The role of inhibins in the regulation of the menstrual cycle and during ovarian stimulation for IVF

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Inhibin: hystorical overview

1923 Mottram & Cramer

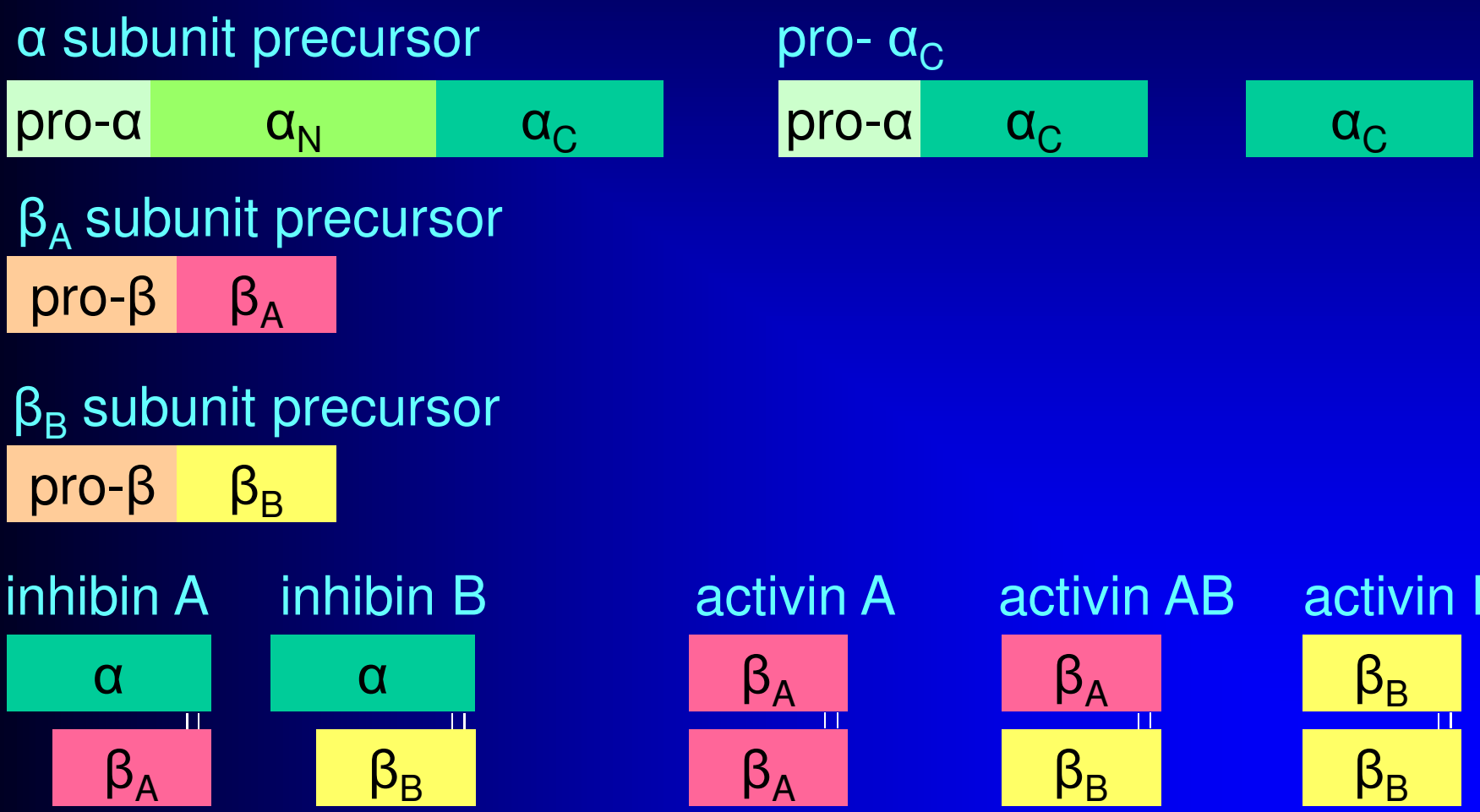
1932 McCullagh („inhibin")

1985 Robertson et al., Ling et al. (isolation)

1986 Vale et al. (activin)

1988 Meunier et al. (placenta, adrenal, pituitary, bone marrow, kidney, spinal cord, brain)

Structure of inhibins and activins



Assays for inhibins

1972	Vale	**bioassay** using dispersed anterior pituitary cells
1986	McLachlan	**RIA** inhibin A + inhibin B + free α subunit
1993	Groome	**ELISA** inhibin A, inhibin B, pro-α_C, activin A, activin B

Inhibin B and inhibin A assay

- Solid phase sandwich ELISA
  (Oxford Bio-Innovation, Oxford, UK)
- Sensitivity: 15.0 pg/ml (inhibin B)
  3.9 pg/ml (inhibin A)
- Intra- and interassay CV <20%

Regulators of follicle growth

Primary agents:

- Follicle-stimulating hormone (FSH)
- Luteinising hormone (LH)
- Prolactin

Potentiators - Inhibitors:

- Ovarian Steroids
  - Estrogen
  - Androgen
  - Progesteron
- Ovarian Peptides
  - Inhibin
  - Activin
  - Follistatin
  - Insulin-like growth factor (IGF)
  - Vascular endothelial growth factor (VEGF)

Regulators of follicle growth
Potentiators and inhibitors – Ovarian peptides

Inhibin

- inhibition of FSH synthesis and release (Robertson et al. 1985)
- only complementary role in inhibition of FSH synthesis and release (McLachlan et al. 1996)
- negativ effect on aromatisation (Ying et al. 1986)

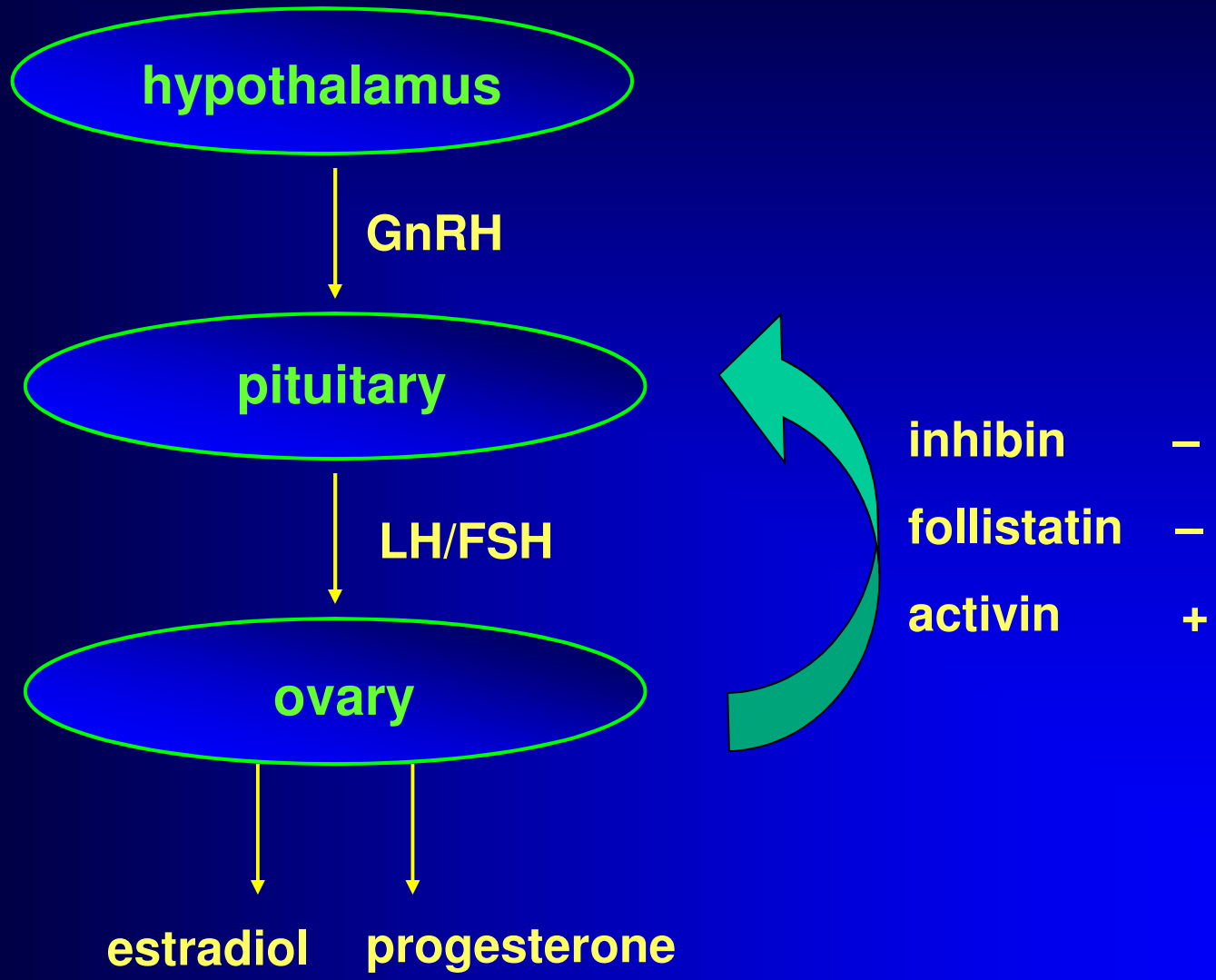
Activin

- stimulation of FSH-secretion (Ling et al. 1986)
- inhibition of FSH-secretion (periovulatory) (DiSimone et al. 1994)
- positiv effect on aromatisation (Ying et al. 1986)
- promoting mitogenesis in granulosa cell (Rabinovici et al. 1990)
- inhibition in progesterone secretion (periovulatory) (Shukovsky & Findlay. 1990)

Follistatin

- inhibition of FSH release (Ying et al. 1987)
- activin-binding protein (?) (Xaio et al. 1992)

The hypothalamus – pituitary – ovary axis



Effects of inhibin

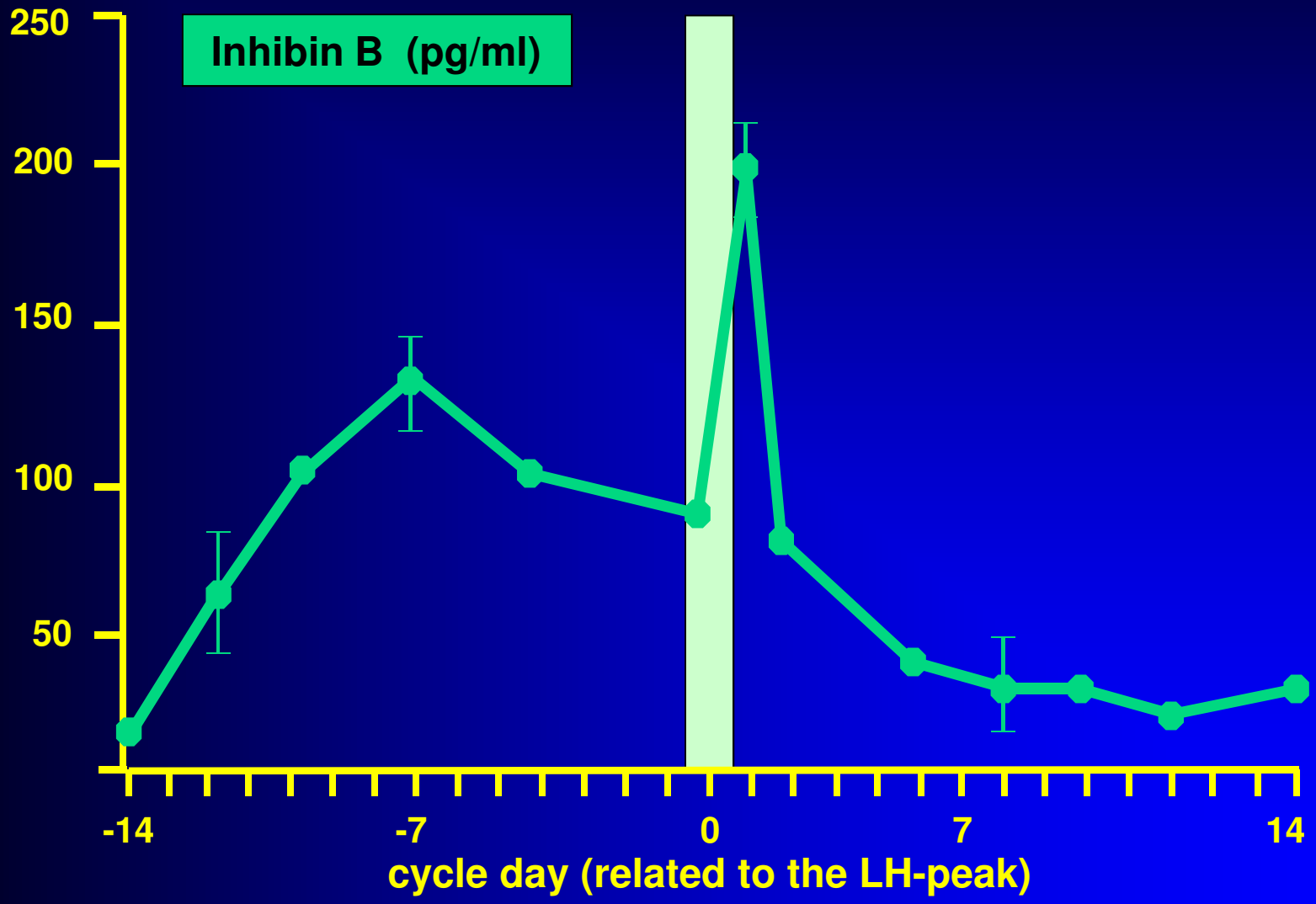
- endocrin — pituitary — - suppression of FSH-release

- autocrin
- paracrin

ovary

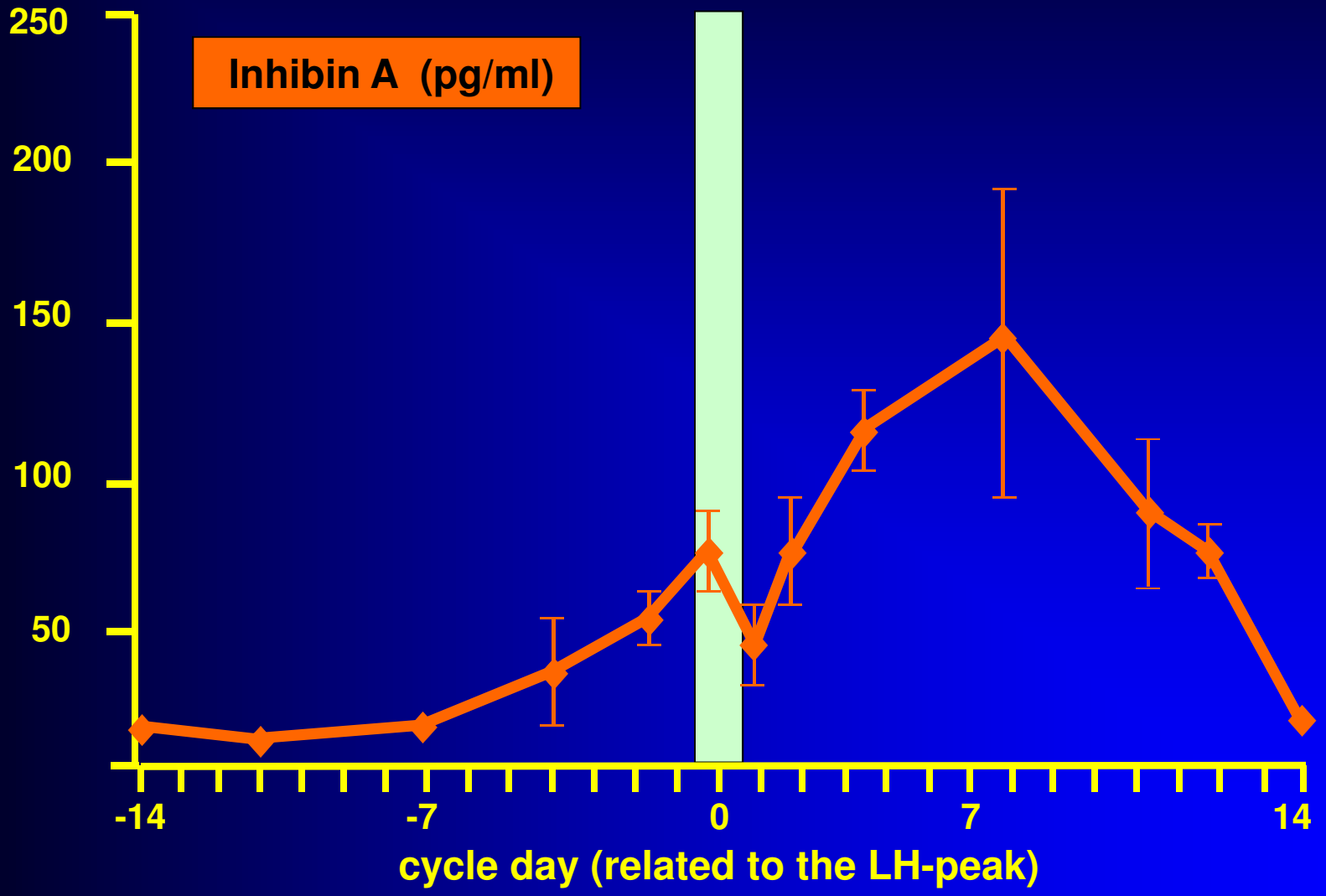
- steroid production
- cell division
- cell differentation

Hormonal changes during the spontaneous cycle



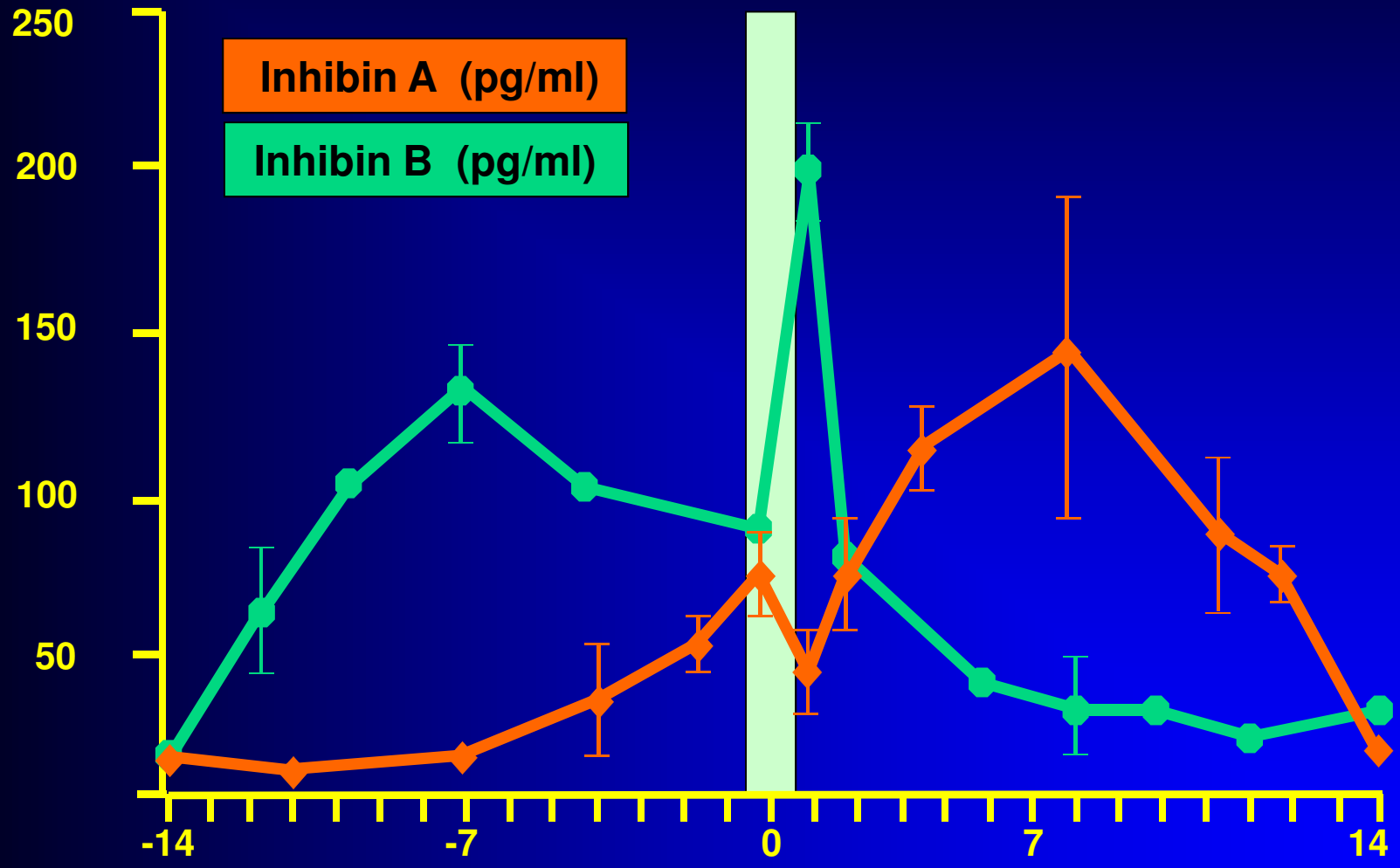
/Lockwood et al (1998) /

Hormonal changes during the spontaneous cycle



/Lockwood et al (1998) /

Hormonal changes during the spontaneous cycle



/Lockwood et al (1998) /

Inhibin production during the spontaneous cycle

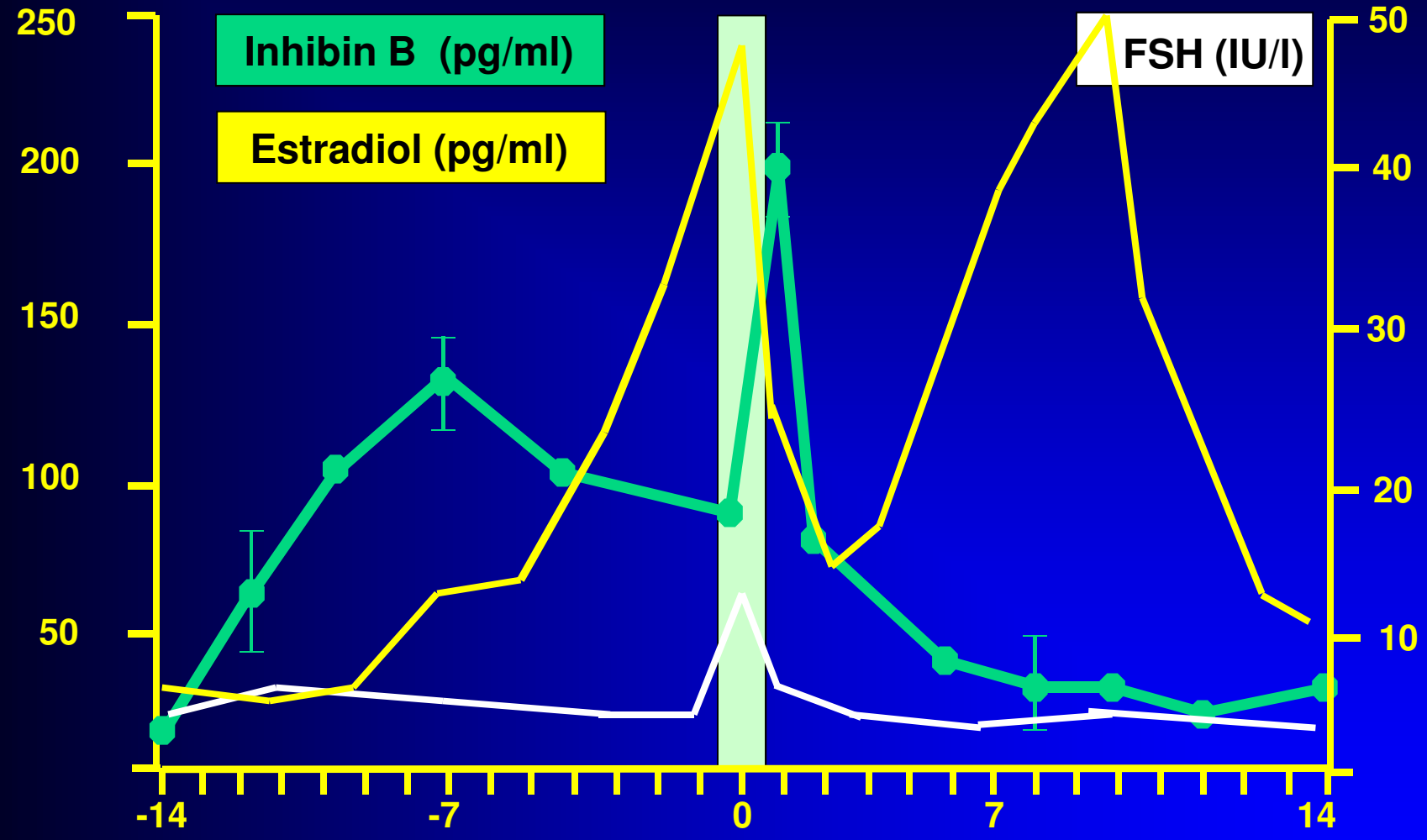
Inhibin B

produced by the growing follicle

Inhibin A

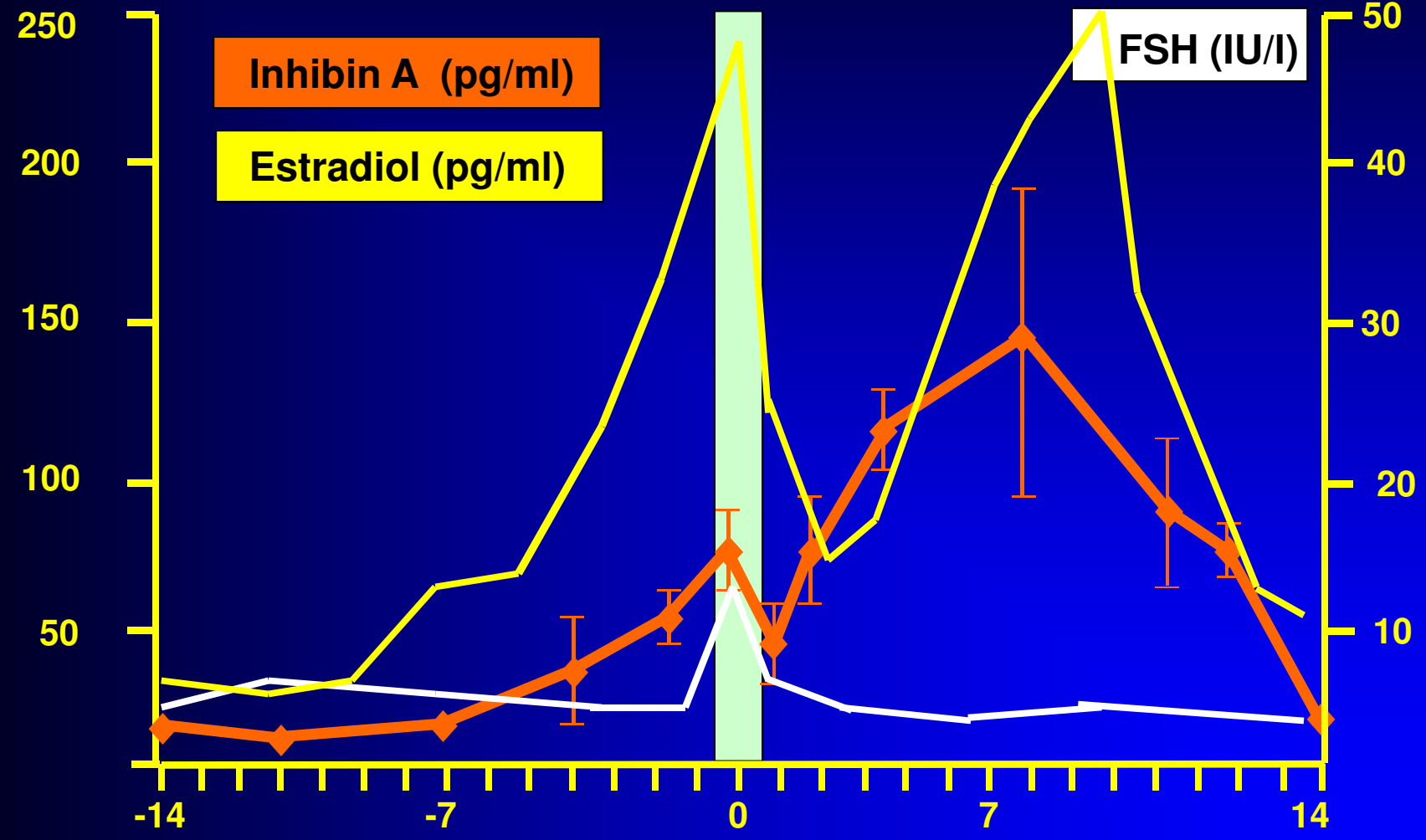
produced by the luteinized granulosa cells

Hormonal changes during the spontaneous cycle



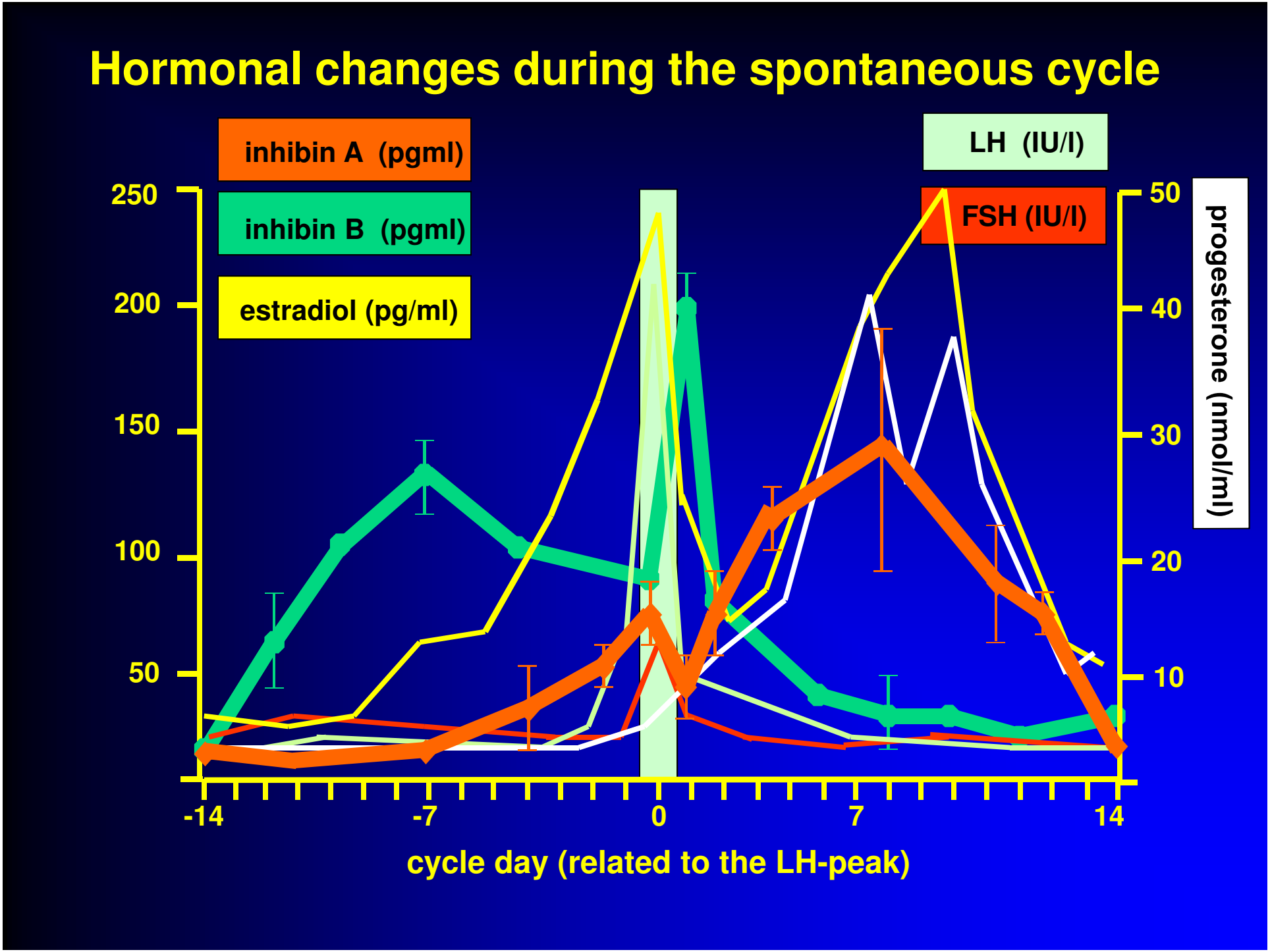
/Lockwood et al (1998) & Muttukrishna et al (1994)/

Hormonal changes during the spontaneous cycle



/Lockwood et al (1998) & Muttukrishna et al (1994)/

Hormonal changes during the spontaneous cycle



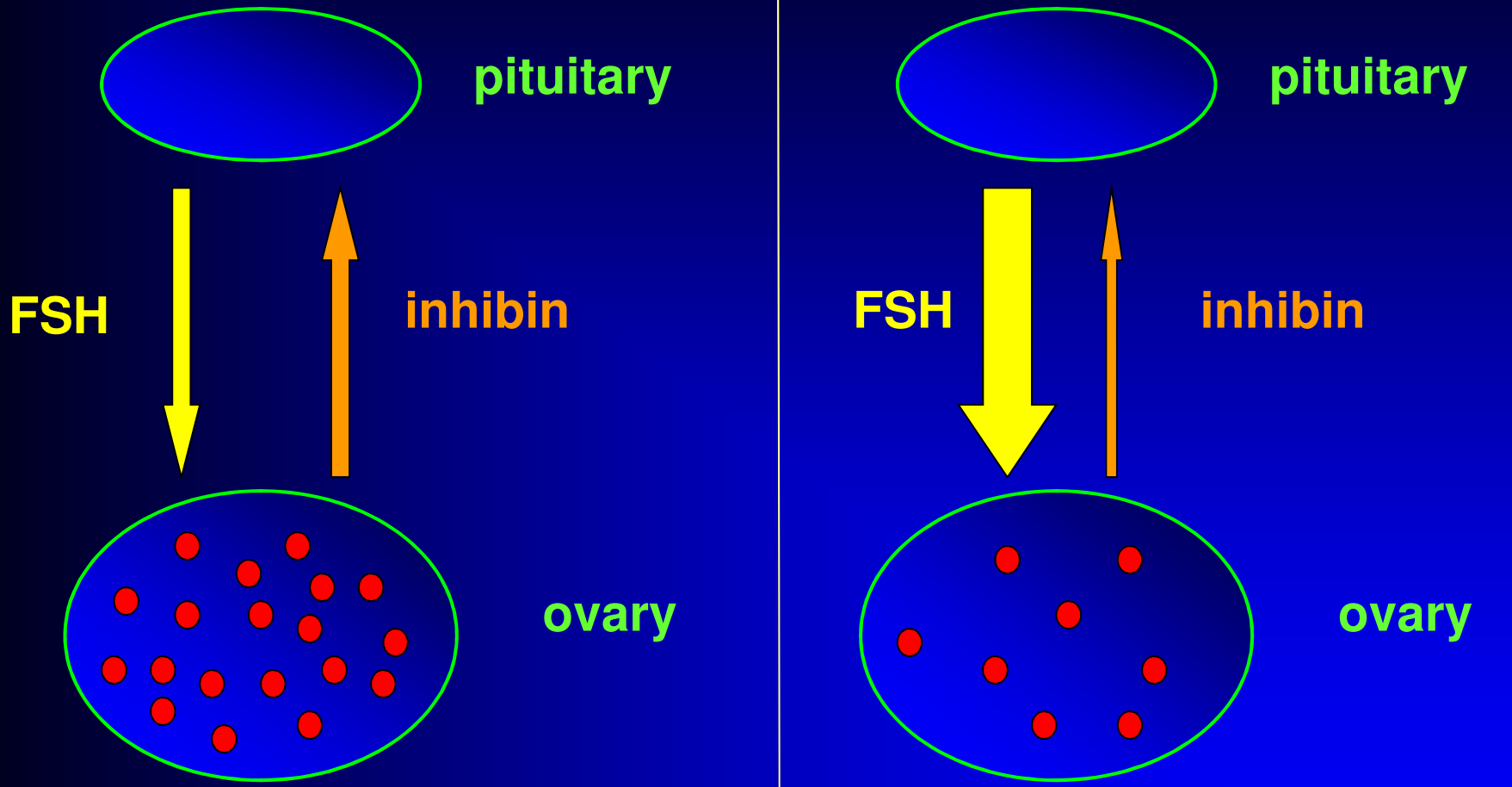
Clinical significance of inhibin B measurement

- **prediction of ovarian response** (Hall et al. 1999)
- **prediction of IVF treatment outcome** (Seifer et al. 1997)
- **assessment of ovarian reserve** (Klein et al. 1996)

Markers of ovarian function

- **indirect**
  - **age** — Schwartz and Mayaux 1982
  - **basal serum FSH** — Muasher et al. 1988; Scott and Hofmann 1991; Navot et al. 1997
  - **clomiphene citrate challenge test** — Navot et al. 1987
- **direct**
  - **inhibin B** — Klein et al. 1996; Seifer et al. 1997; Welt et al. 1999; Urbancsek et al. 2001, 2002
  - **inhibin A** — Danforth et al. 1998

Inhibin A and B in premature ovarian insufficiency



Mechanism of action of inhibin B

Aims of the study

To find out whether serum measurements

- **in the early follicular phase for inhibin B**

or

- **in the midluteal phase for inhibin A**

may have predictive value in view to premature ovarian insufficiency

Inhibin A and B in premature ovarian insufficiency

Patients

Cases (POF) (n = 31)

Controls (n = 61)

matched by

- **age**
- **body mass index**
- **number of ovaries**
- **cycle length**
- **cause of infertility**

Inhibin A and B in premature ovarian insufficiency

Results I

Serum inhibin B measurements in the early follicular phase (day 3–5)

	Cases (n = 28)	Controls (n = 50)	P*
Age (years)	32 (28–34)	32 (29–34)	0.58
BMI (kg/m^2)	21.9 (19.9–23.8)	21.1 (19.8–23.6)	0.87
Cycle length (days)	28 (26–33)	29 (28–30)	0.80
Serum FSH on day 3–5 (IU/l)	23.6 (17.6–35.2)	6.4 (5.0–7.4)	<0.001
Serum inhibin B on day 3–5 (pg/ml)	13.3 (8.5–51.3)	91.9 (53.7–111.3)	<0.001

Data presented as medians (25th–75th percentiles)
*Wilcoxon's matched pairs signed rank sum test

Inhibin A and B in premature ovarian insufficiency

Results II

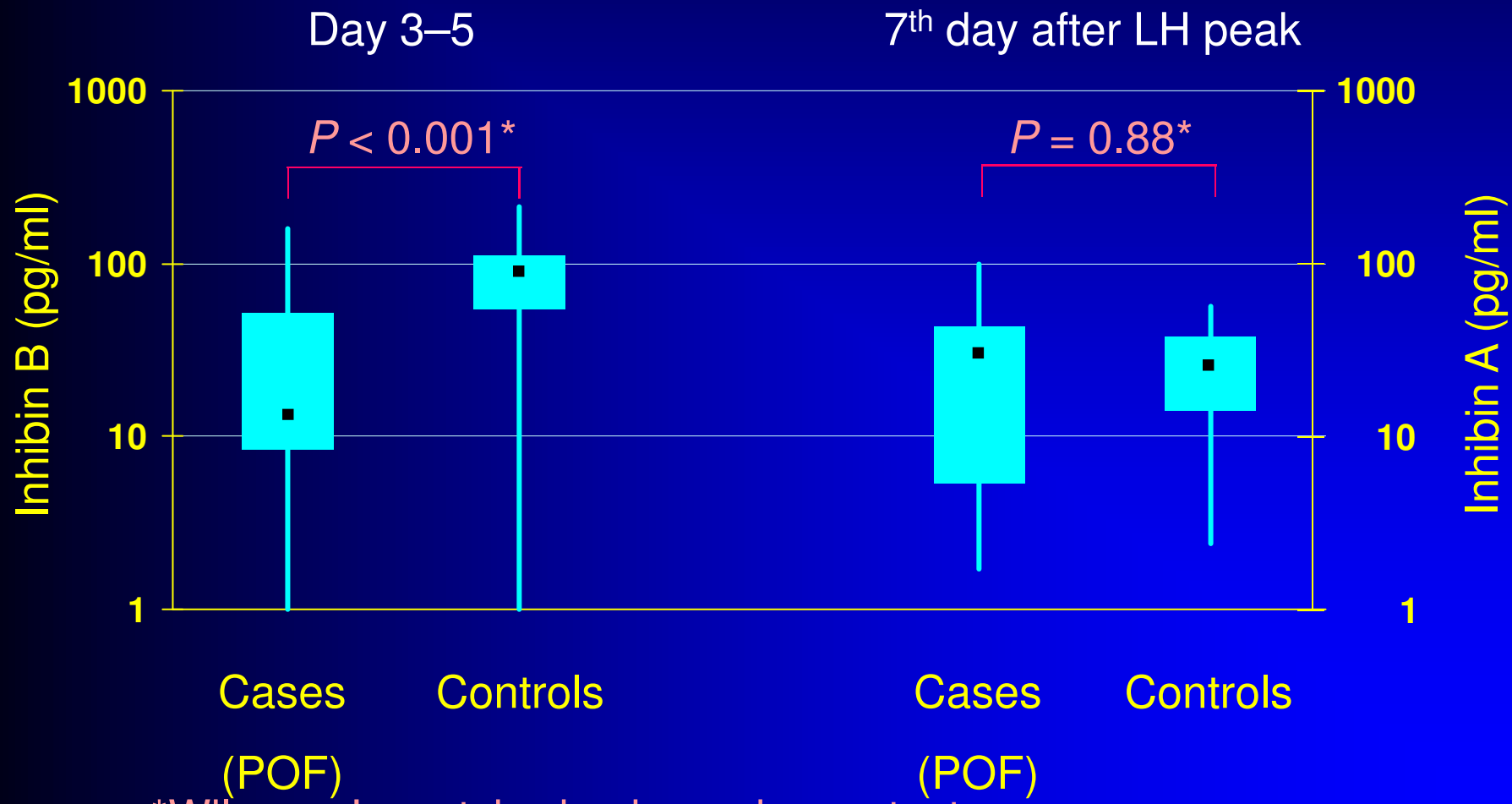
Serum inhibin A measurements in the midluteal phase (7th day after LH peak)

	Cases (n = 26)	Controls (n = 45)	P*
Age (years)	32 (28–34)	32 (29–34)	0.50
BMI (kg/m^2)	21.9 (19.9–23.8)	21.5 (19.6–23.6)	0.60
Cycle length (days)	28 (26–33)	29 (28–30)	0.72
Serum FSH on day 3–5 (IU/l)	23.6 (17.6–35.2)	6.5 (5.0–7.9)	<0.001
Serum inhibin A on 7th day after LH peak (pg/ml)	30.5 (5.4–42.9)	25.8 (14.1–38.2)	0.88

Data presented as medians (25th–75th percentiles)
*Wilcoxon's matched pairs signed rank sum test

Inhibin A and B in premature ovarian insufficiency

Results I + II



*Wilcoxon's matched pairs rank sum test

Conclusions

Serum inhibin B measurements
at the beginning of spontaneous cycles
may have predictive value in view to
premature ovarian insufficiency, while

serum inhibin A measurements
in the midluteal phase
do not seem to have a similar predictive value.

Inhibin A and B in patients with elevated LH/FSH

J Assist Reprod Genet (2006) (2006) 23:141–147
DOI 10.1007/s10815-006-9043-3

PHYSIOLOGY

Luteal-phase inhibin A and follicular-phase inhibin B levels are not characteristic of patients with an elevated LH-to-FSH ratio

Erik E. Hauzman · Péter Fancsovits · Ákos Murber · Thomas Rabe · Thomas Strowitzki · Zoltán Papp · János Urbancsek

Table 1 Clinical and endocrine characteristics of patients with an elevated LH-to-FSH ratio (ELF patients) and controls

	ELF patients ($n = 32$)	Controls ($n = 32$)	p value[a]
Age (years)	28 (25–33)	28 (25–33)	0.24
BMI (kg/m^2)	22.2 (19.8–25.1)	22.4 (20.6–24.4)	0.51
Average cycle length (days)	32 (29–41)	30 (29–32)	0.18
FSH (IU/L)	5.4 (3.5–6.7)	6.6 (5.5–8.2)	<0.001
LH (IU/L)	14.6 (10.0–18.8)	4.5 (3.4–6.0)	<0.001
LH/FSH	2.9 (2.3–3.3)	0.7 (0.6–0.8)	<0.001
E_2 (pg/mL)	51.6 (36.6–71.0)	40.5 (35.8–53.4)	0.11
SHBG (nmol/L)	50.3 (28.0–61.3)	53.7 (37.8–72.5)	0.36
Testosterone (nmol/L)	1.8 (0.9–2.4)	1.4 (1.1–2.5)	0.88
Inhibin B (follicular phase) (pg/mL)	123.5 (68.3–178.0)	119.1 (68.1–141.9)	0.52
Inhibin A (luteal phase) (pg/mL)	15.6 (5.2–32.4)	19.7 (12.3–30.9)	0.45
Testosterone (nmol/L)[b]	2.9 (2.3–4.8)	1.3 (0.9–1.7)	0.008
Inhibin B (follicular phase) (pg/mL)[b]	123.1 (81.6–177.4)	92.6 (67.8–141.2)	0.29
Inhibin A (luteal phase) (pg/mL)[b]	12.5 (5.9–24.8)	22.0 (14.1–28.4)	0.60

Note. Data are presented as medians and interquartile (25th–75th percentile) ranges.

[a] Wilcoxon's matched pairs signed rank sum test.

[b] Results for pairs where ELF patients were hyperandrogenemic (serum testosterone >2.1 nmol/L; $n = 13$ in both groups).

Inhibin B during ovarian stimulation

Inhibin B in serum

- **rises during follicular stimulation for IVF**

  Lockwood et al. 1996
  Elting et al. 2001

- **may predict ovarian response for gonadotrophin stimulation**

  Seifer et al. 1997
  Urbancsek et al. 2001, 2005

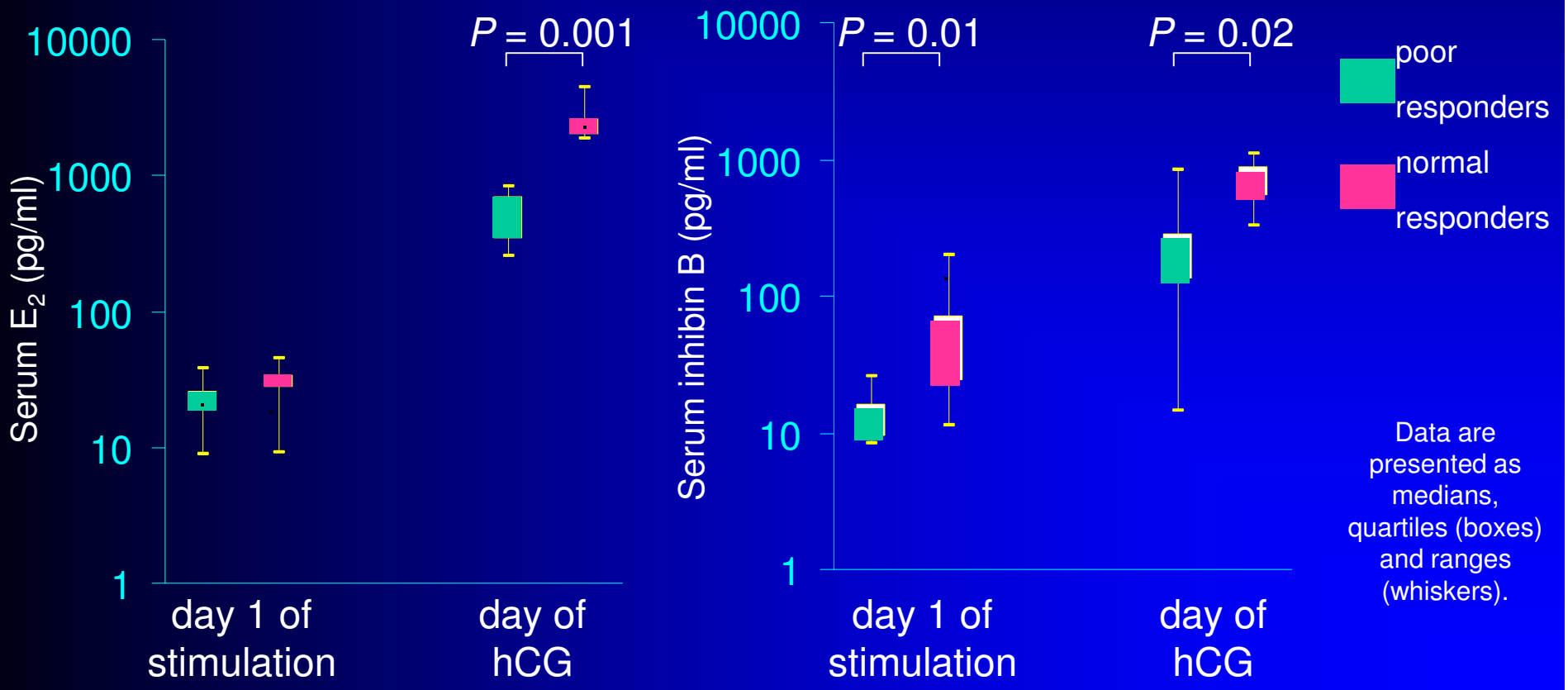
- **may predict pregnancy outcome**

  Hall et al. 1999
  Penarubbia et al. 2000
  Creus et al. 2000
  Urbancsek et al. 2001

Serum inhibin B levels before start of gonadotrophin treatment can predict ovarian response in combined GnRH analogue + gonadotrophin stimulation

Urbancsek J., Hauzman E., Murber Á., Klinga K., Rabe T., Strowitzki T., Papp Z.

Hum Reprod 16 (2001) (Abstract book 1) 149-150



Inhibin B during ovarian stimulation

Serum CA-125 and inhibin B levels in the prediction of ovarian response to gonadotrophin stimulation in IVF cycles (Urbancsek et al. Gynecol. Endocrinol. 2005)

Table I. Clinical and endocrine characteristics of poor and normal responders.

	Poor responders	Normal responders	*p* Value
Age (years)	36.5 (34.5–43.5)	36.5 (34–42.5)	NS
BMI (kg/m^2)	23.3 (19.6–26.1)	22.8 (20.1–25.2)	NS
FSH basal (IU/l)	7.5 (5.4–8.8)	7.8 (6.6–8.3)	NS
E_2 basal (pg/ml)	51.6 (37.2–65.2)	47.1 (40.1–53.9)	NS
Length of down-regulation (days)	16.5 (13.5–18)	15.5 (13–19.5)	NS
Length of stimulation (days)	12 (10.5–12.5)	10.5 (9–11)	0.002
No. of gonadotropin ampoules	51 (38.5–58)	25 (20.5–37.5)	0.001
E_2 on SD1 (pg/ml)	25.5 (18.4–37.8)	35.6 (25.3–57.5)	NS
Inhibin B on SD1 (pg/ml)	10.9 (9.4–16.1)	38.0 (23.6–71.8)	0.004
CA-125 on SD1 (U/ml)	15.6 (13.2–22.3)	22.6 (18.2–26.6)	NS
E_2 at OI (pg/ml)	516.0 (369.5–705.5)	2630.5 (2096.0–2807.0)	0.0004
Inhibin B at OI (pg/ml)	177.8 (143.2–266.1)	805.9 (554.5–988.6)	0.002
CA-125 at OI (U/ml)	13.3 (10.4–16.4)	17.9 (11.7–24.5)	NS
Inhibin B at OPU (pg/ml)	70.9 (29.3–129.7)	242.1 (192.3–567.2)	0.028
CA-125 at OPU (U/ml)	15.9 (11.9–18.8)	14.4 (7.5–18.8)	NS
No. of oocytes retrieved	1 (0–2)	8 (7–9)	0.0004
No. of embryos replaced	0 (0–2)	4 (4–4)	0.0004

BMI, body mass index; FSH, follicle-stimulating hormone; E_2, estradiol; SD1, stimulation day 1; OI, ovulation induction; OPU, oocyte pick-up; NS, not significant; data are median with interquartile range in parentheses; all statistical tests are paired.

Inhibin B during ovarian stimulation

Inhibin B in serum

- **rises during follicular stimulation for IVF**

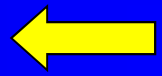
  Lockwood et al. 1996
  Elting et al. 2001

- **may predict ovarian response for gonadotrophin stimulation**

  Seifer et al. 1997
  Urbancsek et al. 2001, 2005

- **may predict pregnancy outcome**

  Hall et al. 1999
  Penarubbia et al. 2000
  Creus et al. 2000
  Urbancsek et al. 2005



Aims of the study

To find out whether inhibin B measurements performed before and after gonadotropin stimulation for *in vitro* fertilization (IVF) and embryo transfer (ET)

- **may be indicative of pregnancy**
- **can predict pregnancy outcome**

Inhibin B during ovarian stimulation

Patients

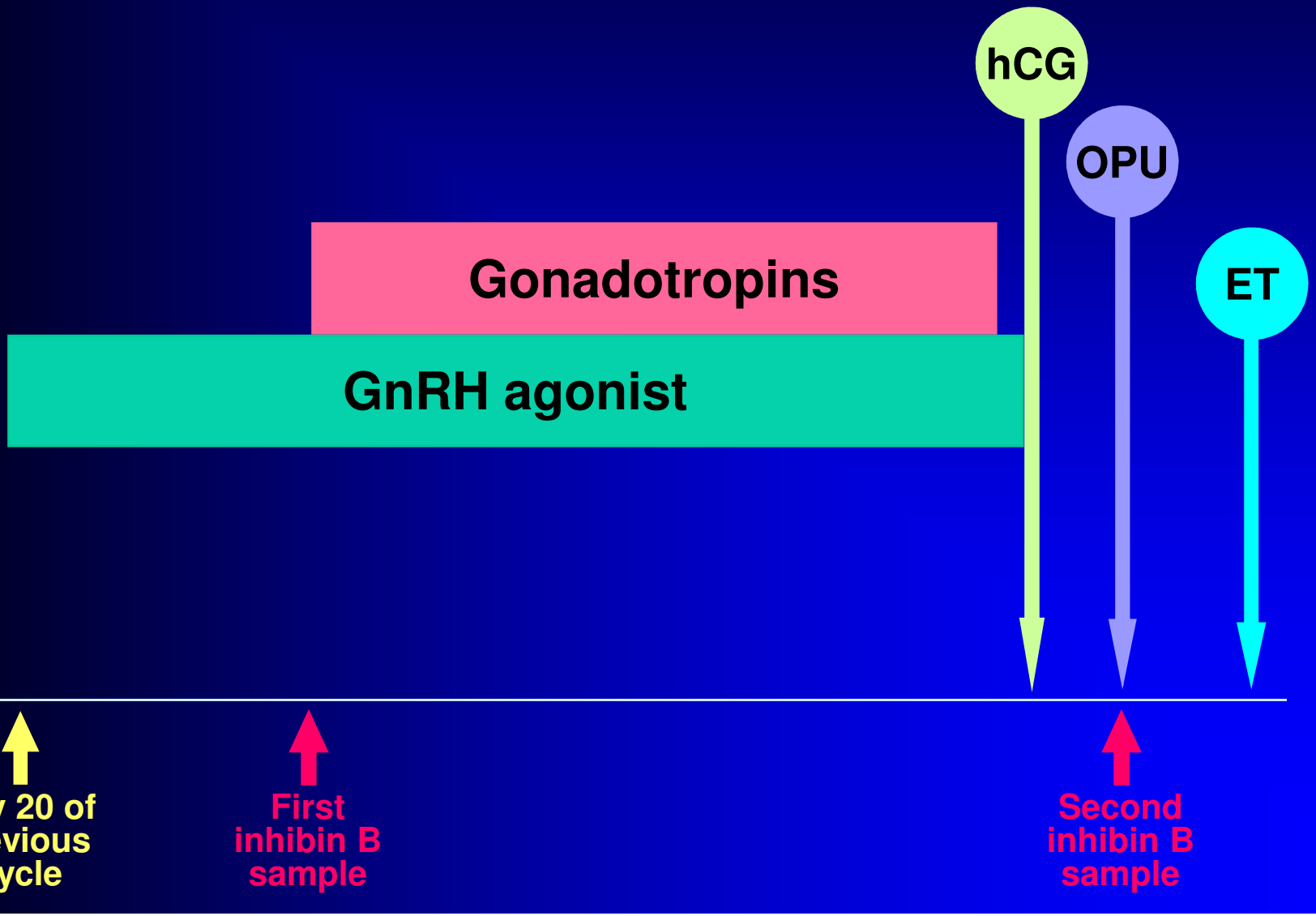
Cases	Controls
(*n* = 55)	(*n* = 55)
'Pregnant' group	'Non-pregnant' group

matched by

- age
- type of sterility
- serum E_2 level on day of hCG
- number of oocytes retrieved
- number of embryos transferred

Inhibin B during ovarian stimulation

Treatment protocol



Inhibin B during ovarian stimulation

TABLE 1

Clinical and endocrine characteristics of pregnant and nonpregnant patients.

	Pregnant group	Nonpregnant group	*P*
Age (y)[a]	31.6 ± 4.0	31.4 ± 3.7	NS
BMI (kg/m^2)[a]	23.1 ± 3.3	22.4 ± 3.0	NS
Main infertility factor (n (%))			NS
Male factor	15 (27)	10 (18)	
Tubal factor	32 (58)	36 (65)	
Endometriosis	2 (4)	6 (11)	
Unexplained	6 (11)	3 (6)	
Treatment (n (%))			NS
IVF	43 (78)	46 (84)	
ICSI	12 (22)	9 (16)	
FSH basal (IU/L)[a]	7.0 ± 2.3	6.6 ± 2.1	NS
E_2 basal (pg/mL)[a]	46.7 ± 19.3	47.9 ± 23.6	NS
Days of stimulation[a]	10.8 ± 1.3	10.5 ± 1.3	NS
Ampules of gonadotropins[a]	30.3 ± 14.3	27.9 ± 10.6	NS
E_2 on day 1 of stimulation (pg/mL)[b]	35.6 ± 14.7	40.2 ± 19.6	NS
Inhibin B on day 1 of stimulation (pg/mL)[b]	22.0 ± 17.5	28.6 ± 22.7	NS
E_2 on day of OI (pg/mL)[a]	2,285 ± 1,036	2,272 ± 1,109	NS
Inhibin B on day of OPU (pg/mL)[c]	299 ± 195	228 ± 150	.022
No. of oocytes retrieved[a]	7.2 ± 2.2	7.1 ± 2.3	NS
No. of embryos replaced[a]	3.5 ± 0.8	3.5 ± 0.7	NS

Note: Data are mean ± SD. All statistical tests are paired. BMI = body mass index; OI = ovulation induction; OPU = oocyte pickup; NS = not significant.

[a] n = 55 for both groups.

[b] n = 40 for both groups.

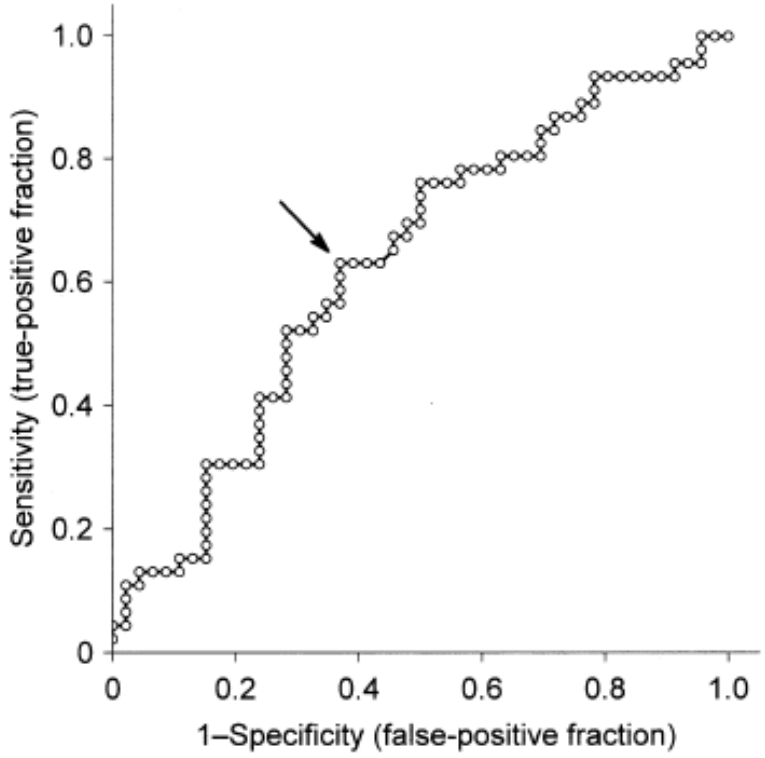
[c] n = 46 for both groups.

Urbancsek. Inhibin B to predict IVF outcome. Fertil Steril 2005.

Inhibin B during ovarian stimulation

FIGURE 1

Receiver-operating characteristic (ROC) curve for the prediction of the establishment of clinical pregnancy by inhibin B on day of oocyte pickup (area under the ROC curve = 0.63). The *arrow* indicates the optimal cut-off point (≥216 pg/mL) for differentiating between pregnant and nonpregnant cycles.



Urbancsek. Inhibin B to predict IVF outcome. Fertil Steril 2005.

Pregnancy outcome

- Early pregnancy loss (≤12 weeks)
  - first trimester abortions
  - ectopic pregnancies
- Viable pregnancies (>12 weeks)
  - singleton ongoing pregnancies
  - multiple ongoing pregnancies

Inhibin B during ovarian stimulation

TABLE 3

Comparison of patients with different pregnancy outcomes.

	Early pregnancy losses (n = 9)	Ongoing pregnancies (n = 56)	P^a	Singleton ongoing pregnancies (n = 30)	Multiple ongoing pregnancies (n = 26)	P^b
E_2 on day 1 of stimulation (pg/mL)	37.4 ± 9.2	36.2 ± 15.0	NS	33.7 ± 14.5	38.9 ± 15.4	NS
Inhibin B on day 1 of stimulation (pg/mL)	19.6 ± 11.1	23.0 ± 18.1	NS	25.1 ± 19.8	20.8 ± 16.4	NS
E_2 on day of OI (pg/mL)	2,203 ± 950	2,404 ± 1,032	NS	2,639 ± 1,158	2,077 ± 736	NS
Inhibin B on day of OPU (pg/mL)	307 ± 147	276 ± 195	NS	282 ± 204	270 ± 188	NS
No. of oocytes retrieved	7.2 ± 1.6	7.2 ± 2.3	NS	7.5 ± 2.3	6.8 ± 2.2	NS
No. of embryos replaced	3.8 ± 0.7	3.5 ± 0.7	NS	3.5 ± 0.8	3.6 ± 0.7	NS

Note: Beside 55 patients with matched nonpregnant pairs, 10 additional pregnant patients without matched pairs were also included for these analyses. Data are mean ± SD.

[a]*P* values for comparison between early pregnancy losses and ongoing pregnancies.

[b]*P* values for comparison between singleton and multiple ongoing pregnancies.

Urbancsek. Inhibin B to predict IVF outcome. Fertil Steril 2005.

Conclusions I.

Serum inhibin B measurements before gonadotropin stimulation do not have predictive value in view to

- **treatment outcome**
- **pregnancy outcome**

Conclusions II.

Serum inhibin B measurements on the day of oocyte pick-up do have predictive value in view to

- **treatment outcome**

independently of

- **age**
- **peak E2**
- **oocyte number**
- **number of transferred embryos**

Clinical significance of inhibin A measurement

- **prediction of early pregnancy outcome**
  (Clifford et al. 1997, Urbancsek et al. 2000, Hauzman et al. 2004)

- **early prediction of preeclampsia** (Muttukrishna *et al*, 1997)
- **screening for Down-syndrome** (Wald *et al*, 1996)
- **follow-up of trophoblast deseases**(Minami *et al,* 1993)
- **diagnosis and follow-up of ovarian cancer** (Lappöhn *et al,* 1989)

Aims of the study

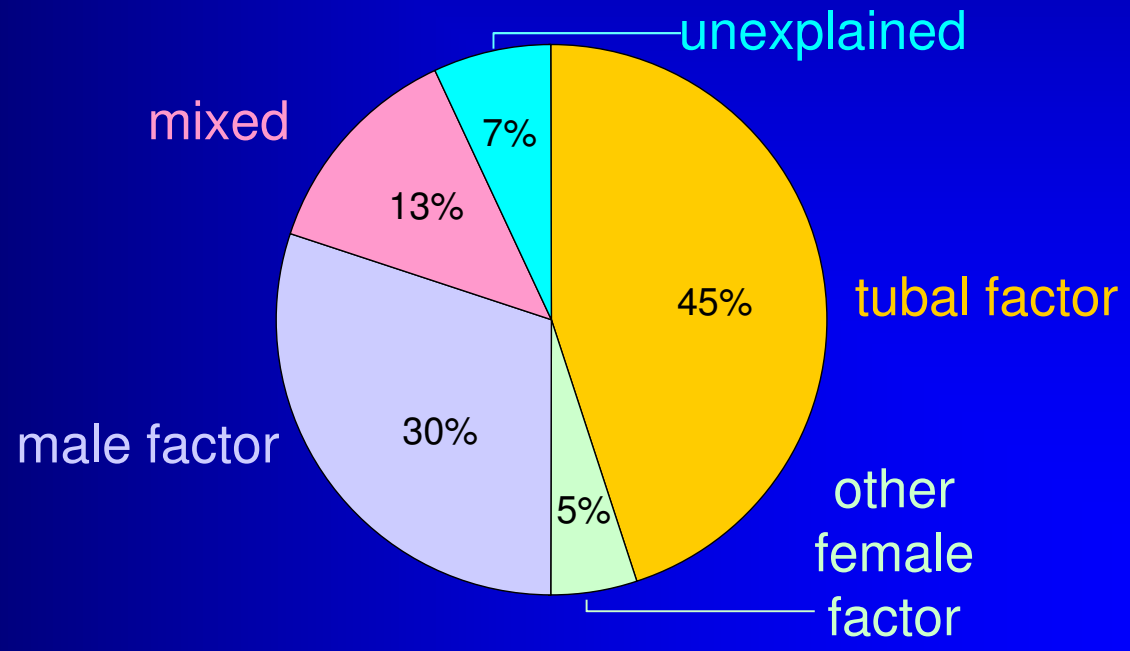
To find out whether inhibin A measurements performed around two weeks after *in vitro* fertilization (IVF) and embryo transfer (ET)

- **may be indicative of pregnancy**
- **can predict various pregnancy outcomes**

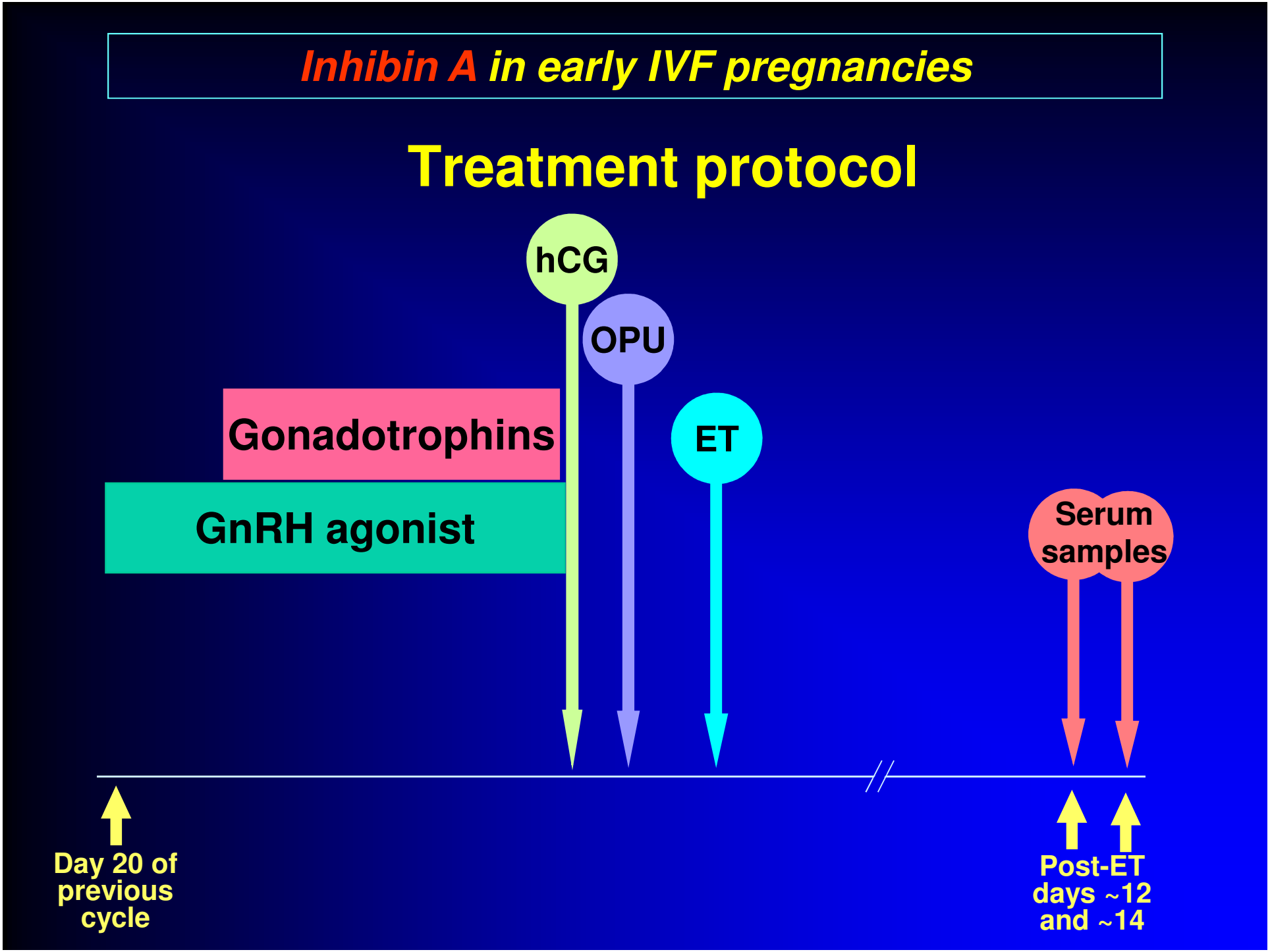
Inhibin A in early IVF pregnancies

Patients

- pregnant cycles: 176 consecutive IVF/ICSI pregnancies
- controls: 50 non-pregnant cycles of the same patients
- cause of infertility:



Inhibin A in early IVF pregnancies

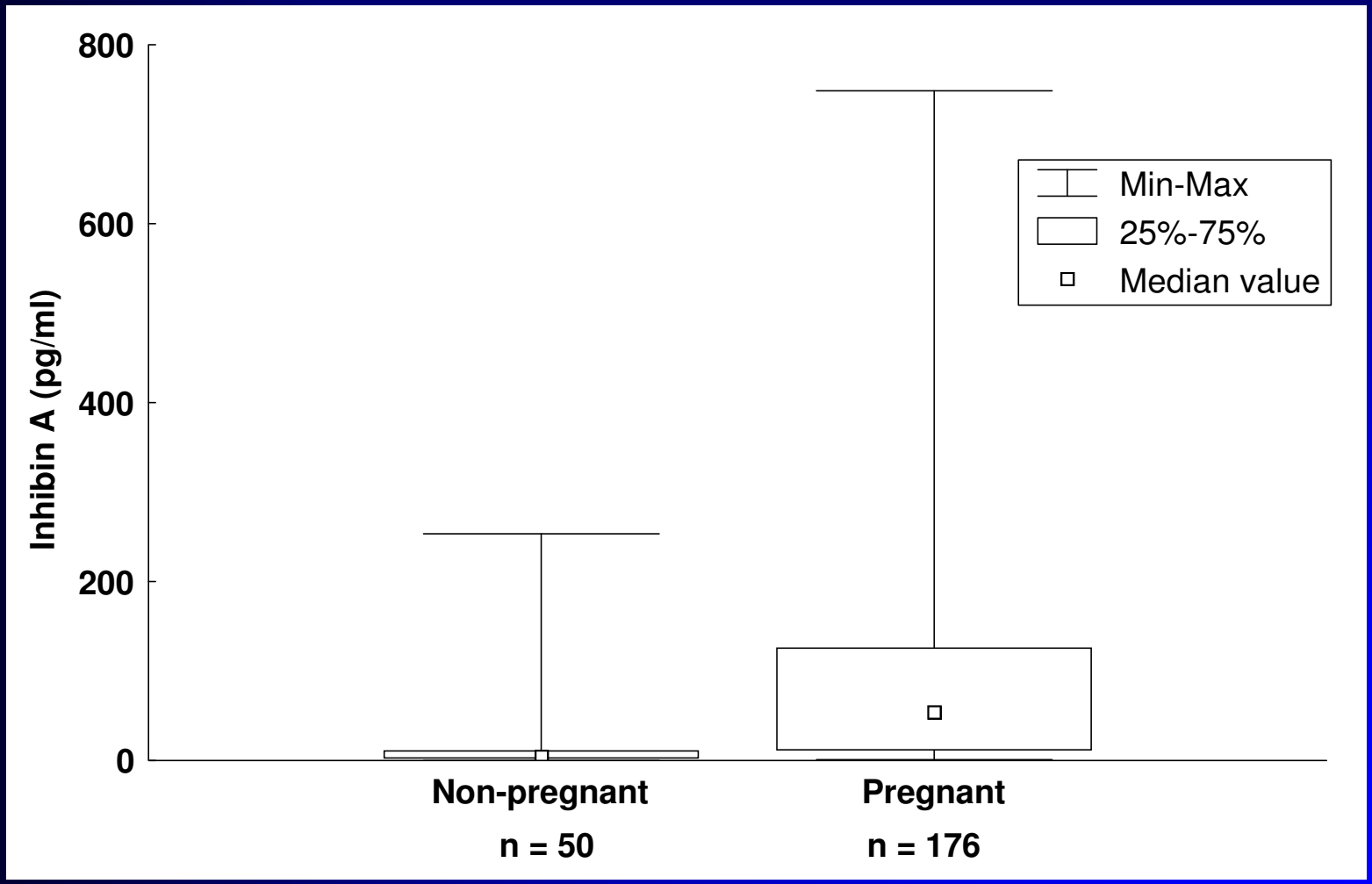


Pregnancy outcome

- Early pregnancy loss (≤12 weeks)
  - preclinical abortion (biochemical pregnancy)
  - first trimester abortion
  - ectopic pregnancy
- Ongoing pregnancy (>12 weeks)
  - singleton ongoing pregnancy
  - multiple ongoing pregnancy

Inhibin A in early IVF pregnancies

Serum inhibin A levels in pregnant and non-pregnant IVF cycles



Serum inhibin A levels in pregnant and non-pregnant IVF cycles

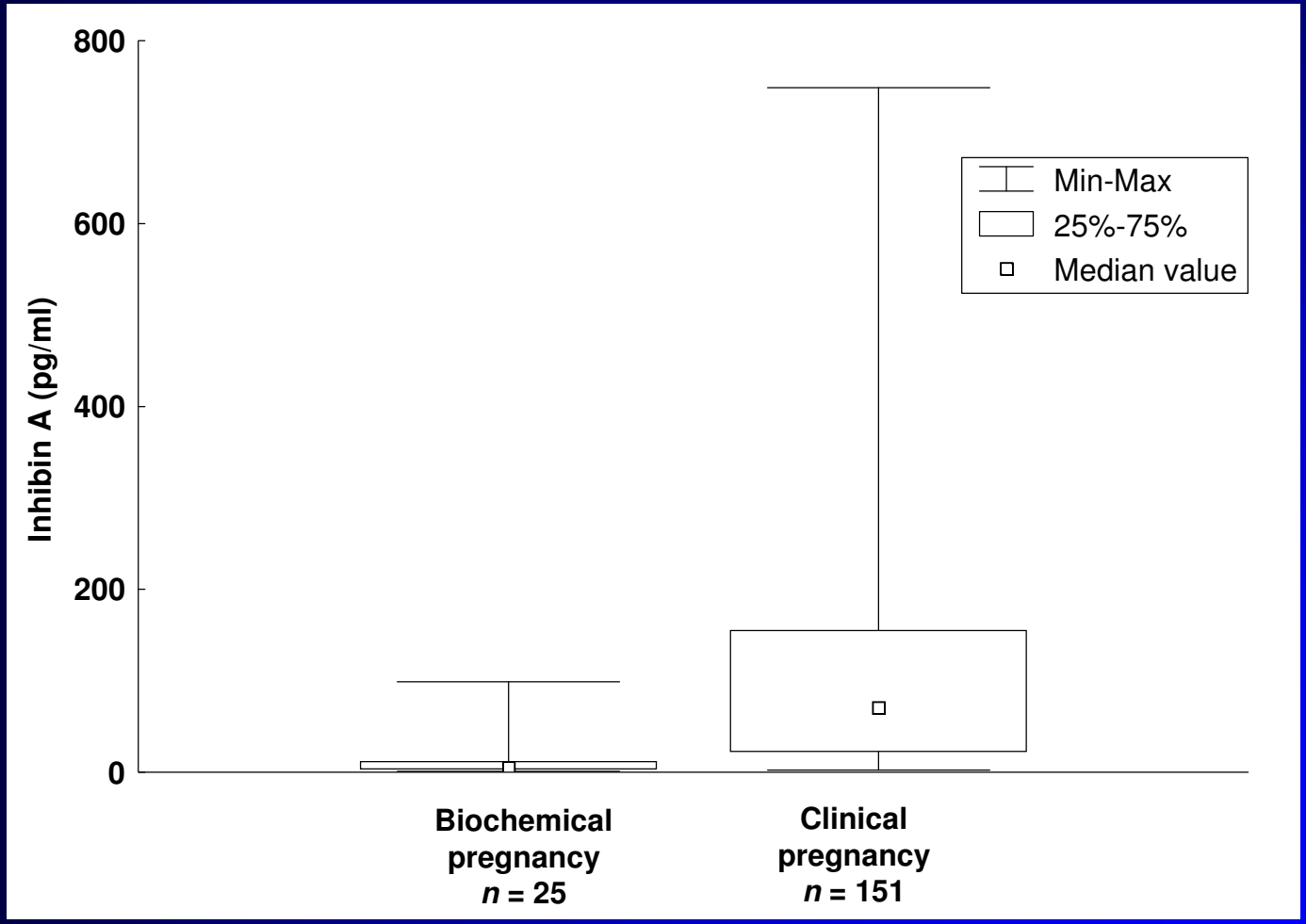
Non-pregnant cycles (n = 50)	Pregnant cycles (n = 176)
4.3 (2.4 – 10.8) pg/ml*	53.8 (11.5 – 125.4) pg/ml*
$P < 0.0001$**	

* Data presented as medians (25^{th}–75^{th} percentiles)

**Wilcoxon's matched pairs test

Inhibin A in early IVF pregnancies

Serum inhibin A levels in biochemical and clinical IVF pregnancies



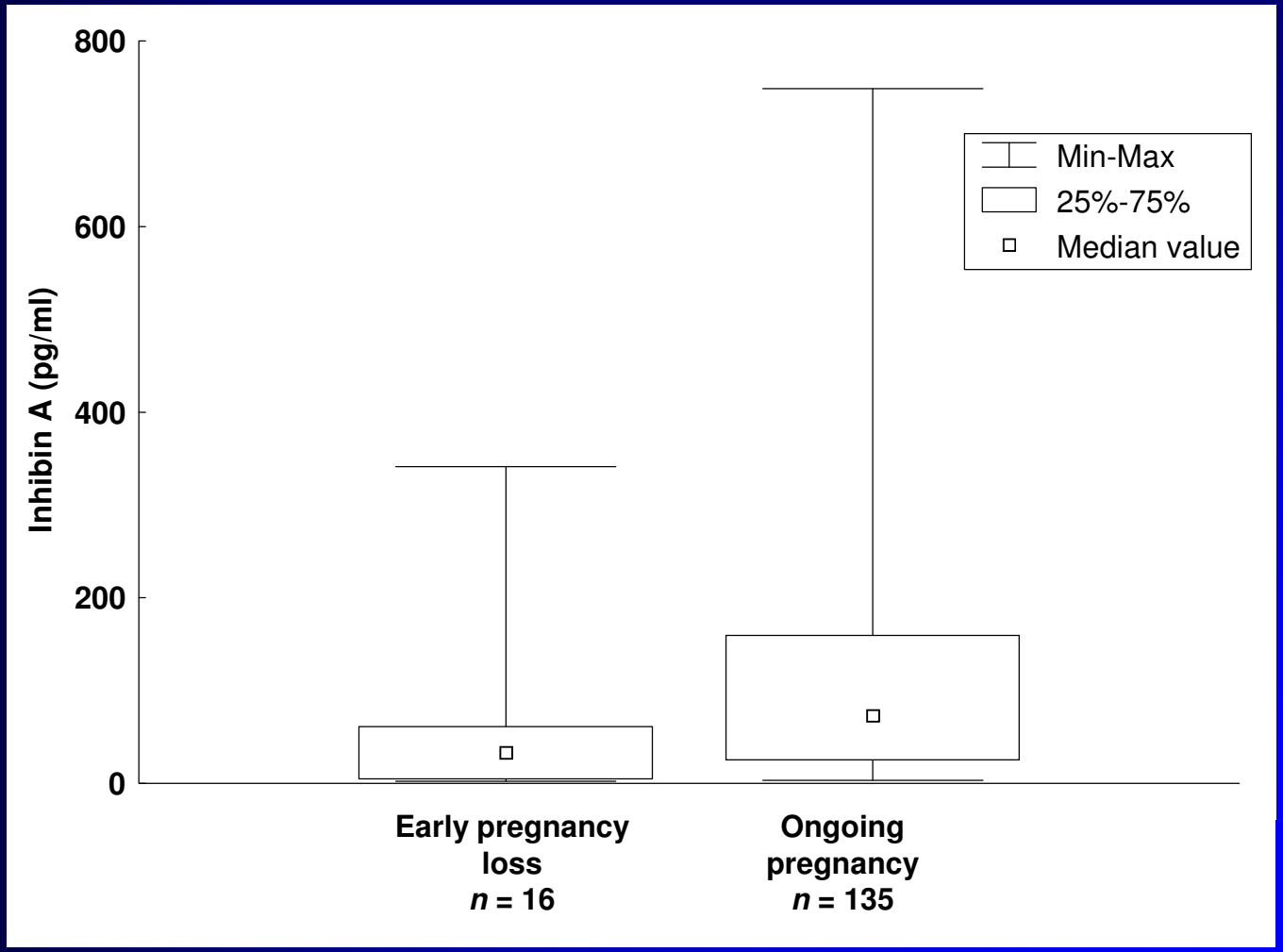
Serum inhibin A levels in biochemical and clinical IVF pregnancies

Biochemical pregnancies (n = 25)	Clinical pregnancies (n = 151)
5.3 (3.3 – 11.5) pg/ml*	70.4 (22.5 – 155.0) pg/ml*
$P < 0.0001$**	

* Data presented as medians (25^{th}–75^{th} percentiles)
**Mann–Whitney *U* test

Inhibin A in early IVF pregnancies

Serum inhibin A levels in early pregnancy loss and ongoing pregnancies



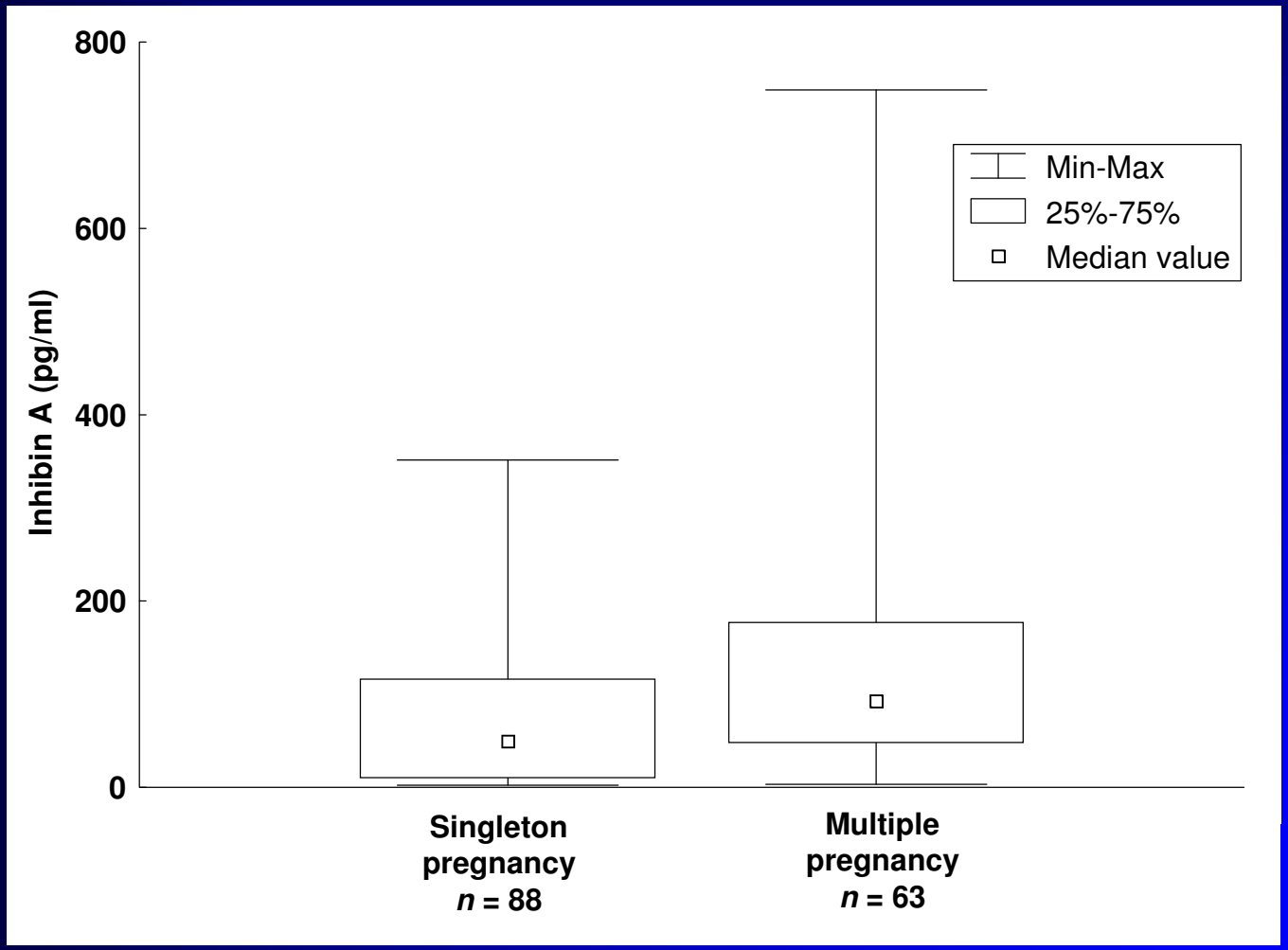
Serum inhibin A levels in early pregnancy loss and ongoing pregnancies

Early pregnancy loss[a] (n = 16)	Ongoing pregnancies[b] (n = 135)
33.2 (4.5 – 61.1) pg/ml[c]	73.1 (25.1 – 159.3) pg/ml[c]
$P = 0.02$[d]	

[a]Clinical pregnancy ≤ 12 weeks
[b]Clinical pregnancy > 12 weeks
[c]Data presented as medians (25th–75th percentiles)
[d]Mann–Whitney *U* test

Inhibin A in early IVF pregnancies

Serum inhibin A levels in singleton and multiple pregnancies



Serum inhibin A levels in singleton and multiple pregnancies

Singleton pregnancies (n = 88)	Multiple pregnancies (n = 63)
49.5 (10.1 – 116.2) pg/ml*	92.7 (47.6 – 177.1) pg/ml*
$P < 0.001$**	

* Data presented as medians (25^{th}–75^{th} percentiles)

**Mann–Whitney *U* test

Conclusions

Serum inhibin A measurements around two weeks after ET have a predictive value in view to

- **treatment outcome**
- **pregnancy outcome**

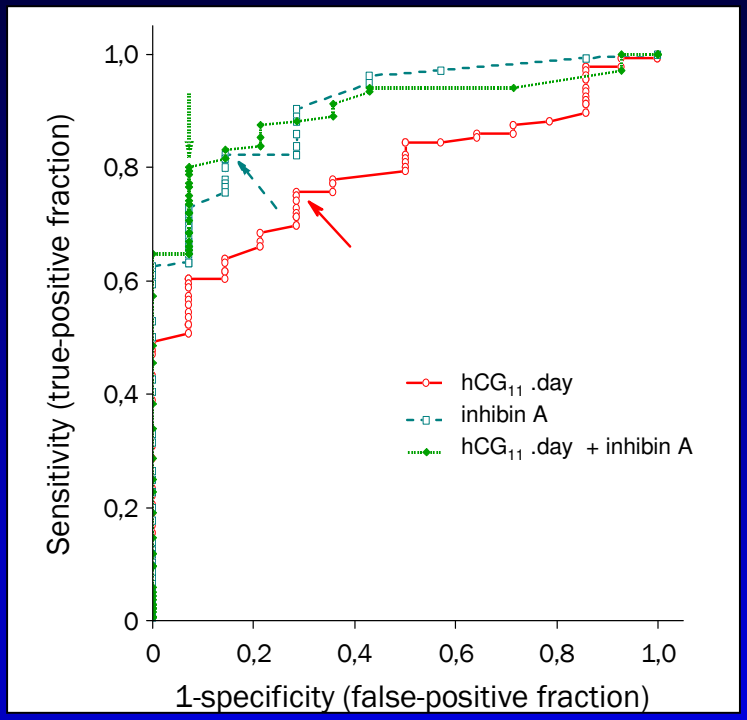
Aim of the study

To compare the predictive accuracy of serum inhibin A measurements with serum hCG measurements.

Inhibin A in early IVF pregnancies

Use of serum inhibin A and hCG measurements to predict the outcome of IVF pregnancies

(Hauzman et al. Fertil. Steril. 2004)



clinical pregnancies ↔ preclinical abortions

	AUC (95% CI)	Optimal cutoff	Sensitivity	Specificity	PPV	NPV
Day 11 hCG level	0,79 (0,69–0,89)[a,b]	46 IU/l	0,76	0,71	0,96	0,23
Mean inhibin A level	0,91 (0,85–0,96)[a]	12 pg/ml	0,82	0,86	0,98	0,33
Linear combination (X) (hCG + inhibin A)	0,90 (0,84–0,96)[b]	1,7	0,80	0,93	0,99	0,33

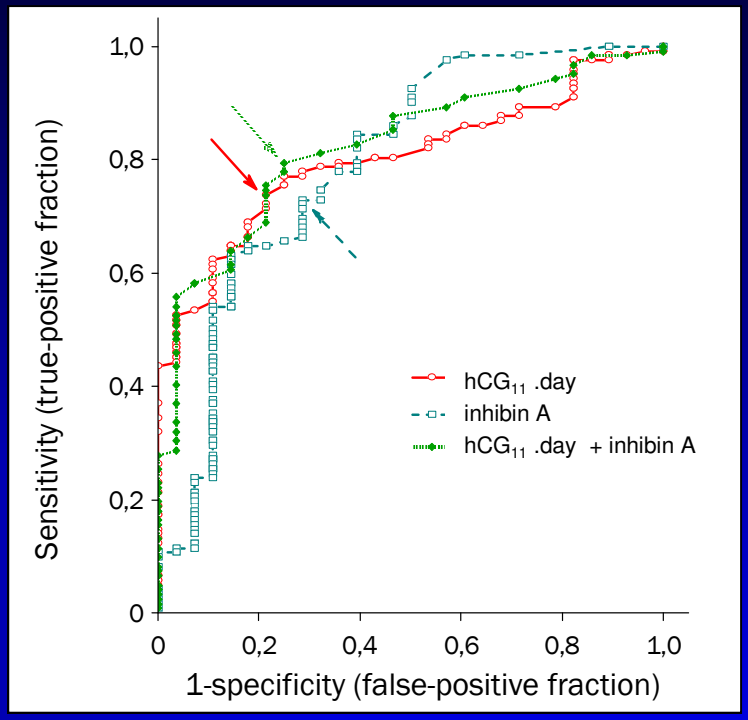
$X = 0{,}0622 + 0{,}00843 \times hCG_{11.\,day} + 0{,}0708 \times$ inhibin A

[a] $P = 0{,}02$; [b] $P < 0{,}001$

Inhibin A in early IVF pregnancies

Use of serum inhibin A and hCG measurements to predict the outcome of IVF pregnancies

(Hauzman et al. Fertil. Steril. 2004)



ongoing pregnancies ↔ early pregnancy losses

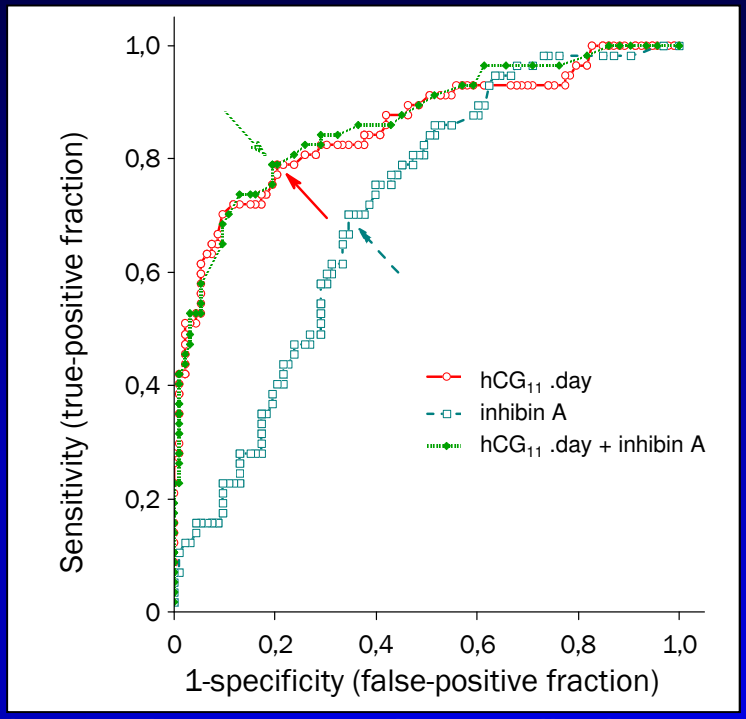
	AUC (95% CI)	Optimal cutoff	Sensitivity	Specificity	PPV	NPV
Day 11 hCG level	0,80 (0,73–0,88)	58 IU/l	0,74	0,79	0,94	0,41
Mean inhibin A level	0,79 (0,71–0,87)	28 pg/ml	0,73	0,71	0,92	0,38
Linear combination (X) (hCG + inhibin A)	0,83 (0,75–0,90)	0,9	0,80	0,75	0,93	0,46

$Y = -0{,}464 + 0{,}0210 \times hCG_{11.\,day} + 0{,}00686 \times \text{inhibin A}$

Inhibin A in early IVF pregnancies

Use of serum inhibin A and hCG measurements to predict the outcome of IVF pregnancies

(Hauzman et al. Fertil. Steril. 2004)



multiple ongoing pregnancies ↔ all other outcomes

	AUC (95% CI)	Optimal cutoff	Sensitivity	Specificity	PPV	NPV
Day 11 hCG level	0,86 (0,79–0,92)[a]	100 IU/l	0,79	0,80	0,70	0,86
Mean inhibin A level	0,71 (0,62–0,80)[a,b]	60 pg/ml	0,70	0,66	0,56	0,78
Linear combination (X) (hCG + inhibin A)	0,86 (0,80–0,93)[b]	–0,5	0,79	0,81	0,71	0,86

$Z = -3{,}114 + 0{,}0199 \times hCG_{11.\,day} + 0{,}00366 \times$ inhibin A

[a] $P = 0{,}004$; [b] $P < 0{,}001$

Conclusions

Serum inhibin A measurements are more accurate than hCG measurements for predicting preclinical abortion after IVF,

but

they have no advatage in forecasting ongoing or multiple ongoing pregnancies.

Summary I.

Measurement of serum inhibin B concententration

- has predictive value
  - - in premature ovarian insufficiency on day 3 of the cycle
  - - in view to ovarian response on day 1 of gonadotrophin stimulation
- seems to have predictive value to IVF treatment outcome on the day of OPU

Summary II.

Measurement of serum inhibin A concentration two weeks after ET has predictive value in view to treatment and pregnancy outcome, however it overtakes the value of hCG measurement only in view to preclinical abortions.