A novel method to predict cryosurvival rates in an artificial insemination donor program

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Objective: Artificial insemination of donor sperm (AID) using frozen semen is recommended in a variety of cases of male infertility. Unfortunately, despite advances in cryopreservation techniques and cryopreservatives, a large variation is seen in the number of total motile spermatozoa recovered from donor samples after freezing. The objectives of our study were 1) to evaluate the average cryosurvival rate (CSR) in donors, and 2) to determine if a modified semen quality (SQ) score derived from individual semen characteristics can predict CSR.

Design: Retrospective study.

Materials and Methods: Data from 33 specimens from a group of normal healthy volunteers was included in our study. Manual semen analysis and sperm motion kinetics was assessed using computer assisted semen analysis (CASA, IVOS, 10.7s, Hamilton Thorne Research, Beverly, Mass) before freezing the specimens. SQ score was calculated using base 10 logarithms of nine sperm parameters: concentration, motility, sperm morphology according to WHO guidelines and Tygerberg’s strict criteria, VCL, VSL, VAP, LIN, and ALH. Samples were cryopreserved test yolk buffer and stored in liquid nitrogen at -196° under identical conditions for 2 to 3 days. Sperm concentration, motility and motion kinetics were repeated in post-thaw specimens. CSR was calculated by dividing the post-thaw percentage (%) motility by pre-freeze % motility X 100.

Results: Of all the sperm characteristics, only the SQ score and %motility correlated significantly with CSR (SQ: r = 0.37, P = 0.03; motility: r = 0.48, P = 0.004). The mean CSR in donors was 58.9% ± 45.7%. An estimated SQ cut-off value of 83 had higher sensitivity (100% vs. 93.3%) and negative predictive value (100% vs. 91.3%) compared to normal motility value of 50%, which is the value present in average fertile population according to WHO criteria (Table 1).

Conclusion: Semen quality score is superior to other sperm characteristics in predicting cryosurvival. Semen samples with an SQ score <83 may be excluded as they may be more susceptible to cryoinjury.

Support: None.
<table>
<thead>
<tr>
<th>Cut-off</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PPV</th>
<th>NPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQ score = 83</td>
<td>100%</td>
<td>63.6%</td>
<td>73.3%</td>
<td>100%</td>
</tr>
<tr>
<td>Motility = 50%</td>
<td>93.9%</td>
<td>63.6%</td>
<td>72%</td>
<td>91.3%</td>
</tr>
</tbody>
</table>

CSR = cryosurvival rate; SQ = semen quality; PPV = positive predictive value; NPV = negative predictive value

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