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Q5(e)

DNA technology in Medicine.

UPSC Civil Services Mains 2015 · Anthropology GS 1 · 10 marks · Applications of Anthropology

12. Applications of Anthropology: Anthropology of sports, Nutritional anthropology, Anthropology in designing of defence and other equipments, Forensic Anthropology, Methods and principles of personal identification and reconstruction, Applied human genetics-Paternity diagnosis, genetic counselling and eugenics, DNA technology in diseases and medicine, serogenetics and cytogenetics in reproductive biology.

Core demand of the question

- Write a note on DNA technology in Medicine
- Keep the note to a 10-mark length of about 150 words

Revision summary

PCR and sequencing find disease variants and guide some cancer care.

NIPT and karyotype serve prenatal and chromosomal medicine.

Recombinant insulin shows DNA as a factory, not only a test.

Databases can misread Indian alleles if they are Europe-heavy.

Ethics of consent and discrimination travel with the kit.

Introduction

DNA technology in medicine uses the genome to diagnose, predict, and sometimes treat. Anthropology meets it in counselling, forensics, and population diversity.

Body**Tools**

- **PCR**, Sanger, and now **NGS** find pathogenic variants in **thalassaemia**, **cystic fibrosis**, and cancers.
- **Karyotype** and **FISH** still catch aneuploidy. **NIPT** screens fetal DNA in maternal blood.
- **Recombinant** insulin and vaccines are DNA-industry medicines, not only tests.

Limits and ethics

- A variant is not always a disease. Penetrance and ancestry bias in databases matter for Indian patients.
- **HeLa** history and later **GINA**-style debates show consent and discrimination risks.
- Gene therapy is real for a few disorders; it is not a general cure.

Flow diagram

DNA technology -> Diagnosis NGS PCR

DNA technology -> Recombinant drugs

DNA technology -> Consent ancestry bias

Conclusion

DNA technology diagnoses Mendelian disease, screens fetuses, and makes some drugs. Medicine still needs phenotype, consent, and local allele files.

Facts & figures

PCR

Amplifies target DNA; foundation of diagnostic genetics.

NIPT

Screens common aneuploidies from cell-free fetal DNA.

Thalassaemia

An Indian public-health target for carrier screening and prenatal diagnosis.

NGS

Massively parallel sequencing for panels, exomes, and tumours.

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