

Apoptotic Chromatin Changes

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From the contents: I. DNA EMPIRE Summary Historical events leading to the recognition of core processes of genetic information RNA World Pre-RNA World Additional arguments supporting the RNA World hypothesis Basic principles of the transfer of genetic information Core information processes belonging to the DNA Empire When did DNA evolve? Molecular oxygen serving the transition from RNA World to DNA Empire Saturation of seawater with oxygen and development of oxygen atmosphere Advantage of oxygen production Oxygen the Janus faced molecule Protection of anaerobes from oxygen toxicity Free radical formation during the synthesis of deoxyribonucleotides Cellular responses to DNA damage Conceptual changes in gene stability Primary information on cytotoxicity obtained at DNA level Detection of genotoxic changes at the structural level of DNA Enzymatic detection of cellular lesions: too late Early detection of cytotoxicity: at DNA level Conclusions References II. STRUCTURAL ORGANIZATION OF DNA Summary Building blocks of nucleic acids Structure of nucleotides Nucleic acid bases Types Aromatic character, planar structure of nucleic acid bases Free nucleic acid bases Light absorption Apolar interactions Hypochrome, hyperchrome effect Major, minor and rare bases Base analogues Antimetabolites Sugar component of nucleotides Why ribose was selected as the sugar component of nucleic acids Criteria for sugar selection Phosphate as nucleotide component Bond types in nucleotides Nomenclature of bases, nucleosides and nucleotides Metabolism of nucleotides De novo biosynthesis Basic conception of biosynthesis Ribonucleotide biosynthesis Deoxyribonucleotide biosynthesis dNDP--dNTP conversion dUMP formation Thymidilate formation (dUMP--dTMP) Regulation of nucleotide biosynthesis Degradation of nucleotides Biosynthesis of coenzymes Tissue specific purine synthesis Function of nucleotides DNA structure Structural levels of DNA Primary structure of DNA Secondary DNA structures H-bonds B-DNA A-DNA Z-DNA Cruciform DNA Bent DNA structures Transition from right-handed to left-handed DNA Tetraplex (quadruplex) DNA Differences in the structure of DNA and RNA Tertiary structure of DNA (topology) Thermodynamic aspects of supercoiling Topoisomerases Models of gyrase action Sign inversion and torsional model of supercoiling Rotating model of negative supercoiling Topology of eukaryotic DNA Nucleosome, the supercoil analogue in

eukaryotes Supranucleosomal (chromosomal) organization of DNA Early chromatin models Solenoid versus zig-zag model Possible fibril arrangements Hairpin model Plectonemic model of chromatin condensation Chromosomes of animal cells Eukaryotic genome size and DNA compaction Chromosome number Metaphase chromosomes Centromere and telomere regions of chromosomes Variation in DNA content, C-value paradox Variation in chromosome number Karyotype, chromosome size Genetic linkage Physical mapping Sex chromosomes Chromosomal aberrations Genetic diversity Eukaryotic cell cycle Cytogenetics Genes Temporal and spatial order of gene replication DNA is replicated and repaired in several subphases References III. CHROMATIN CONDENSATION Summary Importance of chromatin condensation Active and inactive chromatin Euchromatin and heterochromatin Histone code hypothesis Chromosome arrangement in the nucleus Models of chromosome condensation Chromatin folding in the interphase nucleus is poorly understood Chromatin models Review of methodologies ... EAN/ISBN : 9781402095610 Publisher(s): Springer Netherlands Format: ePub/PDF Author(s): Banfalvi, Gaspar

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