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## JOURNAL ARTICLE

# Functional and ultrastructural features of DNA-fragmented human sperm

M. Muratori, P. Piomboni, E. Baldi, E. Filimberti, P. Pecchioli, E. Moretti, L. Gambera, B. Baccetti, R. Biagiotti, G. Forti and M. Maggi

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The functional significance of deoxyribonucleic acid (DNA) fragmentation in ejaculated human sperm is unclear. In this study the extent of DNA strand breakage in swim-up selected spermatozoa was evaluated by terminal deoxynucleotidyl transferase-mediated fluorescein-dUTP nick end labeling (TUNEL)-coupled flow cytometry and correlated with several functional and morphological sperm parameters.

The extent of DNA fragmentation (mean = 11.07%±8.00%, range = 0.79%-42.64%, n = 140) was positively related to abnormal morphology and associated with defects of the sperm tail. A negative correlation was found between DNA breakage and progressive motility. When a stepwise multiple linear regression model was used to analyze the relationship between DNA fragmentation and the aforementioned parameters, only motility results were included in the model. The presence of spermatozoa showing submicroscopic characteristics resembling those of somatic apoptosis has been reported in human ejaculate. To verify whether sperm DNA fragmentation was associated with the presence of such apoptotic-like cells, we performed electron microscopy and TUNEL-coupled flow cytometry in a limited number of sperm samples (n = 24). Although we did not observe any significant relationship between DNA breakage and the characteristics that are suggestive of apoptosis, an association was found with several ultrastructural features, indicating an impaired motility. Hence, we conclude that in ejaculated sperm, DNA fragmentation does not correspond to the apoptosis-like phenomenon and that it is associated with defects of motility.

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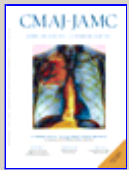
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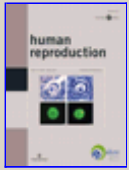
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