

HGH BEHAVIOUR AT TERM OF PREGNANCY AND DURING PUERPERIUM

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The evaluation of HGH behaviour during pregnancy and in the first period of puerperium has been studied by many Authors, but the results proved to be different.

Some Authors ⁽¹⁾ found HGH increased plasmatic levels during pregnancy, while others ⁽²⁾ found HGH standard levels, in basal conditions, during the third trimester of pregnancy and they noticed a decrease of the hormone response to arginine (probably due to suppression of the HGH releasing hypothalamic factor: GRH), and to insulin-induced hypoglycemia.

In some cases, the decrease lasted also 6-8 weeks after delivery.

Greenwood and Hunter observed an increase of HGH levels in the maternal plasma during all pregnancy, at delivery and during puerperium, as well as increased levels of the hormone in the foetus and in the newborn.

The results have been critically evaluated by the Author himself, for, during pregnancy, in the mother, but not in the foetus, there is another hormone of placental source: HCS (Human Chorionic Somatomammotropin).

This hormone shows biological activity and immunological properties like the pituitary HGH.

Greenwood and Hunter, particularly, noticed that until the eighth week of pregnancy the increase of HGH levels is connected only to the presence of circulating HGH, while from the ninth week the increase of HCS misrepresents the reliability of data.

Katz and Grumbach state that the suppression of HGH secretion at term of pregnancy, may be due to the high levels of HCS which would inhibit the releasing HGH hypothalamic factor.

This inhibition lasts even during the puerperium.

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Pyridoxine interferes with the HGH production.

SUMMARY

Human growth hormone (HGH) has been measured in the plasma of 30 subjects at term of pregnancy, at 96 and at 144 h after delivery. The subjects were then selected into three groups: 10 were studied in basal conditions, 10 were given pyridoxine, 10 were given enantate testosterone and valerianate estradiol.

In the first group the correlation index (t of Student) was not significant showing the lack of correlation among the tested averages.

In the second group the index of Student was weakly significant ($t=2.36$, $p<0.05$). In the third group the Authors found a high representative correlation between the term of pregnancy and the 144th hour after delivery ($t=3.81$, $p<0.01$) and between the 96th and 144th hour after delivery ($t=2.95$, $p<0.01$).



COMPARISON GROUPS	FALL %	STAND. ERR.	GRAD. OF LIB.	t
end of pregnancy and a 96 h from delivery	1.58	0.88	18	0.07 < 0.05
end of pregnancy and a 144 h from delivery	4.83	0.89	18	0.22 < 0.05
a 96h from delivery and a 144 h from delivery	6.34	0.85	18	0.31 < 0.05

HORMONAL PROFILE OF HGH AT THE END OF PREGNANCY AND IN PUERPERIUM (Tab.1)

The pyridoxal phosphate, one of the coenzymes deriving from the compounds of the B₆ group, in the proteic metabolism, supports the passage of the aminoacids through the cellular membrane and it is present in the synthesis of the porphyrinic nucleus and of the globin.

The pyridoxal phosphate is, also, a co-enzyme of very important enzymes such as transaminases, aminoacid decarboxylase, aminoacid desulphydrase, Kynureninases.

In the carbohydrate metabolism, the pyridoxal phosphate is the coenzyme of the glycogen phosphorylase, while in the metabolism of the essential fatty acids it represents the prostetic group of an enzyme catalyzing the changing of the linoleic acid into arachidonic acid.

Martin and Clark⁽⁵⁾, on a study conducted on a non-pregnant population, report that the androgens may increase the somatic development; such an effect seems to be carried out through an increased release of HGH from the pituitary, probably due to an immediate stimulation of the hypothalamic-pituitary axis.

The estrogens also affect the HGH release.

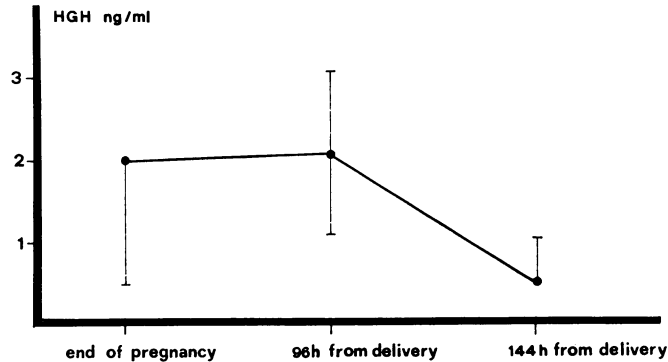
In fact, some Authors⁽⁶⁾ report that estrogens increase the sensivity of the pituitary or that of higher centers, leading to an increase of the plasmatic HGH.

Furthermore, these Authors state that such an effect can explain the differences of HGH plasmatic levels between man and woman.

**Hormonal profile of HGH at term of
pregnancy and in puerperium**

Tab. 2

Case	Subject	HGH plasmatic levels in ng / ml		
		At term of pregnancy	At 96 hrs from delivery	At 144 hrs from delivery
1	P.A. a 21 primigravida spontaneous delivery	1.05	1.00	0.81
2	M.A. a 28 primigravida spontaneous delivery	1.00	0.90	0.70
3	L.B. a 22 primigravida spontaneous delivery	2.50	2.60	2.60
4	C.B. a 25 primigravida spontaneous delivery	1.50	1.80	1.70
5	M.G. a 21 primigravida spontaneous delivery	3.00	3.01	2.90
6	F.M. a 30 primigravida caesarean section	1.70	1.80	1.60
7	S.A. a 24 primigravida spontaneous delivery	2.00	2.30	1.95
8	T.T. a 21 primigravida spontaneous delivery	1.90	1.85	1.80
9	A.L. a 28 multigravida spontaneous delivery	3.10	2.90	2.70
10	M.G. a 27 multigravida spontaneous delivery	0.90	0.80	1.00



COMPARISON GROUPS	FALL %	STAND ERROR	GRAD.OF LIB.	t
end of pregnancy and 144 h from delivery	65	1.90	18	1.84 < 0.05
96 h from delivery and 144 h from delivery	66	1.50	18	2.36 > 0.05

HORMONAL PROFILE OF HGH IN PUERPERIUM IN PATIENTS TREATED WITH PYRIDOXINE (Tab.3)

MATERIAL AND METHODS

The aim of the present investigation was to study 30 patients, checking the variations of the HGH plasmatic rates during the last week of pregnancy and in the first period of puerperium (at 96 and at 144 hours after delivery).

The patients' age ranged between 21 and 35 years, and among them, 19 were primigravidae and 11 multigravidae.

Concerning the delivery, 6 patients underwent caesarean section while 24 delivered spontaneously.

The samples of venous blood were drawn during the last week of pregnancy, at 96 and at 144 hours after delivery.

The patients were then selected into three groups:

- 1) 10 were studied in basal conditions (check);
- 2) 10 were given pyridoxine;
- 3) 10 were given enantate testosterone and valerianate estradiol.

Five patients of the second group were given a dose of 300 mg/daily of pyridoxine and the other five a dose of 600 mg/daily; all by intramuscular injection. Both doses were given throughout 4-5 days.

The third group was given a daily dose of 360 mg of enantate testosterone and 16 mg of valerianate estradiol. Both doses were administered simultaneously by intramuscular injection. The HGH was then measured in the drawn sample, by radioimmunoassay.

RESULTS

1st Group

Statistics: the narrow range of standard error is connected to the slight difference among the compared averages.

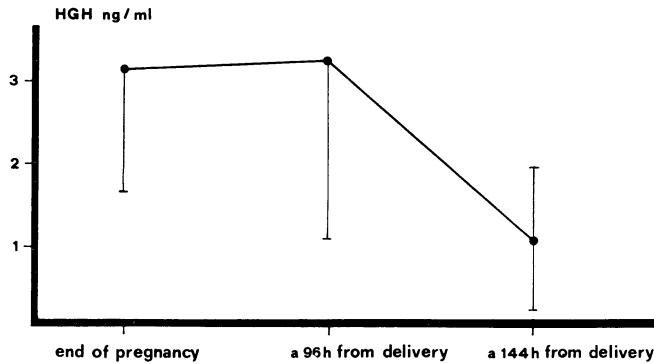
The correlation index (t of Student) expressed in real terms is lower than the

**Hormonal profile of HGH in patients
treated with piridossina (300-600 mg)**

Tab.4

Case	Subject	HGH plasmatic levels in ng/ml		
		At term of pregnancy	At 96 hrs from delivery	At 144 hrs from delivery
1 [▲]	M.R. a 35 primigravida caesarean section	7.50	7.60	2.20
2	R.T. a 22 primigravida spontaneous delivery	0.69	0.72	0.37
3 [▲]	P.R. a 30 multigravida spontaneous delivery	0.60	0.60	0.32
4 [▲]	C.M. a 28 multigravida spontaneous delivery	1.00	1.10	0.21
5	S.S. a 33 primigravida caesarean section	0.81	0.82	0.47
6 [▲]	P.S. a 28 multigravida spontaneous delivery	1.80	1.90	0.19
7	T.F. a 29 multigravida spontaneous delivery	6.40	6.20	0.80
8	T.A. a 31 primigravida caesarean section	0.52	0.52	0.17
9 [▲]	M.S. a 27 multigravida spontaneous delivery	1.00	1.10	0.21
10	L.F. a 29 multigravida spontaneous delivery	0.45	0.40	0.12

(▲) The dosage in these cases has been 600 mg/die



COMPARISON GROUPS	FALL %	STAND. ERR.	GRAD. OF LIB.	t
end of pregnancy and 144 h from delivery	68	1.17	18	3.81 > 0.01
96 h from delivery and 144 h from delivery	66	1.56	18	2.95 > 0.01

HORMONAL PROFILE OF HGH IN PATIENTS TREATED WITH ENANTATE TESTOSTERONE AND VALERIANATE ESTRADIOL (Tab. 5)

ideal one ($0.07 < 0.05$ between the term of pregnancy and 96 hours after delivery; $0.22 < 0.05$ between term of pregnancy and 144 hours after delivery; $0.31 < 0.05$ between 96 and 144 hours after delivery) showing the lack of correlation among the tested averages (table 1).

In four cases we noticed a progressive fall of HGH values from the term of pregnancy to the 96th and the 144th hour after delivery.

In three cases we found an increase at the 96th hour and a fall at the 144th hour after delivery.

In one case there was an increase at the 96th hour with an unchanged value at the 144th hour after delivery.

In one case we observed an unchanged value between term of pregnancy and

96 hours after delivery with a fall at the 144th hour after delivery.

Finally, in another case there was a fall at the 96th hour after delivery and a rise at the 144th hour after delivery (table 2).

2nd Group

Statistics: we can notice a very large range of values with a standard error of 1.90 between the term of pregnancy and 144 hours after delivery and of 1.50 between 96 and 144 hours after delivery.

The average of values at term of pregnancy was 2.07 ± 2.58 ; at 96 hours it was 2.09 ± 1.94 ; at 144 hours after delivery it was 0.50 ± 0.81 .

The correlation index (t of Student) between the term of pregnancy and 144 hours after delivery ($1.84 < 0.05$) is not

**Hormonal profile of HGH in patients treated with
testosterone enantate and estradiol valerianate (▲)**

Tab.6

Case	Subject	HGH plasmatic levels in ng/ml		
		At term of pregnancy	At 96 hrs from delivery	At 144 hrs from delivery
1	L.C. a 30 multigravida spontaneous delivery	3.20	3.40	0.60
2	G.M. a 35 primigravida caesarean section	0.43	0.46	0.40
3	R.A. a 34 primigravida caesarean section	5.10	5.00	1.20
4	S.B. a 26 primigravida spontaneous delivery	1.60	1.50	1.10
5	L.G. a 29 multigravida spontaneous delivery	2.40	2.60	2.20
6	M.T. a 22 primigravida spontaneous delivery	4.30	4.00	0.20
7	T.A. a 29 multigravida spontaneous delivery	2.00	1.90	1.50
8	M.A. a 23 primigravida spontaneous delivery	4.70	4.80	1.00
9	F.M. a 21 primigravida spontaneous delivery	4.50	4.40	0.60
10	R.R. a 25 primigravida spontaneous delivery	2.40	2.30	1.80

(▲) Dosage testosterone enantate mg 360
estradiol valerianate mg 16

significant. It is weakly significant between the 96th and 144th hour after delivery ($2.36 < 0.05$).

The average fall of values between the term of pregnancy and the 144th hour after delivery is of 65%, while between the 96th hour and the 144th hour after delivery it is of 66% (table 3).

In all the cases we have tested the administration of pyridoxine caused a decrease of the HGH values at the 144th hour after delivery. Such a decrease has been linear in two cases from the term of pregnancy to the 144th hour after delivery.

In six cases we noticed an increase at the 96th hour and a fall at the 144th hour after delivery, while in other two cases we found the same values at term of pregnancy and at the 96th hour after delivery with a fall at the 144th hour after delivery (table 4).

3rd Group

Statistics: we noticed a more representative homogeneity of the data with a standard error of 1.17 between the term of pregnancy and 144 hours after delivery and of 1.56 between 96 and 144 hours after delivery.

The average of values at term of pregnancy was 3.06 ± 1.52 ; at 96 hours after delivery it was 3.13 ± 2.10 ; at 144 hours after delivery it was 1.06 ± 0.66 .

The correlation index (t of Student) is highly significant: $3.81 < 0.01$ between the term of pregnancy and 144 hours after delivery and $2.95 < 0.01$ between 96 and 144 hours after delivery.

The average fall of values between the term of pregnancy and 144 hours after delivery is of 68%, while it is of 66.32% between 96 and 144 hours after delivery (table 5).

In all the cases we observed a remarkable decrease of HGH values between the term of pregnancy and 144 hours after delivery.

In four cases we noticed an increase at the 96th hour after delivery and a decrease at the 144th hour after delivery; in six cases there was a linear decrease (table 6).

DISCUSSION

In the first group we can notice a very large fluctuation of the plasmatic rate of HGH among the term of pregnancy, 96 and 144 hours after delivery. Such fluctuation is restrained by the narrow range of standard error.

On studying the hormonal profile of the HGH in the patients of the second group we noticed in all cases a remarkable decrease of the plasmatic rate of the hormone at the 144th hour after delivery. Such decrease was preceded by a rebound at the 96th hour after delivery in 60% of the tested population.

More conspicuous the decrease of the plasmatic rates of HGH at the 144th hour after delivery in the patients of the third group. In this group the linear decrease of values is of 60%.

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