Reduced luteinizing hormone secretion in women with Parkinson's disease

Rapid Communication

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Summary. Plasma luteinizing hormone (LH) levels were significantly lower in 10 postmenopausal women with Parkinson's disease (PD) compared to age-matched controls. The remaining hypophyseal hormones and gonadal steroids were similar in PD patients and in controls, suggesting a selective alteration of hypothalamic dopaminergic mechanisms which regulate LH secretion.

Keywords: Luteinizing hormone, Parkinson's disease, neuroendocrinology.

Introduction

Several data point to a constant damage of hypothalamus structures in Parkinson's disease (PD). Neuropathological studies have shown the presence of Lewi's bodies in the hypothalamus of subjects with PD (Den Hartog and Bethlem, 1960; Langston and Forno, 1978). A decreased concentration of dopamine (DA) (Rinne, 1979; Javoy-Agid et al., 1984; Hornykiewicz and Kish, 1986) and a decreased number of DA receptors (Rinne, 1979) have been reported in hypothalami obtained from PD patients. Hypothalamic nuclei, particularly the dopaminergic ones are involved in the regulation of antero-hypophyseal endocrine function (Martin and Reichlin, 1987) but no consistent abnormalities of basal, circadian and stimulated antero-hypophyseal hormone secretion have yet been detected in PD (see Kirkpatrick and Tamminga, 1988 for a review).

However, only a few investigations, using either a single plasma hormonal value or the response to gonadotropin releasing hormone (GnRH) were performed to evaluate gonadotropin secretion in PD patients (Lundberg, 1972; Hyypa et al., 1978; Conte-Devolx et al., 1987). To better evaluate antero-
hypophyseal function in PD postmenopausal women, pulsatile luteinizing hormone (LH) secretion was studied.

**Materials and methods**

The study was performed in 10 volunteer postmenopausal women, mean (±SD) age 65.1 (± 5.9) yrs, with idiopathic PD. The mean disease duration was 3.4 (± 1.4) yrs, Hoehn and Yahr stage was 1.8 (± 0.7) and the Unified Parkinson’s Disease Rating Scale (UPDRS) (Fahn et al., 1987) score was 33.4 (± 9.6). Ten healthy age-matched women served as controls. All subjects studied were within 15% of their ideal body weight, had undergone menopause at least ten years before and did not receive any drugs for at least two months before the study. Six out of 10 patients never received antiparkinsonian drug (de novo subgroup), 4 other patients were on antiparkinsonian drugs before the wash-out period: 2 of them were receiving low doses of levodopa plus carbidopa and the 2 remaining patients were on anticholinergics. Neither PD patients nor controls showed symptoms or signs of endocrinological and metabolic diseases. Following an overnight fast, at 8 am, a polyethylene catheter was inserted in an antecubital vein of the arm and kept open by slow infusion of saline solution. Blood samples were collected in heparinized tubes every 10 minutes for 4 hours. The women were supine and were not allowed to eat, drink or sleep during the sampling session. After collection, blood samples were centrifuged and plasma immediately frozen at −25°C until assayed. All samples from each subject were run in duplicate in the same assay to avoid interassay variability. Plasma concentrations of prolactin (PRL), estrone (E1), estradiol (E2), progesterone (P), testosterone (T), triiodothyronine (T3), thyroxine (T4) and thyroid-stimulating hormone (TSH) were measured in the first two samples by RIAs as previously described (Melis et al., 1981). Plasma LH and follicle stimulating hormone (FSH) levels were measured in all samples by specific RIA methods (Sorin Biomedica, Vercelli, Italy). LH and FSH were expressed as international units per liter (IU/L) using standards calibrated against LH-MRC 68/40 and FSH-MRC 78/549, where 1 mU MRC 68/40 corresponded to 1.33 mU 2nd IRP-HMG and 1 mU MRC 78/549 corresponded to 2 mU 2nd IRP-HMG. The intra- and interassay coefficients of variation (CV) were less than 5% and 9%, respectively, for LH and less than 3% and 7%, respectively, for FSH. Assay sensitivity was 2 IU/L for LH and 1 IU/L for FSH.

All results are reported as the mean ± SD.

Hormonal pulsatility was evaluated using a computerized program, where a significant peak was defined as an increase in plasma LH concentration from the preceding nadir greater than 3 times the interassay CV (Gambacciani et al., 1987). The LH interpulse period was calculated as the mean of intervals between 2 consecutive peaks.

Statistical analysis of the results was performed by one way analysis of variance. Linear regression analysis was performed using the least squares method. Significance was determined by p < 0.05.

No significant differences for hormonal values were found between the subgroup of de novo PD patients and the other 4 PD patients. Consequently, all PD patients were considered together for the final result analyses.

**Results**

In all subjects FSH, PRL, E1, E2, P, T, T3, T4 and TSH were in the normal range for postmenopausal women and were similar in PD patients and controls (data not shown). By contrast in PD patients mean plasma LH levels were significantly lower (18.1 ± 9.5 IU/L vs 63.4 ± 27.8 IU/L) (Fig. 1) and the