IN REVIEW

The Neurobiology, Neuropharmacology, and Pharmacological Treatment of the Paraphilias and Compulsive Sexual Behaviour

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There has been increasing interest in the treatment of sexual disorders in recent years. Sexual disorders are classified in DSM-IV as sexual dysfunctions, paraphilias, and gender identity disorders. The sexual dysfunctions are nondeviant or nonparaphilic. The sexual dysfunction disorders should include “hyperactive sexual desire disorder” under sexual desire disorders. Further, there should be a specifier for paraphilias of “with hypersexuality” or “without hypersexuality.” There is still in complete understanding of the neurobiology of sexual disorders although functional neuroanatomy and neuropharmacological research has exposed the neurotransmitters, receptors, and hormones that are involved in sexual desire. Various pharmacological agents including serotonin reuptake inhibitors, antiandrogens, LHRH agonists, and others have been documented as reducing sexual desire. An algorithm for the use of these drugs in the treatment of the paraphilias as well nonparaphilic hypersexuality is outlined. The modes of action, dosages, aims of treatment, and usual methods of prescribing these agents is reviewed in this article. Some future directions of research in pharmacological treatment is also discussed.

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Key Words: sexual desire disorders, paraphilias, hypersexuality, compulsive sexual behaviour, antiandrogens, specific serotonin reuptake inhibitors, LHRH agonists

Although it would be premature to say that the neurobiology and neuropharmacology of sexual behaviour is understood, there clearly have been major advances in recent years. There has been significant research on the serotonin receptors and their function in the brain. Serotonin (5-HT) is involved in the neurobiology of many psychiatric disorders, particularly mood disorder, and specifically depression, anxiety, schizophrenia, eating disorders, and obsessive–compulsive disorder (OCD). It also plays a role in migraines. Although the etiology of these disorders is not understood, pharmacological treatments that modulate levels of 5-HT have shown to be effective in all of them. Further, sexual disorders, both paraphilic (sexual deviation) and nonparaphilic (compulsive sexual disorder or nonparaphilic hypersexuality), have also responded to pharmacological treatments modulating serotonin levels (1). This has led to the speculation that a group of disorders could be classified together as obsessive–compulsive spectrum disorders (1,2). This is based not only on the diagnostic characteristics of these disorders as outlined in DSM-IV but also on the fact that they respond to pharmacological treatment affecting the central nervous system level of 5-HT (1,2).

In general, the assessment and treatment of all types of sexual disorders have been neglected by psychiatry. In recent years, however, advances in psychiatry have focused general psychiatry on these important clinical entities. OCD spectrum disorders include OCD, eating disorders, somatoform disorders, impulse control disorders, and neuro psychiatric disorders such as Tourette syndrome (TS); they may also include the sexual disorders (1,2). There are clinical similarities between OCD and sexual disorders that can be summarized as follows (1):

- Obsessions are similar to sexual fantasies, both paraphilic and nonparaphilic.
- Compulsions are similar to compulsive sexual behaviour (CSB), which can be paraphilic or nonparaphilic.
- There is a cross over of comorbidity between OCD and the sexual disorders, with depression and anxiety disorders being common in both groups.
- At a neurobiological and neuropharmacological level, there is a significant overlap between these disorders.

There is no consensus at this time as to whether the paraphilias and compulsive sexual behaviour (nonparaphilic hypersexuality) should be included in the OCD spectrum disorders.
There has been considerable recent progress in mapping out 5-HT receptor subtypes (3). Many pharmacological treatments acting on the central 5-HT system, such as selective serotonin reuptake inhibitors (SSRIs), antidepressants, and 5-HT receptor agonists and antagonists, have been identified, specifically 5-HT1A, 5-HT2A, 5-HT3, and 5-HT4. This classification has been confirmed by the sophisticated techniques of molecular biology, but the latter have also led to the identification of “novel” 5-HT receptor subtypes, specifically 5-HT5A, 5-HT5B, 5-HT5C, and 5-HT5D (3). Various subtypes have also been identified. The 5-HT1 receptor has 5-HT1A, 5-HT1B, 5-HT1D, and 5-HT1F subtypes. The 5-HT2 receptor system has been shown to have 5-HT2A, 5-HT2B, and 5-HT2C subtypes. There do not yet appear to be any subtypes of 5-HT3 and 5-HT4 receptors, but 5-HT2A, 5-HT2B, and 5-HT2C do not have subtypes. These subtypes have been identified, specifically 5-HT1A, 5-HT1B, and 5-HT1F. All of the 5-HT2 receptor subtypes belong to a family of G protein-coupled receptors (3). Pharmacological research into 5-HT receptor subtypes has been found to play a role in a variety of psychiatric disorders (3). Neuropharmacological research into 5-HT receptor subtypes is likely to continue to be of significant interest to general psychiatry and to the evaluation and treatment of sexual disorders.

There have been several studies on the neurobiology of hypersexuality. Broadly, research literature shows that lesions in certain parts of the brain can lead to disinhibition of sexual behavior that may result in compulsive sexual behavior (3). In the neurological and neuropsychiatric literature, there are references to disinhibited sexual behavior as a result of frontal lobe lesions. The caution here is that this is most likely part of a general behavior, and disinhibition of sexual behavior as a result of frontal lobe lesions. Clinical presentation of certain elderly patients with dementia and disinhibited behavior including paraphilic behavior (exhibitionism) and nonparaphilic hypersexuality (in appropriate sexual advances to women) is mostly reported. More detailed clinical evaluation would usually show that this is more clinically obvious disinhibited behavior occurring in a spectrum of other disinhibited behaviors (4,5). Paraphilic behavior has been reported secondary to a wide variety of neuropsychiatric disorders. These include temporal lobe epilepsy, postencephalitic neuropsychiatric syndromes, septal lesions, TS, frontal lobe lesions, tumors in various sites, bilateral temporal lobe lesions, and multiple sclerosis (5). Both nonparaphilic hyposexuality and hypersexuality have been reported in as so ciation with various brain lesions. In the literature, OCD has also been observed secondary to various neurological disorders, and the sites of the lesions causing OCD overlap considerably with the ones that are associated with sexual disorders (3,6,7). It is interesting that coprolalia and coprophagia in TS clearly have a sexual basis (8). Other research shows that these symptoms are related to the degree of Tourette syndrome gene-loading that is present (7). These sexual symptoms develop with treatment using SSRIs and dopamine blockers (4,6,7). These observations support the notion that sexual behavior is associated with compulsive sexual behavior, and a neurobiological abnormality; paraphilia and CSB appear to be a be havioral response to that abnormality. At the same time, there is possibly an overlap of the neurobiological abnormality and OCD spectrum disorders.

The exact nature of hypersexuality is difficult to define. The total sexual outlet (TOS), originally defined by Kinsey as the number of orgasms per week, is one measure of hypersexuality. Kafka has attempted to address this problem in a study of men pre senting for treatment with compulsive sexual behavior, which he describes as “paraphilia re lated disorders” (PRD) (9). In a small study to have 5 or more sexual outlets (orgasms) per week for long periods of their adult lives, while the average age man would have 3 (9). Although this is simple and at tractive in clinical terms, it does not define hypersexuality in empirical terms. What is needed is a large study of paraphilic and nonparaphilic men and women in whom the cal pat terns of sexual drive are evident. In a trial of my own, there would be some degree of so cial or other dysfunction coupled with it, rather than simply a quantity tate mea sure of total orgasms per week. Various levels of sexual drive could be evaluated and defined as hyposexuality, normosexuality, and hypersexuality, based on ranges of sexual outlet measures. What is important is to note that there are some men who have hypersexuality, some of whom may be paraphilic and some who are not. Testing for presence or absence of paraphilia would be relatively cated at all levels of sexual drive, as men and women who have a paraphilia may be hypersexual, normosexual, or hyposexual. In addition, some inviduals exhibit compulsive sexual behavior (CSB), which are not paraphilic. These in clude compulsive masturbation, compulsive use of pornography, and...
pro mis cuity. Indi vid uals with CSB may also be hypersexual, normosexual, or hypo sexual. As com pul sive sex ual be hav iour comes more de fined con cept ually and diag nosti cally, a specific phar macolog i cal ap proach to hypersexual ity (par aphilic or nonpar aphilic), in con trast to normosexual ity or hypo sexual ity, would be de vel oped. Hypersexual ity would be rec og nized as dis tinct from CSB and par aphilic be hav iour. What is not clear from re search to date is whether hypersexual ity is an ag gra vating fac tor in par aphilias. A con sistent diag nostic for mul a tion for hypersexual ity must be de vel oped, and it should be in cluded in DSM-V.

Animal re search and clin i cal stud ies have shown that the mono amines 5-HT and do pa mine af fect sexual be hav iour (1,10). Fur ther, ma nip u la tions of 5-HT and do pa mine can ei ther de crease or in crease sexual be hav iour, de pend ing on which neurophar macologi cal in ten tion oc curs (1,10). Any dis cus sion of the ef fects of neu robi ology on sex ual be hav iour has to take into ac count the neuropep tid es in the brain that are sig nifi cantly in vol ved with the reg u la tion of hor mones (10). A neuropep tide, by de fini tion, is a chain of 2 or more amino ac ids linked by pep tide bonds and di f fers from other pro teins only in the na ture of the pep tide links (10). Over 100 unique, bio logi cally ac tive pep tid es, rang ing in size from 2 to about 40 amino ac ids, have been found, in clud ing gon adotropin-releasing hor mone (GRH) and pro lactin (10). GRH stim u lates the re lea se of fol li cle-stimu lating hor mone (FSH) and lute iniz ing hor mone (LH) from the pitu itary, which de term in es the re pro ductive cy cles and in the testes sex ual de ve elo pment in males (11). The hor mone re lease in re sponse to stim u la tion is high ligh ted by the fact that the re plete hor mone re lease is not re al ized un til se vera l min u tes fol low ing re ce pt or stim u la tion with GRH (10).

Neuropeptides are found through out the cen tral ner vous sys tem as well as in per i pheral or gans such as the gas tro in tes ti nal tract, the pan cre as, and the ad re nal glands (10). The hy po thalam ic re gions con tain sig nifi cant amounts of these neuropep tid es, in clud ing, among oth ers, GRH, corticotropin-releasing hor mone (CRH), and thy roid-releasing hor mone (TRH) (10). Cle ar ly, the role of the neuropeptide trans mitter GRH is criti cal to an un der stand ing of the bio logi cal base of sex ual be hav iour (11). Al though re search in rats has shown that the ef fects of neu ropep tid es on sex ual be hav iour are de pendent on the sex ual de ve elo pment in males (10).

The etiology of the paraphilias or sex ual de vi a tions is un known (17,18). Fur ther, the ac tual in ci dence and pres ence of the para philias is un known (18,19). What is known is that the level of vic tim iza tion of males and fe males in the gen er al pop u lation is fairly con sis tent. As ini tially re ported by Kinsey in the late 1940s, 24% of fe males had been vic tim ized of sex ual abuse when they were 14 years of age or youn ger (20). A na tional sur vey in Can ada in 1984 found that 23.5% of fe males be hav iour...
and 12.8% of males were vic tims of child hood sex ual abuse (21), which is quite con sis tent with Kinsey’s data. This may assist in gaug ing the prev alence of one paraphilia, spe cifi cally, pedophilia. For ex ample, it is known that among iden ti fied pedophiles, ap prox i mately 35% were vic tims of sex ual abuse as children. The average number of vic tims per pedophile is also known. It may there fore be pos si ble to es ti mate the prev alence of pedophilia in the gen er al pop u la tion through ex trap o la tion. In one study of sexual fantasies, two-thirds of males re ported het ero sex ual pedophilic fan ta sies and about one-third of males had rape fan ta sies (22). As the pres ence of de vi ant sex ual fan ta sies is an in di ca tion of the pres ence of a paraphilia at a mild level, this im plies that mild pedophilia is prev a lent at a stag ger ingly high rate in men in the gen er al pop u la tion. Fur ther, as sum ing that the pres ence of rape fan ta sies in di cates the pres ence of another paraphilia, spe cific ally sex ual sad ism, then mild sex ual sad ism would also be highly prev a lent in the pop u la tion at large. In my opin ion, these are gross over es tim ates of the prev alence of mild pedophilia and sex ual sad ism. How ever, even if these figures were over es ti mates, the pres ence of rape fan ta sies is un known, and the pres ence of com pul sive sex ual be hav iour is also un known.

There are a num ber of phar ma col og i cal inter vi sions that are avail able for the treat ment of CSB and the paraphilias. These agents appear to have a direct im pact on sex ual drive. Sex ual drive con sists of vari ous com pon ents, in clud ing a psy cho log i cal com ponent of sub jective de sire to eng age in sex ual ac tiv ity; the sex ual equiv alent of hun ger; the pres ence of sex ual fan ta sies which may be nonparaphilic or paraphilic; a state of sex ual arousal that pro vides moti vation for seek ing out sex ual ac tiv ity; and fi nally, the ac tual sex ual ac tiv ity it self, which ul t i mately re sults in an or gasm (23). Phar ma col og i cal agents have been iden ti fied that can af fect all of the com po nents of sex ual drive and of nonparaphilic sex ual be hav iour, and the pres ence of de vi ant sex ual fan ta sies and about one-third of males had rape fan ta sies (22). As the pres ence of de vi ant sex ual fan ta sies is an in di ca tion of the pres ence of a paraphilia at a mild level, this im plies that mild pedophilia is prev a lent at a stag ger ingly high rate in men in the gen er al pop u la tion. Fur ther, as sum ing that the pres ence of rape fan ta sies in di cates the pres ence of another paraphilia, spe cific ally sex ual sad ism, then mild sex ual sad ism would also be highly prev a lent in the pop u la tion at large. In my opin ion, these are gross over es tim ates of the prev alence of mild pedophilia and sex ual sad ism. How ever, even if these figures were over es ti mates, the pres ence of rape fan ta sies is un known, and the pres ence of com pul sive sex ual be hav iour is also un known.

The evalua tion of sex ual be hav iour re quires ex per tise and training in sexology and a spe cialized sex ual be hav iours clinic. In such a clinic, there is typ ically a de tailed psy chi atric and phys i o col og i cal ex a mina tion and an as sess ment of sex ual be hav iour, us ing vari ous psy cho col og i cal and phys i o col og i cal tests. As vari ous neuropsy chi atric prob lems can have a sig nificant ef fect on sex uality, neuropsy chi atric ex per tise should be avail able and should be used to com plete the eval u a tion. The eval u a tion in cludes a sex hor mone pro file, con sist ing of free and to tal tes to ter one, FSH, LH, est rad io l, prolactin, and pro gesterone. This sex hor mone pro file will also pro vide the base line for any treat ments in volv ing anti an dro gens or hor mones. In ad ded, sex drive an nom ali ties and cer tain high-risk cases for sex ual vi o lence may in volve hor mone ab nor mal i ties. Var i ous ques tion na ires are used to pro vide a struc tured sex ual his tory and mea sure the na ture and de gree of sex ual fan ta sies, the na ture and de gree of cog ni tive dis tor tions and how they re late to paraphilias, com po nents of sex ual drive and of nonparaphilic sexual be hav iour, and the pres ence of sub stance abuse. The last com po nent of the eval u a tion is phys i o col og i cal test ing of sex ual arousal to es ti mate whether a de vi ant sex ual pref er ence is pres ent or not.

This au thor has recently es tab lished an al go rithm for the treat ment of paraphilias (24) that is based on an enhanced clas si fi ca tion of paraphilias de scribed in the DSM-III-R (23). The new clas si fi ca tion scheme has 4 cat e go ries (24):

1. Mild
2. Mod er ate
3. Se vere
4. Cata strophic

The last cat e gory, cata strophic, has been added to the orig in al 3 de scribed in DSM-III-R. The full ver sion of this clas si fi ca tion is avail able in a re cent pub li ca tion by this au thor (23). The newly-developed al go rithm en com pas ses 6 lev els of treat ment for the 4 cat e go ries of paraphilia.

Level 1: Re gard less of the se ver ity of the paraphilia, cog ni tive-behavioural treat ment and re lapse-preven tion treat ment would al ways be given.

Level 2: Phar ma col og i cal treat ment would start with SSRIs. This would be in di cated in all cases of mild para philia.

Level 3: If the SSRIs were not ef fec tive in 4 to 6 weeks at ade quate dos age lev els, a small dose of an anti an dro gen would be added. A typ i cal phar ma col og i cal re gime would be ser traline 200 mg daily with 50 mg of med roxypro ge sterone ace tate (MPA) or 50 mg of cy pro te rone ace tate (CPA). This would be used in mild and mod er ate lev els of paraphilia.

Level 4: The full anti an dro gen or hor monal treat ment would be given orally. This would in vol ve 50 to 300 mg of MPA daily or 50 to 300 mg of CPA daily. This reg i men would be used in most mod er ate cases and in some se vere cases.

Level 5: The full anti an dro gen treat ment or hor monal treat ment would be given intra muscu larly (IM). This would
in involve 300 mg of MPA given IM each week with 200 mg of CPA given IM every 2 weeks. This regimen would be used in some severe cases and some catastrophic cases.

**Level 6:** A complete suppression of androgens and sex drive would be sought by giving CPA 200 to 400 mg IM weekly or providing a luteinizing hormone–releasing hormone (LHRH) agonist. This regimen would be used for some severe cases of paraphilia and would be the treatment of choice in catastrophic cases.

The aims of treatment using this algorithm would be the suppression of deviant sexual fantasies, urges, and behavior, with a medium to high impact on sex drive at Levels 2 and 3. Suppression of deviant sexual fantasies, urges, and behavior, with a moderate reduction in sex drive, would be seen at Levels 3 and 4, but this would be dose-dependent. Suppression of deviant sexual fantasies, urges, and behavior, with a severe reduction in sex drive (de pending on the dose of medication) would occur at Levels 4 and 5. A complete or near-complete suppression of sex drive would be seen at Level 6.

In general, the aims of pharmacological treatments would be to suppress deviant sexual fantasies, to suppress deviant sexual urges, and to reduce the risk of recidivism and further victimization. With regard to nonparaphilic hypersexuality (NPH), a mild, moderate, and severe reduction of sexual drive would be seen at Levels 6.

In addition, the specific serotonine reuptake inhibitors (SSRIs) are commonly used as agents for the treatment of the paraphilias and nonparaphilic hypersexuality. Kafka reported on 4 patients treated for NPH with fluoxetine hydrochloride (30). Significant reductions in sexual drive were observed. He also reported on 3 cases of paraphilia treated with fluoxetine hydrochloride, where considerable clinical improvement was observed (30). Kafka and Prentky completed an open-label outpatient study on one group of men with paraphilia and another group suffering from NPH. Both groups were treated over a 12-week period with a mean dose of 30 mg of fluoxetine hydrochloride daily. Clinical improvement in all cases was noted (31). Stein and others reported a failure of treatment of sexual disorders with fluoxetine hydrochloride (32). Coleman and others completed a study of 13 men with paraphilia treated with fluoxetine hydrochloride and reported improvement in all aspects of deviant sex drive and nonsexual behavior. The clinical response rate was 50%. The treatment nonresponders were followed by fluoxetine hydrochloride, and about 60% of this group showed some clinical improvement. The mean dose of sertraline in Kafka’s study was 100 mg daily, and for fluoxetine hydrochloride it was 51.1 mg daily. The mean duration of treatment was 30.5 weeks (SD 16.8 weeks).

**Pharmacological Treatment**

There are 3 main categories of pharmacological intervention in the paraphilias, and to a certain degree, they could also be used for the treatment of nonparaphilic hypersexuality. These pharmacological treatments are (24):

- The specific serotonin reuptake inhibitors (SSRIs)
- The antiandrogens and hormonal treatments
- The LHRH agonists

**The SSRIs**

The SSRIs have long been documented as causing a reduction in sexual drive. They have also been an important advance in the treatment of the paraphilias because they are well-known to the average psychiatrist (15, 25). Decreasing brain 5-HT in an animal resulted in decreased sexual drive in creases as measured by increased mounting behavior. In contrast, increasing brain levels of 5-HT reduced sex drive and sexual behavior. Therefore drugs that in crease 5-HT levels in the brain have been used to treat paraphilias (15, 25). Starting in 1990, treatment successes for various paraphilias, such as exhibitionism, using fluoxetine, have been reported (25–36). Fluoxetine and sertraline have been the most commonly used pharmaceutical agents for the treatment of the paraphilias and nonparaphilic hypersexuality. Kafka reported on 4 patients treated for NPH with fluoxetine hydrochloride (30). Significant reductions in sexual drive were observed. He also reported on 3 cases of paraphilia treated with fluoxetine hydrochloride, where considerable clinical improvement was observed (30). Kafka and Prentky completed an open-label outpatient study on one group of men with paraphilia and another group suffering from NPH. Both groups were treated over a 12-week period with a mean dose of 30 mg of fluoxetine hydrochloride daily. Clinical improvement in all cases was noted (31). Stein and others reported a failure of treatment of sexual disorders with fluoxetine hydrochloride (32). Coleman and others completed a study of 13 men with paraphilia treated with fluoxetine hydrochloride and reported improvement in all aspects of deviant sex drive and nonsexual behavior. The clinical response rate was 50%. The treatment nonresponders were followed by fluoxetine hydrochloride, and about 60% of this group showed some clinical improvement. The mean dose of sertraline in Kafka’s study was 100 mg daily, and for fluoxetine hydrochloride it was 51.1 mg daily. The mean duration of treatment was 30.5 weeks (SD 16.8 weeks).

Bradford and others reported on a 12-week open-label dose study of pedophilic treated with sertraline (35). There were 20 subjects in the study. Two subjects dropped out. The mean effective dose of sertraline was 131 mg daily. None of the patients discontinued the sertraline due to adverse effects. The study looked at various sexual behaviors and showed that the sertraline was effective. The mean dose of sertraline in Kafka’s study was 100 mg daily, and for fluoxetine hydrochloride it was 51.1 mg daily. The mean duration of treatment was 30.5 weeks (SD 16.8 weeks).

**Clinical Trials**

In a similar study, Greenberg and others looked at a sample of paraphilic men treated with SSRIs compared with a control group (n = 104) who received only...
cognitive-behavioural treatment (25). Over the initial 12-week period of treatment, the frequency and severity of sexually deviant fantasies and urges were significantly reduced in the SSRI-treated group compared with the control group. These studies provide evidence that SSRIs reduce deviant sexual fantasies, urges, and behaviour. This would make them the drug of choice in the treatment of paraphilias as well as nonparaphilic hypersexuality. The number of studies completed to date is still small, however, and no double-blind studies have been reported.

Antiandrogens and Hormonal Agents

The initial hormonal treatment for the paraphilias used estrogens. The effectiveness of these treatments, however, was reduced because of their various side effects, specifically nausea, vomiting, weight gain, and feminization (37–41).

Medroxyprogesterone acetate (Provera) has been the most common form of pharmacological treatment for sexual deviation in the US. This is partly due to studies started at Johns Hopkins, but has also been dictated by the lack of alternatives such as CPA. Several clinical studies have been completed (42–58).

MPA is a progestagen and has a more active through the induction of testosterone reductase in the liver, thereby decreasing circulating levels of testosterone. In addition, its action as a progestagen blocks the secretion of the gonadotropins (FSH and LH), although the mechanism of action is not fully understood (15). Studies have shown that it does not compete with androgens at the androgen receptor level and therefore by definition is not a true antiandrogen (15). MPA can be given both orally or IM. A number of side effects have been described, including weight gain, decreased sperm production, a hyperinsulinic response to a glucose load, and the potential to aggravate or precipitate diabetes mellitus, headache, deep vein thrombosis, hot flashes, nausea or vomiting, and feminization. Clinical studies show that MPA has a significant effect on the oral side effects of orally administered MPA.

Cypoterone acetate is a true antiandrogen as well as having progestational and antigonadotropic effects (15). CPA is by far the most extensively studied antiandrogen in terms of its effects as a treatment for sexual deviation (15). It was originally used in Germany in the mid-1960s and since then has been used extensively in various parts of the world (59–71; and Ortmann J, 1984, unpublished observations).

As a true antiandrogen, CPA is active at anrogen receptors throughout the body. It blocks the intracellular molecular relay receptors. The block of anrogen receptors decreases all types of sexual behaviour, including sexual fantasies, sexual urges and behaviour, masturbation, and sexual intercourse, and it also has an impact on erections. CPA also has strong progestational activity, reducing the levels of FSH and LH. It is the acetate radical that gives it the progestic effect. Cypoterone acetate or the acetate radical has no antigonadotropic effects. CPA is a competitive inhibitor of testoste ratio and dihydrotestosterone at androgen receptors through out the body (15,24).

The first clinical study using CPA was conducted in Germany (66,67). In 1971, Lasch and Laschet reported on more than 100 sex offenders who were treated with CPA. They were mostly ex-hospital inmates and pedophiles, as well as sexual sadists. About 50% of the subjects were also sexual offenders. This was an open-label clinical trial with a treatment duration of 6 months to 4 years (67). In 80% of cases, CPA
given orally at 100 mg daily and sig nifi cantly re duced sex ual drive, erection, and or gasms. CPA was also ad min is tered IM at lev els of 300 mg ev ery sec ond week. With this ap proach, 20% of ex hi bi tion is ts had a com plete elim i na tion of all de vi ant sex ual be hav iour and, in some cases, these be hav iours did not re turn even af ter the treat ment was dis con tin ued. Side ef fects of weight gain, dep ression, and fe male zina tion were noted. Laschet and Laschet re ported on a sim ilar study on 300 men treated for up to 8 years with ex cel lent treat ment come out (66). Sev eral other stud ies have since then been com pleted, all of which show that CPA is gen er ally an ef fective treat ment for sex ual de vi a tion. This au thor com pleted 2 stud ies on CPA, one a dou ble-blind study and the other an ex amination of the sexual arousal patterns of pedophiles (59,60). The dou ble-blind cross over study used 19 sub jects, all of which met DSM-III-R cri ter ia for pedophilia. This sam ple also in cluded sex ual of fenders, prin ci pal ly with high pre treat ment recidivism rates and a mean of 2.5 previous con vic tions for sex ual of fenses per sub ject. CPA was ad min is tered or al ly in 3-month active treat ment phases al ter nat ing with 3-month pla ce bo phases. There was a re duc tion in sex ual arousal re spon ses by ac tive drug treat ment that did not quite reach stat isti cal sig ni ficance. Self-re ported urges of sex ual arousal were all re duced, as was psychopa thology as mea sured by vari ous writ ing styles. Other mea sures of sex ual be hav iour, in clud ing sexual fan ta sies and mas ter bation, were all sig nifi cantly re duced by CPA. In the study of CPA ef fects on the sex ual arousal pat terns of pedophiles, it was noted that de vi ant sexual arousal was differ ently af fected from nor mal i fied arousal in the same sub jects. This dif fer en tial ef fect on sex ual arousal is a very im por tant clin i cal ob serv ation that re quires fur ther re search.

LHRH Agonists

Luteinizing hor mone–re leas ing hor mone agonists have also been used to treat para philias. They have the spe cific treat ment ef fect of over stim u lat ing the hy po thal a mus. There is a de crease in de vi ant sex ual fan ta sies and de vi ant be hav iours. In: Mar ti ni L, Motta M, ed itors. An dro gens and anti androgens. New York: Ra ven Press; 1977. p 77–89.

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Résumé—La neurobiologie, la neuropharmacologie et le traitement pharmacologique des paraphilies et du comportement sexuel compulsif

Ces dernières années, on constate un intérêt accru pour le traitement des troubles sexuels. Les troubles sexuels sont classés dans le Manuel diagnostique et statistique des troubles mentaux (DSM IV) comme étant les dysfonctions sexuelles, les paraphilies et les troubles de l’identité sexuelle. Les dysfonctions sexuelles sont non déviantes ou non paraphiliques. Les dysfonctions sexuelles devraient inclure « le trouble du désir sexuel hyperactif », dans la catégorie des troubles du désir sexuel. En outre, on devrait spécifier si les paraphilies sont « avec hypersexualité » ou « sans hypersexualité ». On ne comprend pas encore complètement la neurobiologie des troubles sexuels, bien que la neuroanatomie fonctionnelle et la recherche neuropharmacologique aient exposé les neurotransmetteurs, les récepteurs et les hormones responsables du désir sexuel. Les études indiquent que divers agents pharmacologiques, y compris les inhibiteurs de recaptage de la sérotonine (IRS), les antiandrogènes, les agonistes LHRH et d’autres réduisent le désir sexuel. Un algorithme pour l’utilisation de ces médicaments dans le traitement des paraphilies et de l’hypersexualité non paraphilique est présenté. Les modes d’action, les dosages, les cibles du traitement et les méthodes usuelles de prescription de ces agents sont recensés dans cet article. On y présente aussi certaines orientations futures de la recherche en traitement pharmacologique.