

responsible for the urticarial skin eruption that was the presenting symptom. Further clinical evaluation showed that the lymphocytic vasculitis also was responsible for the polymyositis that had been identified on physical examination and confirmed by serum enzyme levels. The cause of polymyositis, an inflammatory process affecting symmetrical skeletal muscle groups, is identified only in some patients.<sup>6</sup> Causative agents include adverse reactions to ingestants, autoimmune diseases, malignant neoplasms, sarcoidosis,<sup>7,9</sup> and vasculitis.<sup>10</sup> Although our patient had well-documented sarcoidosis in the past, our clinical, serologic, and histologic evaluation failed to provide any evidence of reactivation of her previous disorder. Thus, to our knowledge, this is the first reported case of a lymphocytic vasculitis producing both polymyositis and urticarial skin lesions.

The differential diagnosis of a lymphocytic vasculitis includes autoimmune diseases, infections, malignant neoplasms, adverse reactions to ingestants, and inflammatory disorders of unknown origin (Table 2).<sup>11-15</sup> When the cause of lymphocytic vasculitis is known, the underlying cause should be removed or treated. Patients such as the one reported here with an unidentified etiologic factor frequently require treatment with anti-inflammatory medication, which may include corticosteroids, azathioprine, and cyclophosphamide. When these medications are used, the lymphocytic vasculitis is usually well controlled.

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## Impotence Related to Anabolic Steroid Use in a Body Builder Response to Clomiphene Citrate

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THE RECREATIONAL USE of anabolic steroids has become commonplace among athletes.<sup>1,2</sup> Exercise enthusiasts frequently subscribe to information from such sources as the "Underground Steroid Handbook"<sup>3</sup> and self-design illicit drug therapy, including the use of human chorionic gonadotropin (hCG), clomiphene citrate (Clomid), and tamoxifen citrate, to counter the side effects of gynecomastia and reduced testicular volume. Despite this apparent drug sophistication, not only can these persons have a psychological dependence on the anabolic steroids,<sup>4,5</sup> but hypogonadotropic hypogonadism that lasts for months<sup>6,7</sup> to years<sup>8</sup> may also develop.

The case presented here illustrates the degree of drug knowledge among body builders, the psychosocial dependence on these drugs, and the potential of clomiphene<sup>9</sup> in treating the disorder of pituitary-gonadal failure in such persons.

### Report of a Case

The patient, a 29-year-old man, had impotence and decreased libido for a year. He is a college student and a competitive body builder who had used anabolic steroids for eight months (January to August 1992), alternating 16-week cycles of testosterone cypionate (Depo-Testosterone), 1,500 to 1,800 mg per week, and oxymetholone (Anadrol), 560 mg per week. After stopping the use of these drugs in August 1992, he was impotent with no spontaneous erections and had diminished libido. He completed a self-selected four-week trial of human chorionic gonadotropin (hCG) in September 1992 without any change in libido and no improvement in potency. The dose of hCG is unknown, and the patient denied any previous use of the drug. He was advised by colleagues to take a course of clomiphene or await the spontaneous return of sexual

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(Bickelman C, Ferries L, Eaton RP: Impotence related to anabolic steroid use in a body builder—Response to clomiphene citrate. *West J Med* 1995; 162:158-160)

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This research was supported by the General Clinical Research Center and National Institutes of Health National Center for Research Resources grant 5 M01 RR00997.

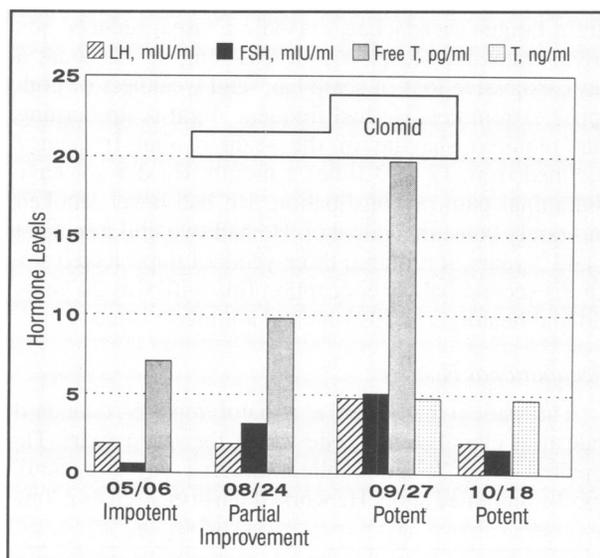
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**ABBREVIATIONS USED IN TEXT**

FSH = follicle-stimulating hormone  
 Gn-RH = gonadotropin-releasing hormone  
 hCG = human chorionic gonadotropin  
 LH = luteinizing hormone

function. He elected to wait for nine months, without success.

He sought endocrine consultation in July 1993, almost a full year after his last steroid dose, because of continued impotence and reduced libido. On examination he was robust, weighing 76 kg (168 lb), height 178 cm (5 ft 10 in), appearing healthy, and was heavily muscled. He had a reduced testicular volume of 10 ml on both sides and 2 cm of gynecomastia on both sides. A urine screening test for exogenous anabolic steroids was negative for 19 steroids or metabolites, including danazol, fluoxymesterone, methyltestosterone, 19-nortestosterone, oxymetholone, and stanozolol, as well as the diuretic probenecid. An adrenocorticotropic hormone-stimulation test showed a normal rise in the cortisol level from 360 to 830 nmol per liter (13 to 30  $\mu$ g per dl). Magnetic resonance imaging with gadolinium enhancement revealed a normal pituitary gland. Serum gonadotropin and free testosterone levels were abnormal, however, as shown in Figure 1, with a follicle-stimulating hormone (FSH) level of 0.6 mIU per ml (1.6 to 17.8 mIU per ml), a luteinizing hormone (LH) level of 1.9 mIU per ml (1.4 to 11.1 mIU per ml), and a free testosterone level of 7.1 pg per ml (19.0 to 41.0 pg per ml).



**Figure 1.**—The 5-month course of response to Clomid (clomiphene citrate) is represented by serial plasma levels of pituitary gonadotropins (luteinizing hormone [LH] and follicle-stimulating hormone [FSH]), gonadal free testosterone (Free T), and total testosterone (T). The associated improvement in sexual potency is seen to parallel the rise in free and total testosterone levels in response to Clomid therapy.

Treatment was initiated with clomiphene, 50 mg orally per day, and after a month of therapy he had noticed no improvement in potency or libido, although he had begun having morning erections. Serum hormone tests showed moderate improvement in FSH, LH, and free testosterone levels, although not in the normal range (Figure 1). A month after taking a double dose of clomiphene (100 mg per day), the patient reported an increase in libido and potency, and he was able to have sexual intercourse daily. His gonadal volume was unchanged, although serum FSH, LH, and free testosterone levels had reached normal for his age (Figure 1). After clomiphene therapy was discontinued three weeks later, the serum FSH and LH levels fell to normal, and the total serum testosterone remained at a normal level of 16.3 nmol per liter (4.7 ng per ml) (range, 12.5 to 34.5 nmol per liter [3.6 to 9.9 ng per ml]). This response suggested a restoration of normal hypothalamic-pituitary-gonadal function, and it was proposed to reevaluate this function with a longer follow-up to determine whether the correction was sustained.

Follow-up of the patient six months later revealed that he had returned to the illicit use of Depo-Testosterone at 400 mg per week to achieve a level of sexual performance three times that achieved with clomiphene alone. He noted that his testes were smaller, and he was considering trying another course of hCG in combination with tamoxifen to prevent worsening gynecomastia.

## Discussion

The illicit use of anabolic steroids is becoming more widespread, especially among those involved in competitive athletics or body building and even among teenagers.<sup>10</sup> Even when gonadal dysfunction occurs, persons often continue using the anabolic steroids, in part because of the neuropsychiatric effects, which include psychotic symptoms, affective syndromes, increased aggression, and psychological dependence.<sup>4,11</sup> In lay literature, it is common to find medical discussions and advertisements concerning anabolic steroids, androgen supplements, and agents used to combat the side effects of gynecomastia, hirsutism, fluid retention, and acne (*MuscleMag International*, September 1994, pp 280-281).

Most synthetic anabolic steroids have some androgenic effects that inhibit gonadotropin-releasing hormone (GnRH) release from the hypothalamus and FSH and LH release from the anterior pituitary. This results in a hypogonadotropic state, and if the agents are used for a prolonged period, testicular atrophy with reduced serum testosterone levels results, causing reduced libido and impotence. When their use is discontinued, the feedback inhibition of GnRH, FSH, and LH synthesis and release is removed and the hypogonadotropic hypogonadism is expected to resolve. According to the literature reports,<sup>5,7</sup> this usually occurs within four months. Only two cases have been reported in which suppression of the hypothalamic-pituitary-testicular axis lasted

longer than four months.<sup>7</sup> The first of these patients was administered hCG, and the outcome was determined to be successful when his wife conceived. The second patient presented with decreased libido three years after his last use of anabolic steroid and was found to have a severely blunted response to a GnRH-stimulation test, consistent with hypothalamic-pituitary suppression.

The patient in the case reported here is unique not only in the year-long suppression of his hypothalamic-pituitary-gonadal axis, but also in the successful response to hypothalamic-pituitary stimulation with clomiphene. Although we do not know his gonadotropin and testosterone levels before he began using steroids, it is unlikely he had a preexisting GnRH-deficiency state (such as Kallmann's syndrome) as he had normal secondary sexual development of phallus and hair distribution before initiating exogenous steroid use. We assume that he was compliant in abstaining from exogenous steroids during the treatment period, based on the negative drug screen and compliance with clomiphene administration. More frequent, random screening would be needed to confirm this assumption. The self-administration of hCG should have elicited a testosterone response, but it is uncertain whether he received true hCG in adequate dosage. Because he perceived the failure of a self-initiated hCG trial, we opted for the use of clomiphene at dosages commonly used in women with hypothalamic-pituitary-ovarian failure. Clomiphene use has previously been reported for the treatment of men who, during evaluation for infertility, are found to have marginal testicular failure or poor gonadotropin production.<sup>8</sup> Clomiphene appears to produce an antiestrogen effect on the hypothalamus that results in increased GnRH release. In addition, clomiphene exerts an estrogenlike effect on the pituitary, increasing pituitary sensitivity to GnRH.<sup>12</sup>

We propose that with the use of clomiphene we were able to augment the hypothalamic and pituitary responses to his low but not absent ambient estrogen derived by aromatization from testosterone. This is the first reported case of clomiphene-induced restoration of FSH, LH, and free testosterone levels in a man with recreational steroid-induced pituitary-gonadal failure.

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## Lead Poisoning in a Radiator Repairer

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MORE THAN 1.4 MILLION workers in the United States are at risk of exposure to lead in industries as diverse as radiator repair, construction, demolition, lead smelting, casting, foundry, and manufacture of stained glass or batteries.<sup>1</sup> Scientists have been aware of the toxic effects of lead since ancient times.<sup>2,7</sup> In 1978 this copious scientific knowledge led to the enactment of a comprehensive lead standard by the United States Occupational Safety and Health Administration (OSHA).<sup>6</sup> Unfortunately, compliance with this standard may be inadequate even today, as is exemplified by this urban case of lead poisoning in a radiator repairer.

### Report of a Case

The patient, a 26-year-old man, was seen because of slight fatigue, headaches, episodic nausea, reduced sex drive, excessive sleepiness (for as long as 12 hours a day), excessive loss of scalp hair, and weakness of both upper extremities. He had frequent slight scalp burning that required shaving of the scalp. Coital frequency declined from 12 to 3 times a month. He did not have abdominal pain or constipation. He had never smoked and rarely consumed alcohol. He had two children aged 1 and 7 years; it required three years of unprotected sex for his second baby's conception (his wife was 24 years old and healthy). In 1991 he had a ureteral stone.

### Occupational History

The patient had been a radiator repairer (standard industrial classification code 7539) for seven years. He repaired 15 to 20 automobile radiators a day in a small, poorly ventilated shop. He worked unsupervised as a lone

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(Lohiya GS, Lohiya S: Lead poisoning in a radiator repairer. *West J Med* 1995; 162:160-164)

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This work was supported in part by the California State Compensation Insurance Fund, Santa Ana, California.

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