Relationship of follicular fluid reactive oxygen species levels and antioxidant capacity with in vitro fertilization pregnancy rates. ¹K. Sharma, Ph.D., ²M Attaran, M.D., ³K Miller, Ph.D., ⁴J Goldberg, M.D., ⁴A Agarwal, Ph.D. and ⁵T Falcone, M.D. ¹Andrology Research & Clinical Laboratories, ²Departments of Urology, ³Gynecology & Obstetrics, Cleveland Clinic Foundation, OH.

Objective: The quality of the oocyte obtained for assisted reproduction may depend on the follicular fluid environment. Elevated levels of reactive oxygen species (ROS) and reduced antioxidant concentration have been implicated in the pathology of male infertility. Similarly, women with unexplained infertility have higher ROS generation in the peritoneal fluid. The purpose of our study was to evaluate follicular fluid ROS levels and total antioxidant capacity (TAC) in women undergoing superovulation for infertility treatment, and to determine if they influence pregnancy rates.

Design: Prospective study in which follicular fluid ROS levels and TAC levels were compared in women who became pregnant versus those who did not.

Materials and Methods: Twenty-six women undergoing IVF were recruited into the study. Their ovarian stimulation consisted of an initial suppression with a GnRH analogue followed by recombinant FSH. After the oocytes were retrieved, clear follicular fluid specimens from each patient were evaluated for ROS and TAC. ROS levels were measured by the chemiluminescence method using luminol as the probe and the results were expressed as counted photons per minute (cpm). TAC was measured in the frozen cell-free follicular fluid aspirates by the enhanced chemiluminescence kit and results were expressed as trolox equivalents. Diagnoses, fertilization rate, and establishment of pregnancy were recorded for all patients. Patients were divided into two groups: women who achieved a successful pregnancy (group I), and those who did not (group II).

Results: Of the 26 women participating in the study, 27% achieved a pregnancy. There were no differences in the mean age of the women or the total number of oocytes retrieved between the two groups. The total number of oocytes recovered in group I was: 13.57 ± 3.46 versus 9.26 ± 1.13 in group II (mean ± SE). Significantly higher ROS levels [log (ROS + 1)] were seen in the group that achieved pregnancy (1.38 ± 0.19 X10⁴ cpm); compared to the group that did not (0.65 ± 0.12 X10⁴ cpm) (P < 0.008). Similarly, higher levels of TAC were seen in women who achieved pregnancy (862.97 ± 101.39) compared to those who did not (690.42 ± 74.67). However, these differences were not significant.

Conclusions: Women who achieved pregnancy by IVF with or without ICSI have higher levels of follicular fluid ROS. The follicular fluid ROS and TAC in women undergoing IVF may have a role in the ability of these women to achieve a pregnancy.