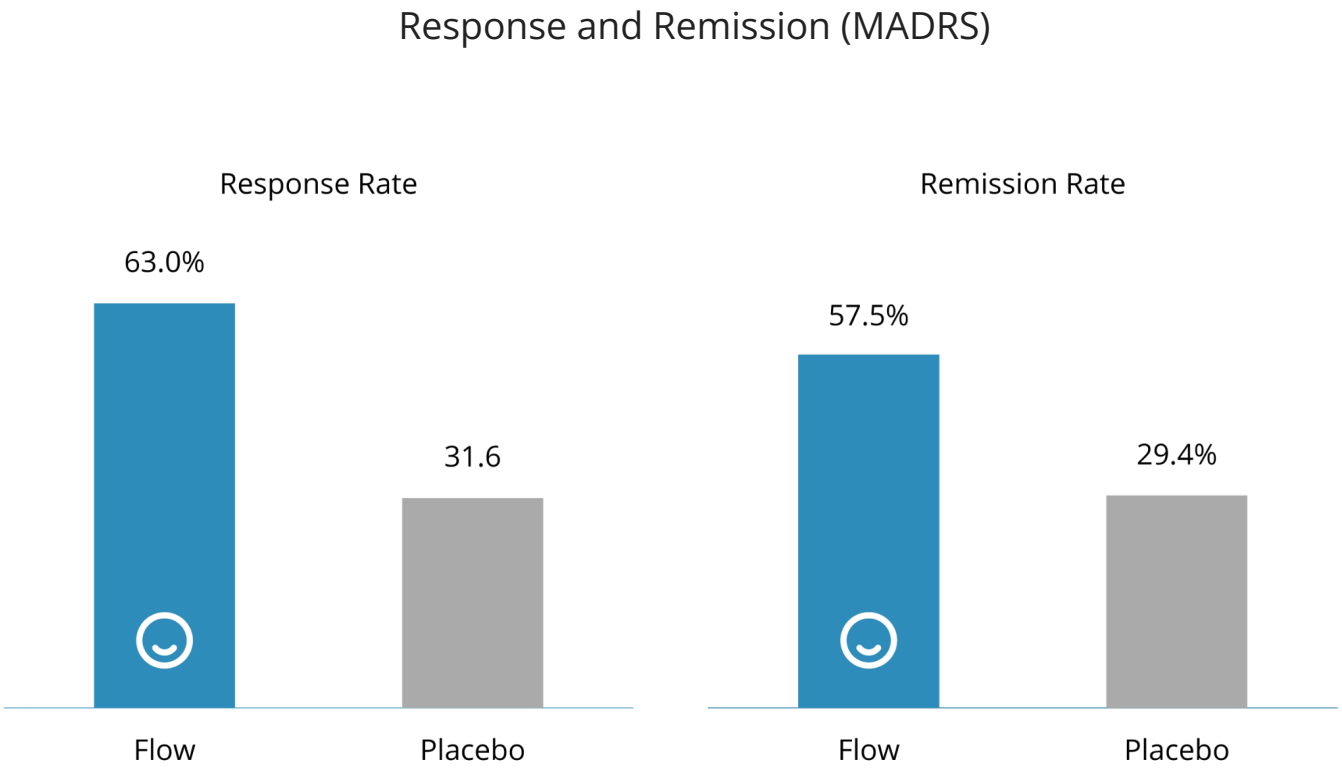
Results:

- **Results based on HDRS-17:** 44.9% remission (vs 21.8% placebo) and 54.4% response rate (vs 26.9% placebo) at week 10.



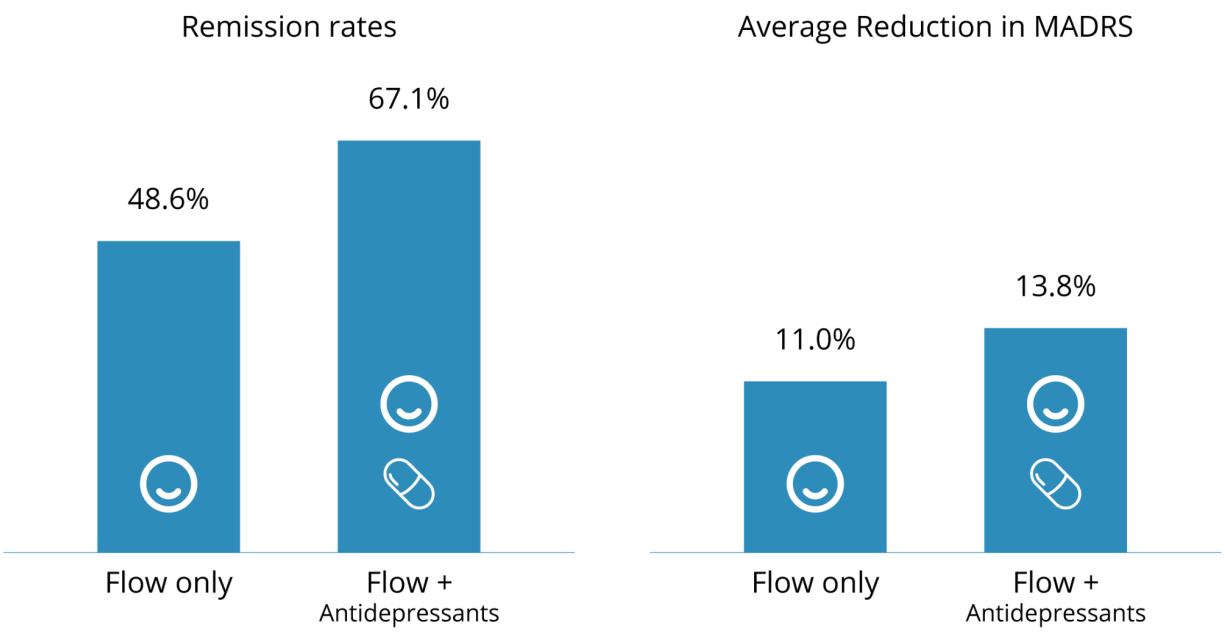
** p>0,025

- **Results based on MADRS:** 57.5% remission (vs 29.4% placebo) and 63.0% response rate (vs 31.6% placebo) at week 10.



** p>0,025

Participants who were on a stable dose of antidepressant medication showed greater improvements than those who didn't take antidepressants:



- No serious adverse events were reported.
- The only statistically significant adverse event was skin irritation (difference 6.9% (1.9% to 14.5%) p = 0.03).
- There were no differences in discontinuation rates between the treatment group and the control group.
- More information on the trial can be found here.

The NHS Primary Care Study Results

July 2023 – Griffiths and colleagues performed a qualitative study using the Flow tDCS treatment in primary care within the United Kingdom's National Health Service (NHS).

The aim of the study was to explore the experience and value of using the Flow tDCS treatment for depression at home.

The patients were offered six weeks of the Flow treatment by their General Practitioner (GP). In addition to 24 home-based brain stimulation sessions, patients were offered to engage in the behaviour therapy training sessions included in the Flow app.

The results of the study provided support for offering Flow as a treatment option for depression in primary care.

The research team concluded:

"Flow has been successfully integrated into a primary care service depression treatment. It is important to offer patients an evidence-based alternative to existing depression treatments (antidepressant medication and talking therapies). The results support the use of Flow as a treatment option for people with symptoms of depression."

Of the 47 patients using the Flow treatment, 18 agreed to in-depth interviews about their experience.

Results:

Following the analysis of the interview data, four main themes emerged:

1. **Feasibility**
2. **Useability**
3. **Acceptability**
4. **Value**

Feasibility
The patients described how Flow was easily and conveniently integrated and used in combination with other treatments such as medication and talking therapies.

The initial process of getting Flow was easy, convenient, and patient friendly. Patients also described setting it up as user-friendly.

Useability
The patients found that they could fit Flow into their day-to-day routine, without too many problems. Side effects such as itching and tingling could easily be managed.

"It's dead simple to be honest, once the app is on there, which is easy to download. I mean, I'm not particularly techie. Because I think anybody, especially when you get older… so simple…" (NHS patient)

The behaviour therapy training facilitated some positive behaviour changes. A majority of patients found it helpful.

"It gives you suggestions for habits and you know it is almost like a mini therapist, I really like that element and I'm finding it most helpful." (NHS patient)

"I did love the therapeutic sleep training. It has made a massive difference to my sleep. I've since had no TV on, I've done my meditation before bed, and then it's been like pitch black…" (NHS patient)

Acceptability

For the majority of the patients, the fact that Flow was an alternative to medication to treat their depression was an important factor.

For those still on medication, Flow was perceived by some as a means to eventually help them come off their medication.

Flow was perceived to be something that worked. Many of the patients felt very strongly about keeping Flow.

"Because I felt it was making a huge difference. After six weeks, I stopped using it with the idea of giving it back. But after a week, I could feel that my mood was going backward again. Then I used it for the following couple of days. And I was back to being how I was. So yeah, then I was, no it's mine you are not having it back!" (NHS patient)

Value

The Flow treatment had a significant positive impact on patients' depression and anxiety.

Several talked about feeling like their old self. Others felt it had relieved them of their depression and anxiety completely.

In addition, patients reported improvements in mood, optimism, confidence, sleep and motivation.

"The effect it's [Flow] had on me, and I think it's been quite groundbreaking for me and my depression and anxiety, it's been a life changer." (NHS patient)

"I don't feel sad anymore. I feel a lot more optimistic, and happier. I have just got a better outlook on things. Using the Flow changes your train of thought. My thinking is now positive rather than negative all of the time... and I feel better in my mood." (NHS patient)

More information about the study can be found here.

The NHS Community Mental Health Team Study Results

February 2024 – another research team led by Griffiths explored participants' experiences and views on the Flow treatment for depression.

In this study, the Flow treatment was offered by a community mental health team (CMHT) within the United Kingdom's National Health Service (NHS). CMHTs deliver community-based mental health care for adults and older adults with severe mental health needs, as close to their home geographical area as possible.

All participants used the Flow treatment at home for at least 6 weeks.

The research team concluded:

"This study provides support for the acceptability, feasibility, useability, and value of Flow, evidencing that successful integration of Flow as part of CMHT patient's depression treatment can be achieved and can be beneficial. Findings suggest that patients in a CMHT (who often have an extensive history of depression and have tried various antidepressants and psychotherapies) were open, willing and want to try tDCS as an alternative treatment."

Out of 27 participants, 14 agreed to in-depth, semi-structured interviews.

Results:

From an Interpretative Phenomenological Analysis (IPA), 11 themes were developed.

1. **A user-friendly device, simple and easy to operate**
   Across all the narratives, the Flow device and its software app training was identified as easy to use. There were no issues in putting it on, starting it, functionality, or using the training.

   "But it's so easy to use. I think that's the key bit. I'm a bit of a technophobe, so am not awfully good with stuff like that, but it's very easy to use…it's almost idiot proof…now, it's just like second nature."
   (Henry)

2. **Mindset: willing and open, nothing to lose**
   Participants were willing, wanting, and needing to try an alternative treatment.

   "I haven't got any other option. There's…nothing else"
   (Robert)

3. **Active agent, taking control of own treatment**
   By using Flow, participants felt they were taking ownership and responsibility in their recovery.

   "You're empowered, to take steps in the right direction…, like have that kind of self-control and self-determination with it and being able to see and measure that impact over time."
   (Calum)

4. **Fits into my personal routine, flexible and convenient**

   "I can choose when I use it. It's certainly different to going to (mental health clinical) appointments, it is easier to use."
   (Jane)

5. **"Uncomfortable" (but not inhibitory) sensations using Flow**

Participants experienced some physical sensations when using Flow that were perceived to be uncomfortable and unpleasant. The important factor was that it did not stop participants from using Flow regularly.

"Tingly, sometimes stingy sensation, but nothing unbearable... I did get like dry patches on my head as well. But nothing unbearable, or that prevented me from using it."

(Emma)

6. **Individual obstacles interfere with engagement**
   Some participants were at times unable to commit to using Flow, for a variety of reasons such as neurodiversity or external stresses.

   "I've been making my way through quite slowly, to be honest, I have ADHD, it very hard for me to sit down and concentrate."

   (Oliver)

7. **Offers a viable alternative to prior ineffective treatments**
   Several participants found that previous treatments have not worked for them, and Flow offers an alternative option. A non-pharmacological alternative was an attractive option.

   "I've suffered with mental health, for as long as I can remember, since childhood and looking back, I've been on so many different medications that have worked for a while, and then it's sort of back to square one again. So, anything I can have that will offer something different, a change that might be the one, is great."

   (Katherine)

8. **Gaining new or recapitulating existing knowledge to support recovery**
   The behavioural training app contributed to knowledge and behaviour changes.

   "It was a lot of stuff on the diet stuff that I didn't really know. I mean, I try to do some of it... I use a lot less processed foods... I eat a lot more nuts now. So, I have changed my behaviour."

   (Giles)

9. **Improvements in symptoms of depression, a lift in mood**

> "I just feel lighter, in general... I feel a lot more confident... I don't feel like I am so bogged down by my own brain. I feel less like the future is like a black void that's never going to come about, I feel less worthless... I feel more genuinely happy about things."
>
> (Oliver)

10. **Benefitting from "knock-on effects", a positive feedback loop**
    Through Flow lifting their depression, participants experienced cumulative effects. They were able to engage in things like a better diet, they had more energy, slept better, had more motivation, and they could enjoy engaging in activities (e.g., socialising, doing physical exercise), all of which in turn positively impacts on their depression.

    > "But I feel now that my motivation has got better, definitely more motivation. I am getting knock-on effects, I am more motivated and finding it easier to go out and socialise people that then has impacted my mental health positively because I'm feeling better for doing that."
    >
    > (Sally)

11. **It didn't work for me, no noticeable impact**
    For three participants, they experienced no noticeable difference using Flow.

    > "I don't think Flow made me any worse. I just don't think it's made me any better."
    >
    > (Robert)

More information about the study can be found here.

Real-World Results

In addition to conducting clinical trials, Flow Neuroscience collects data from the patients on the Flow platform (via the Flow app). Up to February 2024, over 20 000 patients have used the Flow treatment.

Depression scores are collected weekly from all patients using the Montgomery and Åsberg Depression Rating Scale (MADRS-s) – a reputable and clinically-validated questionnaire for measuring depressive symptoms.

According to the MADRS-s data, around 77% of Flow patients report a clinically significant improvement within 3 weeks (–3 points or more on the MADRS-s). And 90% of the overall improvements usually occur within the first 10 weeks of treatment.

An analysis of the real-world data collected between March 2019 and March 2024 indicated that 28.7% of Flow patients had reached full remission within 3 weeks. At week 10, 36.3% had reached remission. The analysis included Flow patients with a minimum of 60% adherence to the standard treatment protocol.

The results are particularly noteworthy considering that around 92% of Flow patients report that they have already tried one or several treatments before choosing Flow. A consistent theme in patient feedback and interviews is that antidepressant medication and/or psychotherapy have had little or no effect (or have been unmanageable due to side effects or waiting times). Consequently, treatment resistance may be over-represented among Flow patients.

Please note: *The rates of improvement may vary with time because of the constantly growing number of Flow patients.*

Why are the real-world results different from the clinical trial results?

In general, real-world results are expected to underperform controlled trials for depression treatment. This is typically due to:

1. **Patient selection in trials:** Real-world results usually include patients with multiple comorbidities, which can complicate results and make it more difficult to achieve an impact on depression scores.

2. **Clinician influence:** In clinical trials, clinicians usually administer depression score questionnaires and supervise patients through the treatment protocol. When it comes to real world data, patients report symptoms themselves. Clinicians tend to report bigger improvements in depression scores than patients.

Adverse events

One of the most tangible benefits of the Flow tDCS treatment is the unusual absence of side effects and adverse events.

Real-world reports

Up to February 2024, over 20 000 people have used the Flow tDCS treatment. Less than 5% have reported any adverse events.

The most commonly reported adverse events from the Flow treatment are:

- Headache (~1,5%)
- Skin irritation (~1%)
- Tinnitus (~0,6%)
- Mild skin burn (~0,3%)
- Anxiety (~0,2%)
- Skin redness (~0,1%)
- Worsening of symptoms (~0,1%)

Please note: *The percentages may vary slightly with time because of the constantly growing number of Flow patients.*

These adverse events typically resolve within a few hours to no more than a few days. Flow patients tend to adapt to the treatment over time, resulting in a reduction or disappearance of side effects with continued use.

The high tolerability of tDCS is repeated across clinical trials where drop out rates usually don't differ between treatment group and sham/control group.

Clinical evidence

Clinical studies, such as the one performed by Bikson (2016) and colleagues examining over 33 000 tDCS sessions, show that the current used in tDCS treatment protocols is not strong enough to cause any damage to the brain.

A 2020 study by Chhabra and colleagues, examining adverse effects of over 2000 tDCS sessions, found side effects to be mild, transient and well-tolerated. The most commonly reported side effects included:

- Burning sensations (16.2%)
- Skin redness (12.3%)
- Scalp pain (10.1%)
- Itching (6.7%)
- Tingling (6.3%)

The randomised, controlled Empower study (2023) included 174 participants and investigated the effects of the Flow tDCS treatment on moderate to severe depression.

The only statistically significant adverse event was skin irritation (difference 6.9% – 1.9% to 14.5%, $p = 0.03$).

Two participants in the active group reported burns at the left electrode site from using sponges which had dried out. Both burns healed, and neither developed into skin lesions.

Two people in the treatment group and in the control group respectively reported temporary tinnitus as an adverse event.

There were no differences in discontinuation rates between the treatment group and the control group.

Read more about adverse events and how to minimise them in the Fundamental Flow for Clinics.

Antidepressant medication. In comparison, a large international cohort (2018) including people from 38 different countries showed that a majority of antidepressant users experienced several adverse effects.

61% of the participants reported at least 10 adverse effects. Some of the most common ones are listed below:

- Feeling emotionally numb (reported by 71%)
- Feeling foggy or detached (70%)
- Feeling not like myself (66%)

- Sexual difficulties (66%)
- Drowsiness (63%)
- Reduction in positive feelings (60%)
- Suicidality (50%)

In addition, withdrawal effects were reported by 59% and 40% reported an addiction to the drug.

Contraindications

There are no universal contraindications to using the Flow tDCS treatment.

The following conditions may require extra precautions – such as careful monitoring:

- Broken/inflamed/infected skin (for example psoriasis) at the site of the electrodes
- A cranial or intracranial implant
- In case the skull is not intact (eg. after a craniectomy)
- An active implanted medical, metallic or electronic device (such as a cardiac pacemaker, spinal cord stimulator, cochlear implant, implanted hearing aid or defibrillator)
- Epilepsy (or a history of seizures)
- Bipolar disorder

Please note that the Flow tDCS treatment is not licensed for use in pregnancy or for people below 18 years of age.

The treatment is safe to use while breastfeeding and with postpartum depression (PPD).

Use during pregnancy

Please note that the Flow treatment is not licensed for use in pregnancy.

There is no evidence in the literature to suggest that tDCS treatment could be harmful to use when pregnant. The electric current targets the brain directly without affecting the hormonal or digestive systems, making tDCS a tempting option for treating depression during the peripartum period.

However, more large-scale controlled trials are needed before any definitive conclusions can be drawn.

Today, the option to use tDCS during pregnancy should be carefully evaluated in each individual case.

Please note that the Flow treatment is safe to use while breastfeeding and with postpartum depression (PPD).

Encouraging research results for tDCS during pregnancy:

2022 – Laurin et al: A systematic review including seven studies and 33 women. No serious adverse effects for the mothers or children.

2019 – Vigod et al: A pilot randomised controlled trial showing promising results for tDCS during pregnancy. There were no serious adverse events.

2018 – Kurzeck et al: A systematic review concluding that the scientific evidence for tDCS during pregnancy is sparse but promising.

Use in children

The Flow treatment is only medically approved (CE-marked Class IIa) for adults aged 18 years or older with Major Depressive Disorder.

For more information about tDCS for children and adolescents, visit tDCS Treatment in Young People with Depression.

Long-term use

There is promising evidence indicating that tDCS is safe to use long-term and effective at preventing relapse.

Daily tDCS sessions over the DLPFC have been used for 6 consecutive months without any adverse events, suggesting it is suitable for long-term use (see for example Im et al., 2019 on Alzheimer's disease).

There is no evidence to suggest that adverse events would increase beyond 6 months, but few such long-term studies exist. Randomised, controlled studies are still needed to draw firm conclusions about the long-term effects of tDCS use.

The following studies indicate the safety and efficacy of tDCS long-term treatment for depression:

2022 – Woodham et al: An open-label, single-arm feasibility study with long term outcomes investigated home-based tDCS treatment for depression.

At week 6, 22 participants (91.7%) showed a clinical response. 21 participants (87.5%) achieved remission.

At the 6-month follow up, clinical response was 21 out of 23 participants (91.3%). Remission was 17 out of 23 participants (73.9%).

The treatment was described as "very acceptable" or "quite acceptable" by all participants (n=24).

2021 – Razza et al: A systematic review and meta analysis investigated the follow-up effects of tDCS for depression. The analysis included 11 studies and showed that depressive symptoms continued to improve during the tDCS follow-up phase. It suggested that maintenance treatment might further improve the gains from acute tDCS treatment.

2019 – Aparicio et al: A 6-month follow-up clinical trial investigated the effects of tDCS for preventing depression relapse. The study included 24 patients who had responded to tDCS treatment in the acute treatment phase (15 tDCS sessions over 3 weeks). The participants were followed for up to 6 months.

The maintenance treatment included 2 weekly tDCS sessions.

tDCS was well tolerated, both during the acute phase and the follow up phase. No adverse events were reported.

The studies main findings were:

1) Patients presented approximately a 50% improvement in depression during the follow up phase.
2) The overall relapse rate was 26.5%.
3) Antidepressants treatment-resistant depression was associated with higher levels of relapse.

2013 – Valiengo et al: The SELECT-TDCS trial followed participants for 6 months and found that tDCS was effective both as a treatment in the acute phase of depression and as relapse prevention.

However, the relapse rate was higher in comparison to Aparicio's study (53% vs 26.5%). According to Aparicio (2019), the probable explanation was that the SELECT trial included significantly fewer maintenance sessions.

2 weekly maintenance sessions are likely more effective than 1.

Read more about How to Use the Flow Treatment long-term in Clinical Practice.

The treatment protocol

As a starting point, the following protocol is available for all patients:

The first 3 weeks of treatment – The Activation Phase
The patient completes 5 stimulation sessions a week at home (each session is 30 minutes long).

Week 4 and beyond – The Strengthening Phase
The patient completes 2-3 stimulation sessions a week at home for a minimum of 7 weeks.

The 10 week milestone: If the treatment has proven helpful at week 10, the Strengthening phase is continued for 6-12 months to help maintain progress and prevent relapse.

Note 1: It is common for patients to experience a transient and mild increase in depressive symptoms as the treatment protocol is reduced to 2-3 sessions a week. This tends to last a few days.

However, if it persists for more than one week and/or if it is a significant worsening of symptoms (sometimes described as “my depression has come back”) – consider the following steps:

1. Increase the number of stimulation sessions to 5 for another 3 weeks (the protocol can be adjusted via the Clinician Platform).

2. After 3 weeks have passed, try again to reduce the number of stimulation sessions to 2-3 per week and re-evaluate the results.

3. Should the same problem appear again, the stimulation schedule can be set to 5 sessions a week for the next few months.

Note 2: The standard protocol for the Strengthening phase is automatically set to 2 sessions/week. However, the Empower study (2023) used 3 sessions/week with positive results. The protocol from the Empower study can be used from the start of treatment.

For more information about long-term use of the Flow treatment and when to customise the stimulation protocol, please visit this webinar.

Long-term protocols

The recommended protocols for long-term use of the Flow treatment are rooted in the scientific literature and have been reviewed by Flow Neuroscience's scientific board, including Professor of Psychiatry at King's College London, Allan Young, and leading researcher in neuromodulation at the University of São Paulo, André Russowsky Brunoni.

The protocol is based on how the patient responds to the Flow treatment during the initial 10 weeks.

Patients with a high risk of depression relapse are recommended a slightly different protocol than patients with a low risk of relapse **– a minimum of 12 months treatment instead of 6 months.**

High risk factors include:

- Childhood maltreatment (such as physical, emotional or sexual abuse, physical or emotional neglect, family conflict or violence).
- Residual symptoms from the last depressive episode.
- A history of depressive episodes.
- Chronic physical or mental health disorders.

The following factors may also increase the risk, but the scientific evidence proving their impact on relapse is not as strong:

- An anxiety disorder.
- Rumination – experiencing repetitive negative thinking or easily dwelling on negative feelings/thoughts.

Low risk of relapse patients are exempt from these risk factors.

Below, you'll find the recommended long-term protocols for three common scenarios.

Scenario #1: The patient reaches remission by week 10

Recommendations for high risk of relapse patients: a minimum of 3 stimulation sessions a week for a minimum of 12 months to help maintain remission.

For low risk of relapse patients: 2-3 stimulation sessions a week for a minimum of 6 months to help maintain remission.

Note: if the patient has a customised stimulation schedule it can be used for the whole duration of the treatment. For more information about when to customise the treatment protocol, please visit this webinar.

Scenario #2: The patient achieves a 50% reduction of symptoms or a significant improvement (but not full remission) by week 10

What signifies a significant improvement? Ultimately, the patient will decide if the treatment is helpful or not. If they find the treatment helpful and tolerable, long-term use is recommended.

Common examples of a significant improvement:

- The patient's depression score improves from severe depression to moderate/mild, or from moderate depression to mild.

- The patient experiences that the Flow treatment is preventing their depression from worsening during challenging times or periods of intense stress.

For all such patients: Consider increasing the number of stimulation sessions to 5 per week.

For high risk of relapse patients: Continue the treatment for a minimum of 12 months to help maintain the results.

For low risk of relapse patients: Continue the treatment for a minimum of 6 months to help maintain the results.

In this scenario, a combination of evidence-based treatments can be beneficial. For example, combining tDCS treatment with antidepressant medication may enhance the efficacy of both treatments (see Woodham et al., 2023, McLaren et al., 2018, Brunoni et al., 2013).

Scenario #3: The patient does not reach an improvement, response or remission by week 10

For all such patients: Re-evaluate the use of the Flow treatment. Usually, the largest improvements occur within the first 10 weeks. If the patient does not report any improvements at all at this point, the Flow treatment is probably not effective for them.

However, if the patient reports significant value from the Flow treatment, continued treatment is still relevant. In such cases, a combination of evidence-based treatments should be considered. For example, combining tDCS treatment with antidepressant medication may enhance the efficacy of both treatments (see Woodham et al., 2023, McLaren et al., 2018, Brunoni et al., 2013).

For more information, watch this webinar on long-term usage of the Flow treatment.

Or, visit this article on How to Use the Flow Treatment in Clinical Practice.

Future uses of tDCS

To date, the only tDCS treatment with Level A evidence (definite effect) is the treatment of Major Depressive Disorder (MDD).

The Flow tDCS device is solely classified as a Class IIa medical device for the treatment of depression in adults.

Should a clinic choose to use the Flow tDCS device to treat any other condition, this would be classified as “off-label” use with the accompanying risks.

Level B evidence

According to Fregni and colleagues (2020), there is currently Level B evidence (probable effect) for the use of tDCS on several conditions. A few of these conditions are treated by targeting the same area as the Flow tDCS device – the left dorsolateral prefrontal cortex (DLPFC).

tDCS treatment usually targets the left DLPFC in:

- Cognitive symptoms of Parkinson's disease
- Auditory hallucinations in Schizophrenia (however the cathode is placed differently – over the left temporoparietal area)

A minority of studies have used the left DLPFC as a target for the treatment of pain disorders.

tDCS treatment usually targets other brain areas in:

- Alcohol addiction (usually the **right** DLPFC)
- Epilepsy (cathode placed over the affected area)
- Neuropathic pain (motor cortex)
- Migraine (motor cortex)
- Fibromyalgia (motor cortex)
- Stroke rehabilitation (motor cortex)

Please note that tDCS may have probable or possible effect for other conditions not included in Fregni's analysis.

Level C evidence

According to Fregni and colleagues (2020), there is currently Level C evidence (possible effect) for the use of tDCS in:

- Obsessive-Compulsive Disorder (targeting the pre−SMA)
- Aphasia (various placements, some targeting Broca's area)

Please note that tDCS may have probable or possible effect for other conditions not included in Fregni's analysis.

ADHD

There is promising and growing evidence for tDCS treatment of ADHD symptoms.

In 2022, a randomised, double-blind, controlled trial showed that at-home tDCS treatment significantly improved attention in 64 adult patients with ADHD. The treatment used the anode over the **right** DLPFC.

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