

## SEMEN CHARACTERISTICS AND INFERTILITY IN AGING

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A study was initiated to compare the spermograms according to age in 570 consecutive men with a history of infertility. The semen was evaluated by computer-assisted semen analysis (CSA) and by the hyposmotic swelling test (HOS). A statistical difference was seen between men over 50 years of age compared with younger men, but only for the HOS scores and velocity. No statistical differences were found on any of the other parameters. Since most semen parameters were similar even in the men over age 50, a definite decline in fertility potential with increasing age could not be determined by this study.

**Key Words:** Semen; Age; Infertility; Fertility.

### INTRODUCTION

Fecundity decreases, with advancing age. One important factor in males may be a reduction in sperm concentration and motility [5]. In females, ovulation disorders are more frequent after age 30 and the average age of menopause is 50 [6]. Although men may have children at a far older age than their female counterparts, it is not known whether a higher percentage of males produce subfertile sperm with advancing age. A study was initiated to evaluate whether there is a greater male factor contribution in infertile couples as the age of the husband increases. The study involved a retrospective analysis of the spermograms from husbands of 570 consecutive couples presenting with infertility. The ages of the husbands ranged from 22 to 70 years. Each semen sample was evaluated by both the CellSoft computer assisted semen analysis (Cryo Resources Ltd.), and the hyposmotic swelling test [4]. The latter was performed by adding 1 ml of hyposmotic reagent to 0.1 ml of well-mixed semen, followed by incubation of the mixture for 30 min at 37°C. After incubation, microscopic evaluation was made and the percentage of sperm with swollen tails was determined. The computer-assisted semen analysis (CSA) included the following parameters: (1) count (millions/ml); (2) percent motility; (3) velocity ( $\mu\text{m/s}$ ); (4) linearity (straight-line velocity divided by curvilinear velocity); (5) lateral head displacement (ALH) evaluated as ALH mean ( $\mu\text{m}$ ) and ALH max ( $\mu\text{m}$ ), and beat/cross frequency (Hz1/s); (6) morphology (percent of normal). The hyposmotic swell-

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ing (HOS) scores were judged as normal,  $\geq 60\%$ ; gray zone, 50–59%; and abnormal,  $< 50\%$  of the sperm demonstrate swelling. The patients were divided into four groups by age: group 1,  $> 50$ ; group 2, 41–50; group 3, 31–40; and group 4, 22–30 years.

The data for the CSA evaluation and HOS scores (Table 1) were analyzed by analysis of variance. A  $p$  value of  $\leq 0.05$  was considered as statistically significant. A Bonferroni correction for multiple comparison was applied. There were no statistically significant differences among any of the four groups for count, percent motility, linearity, and ALH mean.

Statistical differences, however, were seen in the HOS scores as follows: group 1 vs. group 3,  $p < 0.001$ ; group 1 vs. group 4,  $p < 0.001$ ; group 1 vs. 2, 3, and 4 combined,  $p < 0.002$ . Velocities also showed statistical differences: velocities were significantly lower in group 1 than in group 2 ( $p < 0.05$ ), group 3 ( $p < 0.01$ ), and group 4 ( $p < 0.03$ ). Group 1 vs. 2, 3, and 4 combined showed a  $p$  value of 0.02. There were no differences between groups 2, 3, and 4 for velocity.

The comparison of the percentage of subnormal HOS scores ( $< 50\%$ ) showed 29% in group 1, 7% in group 2, 2% in group 3, and 2% in group 4. Statistical analysis by  $\chi^2$  showed group 1 as significantly different from groups 2, 3, and 4 ( $p \leq 0.001$ ) in the subnormal HOS scores.

## DISCUSSION

Previous data have shown a correlation between subnormal HOS scores and infertility [2]. However, although the average HOS score fell within the grey-zone for group 1 men, only 2 of 7 (29%) had subnormal HOS scores [1]. Clinically there may be no significant difference between fertility potential in men with gray zone vs. normal HOS scores. To date, we have not encountered a pregnancy in the wife of a husband with a subnormal HOS score. Perhaps in the future, with additional knowledge and experience, more subtle fertility potentials may be discerned between gray zone and normal HOS groups.

The data presented here suggest that up to age 50, no differences exist between the different semen parameters on CSA except for reduced velocity [3]. Though men over 50 do show reduced HOS scores, further investigation is needed to determine the clinical significance of these findings.

TABLE 1 Mean Values for Each Semen Parameter in the Four Age Groups

Parameters	Means for Each Age Group			
	Group 1	Group 2	Group 3	Group 4
Count $\geq 20 \times 10^6/\text{ml}$	76 $\pm$ 61	84 $\pm$ 57	87 $\pm$ 79	71 $\pm$ 66
Percent motility $\geq 50$	34 $\pm$ 14	44 $\pm$ 20	49 $\pm$ 19	39 $\pm$ 20
Velocity $\geq 40 \mu\text{m/s}$	35 $\pm$ 7	43 $\pm$ 9	44 $\pm$ 10	43 $\pm$ 8
Linearity $\geq 5.5$	5.4 $\pm$ 1.3	6.0 $\pm$ 1.1	6.0 $\pm$ 1.0	5.8 $\pm$ 1.2
ALH max $\geq 2.30 \mu\text{m}$	2.4 $\pm$ 0.5	2.6 $\pm$ 0.6	2.6 $\pm$ 0.7	2.6 $\pm$ 0.7
Beat/cross freq. $\geq 13 \text{ Hz}/\text{s}$	14.8 $\pm$ 1.7	15.3 $\pm$ 1.9	15.3 $\pm$ 1.7	15.3 $\pm$ 2.7
Morphology $\geq 50\%$ normal	46 $\pm$ 15	37 $\pm$ 15	36 $\pm$ 15	39 $\pm$ 16
HOS $\geq 60\%$	58 $\pm$ 9	68 $\pm$ 12	71 $\pm$ 10	72 $\pm$ 10

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