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Reduced Neuronal Responsiveness to Visual Sexual Stimuli in a Pedophile Treated with a Long-Acting LH-RH Agonist

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The introduction of long-acting luteinizing hormone-releasing hormone (LH-RH) agonists in the early 1990s opened up a new era in the management of paraphilic disorders. Despite the fact that they are not yet officially approved and may have significant side effects [1], there is first evidence for their efficiency especially in suppressing pedophilic urges and arousability [2]. In the past 2 years, a growing body of literature has appeared on functional brain correlates of sexual arousal in clinical populations [3] and particularly with regard to pedophilia, where also morphological deficiencies could be verified [4–8]. Here, we report first evidence of an altered neuronal response pattern in a pedophile treated with an LH-RH agonist.

The brain activation pattern in response to sexual stimuli was analyzed in an incarcerated pedophilic forensic inpatient (age: 38.4 years) who matches the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition criteria for pedophilia, exclusive type (female children), and who has sexually abused at least four prepubescent girls (criminal record). At the time of assessment, the patient had been solely treated with Trenantone® (Takeda Pharma, Aachen, Germany) over a period of 3 years (11.25 mg leuprolide acetate depot injection every 3 months), and with supportive psychotherapy. Serum testosterone levels were constantly suppressed to castration levels after 4 weeks of treatment (4.31 ng/mL prior to treatment and constantly ≤ 0.6 ng/mL after 4 weeks). As assessed by visual analog scales every 3 months, the patient reported a gradual reduction in deviant fantasies and masturbation frequency over time, finally resulting in a decrease of more than 90% compared with his base level, after a 9-month period of application.

The functional magnetic resonance imaging sessions consisted of several epochs of sexually arousing visual stimuli alternating with neutral visual stimuli as used in the study mentioned earlier [4]. Whole body slides of nude girls and

women were used as sexually arousing stimuli; the control stimuli were slides of the same groups in dressed mode (for details on study design and data analyses, please see Schiffer et al. [4]).

Viewing slides of dressed vs. undressed women revealed no differences in neuronal activation in the current case, whereas viewing slides of dressed vs. undressed girls led to significantly stronger activation of the right frontopolar prefrontal cortex (FPPFC), the left subgenual anterior cingulate (ACC), and the bilateral superior temporal cortex (STC), as well as the right cuneus and both middle occipital gyri (Figure 1A). Additionally, we examined the (un)dressed women vs. (un)dressed girls contrast. There were no significant differences while viewing preferred vs. unpreferred persons in a dressed mode. In an undressed mode only the undressed girls > undressed women contrast revealed significantly stronger activation in the dorsolateral prefrontal cortex Brodmann Area (BA) 9/46, the STC (BA 38), the superior parietal lobule (BA 7), and both middle occipital gyri (Figure 1B). However, compared with the group of unmedicated heterosexual pedophiles [4], the patient treated with LH-RH agonist showed no activation of the (hypo)thalamus, amygdala, insula, substantia nigra, hippocampus, or the rostral part of the ACC, although these brain areas are well-defined for the processing of emotional and autonomic aspects of sexual behavior [4,9] and were activated in all subjects in the aforementioned group with the given threshold [4].

We therefore suggest that the treatment of pedophiles with an LH-RH agonist and the consequent strong decrease in testosterone levels may suppress the neuronal processing of sexual stimuli primarily in subcortical brain areas which are known to be significantly modulated by sex steroids [10]. Other brain areas, in contrast, remain almost unaffected, as indicated by the activation of the FPPFC, ACC (ventral part), and STC in this patient. Even though this observation is uncon-

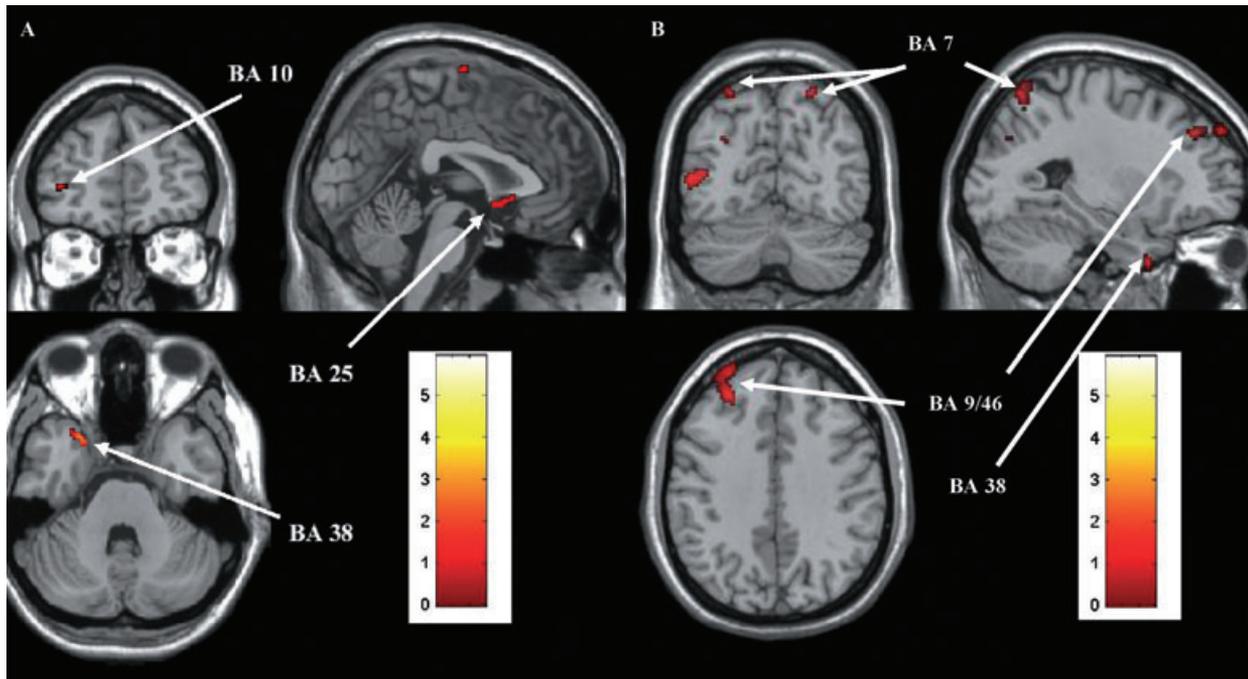


Figure 1 (A) Activation map (MNI coordinates: $-2 \times 49 \times 32$) of the Sexual > Neutral Block contrast of the pedophile treated with leuprolide acetate in the girls condition showing stronger activation of the left inferior frontal gyrus (BA 10) with the maximum at $-38 \times 49 \times 1$; $t = 3.80$, the left anterior cingulate gyrus (BA 25) with maxima at $-2 \times 17 \times -3$; $t = 3.97$ and $-2 \times 5 \times -7$; $t = 3.26$, and the left superior temporal gyrus (BA 38) with maxima at $-26 \times 14 \times -28$; $t = 5.93$, and $-34 \times 18 \times -24$; $t = 4.25$. (B) Activation map (MNI coordinates: $-26 \times -69 \times 37$) of the Girls > Women contrast of the same patient showing stronger activation in the right dorsolateral prefrontal cortex (BA 9/46) with maxima at $28 \times 54 \times 38$; $t = 4.26$ and $30 \times 40 \times 36$; $t = 4.00$, both superior parietal lobules (BA 7) with maxima at $32 \times -64 \times 64$; $t = 4.26$, $30 \times -62 \times 48$; $t = 3.30$ and $-36 \times -52 \times 63$; $t = 3.59$ and the left superior temporal cortex (BA 38) with the maximum at $-36 \times -52 \times -36$; $t = 3.80$ (for details on methodology and activations patterns in non-treated pedophiles see Schiffer et al.3).

trolled, the comparison of the resulting patterns in the case reported here and in the group study pleads for the construct validity of the data and possibly provides first evidence of a treatment-induced alteration in the neuronal sexual response pattern in pedophilia. This finding warrants further investigations in a large sample with a controlled study design.

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Sexual Activity of Hungarian Men

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The issue of the sexual performance has always been interesting for both genders. Many legends, fibs, and white lies were self-reported widespread, mainly among men. What is the normal frequency of sexual intercourse? How does it depend upon age, ethnicity, culture, and geographical localization? These issues and problems are often discussed among friends or partners, but rarely with medical professionals. During routine medical consultations, these questions are mostly neglected.

Sexuality is multifactorial in psychosocial sense and mainly depends upon biological conditions, cultural background, and actual state of health [1]. In the literature, limited reports and rarely comparable data were found on sexual activity, and frequencies of intercourse of different male populations [2–4].

To evaluate these habits in our country, a male population was examined and questioned in a medical setting.

Patients presenting for urological or andrological consultations were consecutively selected between January 2002 and June 2005. Within a study population of 723 men, 642 participated in family planning counseling, 81 others had minor urological problems.

Inclusion criterion was active sexual life with a steady female partner, spouse, or wife. Exclusion criteria were genital disorders and psychological conditions, any medication that is supposed to affect sexual desire or performance, any sign

of erectile dysfunction or any pharmacological treatment in these issues (aphrodisiacs, testosterone supplementation, and phosphodiesterase type 5 inhibitors), hypogonadism, and admitted bisexuality.

The recording of past medical history, actual state of health, and medications was followed by routine andrological examinations. Questions concerning the average numbers of intercourse during 1 week were also among the recorded data in patients' files.

Only data on sexual activity are reported here.

In the age cohort between 20 and 30 years, a subgroup was formed (26–30 years), supposing that majority of young men had more intercourse, when living in a stable relationship, circa from 25 years up.

Reported activity ranged by the men (as 1–2/week, 2–3/week, etc.) is presented in Table 1.

It seems there are only minimal differences among age decades in the means and in the distribution. The mean data showed coitus was performed 150 times annually.

Without reliable medical records, it is very hard to compare data from different sources.

There are available data from popular websites focusing on self-reported sexual performance in an entire questioned population without making distinction regarding the age. According to these, the average global numbers of intercourses are 103/year. Greek men reported 138, while the Japanese