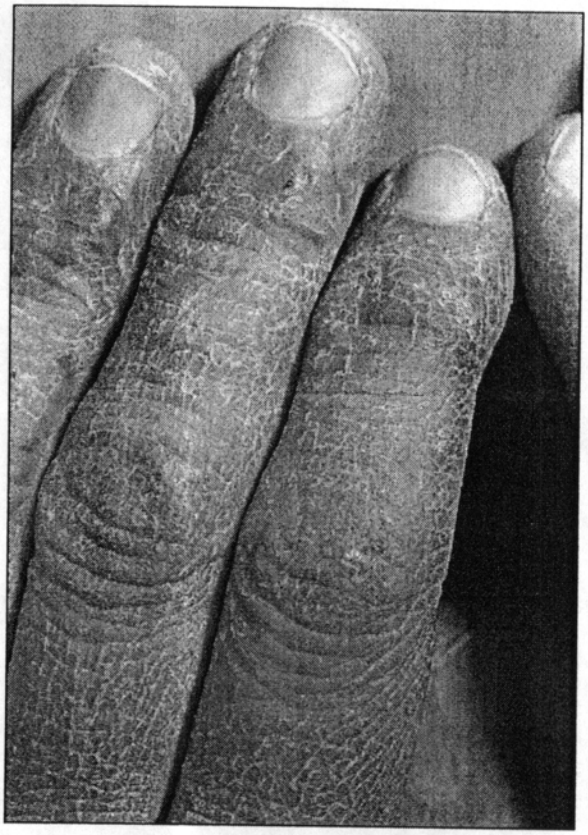

Figure 1. Dry hand with an ichthyosiform appearance after thoracoscopic sympathectomy and additional self-treatment with tanning hand baths.

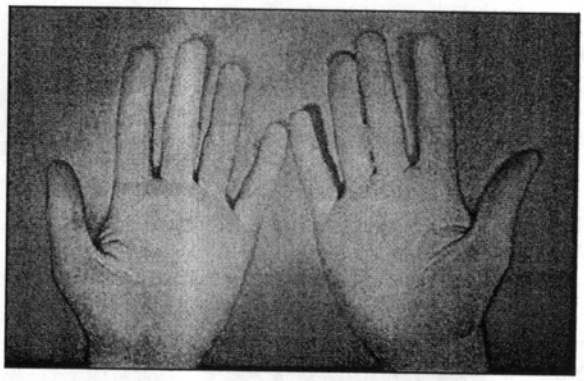

Figure 2. Minor iodine starch test to make palmar sweat production visible demonstrates virtual anhidrosis.

depression as a reaction to a chronic somatic disease.[4] Body dysmorphic disorder is defined as a disturbed body image resulting in an unreasonable concern about appearance and an extreme lack of self-confidence and self-identity[5]: the patient suffers from a psychiatric illness with nonexistent somatic manifestations. The psychcopathological characteristics of patients with EHH can be divided into 3 subgroups: type 1, patient with objectifiable EHH due to psychosomatic disorder; type 2, patient with objectifiable EHH with secondary psychiatric reaction as a consequence of chronic skin disease (sociophobia, depression, anxiety); and type 3, patient with BDD without any objective symptoms of EHH.

Our patient clearly is classified as type 3, with a nonexistent hyperhidrosis, typically complaining of skin problems that show no significant objective dermatological pathology on examination (hyperhidrosis). Very characteristic for the diagnosis of BDD is the futile attempt to persuade the patient to seek appropriate psychiatric treatment. His obsessional demand for botulinum toxin treatment can be described as "botulinophilia." While treatment of a objectifiable hyperhidrosis can cure psychological distress such as pseudophobia, social phobia, or anxiety, patients with BDD must be protected from invasive treatment and need psychiatric treatment. The dermatologist or the general practitioner plays the most important role as an initial filter to distinguish patients with type 1 or 2 from patients with type 3 EHH. Gravimetry and Minor iodine starch tests are indispensible to assess hyperhidrosis before any treatment, particularly when surgical treatment or botulinum toxin injections are planned.

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Definition of Axillary Hyperhidrosis by Gravimetric Assessment

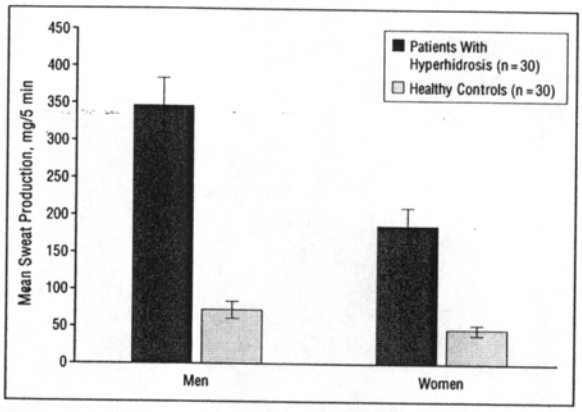
Essential focal hyperhidrosis is characterized by excessive sweating of certain body areas, particularly axillae, palms, and soles.[1,2] So far, no attempt has been made to define axillary hyperhidrosis by quantification of the sweat production over time in a given area. We therefore used gravimetric assessment to compare the sweat production of healthy control subjects with that of patients with disabling axillary sweating.

Subjects and Methods. The axillary sweat production was measured gravimetrically in 60 untreated patients (30 men and 30 women) with the diagnosis of essential axillary hyperhidrosis. Thyroid dysfunction and diabetes mellitus were excluded. Sixty healthy volunteers (30 men and 30 women) served as controls. Patients and controls did not take drugs known to affect sweating. To further minimize the influence of external variables, we chose control sub-

Data of Patients With Hyperhidrosis and Controls*

Characteristic	Men		Women	
	Hyperhidrosis	Controls	Hyperhidrosis	Controls
Age, y	31.5 (18-55)	29.9 (18-62)	27.9 (18-47)	28.6 (19-42)
Body mass index, kg/m²	25.5 (19.2-32.9)	23.5 (18.2-46.3)	21.9 (18.2-29.3)	22.2 (18.3-37.2)

*Data are given as mean (range).



Mean sweat production in men and women with axillary hyperhidrosis vs male and female controls. Error bars indicate SEM.

jects similar to the patients in age and body mass index (**Table**).

Gravimetric assessment was conducted after 15 minutes at rest in a sitting position. All tests were performed in the same room at a room temperature of about 25°C at a randomly chosen time of day but at least 2 hours after food intake. The axillae were thoroughly cleaned with an absorbent paper before gravimetry. A 90-mm-diameter round filter paper (Whatman International Ltd, Maidstone, England) was weighed with a microbalance (Sartorius BP 121 S; Sartorius AG, Göttingen, Germany), and the weight recorded. Subsequently, a plastic bag was put under the filter paper, which was placed under the axilla, to avoid evaporation of sweat. After 5 minutes, the round filter paper was reweighed, and the difference between the 2 weights was taken as sweat production in milligrams over 5 minutes. We performed successive gravimetric measurements for both axillae. The mean was taken for statistical analysis (Statistica 5.5A; SPSS 10.0 for Windows, SPSS Inc, Chicago, Ill).

Results. As shown in the **Figure**, the male patients with hyperhidrosis produced a mean±SEM of 346.0±37.1 mg of sweat per 5 minutes, which was almost 5 times the amount of male controls (72.0±11.7 mg per 5 minutes) ($P<.001$). Sweat production in female patients with hyperhidrosis (186.8±23.8 mg per 5 minutes) exceeded the amount of female controls (46.0±6.8 mg per 5 minutes) by more than 4-fold ($P<.001$). Male hyperhidrosis patients produced almost twice the amount of sweat that female patients did ($P<.001$). There was no significant difference in sweating between the right and the left axillae in both patients and controls.

Sweat production exceeded 100 mg in 29 (97%) of 30 male patients and 50 mg in 29 (97%) of 30 female patients with axillary hyperhidrosis. Twenty-two (73%) of 30 values in the control group of both sexes were below these limits.

Comment. The overlap between patients and controls may be caused by intraindividual variation of axillary sweat production at different times, which was not assessed in this study. Moreover, the individual disability caused by a raised but not excessive axillary sweat production is certainly varying. Therefore, no definite cutoff value that clearly distinguishes patients with hyperhidrosis from normohidrotic individuals can be given. On the other hand, as patients with hyperhidrosis tend to sweat much more than healthy persons, hyperhidrosis has to be regarded as a true disease. In most instances, the patient's perception of increased sweating can be objectified by gravimetry.

That men with hyperhidrosis produce twice the sweat that women with hyperhidrosis do may be caused by a larger area of close-set sweat glands in men. However, other mechanisms such as endocrine or autonomic influences are also likely to contribute to the difference.

There have been no studies quantifying axillary sweat production in patients with hyperhidrosis vs healthy controls to define a cutoff value for disease definition. Most studies on focal hyperhidrosis are clinical trials on the efficacy of a certain treatment, particularly botulinum toxin therapy, providing only measurement values before and after treatment.[3] In other publications, gravimetric measurement is done under different conditions,[4] or results obtained from different locations of focal hyperhidrosis are combined.[5]

In conclusion, gravimetric assessment of axillary sweat production proved an appropriate tool to objectify axillary hyperhidrosis. We suggest a minimum sweat production of 100 mg per 5 minutes in male and 50 mg per 5 minutes in female patients with hyperhidrosis as suitable values to identify patients with axillary hyperhidrosis. In addition to the quantification of sweat production, personal embarrassment and individual impairment of the quality of life associated with excessive sweating must enter into the definition of essential axillary hyperhidrosis.

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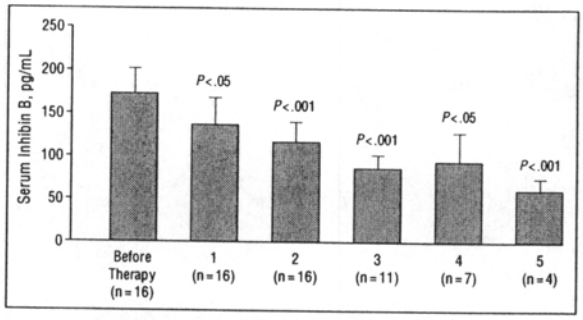

Figure 1. Mean±SEM inhibin B serum levels in men with malignant melanoma during therapy with interferon alfa-2b. Numbers represent number of examination after initiation of therapy; examinations were made in intervals of 2 to 12 weeks (mean, 8 weeks).

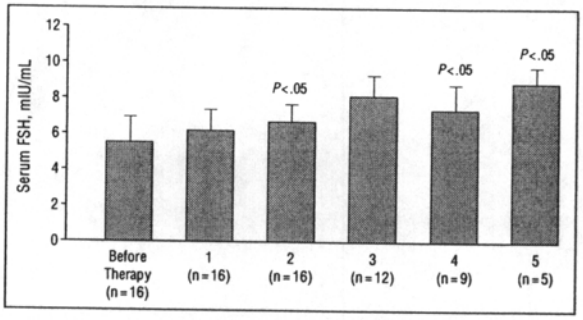

Figure 2. Mean±SEM follicle-stimulating hormone (FSH) serum levels in men with malignant melanoma during therapy with interferon alfa-2b. Numbers represent number of examination after initiation of therapy; examinations were made in intervals of 2 to 12 weeks (mean, 8 weeks).

Endocrinologic Changes in Male Patients With Melanoma During Interferon Alfa-2b Therapy

Chronic and malignant diseases have been shown to affect gonadal hormone secretion.[1,2] There are only limited data about endocrinologic changes in male patients with melanoma. Meikle et al[3] reported reduced production of testosterone in men with metastatic renal carcinoma or melanoma during therapy with interleukin 2. In contrast, interferon alfa seems to have no effects on the testes of men with hematological diseases or hepatitis C.[4]

Patients, Materials, and Methods. Serum samples were obtained from 15 men (mean age, 55 years; range, 23-82 years) with malignant stage II-IV melanoma before treatment and at intervals of 2 to 12 weeks during therapy. Patients were treated with interferon alfa-2b, 20 million IU/d intravenously during the first week, 10 million IU/d subcutaneously for the next 3 weeks, followed by 3×3 million IU/wk subcutaneously. The duration of treatment was up to 56 weeks. Four patients showed progression of cancer during therapy.

Serum samples were frozen at –20°C until measurement of inhibin B, follicle-stimulating hormone (FSH), luteinizing hormone, and testosterone.

Results. Inhibin B concentration (mean±SEM) before therapy started at 171.3±30.0 pg/mL, with a time-dependent, statistically significant decline during therapy (**Figure 1**). This decrease was still significant after patients with progression of melanoma disease had been excluded from analysis. Follicle-stimulating hormone values before therapy were normal (range, 0.7-11.1 mIU/mL) (**Figure 2**). During the first 5 months of therapy, these values did not change significantly; however, 5 months later, FSH concentrations increased markedly ($P<.05$).

Luteinizing hormone and testosterone serum levels did not show significant changes.

Comment. Most of our outpatients with malignant melanoma show reduced libido during therapy with interferon alfa-2b. However, the findings of the present study did not reveal increased prevalence of hypogonadism in these patients. The decreased libido is more likely dependent on psychosomatic factors related to the cancer disease. In contrast to testosterone, inhibin B levels were significantly reduced during therapy. Inhibin B is a peptide hormone produced by Sertoli cells. Therefore, decreased inhibin B levels indicate testicular damage with reduced spermatogenesis. Serum levels of this hormone are negatively correlated with those of FSH.[5] The average inhibin B values of our patients before treatment with interferon alfa-2b were subnormal. This may be due to 2 reasons. First, low inhibin B levels may reflect reduced spermatogenic activity in older patients (mean age of examined patients, 55 years). Second, testicular function in patients with malignant melanoma may be already impaired prior to therapy. It is remarkable that despite the exclusion of patients with tumor progression, the decrease of inhibin B concentration was still statistically significant.

Changes in inhibin B concentrations started earlier than the increase of FSH values. Therefore, our study also demonstrates that inhibin B as a marker of Sertoli cell function is more sensitive than FSH. It seems to be more useful to determine levels of inhibin B rather than FSH in studies investigating the effects of various hazards on testicular function.

Further investigations including semen analysis must be performed. If there is evidence of spermatogenic failure caused by interferon therapy, semen cryoconserva-