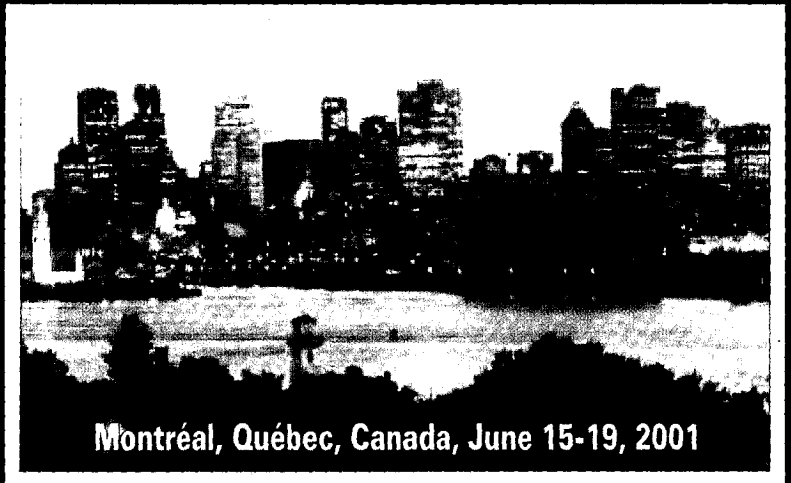


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***MEDICAL PUBLICATIONS***

# The Relative Discrepancy Between Viability and Hypo-Osmotic Swelling Test (HOST) Scores Is Not Related to In Vitro Fertilization (IVF) Outcome

J.H. Check, D. Kiefer, M.L. Check, C. Wilson and J.K. Choe

*The University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School at Camden, Cooper Hospital University Medical Center  
Division of Reproductive Endocrinology & Infertility, Camden, NJ, U.S.A.*

## Summary

The hypo-osmotic swelling test (HOST) score when  $<50\%$  is associated with very poor pregnancy rates (PRs) associated with implantation failure, not failed fertilization. The study presented here evaluated whether a large discrepancy between the viability test (which measures structural integrity of the sperm membrane) and HOST score (which measures functional integrity of the sperm membrane) may also predict the presence of the toxic factor that causes embryo implantation disorders. The relative discrepancies were divided into four quartiles. There were no differences in clinical or viable PRs or implantation rates according to percentile. Thus, these data do not support the hypothesis that the relative discrepancy between HOST scores and viability is related to IVF outcome.

## Introduction

Marked reduction in fecundity has been found related to male partners having semen demonstrating subnormal ( $<50\%$ ) hypo-osmotic swelling test (HOST) scores (1). The test measures the functional integrity of the sperm membrane (2). The abnormality interestingly does not prevent the sperm from fertilizing the oocyte (3-6), but instead prevents the embryo from implanting (7, 8).

Viability is a measure of the structural integrity of the sperm membrane. The fact that *in vitro* fertilization (IVF) with intracytoplasmic sperm injection (ICSI) has been extremely successful in obviating the HOST defect (9), and that treating the sperm with a protein digestive enzyme (chymotrypsin) may also on occasion allow pregnancies (10), it has been hypothesized that the HOST abnormality may be related to a toxic protein attached to the sperm that gets transferred to the zona pellucida by supernumerary sperm; the hypothesis continues that this toxic factor remains a part of the embryo and impairs the functional integrity of the embryo membrane which prevents implantation (11).

Sperm with poor structural integrity as manifested by poor viability would automatically have low HOST scores but yet theoretically not have attached to them, the hypothesized toxic protein. The study presented here evaluated whether patients with a relative large discrepancy between viability and HOST score, even though the HOST score remains above 50%, may still have present the purported toxic factor and thus manifest low implantation rates.

## Materials and Methods

A retrospective study of IVF-embryo transfer (ET) cycles was performed.

Inclusion criteria were that female partners were <40 years old and used their own gametes, at least four oocytes were retrieved, the first cycle per patient in the study was used, the minimal HOST score was 50%, the males also had all other semen parameters normal ( $\geq 20 \times 10^6$ /mL count, motility >40%, strict morphology >4%, and negative antisperm antibodies), and all semen samples used were fresh ejaculates.

All cycles from 1/1/99 to 4/30/00 were reviewed. In addition cases with HOST scores between 50-59% in the period 1/1/97 and 12/30/98 were added to increase the number of patients with grey zone HOST scores.

The difference between the viability and HOST score was computed (relative discrepancy = (viability score - HOST score / viability score).

## Results

There were 58 patients used in the study. The discrepancy scores ranged from 2.3 to 40.4. The 25<sup>th</sup> percentile was 9.1, the 50<sup>th</sup> percentile was 11.1, and the 75<sup>th</sup> percentile was 23.9. Patients were stratified into four groups based on the four quartiles of the discrepancy group. The clinical and viable pregnancy rates per transfer, spontaneous abortion rate, and implantation rate according to quartile is seen in Table 1.

Table 1

	1 <sup>st</sup> quartile Dis. between 2 & 9.1	2 <sup>nd</sup> quartile Dis. between 9.2 & 16	3 <sup>rd</sup> quartile Dis. between 16.1 & 23.9	4 <sup>th</sup> quartile Dis. >24
# of transfers	16	14	14	15
Clinical PR/ transfer	46.7% (7/15)	28.6% (4/14)	50.0% (7/14)	40.0% (6/15)
Viable PR/ transfer	40.0% (6/15)	21.4% (3/14)	35.7% (5/14)	33.3% (5/15)
SAB rate	14.3% (1/7)	25.0% (1/4)	28.6% (2/7)	16.7% (1/6)
Implantation rate	21.7% (10/46)	15.5% (7/45)	21.4% (9/42)	17.9% (10/56)

## Conclusions

These data fail to demonstrate that sperm with HOST scores  $\geq 50\%$  are associated with embryo implantation defects even if there is a wide discrepancy between viability and HOST score. It seems reasonable to conclude that when this toxic factor does exist, it is usually sufficient to reduce the HOST score to  $< 50\%$ . There is probably no advantage in measuring viability when performing IVF as long as the HOST score is measured.

## References

1. CHECK JH, EPSTEIN R, NOWROOZI K, SHANIS BS, WU CH, BOLLENDORF A. The hypoosmotic swelling test as a useful adjunct to the semen analysis to predict fertility potential. *Fertil Steril* 52:159-61, 1989.
2. JEYENDRAN RS, VAN DER VEN HH, PEREZ-PELAEZ BG, CRABO BG, ZANEVELD LJD. Development of an assay to assess the functional integrity of the human sperm membrane and its relationship to other semen characteristics. *J Reprod Fertil* 70:219-28, 1984.
3. BARRATT CLR, OSBORN JC, HARRISON PE, MONLESS N, DUMPHY BC, LENTON EA, CODIE ID. The hypoosmotic swelling test and the sperm mucus penetration test in determining fertilization of the human oocyte. *Hum Reprod* 4:430-4, 1989.
4. SJOBLUM P, COCCIA E. On the diagnostic value of the hypoosmotic sperm swelling test in an in vitro fertilization program. *J In Vitro Fertil Embryo Transfer* 6:41-3, 1989.

5. AVERY S, BOLTON UM, MASON BA. An evaluation of the hypoosmotic sperm swelling test as a predictor of fertilizing capacity in vitro. *Int J Androl* 13:93-9, 1990.
6. CHAN SYW, WANG C, CHAN STH, HO PC. Differential evaluation of human sperm hypoosmotic swelling test and its relationship with the outcome of in-vitro fertilization of human oocytes. *Hum Reprod* 5:84-8, 1990.
7. CHECK JH, STUMPO L, LURIE D, BENFER K, CALLAN C. A comparative prospective study using matched samples to determine the influence of subnormal hypoosmotic test scores of spermatozoa on subsequent fertilization and pregnancy rates following in vitro fertilization. *Hum Reprod* 10:1197-2000, 1995.
8. KATSOFF D, CHECK ML, CHECK JH. Evidence that sperm with low hypo-osmotic swelling scores cause embryo implantation defects. *Arch Androl* 44:227-30, 2000.
9. CHECK JH, KATSOFF D, CHECK ML, CHOE JK, SWENSON K. In vitro fertilization with intracytoplasmic sperm injection is an effective therapy for male factor infertility related to subnormal hypo-osmotic swelling test scores. *J Androl* 22:261-5, 2001.
10. KATSOFF D, CHECK JH. Two methods of achieving pregnancies despite subnormal hypo-osmotic swelling test scores. *Fertil Steril* 68:549-51, 1997.
11. CHECK JH, KATSOFF D, CHECK ML. Some semen abnormalities may cause infertility by impairing implantation rather than fertilization. *Med Hypoth*, In press.



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