

Does sperm quality depend on lab quality?

The role of QC in the andrology laboratory

Reproductive Andrology
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Outline

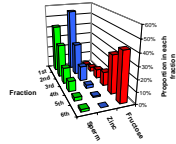
- Can you trust your andrology laboratory?
- What does semen analysis actually measure?
- Why is this important for clinicians?

Can you trust your laboratory?

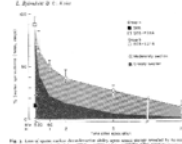
- All laboratory test have a variability
 - Biological variation
 - "Technical" variation
 - Sources "outside" the lab
 - Sources in the lab

Biological variability

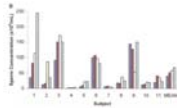
- Semen is not blood
 - Stimulation and abstinence time
 - Sequence of ejaculation
 - Changes after ejaculation



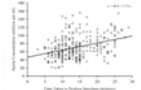
Björndahl & Kvist. *Repro Med Online* 2003



Björndahl & Kvist. *Acta Phys Scand* 1985



De Jonge et al. *Fertil Steril* 2004



Pound et al. / *Physiology & Behavior* 2002

”External” sources of errors and variability

- Sample collection and transportation errors
 - *Incomplete collection*
 - Missing first part?
 - *Toxic collection vial*
 - Motility decreases and sperm die
 - *Long transport*
 - Delayed examination
 - *Cold transport*
 - Decreased motility

Measures to reduce variability in the lab

- *Standardized methods*
 - Equipment
 - Sufficient numbers of cells assessed
 - Procedures that minimize risk for errors
 - Criteria and assessments
 - Staining
- *Standardized training*
- *Internal quality control*
- *External quality assessment*

Equipment

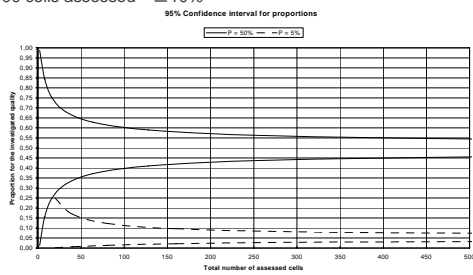
- Temperature control
- Positive displacement pipette for volume
- Phase contrast microscopy for unstained sperm
- Bright field microscopy for stained sperm



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Sufficient numbers of cells assessed

Influence of random factors
100 cells assessed $\approx \pm 20\%$
400 cells assessed $\approx \pm 10\%$



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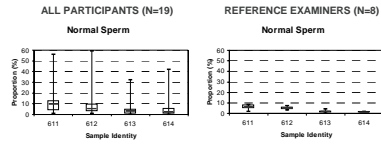
Minimize risk for errors

- Robust methods:
 - Sufficient numbers of sperm assessed
 - Representative sampling
 - Control of timing of examination
- In-built controls
 - Duplicate counts with comparison
- Equipment:
 - Adequate
 - Regular control measurements of pipettes

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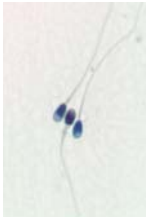
Criteria and assessments

- Sperm motility: different grades of motility
 - Definition
 - Training
- Sperm morphology: normal and abnormal
 - Definitions
 - "Old" criteria
 - Strict criteria
 - Training



Staining

by kind permission of Dr Roelof Menkveld



Papanicolaou staining



Diff Quik staining

Standardized training

- Understanding
 - Reasons for all steps in methods
 - Why necessary to avoid "short cuts" and improvisations
- Possibility to control own work
 - Professional pride
 - Increased sense of responsibility
- New members of staff
 - Repeated training with series of material
 - Comparison with experienced lab staff

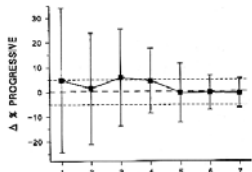


Figure 16.4. Results obtained by 100 operators trying to perform normal sperm count on the same 100 spermatozoa for 10 days. The 100 operators had different levels of experience and skill. The horizontal line indicates the average of all operators and the horizontal bars indicate the 95% confidence limits for the population.

Mortimer, *Practical Laboratory Andrology*, Oxford University Press, 1994

Internal Quality Control

- Results should not vary between different members of staff
- Results should not vary from one day to another

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External Quality Assessment

- Are the results comparable to results from other laboratories?
 - *Interpretation of individual lab results from other centres*
 - *Implementation of methods based on studies from other centres*

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What does semen analysis measure?

- *Sperm number*
 - Production, transport and "export"
- *Sperm motility*
 - ONE functional aspect
 - Effect of time in semen, sequence of ejaculation
- *Sperm appearance (morphology)*
 - Relation to pregnancy/fertilization success
 - Effects of sperm ageing, sample handling, staining, optics
- *Sperm vitality*
 - Are immotile sperm dead or alive?
 - Some methods kill sperm...

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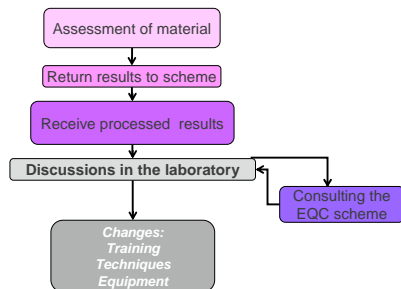
Importance for the Clinician

- Can I trust the results from the laboratory?
 - Control of sources of errors and variability
- Interpretation of lab reports from different laboratories
 - Are assessments from different laboratories really comparable?
- Implementation of new developments
 - Can I use studies from other laboratories to interpret results from our lab?

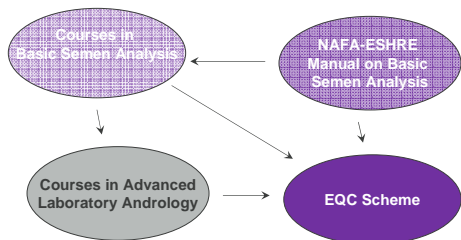
Quality Improvement in Semen Analysis

- *Courses in Basic Semen Analysis (1994-)*
 - Standardized curriculum, 4 days
 - Theory and Practical Training
 - Given in local language if possible
- *ESHRE SIGA External Quality Control Programme (1999-)*
 - Link together EQA Schemes in different regions
 - Provide EQA Scheme for regions lacking own programmes
 - Work for standardization of EQA Programmes for Semen Analysis
- *NAFA-ESHRE Manual on Basic Semen Analysis (2002)*
 - English (2002)
 - Greek (2004)
 - Spanish (2005)

ESHRE SIGA - EQC Programme



SIGA Programme – a Summary



The informed clinician...

- To interpret semen analysis results, the informed clinician
 - ... will ask not only for *sperm concentration*, and *proportions motile, normal and vital sperm*, but ask for information about the
 - completeness of sample collection
 - abstinence time
 - time between sample collection and assessment
 - total semen volume and total number of sperm in the ejaculate.

The informed clinician...

- To interpret semen analysis results properly, the informed clinician
 - ... *should be aware of*
 - the number of sperm the laboratory base their assessments on
 - the temperature for motility analysis
 - the staining procedures for morphology
 - the vitality method used
 - that Internal Quality Control is used
 - participation in an External Quality Assessment Programme

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