Ethical and Medical Considerations of Androgen Deprivation Treatment of Sex Offenders

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Context: Blood testosterone codetermines the threshold for erotosexual imagery and sexual activity. Androgen deprivation may therefore have a place in the treatment of unacceptable sexual behavior. Although androgen deprivation can be effective for sex offenders, their basic human rights must be respected; otherwise such treatment constitutes a violation of their physical integrity and is ethically unacceptable. As experience in treating prostate cancers demonstrates, androgen deprivation may have serious side effects. Endocrinologists are qualified to advise on and monitor androgen deprivation, but they are placed in an atypical position because the indication for such treatment is not dictated by endocrine disease.

Objective: The aim of this study was to provide an ethical framework for advising on androgen deprivation treatment of sex offenders and dealing with side effects.

Evidence Acquisition and Synthesis: A literature search was conducted in PubMed, Psychinfo, and references from the multiple systematic reviews and meta-analyses published on this topic. An attempt has been made to provide an appreciation of the ethical aspects of androgen deprivation in sex offenders, the efficacy of treatment, the potential risks of treatment, therapeutic options, and recommendations for monitoring treatment.

Conclusions: Provided that the human rights of sex offenders are respected and informed consent is given, androgen deprivation within a comprehensive framework of psychotherapeutic treatment can make a meaningful contribution to the prevention of recidivism by enabling better control of sexual impulses. Knowledge of side effects and their treatment has been mostly gleaned from experience with prostate cancer patients, and this should be made available to sex offenders undergoing androgen deprivation. **(*J Clin Endocrinol Metab* 96: 3628–3637, 2011)**

Over the past 20–30 yr, a biological substrate of human sexuality and its pathologies, traditionally the domain of psychiatry, has emerged (1, 2). The extent of biological determinants is still not well understood, but behaviors once regarded with moral opprobrium as acts of choice may in fact be related to the neurobiology of brain function with an implication of biological determinism. Sexual compulsion may be associated with neuropathologies for which psychological treatment together with pharmacotherapy can be provided (3, 4). This paper focuses on the role that androgen reduction can play in sexual behavior disorders that violate the rights of others.

Sexual arousal is dependent on neural (sensory and cognitive), hormonal, and genetic factors and, in the human case, the complex influences of culture and sociosexual context (1, 5). People who are compulsively responsive to and dependent on abnormal sexual stimuli for arousal and orgasm for a duration of at least 6 months are defined as paraphiliac (6) in Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (Text Revision) 2000 (7). Paraphilias occur predominantly in men but also in women (8). Extreme paraphilias (such as pedophilia or lust murder) may bring individuals into conflict with others in society and the law. Although such behavior is

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Abbreviations: ADT, Androgen deprivation treatment; CPA, cyproterone acetate; MPA, medroxyprogesterone acetate.

intolerable, it should be noted that perpetrators are suffering from a pathological condition and (forensic) medicine may play a part in their treatment, potentially including pharmacological interventions.

In men, androgens are fundamental to normal sexual behavior (9) and are primarily directed at sexual interest or desire (5, 10, 11). In all people, including persons with a paraphilia, testosterone codetermines the threshold at which erotosexual imagery and sexual activity occurs. Reducing the biological activity of androgens raises this threshold, particularly for those paraphilias characterized by intense and frequent sexual desire and arousal. Sexual behavior with overtones of compulsivity may not respond so well to androgen reduction and is better treated with selective serotonin reuptake inhibitors (4, 12).

Despite methodological shortcomings, there is evidence that treatment lowers sexual recidivism significantly (13–15), although a person's basic inclinations are not changed (16). Interventions are mostly designed to increase voluntary control over sexual arousal, reduce sex drive, or teach self-management and relapse prevention skills to individuals who are motivated to avoid acting upon their sexual impulses and thus contribute to the prevention of recidivism (13, 15, 17, 18).

Endocrine intervention to reduce androgen action may be deemed effective by a forensic mental health professional, but endocrinologists who become involved in the decision-making process in this context are placed in an atypical position because such an indication is not dictated by endocrine disease. This review is primarily intended to address the information needs of endocrinologists who find themselves in this situation. It does not examine in great detail the potential for ethical and legal complications, although this is also obviously a serious point of consideration.

Ethical Aspects

The ethical approach to the medical treatment of sex offenders is contentious and complex. The field of ethics is not an objective reality that can be divorced from values, attitudes, feelings, or (religious) beliefs that all exert a decisive influence, preventing full agreement, or even consensus. An additional complicating factor is that many sex offenders also suffer from serious copsychopathology (19).

There can be no question that society is entitled to punish those who violate the rights of others or that it has a duty to protect its citizens by curtailing the freedom of the violators. For decades, the penal approach to sex offenders has focused almost entirely on issues of punishment and risk assessment and management for the purpose of community protection and retributive justice (20), with limited success in reducing recidivism (21).

Because the only options for preventing repeat offending are ongoing incarceration or behavior modification, effective treatment is an obvious goal. Androgen reduction unquestionably reduces sexual interest (libido) and performance (10). It also reduces reoffending (16). Past involuntary castration of sex offenders (16), although morally reprehensible and not always targeted at high-risk cases (22, 23), resulted in recidivism rates of less than 5% invariably being reported over long follow-up periods, compared with expected rates of 50% or more (1, 16, 24), although some reports are more conservative (25).

Studies of the use of antiandrogenic drugs report similar efficacy (24, 26–28), and a comprehensive meta-analysis of sex offender treatment has found that both surgical and hormonal interventions reduce recidivism much more than any other treatment approach, particularly when used alongside psychological treatment (14). Although hormonal intervention is sometimes referred to as "chemical castration," this is something of a misnomer; it also evokes the clearly unethical involuntary castrations of earlier times and can influence the discourse on ethics. The more neutral "androgen deprivation treatment" (ADT), widely used in the scientific literature on the treatment of prostate carcinomas, may be preferable when discussing androgen reduction.

Some experts are cautiously optimistic that sex offenders can be successfully treated (13, 16, 21), and ADT has the important advantage that it is reversible. However, this gives rise to questions regarding the basis of medical involvement. It can be argued that medical input in these cases not only straddles the boundary between treatment and punishment, but also may shift the doctor's focus from the best interests of the patient to one of public safety while carrying with it a sense of symbolic retribution (29). Evidently, providing hormonal treatment from such an approach poses ethical questions of informed consent and truly free choice.

Certainly, pharmacotherapy should be voluntary because mandatory treatment is not only ethically questionable, but also carries a high risk of noncompliance (not taking the medication or procuring testosterone from the black market). However, the correctional system is ultimately an environment of legal coercion and retribution; some may argue that pharmacological treatment cannot be offered on a genuinely voluntary and consensual basis in this context because it forces the sex offender to choose to consent to the lesser evil, and that it is unethical to place anyone in this position, also in view of the considerable risk of side effects. However, this position can also lead to

therapeutic nihilism because it would be equally unethical not to offer treatment with proven efficacy.

A more complete interpretation of the Hippocratic injunction to do no harm can be found in the Hippocratic Corpus in Epidemics: "The physician must have two special objects in view with regard to disease, namely, to do good or to do no harm" (30).

From the perspective of the offender, the good may be freedom from obsessive sexual thoughts or a dominating sex drive, enabling participation in treatment programs (29). The fact that there are side effects to a treatment need not, in itself, necessarily be an absolute contraindication. There are many situations where a degree of harm is inflicted on patients to achieve a net benefit, like certain forms of surgery or cancer treatment. There is an intrinsic moral difference between intentionally inflicting harm and prescribing treatment that carries a risk of causing harm but has an expected net beneficial outcome.

Some professionals working with sex offenders have adopted a policy of treatment primarily directed at rehabilitation that embraces human rights as a core value. They recognize that a sex offender is also a human being in need of support, and that help should be given on the basis of general fundamental principles and values of medical ethics, such as compassion, respect for the individual, and a nonjudgmental attitude. This ensures autonomy in making informed voluntary decisions, nonmaleficence in avoiding harm to the offender, beneficence in ensuring that the welfare of the individual is the primary goal of treatment, and justice in that the offender is treated fairly, equitably, and in accordance with his or her rights (20, 31). The extension of human rights and related protections to sex offenders need not infringe on the public's right to safety (32), and the objective of humane treatment must be carefully balanced against that (33).

With the more humane approach to sex offenders has also come greater understanding that the person behind the label is an individual with sexual deviance and (dynamic) offender characteristics that may be amenable to treatment (13, 15, 16). Recent treatment approaches that have found acceptance are the "good lives model" and the "risk-need-responsitivity" model (34, 35), often combined with pharmacological treatment (14–16) depending on the psychological disposition of the offender.

A special category of sex offenders is made up of juveniles experiencing paraphiliac impulses with the emergence of hormonal puberty (36, 37). Here, the ethics of ADT are compounded by potential interference with the developmental course of puberty and the legality of informed consent. Experts agree that any use of ADT in this circumstance should be judicious and exceptional (36, 38, 39). With regard to side effects, a parallel may be drawn with juvenile transsexuals whose hormonal puberty is halted for 2–4 yr and who, receiving cross-sex hormones later in puberty, show a near-normal catch-up of pubertal development (40).

Another special category is formed by people with intellectual disabilities. Their sexual behavior may be socially inappropriate to an extent that sometimes, although not always, amounts to sexual offending (41). In these situations as well, the rights of the individual must be carefully balanced against the rights of society before a decision is taken to provide ADT.

In the context of a rehabilitative approach to sex offenders, it is ethical to offer hormonal treatment to achieve a reduction of androgen action and potentially improve control of sexual impulses and desires that can help prevent recidivism. The physician's aims are directed at the offender as a person in need of help and not primarily at the interests of the correctional system, which are legitimate but are not the physician's main professional responsibility. In view of the multitudinous actions of androgens, side effects of hormonal interventions are probable and should not be underestimated. In this regard, the endocrinologist may play an advisory role so as to prevent or minimize undesired effects (for review, see Refs. 42 and 43). Obviously, considerations of whether ADT treatment is truly helpful (16), along with its long-term potential deleterious effects (42, 43), will weigh heavily in judging its ethical acceptability.

Patients have not traditionally been included in the decision-making process of medical practice and ethics, but increasing patient autonomy has become part of modern medicine, and there is no good reason not to present the ethical dilemma to candidates for ADT and openly discuss it with them. If we genuinely believe in patient autonomy, we must be prepared to concede that there is indeed little freedom of choice when long-term detention is the only alternative to androgen deprivation. A truly informed decision cannot be made unless this insight is fully shared with the offender. It goes without saying that psychiatric comorbidity may interfere with the capacity to give informed consent and with the legality of any consent that is given (42, 44).

Increasingly, sex offenders and others driven by unacceptable paraphilias may wish to explore the possibilities of ADT as a means of improving control of their impulses before they come into conflict with the law (45). It will be clear that any indication for ADT should also involve an expert mental health professional.

Aspects of Androgen Deprivation

Guidelines for the role of pharmacological agents in the treatment and management of paraphilia have been de-

veloped in conjunction with specific psychosocial and psychotherapeutic interventions (16). Double-blind, placebo-controlled studies of antiandrogens are virtually absent because of the practical difficulties of carrying them out.

The traditional approach to pharmacological treatment of sex offenders has been much like that of prostate cancer, where the aim is to reduce the biological action of androgens to an absolute minimum (46–48). A question is whether this is in fact necessary for the actual purpose of the treatment, which is a better control of sexual impulses (49, 50). It should be noted that sexual offenders often have a compulsive element to their aberrant behavior, not related to the action of testosterone.

The blood level of testosterone critical for normal male sexual function varies somewhat among individuals, although studies of a clinical nature indicate that on average it approximates the lower limit of the eugonadal reference range for young men (51–54). In an experimental study to determine dose/response relationships in young men, graded doses of testosterone had no differential effects on sexual function, visual-spatial cognition, and mood (55). A reduction of serum testosterone below the lower limit of reference values is necessary to achieve success in reducing recidivism, but it may not be necessary to reduce this to the extent of prostate cancer treatment.

Whether retaining some level of androgen action might have benefits in preventing or slowing the cumulative detrimental side effects of ADT is addressed in *Side Effects of Androgen Deprivation Treatment*. Ideally, the period of ADT should be as brief as possible (22). Paraphilia is, however, a chronic condition; for severe cases, a minimum ADT duration of 3 to 5 yr is necessary, and for mild cases, at least 2 yr (16). This span of time is sufficient for serious side effects to occur, although these are reversible when testosterone levels return to normal again. With recurrence of paraphiliac sexual fantasies, treatment should be reinstated (16). Because sex offenders are on average 20–30 yr younger than men with prostate cancer, they are less likely to be suffering comorbidities, although these must be tended to if present.

Pharmacological Reduction of Androgen Action

Three main classes of antiandrogens have been used for this purpose. For a review of the properties of these drugs, each with a specific pharmacological action, see Ref. 12.

Cyproterone acetate (CPA)

CPA has a dual action; it inhibits LH secretion due to its progestational properties, but it is also a weak partial agonist and a competitive inhibiter of intracellular androgen receptors (56). It is associated with gynecomastia in 20% of men (56). Other reported possible adverse effects include liver dysfunction and adrenal suppression, particularly in the case of (female) adolescents (57), although not confirmed in a large-scale study (58). CPA is available in both oral and im injection formulations, although not in the United States.

In a brief (3-month) double-blind placebo-controlled study of 19 men with paraphiliac disorders, CPA significantly reduced sexual arousal, fantasy, and most importantly, self-reported sexual activity (59). Summaries of the efficacy of this medication in the treatment of sex offenders have been published (59, 60). In a review of seven studies involving 96 sex offenders treated with CPA and followed for up to 4.5 yr (average follow-up time was 3 yr), six studies reported a recidivism rate of 0%, and the seventh study reported a recidivism rate of 16.7% (61).

Medroxyprogesterone acetate (MPA)

Like CPA, MPA also has the important action of inhibiting LH secretion. In a review of eight studies of 452 male sex offenders treated with MPA and followed from 1 to 13 yr, recidivism rates (defined in a variety of ways across the studies) ranged from 1% to as high as 17% (62). In a double-blind, placebo-controlled study of 11 pedophiles who completed a 3-month treatment trial, the five men treated with MPA reported fewer sexual fantasies. However, no difference in other factors such as frequency of orgasm or quality of erection was found between groups (63).

GnRH agonists

A third means of decreasing circulating testosterone is the use of GnRH agonists. The best studied in sex offender research are leuprolide (64) and triptorelin (65), reviewed in Refs. 12, 48, and 66. One study involved nonblinded treatment of 30 men with paraphilias (25 of whom were pedophiles) using triptorelin. All men reported complete elimination of deviant fantasies and deviant sexual activities. This effect persisted for all 25 men who continued treatment for over 1 yr. During the study, five men stopped treatment for a variety of reasons (including in two cases the wish to have children). Of the three who stopped due to "side effects," all were switched to CPA, but two subsequently reoffended (67). Usually studies comprise small groups of men (47).

Side Effects of ADT

Upon administration of drugs like MPA, CPA, and GnRH agonists, a profound decline in sex steroid levels follows,

TABLE 1. Estimated risks for selected side effects of ADT in men

Side effects	ADT duration	% Change or hazard ratio (Ref.)
Bone mineral density and fracture risk		
Bone mineral density	6 months	−3.5% (79, 80)
	12 months	−5.3% (79, 80)
	12 months	−3.3% (73)
	12 months	−4.9% and −6.8% (65)
Any fracture[a]	5 yr	1.45 (95% CI, 1.36–1.56) (74, 80)
Fracture resulting in hospitalization[a]	5 yr	1.66 (95% CI, 1.47–1.87) (74, 80)
Glucose and lipid metabolism		
Weight and body mass index	6 months	+0.8% (92, 95)
	11 months	+2.4% (91)
Fat body mass	3 months	+8.4% (91)
	11 months	+9.4% (72, 80)
Lean body mass	3 months	−2.8% (72)
	11 months	−2.7% (72, 80)
Muscle area	11 months	−3.2% (72, 80)
Total cholesterol level	6 months	+6.1% (92)
	11 months	+9.0% (89–91)
High-density lipoprotein cholesterol level	11 months	−11.3% (89–91)
Low-density lipoprotein cholesterol level	11 months	+7.3% (89–91)
Triglyceride level	6 months	+8.2% (92)
	11 months	+27% (89–91)
Fasting insulin level	3 months	+64% (90, 94)
Incident diabetes	4.6 yr	1.44 (95% CI, 1.34–1.55) (91, 94)
Cardiovascular disease/mortality		
Incident coronary heart disease	4.6 yr	1.16 (95% CI, 1.10–1.21) (93)
Incident myocardial infarction	4.6 yr	1.11 (95% CI, 1.01–1.21) (93)
Incident sudden cardiac death	4.6 yr	1.16 (95% CI, 1.05–1.27) (93)
Mood disturbances		
Depression (or other affective disorder)	4.3 yr	1.08 (95% CI, 1.02–1.15) (105)
Constitutional symptoms (*e.g.* fatigue, malaise, anorexia, abnormal weight gain, debility)	4.3 yr	1.17 (95% CI, 1.13–1.22) (105)

Data were extracted from studies on men treated for prostate cancer with androgen deprivation. Therefore, extrapolation to treatment of sex offenders has limited value. Adapted from E. J. Giltay and L. J. Gooren: Potential side effects of androgen deprivation treatment in sex offenders. *J Am Acad Psychiatry Law* 37:53–58, 2009 (43), with permission. © American Academy of Psychiatry and the Law.

[a] Observed among those receiving nine or more doses of GnRH agonist in the first 12 months after diagnosis of prostate cancer.

not only of serum testosterone but also of estradiol, predominantly the product of peripheral aromatization of androgens, and a complete suppression of testosterone will also result in low serum estradiol. Yet estrogens are important in the male (68, 69). They have favorable effects on skeletal growth and bone maturation (69), brain function (70), and cardiovascular physiology (71). Estimated risks of ADT are presented in Table 1. Suggestions for monitoring are presented in Table 2.

Bone mineral density and fracture risk

Commencement of ADT treatment in adult men with advanced prostate cancer produces rapid bone loss of a magnitude comparable to the depletion of skeletal integrity in women after surgical ovariectomy or early menopause. Within 1 yr the density of lumbar spine bone decreases by about 5–10% (72–74), with further bone loss thereafter. Also lean body mass decreases upon ADT (by about 5%), which may increase the risk of falls adding to the risk of fractures. Sex steroid deficiency resulting from treatment for prostate cancer will lead to microarchitectural decay, probably more closely linked to lack of testosterone than estradiol (75). Correlations between serum testosterone, estradiol, and SHBG have been demonstrated (76, 77), suggesting that beneficial effects on bone might result from less than complete suppression of testosterone.

A comparison of men with prostate cancer found that those who underwent ADT had a significant overall increased fracture risk of 23% [summary relative risk, 1.23; 95% confidence interval (95% CI), 1.10–1.38] compared with those who did not (78–80).

A recent study argues in favor of bone mineral density measurement and the use of alendronate in cases of osteoporosis before commencing ADT (81). Bisphosphonate treatments in men with hormone-sensitive prostate cancers slow bone resorption by their inhibitory effects on osteoclast activity effectively preventing bone loss associated with ADT, underscoring the importance of treating early to avoid this (82, 83).

TABLE 2. Recommended clinical assessment of men before the start of ADT and during follow-up

Risk assessment before the initiation of ADT
History taking: prior fractures, prior cardiovascular events, family history of osteoporosis and cardiovascular disease, alcohol consumption, and smoking habits
Rule out and/or treat affective disorders
Advise lifestyle modification, including weight-bearing exercise, healthy dietary pattern, and abstinence from smoking and excessive alcohol use
Physical examination: especially weight, height, waist circumference and blood pressure
Complete laboratory screening, with fasting glucose (to detect incident diabetes), lipid profiles, hemoglobin and hematocrit level
DEXA
Clinical assessment after the initiation of ADT
History taking and physical examination (at least every 6 months): especially check for signs and symptoms of weight gain, hypertension, hot flushes, depression, emotional disturbances, and other constitutional symptoms
Laboratory examination: fasting glucose, lipid profile, hemoglobin, and hematocrit level
DEXA (every 1 or 2 yr)

Adapted from E. J. Giltay and L. J. Gooren: Potential side effects of androgen deprivation treatment in sex offenders. *J Am Acad Psychiatry Law* 37:53–58, 2009 (43), with permission. © American Academy of Psychiatry and the Law. DEXA, Dual-energy x-ray absorptiometry.

Estrogens are probably more significant than androgens in maintaining bone mineral density (69, 84). Consequently, treatment that preserves the biological action of estrogens, such as bicalutamide (85), may be preferable in principle, although this will produce substantial gynecomastia due to unopposed estrogen action. However, there is no experience with drugs like bicalutamide in the treatment of sex offenders.

Selective estrogen receptor modulators with intrinsic estrogen activity (tamoxifen, toremifene) may be helpful (86). Denosumab is a fully human monoclonal IgG (2) antibody that binds to the receptor activator of nuclear factor-κB ligand (RANKL) and inhibits bone resorption due to RANKL-mediated osteoclastogenesis. In Europe, sc denosumab is indicated for cancer treatment-induced bone loss in men and in postmenopausal women with breast cancer (87, 88).

Metabolic effects: glucose and lipid metabolism

The risks of developing atherosclerosis from ADT have been reviewed (89–92), particularly in the advisory of the American Heart Association (93). Men undergoing ADT for prostate cancer show that within 3 months significant metabolic changes have occurred (43% increase in fat mass and 26% increase in insulin levels) (94, 95). More recently, visceral fat accumulation was more closely linked to testosterone than to estradiol, with insulin resistance as a secondary effect (96). ADT for prostate cancer generally takes place in elderly men, whereas the age range of sex offenders may be lower. In a 10-wk study of healthy lean men (23.2 $\pm$ 0.5 yr), suppression of testosterone by a GnRH analog was associated with a marked decrease in measures of whole body protein anabolism, decreased strength, decreased fat oxidation, and increased adiposity (97). Epidemiological prospective studies have examined the association between low testosterone levels in men and the subsequent development of diabetes type 2 over 7–10 yr. The odds of future diabetes were 1.58 for a decrease of 1 SD in free testosterone (4 ng/dl) (98). Low levels of testosterone are associated with the development of metabolic syndrome and diabetes in men. After 11 yr of follow-up, 147 of 702 men had developed metabolic syndrome, and 57 had diabetes. Men with total testosterone, calculated free testosterone, and SHBG levels in the lower fourth had a many times greater risk of developing metabolic syndrome and diabetes after adjustment for age (99). Another recent report came to a similar conclusion (100). The degree of suppression of serum testosterone may be an element in the development of metabolic syndrome and diabetes mellitus, and a nontotal suppression of testosterone may slow the occurrence of side effects of ADT.

As already pointed out in regard to bone mass, adding a selective estrogen receptor modulator like toremifene may help to reduce the negative effects of ADT treatment on serum lipids (101).

Statins lower blood low-density lipoprotein levels and reduce the risk of cardiovascular events serving as primary prevention. This has not only been found in patients with cardiac disease, but also in diabetics, in whom the first major cardiovascular events were reduced by 37% (102). Diet and physical activity may also be helpful in counteracting the effects of ADT (103).

Fertility

ADT leads to suppression of spermatogenesis. After hormonal regimens of male contraception, spermatogenesis recovers within 24 months of termination (104). Sperm cryostorage might also be offered.

Mood

Mood disturbance and depression are often associated with low androgen levels (105). Men receiving ADT may also experience decreases in cognitive function and self-esteem, as well as libido and sexual function (106, 107). For review, see Ref. 108. Aging and comorbid conditions may be codeterminants (109).

In the case of sex offenders receiving ADT, emotional disturbances, fatigue, memory difficulties, asthenia, lack

of drive and listlessness have been reported. The risk may be relatively small (56, 67) but should not be ignored. The effects of a depot of leuprolide acetate on mood have been tested in a double-blind, placebo-controlled trial in healthy men. Although testosterone levels were markedly suppressed, there were only slight increases in depressive symptoms on the group level, although a subgroup of men (10–15%) displayed clinically relevant increases (as assessed by the Beck Depression Inventory) (110). It is plausible that negative effects on mood induced by long-term hypogonadism are much more prevalent among sex offenders than in the selected group of healthy young men only treated for 4 wk. Presumably, mood disorders and depression will be diagnosed by the attending health professional, but it is pertinent to associate mood disorders with ADT.

Other complications

Hot flushes (and night sweats) occur, with varying intensity, in the majority (up to 80%) of men receiving ADT, which may reduce quality of life (67, 110, 111). Hemoglobin levels decline by about 10% (112, 113), usually not affecting health unless cardiac or pulmonary functions are marginal. ADT reduces sebaceous gland activity, which may lead to a dry skin and brittle nails (114). Itching and skin tears can be alleviated by topical application of moisturizing creams. Sexual hair growth decreases upon ADT (*i.e.* feminization) (67).

Potential other side effects encountered are migraine, leg (muscle) cramps, phlebitis, vertigo, elevation of blood pressure, gastrointestinal complaints, gall bladder stones, thromboembolic complications (deep vein thrombosis), tender breasts and, especially with the use of CPA, gynecomastia (115, 116).

Conclusion

ADT raises the threshold at which erotosexual imagery and sexual activity occur, and it may have a place in the treatment of unacceptable sexual behavior. ADT reduces recidivism when offered to sex offenders within a comprehensive context of psychotherapeutic treatment. It enables better control of sexual impulses. But unless it is provided on a voluntary basis, with respect for the basic human rights of the sex offender, ADT is a violation of physical integrity and is unethical. Sex offenders have the right to refuse ADT. As evident from the treatment of prostate cancers, ADT may have serious side effects that should be prevented or treated to ensure that they do not outweigh the positive aspects (43, 117, 118). At the very least, men about to undergo ADT should receive reliable information and counseling on its effects and be carefully monitored for any complications of treatment, including the effects already mentioned as well as fatigue, sexual dysfunction, hot flushes, and anemia. In the treatment of androgen-sensitive prostate cancer, intermittent androgen deprivation has been experimented with as a way of limiting side effects (119). It would be worthwhile to study whether this approach might work in sex offenders. Selective androgen receptor modulators are a class of androgen receptor ligands that bind to androgen receptors and display tissue-selective activation of androgenic signaling. If a compound could be developed that retains its anabolic effects on bone and muscle but selectively does not exert androgen effects on libido (the brain) (120), this would be an important step forward.

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