Tiagabine for treating painful tonic spasms in multiple sclerosis: a pilot study

Tiagabine (Gabitril, Paris, France) is a new antiepileptic drug that acts as a selective inhibitor of the γ-aminobutyric acid (GABA) transporter, GAT-1. It has recently been reported to be effective in diseases other than epilepsy, such as stiff man syndrome and neuropathic pain, conditions in which GABAergic mechanisms are supposedly involved. In multiple sclerosis, painful tonic spasms affect approximately 10% of patients and are usually treated with GABAergic drugs such as baclofen or gabapentin.

We undertook an open label pilot study of tiagabine, in a dose range of 5 to 30 mg/day, in a group of seven multiple sclerosis patients with painful tonic spasms who were non-responsive or intolerant to established drug treatment. The patients had previously been treated with gabapentin, baclofen, diazepam, or clonazepam, and were being followed in the department of neurology, PA Mioone Hospital, Genoa, Italy. Four subjects were female and three were male, with a mean age of 45.1 years, mean disease duration of 7.1 years, and expanded disability status score (EDSS) of 4.0. Four patients had relapsing-remitting, one had secondary progressive, and two had primary progressive disease. Painful tonic spasms were defined as transient painful extension or flexor spasms in the lower limbs, with abrupt onset and brief duration (from a few seconds to a few minutes), with repetitive and stereotyped features. The subjective level of the painful tonic spasms was scored using a three point scale previously described: 0, no pain, no attack; 1, mild pain or discomfort, present only a limited amount of time; 2, intermediate pain or discomfort: the duration moderate interferes with daily activities; 3, severe pain: intensity or frequency of symptoms seriously limiting normal daily activity. Spasticity level was scored using the Ashworth scale. Tiagabine was started at 5 mg daily and increased until spasms were controlled. The patients were clinically evaluated at baseline (T0), after pain relief was achieved (T1), and after three months from the beginning of the protocol (T2). The Ashworth score changed by one point in all four subjects, with a reduction of two points on the pain scale; efficacy was maintained for a period of three months in all four subjects. The Ashworth score changed by one point in one subject. The clinical characteristics of the patients and the painful tonic spasms scores before and after treatment are given in table 1.

Two patients (Nos 2 and 5) dropped out of the study because of adverse effects: one due to nausea and dizziness, the other due to drowsiness and weakness. These subjects had a longer disease duration and higher EDSS scores, suggesting a possible correlation between disease severity and adverse effects.

Four patients had complete and sustained recovery within one month of initiation of treatment (a reduction of two points on the Ashworth scale). Only a limited amount of time; 2, intermediate pain or discomfort, presents only a limited amount of time; 2, intermediate pain or discomfort: the duration moderate interferes with daily activities; 3, severe pain: intensity or frequency of symptoms seriously limiting normal daily activity. Spasticity level was scored using the Ashworth scale. Tiagabine was started at 5 mg daily and increased until spasms were controlled. The patients were clinically evaluated at baseline (T0), after pain relief was achieved (T1), and after three months from the beginning of the protocol (T2). The Ashworth score changed by one point in all four subjects, with a reduction of two points on the pain scale; efficacy was maintained for a period of three months in all four subjects. The Ashworth score changed by one point in one subject. The clinical characteristics of the patients and the painful tonic spasms scores before and after treatment are given in table 1.

Table 1. Clinical characteristics of the patients and painful tonic spasms scores before and after treatment.

<table>
<thead>
<tr>
<th>Case</th>
<th>Sex</th>
<th>Age (years)</th>
<th>EDSS</th>
<th>Dose</th>
<th>T0</th>
<th>T1</th>
<th>T2</th>
<th>Type</th>
<th>Duration (years)</th>
</tr>
</thead>
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<tr>
<td>1</td>
<td>M</td>
<td>34</td>
<td>2.5</td>
<td>10 mg</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>RR</td>
<td>5</td>
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<tr>
<td>2</td>
<td>M</td>
<td>65</td>
<td>7.5</td>
<td>5 mg</td>
<td>3</td>
<td>Se</td>
<td>SP</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>43</td>
<td>3</td>
<td>30 mg</td>
<td>3</td>
<td>1</td>
<td>PP</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>52</td>
<td>2</td>
<td>10 mg</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>RR</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>61</td>
<td>6.5</td>
<td>5 mg</td>
<td>3</td>
<td>Se</td>
<td>PP</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>44</td>
<td>3.5</td>
<td>15 mg</td>
<td>3</td>
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<td>15 mg</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>RR</td>
<td>6</td>
</tr>
</tbody>
</table>

EDSS, expanded disability status scale; F, female; M, male; PP, primary progressive; RR, relapsing-remitting; Se, side effects; SP, secondary progressive; T0, study entry; T1, at pain relief; T2, after 3 months.

COMMENT

Typically, antiepileptic drugs are effective for treating paroxysmal symptoms in patients with multiple sclerosis at doses that are lower than those used in epilepsy. For this reason, we arbitrarily set the maximum dose of tiagabine at 30 mg/daily, while in epilepsy the maximum dose is usually 56 mg daily. Moreover, patients with multiple sclerosis treated with antiepileptic drugs more often report central nervous system side effects than patients with other diseases such as seizures or mood disorders.

The results of this study suggest a possible new treatment for painful tonic spasms in multiple sclerosis and support the postulated GABAergic mechanism of action as the key factor in the choice of drug therapy. The spasticity level, measured with the Ashworth scale, did not change during the study period, as reported in trials of other antispasticity drugs such as tizanidine. This may reflect the inability of the scale to detect mild changes, or the different pathogenesis of painful tonic spasms and spasticity. The frequency of side effects of this agent in patients with multiple sclerosis and its efficacy in the treatment of painful tonic spasms or spasticity must be confirmed in a larger study.

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References


Harlequin syndrome: an association with overlap parasomnia

We describe the novel association of Horner syndrome and central paroxysmal facial flushing and sweating, occurring with physical exertion and heat, rarely spontaneously, and lasting 20 to 30 minutes. Approximately one year after the trauma, her sleep became restless, being interrupted by excessive motor activity, seemingly purposeful and sometimes harmful, associated with vocalisation and a report of dreaming corresponding to the motor manifestations. Hypnagogic hallucinations and sleep paralysis could also rarely occur. Both facial flushing and sleep disturbances worsened after another accident to her face when she was 64.

Examination at age 66 showed partial ptosis of the left eyelid, anisocoria, and heat, rarely spontaneously, and lasting 20 to 30 minutes. Approximately one year after the trauma, her sleep became restless, being interrupted by excessive motor activity, seemingly purposeful and sometimes harmful, associated with vocalisation and a report of dreaming corresponding to the motor manifestations. Hypnagogic hallucinations and sleep paralysis could also rarely occur. Both facial flushing and sleep disturbances worsened after another accident to her face when she was 64.

Since then she had recurrent sudden onset episodes of right hemifacial flushing and sweating, occurring with physical exertion and heat, rarely spontaneously, and lasting 20 to 30 minutes. Approximately one year after the trauma, her sleep became restless, being interrupted by excessive motor activity, seemingly purposeful and sometimes harmful, associated with vocalisation and a report of dreaming corresponding to the motor manifestations. Hypnagogic hallucinations and sleep paralysis could also rarely occur. Both facial flushing and sleep disturbances worsened after another accident to her face when she was 64.

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Careful examination of the right pupil was smaller than the left and did not dilate to dark. Right iris heterochromia with right ptosis and subtle enophthalmos were also present, and epinephrine 0.01% eye drops did not change the size of the right pupil. A body heating test with alizarin powder application showed absent sweating in the right hemiface. Brain and spinal cord MRI and neurophysiological investigations including neuroregenerative tests as in patient 1 were all normal.

Twenty four hour video PSG showed long sequences in which NREM and REM PSG features were intermingled: in particular runs of REM and NREM sleep intervened into stage 2 sleep associated with chin EMG fluctuations, and K complexes and sleep spindles were observed during REM sleep patterns. Chin muscle atonia was not complete during REM sleep, with brief sudden twitches and tonic EMG bursts; full blown REM sleep behaviour disorder (RBD) could not be recorded; chin muscle atonia could also appear suddenly during NREM sleep, randomly or before a leg movement. These intermingled NREM-REM sleep PSG patterns occupied 33.5% of total REM and stage 2 NREM sleep time.

CASE 2
A 52 year old woman presented with a two year history of sudden sweating and flushing of the left hemiface. Physical exercise and heat could cause these episodes, which also occurred spontaneously. Lacrimal and gustatory sweating were absent. At age 51, abnormal motor activities had appeared during sleep, associated with vocalisation resulting from vivid frightening dreams which the patient could report after waking. During admission, episodes characterised by sudden arousal during nocturnal sleep with screaming and fearful vocalisation were observed by room mates. From this time, nocturnal sleep became non-refreshing and was interrupted by brief and abrupt awakenings; there was excessive daytime sleepiness. On physical examination the right pupil was smaller than the left and did not dilate to dark. Right iris heterochromia with right ptosis and subtle enophthalmos were also present, and epinephrine 0.01% eye drops did not change the size of the right pupil. A body heating test with alizarin powder application showed absent sweating in the right hemiface. Brain and spinal cord MRI and neurophysiological investigations including neuroregenerative tests as in patient 1 were all normal.

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COMMENT
Our patients had anhidrosis of one side of the face and long standing ipsilateral Horner’s syndrome associated with both spontaneously occurring and heating/exertion induced paroxysmal hemifacial sweating, consistent with Harlequin syndrome. They probably suffered a lesion of the first sympathetic neurone. While the negative dilute epinephrine eye drop test result suggested an absence of adrenergic supersensitivity secondary to a third sympathetic neurone lesion, absent lacrimal and gustatory sweating excluding a second or third sympathetic neurone lesion at the site of the lesion site, however, eluded us because of the negative MRI findings. In addition, our patients suffered abnormalities of nocturnal sleep, with recurrent seemingly purposeful motor activities like enacting falling into NREM and REM sleep, and PSG patterns characterised by an admixture of wake, NREM, and REM sleep EEG elements. Thus our patients had evidence for both a disorder of arousal and RBD because, from a behavioural point of view, they presented with atypical sleep with frequent muscle twichings, vocalisation, and dream-like mentation on waking. Such a mixed state of wakefulness and sleep is typical of the state dependent failure of control of the so called “parasomnia overlap” syndrome. Hypnagogic hallucinations and sleep paralysis were also reported by patient 1. Remarkably, the Harlequin syndrome was temporally linked and preceded the parasomnia overlap syndrome by one year, suggesting a possible connection between the two. Overlap parasomnia has been noted after lesions, even traumatic, of the brain stem and forebrain regions, but ours is the first report of an association between Harlequin syndrome and sleep disorders in the form of overlap parasomnia syndrome. Our findings emphasise the need for an integrated approach to patients with autonomic and sleep disorders.

Acknowledgements
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References


Figure 1 (A) Sleep histogram. Bullets along the top of the panel identify sudden short lasting awakenings during non-rapid eye movement (NREM) sleep, as exemplified in panel B. Black squares indicate periods with “mixed EEG” patterns, repetitively waxing and waning during NREM and REM sleep, as per panel C. The black triangle is an RBD (rapid eye movement sleep behaviour disorder) episode. (B) Videopolysomnographic (PSG) recordings (excerpts) of an arousal from NREM sleep, showing EEG α rhythms intruding suddenly upon deep sleep NREM activity. After 25 seconds the EEG again showed NREM light sleep activity. (C) PSG recordings show NREM sleep, showing EEG disorder) episode. (B) Videopolysomnographic (PSG) recordings (excerpts) of an arousal from and REM sleep, as per panel C. The black triangle is an RBD (rapid eye movement sleep behaviour disorder) episode. (B) Videopolysomnographic (PSG) recordings (excerpts) of an arousal from
An expansion in the ZNF9 gene causes PROMM in a previously described family with an incidental CLCN1 mutation

In 1997 Mastaglia et al described a two generation family of Macedonian origin with phenotypic features of PROMM and an incidental CLCN1 mutation. Affected individuals had mild myotonia, predominantly proximal muscle weakness, and cataracts, compatible with a diagnosis of proximal myotonic myopathy (PROMM). Molecular genetic studies showed that the proposita did not have the chromosome 19 myotonic dystrophy (DM1) CTG expansion, but did have the R894X mutation in exon 23 of the muscle chloride channel gene (CLCN1). However, she only had passed the R894X mutation to one of her two affected offspring. Thus the CLCN1 gene mutation did not segregate with the disease. We can now confirm that a definite genetic cause for PROMM has been identified in this family.

In 1998 a locus for a second type of myotonic dystrophy (DM2 or PROMM) was mapped to chromosome 3q21. In 2001 it was shown that DM2/PROMM was caused by a CCTG repeat expansion located in intron 1 of the zinc finger protein 9 (ZNF9) gene. Inheritance of the microsatellite markers D3S608, D3S514, and D3S684—often called the “DM2 locus”—was compatible with DM2 being the disease in the family described by Mastaglia et al. The DM2 repeat expansion is difficult to demonstrate because of its very large size, but the presence of an expansion can be inferred by the non-inheritance of the normal sized allele from the affected parent, as in other expansions. The proposita of the family reported by Mastaglia et al shows only one normal sized allele for the tetranucleotide repeat region of the ZNF9 gene, and by inference she has an expanded allele. This may occur through the proposita either being homoygous for the same sized normal allele or through having one normal sized allele and one expanded allele. Her two affected offspring also only have one normal sized allele, and in both of them this is different in size from the normal sized allele of their mother. Thus they have not inherited a normal sized allele from their mother, but have inherited different normal sized paternal alleles. This family is thus suffering from DM2/PROMM.

The proband was 49 years old when initially described and had been symptomatic for 15 years. In the six years since that description, there has been minimal worsening of symptoms, with the patient reporting a little more difficulty in climbing stairs and rising from low chairs. Her MMSE score fell from 29 to 23 in two years (personal observation), this would not appear to be typical of DM2. Although there has been a recent report of a patient with PROMM and schizophrenia who was intolerant of neuroleptics and susceptible to malignant hyperthermia, the proband has had several general anaesthetics without mishap. However, she developed a psychiatric disorder in the form of depression, which is the third report of psychiatric dysfunction in PROMM patients.

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The validity of using the mini state examination in NICE dementia guidelines

The mini mental state examination (MMSE) is widely used as a rapid means of quantifying cognitive function. The National Institute for Clinical Excellence (NICE) guidelines concerning the use of cholinesterase inhibitors (CI) in Alzheimer’s disease recommend using the MMSE as a quantifiable measure to inform decisions regarding initiation and continuation of drug treatment. Our study questions whether poor inter-rater reliability of the MMSE makes it an inappropriate tool for monitoring drug response. A postal survey evaluating the MMSE scores in Alzheimer’s disease showed that the MMSE was widely used in clinical practice by 91% of respondents, with 51% of respondents describing their use as “frequent”. Test choice and method of scoring this section of the MMSE are shown in fig 1. Over 10% of respondents were aware of schemes describing standardised scoring of mistakes when spelling WORLD backwards. Raters were asked to score a sample incorrect score “DRILOW”. We did not allow a “correct” score for this example since we believe the original guidance on how to score errors is imprecise. Out of a maximum of five points, 51% assigned a score of three and 25% a score of one. Other scores included two respondents assigning a score of five. When scoring “91–85–78–71–64”, 59% assigned a score of four points and 23% a score of one.

This survey of consultant neurologists confirmed substantial variability in the use and scoring of the serial sevens/WORLD backwards section of the MMSE. This inter-rater error leads to a potential score difference of up to four points for this section alone. We focused on the MMSE alone to ensure brevity of the survey, as we perceived that the scoring method assigned to these questions is particularly dependant on the rater’s interpretation. Rogers et al found the appropriate score in MMSE score after 12 weeks of treatment with CI to be 1.3 points. ‘NICE guidelines for CI prescription in Alzheimer’s disease give specific recommendations to stop these drugs if a patient’s score deteriorates when the MMSE is repeated two to four months after commencement, or if the score falls below 12 points. Our results show that typical patterns of scoring the MMSE are too inconsistent to detect such small changes and so may lead to inappropriate cessation of CI treatment.

The findings are in keeping with the large inter-rater variability previously demonstrated among a small group of psychiatrists, suggesting that the results likely to be generalisable to most doctors. Our study’s incomplete response rate and finding that only half the respondents use the MMSE frequently introduces sources of selection bias, and we believe that numbers were large enough to derive meaningful conclusions.

Should NICE use the MMSE as their recommended cognitive rating scale in Alzheimer’s disease? Few of the studies demonstrating a benefit from CI use in Alzheimer’s disease use the MMSE as a primary outcome.

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measure. However, cognitive tests used in CI trials such as Alzheimer’s disease assessment scale (ADAS-cog) are time consuming. Using a modified version of the MMSE, a standardised scheme to score errors made, or an alternative test, introduces new problems.

Although the MMSE has a number of limitations, awareness of these highlights some simple ways of improving its reliability in practice. Physicians should rigorously standardise their own testing methods. Local MMSE scoring guidelines could be instituted. It is helpful to retain completed score sheets in patient notes and to document in clinic letters whether serial sevens and/or WORLD were tested. Because NICE estimate there to be 400 000 sufferers of Alzheimer’s disease currently in England and Wales, the cost implications to the NHS regarding the appropriate use of CI’s is vast. We call for inclusion of more detailed guidance on MMSE use in NICE recommendations and for further studies of new dementia treatments to use the MMSE as an outcome measure.

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References


Figure 1. Use of counting backwards from 100 in sevens and spelling WORLD backwards in clinical practice.

Figure 1. ‘‘When the feeling’s gone’’: a selective loss of musical emotion

Loss of ‘‘feeling’’ is a common lament in popular music:

Tragedy: when the feeling’s gone and you can’t go on (Tragedy as performed by the Bee Gees. Spirits have Flown, 1979.)

Here we describe loss of the feeling or emotion produced by music itself. Musical emotion can be considered at a number of levels. At the most fundamental level, dissonance produces a perception that is unpleasant to most listeners. More variable is the intense pleasure that certain music may evoke in particular listeners, often described as a ‘‘shiver down the spine’’ or ‘‘chills’’, which is likely to represent a more complex aesthetic response. We describe a patient with selective loss of this emotional response to music, due to a local brain lesion.

A 52 year old right handed radio announcer collapsed in February 2000. He was found afterwards to have a total loss of speech comprehension and output, and a right hemiplegia. His speech recovered well, such that 12 months after the event he had only subtle output phonological problems. Motor functions recovered completely and he had no residual lateralisating motor signs. However, he reported a persistent alteration in his auditory experience. He was in the habit of listening to classical music, to relax after working his night shift at the radio station, and had derived particular pleasure from listening to Rachmaninov preludes. He experienced an intense, altered emotional state or ‘‘transformation’’ when he did this. In common with other subjects who have this experience, the transformation was only...
produced by particular pieces, and he did not describe such an experience in response to music other than Rachmaninov’s, nor to other sensory experiences. This emotional response to the music was lost following the acute event, and remained absent during the period of testing between 12 and 18 months after the stroke. During this period he was able to enjoy other aspects of life, and reported no biological features of depression. He had noticed no change in his hearing, and was still able to identify speech, music, and environmental sounds normally.

When assessed in April 2001, pure tone audiometry, auditory filter widths, speech audiometry, prosody perception, and music perception were all normal. Musical perception was examined using a battery of tests during which subjects are required to make same/different judgments on melody pairs that can show differences in melodic structure, rhythm, and metre. Our patient showed normal scores on tests of scale (28/30), contour (27/30), interval (28/30), rhythm (28/30), metre (29/30), and incidental memory (27/30); see http://www.fas.umontreal.ca/psy/GRPLABS/hmrg/website/index.html for normative data. Structural MRI revealed infarction involving the left insula and extending anteriorly into the left frontal lobe and inferiorly into the left amygdala. After normalisation to the standard stereotactic space of Talairach, the infarcted regions showed a close correspondence with left hemisphere areas activated during emotional response to music in normal subjects (fig 1).

In a case such as this it is impossible to prove that the stroke produced a new deficit in the emotional reaction to music without direct evidence of the emotional reaction and its autonomic effect both before and after the stroke. The interest of this investigation accrues from the subjective report of the patient alone. Nevertheless, this is the first documented case of such a deficit of which we are aware, completing an important double dissociation between musical cognition and emotional processing. Such a dissociation would require the presence of distinct substrates for musical cognition and emotion.

The cerebral basis for musical emotion has only recently been the subject of systematic study. In the clinical literature, an impaired emotional response to music is generally accompanied by disordered musical perception (amusia). However, one previously reported patient had impaired recognition of music despite a preserved affective response. In contrast, our patient strikingly illustrates the reverse dissociation, with normal recognition of music but loss of the emotional response to music. Together, these two cases complete a double dissociation between the perceptual and emotional components of music processing. This double dissociation suggests that the emotional effect of a piece of music is not predetermined by simple acoustic properties (which were processed normally in our patient).

Accumulating evidence from functional brain imaging studies in normal individuals suggests that functionally and anatomically separable neural networks mediate music perception and emotion. The perception of music involves the superior temporal lobes and inferior frontal lobes. In contrast, emotional processing of music engages a distributed brain network that is also recruited by other powerful emotional stimuli that produce autonomic arousal. This network includes bilateral medial limbic structures, insula, ventral striatum, thalamus, midbrain, and widespread neocortical regions. The present study enables us to conclude that the left insula is involved in normal musical emotional processing of music.

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**References**


