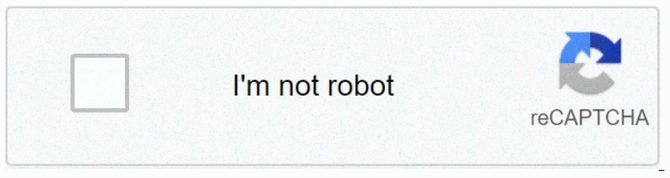

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Investigation of dna structure and replication answers

In DNA structure and replication we expand our knowledge of the structure of DNA from Topics 2.6. This unit will also focus on those responsible for the discovery of the DNA spiral and prove that DNA is a genetic code. This device will last 3 school days. The essential idea: the structure of DNA is ideal for its function. Scientific Nature: Careful observations - Rosalind Franklin's X-ray diffraction has provided important evidence that DNA is a double spiral. (1.8) Describe the role of Rosalind Franklin in interpreting the structure of DNA. 7.1 U1 Nucleosomos helps supercoil DNA. Draw and mark the nucleooma structure, including the H1 protein, octagonal core proteins, sieve DNA and two DNA wraps. Explain the amount of supercoiling (DNA→ nucleomas → beads in a line → 30nm fiber → unreplicated interphase chromosomes → replicated metaphase chromosomes). DNA is laid out on chromosomes of eukaryotes. Each chromosome contains one very long molecule of DNA. Dna must be packed. For example, each human cell contains approximately 2m DNA distributed between 46 chromosomes, but the average diameter of each cell is only 10-30 µm. A packed unit of chromatin fiber is called nucleosphere, which looks like a ball on the thread. Each nucleosome consists of:two DNA loops of approximately 150bp long wrapped around 8 central histone proteins; Central histone proteins have structures that affect how tightly DNA is packagedanother-type histone, called H1, which binds DNA to a central bead. Among each nucleomos is a short segment of naked DNA. This is called tying DNA. The nucleoso are arranged in rolls, and in preparation for nuclear division, the structure of the rollers is re-glued to form a supercoylated chromosome.. Nucleosomos are important for safe storage of DNA. They also play an important role in the regulation of transcription. 7.1 The structure of the U 2 DNA proposed a mechanism for DNA replication. (Details of DNA replication vary between prokaryotes and eukaryotes. Only prokaryotic systems are expected) (companion of the Oxford Biology Course p. 347). Describe the dna structure properties that suggested a DNA replication mechanism. DNA is twice trapped and shaped like a ladder, with ladder sides from repeating phosphate and deoxyribosis sugar molecules covalently bonded together. Each deoxyribosis molecule contains phosphate covalently attached to 3' carbon and 5' carbon. Phosphate, connected to one deoxyribosis molecule 5', is covalently attached to another deoxyribosis molecule that forms a long single strand of DNA called the DNA spine 3'. DNA strands run antiparallel each other with one strand running 5′ in the direction of 3 and the other direction running 3′ to 5 when looking at the directions in the same direction. The ladder rungse have two nitrogen bases (one from each direction) that are connected by hydrogen connections. From two strands are anti-parallel replication going in different directions DNA strandPurines are two ring nitrogen bases and pyrimidines are single ring nitrogen bases. Nitrogen bases coincide according to chargaff rules, in which adenine (purine) always binds to thymine (pyrimidine) and guanine (purine) always associated with cytoxin (pyrimidine). 7.1 U 3 DNA polymerase can only add nucleotide to the end of ground 3' soil. (Companion of the Oxford Biology Course, p. 349). Compare replication due to the leading direction and lagging DIRECTIONs of DNA. Explain why replication differs from leading and lagging STRANDs of DNA. Describe the formation of Okazaki fragments in the lagging strand. DNA polymerase is an enzyme that creates DNA molecules by repairing nucleotide, DNA building blocks. These enzymes are necessary for DNA replication and usually act in pairs to create two identical strands of DNA from one original DNA molecule. During this process, DNA polymerase reads existing STRANDS of DNA to create two new strands corresponding to existing ones. Every time a cell divides, DNA polymerase needs to be helped to duplicate the cell's DNA so that a copy of the original DNA molecule can be passed on to each subsidiary cell. In this way, genetic information is transmitted from generation to generation. Before replication, an enzyme called helicase will unwrap the DNA molecule from a tightly woe form. This opens up or unzips dual stuck DNA to provide two single-form DNA that can be used as templates for replication. DNA polymerase adds new free nucleotide to the newly formed end of skein 3' by prolonging it in direction 5' –3. However, DNA polymerase cannot begin the formation of this new chain and can only add nucleotide to an existing 3'-OH group. Therefore, a primer is required, to which nucleotide can be added. Primers usually consist of RNA and DNA bases, and the first two basics are always RNA. These primers consist of another enzyme called primacy. The image of DNA replication animation DNA polymerase proofing animation from Khan Academy's 7.1 U 4 DNA replication is uninterrupted in the lead direction and uninterrupted in lagging directions. (Companion of the Oxford Biology Course, p. 349). Describe the role of these proteins in DNA replication: helicase, topoisomers (AKA gyrase), one trapped binder protein, primate, DNA polymerase III, DNA polymerase I and DNA disease. The DNA replication process is commonly referred to as continuous, since the polymerizing enzyme can add nucleotide only in direction 5' - 3, synthesis is one strand (the frontal strand is continuous towards the fork in a direction of 5'-3'. In the next part (behind direction) as the forks open, many sites are initializing are exposed. Fusion, then takes place in the direction of short segments 5'-3. That is, synthesis behind the direction is non-continuous. Short a fragment of the selated behind is called Okazaki. These fragments contain about 1,000 - 2,000 nucleotide long images from gene iv 7.1 U 4 DNA replication performed by complex system enzymes. (Data on DNA replication vary between prokaryotes and eukaryotes. Only pro-military systems are expected. Proteins and enzymes involved in DNA replication should include helikasis, DNA gyrase, single-strand proteins, RNA primacy and I and III DNA polymerases. DNA replication creates two identical strands with each direction, consisting of one new and one old direction (semi-conservative). DNA replication occurs in many different places in a DNA strand called replication origin (represented by bubbles along the strands). DNA gyrase: An enzyme that reduces the strain when double DNA is unwrapped due to helicase causes negative overviration of the DNA body: controls the removal of additional strands of DNA from coiled DNAseparates, produce replication branch binding proteins: binds to single-sided REGIONS of DNA so that two strands cannot reconnect with additional pairs of bases, To allow other enzymes to function effectively in itRNR Primacy: DNA polymerase III can only add DNA nucleotide to the free end of 3' on the existing DNA direction, the RNA primacy uses a DNA template to intersect a short sequence of 10 RNA nucleotides known as RNA primerDNA polymerase III: DNA polymerase III as a template free dexoyribonucleoid triphosphate from solution to primary/template fibres settled for additional basic mating rules (A=T , G = C) DNA polymerase III can only add deoxyribonunucleooid triphosphates to free 3' existing nu end of the direction of the sclerotide , in only one of the two strands of DNA, DNA polymerase III can continuously synthesize toward the replication fork: this is called the leading nail VN polymerase I:DNA polymer is a proofing enzyme that removes RNA nucleotide in RNA nucleotide, which they have DNA nucleotidDna diseases: form covalent bonds that bind Okazaki fragments completes DNA synthesis along the lagging axis 7.1 U 5 5 In some REGIONS of DNA proteins do not encode, but perform other important functions. (Oxford Biology Cooking Companion Page 350). Explain how RNA primers are needed during DNA replication. Explain what DNA replication means in direction 5' -3. Genes contained in DNA, called coding sequences, code for polypeptides, created during transcription and translation. Most DNA is not coding sequences that perform other functions, such as gene expression regulators, introns, telomeres and tRNAs genes. Unique or single copy genes include exons and intronsexons code for mature mRNA, which have polypeptide peptide codes rewritten into RNA but are then removed by enzymes that together cope with mature mRNA, which codes for polypeptides Genes for other RNA types are not protein code for tRNA code rRNASome dna compartments act as gene expressionist regulators involved in activating or deaconting Themomers at chromosome ends uncoded proteins Very repetitive sequences do not serve the known functional function, called satellite DNA, accounting for 5-45% of genomes contains 5-300 base pairs per repeat, and my repeat up to 10,000 times per genome is not known because recurrent sequences are different from the person, they are useful for DNA profiling , which allows DNA fingerprints to be identified in order to identify samples of individuals in DNA regions that are not protein code, should be limited to gene expression regulators, introns, telomeres and genes for tRNAs.DNA in human genome sequencing indicates that 98,5 % does not encode proteins, rRNA or tRNA in approximately a quarter of the introns and gene-related regulatory sequences of human genome codes program 7.1 A 1 Rosalind and Maurice Wilkins test dna structure X-ray diffraction. (Oxford Biology Language Companion Page 346). Describe the process of X-ray diffraction. Describe the deductions for the structure of DNA made from an X-ray diffraction pattern. Rosalind Franklin and Maurice Wilkins used x-ray diffraction to test the structure of DNA. they were able to identify some spiral dimensions using X-ray diffraction. X-ray diffraction patterns are common, so the dimensions of the spiral must be consistent. According to Franklin, Wilkins shared with James Watson (without Franklin's permission), who, with the help of Francis Krid, used the information to create a molecular model of the underlying STRUCTURE of DNA. In 1962, Watson, Crick and Wilkins (but not Franklin) were awarded the Nobel Prize for their contribution to the DNA structure identification image from BBC Science 7.1 A 2 The use of nucleotide containing deoxyribonucleic acid to stop DNA replication in preparation for sampling to determine the main sequence. (Companion of the Oxford Biology Course, p. 351). Define VNTR. Explain why VNTR is used for DNA profiling. Dideoxyribonucleotides inhibits DNA polymerase during replication, thereby stopping replication. Dideoxyribonucleotides with fluorescent markers shall be used and included in DNA sequences to stop replication at the point where they are added. This creates fragments of different sizes with fluorescent markers, which can be separated by gel electrophoresis and analysed by comparing the color of fluorescence with the length of the fragment. The Sanger method of DNA sequence 7.1 A 3 Tandem recurs used for DNA profiling. Short tandem repetitions (LST), also known as variable tandem repetitions (VNTR), are non-coded DNA regions that contain repetition of the same nucleotide sequence. These short repetitions show differences between individuals based on the number of times sequences are repeated. For example, CATACATACATACATACATACATACATA is an STR where the nucleotide sequence cata repeated six times per person. However, for another person, this repetition of tandem can occur only 4 times catacatacatacata. These repetitions of variable tandem are the basis for DNA profiling used in crime scene studies and genealogical studies (paternity tests). The diagram below shows how different number of these allieds are used by VNTR to create fingerprints of a person's DNA. Skill 7.1 S 1 Hershey and Chase experiment results analysis, providing evidence that DNA is a genetic material. (Oxford Biology Course Companion p. 344). Specify the experimental question that was tested in the Hershey and Chase experiment. Explain the hershey and chase experiment procedure. Explain how the results of the Hershey and Chase experiment supported the concept of nucleic acids as a genetic material. In the middle of the 20th century, scientists still did not know whether DNA or protein was a genetic material of the cell. It has been known that some viruses consist only of DNA and protein fur and were able to transfer their genetic material to the hosts. In 1952, Alfred Hershey and Martha Chase conducted several experiments to prove that DNA is the genetic material of Hershey and Chase Animation 7.1 S 2 The use of molecular imaging software to analyze protein and DNA interfaces in nucleomosm. (Oxford Biology Course Companion p. 348) Identify nucleosom structures using molecular imaging software. Describe the mechanism of histone-DNA association. COMPLEX BETWEEN NUCLEOSOME CORE PARTICLES (H3,H4,H2A, H2B) IR 146 BP LONG DNA FRAGMENT Key terms H1 proteinHershey-Chase leading strandDNA primase 3' DNA analyte topoisomena (AKA gyrase) Franklin-Wilkinssingle trapped binding protein x-ray diffraction behind strandDNA polymerase I 5 short tandemsupercoiling DNA diseasesecsec oding sequences of nucleomos Okazaki fragments DNA polymerase IIoctamer key protein hyper-variablesrepetitive sequences chain terminator nucleotides replication helicase RNA primer primary DNA non-coding link DNA primase telomere VNTR PowerPoint and notes theme 7.1 Chris Payne Correct use terminology is a basic biology skill. It is very important to use key terms correctly when reporting your understanding, especially in evaluations. Use quiz cards or other tools, such as learning, dispersing, space race, spelling, and test, to help you master your vocabulary. IOCHighly repetitive sequences were once classified as garbage DNA, showing some confidence that it had no role. How many labels and categories used to obtain knowledge affect the knowledge we receive? Video clips bill nye talks about The Greatest Discoveries Nobel Laureate James Watson opens TED2005 with an open and funny story about how he and his research partner, Francis Crick, discovered the DNA Rosalind Franklin structure was British which helped to discover the structure of DNA, but you probably haven't heard of Hank will try to solve this gap in his knowledge of today's SciShow: Great Minds. The discovery of a DNA double spiral structure was one of the most important in the 20th century. Supercoiling DNA Short Tandem repeats a brief explanation using STR DNA fingerprints How do we tell people other than using their DNA? From homicide investigations to paternity tests