

Bio203 Current 2019 Solved Papers

Difference between type II and type IIs restrictions enzyme system ? (2 marks)

Type II

- 1) ☐ Most of the useful R-M system is Type II
- 2) ☐ Type II enzymes recognize a defined sequence and cut within it

Type IIs

- 3) ☐ Type IIs systems have similar cofactors and structure to type II but restriction occurs at a distance
- 4) from recognition site that limits their usefulness

What is SNPs profile ?(2 marks)

A **SNP** is defined as a single base change in a DNA sequence that occurs in a significant proportion (more than 1 percent) of a large population.

- Genome of each individual contains distinct SNP pattern.
- People can be grouped based on the SNP profile.
- SNPs Profiles important for identifying response to Drug Therapy

How many SNP screening techniques? 3

- Two different screening strategies
 - 1) Many SNPs in a few individuals
 - 2) A few SNPs in many individuals
- ❖ Different strategies will require different tools

DNA ligase enzyme activity? (3 marks)

DNA ligase is a specific type of enzyme, a ligase, that facilitates the joining of DNA strands together by catalyzing the formation of a phosphodiester bond. It plays a role in repairing single-strand breaks in duplex DNA in living organisms, but some forms may specifically repair double-strand breaks.

OR

DNA ligase is a DNA-joining enzyme. If two pieces of DNA have matching ends, ligase can link them to form a single, unbroken molecule of DNA. In DNA cloning, restriction enzymes and DNA ligase are used to insert genes and other pieces of DNA into plasmids.

Principle of southern blotting and who cleaved DNA in it? (3 marks)

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The Southern blot is used to detect the presence of a particular piece of DNA in a sample by a molecular probe. Southern Blotting is named after its inventor, the British Biologist Edwin Southern (1975).

Principle

This technique is based on the principle of separation of DNA fragments by gel electrophoresis and identified by labelled probe hybridization.

Basically, the DNA fragments are separated on the basis of size and charge during electrophoresis. Separated DNA fragments after transferring on nylon membrane, the desired DNA is detected using specific DNA probe that is complementary to the desired DNA.

Procedure

- DNA is extracted from cells, leukocytes.
- DNA is cleaved into many fragments by restriction enzyme (e.g, BamH1, EcoR1 etc)
- The resulting fragments are separated on the basis of size by electrophoresis.
- The DNA fragments are denatured and transferred to nitrocellulose membrane for analysis.
- The labeled probe is added to the blocked membrane in buffer and incubated for several hours to allow the probe molecules to find their targets.
- Blot is incubated with wash buffers containing NaCl and detergent to wash away excess probe.
- Radioactive probes enable auto radiographic detection.

Properties and uses of probes in southern blotting ?(3marks)

SOUTHERN BLOTting PROBES

Labeled material to detect a target.

For DNA: 20-30 nucleotides, complementary to a region in the gene or DNA.

Properties

RADIOACTIVE PROBE - P32

- ☐ Sensitive
- ☐ Relatively cheap
- ☐ Hazardous
- ☐ Radioactive waste disposal regulations should be followed

NON-RADIOACTIVE PROBE - BIOTIN

- ☐ Sensitive
- ☐ Relatively expensive

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HYBRIDIZATION OF PROBES

□ The binding between single stranded labeled probe to a complementary nucleotide sequence on the target DNA.

Use of Probes

Probes are used to detect complementary region in the gene or DNA.

Haplotype?(3 marks)

A haplotype is a group of genes within an organism that was inherited together from a single parent. "It is a set of DNA variations, or polymorphisms, that tend to be inherited together. A haplotype can refer to a combination of alleles or to a set of single nucleotide polymorphisms (SNPs) found on the same chromosome."

The word "haplotype" is derived from the word "haploid," which describes cells with only one set of chromosomes, and from the word "genotype," which refers to the genetic makeup of an organism.

Haplotype correlate with phenotype??(5 marks)

- The "Haplotype centric" approach combines the information of adjacent SNPs into composite multi locus haplotypes.
- Haplotypes are not only more informative but also capture the regional LD information, which is assumed to be robust and powerful.
- Association of haplotype frequencies with the presence of desired phenotypic frequencies in the population will help in utilizing the maximum potential of SNP as a marker.

Four types of restriction modification system (5marks)

At least four R-M systems are known

Type I

Type II

Type III

Type IIs

Type I

- ♣ Type I systems were the first to be characterized from E. coli K 12.
- ♣ The active enzyme consists of two restriction subunit, two modification subunit and one

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recognition subunit.

♣ Type I systems are of little value for gene manipulation.

Type II

- Most of the useful R- M system is Type II
- Type II enzymes recognize a defined sequence and cut within it

Type III

- Type III enzymes have symmetrical recognition sequences but otherwise resemble type I systems and are of little value

Type IIs

- Type IIs systems have similar cofactors and structure to type II but restriction occurs at a distance from recognition site that limits their usefulness

Difference between T II and TIIs restriction and modification system 2

Question Repeated.

Name of the substance that uses as solid support in southern blotting 2

Nylon

At where does RFPL occur?? 2

An RFLP occurs when the length of a detected fragment varies between individuals. Each fragment length is considered an allele, and can be used in genetic analysis.

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Principal of southern blotting and DNA cleavage. 3

Question Repeated.

General properties of probes-5

Q Repeated

Explain VNTRs .-5

- ❖ DNA profiling uses repetitive sequences that are highly variable, called variable number tandem repeats (VNTRs), particularly short tandem repeats (STRs). VNTR loci are very similar between closely related humans.
- ❖ A Variable Number Tandem Repeat (or VNTR) is a location in a genome where a short nucleotide sequence is organized as a tandem repeat.
- ❖ These can be found on many chromosomes, and often show variations in length between individuals.
- ❖ Each variant acts as an inherited allele, allowing them to be used for personal or parental identification.
- ❖ There are two principal families of VNTRs:
 1. Microsatellites.
 2. Minisatellites
- ❖ **Microsatellites**, also known as Simple Sequence Repeats (SSRs) or short tandem repeats (STRs), are repeating sequences of 2-6 base pairs of DNA. •
- ❖ A **minisatellites** (also referred as VNTR) is a section of DNA that consists of a short series of bases 10–60 base pairs. •
- ❖ Their analysis is useful in genetics and biology research, forensics, and DNA fingerprinting.

Write a note on restriction and modification system-5