Q8(c)

What do you understand by Immunogenetics? Explain with suitable examples

UPSC Civil Services Mains 2015 · Anthropology GS 1 · 15 marks · Mendelian genetics in man-family study, single factor, multifactor, lethal, sub-lethal and polygenic inheritance in man.

9.2 Mendelian genetics in man-family study, single factor, multifactor, lethal, sub-lethal and polygenic inheritance in man.

Core demand of the question

- What do you understand by Immunogenetics? Explain with suitable examples
- Write about 200 words for 15 marks

Revision summary

Immunogenetics studies genes of antigens and immune response.

ABO and Rh govern transfusion and newborn haemolysis.

HLA matching is central to transplantation.

HLA alleles associate with autoimmune disease.

Population HLA maps are anthropological, not racial medicine.

Introduction

Immunogenetics is the genetics of the immune system. It studies inherited variation in antigens, antibodies, and the loci that decide transplant and disease risk.

Body

Core

- **Blood-group antigens are immune structures: ABO** and **Rh** decide transfusion and **haemolytic disease of the newborn**.
- **HLA** (MHC) on chromosome 6 is the densest human immunogenetic map. Matching matters in kidney and bone-marrow grafts.
- Antibody allotypes (**Gm**, **Km**) and **immunoglobulin** gene rearrangements join Mendelian inheritance to somatic diversity.

Examples

- **Landsteiner** found ABO. **Levine** linked Rh to newborn jaundice.
- **Ankylosing spondylitis** and **HLA-B27**, **coeliac** and **HLA-DQ**, **type 1 diabetes** and **DR/DQ** haplotypes.
- **G6PD** and some complement loci sit on the border of immuno-haematology and infection.
- **Hybridoma** and now sequencing of TCR and BCR repertoires are laboratory immunogenetics.

Anthropology

• HLA clines and Indian caste-tribe samples are used in population history, with care against racial medical myths.

Flow diagram

Immunogenetics -> ABO Rh transfusion Rh transfusion

Immunogenetics -> MHC transplant disease

Immunogenetics -> Antibody allotypes

Conclusion

Immunogenetics is inherited immune variation. ABO, Rh, and HLA are the teaching trio, with disease associations and transplant matching as the applied face.

Facts & figures

Landsteiner

Discovered ABO groups, the founding immunogenetic system.

Rh

D antigen incompatibility can cause haemolytic disease of the newborn.

HLA-B27

Strong association with ankylosing spondylitis, a teaching example.

MHC

Major histocompatibility complex; HLA in humans, on 6p.