

EVALUATION OF THE CENTRAL DOPAMINERGIC ACTIVITY IN GESTATIONAL HYPERPROLACTINAEMIA BY MEANS OF THE ELECTRORETINOGRAPHIC TECHNIQUE

I. DE LUCA BRUNORI (*) - G. MOGGI (*) - P. FORNARO (**)

G. TETI (*) - S. MURRU (*) - A. GADDUCCI (*)

P. CASTROGIOVANNI (**) - M. PEROSSINI (***)

(*) Clinica Ostetrica e Ginecologica - Università di Pisa (Italy)

(**) Clinica Psichiatrica - Università di Pisa (Italy)

(***) Clinica Oculistica - Università di Pisa (Italy)

Summary: Electroretinography, a simple, bloodless technique commonly used in ophthalmological diagnostic practice, seems to give important informations on the level of activity of the retinal and/or other central dopaminergic systems.

The Authors have employed this technique in a group of 30 normal pregnant women in the ninth month of gestation, in order to evaluate the dopaminergic activity in a condition of physiological hyperprolactinemia, such as pregnancy, and in a group of 25 normal nonpregnant control women.

The b wave amplitude of the electroretinographic traces was significantly higher in pregnant women than in controls, suggesting an over-activity of dopaminergic systems in late pregnancy.

The possible interpretations of these data are discussed.

Key words: electroretinography, hyperprolactinemia, dopaminergic system, pregnancy.

INTRODUCTION

In recent years many factors influencing synthesis and secretion of prolactin (PRL) were identified. The hypothalamic dopaminergic neurons and the dopaminergic drugs inhibit prolactin release (^{1, 2, 3}), while the hypothalamic serotonergic neurons seem to have stimulatory effects on hormone release from anterior pituitary (⁴). On the other hand the role of noradrenergic (^{5, 6}), gabaergic (⁷), colinergic (⁸) and peptidergic (⁹) systems in the prolactin secretion is not yet clarified.

Dopamine (DA) displays its tonic inhibitory effect by means of a direct action on lactotropic cells and/or a stimulatory effect on Prolactin Inhibiting Factor (PIF) release from the median eminence in the pituitary portal hematic district (^{10, 11}); dopamine could be identified as PIF.

Frequently ethiopatogenesis of hyperprolactinemic states is often explained

with difficulty. In fact the hyperprolactinaemia is caused by changes of dopaminergic systems involved in the control of hormone secretion (functional hyperprolactinaemia) or by micro-macro adenomas of lactotropic cells (tumoural hyperprolactinaemia).

Electroretinography (ERG), a simple, bloodless technique commonly used in ophthalmological diagnostic practice, seems to give important information about levels of the activity of the dopaminergic central systems (^{12, 13, 14, 15}). The ERG b wave amplitude evaluation seems able to detect the level of activity of the retinal and/or other dopaminergic central systems (^{16, 17}).

With the present study we wanted to investigate possible correlations between the ERG b wave amplitude and prolactin values in normal pregnant women in the

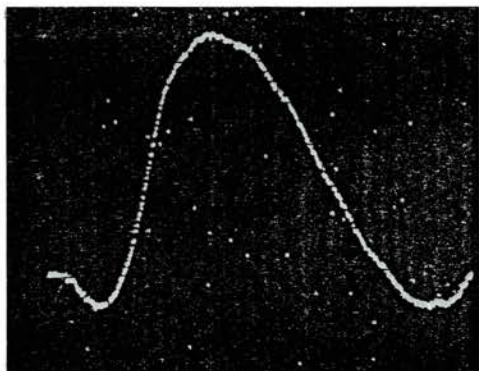


Fig. 1.

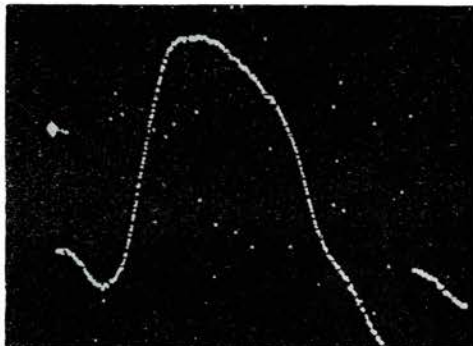


Fig. 2.

ninth month of gestation, which is a condition of physiological hyperprolactinaemia.

MATERIAL AND METHODS

30 normal pregnant women, from 19 to 36 years, between the 36th and the 40th week of gestation volunteered for the study.

Results were compared with those of a control group of 25 women, from 22 to 34 years, with normal values of prolactin (<25 ng/ml) during the early follicular phase.

All the subjects were studied by means of electroretinography, performed by standard technique, and fasting prolactin plasma levels, measured by radioimmunologic method.

The ERG recordings were obtained by applying Henkes contact lenses with silver electrodes after local anesthesia. The active electrode was placed on the cornea, and the indifferent one on the forehead. After 30 min. of adaptation to the dark under scotopic conditions, a 1 sec. photostimulation of 1 Joule was used. The ERG was visualized on an oscilloscope and recorded with a Polaroid camera; it is a polygraphic trace with a negative deflection (a wave) and a wide positive elevation (b wave). Computer was used for b wave amplitude evaluation.

Statistical analysis was made by means of Student t test.

RESULTS

Mean (\pm SE) b wave voltage value was significantly higher in pregnant women than that released in normal nonpregnant

control women (μ V 418 ± 15.88 vs 357 ± 12.07 — $P < 0.005$).

Prolactin values were significantly higher in pregnant women than in controls (ng/ml ($M \pm SE$) 127.05 ± 8.45 vs. 10.08 ± 0.454 — $P \ll 0.001$).

Fig. 1 and 2 show electroretinographic recordings of two pregnant women, respectively at the 37th and 39th week of gestation.

Fig. 3 shows ERG recording of a normal nonpregnant control woman.

DISCUSSION

Our results demonstrate that the ERG b wave amplitude is higher, at a statistically significant level, in pregnant women than in normal nonpregnant control women.

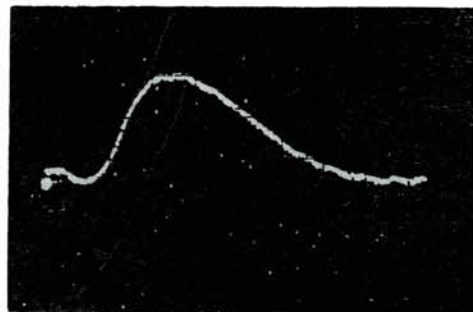


Fig. 3.

In pregnancy there is a physiological hyperprolactinemic state, while our results suggest an over-activity of central and/or retinal dopaminergic systems.

Since the prolactin secretion is affected by tonic inhibitory control of dopamine and prolactin plasma levels are very elevated in pregnancy, a decrease of dopaminergic activity levels was expected.

The following hypothesis might be formulated: the various dopaminergic systems (such as the retinal, mesolimbic, mesocortical, nigrostriatal, and tuberoinfundibular ones) have different levels of activities.

Another interesting hypothesis is that the following possible "feed-back" mechanisms play a role in prolactin release: high prolactin plasma levels seem able to activate dopaminergic tuberoinfundibular neurons with a consequent increase of DA synthesis by the median eminence, DA release in hypophysarian portal hematic district and lactotropic cells activity inhibition^(18, 19).

However retrograde blood flow in the pituitary stalk was demonstrated⁽²⁰⁾ and dopaminergic over-activity in hyperprolactinemic states of pituitary adenomas could be possible⁽¹⁸⁾. Therefore it is possible that gestational hyperprolactinaemia, produced by direct stimulatory effects of the high estrogen plasma levels on lactotropic cells⁽²¹⁾, leads to increased hypothalamic dopaminergic tonus, besides the retinal one, because of short feed-back mechanisms activated by the massive hypophysarian synthesis of prolactin.

In conclusion ERG evaluation seems able to detect prolactin secretion abnormalities and could be used in the diagnostic approach of hyperprolactinemic states.

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