in "CLINICAL PSYCHONEUROENDOCRINOLOGY IN REPRODUCTION"
L. Zichella, P. Pancheri, ed.
Academic Press (N.Y.), 1978,
301-319,

A PSYCHONEUROENDOCRINOLOGICAL STUDY OF ERECTILE "PSYCHOGENIC IMPOTENCE": A COMPARISON BETWEEN NORMAL PATIENTS AND PATIENTS WITH ABNORMAL REACTION TO GLUCOSE TOLERANCE TEST

J. J. Legros,[1]* C. Mormont[2] and J. Servais[2]‡

[1] *Neuroendocrine Laboratories, Department of Clinical Pathology, Radioimmunoassay Laboratory, University of Liège, and*
[2] *Department of Psychiatry, Faculty of Medicine, University of Liège, Belgium*

SUMMARY

Neuroendocrine profiles of 88 patients suffering from "psychogenic" erectile impotence have been studied.

Using the oral glucose tolerance test (OGTT), 30 (34.1%) of these patients were found to be "pre-diabetic". In these 30 patients, testosterone blood levels were lower and LH levels higher than in the other group. We discuss the physiopathology of impotence in the men with mild glucidic abnormalities. The patients with normal OGTT can be divided into 3 subgroups, 2 of which show endocrinological evidence of hypothalamo-hypophysio-gonadal dysfunction. The understanding of the physiopathology of these groups remains completely unexplained and requires further investigations.

INTRODUCTION

Sexual erectile impotency is thought to be psychogenic in more than 90% of cases. However, recent data indicate that 44.8% of patients suffering from so-

called "psychogenic impotence" had an abnormal glucose tolerance test (Deutsch, unpublished data cited in "Diabetes Outlook", 1976). Since impotency is found in 37–55% of diabetic males and recent studies have revealed changes in autonomic nerve fibers of the corporosa caverna in impotent patients with overt diabetes (Faerman *et al.*, 1974), we found it interesting to compare the neuroendocrine and psychological status of patients with no glucose abnormalities with those of patients having a mild disturbance in glucose tolerance.

Furthermore, we were searching for any relationship between various psychological traits and androgenic or prolactinic functions, since these two hormonal systems are quite likely to play a rôle in sexual dysfunction in the male.

MATERIAL AND METHODS

Patients

One hundred and one men were examined for a period of ±3 years (1973–1976); they were all referred to a sexologist (J. S., psychosomatician) for investigation and treatment of "psychogenic impotence" by their general practitioner. Hence patients with known organic sexual insufficiency (overt diabetes, renal insufficiency, vascular disease, etc.) were not included in this study.

They were all examined clinically by an intern (J. J. L.); a had a routine basal biological check (S. M. A. 12., similar to that described by Legros *et al.* (1975) and lipidogram) and endocrine levels were measured (urinary 17-OH, blood PBI, T_7, cortisol, prolactin (HPr), GH. This enabled us to eliminate 13 patients with clear-cut organic disease: 4 with peripheral hypothyroidism, 2 with prolactin adenoma (1 with enlarged sella turcica), 2 with central neuropathy, 2 with overt diabetes, 1 with vasculopathy, 1 with mild kidney insufficiency and 1 with hemochromatosis.

Endocrine Investigations

1) For each patient, body weight was expressed as a percentage of the mean o the US population according to height and age (Metropolitan tables).

2) The oral glucose tolerance tests (OGTT) were done using 100 g glucose. Bl samples were taken just before glucose ingestion (time 0) and then at 30 min, 60 min and each hour for 4 h. Blood glucose was estimated using an Auto-technicon analyser; immunoreactive insulin and growth hormone (GH) were measured routinely by radioimmunoassay (RIA) on each serum. The criteria described by Lefebvre and Luyckx (1974) were used to define those patients with an abnorma tolerance curve (blood glucose > 1.6 g/l at the peak and > 1.2 g/l at after 2 h): individuals with only one of these abnormalities were considered as abnormal. This test was done some days or weeks before the neuroendocrine tests.

3) Neuroendocrine tests were made at 8 a.m. in ambulatory, fasting patients in the metabolic ward.

Urine from the preceding day (24 h) was collected in order to estimate the levels of 17-ketosteroids (Henry and Thevenet, 1953), 17-OH steroids (Vivario

al., 1954), free cortisol (Dash *et al.*, 1975) and estrogen excretion (Outch *et al.*, 1972).

An indwelling catheter was used and samples were taken 15 min before, just prior to (at time 0) and 10, 20, 30, 45, 60 and 120 min after the injection of a mixture of TRH (Roche) (200 μg) and LRH (Hoechst) (25 μg).

Blood was allowed to clot at 4 °C, and plasma or serum were obtained after centrifugation. Testosterone (total immunoreactive testosterone, i.e. bound and free testosterone and dehydrotestosterone (DHT)) (Furyama *et al.*, 1971); free thyroxine index (Clark and Horn, 1965) and cortisol (Dash *et al.*, 1975) were measured in samples at −15 min and 0 time while TSH, FSH and LH were estimated in all samples; prolactin (HPr) was measured in the tests done in mid-1975.

After the test the patients had a 30-min rest, samples were taken again 15 min before, just prior to (time 0) and 10, 20, 30, 45, 60 and 120 min after the injection of insulin (0.1 I.U./kg body weight). Blood glucose and GH values were measured in all samples. In some cases, for practical reasons, not all the tests were made. All the hypophysial hormones were measured by radioimmunoassay (RIA) methods using C.I.S. kits. All drugs were stopped (except sometimes a mild hypnotic) for at least 1 month before the tests were made.

Psychological Investigations

A psychologist (C.M.) tested 49 patients using T.A.T., M.M.P.I., Rorschach and interviews within a month of the endocrine tests. In this study we will only analyse the "sexual interest" (M_F) and "depression" (D) score of the M.M.P.I.

Statistical Evaluations

Statistical comparisons were made using Student's "*t*" test for unpaired samples, two-tailed (2 *p*).

The total quantities of hormones released during the various endocrine tests were calculated with a computer using planimetry. The area corresponding to the mean of the two base levels was subtracted from the total surface.

RESULTS

Oral glucose tolerance was abnormal in 30 patients (34.1%) and normal in the other 58 (65.9%). This led us to divide the patients into two groups: normal OGTT (N) and chemical diabetes (D). The principal clinical characteristics in both groups of patients are given in Table I. The ages of the patients in both groups are similar, the trouble is primary in 1 patient in group D and in 5 patients in group N. In group N mean body weight is lower than in group D. The dynamic variation of blood glucose, insulin and GH blood levels are shown in Fig. 1, while statistical comparisons are given in Table II. Mean basal and stimulated blood-insulin are higher in group D than in group N. In the hypoglycemic phase of the test GH release is similar. Hence patients in group D behave as moderately obese males, with an increased insulin response.

The dynamic variations of FSH and LH blood levels during the LRH tests are

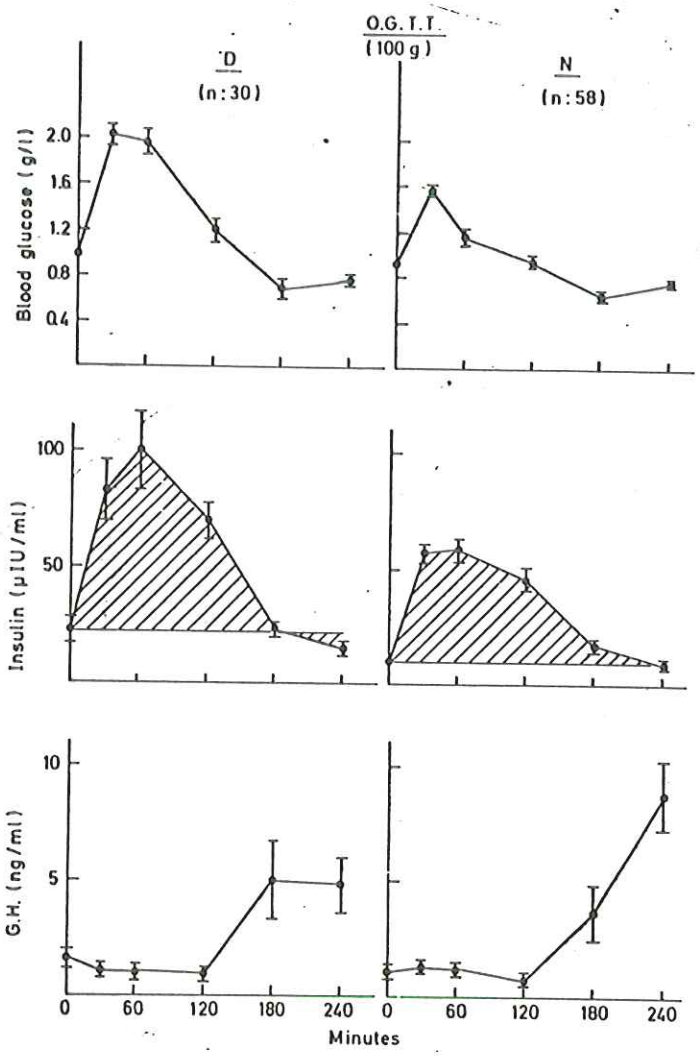

Fig. 1. Variations in levels of blood glucose, serum insulin and growth hormone (GH) during an OGTT in 88 patients suffering from "psychogenic impotence". Patients are devided into two groups according to their tolerance to glucose: D, abnormal tolerance; N, normal tolerance.

ble I. Main clinical features in 88 patients suffering from "psychogenic impo-ce" divided into two groups according to OGTT results: D, abnormal tolerance; normal tolerance.

	D	t	2p	N
n	30	-	-	58
%	34.1 %	-	-	65.9 %
PRIMARY IMPOTENCY	1 case			5 cases
AGE	44 ± 1.9	1.7	N.S.	39 ± 1.4
WEIGHT (% normal mean weight)	106 ± 3 %	3.6	< 0.001	94 ± 2 %

able II. Mean basal cholesterol, triglycerides and immunoreactive insulin and release of insulin in OGTT in 88 patients suffering from "psychogenic impotence". atients are devided into two groups according to their tolerance to glucose: D, normal tolerance; N, normal tolerance.

	D	t	2p	N
CHOLESTEROL (g /l)	2.5 ± 0.1	0.2	N.S.	2.5 ± 0.1
TRIGLYCERIDES (g /l)	1.8 ± 0.5	1.5	N.S.	1.2 ± 0.1
I.R. INSULIN (basal) (μ I.U./ml)	14.7 ± 1.6	2.8	<0.02	9.9 ± 0.9
I.R. INSULIN (release) (μ I.U./4 h)	9546 ± 1401	2.5	<0.02	6374 ± 80

Table III. Mean urinary estrogens, 17-ketosteroids, basal blood testosterone, LH, FSH and LRH-stimulated LH and FSH release in patients with "psychogenic impotence". Patients are divided into two groups according to their tolerance to glucose: D, abnormal tolerance; N, normal tolerance.

	D	t	2 p	N
Ur. ESTROGENS (mg/ 24 h)	16.1 ± 2.5	1.1	N.S.	21.2 ± 3.1
Ur. 17 KETO (mg/ 24 h)	10 ± 0.8	2.1	<0.05	13 ± 0.6
TESTOSTERONE (ng/100 ml)	470 ± 23	2.3	<0.05	575 ± 27
L H (BASAL) (m I. U. /ml)	5.5 ± 0.5	3.7	< 0.001	3.5 ± 0.3
L H (RELEASE) (m I. U. / 2 h)	970 ± 134	1.2	N.S.	82 ± 75
F S H (BASAL) (m I. U. /ml)	7.5 ± 0.9	1.5	N.S.	5.1 ± 0.6
F S H (RELEASE) (m I. U. / 2 h)	366 ± 73	0.6	N.S.	308 ± 49

shown in Fig. 2, while statistical comparisons of the gonadotropin function, urinary estrogens, 17-ketosteroids and basal plasma testosterone are given in Table III.

There is a significant decrease of 17-ketosteroids and testosterone in group D compared with group N. In contrast, basal LH is significantly higher in group D; basal FSH, FSH and LH release are always higher in group D than in group N: however, this is not significant. All the mean basal values obtained are within the range found in normal males using the same assay technique, but without control of either sexual potency or glucose tolerance (urinary estrogens: 4-40 mg/24 h; urinary 17-ketosteroids: 5-19 mg/24 h; plasma testosterone: 590 ± 170 ng/100 ml (2 S.D.); serum LH: 2.4 ± 1.8 mI.U./ml; serum FSH: 3.8 ± 2.2 mI.U./ml).

The other endocrine results are similar in both groups of patients, as is shown in Figs 3 and 4, and Tables IV, V and VI. GH release is slightly less in group D than in group N: this is presumably secondary to insulin resistance since minimum blood glucose values are less in group D, and since the same relationship between peak values GH and minimum blood glucose is noted in both groups (Table V).

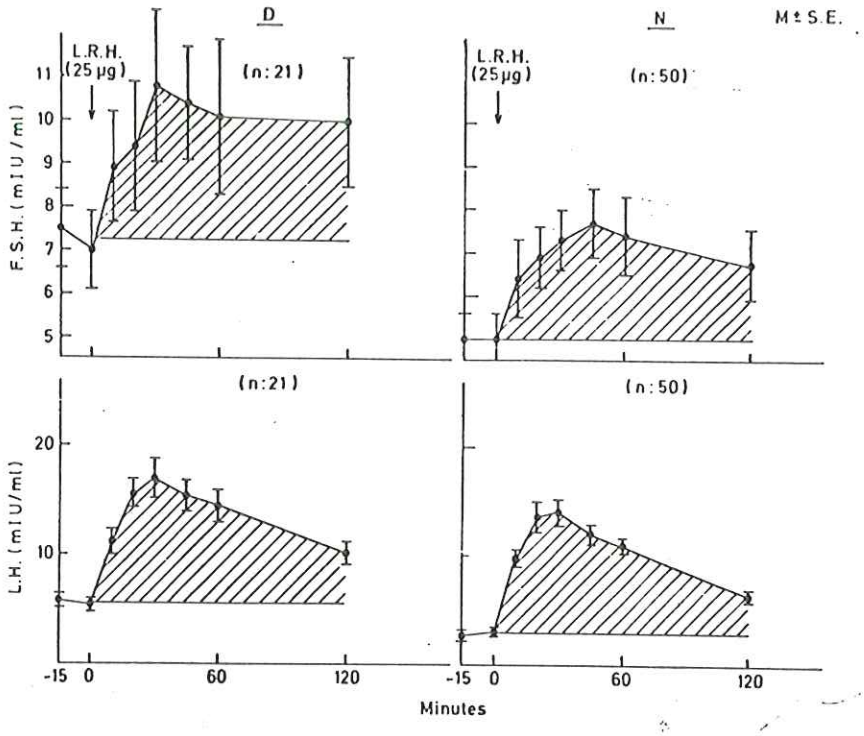

Fig. 2. Variations in levels of serum FSH and LH blood levels during the LRH (25 µg) stimulation test in patients suffering from "psychogenic impotence". Patients are divided into two groups according to their tolerance to glucose: D, abnormal tolerance; N, normal tolerance.

All the mean values obtained are within the range found in normal males using the same assay techniques, but without control of either sexual potency or glucose tolerance (serum TSH: 2.5 ± 1.3 mI.U./ml; serum HPr: 172 ± 52 µI.U./ml; serum GH: 4.2 ± 2.5 mg/ml; urinary cortisol: 50–150 µg/24 h; urinary 17-OH: 0.6–4.3 mg/g creatinine; plasma cortisol: 9–20 µg/100 ml).

In M.M.P.I. tests there are no differences between the two groups in either "depression" score: 62.7 ± 3.22 in group D (n: 18) and 59.7 ± 4.03 in group N (n: 30), or in the "sexual interest" score: 58.2 ± 1.8, group D (n: 18) and 57. 8 ± 1.5, group N (n: 30).

In group D we found a relationship between "sexual interest" and testosterone blood level (r: 0.43, $p < 0.05$) and, to a lesser extent, with 17-ketosteroid excretion (r: 0.32, $p < 0.1$). Such relationships do not exist in group N (Figs 5 and 6). There are weak, insignificant relationships between "depression" score and testosterone blood level (r: 0.29 and 0.28) and 17-ketosteroid excretion (r: 0.34 and 0.07) (Figs 7 and 8). There is no relationship between GH release and "depression"

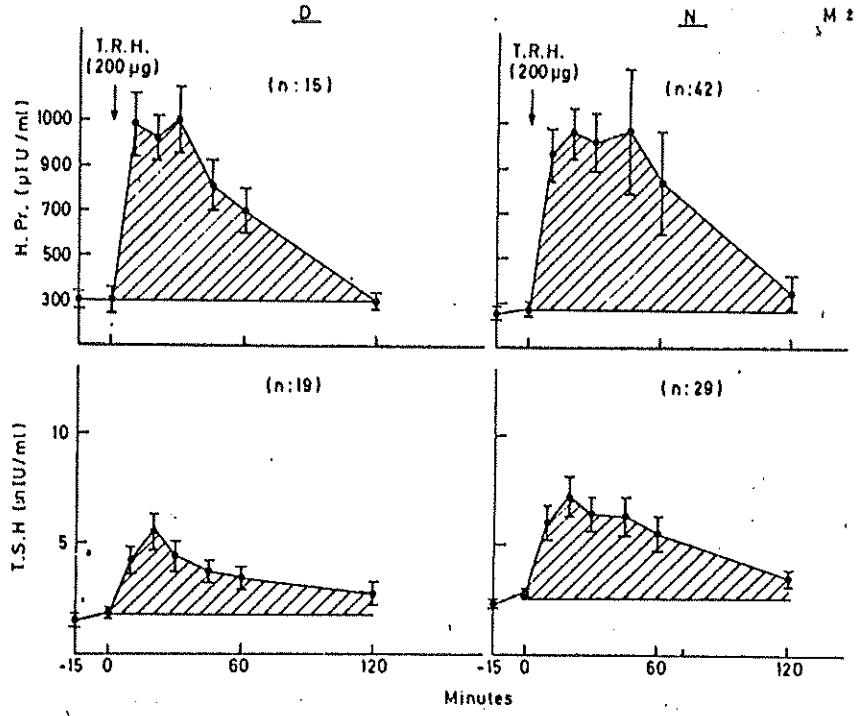

Fig. 3. Variations in levels of serum TSH and prolactin (HPr) during the TRH (200 µg) stimulation test in patients suffering from "psychogenic impotence". Patients are divided into two groups according to their tolerance to glucose: D, abnormal tolerance; N, normal tolerance.

Table IV. Mean basal free thyroxine index, TSH and HPr, and TRH-stimulated TSH and HPr release, in patients with psychogenic impotence. Patients are divided into two groups according to their tolerance to glucose: D, abnormal tolerance; N, normal tolerance.

	D	t	2 p	N
FREE THYROXINE INDEX	2.4 ± 0.1	0.01	N.S.	2.3 ± 0.1
T S H (BASAL) (m I. U. /ml)	2.4 ± 0.4	0.00	N.S.	2.3 ± 0.2
T. S H (RELEASE) (m I. U. /2 h)	236 ± 54	1.01	N.S.	340 ± 50
H Pr (BASAL) (µ I. U. /ml)	291 ± 40	1.1	N.S.	242 ± 24
H Pr (RELEASE) (µ I. U. /2 h)	49387 ± 7925	0.3	N.S.	59540 ± 16065

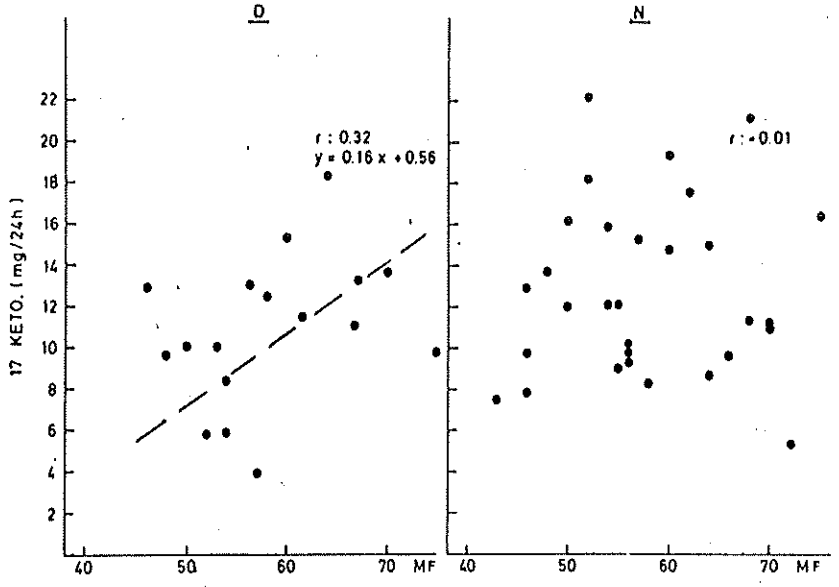

Fig. 6. Individual values of urinary 17-ketosteroids (ordinate) and M.M.P.I. "sexual interest" score (abcissa) in patients with "psychogenic impotence". Patients are divided into two groups according to their tolerance to glucose: D, abnormal tolerance; N, normal tolerance.

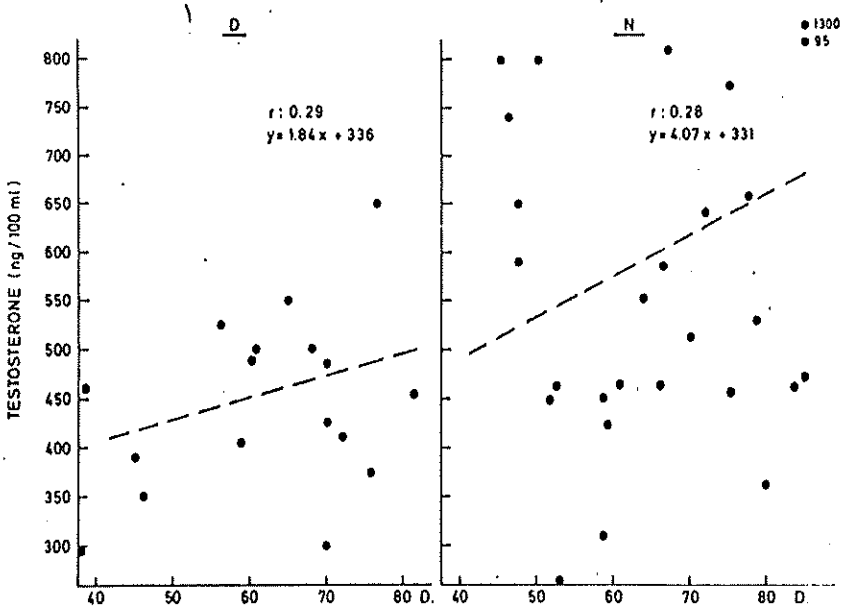

Fig. 7. Individual values of testosterone blood levels (ordinate) and M.M.P.I. "depression" score (abcissa) in patients with "psychogenic impotence". Patients are divided into two groups according to their tolerance to glucose: D, abnormal tolerance; N, normal tolerance.

Table V. Mean serum basal level and release of growth hormone during insulin-induced hypoglycemia in patients suffering from "psychogenic impotence". The mean minimum glucose value observed during the test is also indicated, together with the relationship between peak GH and the minimum glycemia value obtained in each patient. Patients are divided into two groups according to their tolerance to glucose: D, abnormal tolerance; N, normal tolerance.

	D	t	2p	N
G H (BASAL) (ng/ml)	1.3 ± 0.3	0.02	N.S.	1.3 ± 0.4
G H (RELEASE) (ng/2 h)	1516 ± 343	1.62	N.S.	1956 ± 187
MINIMAL BLOOD GLUCOSE (g/l)	0.29 ± 0.04	2.06	N.S.	0.19 ± 0.06
RELATION G H PEAK ↓ MINIMAL BLOOD GLUCOSE	$\frac{r = -0.63}{y = -76x + 41}$	—	—	$\frac{r = -0.63}{y = -67x + 43}$

Table VI. Mean basal urinary cortisol and 17-OH, and plasma cortisol, in patients with "psychogenic impotence". Patients are divided into two groups according to their tolerance to glucose: D, abnormal tolerance; N, normal tolerance.

	D	t	2 p	N
Ur. FREE CORTISOL (μg/24 h)	87 ± 20	1.5	N.S.	123 ± 15
Ur. 17 OH (mg/g creatinine)	3.7 ± 0.3	0.8	N.S.	3.3 ± 0.2
PLASMA CORTISOL (8 a.m.) (μg/100 ml)	16.1 ± 2.3	0.05	N.S.	15.1 ± 0.7

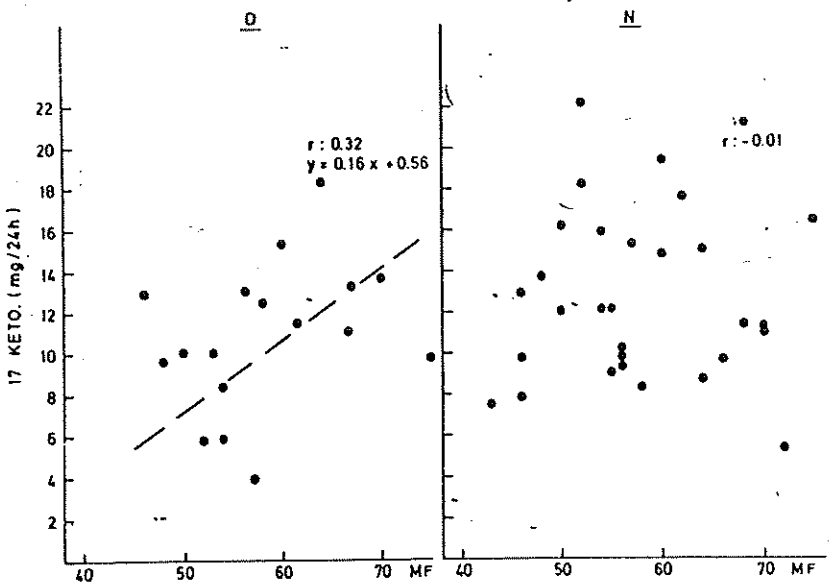

Fig. 6. Individual values of urinary 17-ketosteroids (ordinate) and M.M.P.I. "sexual interest" score (abcissa) in patients with "psychogenic impotence". Patients are divided into two groups according to their tolerance to glucose: D, abnormal tolerance; N, normal tolerance.

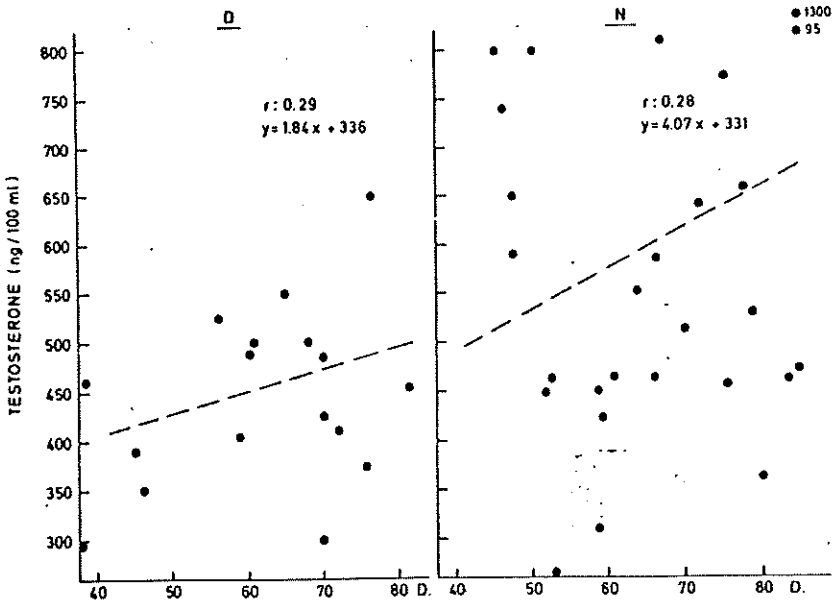

Fig. 7. Individual values of testosterone blood levels (ordinate) and M.M.P.I. "depression" score (abcissa) in patients with "psychogenic impotence". Patients are divided into two groups according to their tolerance to glucose: D, abnormal tolerance; N, normal tolerance.

DISCUSSION

In this study we found a high incidence of abnormal glucose tolerance tests in patients suffering from so-called "psychogenic impotence" since more than 30% of clinically normal males reacted abnormally to OCTT. Random tests in a normal population of similar age reveal ± 8% chemical diabetes (Lefebvre, Personal communication). One has to emphasize that we have excluded patients with abnormally high, fasting blood-glucose: this could account for the slight difference between Deutsch's results (± 40%) and ours.

The question then arises: is there some endocrine disturbance specific to patients suffering from chemical diabetes and, if so, is this trouble related to the sexual problem?

Here we provide clear evidence that there is a decrease in androgenic hormones (testosterone, 17-ketosteroids) in patients with mild glucose abnormalities when compared with patients without glucose intolerance. This decrease seems to be secondary to a testicular hypofunction since basal LH is higher than it is in the normal group. Hence our data contradict previous studies which found either no decrease of androgenic function (Faerman *et al.*, 1972; Jakubowski *et al.*, 1970) or hypogonadotrophic hypogonadism (Schoffling *et al.*, 1963) in patients with overt diabetes. Although the difference is not significant due to the dispersion of results, we have to point out the higher levels of FSH in the "pre-diabetic" groups. According to previous work (see Franchimont *et al.*, 1972) this finding reflects trouble with spermatogenesis. However, further tests are necessary to show testicular impairment, i.e. HCG stimulation test, spermogram and testicular biopsy. The first test is the only one accepted randomly by our patients; preliminary results indicate a failure to increase testosterone blood levels when compared to a series of patient with low testosterone and normal LH (presumed to be a result of hypothalamic dysfunction, see below). In some impotent males, Ismail *et al.* (1970) also noted a low excretion of urinary testosterone and a decreased response to HCG; OGTT were not performed in those patients.

The other antehypophysial functions, including the very sensitive somatotropin release, are similar in both groups of patients, which thereby excludes the possibility of one major deficiency in patients with chemical diabetes.

These endocrine findings, i.e. low testosterone and high LH and FSH are very similar, although less dramatic, than those we observed in 12 patients with overt diabetes (unpublished results). It is interesting to note that the biological findings were the same in both types of diabetes: insulin-dependent or insulin-resistant. As in the present study the findings were similar in the "obese" pre-diabetic subjects with hyperinsulinism (the majority of our patients: 27) and in 3 lean patients with an insulin hyporesponsiveness to glucose. It then appears that the overall endocrine picture is secondary in importance to the disordered glucose metabolism, whatever the cause.

The difference between testosterone plasma levels in the two groups of patients could explain the wide range of results in psychogenic impotence previously found by various authors: some claimed a mean decrease (Ismail *et al.*, 1970; Legros *et al.*, 1973a, b; Servais *et al.*, 1975), and some normal levels (Racey *et al.*, 1973; Benkert, Personal communication).

low levels similar to those we described previously (Legros *et al.*, 1973a, b). This could be due to the change of technique: formerly we used the time-consuming, but very specific, technique of gas–liquid chromatography (G.L.C.), while the present results were obtained by a radioimmunoassay, which measures dehydrotestosterone (DHT) as well as testosterone.

It remains to discuss whether the hormone trouble is associated with the sexual impotency and, if so, whether the erectile deficiency is due to the decrease in androgens. This could be answered by studying a control group of the same age, with chemical diabetes, but not suffering from sexual impotency. Such a study is problematical, not only in the recruitment of patients, but also in testing the controls' "normality" of sexual function. It is quite clear that similar sexual performances can be described as impotency by some patients and as normal activity by others, depending entirely on previous experience. Overcoming the problems in establishing a control group would also be useful for future studies on patients with normal glucose tolerance.

An answer can also be found from observing results of therapy: it is the opinion of one of us (J.S.) that endocrine treatment combining HCG and testosterone propionate is often more efficient than treatment with HCG alone. However, until now we have not compared the efficiency of endocrine therapy in the two groups of patients.

Examining the psychoendocrine correlation leads us to conclude that there may well be an association between sexual problems and high levels of androgens. Indeed, using two very different techniques (measuring plasma basal testosterone and urinary 24-h 17-ketosteroids) we found a relationship between the M.M.P.I. "sexual interest" score and hormonal status: a high rate of interest is seen in patients with normal or high levels of either blood testosterone or 17-ketosteroid excretion. However, in the classical interpretation of the M.M.P.I. M_F-score our findings would mean that patients with high testosterone levels exhibit more "feminine" behavior than do the others. At first glance this seemed contradictory, except if one admits that impotent men (with either vascular or neurological impotency, independant of testosterone blood levels) have a compensatory homosexual interest related to residual androgenic function. Moreover, our results are in agreement with data by Keith *et al.* (1974), who, using carefully matched methods, found higher testosterone blood levels in male homosexuals than in heterosexuals. In a recent study, one of us (Servais, 1976) also found that, of 320 men in consultation for psycho-sexual problems, 20.6% had a hyperandrogenic morphotype (established according to Decourt and Doumic), while only 8.1% of 210 men examined for "non-sexual" complaints had this biotype. Hence, patients with high androgenic function appear to have more sexual problems than the other patients. Interpreting the M_F score alone, however, is very difficult and a more sophisticated approach to rating sexual interest in the D group is presently made to confirm this hypothesis. It is also of interest to note that when studying the "depression" scale, similar correlation were found in *both* groups of patients, although they were very weak. This partly confirms previous results obtained in a group of 80 impotent males (without studying the OGTT) in whom it was observed that patients with normal or high testosterone levels are more depressed than are impotent men with low androgens (Legros *et al.*, 1975b). Although such a relationship is not confirmed by other studies (Sachar *et al.*, 1973), it seemed, however, that there again patients with light or normal levels of androgens are more "distressed" than others.

tressed than others.

If one acknowledges an association between sexual impotency and glucose disturbance it remains, therefore, to discuss the psychophysiopathogenesis of the former.

As summarized in Fig. 7, many possibilities can be put forward. Chemical diabetes could result in neurological and vascular changes in the genitalia which could lead, on the one hand, to erectile impotency and, on the other, to a decrease in the testicular endocrine function. The action of endocrine treatment and the relationship between M.M.P.I. "sexual interests" and androgens, however, prompt two indirect arguments favoring the hormonal insufficiency being directly responsible for sexual failure. The possibility that a decrease in the frequency of sexual intercourse is responsible for a drop in levels of blood testosterone is ruled out by comparison with patients of group N, many of whom have normal androgen blood levels. Moreover, the data on the influence of coitus on testosterone secretion are conflicting: some claimed there was a proportional increase (Ismail and Harkness, 1967; Fox *et al.*, 1972) and some found there was no influence at all (Raboch and Starka, 1973; Stearns *et al.*, 1973).

It is also possible that the primary trouble is psychogenic leading to a second-

Table VII. Neuroendocrine results in the group of patients with normal glucose tolerance test. They are divided into three sub-groups according to levels of basal FSH and blood testosterone (M ± S.E.)

	? TESTICULAR DYSFUNCTION (FSH > 6 mI. U.) (n : 14)	? HYPOTHALAMIC DYSFUNCTION (TESTO < 370 ng) (n : 19)	? TRUE PSYCHOGENIC IMPOTENCE (NORMAL) (n : 25)
TESTOSTERONE (ng/100 ml)	83.5 ± 6.4	409.6 ± 14.6	679.4 ± 37.5
L H (m I.U./ml)	7.12 ± 0.72	3.33 ± 0.39	2.92 ± 0.28
F S H (m I.U./ml)	11.07 ± 1.81	3.05 ± 0.28	3.24 ± 0.30
H Pr (n I.U./ml)	268.1 ± 54.3	182.37 ± 32.39	243.26 ± 33.8
L H RELEASE	1137.7 ± 225	667.8 ± 76.5	789.2 ± 95.6
H Pr RELEASE	78466 ± 27300	51793 ± 11851	45466 ± 9711
CORRELATION TESTO H Pr RELEASE	r : 0.02 (n : 7)	r : - 0.46 (n : 8) y = - 0.001 x + 466	r : 0.18 (n : 11)

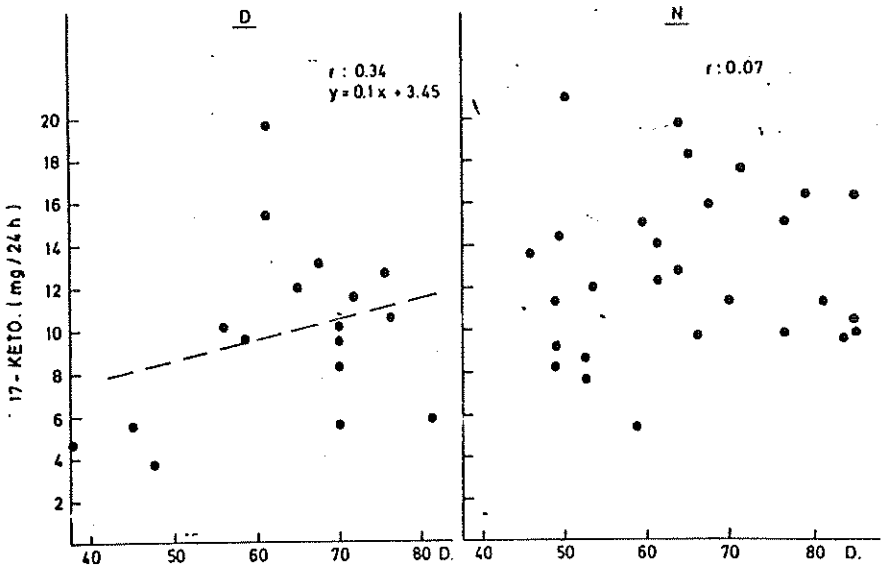

Fig. 8. Individual values of urinary 17-ketosteroids (ordinate) and M.M.P.I. "depression" score (abcissa) in patients with "psychogenic impotence". Patients are divided into two groups according to their tolerance to glucose: D, abnormal tolerance; N, normal tolerance.

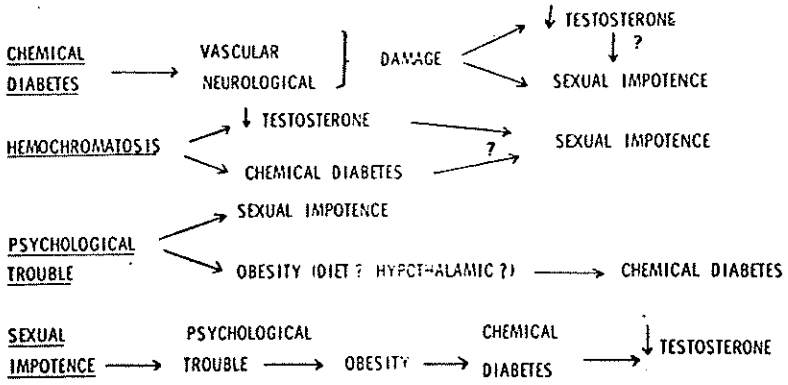

Fig. 9. Sexual impotence in patients with chemical diabetes (35% of patients): hypothetical psychopathogenetic pathways for sexual erectile impotence in patients suffering from "psychogenic impotence" and having an abnormal OGTT.

ary obesity which is itself, responsible for chemical diabetes. Contradicting this hypothesis is the presence of a similar endocrine panel in both lean and obese patients.

The incidence of primary hemochromatosis, frequent in the Celtic population (Simon, Personal communication), which could explain the simultaneous existence of *mild* glucose abnormalities (with insulin hypo- or hyper-responsiveness) and *mild* testicular deficiency, has to be ruled out. We have just begun to search for abnormally high, serum iron levels in patients with erectile impotency during

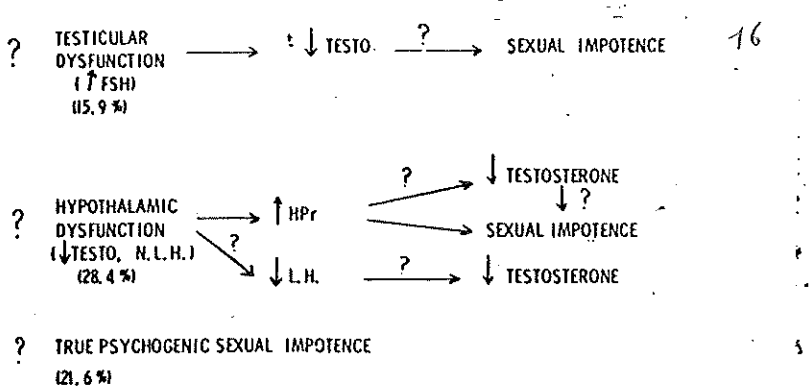

Fig. 10. Sexual impotence in patients with normal glucose tolerance (65% of patients): hypothetical psychophysiopathogenic pathways in patients with normal glucose tolerance test suffering from sexual impotence.

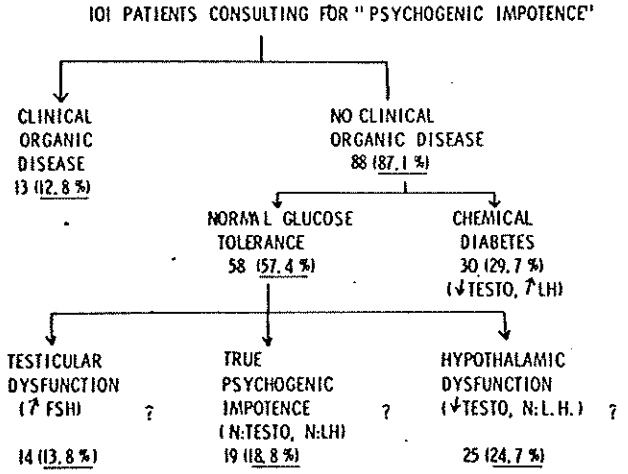

Fig. 11. Summary of the different disturbances found in 101 patients who consulting a psycho-somatician for "psychogenic sexual impotence" for a period of ±3 years.

the 3 last months (10 patients) and have found one with high levels of serum iron (250 μg/100 ml), abnormal OCTT and testicular deficiency. If a mild degree of primary idiopathic hemochromatosis is responsible for a part of our chemical and endocrine findings, then we could explain in part, the relatively high incidence of so-called "psychogenic impotence" in this part of Europe when compared to other countries, including the USA.

Whatever the cause of sexual impotence and the pathogenic relationship between it and chemical diabetes, our results emphasize the necessity to submit all impotent males to an OGTT. Indeed, even if both disturbances are independent, the finding of an abnormal OGTT indicates the need for a new diet which would in any case, be favorable for the patient in the future.

When the patients with normal OGTT are considered as a whole there are

neither specific clear-cut endocrine abnormalities nor psychoendocrine relationships. However, it seemed that this group can be divided into 3 sub-groups (see Table VII).

Among the 58 patients studied, 14 had basal FSH levels higher than 6 mI.U./ml which could indicate a decrease in spermatogenic function. This testicular defect is indirectly confirmed by higher LH release during LRH stimulation ($2\ p < 0.02$), which might mean that a normal testosterone level is achieved in these patients by an increase in LH synthesis. A spermogram was made in four of these patients which confirmed an oligospermia in all cases. It remains, however, to test whether this testicular trouble is related to sexual impotency.

Among the 44 remaining patients, 19 had basal testosterone values lower than 470 ng/100 ml; the mean LH basal level, LH release and prolactin release was no different to that in the patients with normal testosterone levels. However, in 8 patients from this group, in whom all the neuroendocrine tests were made, there was an inverse relationship between HPr release and testosterone blood levels. Although this should be confirmed using a greater number of test cases, it could mean that the hypothalamus of some patients are more sensitive to normal levels of prolactin than those of normal individuals. One could also speculate that a hypothalamic inhibition of psychological origin induces a decrease in the spontaneous LH release (responsible for a decrease in testosterone blood levels) and a related increase of hypophysial HPr content. In this group the relationship between HPr and LH is further confirmed by a positive relationship (r: 0.53, n: 8) between LH and HPr release; such a relation does not exist in the other groups.

In this respect the hypothalamic trouble could be a secondary factor compared to psychological disturbances; sexual impotence would then be a real psychosomatic symptom, as we have previously discussed (Servais *et al.*, 1975). However, one has to emphasize that the positive relationship between LH and HPr release could also be secondary to *peripheral* competition between these two hormones. Hence, further experiments will be necessary to elucidate the mechanism of the trouble with LH-testosterone feedback in these patients.

Lastly, no abnormalities could be found in 25 patients, who suffered from what we could term "true psychogenic impotence". However, we should stress here that the discovery of either chemical diabetes or testicular deficiency does not necessarily exclude an independent "true psychogenic impotence".

Further experiments are now in progress using the assays for free plasma testosterone, plasma estrogens and more sophisticated psychological ratings.

CONCLUSION

Using an oral glucose tolerance test we have shown that 34.1% (30 cases) of patients with so-called "psychogenic impotence" suffer from chemical diabetes. In these patients, testosterone plasma levels are lower and LH serum levels higher than in the 65.9% patients with normal glucose tolerance: these data give weight to the arguments in favor of a *peripheral* androgenic deficiency, even in cases of only mild disturbances of carbohydrate metabolism.

It is not known whether this trouble is responsible for sexual erectile impotence, or simply a simultaneous occurrence.

In the patients with normal OGTT (58 cases) we sometimes found evidence of testicular deficiency (14 cases) and hypothalamic dysfunction (19 cases). In this latter group there is some relationship between prolactin and androgenic function, suggesting that this hypophysial hormone has a putative rôle in the pathogenesis of impotency. No neuroendocrine abnormalities were found in 25 patients.

ACKNOWLEDGMENTS

We wish to thank Mrs F. Louis, who helped us to count and analyse the data; Mrs F. Henuzet (Radioimmunoassay Laboratory) and Mr J. Sulon (Steroid Laboratory), who made most of the assays, and the nurses of the metabolic ward (chief: Mrs Lacroix), who did the neuroendocrine tests.

We are also grateful to Mrs M. Fodor who typed the manuscript and to Mrs Delporte and Mr Lacroix (Hôpital d'Ougrée) who kept in order all the documents related to the patients.

We also thank the pharmaceutical firms Roche and Hoechst who provided us with TRH and LRH, respectively.

REFERENCES

Ansari, J. M. A. (1976). *In* "Abstracts of the VIIth Congress of the International Society of Psychoneuroendocrinology".

Clark, I. and Horn, D. B. (1965). *J. clin. Endocrinol. Metab.* 25, 39–45.

Dash, R. J., England, B. G., Midgley, Jr., A. R. and Niswender, G. D. (1975). *Steroids* 26, 647–662.

Faerman, I., Vilar, O., Rivarola, M., Rosner, J. J., Jadzinsky, M. N., Fox, D., Perez-Lloret, A., Bernstein-Hahn, L. and Saraceni, D. (1972). *Diabetes* 21, 23–30.

Faerman, I., Glocer, L., Fox, D., Jadzinsky, M. N. and Rapaport, M. (1974). *Diabetes* 23, 971–976.

Fox, C. A., Ismail, A. A. A., Love, D. N., Kirkham, K. E. and Loraine, J. A. (1972). *J. Endocrinol.* 52, 51–58.

Franchimont, P., Millet, D., Vendrely, E., Legros, J. J., Letawe, J. and Netter, A. (1972). *J. clin. Endocrinol. Metab.* 34, 1003–1008.

Furuyama, S., Nucent, C. A. and Mayes, D. M. (1971). *Steroids* 16, 415–428.

Henry, R. and Thevenet, M. (1954). *Annls Biol. Clin.* 12, 65–69.

Ismail, A. A. A. and Harkness, R. A. (1967). *Acta endocrinol.* 56, 469–480.

Ismail, A. A. A., Davidson, D. W., Lorraine, J. A., Cullen, D. R., Irvine, W. J., Cooper, A. J. and Smith, C. G. (1970). *In* "Reproduction Endocrinology" (J. Irvine, ed) 138–147. Livingstone, Edinburgh.

Keith, H., Brodie, H., Gartrell, N., Doering, C. and Rhue, T. (1974). *Am. J. Psychiat.* 131, 82–83.

Lefebvre, P. and Luyckx, A. (1974). "Savoir Interpréter les Épreuves Fonctionnelles en Diabetologie". De Visscher, Bruxelles, and Maloine, Paris.

Legros, J. J., Franchimont, P., Palem-Vliers, M. and Servais, J. (1973a). *Endocrinologia exp.* 7, 59–63.

Legros, J. J., Palem-Vliers, M., Servais, J., Margoulies, M. and Franchimont, P. (1973b). *In* "Hormones and Brain Function" (K. Kissak, ed) 527–529. Plenum Press, New York.
Legros, J. J., Demoulin, A. and Franchimont, P. (1975a). *Psychoneuroendocrinol* 1, 185–198.
Legros, J. J., Servais, J. and Mormont, C. (1975b). *Psychoneuroendocrinology* 1, 203–205.
Outch, K. H., Dennis, P. M. and Larssen, A. (1972). *Clinica chim. Acta* 40, 377–380.
Raboch, J. and Starka, L. (1973). *Archs sexual behavior* 2, 309–315.
Racey, P. A., Ansari, M. A., Rowe, P. H. and Clover, T. D. (1973). *J. Endocrinol.* 59, XXIII.
Sachar, E. J., Halpern, F., Rosenfeld, R. S., Gallagher, T. F. and Hellman, L. (1973). *Archs gen. Psychiat.* 28, 15–18.
Schoffling, K., Federling, K., Ditschuneit, H. and Pfeiffer, E. F. (1963). *Diabetes* 12, 519.
Servais, J. F. (1976). *Acta psychiat. Belgica* 76, 90–96.
Servais, J. F., Mormont, C. and Legros, J. J. (1975). *Revue de Médecine Psychosomatique et de Psychologie Medicale* 3, 263–269.
Stearns, E. L., Winter, J. S. B. and Faiman, C. (1973). *J. clin. Endocrinol. Metab.* 37, 687–691.
Vivario, R., Van Cauwenberge, H., Vliers, M. and Heusghem, C. (1954). *Ann. Endocrinol.* 15, 365–371.