**Human Variation, Disease & Personalized Medicine**

**Human Sequence Variation**

* SNPs (Single Nucleotide Polymorphisms).
* Insertions/deletions.
* Role in genetic diversity and disease predisposition.

**Phenologs & Comparative Genomics**

* **Phenologs**: Different organisms showing similar genetic bases for traits.
* Comparative genomics → compare human vs model organisms (mouse, yeast, zebrafish).
* Use in drug discovery and disease models.

**Personalized Medicine**

* Definition: Tailoring treatment to a patient’s genetic profile.
* Examples:
  + Cancer genomics.
  + Pharmacogenomics (drug responses).
* Ethical challenges: privacy, accessibility.

**🧪 Lab: Exploring Variation Databases**

* Use dbSNP or ClinVar (NCBI).
* Search for a known disease-causing SNP (e.g., BRCA1 mutation in breast cancer).
* Interpret database output.

Activity: Find one SNP and explain whether it’s benign or pathogenic.

**Quick Review**

1. What are SNPs and why are they important?
2. How can comparative genomics help in studying human disease?
3. Give one real-world example of personalized medicine.