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The Human Sperm Head: A Key for Successful Fertilization

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In order to examine the predictive value of determining the sperm head shape, the acrosomal size, the presence of acrosomal vacuoles, and the challenged acrosome reaction (AR) on the outcome of a standard in vitro fertilization (IVF) program, a prospective study was conducted that included 75 couples undergoing IVF treatment. An assessment of sperm morphology was performed using the Hobson Sperm Tracker (Hobson Tracker Limited, Sheffield, United

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Kingdom). The assessment of the AR was performed before and after adding pooled undiluted human follicular fluid (FF). The outcome measure was an IVF rate of inseminated oocytes. A positive correlation was found between the fertilization rate (FR%) and the proportion of the sperm with a normal (oval) head shape (P < .001), the sperm exhibiting acrosomal vacuoles (P < .003), the sperm with a normal acrosomal size (40%–70% of total head area, P < .025), and the sperm undergoing AR after adding FF (P < .001). Multiple logistic regression analysis revealed that by incorporating the above 4 parameters, the sensitivity of prediction of IVF FR% values was 79%, and the specificity was 93%, with a positive predictive value of 96%. This study shows that the multiparametric assessment of the sperm head is useful in predicting the FR% values of a standard IVF treatment. The automated analysis used in this study is shown to maintain a level of precision and accuracy acceptable for application in a routine semen analysis situation.

Key words: Fertilization rates, in vitro fertilization, computer-assisted sperm analysis, acrosome, vacuoles, sperm morphology