Journal of Andrology, Vol. 25, No. 4, July/August 2004

Standardized Methods for Semen Evaluation in a Multicenter Research Study

CHARLENE BRAZIL[*], SHANNA H. SWAN[†], ERMA Z. DROBNIS[‡], FAN LIU[†], CHRISTINA WANG[§], J. BRUCE REDMON[||] AND JAMES W. OVERSTREET[*] THE STUDY FOR FUTURE FAMILIES RESEARCH GROUP

From the [*] Division of Reproductive Biology, Department of Obstetrics and Gynecology, University of California, Davis, California; the [†] Department of Family and Community Medicine and the [‡] Department of Obstetrics and Gynecology, University of Missouri, Columbia, Missouri; the [§] Department of Medicine, Harbor-UCLA Medical Center, Los Angeles, California; and the [||] Departments of Medicine and Urologic Surgery, University of Minnesota, Minneapolis, Minnesota.

Correspondence to: Dr James W. Overstreet, Center for Health and the Environment, University of California, One Shields Ave, Davis, CA 95616 (e-mail: jwoverstreet{at}ucdavis.edu).

Semen evaluation methodology is complex and difficult to standardize. Rigorously standardized laboratory protocols and strict quality control (QC) are essential for meaningful comparison of data from multiple sites. We describe the methods used for determination of semen volume, sperm concentration, and percent sperm motility in the Study for Future Families, a multicenter study of semen quality in the United States. Each of these 3 semen parameters was assessed using 2 techniques, which provided the opportunity to compare precision and assess suitability for multicenter studies. Detailed protocols were used, and technicians were centrally trained. A total of 509 semen evaluations were performed. Semen volume measured by weight was greater ($P < .0001$) than that determined by pipetting (3.7 ± 1.6 mL vs 3.2 ± 1.6 mL). Sperm concentration determined using hemacytometer chambers was consistently higher ($P < .001$) than that using disposable MicroCell chambers (81.0 x 10^6/mL vs 65.9 x 10^6/mL). Precision was slightly greater for the MicroCell chamber. The percentage of motile sperm was assessed by a simple counting technique as well as by the World Health Organization categorical method that assigns individual motile sperm to "a," "b," and "c" categories on the basis of progression. When these 3 categories were collapsed, the methods provided values that were not statistically different ($P > .05$), although the collapsed values tended to be higher (58.1% vs 51.6%) and less precise (CV 7.7% vs 4.1%) for the categorical method than for motility determined using the simple method. The data obtained in this study demonstrate the critical need for rigorous standardization of protocols and techniques for multicenter studies.

Key words: Sperm concentration, semen volume, sperm motility, quality control, observer variation, precision

This article has been cited by other articles:

Journal of ANDROLOGY HOME

A. Stokes-Riner, S. W. Thurston, C. Brazil, D. Guzick, F. Liu, J. W. Overstreet, C. Wang, A. Sparks, J. B. Redmon, and S. H. Swan
One Semen Sample or 2? Insights From a Study of Fertile Men
J Androl, September 1, 2007; 28(5): 638 - 643.
[Full Text] [PDF]

HUMAN REPRODUCTION HOME

S.H. Swan, F. Liu, J.W. Overstreet, C. Brazil, and N.E. Skakkebaek
Semen quality of fertile US males in relation to their mothers' beef consumption during pregnancy
Hum. Reprod., June 1, 2007; 22(6): 1497 - 1502.
[Abstract] [Full Text] [PDF]

Journal of ANDROLOGY HOME

J.-C. Lu, F. Chen, H.-R. Xu, Y.-F. Huang, and N.-Q. Lu
Standardization and Quality Control for Determination of Fructose in Seminal Plasma
J Androl, March 1, 2007; 28(2): 207 - 213.
[Full Text] [PDF]

Journal of ANDROLOGY HOME

T. G. Cooper, C. Brazil, S. H. Swan, and J. W. Overstreet
Ejaculate Volume Is Seriously Underestimated When Semen Is Pipetted or Decanted Into Cylinders From the Collection Vessel
J Androl, January 1, 2007; 28(1): 1 - 4.
[Full Text] [PDF]

Journal of ANDROLOGY HOME

T. G. Cooper, B. Hellenkemper, J. Jonckheere, N. Callewaert, A. J. Grootenhuis, W. M. Kersemaekers, A. Leung, and C. Wang
Azoospermia: Virtual Reality or Possible to Quantify?
J Androl, July 1, 2006; 27(4): 483 - 490.
[Full Text] [PDF]

Journal of ANDROLOGY HOME

N. S. Prathalingam, W. W. Holt, S. G. Revell, S. Jones, and P. F. Watson
The Precision and Accuracy of Six Different Methods to Determine Sperm Concentration
J Androl, March 1, 2006; 27(2): 257 - 262.
[Abstract] [Full Text] [PDF]

Journal of ANDROLOGY HOME

L. Bjorndahl and C. L. R. Barratt
Semen Analysis: Setting Standards for the Measurement of Sperm Numbers
J Androl, January 1, 2005; 26(1): 11 - 11.
[Full Text] [PDF]

D. H. Douglas-Hamilton, N. G. Smith, C. E. Kuster, J. P. W. Vermeiden, and G. C. Althouse

Capillary-Loaded Particle Fluid Dynamics: Effect on Estimation of Sperm Concentration

J Androl, January 1, 2005; 26(1): 115 - 122.

[Abstract] [Full Text] [PDF]

C. Brazil, S. H. Swan, C. R. Tollner, C. Treece, E. Z. Drobnis, C. Wang, J. B. Redmon, and J. W. Overstreet

Quality Control of Laboratory Methods for Semen Evaluation in a Multicenter Research Study

J Androl, July 1, 2004; 25(4): 645 - 656.

[Abstract] [Full Text] [PDF]