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Semen Analysis: Setting Standards for the Measurement of Sperm Numbers

Andrology Lab Corner*

LARS BJÖRNDAHL AND CHRISTOPHER L. R. BARRATT

From the Assisted Conception Unit, Birmingham Women's Hospital and Reproductive Biology and Genetics Group, School of Medicine, University of Birmingham, Birmingham, United Kingdom.

Recently several authors have highlighted the need for rigorous quality control as a basis for high-standard quality assurance in the andrology laboratory (Björndahl et al, 2004; Keel, 2004). One aspect of quality assurance is selection and validation of appropriate techniques and equipment. Accurate determination of sperm concentration is crucial for the correct diagnosis of the male and the effective delivery of a sensible treatment plan.

A large number of different techniques to estimate sperm concentration have been reported. In the mid-1990s a series of fixed-depth disposable slides were evaluated as rapid and effective pieces of equipment for the estimate of sperm concentration. Preliminary data from a number of studies suggested that, at least in the 20-μm-depth format, such chambers resulted in a noticeable underestimate of sperm concentration compared to the gold standard (improved Neubauer hemocytometer). Using this information, the World Health Organization stated that ''such chambers, whilst convenient in that they can be used without dilution of the specimen, may lack the accuracy and precision of the haemocytometer technique'' (World Health Organization, 1999). Further data—for example, from Tomlinson and colleagues—showed that 2 proprietary disposable slides (Microcell, Conception Technologies, San Diego, Calif; Leja, Leja Products, BV Nieuw-Vennep, The Netherlands) gave lower sperm concentrations compared to the hemocytometer method (Tomlinson et al, 2001). Consistent with these observations were reports from the American Association of Bioanalysts proficiency testing program (Keel et al, 2000) and the Study for the Future Families Research Group (Brazil et al, 2004a,b).

In two papers in the current issue, Douglas-Hamilton and colleagues (Douglas-Hamilton et al, 2005a,b) provide an advanced theoretical model to explain the lower results obtained using 20 μm fixed-depth disposable slides and provide experimental data verifying their predictions. In addition, the model explains why 100-μm-deep chambers (improved Neubauer hemocytometer) are not significantly influenced by the Segre-Silberberg effect and thus are not prone to the errors occurring in thin capillary–loaded slides.

The explanation provided by Douglas-Hamilton and colleagues (Douglas-Hamilton et al, 2005a,b) may allow ''compensation factors'' to be applied to sperm concentration data produced using thin capillary–loaded slides. However, the authors are correct in their conclusions that ''these findings re-affirm the need to critically assess new technologies for accuracy, repeatability and precision.''

In view of the above, the use of 20-μm thin capillary–loaded slides for the determination of sperm concentration is not compatible with the requirement for high-standard quality assurance in the andrology laboratory.

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Correspondence to: Professor Christopher Barratt, Assisted Conception Unit, Birmingham Women's Hospital, Metchley Park Road, Birmingham B15 2TG, United Kingdom (e-mail: c.l.barratt@bham.ac.uk).

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