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JOURNAL ARTICLE

DNA organization in human spermatozoa

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Previous studies from this laboratory on hamster spermatozoa have demonstrated that rodent sperm DNA is packaged into the sperm nucleus in a specific manner by nuclear structures. The entire genome is organized into DNA loop domains attached at their bases to a sperm nuclear matrix, the skeletal structure of the nucleus. When nuclei are completely decondensed, the nuclear matrix dissipates, and the entire genome remains anchored to a single structure located at the base of the tail, termed the nuclear annulus. Here, we have extended these studies to human sperm nuclei, which were found to be similar to hamster. Human sperm DNA was found to be organized into loop domains attached at their bases to a nuclear matrix. The average size of the human sperm halo of DNA surrounding the extracted sperm nucleus (made up of DNA loop domains) was about 50% smaller than those that have been reported for somatic cells (this corresponds to an approximate loop domain size of 26.8 +/- 2.1 kb). Human sperm DNA also remained anchored to the base of the tail when completely decondensed, indicating the existence of a nuclear annulus-like structure in human spermatozoa; but, unlike the hamster nuclear annulus, the human annulus could not be isolated because of its structural instability when separated from the tail. Using human centromere repeats as a probe for in situ hybridization, we examined the packaging of individual DNA sequences within the sperm nucleus. These studies demonstrate that human sperm DNA is highly organized by nuclear structures.

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W. S. Ward, Y. Kimura, and R. Yanagimachi
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Human sperm DNA integrity assessed by the Comet and ELISA assays
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J. A. Kramer and S. A. Krawetz
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