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JOURNAL ARTICLE

Consistency of sperm morphology classification methods

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The World Health Organization (WHO) recently suggested new morphometric dimensions for normal sperm heads and new sperm head classification rules. These specifications differ from previous WHO methods and from the Kruger method for strict morphology assessment. We analyzed the WHO and Kruger sperm classification rules to determine their appropriateness as predictive linear models. We reviewed the theoretical requirements for allometric modeling, a more traditional approach for specifying the size relationships between phenotypic characters, and developed valid allometric models based on the statistical properties of over 3,700 measurements of individual sperm head dimensions. We implemented the WHO, Kruger, and Allometric methods on the same set of digitized sperm heads to study the empirical consequences of different metric requirements and classification methods. Results show that the WHO and Kruger methods are internally consistent, but specify nonconstant variance. Hence, they are inappropriate linear models. The allometric models were internally consistent and specified constant variance. Hence, they are appropriate linear models. Significant differences were found in the percentage of normal sperm between the methods. On average, the Kruger method produced the lowest value and the Allometric methods produced significantly higher values than the WHO methods, but no average difference was found between WHO methods or between Allometric methods. Nevertheless, the percentage of normal sperm did change significantly for individual specimens. These results indicate that small differences in metric requirements and classification rules can dramatically change the percentage of normal sperm. Until more rigorous definitions of sperm features can be developed, and valid statistical models can be used to describe the population characteristics of fertile sperm, the prognostic value of sperm morphology is limited.

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