surrogates of six hysterectomized women became pregnant, while five did so (one surrogate became pregnant twice) for the Rokitansky syndrome patient group.

Outcome parameters of the study population

Variables	Rokitansky syndrome (n = 6)	Hysterectomized (n = 16)
Mean patient age (range) (years)	30.8 (27–35)	38.8 (33–46)
Mean age of surrogate (range) (years)	33.8 (29–39)	29.4 (23–39)
Mean no. of oocytes retrieved (range)	13.7 (4–40)	8.5 (1–22)
No. of cycles started (reached oocyte retrieval)	12 IVF, 3 FER (12 IVF)	21 IVF, 1 FER (18 IVF)
No. of cycles reaching embryo transfer	11 IVF, 3 FER	16 IVF, 1 FER
Fertilization rate (%)	68.3	65.0
Mean no. of embryos transferred (and cryopreserved)	2.9 (6.0)	2.4 (2.2)
No. of pregnancies per embryo transfer (%)	6/14 (43)	6/17 (35)
No. of miscarriages	3	2
No. of babies	Twins 1; singletons 1; ongoing 1	Twins 3; singletons 1

FER = frozen embryo replacement.

Conclusion: Gestational surrogacy is a viable treatment option for these females. Patients with Rokitansky syndrome seem to have a better outcome than hysterectomized women. This may be related to their younger age. It is also possible that hysterectomy accelerates ovarian senescence.

P-056. ICSI without polyvinylpyrrolidone: report of a series of 305 consecutive treatment cycles

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Introduction: The majority of IVF centres are currently using a solution of polyvinylpyrrolidone (PVP) for the successful achievement of ICSI. To avoid introducing such a potentially harmful agent into the oocyte, we have developed a PVP-free ICSI procedure.

Materials and methods: A total of 283 patients were treated with ICSI between July 1995 and December 1996. Sperm defects consisted of a low sperm count ($10.46 \pm 12.96 \times 10^6$/ml; range 1×10^{-4}–80) and severe asthenozoospermia (percentage progressive motility 8.10 ± 7.30%; range 0–40) associated with severe teratozoospermia (percentage abnormal forms 85.83 ± 14.81%; range 60–95). Multifollicular induction, oocyte retrieval and sperm sample preparation were conducted as described previously (Jean *et al.*, 1992). Denuded oocytes to be injected were transferred one after another with 5 µ sperm suspension in a 0.4 ml drop of fresh B2 medium onto the lid of a Nunclon four-well dish and then placed under an inverted microscope fitted with two manipulators. The motile selected spermatozoon was immobilized by lowering the injection pipette and pressing the tail against the bottom of the lid until it stopped moving. Once immobilized, the spermatozoon was sucked, tail first, into the pipette and then injected into the oocyte using the smallest possible volume of B2 medium.

Results: The overall results of our ICSI programme are summarized below.

Results of PVP-free ICSI at our IVF centre

	Origin of the spermatozoon		Total
	Fresh	Epididymal	
No. of cycles (oocytes collection)	282	23	305
No. oocytes injected	2021	178	2199
No. of intact oocytes	1546	141	1687
No. of oocytes fertilized (2PN)	927	76	1003
Fertilization rate (%)	60	54	60
No. of embryo transfers	258	21	279
Embryo transfer rate per cycle (%)	91	90	91
No. of pregnancies (β-HCG positive)	38	4	42
Pregnancy rate per cycle (%)	13	17	14
Pregnancy outcome	7	2	9
Implantation rate per embryo (%)	7.0 (45/649)	12.0 (6/47)	7.3 (51/696)
No. of children born	10	3	13

Viable pregnancies were ongoing or delivered at the time of writing. Biochemical pregnancies were not included.

Conclusions: Our results confirm that ICSI can be achieved successfully without using PVP. It now seems difficult to justify the injection of any potentially harmful agent into the oocyte during the ICSI procedure.

Reference:

Jean *et al.* (1992) *Fertil. Steril.*, **57,** 591–596.

P-057. Computation of sperm motion for the prediction of fertilization *in vitro* of cumulus-enclosed human oocytes

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Introduction: In various animal models hyperactivated motility is an essential property of capacitated spermatozoa and is characterized by the sudden appearance of a vigorous motion pattern. Several algorithms have been proposed to measure with computer-assisted sperm analysis (CASA) the rate of hyperactivated motility of human spermatozoa. Whether the fertilizing failure of spermatozoa in IVF is caused by a lack of hyperactivated motility or by an unspecific inadequacy of sperm motion has yet to be studied. This study prospectively assessed the predictive value of six different algorithms of hyperactivated motility together with the percentile values of

single motion parameters for the fertilization rate of cumulus-enclosed human oocytes *in vitro*.

Materials and methods: A total of 169 couples treated with conventional IVF were selected for this prospective study. The median curvilinear velocity (VCL) of the swim-up spermatozoa was measured with CASA. The number of washed spermatozoa inseminated into each oocyte in 0.1 ml culture medium was based on VCL. In those samples displaying a low median VCL value it was predicted that fertilization would not take place and high numbers of spermatozoa (200 000/0.1 ml) were inseminated. In those with high median VCL values the fertilization of three oocytes was predicted and fewer spermatozoa were inseminated (16 000/0.1 ml). Based on the results of IVF the true-positive (88 couples, 52.1%) and true-negative (20 couples, 11.8%) rates of the prediction were calculated.

Results: The sensitivity of the prediction of IVF with CASA was 92% and the specificity was 24%. Six different published algorithms describing hyperactive motility were applied to the CASA data of the true-positive and true-negative patient groups. All six resulted in statistically significantly higher hyperactivity rates in the true-positive group. In addition, three single-motion parameters [VCL, lateral head displacement (ALH) and linearity (LIN)] permitted distinction between the samples with high and low fertilization rates. To screen for cut-off values distinguishing between both patient groups, the data for all motion parameters were split into percentile values: at all percentile levels the values of VCL, ALH and LIN were significantly different between the groups, and no distinctive cut-off value was identified.

Conclusion: Fertilization failure in IVF is caused rather by a more general and unspecific disturbance of sperm motion than by just a lack of hyperactivated motility.

P-058. Relationship between ovarian response and plasma FSH concentration following menotrophin administration

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Introduction: The variability of ovarian response during stimulation by gonadotrophins in IVF protocols is one of the main difficulties encountered in assisted reproduction, despite the use of GnRH agonists. Ovarian status, explored by basal FSH concentration, is one of the explanations for this variability. It has also been suggested that the plasma concentration of FSH could vary from one patient to another undergoing the same stimulation by gonadotrophins and that this could be used as a predictive test of oestradiol response in patients undergoing an IVF treatment following desensitization by GnRH agonists using a long-term protocol.

Materials and methods: A total of 23 patients with a normal basal FSH concentration (range 2.3–7.8) were stimulated with either HMG or highly purified FSH following a 20 day-long desensitization by either a single injection of 3 mg triptorelin or daily s.c. injections of 0.1 mg triptorelin. Ovarian desensitization was assessed on day 1 by a serum oestradiol concentration <50 pg/ml. Patients received 2.0, 2.5, 3.0, 3.5 or 4.0 ampoules/day during the first 4 days, according to the expected stimulation response. The dose of hormone was adapted on stimulation day 5 and subsequent days, according to the serum oestradiol concentration and, when necessary, to the vaginal sonography. Serum FSH concentrations were assessed simultaneously with oestradiol up to the day of ovulation induction by 10 000 IU HCG. Patients were classified into three groups according to the oestradiol response: group 1 (high response), when the serum oestradiol concentration curve exceeded the 90th percentile; group 2 (medium response), when the curve remained between the 100th and the 90th percentile; and group 3 (low response), when the curve remained below the 10th percentile.

Results: We first studied the variation of FSH alter 4 days of stimulation (dFSH D1–D5). We found a significant linear correlation between FSH D1–D5 and the dose of gonadotrophin administered ($r = 0.42$, $P < 0.02$). This variation was not correlated ($r = -0.3$, not significant) to the body mass index [= weight (kg)/height^2 (m^2)], but our population was small and showed a narrow distribution of BMI (range 17.9–26.2). There was no difference either between the HMG and high purity FSH groups, or between the 3 mg triptorelin and 0.1 mg triptorelin groups. More interesting, dFSH D1–D5 was the same, according to the dose of gonadotrophin administered, whether or not the oestradiol response was in group 1, 2 or 3; oestradiol response was not predictable in our population by dFSH D1–D5. Next we analysed the profile of serum FSH concentration throughout the stimulation: FSH concentration reached a plateau at day 5, the value of which was correlated with the dose of gonadotrophin administered; however the area under the curve did not differ significantly between groups 1, 2 and 3. One interesting characteristic of FSH concentration was the rapid decline when gonadotrophin administration was discontinued: the day after HCG injection, mean decline was 31.6 ± 15.7% and was not dependent on either BMI or the dose of gonadotrophin administered on the last days of stimulation.

Discussion and conclusion: The exogenous administration of FSH to ovary-desensitized women leads, after 4 days, to a dose-dependent serum FSH concentration which is not predictive of ovarian oestradiol response throughout stimulation. Moreover, women with radically different profiles of oestradiol response (groups 1, 2 and 3), but with normal basal FSH concentrations, show similar profiles of FSH evolution throughout stimulation. As oestradiol secretion reflects ovarian response to stimulation, we may conclude from this observation that an explanation for its variability among women undergoing IVF treatment does not lie in a different metabolism of FSH but in the variability of ovarian and follicular sensitivity to circulating FSH.