INKBIOLOGY FLASHCARDS

Gene regulation, genomics and biotechnology

Unit B17 · 30 cards · fronts and backs

Print double-sided, flipping on the long edge, and each answer lands behind its question. Cut along the card borders.

Definitions in mark-scheme wording, and the misconceptions that lose marks. These cards and each lesson's whole-lesson check run on the website with spaced-repetition scheduling, at inkphysics.co.uk/biology/flashcards.

DEFINITION

Define: Gene expression.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

Define: Transcription factor.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

Define: Promoter.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

Define: Oestrogen response element.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

Define: Steroid hormone.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

Define: Epigenetics.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

Define: Epigenome.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

Define: Histone acetylation.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

A protein that binds to a specific base sequence in DNA, usually in or near a promoter region, and so increases or decreases the rate of transcription of that gene.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

The process by which the information in a gene is used to produce a functional product, usually a polypeptide.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

A specific base sequence near a target gene to which an oestrogen-receptor complex binds, increasing the rate of transcription.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

A region of DNA at the start of a gene to which RNA polymerase and transcription factors bind.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

Heritable changes in gene expression caused by chemical modifications to DNA and to the histones associated with it, without any change to the base sequence.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

A lipid-soluble hormone that crosses the cell-surface membrane by simple diffusion and acts on an intracellular receptor.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

The addition of acetyl groups to histone tails, which reduces their positive charge, loosens the chromatin and increases transcription.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

The full set of such chemical marks on a cell's DNA and histones at a given time.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

Define: DNA methylation.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

Define: SiRNA.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

Define: RNA interference.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

SPOT THE ERROR

Say what is wrong with this claim:

A liver cell keeps the genes it needs and throws the rest away.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

Define: Mutation.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES WRONG

DEFINITION

Define: Silent mutation.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES

DEFINITION

Define: Frame shift.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES WRONG

DEFINITION

Define: Control sequence.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES

DEFINITION

Small interfering RNA: short double-stranded RNA fragments, one strand of which guides a protein complex to a complementary mRNA so that the mRNA is broken down and cannot be translated.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

The addition of methyl groups to cytosine bases; heavy methylation of a promoter reduces or prevents transcription of that gene.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

SPOT THE ERROR

Nothing is thrown away. A neurone's nucleus holds the insulin gene complete and undamaged, and a β cell holds every gene a neurone uses. What differs is which are transcribed, which is why a nucleus from an adult udder cell produced a whole sheep in 1996.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

The inhibition of gene expression by small RNA molecules binding to complementary mRNA.

CONTROL OF GENE EXPRESSION: WHICH GENES A CELL READS

DEFINITION

A base substitution that produces a triplet coding for the same amino acid, so the primary structure of the polypeptide is unchanged.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES WRONG

DEFINITION

A change in the base sequence of DNA.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES

DEFINITION

A region of DNA that is not translated but determines whether, when and how strongly a gene is transcribed.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES WRONG

DEFINITION

The displacement of the reading frame caused by insertion or deletion of a number of bases that is not a multiple of three.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES

DEFINITION

Define: Proto-oncogene.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES WRONG

DEFINITION

Define: Oncogene.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES WRONG

DEFINITION

Define: Tumour suppressor gene.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES WRONG

DEFINITION

Define: Metastasis.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES WRONG

SPOT THE ERROR

Say what is wrong with this claim:

A base substitution that does not change the amino acid is a mutation that never really happened.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES WRONG

DEFINITION

Define: Reverse transcriptase.

RECOMBINANT DNA TECHNOLOGY: ISOLATING, INSERTING AND EXPRESSING GENES

DEFINITION

Define: Complementary DNA (cDNA).

RECOMBINANT DNA TECHNOLOGY: ISOLATING, INSERTING AND EXPRESSING GENES

DEFINITION

Define: Recombinant DNA.

RECOMBINANT DNA TECHNOLOGY: ISOLATING, INSERTING AND EXPRESSING GENES

DEFINITION

A mutated or over-expressed proto-oncogene whose product stimulates division continuously.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES WRONG

DEFINITION

A normal gene whose product stimulates cell division in response to a growth signal.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES

DEFINITION

The spread of cells from a malignant tumour through the blood or lymph to form secondary tumours.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES WRONG

DEFINITION

A gene whose product slows the cell cycle or triggers apoptosis; loss of both alleles removes that control.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES

DEFINITION

An enzyme, obtained from retroviruses, which catalyses the synthesis of DNA from an RNA template.

RECOMBINANT DNA TECHNOLOGY: ISOLATING, INSERTING AND EXPRESSING A GENE

SPOT THE ERROR

Silent describes one triplet in a coding sequence and nothing else. A base change in a promoter alters how much protein is made, and one at an intron boundary ruins the splicing; some β-thalassaemias arise that way with the coding sequence entirely intact.

MUTATION AND CANCER: WHAT GOES WRONG, AND WHERE IT GOES

DEFINITION

DNA made by joining together sequences from two different organisms.

RECOMBINANT DNA TECHNOLOGY: ISOLATING, INSERTING AND EXPRESSING A GENE

DEFINITION

DNA made from an mRNA template by reverse transcriptase, and therefore containing no introns.

RECOMBINANT DNA TECHNOLOGY: ISOLATING, INSERTING AND EXPRESSING A GENE

DEFINITION

Define: Transgenic organism.

RECOMBINANT DNA TECHNOLOGY: ISOLATING, INSERTING AND EXPRESSING GENES

SPOT THE ERROR

Say what is wrong with this claim:

Cut the gene out, drop it into a plasmid, mix that with bacteria, and you have bacteria making your protein.

RECOMBINANT DNA TECHNOLOGY: ISOLATING, INSERTING AND EXPR

DEFINITION

Define: DNA probe.

GENOMES, SCREENING AND GENE THERAPY: WHAT A SEQUENCE IS GOOD FOR

DEFINITION

Define: Hybridisation.

GENOMES, SCREENING AND GENE THERAPY: WHAT A SEQUENCE IS GO

DEFINITION

Define: DNA microarray.

GENOMES, SCREENING AND GENE THERAPY: WHAT A SEQUENCE IS GOOD FOR

SPOT THE ERROR

Say what is wrong with this claim:

Gene therapy changes your DNA, so any children you have will inherit the change.

GENOMES, SCREENING AND GENE THERAPY: WHAT A SEQUENCE IS GO

SPOT THE ERROR

Four things stop it. A restriction enzyme cuts at its recognition sequence, not at the ends of a gene; a chromosomal gene carries introns and a bacterium cannot splice; the cut ends need ligase; and well under one bacterium in a hundred takes up a plasmid.

RECOMBINANT DNA TECHNOLOGY: ISOLATING, INSERTING AND EXPRESSING A GENE

DEFINITION

An organism containing DNA transferred into it from another species.

RECOMBINANT DNA TECHNOLOGY: ISOLATING, INSERTING AND EXPR

DEFINITION

The binding of a probe to a complementary single-stranded target sequence by hydrogen bonds between complementary bases.

GENOMES, SCREENING AND GENE THERAPY: WHAT A SEQUENCE IS GOOD FOR

DEFINITION

A short single-stranded length of DNA, labelled radioactively or fluorescently, with a base sequence complementary to a target sequence.

GENOMES, SCREENING AND GENE THERAPY: WHAT A SEQUENCE IS GO

SPOT THE ERROR

Somatic gene therapy alters body cells such as lung epithelium, bone marrow and retina, and does nothing to the cells that become sperm or eggs, so nothing is inherited. Germ line therapy would be inherited, which is why countries that have legislated have prohibited it.

GENOMES, SCREENING AND GENE THERAPY: WHAT A SEQUENCE IS GOOD FOR

DEFINITION

A plate carrying many different DNA probes at known positions, allowing thousands of sequences to be tested for at once.

GENOMES, SCREENING AND GENE THERAPY: WHAT A SEQUENCE IS GO