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## Brain injury fatigue scale pdf

Fatigue is common on and off in patients with traumatic brain injury (TBI). Its mechanisms are complex and multi-factor. We conducted a review of the condition report literature using the following keywords: brain damage, depression, neuroendocrine disorders and treatment. Five scales were used to assess fatigue in TBI patients: fatigue severity scale, visual analog scale (VAS) for fatigue, fatigue impact scale, Barrow Neurological Institute fatigue scale (BNi) and cause fatigue questionnaire (COF). The BNi fatigue scale and COF questionnaire are specifically designed for patients with brain injuries. Fatigue occurs in 43-73% of patients and is one of the first symptoms for 7% of them. Fatigue does not seem to be significantly related to the severity of the injury, and not over time since the injury. This may be related to the mental effort necessary to overcome attention deficits and slowed processing (coping hypothesis). It may also be associated with sleep disorders and depression, although the link between fatigue and depression is discussed. Finally, fatigue may also be associated with infelic pituitary insufficiency (growth hormone failure, hypocorticism). To date, no study has been published to treat fatigue after TBI exists. Fatigue is experienced by everyone at some point after a period of physical or mental activity and is a signal from our body that tells us to take a break. Normal fatigue is limited in time and alleviated by rest, while pathological fatigue, such as those experienced after a brain injury, can occur most of the time. It cannot improve with rest and can significantly affect people being able to perform the actions they want to do. This page provides an overview of fatigue, a common effect of brain damage: Learn more in our brochure [Managing Fatigue After Brain Injury \(PDF\)](#) or exploring the links at the bottom of the page. Fatigue is a personal experience that is different for everyone. For some it can feel like overwhelming fatigue, which makes them unable to complete the normal activities of everyday life. People can say that they feel exhausted, lack energy, weak, can not motivate, or sleepy. For others, it can aggravate the difficulties associated with their injury, for example, forgetfulness, irritability, blurred speech, distraction or dizziness. Fatigue often makes resuming previous roles and daily activities more difficult and can contribute to people becoming socially isolated. Therefore, fatigue can have an impact: what do we think (for example: I should not feel like I am useless) how we feel (for example, frustrated, unable to cope, irritable) what do we do (for example, avoiding activity or increasing exercise) What causes fatigue after a brain injury? Fatigue can be the result of direct brain structures or due to other factors such as the need to make more effort to think or move. The brain system, which appears to be associated with fatigue, is part of the maintains vigilance. It is known as the ascending reticular activation system (ARAS), and connects the brain stem with the hills, hypothalamus and cerebral cortex. ARAS affects alertness, affecting the amount of information that the hills transmit to conscious awareness. Many people experience fatigue after a brain injury, but the causes are still poorly understood. Scientific studies have shown that there are many different factors that make people prone to feeling tired and can affect how they react to it. Some of the factors include: Some of these factors can be managed more efficiently to enable you to better deal with the daily activities that matter to you. What are the signs of fatigue after a brain injury? To cope with fatigue, you must first be able to recognize it. So how do you know when you're getting tired or fatigue starting to build up? Some symptoms may include: sizzling loss of concentration/attention of the eyes feeling heavy, or eye-watering head-rubbing feeling of a dizzying fidgeting/getting irritable limb feeling of severe stomach nausea however, after a brain injury it can be difficult to notice these symptoms. This may be due to problems with sensory feedback to the brain. What are your symptoms that tell you you're starting to get tired? How does it feel, what do you think and how do you behave? It can be helpful to ask family and friends what signs they will notice. What causes fatigue after a brain injury? The things that cause fatigue will be different for everyone. Some examples of activities reported to be more tiring after a brain injury include: working in a computer to deal with paperwork/correspondence in a busy environment, such as a shopping mall focusing on one conversation in a noisy place, such as driving in a pub or catching public transport It may take some time to figure out what the triggers are, so fatigue can feel difficult to control. However, it is likely that some activities are more tiring for you; what are they? The people around you can help you determine what they are. Consider monitoring fatigue by assessing how tired you feel before and after various activities, perhaps on a scale of 1-10. This can give you an idea of which actions you can find more or less fatiguing. It is important to recognize those activities or situations that are more tiring so that you can plan them in your daily routine. When you realize which actions are more or less tiring, you can set priorities and set realistic goals for what is achievable in one day. How to deal with fatigue after a brain injury? For some people, fatigue improves over time. However, for many people fatigue is a condition that they need to learn to manage in the long run. There is no single cure for fatigue after a brain injury, although recent studies have shown that cognitive behavioral therapy can help you cope with man's understanding of their experience of fatigue, triggers and ability to react. Managing fatigue requires different strategies to address the factors that contribute to it. Some of these strategies may seem like common sense, and some may already be in use. Taking the time to consistently put some of these principles into practice will hopefully allow you to better deal with your daily activities and feel more under the control of your life. Check out the links below and download our Brain Injury Management brochure (PDF). My story Despite the fact that it is difficult to come to terms with my brain damage and its effects initially, I am now eager to keep my fatigue under control and start learning to live with brain damage. Read the story [Open Access reviewed chapter](#)By Birgitta Johansson and Lars RönnbackSubmitted: September 20, 2013Opia: October 23, 2013Published: February 19, 2014DOI: 10.5772/57311Fatigue after traumatic brain injury (TBI) is common but often overlooked. But for people struggling with fatigue after a brain injury day after day, fatigue is a serious problem. This mental fatigue after injury is characterized by limited energy reserves to perform ordinary daily activities. People who have not experienced this extreme exhaustion, which can appear suddenly and without prior warning during mental activity, do not understand the problem. This is especially difficult to understand, because fatigue can occur even after seemingly trivial mental activities, which for non-injured people are considered relaxing and pleasant, such as reading a book or talking to friends. Normal, well-functioning, the brain performs mental activities simultaneously throughout the day, but after a brain injury, a higher level of energy is needed to cope with cognitive and emotional situations. In this chapter we emphasize mental fatigue after TBI. In the case of prolonged mental fatigue, this may be the only factor that prevents people from returning to the full range of activities that led to their trauma from working, studying and social activities. We describe mental fatigue and suggest diagnostic criteria, as well as give a theoretical explanation for this. At the end of the chapter, we discuss treatment strategies and provide some examples of possible therapeutic alternatives that can alleviate mental fatigue. Normally, the brain works in an energy-efficient way and outstanding energy reserves are present. This is due to well-functioning ion and amino acid transport systems and other effective physiological processes. After a brain injury, some of these systems are down regulated, and when the need for mental energy are high physiological processes do not work to their full capacity; stop working effectively with the resulting loss of energy. This may be an explanation of why fatigue occurs About 100-300/100,000 people sustain TBI each year, and most injuries severity [1]. Most patients recover within one to three months after mild TBI [2, 3]. Fatigue is one of the most important long-term symptoms after TBI, and is most serious immediately after a head injury. However, it is difficult to come to any clear number, how common is fatigue, and in particular mental fatigue. The reason for this is that different results have been obtained, and these are due to differences in definitions and differences in methodologies in different studies. In control studies, the incidence of long-term fatigue ranges from 16 to 73 % [4-6]. There is no correlation between persistent fatigue and the severity of primary trauma, the age of a person at the time of injury or sometimes from injury [7,8]. For people suffering from fatigue 3 months after the accident, fatigue remained relatively stable for a long time [9]. In particular, for those patients who suffered from the syndrome a year after the accident, the improvement in fatigue was limited [10]. In the above reports, fatigue is discussed in terms of a single design, that is, physical or mental aspects are not distinguished. In this chapter, we consider mental fatigue as a separate construct and discuss its relationship with cognitive and emotional symptoms. Mental fatigue is not a disease, rather it is a continuation of the mental, probably due to disorders of higher brain functions, both physical and psychological origin. It is contained in, and defined in diagnoses of Mild Cognitive Impairment (F06.7), Neurasthenia (F48.0) and Post-Traumatic Brain Syndrome (F07.2) [11]. A typical feature of pathological mental fatigue after TBI is that mental exhaustion becomes pronounced during sensory stimulation or when cognitive tasks are performed for a long time without interruptions. There is a drain of mental energy on mental activity in situations where there is an invasion of the senses with an overload of sensations, as well as in a noisy and hectic environment. A person feels that their brain is overloaded after a small load. Another typical feature is the disproportionately long recovery time needed to restore mental energy levels after mental exhaustion. Mental fatigue also depends on the total level of activity, as well as on the nature of the requirements of daily activities. Fatigue often changes during the day depending on the activities performed. Thus, fatigue is a dynamic process with differences in mental energy levels. Fatigue can appear very quickly, and when so, it is not possible for the affected person to continue the current activity. Common associated symptoms include memory and concentration impairment, slow thinking, irritability, tearfulness, sensitivity to sound and light, sensitivity to stress, sleep problems, lack of initiative and headache [12]. For many people, mental fatigue is the dominant factor that limits a person's ability to normal life with work and social activities. For most people, fatigue subsides after a while, while for others, this pathological fatigue persists for several months or years, even after the brain damage has subsided. Interestingly, however, as many as 30% of family or friends interpreted fatigue as laziness[9]. Theories about mechanisms that take into account mental fatigue, including our own theory, suggest that cognitive activities require more resources and are more energy-intensive associated with brain damage than usual [13,14]. Thus, more extensive neural circuits are used in TBI victims compared to control during a given mental activity [15]. This means increased brain effort after a brain injury. Schematic representation of mental energy recovery after TBI. The green line represents a full recovery, while the blue and red lines represent recovery disorders in terms of mental energy levels. People whose recovery occurs after the blue line recover partially. When they return to work and daily activities they are unable to manage and are exhausted. People whose recovery occurs after the red line, do not recover and are not able to return to work and daily activities. Therapist Luann Jacobs describes the mild TBI and lack of endurance that many may experience. Because they are able to do what is normal and what seems normal, they risk misunderstood their symptoms [16]. Mild brain damage is a real mistake because it conveys the idea that nothing is a problem when it is reversed more often. This is called mild, because in fact a slightly injured brain can walk, talk, eat and dress independently, often sometimes driving a car, shop, cooking, going to school and even working. What does not take into account this term is the inherent limits of how often, how long (endurance) and all important, how consistently (e.g. daily, once a week) these activities can be performed. Even more elusive is the idea of how many of these daily activities can be done consecutively on a given day, as is normal in the lives of people who are not brain-hurt. Fatigue, which they feel, eerier the description, going far beyond and much deeper than anything that an unshutful person of the brain would consider deep exhaustion. The cause of this extreme fatigue is unknown. However, there is speculation that the symptom may be due to dysfunction of astrocytes,

the most common supportive cells in the brain [17, 18]. As a consequence, the communication of nerve cells does not work properly. Schematic drawing of a synapse with glutamate as a transmitter and astrocyte with processes surrounding the synaptic terminal. When released from the presynaptic terminal (pre-syn; this is shown in red in the figure), glutamate interacts with glutamate-recognize receptors on the postsynaptic membrane (post-syn; shown green in the picture). After stimulation of the postsynaptic neuron, glutamate is taken by glutamate transporter systems. Glutamate is converted into glutamine in astrocytes and transported back to the presynaptic terminal, where glutamine is converted back into glutamate. During this process, and reducing ATP levels as a signal, glucose is taken from the bloodstream to supply neurons and astrocytes with energy. After TBI follows neuroinflammation with downward regulation of astroglial glutamate transport systems. If this condition is not completely restored, there will be an impairment of extracellular glutamate purification with slightly increased extracellular glutamate levels, slight astrocyte edema and glucose uptake disorders. Neural activity, if prolonged, can cause an energy crisis. After TBI there is low quality neuroinflammation with down regulation of star glutamate transporters and Na<sup>+</sup>/K<sup>+</sup>-atpase activities [19, 20]. If these physiological systems are not completely restored, there will be a dysfunction support for glutamate transmission. Glutamate signaling is essential for information processing, including learning and memory formation. Low levels and fine-tuning of extracellular glutamate are essential to maintain high precision in information processing and thus high efficiency in the handling of information within the CNS. Our hypothesis suggests that such dysfunction may be the basis for mental fatigue at the cellular level. Based on experimental data, astroglial cells are considered the most important cells for removing extracellular space from glutamate during glutamate transmission. In addition, experimental data show that this purification capacity is attenuated by substances or conditions associated with brain dysfunction or pathology (see [17]). If the abilities of these processes are not fully restored, the function of neurons is impaired in at least two ways: 1) extracellular glutamate levels increase on neuronal activity, leading to nonspecific signaling and 2) lack of energy. In the case of a high mental load with high neuronal activity, these factors can lead to a metabolic breakdown of the neural circuits – previously we called it a dead blockage, which can take a long time to restore. We believe that this metabolic failure is one of the likely explanations for the pronounced and sudden exhaustion that tbi victims with mental fatigue may experience. The long recovery time at the cellular level corresponds to the long time it takes for TBI victims to restore mental activity. One way to restore this dysfunction is to stimulate the +K<sup>+</sup>-ATPase along dopaminergic circuits that regulate attention and executive functions. Possible candidates are methylphenidate and dopaminergic stabilizer OSU6162 (see treatment below). There are plenty of scales to assess fatigue in general and several of these scales are designed for use in various diseases [21, 22]. We include questions about feeling tired, perceived effects on the mental or cognitive effects. Many of the scales are self-reported on likert or ordered scale, with the following alternatives answering: Never, Sometimes, Regularly, Often or Always. We have developed and used the Mental Fatigue Scale (MFS) over the past five years. We decided to build this scale because we were unable to find a scale of assessment tailored to mental fatigue. Mfs is a multidimensional questionnaire with 15 questions. It contains affective, cognitive and sensory symptoms, sleep duration and day-time changes in the severity of symptoms. Questions concern the following issues: fatigue in general, lack of initiative, mental fatigue, mental regeneration, difficulty concentrating, memory problems, slow thinking, sensitivity to stress, increased emotional propensity, irritability, sensitivity to light and noise, decreased or increased sleep patterns, as well as 24-hour changes in symptoms. The questions on the scale are based on joint action and we have linked the estimate to the scale alternatives. It is also possible to provide estimates between the two alternatives. The aim was to make the scale more consistent between individuals as well as between ratings for the same person. Examples of alternatives can help a person respond in a similar way despite the current state of fatigue or emotional state. MFS is designed in a similar way to the Comprehensive Psychopathological Assessment Scale (CPRS). Cprs also contains sample alternatives and is used to record changes in psychopathology over a relatively short period of time [23]. The questions contained in MFS are based on symptoms described after longitudinal studies of patients with TBI, brain tumors, infections or inflammations of the nervous system, vascular brain diseases and other brain disorders, indicating that acquired brain damage or disorders may cause similar symptoms [24-26]. The scale is free of charge and can www.mf.gu.se in English (both Swedish and English). We've rewritten one of the questions in MFS, below: Mental fatigue Does your brain quickly get tired when you need to think hard? Are you mentally tired of things like reading, watching TV or having a conversation with a few people? Do you need to take breaks or change to another activity? OSmage manage in the same way as usual. My ability to exercise mentally is not reduced.0.51 am quickly tired, but I am still able to perform the same mental effort as before.1.52 am tired quickly and need to take a break or do something different more often than before.2.53 am tired so quickly that I can not do anything or need to give up everything after a short period (about five minutes). Figure 4 shows how healthy checks and sufferers of mild TBI, TBI and stroke include separate questions on mfs. Victims of brain damage were divided into different groups total mfs rating. When a person scores low on one question, the overall rating on most separate questions will also be low, while individuals rate highly on one question on mfs, they will also rate most questions at a high level. Assessment in separate positions on the mental fatigue scale for control and injured people in the brain. People with brain injuries are divided into groups according to their total mfs rating. Scores on MFS by healthy controls and individuals who experienced mild TBI or TBI showed no significant differences between men and women, and there was no correlation between MFS scores and age or education of TBI victims (Figure 5). In addition, we found no correlation for TBI participants in relation to the time since the injury and their assessment at MFS. In our study, we worked with participants with mental fatigue lasting six months or periods greater than six months. At this stage, we don't have any rating data at first after tbi or mild TBI. This is due to the fact that the assessment may not be correlating with time from injury. The control group assessed MFS significantly lower than mild TBI and TBI victims. The participants included in the study were healthy and participants who suffered mild TBI or TBI without severe depression. Participants were aged 20-67 years. We recommend a cut-off result on MFS at 10.5. The score of 10.5 per MFS was found to be significantly different from the control sample and is also above the 99th percentile for the control group. A score above 10.5 means a problem for a person, although a serious problem is not always there. However, such an outcome means that that person must consider the current situation in his or her work and/or social life. MFS had high internal consistency and all separate elements were rated significantly higher among wounded patients in the brain compared to healthy controls (see also Figure 5). Correlation with age and mfs scores for healthy controls and people with long-term mental fatigue after a brain injury. It has been suggested that subjective mental fatigue after TBI or mild TBI correlates with poor performance in attention tests and reduced processing speed [13, 27, 29-34]. We also found that information processing speed, attention and working memory were significantly reduced for victims of brain damage (both mild TBI and TBI) compared to control. In addition, the tests significantly correlated with the results of mfs (Figure 6). Among cognitive functions, processing speed has been shown to be a significant predictor of evaluation on MFS [27]. Correlation between mental fatigue scale and information processing speed (Digit Symbol-Coding). In the TBI population, depression is elevated, although there is a high frequency variability, depending on methodological differences [35-37]. In our study, we included participants who complained of mental fatigue after TBI and patients affected by severe depression, because our intention was to investigate the component of mental fatigue. Despite this, we found, using CPRS/MADRS, that there was no elevation in depression rating positions for TBI participants compared to control. The CPRS scale covers both depression and the scale of anxiety [23, 38]. The cprs depression scale is also called the Montgomery-Åsberg Depression Assessment Scale (MADRS) [39]. However, there are overlapping elements in mfs and CPRS. Overlapping elements include lack of initiative, difficulty concentrating, irritability and decreased sleep. From the analysis of the factor, the elements were divided into the component of mental fatigue and depression and the anxiety component. Irritability has been placed in the depressed component of anxiety and the other three elements in the mental fatigue component. Using new ingredients analysis, we found that by adjusting the mental fatigue component, the difference observed between injured brain patients and controls in the anxiety component of depression was removed. However, removing the depressive component of anxiety did not affect the difference observed between the brains of injured individuals and control in the mental fatigue component. In this sample of subjects, we were able to demonstrate that a significant effect on the difference observed between injured brain patients and controls in depression results can result in overestimation if the effect of the mental fatigue component is not taken into account. This means that mental fatigue and depression must be treated as separate structures and it is also important to make this distinction for the purposes of therapeutic strategies. Diagnostic criteria for post-traumatic brain syndrome include most of the symptoms that are often present along with mental fatigue. However, we suggest that mental fatigue is the main symptom after a brain injury reflecting inefficient support for neural networks. Mental fatigue is a lack of mental energy with cognitive, emotional and sensory impairments. Mental fatigue is characterized by an unusual feeling of fatigue or malaise. There is a drain on a person's mental energy for mental activity. The result is a decrease in attention and ability to concentrate. Situations that involve a high level of external signals and overload of impressions are tiring. Lack of energy levels and too long recovery time are the result of excessive effort. This condition weakens a person's ability to function at work, study and meetings with family and friends. Mental fatigue persists for at least 1 month; The sum of the results from mfs is 10.5 points or more. Typical symptoms include: Extremely rapid drainage of mental energy on mental activity; Impaired attention and ability to concentrate over time; After excessive effort, a long recovery time disproportionate to the level of effort; Daily variability symptoms of fatigue with fatigue are often better in the morning and worse in the afternoon and evening; differences from day to day; Usually one or more related symptoms (see below); The following additional or associated symptoms are common: Mood swings, irritability and stress intolerance; Memory problems; Sleep problems; Sensitivity to light or noise; Headaches after excessive exertion. Sleep problems most often occur as follows: shorter sleep time with interrupted wake-up call or sleeping more than usual. If a person becomes more mentally tired, sleep will most often get worse, and if a person rests for several days sleep can improve again. Emotional strain can increase the severity of fatigue, but if mental fatigue exists, it will remain even after emotional components like depression or anxiety have been treated. However, it is important to treat emotional problems. In this way, mental fatigue can, to some extent, be relieved. Total and almost paralyzing fatigue; Longer rest periods may be needed, often for several days; Worsening of symptoms over time. Currently, there is no effective treatment for mental fatigue. For many people, there is an increased risk of doing too much and becoming even more tired. Today, the most important recommendations are to adapt to the available energy, doing one thing at a time, resting regularly and not overdoing it. When mental fatigue is present, it is important to adjust your work as well as daily activities to levels that your brain can manage. However, it is difficult for most people and can take a long time or even years to adjust to a balanced level. It can also be difficult for a person to learn alone and can take several years of considerable struggle, frustration, despair and depression to find the right balance between rest and activity. Professional support is required, but it can be difficult or impossible to find, especially when mental fatigue lasts for many years. The figure illustrates the levels and fluctuations of mental fatigue measured with MFS after TBI and changes over time. Most mild TBI victims recover completely (green field) and do not exceed 10 points on mfs. People in blue, yellow or red fields suffer from mental fatigue to varying degrees. Treatment strategies have also been shown to reduce mental fatigue, while excessive effort leads to increased rates on MFS. Paradise regular breaks. Encourage rest before becoming over-tired. Try to work at a steady pace by taking on one task at a time with short periods of work and prioritize tasks. Schedule days or classes per week in a journal or journal. Avoid excessive exertion. Using a strategy is important. Resting the brain as much mental energy as possible will be alleviated. However, the brain and the person also need positive experiences and to ensure that the It is difficult to achieve this balance between rest and stimulation. When mental fatigue becomes a long-term problem, it is important to be able to alleviate the symptoms. We have reported on significantly reduced mental fatigue after treatment using the Mindfulness Based Effort Reduction (MBSR) program [40, 41]. We have also reported on possible therapeutic strategies to reduce mental fatigue by using pharmacological treatments, using neurostimulants as methylphenidate [42], which affects dopamine and norepinephrine signaling. We have also reported on a new substance not currently available on the market, (-)OSU6162, which is a dopamine and serotonin stabilizer [43]. The MBSR program has been tested on TBI and stroke victims suffering from long-term mental fatigue [40]. MBSR is a clinically effective method for a wide range of conditions such as stress, depression, pain, and fatigue after cancer, with the potential to help individuals cope with their difficulties [44-47]. It is also suggested that MBSR is associated with improved attention and cognitive flexibility [48] as well as changes in brain neuronal connectivity [49]. MBSR covers a number of formal and informal practices. The intervention is based on the MBSR Kabat Zinn programme [50]. Formal practices at MBSR are described by M. Cullen 2011 [51] and include gentle Hatha yoga with an emphasis on mindful body awareness, body scanning aimed systematically, region by region, nurturing body awareness without straining and relaxing muscle groups associated with progressive relaxation, and sitting meditation with breath awareness, as well as systematically expanding the field of consciousness to include all four foundations of mindfulness : body awareness, sense, mental states and mental content. As such, the intention of MBSR is much greater than a simple reduction in stress. The program consists of eight weekly group sessions, each lasting about 2.5 hours, a one-day-long silent run retreat between sessions six and seven and home practice about 45 minutes, six days a week. Participants receive guided instructions and homework CDs. We found significantly reduced mental fatigue after the MBSR program, and participants significantly improved processing speed compared to check on the waiting list [40]. The improvement was independent of gender, time from injury and age. Another recent study with MBSR for patients with mild TBI showed a similar outcome with significant improvements in quality of life, perceived self-efficacy, working memory and attention [52]. In addition, a small-scale study of 10 mild MBSR TBI participants over a 12-week period also showed a significantly better quality of life and a reduced depression rating [53]. The effects were maintained a year later among the seven participants who could be contacted. They also noted improvements in reported energy levels following [54]. However TBI, a short MBSR program over a period of 4 weeks did not cause any cognitive or emotional changes [55]. Results show that mindfulness practice can be a therapeutic method well suited to people suffering from mental fatigue after a brain injury. One of the reasons mbsr was effective may be that this treatment offers strategies to better cope with stressful situations appropriately and save with mental energy. Despite the problem of ensuring that participants do not sleep, which is one of the basic aspects of meditation, it was possible to adapt mindfulness to the needs of people with mental fatigue and improve their wakefulness, as well as reduce their level of mental fatigue. Methylphenidate inhibits the re-uptake of dopamine and norepinephrine, resulting in increased extracellular concentrations of dopamine and norepinephrine [56]. Methylphenidate has been used for many years to treat ADHD in children in the first place to increase wakefulness, attention and ability to concentrate. Methylphenidate has also been tested on TBI victims with a positive effect on information processing speed and, to some extent, on working memory and attention [57-63]. Guidelines for the use of methylphenidate have been proposed to reduce attention and processing speed after TBI [64], while there are no such guidelines for fatigue after TBI. In an open-label randomized study, methylphenidate significantly improved dose-dependent mental fatigue as assessed in MFS [42]. Element pain was also studied and we found that this item was rated highly by the majority of participants in our study, as participants were recruited based on items, TBI and pain. However, no significant pain relief was reported as a result of methylphenidate treatment. However, it is important to note that pain can hide symptoms of post-traumatic brain injury or mental fatigue, which is not always associated with actual pain. We also found that there was no interaction between pain and mental fatigue in participants treated with methylphenidate. These results indicate that it is necessary not only to treat patients for pain, for which they are primarily directed to the clinic, but also for mental fatigue, if any. Methylphenidate was well tolerated by TBI participants. However, the tolerance of methylphenidate varied between participants and we therefore recommend starting treatment with an initial low dose. The OSU6162 monoaminergic stabilizer interacts with both dopaminergic and serotonergic systems. It appears to act as an antagonist at the point of binding of the D2 receptor. More recent studies have shown that OSU6162 also exerts a stabilizing effect on the circuits of serotonergic neurons, acting as a partial agonist 5-HT2A [65, 66]. In two randomized, double-blind and placebo-controlled studies, we found statistically significant relief of mental fatigue after a stroke or TBI by OSU6162 during 4 weeks active medicine [43]. Nevertheless, patients in these studies were small (21 TBI and 19 stroke victims). More research is needed, with more patients, and in particular longer treatment periods, as mental fatigue can be prolonged. The side effects were mild and could have been avoided by adjusting the dose. Several patients experiencing such side effects expressed a desire to continue treatment with the drug. Similar results were detected for methylphenidate and OSU6162. These drugs have been shown to have the effect of both alleviating mental fatigue and increasing information processing speed. Mental fatigue can become a long-term and worrying problem after TBI having a significant impact on life and well-being. It is important to recognize and assess mental fatigue when discussing options for therapeutic methods, since mental fatigue was the result of TBI. After TBI, mental energy levels do not, and the brain needs to relax. It is not possible to improve mental energy with training in order to perform more mental activity. In fact, training with a view to resting the brain is what is important. Tailored and energy-efficient strategies are important, and most patients need support to achieve a lasting balance between activity and rest, as it is difficult, takes a long time and can be frustrating. The treatment studies we have reported are designed to help a person better manage their life. However, it is important to point out that there is a risk that the drug may force a person to do more than is appropriate. The reason for this is that most often they want to conduct activities in a similar way as before the injury and yearn for the chance to be able to do so. The problem is that for most people suffering from long-term mental fatigue after TBI, activity levels are close to the threshold of what they are able to maintain. This makes them vulnerable if they increase their activity level too much. With mindfulness, most participants reported more energy, but also became more satisfied and happy with life. Mindfulness also gave them a tool to use and they could take control of their own lives; as it is here and now, no longing for a better life or rumination over what was. It also saves energy! Combination with neurostimulators and mindfulness can be a good therapeutic strategy. In the future, studies are warranted for early treatment with the intention of reducing the development of long-term mental fatigue. We also need to better explain and conduct an in-depth analysis of mental fatigue.3573total chapter downloads8Crossref quotesJemy IntechOpen, the world's leading publisher of Open Access books. Built by scientists, for scientists. Our readership includes scientists, professors, scientists, librarians and students, as well as business professionals. We share our knowledge and peer-reviewed research work with libraries, scientific and engineering and work with corporate R&D departments and government entities. More about us

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