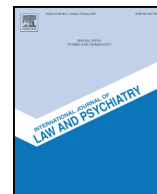




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## When benefitting a patient increases the risk for harm for third persons – The case of treating pedophilic Parkinsonian patients with deep brain stimulation

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## ABSTRACT

This paper investigates the question whether it is ethically justified to treat Parkinsonian patients with known or suspected pedophilia with deep brain stimulation – given increasing evidence that this treatment might cause impulse control disorders, disinhibition, and hypersexuality. This specific question is not as exotic as it looks at a first glance. First, the same issue is raised for all other types of sexual orientation or behavior which imply a high risk for harming other persons, e.g. sexual sadism. Second, there are also several (psychotropic) drugs as well as legal and illegal leisure drugs which bear severe risks for other persons. We show that Beauchamp and Childress' biomedical ethics fails to derive a veto against medical interventions which produce risks for third persons by making the patients dangerous to others. Therefore, our case discussion reveals a blind spot of the ethics of principles. Although the first intuition might be to forbid the application of deep brain stimulation to pedophilic patients, we argue against such a simple way out, since in some patients the reduction of dopaminergic drugs allowed by deep brain stimulation of the nucleus subthalamicus improves impulsive control disorders, including hypersexuality. Therefore, we propose a strategy consisting of three steps: (1) risk assessment, (2) shared decision-making, and (3) risk management and safeguards.

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### 1. Introduction

New developments in neurotechnology have given rise to new problems in clinical applications. An important example is deep brain stimulation (DBS): a technique that is now widely applied in movement disorders and is increasingly used in other neurological conditions (e.g., epilepsy) and psychiatric disorders (review: Holtzheimer & Mayberg, 2011). In this paper, we discuss a scenario that raises challenges for established principles of bioethics, namely the question if and under which circumstances it should be allowed to treat patients suffering from Parkinson's disease (PD) with DBS, if they could benefit from such a treatment but have been diagnosed with pedophilia – i.e. show a sustained sexual interest in pre-pubertal children. Although the specific scenario is hypothetical at this point and will not be of quantitative importance, it is an exemplar for considering potential harm to others as a principle for medical decision making – a principle that has not yet been widely discussed in medical ethics, at least as far as the tradition of the ethics of principles proposed by Beauchamp and Childress (2013) is concerned. The investigation of the marginal case of pedophilic PD patients demanding DBS will lead us to the more general question

whether it is ethically and legally allowed to treat patients regarding only their own well-being if the treatment might induce changes in personality or behavior which make the patient dangerous to others.

The general problem that a patient may possibly harm third persons due to having received medical treatment, i.e. the requirement of a (third-person-) risk-benefit analysis, is a known issue in bioethics. Examples include medications during pregnancy that can harm the embryo or fetus (e.g. thalidomide), drugs or diagnostic agents (e.g. contrast agents or nanoparticles) that end up in the environment and increase risks to other persons (e.g. oral contraceptives leading to an increased estrogen exposure and therefore to a higher prostate carcinoma incidence and mortality; Margel & Fleshner, 2011), or the potential risks of (future) xenotransplants to public health (Fovargue & Ost, 2010). However, medical treatments that may change the patient's biological foundation of decision-making and behavior control in such a way that the treated patient will more likely harm others raise an additional ethical question: whether possible benefits for patients justify the risk of unintended and undesirable changes in their personality which might make them more dangerous than they used to be and want to be. Such a risk is associated with certain neurosurgical or pharmacological interventions into the brain which modify structures or functions relevant for behavior. If the patient has not become incompetent by the therapy, but underwent a change in personality which he or she is neither aware of nor responsible for, it is difficult to decide, whether

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negative consequences of such changes have to be accounted for by the patient, the physicians or the manufacturers of the responsible drugs or devices.

Treating patients who have known or suspected pedophilia with DBS is a paradigmatic example of such a problem. Increasing evidence that DBS, particularly in the nucleus subthalamicus (STN), might cause impulse control disorders, disinhibition, and hypersexuality has motivated Elena Moro, the editor of the *European Journal of Neurology*, to warn physicians not “to jump the gun” (Moro, 2009). The first intuition when confronted with this problem in the case of Parkinsonian patients with known or suspected pedophilia might be to ban the application of DBS, since the treatment might cause a significant threat of future sexual offenses against children. However, this remedy is disputable because in some PD patients, the reduction of dopaminergic drugs after STN DBS has improved impulsive control disorders, including hypersexuality (Broen, Duits, Visser-Vandevale, Temel, & Winogrodzka, 2011). Thus, STN DBS might in some patients reduce the risk of child sexual abuse, making this a hard decision. A decision, however, seems required as the victims of pedophilia are vulnerable persons with very limited potential for self-defense.

## 2. Pedophilia and child molestation

The term “pedophilia” describes a sustained sexual interest in (pre) pubertal children that may lead to actual sexual contact. It is important to note that pedophilia is neither a necessary nor a sufficient precondition of child molestation. The diagnostic criteria for pedophilia of the ICD-10 and the DSM-IV-TR differ significantly; thus they include quite different groups of persons. The pedophilia diagnosis according to ICD-10 requires only a long-lasting predominant sexual interest in children (WHO, 2010), whereas the DSM-IV-TR requires first a long-lasting sexual interest in children (not necessary predominant), second that the person had sexual contact with children, suffers from the disposition or has social problems because of it (American Psychiatric Association, 2000).

Relating child molestation or other pedophilic behavior to brain disorders and/or their treatment requires a deeper understanding on the biological factors underlying the deviant sexual interest in children. However, the current state of knowledge does not allow a clear answer in that respect. A comprehensive overview over the causes of pedophilia is further complicated by the fact that some researchers use DSM-IV criteria for pedophilia, others ICD-10 criteria, and many just investigate sexual offenders who seem to prefer children; therefore the different studies investigate different groups of persons. Recent research assumes that pedophilia has multiple contributing factors, including a genetic predisposition (Alanko, Salo, Mokros, & Santtila, 2013), abnormalities in brain morphology (Cantor et al., 2004, 2008; Schiffer et al., 2007; Schiltz et al., 2007) and brain function (Sartorius et al., 2008; Schiffer & Vonlaufen, 2011; Schiffer et al., 2008; Walter et al., 2007). Especially important are executive dysfunctions concerning response inhibition (Schiffer & Vonlaufen, 2011), early neurodevelopmental perturbation (Cantor et al., 2008; Kruger & Schiffer, 2011), and specific neuropsychological factors (lower overall IQ, slower processing speed, weaknesses in frontal and temporal lobes functions) (Cantor, Blanchard, Robichaud, & Christensen, 2005; Kelly, Richardson, Hunter, & Knapp, 2002; Kruger & Schiffer, 2011; Suchy, Whittaker, Strassberg, & Eastvold, 2009; Veneziano, Veneziano, LeGrand, & Richards, 2004).<sup>1</sup> Neurological

<sup>1</sup> Many of the cited original papers used DSM-IV (revised) criteria; namely Cohen et al. (2002), Cohen et al. (2010), Kruger & Schiffer (2011), Schiffer et al. (2007), Schiffer, Paul et al. (2008), Schiffer, Krueger et al. (2008), Schiffer & Vonlaufen (2011), Schiltz et al. (2007), and Walter et al. (2007). Sartorius et al. (2008) have used ICD-10 criteria. Alanko et al. (2013) used self-designed questionnaires to diagnose pedophilia, whereas Cantor et al. (2004) assessed pedophilia by the patients' sexual history and penile response to erotic stimuli. Many studies just investigated men who were convicted because of sexual offenses against children; whereby some tried to differentiate between pedophilic and non-pedophilic offenders (Cantor et al., 2008; Kelly et al., 2002; Mendez et al., 2000; Salter et al., 2003; Suchy et al., 2009; Veneziano et al., 2004).

disorders, particularly (frontotemporal) dementia and hippocampal sclerosis, which affect the temporal lobes bilaterally, can result in hypersexuality which may unmask a previously hidden pedophilia (Mendez, Chow, Ringman, Twitchell, & Hinkin, 2000; Mendez & Shapira, 2011). Lesions in various combinations of limbic structures, including the hypothalamus, can cause alterations in sexual behavior and orientation (including hypersexuality and paraphilias). Damage to the orbitofrontal region of the limbic system can cause disinhibited (sexual) behavior. Particularly, sexual deviation involving a deviation of the sexual object (e.g., pedophilia) seems to be associated with lesions prior to age 3 years (Baird, Wilson, Bladin, Saling, & Reutens, 2007). Personal experiences can also contribute to pedophilia (Jespersen, Lalumiere, & Seto, 2009; Salter et al., 2003), especially sexual abuse in childhood (Cohen et al., 2002, 2010).

It is not known whether PD itself is a risk factor for developing pedophilic behavior – as it is the case with frontotemporal, vascular and Alzheimer's dementia, and Huntington's disease (Mendez & Shapira, 2011). However, there are indications that the risk of aberrant sexual behavior such as hypersexuality, exhibitionism, or pederasty may be underestimated in Parkinson's disease (Berger, Mehrhoff, Beier, & Meinck, 2003). In a few cases therapies of PD (right pallidotomy in one case, medication in another case) have induced pedophilic behavior (Mendez & Shapira, 2011), allowing the conclusion that the risk of DBS induced pedophilic behavior and sexual assaults against children are not merely of theoretical interest.

Obviously the question whether to offer DBS to pedophilic Parkinsonian patients is an ethical and a legal dilemma in which particularly the beneficence principle and the duty to avoid harm for others conflict. However, these two ethical norms do not conflict but harmonize in the case where aberrant sexual behavior (or impulse control disorders and hypomania) results from the medical therapy and is alleviated by drug reduction allowed by DBS (Broen et al., 2011). Unfortunately, it is not yet possible to predict for the individual case whether DBS either will make a particular patient hypersexual with risks for other persons, or will allow for drug reduction such that a drug-induced hypersexuality is cured.

In this paper, we will analyze this dilemma and provide answers to the following questions: Should physicians offer DBS to Parkinsonian patients with known pedophilic traits? Should pedophilia be an exclusion criterion for DBS, or are there possibilities to treat pedophilic Parkinsonian patients using DBS without increasing the risks for children? Should DBS be considered only for pedophilic Parkinsonian patients who have developed impulse control disorders and hypersexuality under medical treatment?

## 3. Parkinson's disease and side effects of therapeutic interventions

Parkinsonism is a degenerative neuropsychiatric disorder with severe motor dysfunctions (tremor, rigor, akinesia and dyskinesia) (Lang & Lozano, 1998) as well as cognitive, affective and behavioral symptoms (Pillon, Czernecki, & Dubois, 2003; Tröster & Woods, 2003) including depression (prevalence 70%), anxiety (69%), apathy (48%), irritability (47%), and executive impairment (41%) (Kulisevsky, Pagonabarraga, Pascual-Sedano, García-Sánchez, & Gironell, 2008).

Up to now, treatments are only symptomatic and do not stop disease progression. Standard treatment involves the dopamine precursor levodopa and (increasingly) dopamine agonists (Santiago & Factor, 2003). However, medication may lead to unwanted side-effects whose prevalence increases as, with disease progression, the drug dosage has to be increased. Examples of unwanted side-effects are on-off-phenomena due to pharmacokinetics, levodopa-induced dyskinesia (LID), and non-motor symptoms such as mood and anxiety fluctuations, psychosis and impulse control disorders (ICD). The latter comprise pathological gambling, compulsive shopping, binge eating, hobbyism, compulsive levodopa use, and hypersexuality (recent review: Voon, Fernagut, Wickens, Baunez, et al., 2009). Their prevalence rates are relatively

high. A large study with 3090 PD patients (of whom nearly all were taking levodopa and/or dopamine agonists) found impulsive control disorders in 13.6% and especially compulsive sexual behavior in 3.5% of patients. The study also demonstrated that dopamine agonist treatment was associated with 2- to 3.5-fold increased odds of having an impulse control disorder (Weintraub et al., 2010), whereas levodopa by itself appears to have a very low risk for these disorders (Ahlskog, 2011; Bostwick, Hecksel, Stevens, Bower, & Ahlskog, 2009; Klos, Bower, Josephs, Matsumoto, & Ahlskog, 2005). This increased risk due to new medication strategies is confirmed by a recent study in which patients had been routinely asked about such aberrant behaviors. According to the study, 24% of patients taking dopamine agonists at least in the therapeutic range suffered from ICD (mostly pathological gambling and hypersexuality) (Hassan, Bower, Kumar, Matsumoto, & Ahlskog, 2011). Dopamine agonists seem to induce particularly obsessive sexual behaviors (Bostwick et al., 2009; Cannas et al., 2007; Hassan et al., 2011; Klos et al., 2005; Munhoz, Fabiani, Becker, & Teive, 2009; Shapiro, Chang, Munson, Okun, & Fernandez, 2006; Weintraub et al., 2010).

Such behavioral problems are mainly observed in male patients (Ahlskog, 2011; Klos et al., 2005; Merims & Giladi, 2008). These behaviors include rape, sexual assaults against children, incest, zoophilia, frotteurism, exhibitionism, collecting pornographic material, voyeurism, and hyperlibidinous behavior (Cannas et al., 2007). The drug-enhanced urge for sex, gambling, etc. is often experienced as consistent with one's self-image or personality; typically, insight into the disorder is impaired (Voon, 2010). Since neither patients nor their spouses may willingly discuss an aberrant sexual behavior with physicians, the risk of such a behavior due to PD treatment is probably underestimated (Cannas et al., 2007; Hassan et al., 2011; Klos et al., 2005; Merims & Giladi, 2008; Shapiro et al., 2006). In summary, current research indicates that in particular the new generation of dopamine agonists (e.g., pramipexole and ropinirole) often provokes behavioral disorders such as hypersexuality, excessive gambling, shopping, and eating. It has been proposed that dopamine agonists interacting with an underlying susceptibility along with impaired disinhibition are the key factors in the pathophysiology of these behaviors (Voon, 2010).

Because of these shortcomings and side-effects of medical PD treatment, a neurosurgical intervention can be an alternative. As DBS has the advantage of near reversibility and adaptability, it has widely replaced ablative neurosurgical procedures. DBS has impressive beneficial effects on motor functions, and additionally sometimes reduces depression, apathy, and anxiety (Houeto et al., 2006; Schneider et al., 2003; Witt et al., 2006). When addressing PD symptoms, various DBS targets are currently in use (depending on the symptoms), among them are the STN (see above), the internal globus pallidus (GPi) and the ventral intermediate part of the thalamus (Vim). As the stimulation of the STN allows for a drug reduction of 50% in average (allowing control of medication-induced side effects) and also due to further advantages, the STN has become the preferred target (Benabid, Chabardes, Mitrofanis, & Pollak, 2009), although the incidence of affective and behavioral sequelae seems to be higher than for the other targets (Hariz et al., 2008; Temel et al., 2006; Voon, Kubu, Krack, Houeto, & Tröster, 2006). The reason for the latter is probably the involvement of the STN in the modulation of sensorimotor, limbic, and cognitive functions, which is indicated by several lines of evidence (PET studies in PD patients with STN DBS, lesion experiments with rats and monkeys, and clinical observations; Funkiewiez et al., 2003).

As STN DBS can have cognitive, affective or behavioral sequelae (recent reviews: Temel et al., 2006; Heo et al., 2008; Kleiner-Fisman et al., 2006; Meagher et al., 2008; Parsons, Rogers, Braaten, Woods, & Tröster, 2006) including depression and apathy, but also impulse control disorders (including hypersexuality) and hypomania (recent reviews: Broen et al., 2011; Demetriades, Rickards, & Cavanna, 2011), this intervention poses similar questions as those occurring in connection with medication-based therapies (details in Müller & Christen, 2011). Case studies show incidences of various psychiatric sequelae,

namely depression, suicides, aggression, delusion, hallucinations, hypersexuality, pathological gambling, risk-taking behavior, hypomania, or mania (Christen, Bittlinger, Walter, Brugger, & Müller, 2012). These sequelae may lead to social problems, especially in partnership and work, in spite of a good clinical outcome (Brentrup, Ohrmann, Weckesser, Tombach, & Bothe, 2004; Gisquet, 2008; Herzog et al., 2003; Houeto et al., 2002; Krause et al., 2001; Perozzo et al., 2001; Romito et al., 2002; Schüpbach et al., 2006; Sensi et al., 2004). Fortunately, in most cases, the affective and behavioral sequelae are transient or can be managed by the adaptation of the stimulation parameters or by psychiatric drugs.

However, important for our question is the finding that STN DBS can increase the impulsivity scores significantly – despite significant post-surgical reduction of dopaminergic medication including dopamine agonists (Hälbig et al., 2009). Furthermore, in some patients, STN DBS seems to induce pre-mature behavioral responses in conflict situations (Frank, Samanta, Moustafa, & Sherman, 2007) and to deteriorate the ability for socio-moral judgment measured by the Kohlberg (1984) scale (Brentrup et al., 2004). Finally, current clinical experience shows that the occurrence and strength of cognitive, affective, and behavioral sequelae of DBS are not predictable for an individual particular patient. Particularly for impulse control disorders, DBS can be an effective indirect treatment, while it can also worsen or cause the development of ICDs (Broen et al., 2011).

Whether positive or negative outcomes dominate, is hard to decide. A recent literature search for studies about ICD occurring after DBS identified four original studies examining a total of 182 patients for ICD. Three out of these four studies report the development of ICDs after DBS surgery; additional evidence is provided by nine case reports of 39 patients (ICDs developed de novo or worsened after DBS in 17 cases, i.e. in 56%, whereas ICDs improved or resolved after DBS in 22 cases, i.e. in 44%) (Demetriades et al., 2011).

This problem is made even more complicated by the fact that in some cases, DBS and the subsequent drug reduction have both positive and negative behavior consequences: For example, a medically treated Parkinsonian patient had episodes of hypersexuality, including pedophilic behavior, and other symptoms of impulse control disorder. He was treated with DBS, and when a few months after DBS surgery the dopaminergic treatment was reduced, the impulse control disorders improved. But the patient developed a depressive state and attempted suicide (Soulas et al., 2008).

#### 4. Changes in sexual behavior caused by DBS

The current state of research with respect to the consequences of both medication-based and DBS interventions on aberrant sexual behavior (and behavioral sequelae in general) displays a perplexing image, as both therapies seem to have the potential to induce such behaviors in some patients as well as to alleviate these symptoms in other cases. As the effects of DBS on sexuality have not been investigated systematically, we provide an overview on several case reports which describe major effects of DBS on sexual behavior.

Certainly not all changes in sexual behavior probably resulting from DBS interventions are problematic. An example is a case study that reports a 65-year-old architect and hobby painter who was treated with STN DBS. Before stimulation, his themes were exclusively architectural; afterwards he painted exclusively female acts, although he had never painted nudes before (Witt et al., 2006).

Several studies reported transient changes in sexual behavior. Romito and colleagues report that among their 30 PD patients treated with STN DBS, four developed remarkable disorders of sexual behavior after the implant (Romito et al., 2002). Among them were two men who developed remarkable manic symptoms and changes in sexual behavior that met the diagnostic criteria for a manic episode. One of them, a 52-year-old man, developed a manic syndrome two days after the implant (before the stimulator was switched on!), characterized by

inflated self-esteem and grandiosity. He planned hazardous business investments and began driving his car in a reckless manner. His sexual desire, sexual fantasies, and sexual activity increased (“like when I was twenty”). These changes interfered significantly with the patient’s social life and relationships. In the other patient, a 42-year-old man, manic symptoms started a few hours after the beginning of stimulation. He developed inflated self-esteem, labile mood, increased sexual desire and non-customary sexual behavior (inappropriate seductive behavior towards female medical staff and indiscriminate sexual encounters). In both cases, turning off stimulation worsened the Parkinsonian motor symptoms significantly without resolving the manic symptoms. The authors suppose that surgery and/or the stimulation had played a role in the appearance of manic symptoms, and that the surgical procedure might have induced a dysfunction of some neural cortical-subcortical circuits involved in mood, which could not be corrected by reducing stimulation for a short while. Krause and colleagues report that three out of 18 patients had a strong increase in libido after DBS (two patients with GPi stimulation, one patient with STN stimulation). Two of these patients had to be treated in an inpatient psychiatric clinic for this reason (Krause et al., 2001). Roane, Yu, Feinberg, and Rogers (2002) report a male patient who had a right-sided pallidotomy (lesion of parts of the globus pallidus), but became hypersexual after the left-sided DBS of the GPi. The patient lacked insight into his inappropriate behavior and argued that his sexual preoccupation stemmed from his wife’s lack of sexual availability. The hypersexuality was eventually controlled by the antipsychotic drug clozapine. Doshi and Bhargava (2008) report the case of a 70-year-old man from a conservative Indian family who had become hypersexual after DBS. His wife related that he insisted on sexual gratification every night and would become very aggressive if denied. The patient realized that although this was exhausting for him, he could not control his urge. As the stimulation parameters were very effective in alleviating all his PD symptoms he and his family were not willing to try any other parameters. His hypersexual behavior continued for almost four years after which it abruptly stopped without any medical intervention. However, his wife attributes this change to his interaction with a religious guru.

A more problematic case with long-lasting social consequences is reported by Houeto et al. (2002), where the wife of a patient receiving STN DBS reported behavioral disorders with sexual deviancy, exhibitionism, and heightened libido, but poor conjugal relations. She no longer felt secure and was constantly afraid that something might happen to the children in the neighborhood. The couple finally divorced. During the subsequent months, the patient showed an interest in gambling and traveled to foreign countries where he was suspected of sex tourism. The treating physicians conclude: “In summary, this patient with severe Parkinson’s disease was considered to be a novelty seeker and had manifested sexual deviancy that had not been noted when he was selected for neurosurgery. We suspect that the improvement in his motor condition after stimulation therapy favored full expression of his behavioral abnormalities.”

Although hypersexuality after DBS occurs mainly in male patients, a few cases of female DBS patients have been reported, too. Herzog and colleagues report a female patient who gradually developed a first episode of mania with psychotic symptoms after STN DBS. She lost normal social inhibitions, engaged in unrestrained buying of cloths, and fell in love with two neurologists. Her judgment was impaired, and she became suspicious, hostile and paranoid. Stimulation arrest led to a rapid deterioration of her mood without any improvement in mania. With the combination of an antipsychotic drug (clozapine) and a mood stabilizer (carbamazepine) the affective disorder remitted within 3 months (Herzog et al., 2003). Romito and colleagues report a 57-year-old woman with a history of hypomania during youth. After STN DBS, she experienced a marked increase of sexual drive, which lasted for about 18 months, and then gradually disappeared (Romito et al., 2002). Doshi and Bhargava (2008) report a 58-year-old woman without preoperative psychiatric problems who became hypersexual after STN

DBS. Her nurse said that postoperatively she often forced herself into her husband’s room to demand sex. In addition, she exposed herself to other males in the family and demanded sex. Furthermore, her craving for sweets increased postoperatively, which was problematic since she was diabetic. The physicians were surprised that, despite the evolution of these problems, she came across as an extremely mature person who showed no indications of her abnormal behavior. Her aberrant behavior continued for a period of five years, and was finally controlled with the introduction of an antipsychotic drug (clozapine).

We are not aware of any case report on child molestation after DBS, although one study reports aberrant sexual behavior (exhibitionism, sex tourism, and behavior that is considered as threatening to children by the patient’s wife) that is presumably correlated with pedophilia coming either to light or to existence (Houeto et al., 2002). However, a recent paper of Mendez and Shapira (2011) indicates that such a behavior may result from an ablative neurosurgical therapy of PD as well. They report a 59-year-old man who underwent a right pallidotomy for PD. Immediately after the pallidotomy, he became markedly hypersexual. He was accused of touching his 5-year-old granddaughter inappropriately and asking her to touch his penis. His granddaughter was removed from the home by Child Protective Services. He also forced his wife to have sex with him and demanded oral sex multiple times/day. He masturbated frequently, propositioned his wife’s female friends, began hiring strippers and prostitutes, and spent hours viewing Internet pornography. At one point, his wife found him trying to sexually relieve himself while viewing a photograph of his 5-year-old granddaughter. He was ashamed of his behavior, complained of intrusive sexual thoughts and urges that overwhelmed him, and desired to just have his libidinal urges “normalized” again. In this case, there was no history of psychiatric illness, unusual sexual behavior, or drug-induced behavioral changes prior to his surgery. A reduction of his anti-PD medications resulted in a gradual decrease in his sexual behavior – but for the price of worsening his Parkinsonism symptoms. Another four cases of disinhibition and inappropriate sexual behavior following pallidotomy have been published (Shannon et al., 1998: three cases persistent at 6 months; Dogali et al., 1995: one case of transient sexual disinhibition for 24 h after surgery).

To summarize: in some patients, DBS causes hypersexuality, often in combination with hypomania or further symptoms of impulse control disorder like pathological gambling. In the large majority of the patients, these symptoms can be controlled. Either they vanished spontaneously within several months, or due to a change in stimulation and/or the introduction of neuroleptic drugs. However, some behavioral changes had (long-lasting) social effects, damaged relations and included – as the example of pallidotomy shows – a risk for child abuse.

## 5. Ethical evaluation of DBS for pedophilic Parkinsonian patients

We have recently evaluated STN DBS for Parkinsonian patients (Müller & Christen, 2011) using the principles of biomedical ethics of Beauchamp and Childress (2013). The evaluation of STN DBS according to these principles (respect for the patient’s autonomy, beneficence, nonmaleficence, and justice) revealed that, in general, DBS can be recommended for many Parkinsonian patients, if certain conditions (among them a careful risk-benefit assessment) are fulfilled. The most difficult ethical problem of STN DBS is posed by the fact that both the disease as well as the available therapies (i.e. medication, pallidotomy, and DBS) may cause in some patients “personality changes” (as understood in psychiatry). The current data indicates that each of the “Big Five” (the basic personality traits, i.e. extraversion, neuroticism, agreeableness, conscientiousness, openness to experience; see Costa & McCrae, 1992) has been modified by STN DBS in some patients (Müller & Christen, 2011). Given this complexity, we have argued that the mere occurrence of personality alterations is no ethical argument against DBS. The ethically decisive question is not whether DBS can alter the personality or not, but whether it does so in a good or bad way (see also

Synofzik & Schlaepfer, 2008). But this is indeed a difficult ethical question, since the evaluation of personality properties strongly depends on culture.

The issue of DBS for pedophilic Parkinsonian patients replicates these problems in a paradigmatic way – but under more severe conditions, since in this case, DBS involves not only risks for the patient, but also severe risks for third persons. The problem consists of several aspects. First, one has to keep in mind that pedophilia is neither a necessary nor a sufficient condition for child molestation (Mokros, Osterheider, & Nitschke, 2012), i.e. not all sexual violence against children originates from pedophiles and not all pedophiles act out their preference. Pedophilia is nevertheless a relevant risk factor as 25–50% of all legally sanctioned cases of child abuse have been performed by pedophiles (Schaefer et al., 2010). As both DBS and medication can cause impulse control disorders including hypersexuality and disinhibition, the risk that pedophilic traits are realized is bigger than in pedophiles without these additional risk factors. Second, the literature on impulse control disorders like hypersexuality and pathological gambling indicates that DBS has the potential to both induce and reduce the risk that a pedophilic trait is realized (or maybe even caused). The latter, however, is only possible in a case when medication-induced pedophilia has occurred beforehand (e.g., Mendez & Shapira, 2011, patient no. 5; Cannas et al., 2007; Beier, Bosinski, & Loewit, 2000, p. 351).

How does the risk-benefit-assessment analysis according to the principles proposed by Beauchamp and Childress deal with such a case? At first sight, an intervention that benefits the patient but could cause or increase a disposition for sexual offenses against children is unethical according to the four principles, if such a disposition is either caused against the patient's will (respect for the patient's autonomy), or causes harm for the patient (nonmaleficence). This derives the conclusion that a pedophilic Parkinsonian patient should be treated with DBS, if the individual risk-benefit-analysis is positive, unless the patient refuses a treatment which increases his disposition for sexual offenses against children or would suffer from such an increased disposition. The latter can be expected if the patient lives in a society which condemns and regularly punishes sexual offenses against children.

However, it is irritating that this argumentation solely refers to the harm for the patient, neglecting the harm that could be caused to third persons. Additionally, in this case the suffering of the patient depends on cultural variables, namely on the attitude of society towards sexual relations with children. As is generally known, these attitudes have changed over time. Unfortunately the sexual abuse of children is practically tolerated in many countries – despite the fact that the Optional Protocol on the sale of children, child prostitution and child pornography, which is part of the Unicef Convention on the Rights of the Child, has been signed by more than 100 states.

Although Beauchamp and Childress acknowledge that patient's decisions which potentially harm others might be overridden by competing moral considerations (2013, p. 107–8), and although the principle of nonmaleficence is logically not restricted to the patient but may also include harm inflicted upon third persons, it is noticeable that they discuss this principle only with respect to the patient himself. The issue that curing a patient may have the (unwanted) side effect that the patient becomes a risk for third persons is not discussed by Beauchamp and Childress. Only one case (the Tarasoff case) considers that actions of medical practitioners (here: not disclosing that a psychotic person expresses the wish to kill a girl) may cause harm for third persons – and this case is not related to the issue that a beneficial treatment for the patient involves the risk of harming third persons. This “blind spot” in the ethics of principles is probably related to the historical context in which it has been developed, i.e., a time in which patient autonomy was routinely overruled by paternalism, expressed by medical scandals like the Tuskegee-Syphilis study. It may also reflect a pronounced focus on individualism in American bioethics that has been criticized since several years, e.g., with respect to public health issues (Hall, 1992). The American Medical Association's Code of Medical Ethics has exactly the

same blind spot (American Psychiatric Association, 2012): Threats to inflict serious physical harm to third persons are discussed only with regard to exceptions from the confidentiality principle. Only the Declaration of Helsinki of the World Medical Association demands that medical research studies must be preceded by careful assessments of risks, burdens and benefits to the persons involved in research and to other individuals affected by the condition under investigation. But this demand is addressed only to medical researchers, not to medical practitioners.

The problem that providing an effective therapy might increase the risk that the patient becomes a danger for others should also be distinguished from the problem which is widely discussed in the ethics of psychiatry, namely the justification of measures of constraint in the case of (psychotic) patients who are a danger for third persons. Rather, we think that a principlism-based risk-benefit assessment requires a broader perspective including third persons who may be affected by medical treatments. This point seems to be of particular relevance in the case of the principle of nonmaleficence, i.e. also the potential harm caused in third persons due to a specific therapeutic intervention must be considered as well. It certainly does not only involve the paradigmatic case of pedophilia in PD patients but also other behavioral abnormalities that have the potential to harm third persons; e.g. hypersexuality, aggressiveness or recklessness.

## 6. Should DBS be offered to Parkinsonian patients with known or suspected pedophilia?

Based on the above considerations, we can now answer the question “Should pedophilic Parkinsonian patients be treated with deep brain stimulation?” First, it requires an assessment of the following risks:

- What is the risk of DBS to increase the disposition for child abuse?
- In the case that medication-based therapies have increased the disposition for child abuse: What is the chance that DBS and the subsequent drug reduction will decrease this disposition?

In the assessment of these risks one has to take into account that pedophilic dispositions are heavily tabooed, i.e. it can be expected that patients and their relatives will rarely report their incidence. This means that it will be very difficult to get valid estimations of these risks. Here, the available data on hypersexuality caused or decreased by DBS may serve as a first proxy.

Given the fact that behavioral changes resulting from DBS are generally hard to predict for the individual case, probably only in very few cases (i.e. when there is evidence of pedophilia due to the patient's history) will it be possible to predict an increased or decreased risk for child abuse after the therapy. Nevertheless, it will be required to think about potential strategies (e.g., prescription of psychotropic drugs or reducing the stimulation parameters) to diminish this risk. Since no case of child abuse by a DBS patient has been published up to now, it would be an undue hardship to exclude pedophilic patients (and other patients with a known dangerous sexual orientation or behavior) generally from DBS. But although the risk of DBS causing severe crimes may be low, the impact of such crimes is very high. Therefore special safeguards are justified for pedophilic patients who ask for a DBS treatment. We propose the following strategy consisting of three steps. Note that this strategy is not meant as a screening program for all patients demanding for DBS, but as a guideline for treating patients who are known or suspected for either pedophilia or incidents of child molestation, respectively. Surely, in the majority of cases, the physicians do not know anything about either a pedophilic orientation or a possible delinquency history of patients, and they do have neither the duty nor the right to investigate these issues.

### 6.1. Risk assessment

Patients who have a strong pedophilic drive and/or poor self-control and/or poor moral judgment abilities and/or poor empathy, have a

heightened risk for sexual offenses against children. General risk factors for hypersexuality are substance abuse and smoking (Merims & Giladi, 2008). Therefore, all known risk factors have to be evaluated carefully for all patients for whom the standard assessment procedure reveals a disposition for behaviors which endanger third persons. Particularly, it has to be differentiated whether the degree of each single risk factor is altered by (a certain dosage of) dopaminergic drugs.

- First, an assessment of hypersexuality and especially of the pedophilic orientation is required. Optimally, the patient's pedophilic drive before and since dopaminergic treatment (in the current dosage) has to be assessed by questionnaires and structured interviews. The Sexual Compulsivity Scale could be used for assessing sex addiction, although this tool has not yet been validated in PD patients (Merims & Giladi, 2008). To assess the sexual orientation is difficult both from a scientific and an ethical point of view: Phallometric assessments cannot be recommended, firstly because their reliability is questionable, especially for nonadmitting pedophiles (Ponseti et al., 2012), and secondly because probably most patients would not give consent to such a degrading procedure. The same problems can be expected for future diagnosis methods such as an automatic fMRI-based classification technique which analyses brain activity triggered by sexual images (Ponseti et al., 2009, 2012). Therefore the diagnosis of a pedophilic orientation will remain difficult.
- Second, history taking of the patient's delinquency is obligatory.
- Third, a screening for impulsivity and impulse control disorders should be performed, e.g. with the Barratt Impulsivity Scale and the Minnesota Impulsive Disorders Interview (details in Hälbig et al., 2009).
- Fourth, the patient's self-control, moral judgment ability, and empathy have to be evaluated because these properties may be safeguards which allow for controlling the pedophilic urges. Different tools are available for assessing these properties: Cambridge Gambling Task, Information Sampling Task, Stockings of Cambridge (for assessment of executive functions, especially those related to decision-making, risk-taking and impulsivity); the Multifaceted Empathy Test (MET) (Dziobek et al., 2008) and an assessment tool for social cognition (MASC) (Dziobek et al., 2006); the Moral Judgment Test (Lind, 2008) and the Defining Issues Test (Rest, Narvaez, Bebeau, & Thoma, 1999). Depending on the results of these evaluations, the following cases have to be differentiated:
  - Case 1: If the patient has a relatively weak pedophilic drive, no delinquency history and good self-control, moral judgment abilities and empathy, then DBS might be considered further.
  - Case 2: If one or several of the abovementioned risk factors have developed only after dopaminergic treatment, STN DBS and drug reduction might reduce the risk factors and therefore should be considered as a therapy option for the patient.
  - Case 3: If one or several of the abovementioned risk factors were present before disease onset or before dopaminergic treatment, STN DBS and drug reduction probably will not reduce the risk factors; in contrast, DBS might cause hypersexuality and an impulse control disorder and decrease self-control or moral judgment ability. Therefore STN DBS should not be offered to the patient.

## 6.2. Shared decision making

Only in case 1 and 2, STN DBS might be an option that should be investigated further:

- The patient should be informed about the specific psychiatric risks of DBS, especially about the risk of diminished self-control and impulsivity, as well as about the chance of psychiatric improvement after drug reduction.
- Only if both the patient and the physicians are convinced that DBS and drug reduction might not change or even improve the patient's self-control, DBS should be considered further.

## 6.3. Risk management and safeguards

DBS should be offered to pedophilic Parkinsonian patients under the following conditions:

- The patient and the physicians make a contract with the following content: The physicians are both allowed and obliged to perform regular psychiatric investigations of the patient. The stimulation can be stopped or reduced by the physicians at any time, if they judge that the continuation of the stimulation would cause a condition that is too dangerous for the patient or for others. But at present, the legal grounds for a forced adjustment of the stimulator are very problematic, especially if no immediate threat to others is imminent, and Ulysses contracts lack legal validity (at least under German law) (Schmitz-Luhn, Katzenmeier, & Woopen, 2012). Nevertheless, such a contract might be binding for at least those patients who feel ethically bound by contracts. Alternatively, a technical trick (which is not possible with current stimulators but could be easily added as a new feature) could help to manage regular psychiatric check-ups even for non-compliant patients: The stimulator could be programmed so that it switches itself off at a predefined point of time and can be switched on only by the treating physicians.<sup>2</sup> It is important to note that this procedure is different from a Ulysses contract which allows a coerced treatment against the natural will of the patient. In this case, the contract allows only for discontinuing a treatment. To switch off the device or not to switch it on again or to reduce the voltage, is comparable with not prescribing another dose of drugs due to severe risks or side effects although the patient demands for them; this strategy is not concerned by the legal problems of coerced treatments.
- The adaptation of the stimulation parameters should not only optimize motor functions, but also aim additionally at preserving the patient's self-control and moral competence. This is an evident requirement for physicians offering DBS, but it requires also regular assessments of these properties in the follow-up which usually involves other physicians than the team that performs the intervention.
- Psychotherapeutic support should be offered to the patient.

It is important to find a consensus with the patient. The aim of assessment and counseling has to be a solution that helps the patient without causing risks for other persons. If no consensus can be found, it can be expected that the patient goes to the next center that will not deny the required treatment, since no law forbids that pedophilic patients or sexual offenders who suffer from Parkinson receive a DBS treatment.

Finally, we remind that this analysis based on the case of pedophilic Parkinsonian patients is only an exemplar. Other behavioral abnormalities that may be altered by DBS and that also involve a severe risk for third persons, e.g. aggressiveness or recklessness, should be treated in a similar way.

## 7. Conclusion

Patient selection criteria raise questions of justice. On the one hand, safeguards are necessary to exclude patients at risk, especially those with a history of psychiatric disorders and sexual deviance. On the other hand, strict selection criteria might unfairly exclude patients who could profit from the therapy and would not harm themselves or others.

An optimal counseling process and safeguards in the patient selection criteria to exclude patients at risk can avoid ethical problems in many cases. But since no definite tests exist to predict for a particular patient whether DBS will induce mania, hypersexuality or loss of self-control, the general ethical dilemma remains.

<sup>2</sup> We thank Dr. Thomas Hälbig, neurologist at Charité - Universitätsmedizin Berlin, for this idea.

If a stimulation-induced mania occurs, the patient would be evaluated as not competent by psychiatrists, and then the treating physicians would be allowed to adapt the stimulation parameters according to their medical judgment. For a better management of such conflicts, we have proposed to implement advance directives to manage states of temporarily losing the decisional competence (Müller & Christen, 2011).

But if the patient is judgmentally able, then physicians will face legal problems if they think that the continuation of the stimulation might provide severe risks for other persons. If the stimulation system has once been implanted, it might be difficult to adapt the parameters so that the risks for other persons are reduced, even at the price of a suboptimal motor symptom control. Therefore, a contract between patient and physicians (Ulysses contract) could be a good solution which is both fair and viable.

Beside the clinical and ethical problems discussed here, difficult legal issues are raised by a therapy-induced disposition for illegal behavior: Is the criminal responsibility of a pedophilic person who develops a severe impulse control disorder after DBS diminished? Who is responsible if such a patient abuses a child? Is the treating physician jointly guilty because his intervention has caused or enhanced the dangerous disposition of the patient which finally caused a sexual offense? All these questions should be scrutinized in detail by philosophers and legal theorists. Obviously, their answers will differ significantly depending on their legal system and will depend particularly on whether it allows for exculpation on the grounds of a lack of volitional control due to illness – or due to iatrogenic disability.

We agree with Klaming and Haselager (2010) who parallelize the issue of DBS-influenced behavior with behavior influenced by prescribed drugs. Under German law, a person who commits an offense can be declared not fully responsible for his/her actions, if he/she was intoxicated, and if the drug had diminished his/her ability to control himself/herself significantly at the time of the offense. This holds both for voluntary and involuntary intoxication, although only in case of an involuntary intoxication the individual cannot be blamed for his/her actions, whereas in case of a voluntary intoxication, he/she is at least responsible for its foreseeable consequences. The possible influence of STN DBS on behavior is analogous to an involuntary intoxication with certain prescribed drugs, and therefore we are convinced that courts in Germany should acknowledge in certain cases a diminished legal responsibility for offenses committed under the influence of deep brain stimulation. In several lawsuits in different countries, courts have considered persons on antidepressants or dopamine agonists to have no or only diminished responsibility for severe crimes such as child pornography offenses, child sexual abuse and even manslaughter (Berger et al., 2003; McDermott, 2008; discussion: Klaming & Haselager, 2010; Carter, Ambermoon, & Hall, 2011). In these cases, it was acknowledged that the criminal behaviors had been caused by an iatrogenic disorder.

The other side of the coin is a partial responsibility for the offenses that is taken by the pharmaceutical companies which produce the drugs, if they fail to warn physicians and patients adequately of possible mental sequelae. In at least one case, the producer of an antidepressant was deemed 80% responsible for an extended suicide of a patient who just had started taking the drug (details in Klaming & Haselager, 2010). And in Australia and the US, class action suits of Parkinsonian patients, who have been financially ruined by drug-induced pathological gambling and compulsive shopping, have been brought against pharmaceutical companies that produce dopamine agonists (Whitehead, 2008). Analogously, we expect a partial legal responsibility for physicians who select stimulation parameters causing an iatrogenic mental disorder which could be causative for a severe crime. Although this is speculative yet, we strongly recommend a very careful selection of patients for DBS also with regard to foreseeable changes in personality, impulse control, and sexual behavior which bear significant risks for severe offenses. Foresight and caution are particularly important in this difficult field.

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