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JOURNAL ARTICLE

The nuclear status of human sperm cells by TEM image cytometry: nuclear shape and chromatin texture in semen samples from fertile and infertile men

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Changes in nuclear size, shape, and chromatin texture during spermiogenesis and epididymal transport of human sperm were recently analyzed using transmission electron microscopy (TEM) image cytometry followed by multivariate statistical analysis of data. In the present study, this same methodology was used to investigate the nuclear morphology of spermatozoa in semen samples from fertile and infertile men. Analysis was carried out on a large series of micrographs of sections of sperm nuclei from a donor group with proven fertility and from a patient group with a mean infertility duration of 10 years with no obvious male or female infertility factors (only a slight decrease in the proportion of sperm heads with normal morphology was noted in routine semen tests). For the patient group, it was found that nuclei had a significantly less flattened shape (i.e., increased roundness as a consequence of increased thickness and decreased length). Furthermore, significant differences between donor and patient groups were found for most parameters of chromatin texture. In the patient group, chromatin was less condensed, and there was more homogeneous distribution of the different degrees of chromatin condensation. In addition, the organization of chromatin condensation and distribution along the major axis of the nucleus was found to be significantly different in the two groups. Stepwise linear discriminant analysis indicated a good classification rate of only 66% for nuclei of patients when using the eight major nuclear parameters, thus indicating the striking heterogeneity of nuclear morphology for both patient and donor groups. (ABSTRACT TRUNCATED AT 250 WORDS)

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