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JOURNAL ARTICLE

Structure of the rRNA genes in the hamster sperm nucleus

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We have examined the structure of the major ribosomal RNA (rRNA) genes in the hamster sperm nucleus, using fluorescent in situ hybridization (FISH). The rRNA genes are present as tandemly repeated clusters located at the telomeric ends of the short arms of five pairs of acrocentric chromosomes in the Syrian golden hamster (as they are in humans). In somatic cells, these five chromosome pairs come together to form the nucleolus, the site of rRNA synthesis. The nucleolus remains intact through S phase of the cell cycle, breaking apart only during late G2 and mitosis when the chromosomes condense. Mammalian sperm nuclei are the final products of meiotic division and morphological differentiation that includes a dramatic chromatin condensation. Consequently, it was not immediately obvious whether the rRNA genes would be condensed into a nucleolus-like structure in the mature spermatozoa, or separated, as they are in mitotic chromosomes. We found that of 117 sperm nuclei examined, 91.5% contained between two and five FISH signals for the rRNA gene clusters, and 64.0% contained four (29%) or five (35%) signals. In decondensed hamster sperm nuclei, the rRNA hybridized signals were separated into independent strands. These data collectively indicate that the chromosomes containing the rRNA genes are not bound together into a pre-nucleolar structure in fully condensed mammalian sperm nuclei.

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