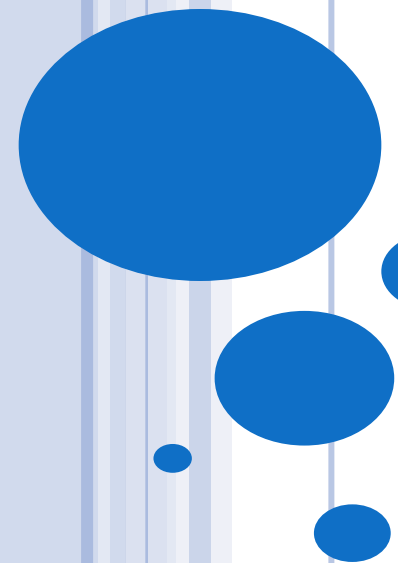




Centurion
UNIVERSITY



NUTRITIONAL GENOMICS

1) INTRODUCTION- NUTRITIONAL GENOMICS

2) GENES

3) INTERACTION BETWEEN NUTRIENT AND GENE

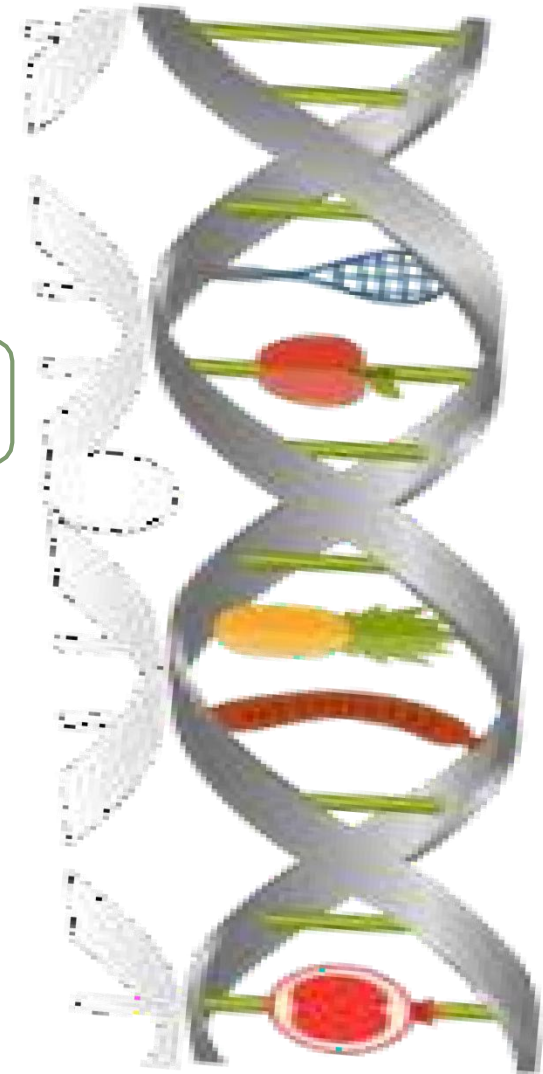
4) CLASSIFICATION

5) NUTRIGENOMICS

6) NUTRIGENETICS

7) ADVANTAGES AND DISADVANTAGES

8) CONCLUSION

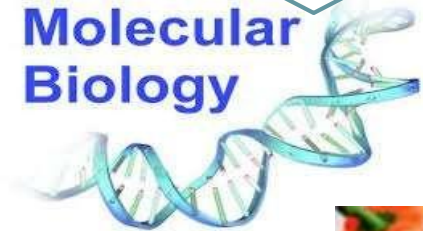


NUTRITIONAL GENOMICS

✓ **IT IS NEW AND FASTMOVING
FIELD – COMBINES
MOLECULAR
BIOLOGY,
GENETICS AND NUTRITION**

✓ **PROVIDES GENETIC
UNDERSTANDING FOR HOW DIET,
NUTRIENTS AND OTHER FOOD
COMPONENTS AFFECT BALANCE
BETWEEN HEALTH
AND DISEASE BY ALTERING THE
EXPRESSION / STRUCTURE OF
INDIVIDUAL
GENETIC MAKEUP**

**Molecular
Biology**

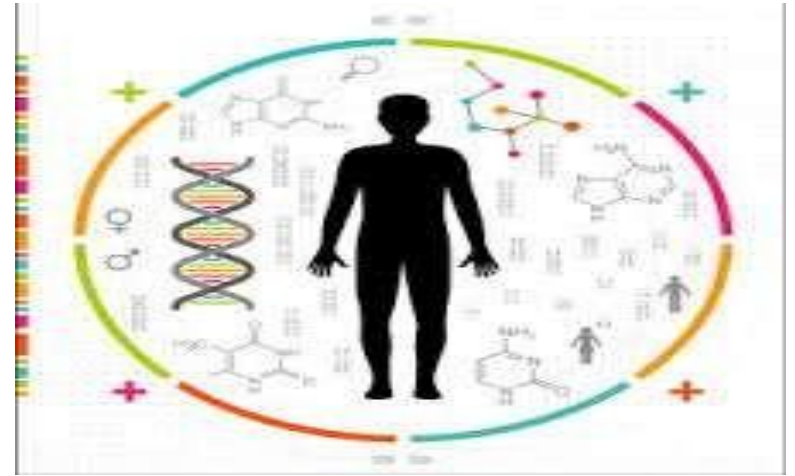


GENETICS



NUTRITIONAL GENOMICS

✓ Nutritional Genomics Has Transformed Nutrition From Classical To Molecular Level



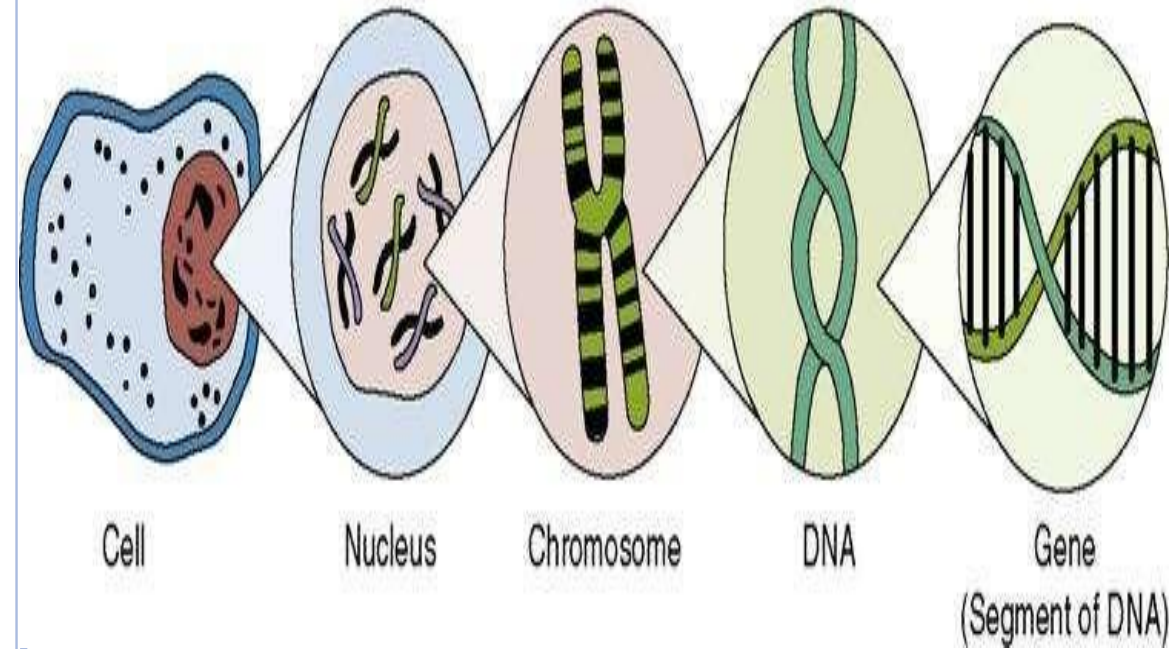
“Let food be thy medicine
and medicine be thy food”
– Hippocrates

PALEOSPIRIT.COM

✓ It Helps Us To Determine Which Nutritional Component Are Most Beneficial For Individual's Health.

GENES

INSIDE THE CELL



➤ **DNA**- Long Thread Like Molecule Provide Blueprint Of Instruction For Our Body's
50 Trillion Cells

- **DNA** → **CHROMOSOMES**
- **Chromosomes Located In Nucleus Of Cells**
- **Gene** Is A Region / Segment Of Dna That Contain **Specific Code**

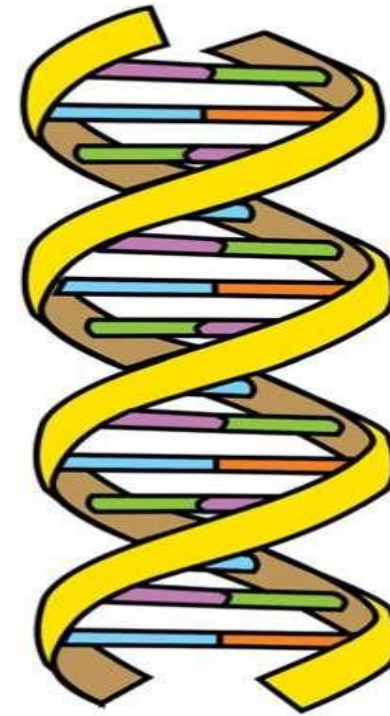
GENOME

- ✓ Gene Sequence Tells Cell How To Make **Protein** Molecule
- ✓ Protein Control Many Aspects



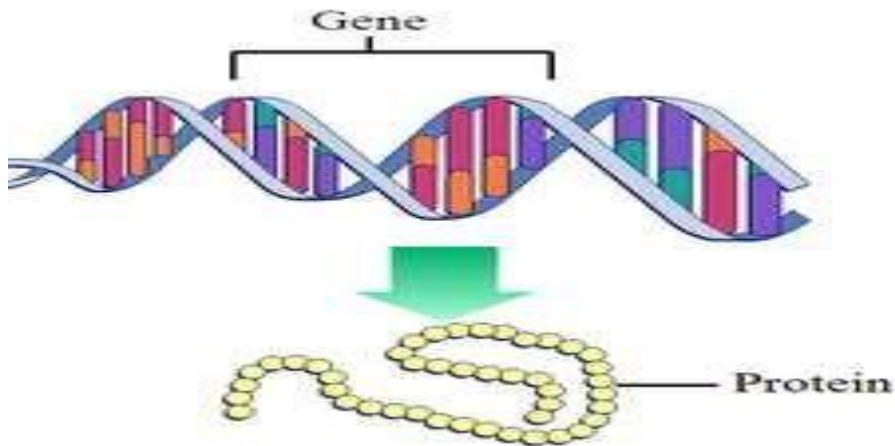
Cellular Anatomy, Physiology And Metabolism

- ✓ Proteins – **Enzymes, Receptors, Peptide Hormones, Structural Building Blocks**



- Adenine
- Thymine
- Cytosine
- Guanine

- Sugar-phosphate backbone



✓ **Genome**- Total Set Of Genes In An Organism

✓ **Human Genome**- Consists Of **20,000** Genes

NUTRITIONAL GENOMICS

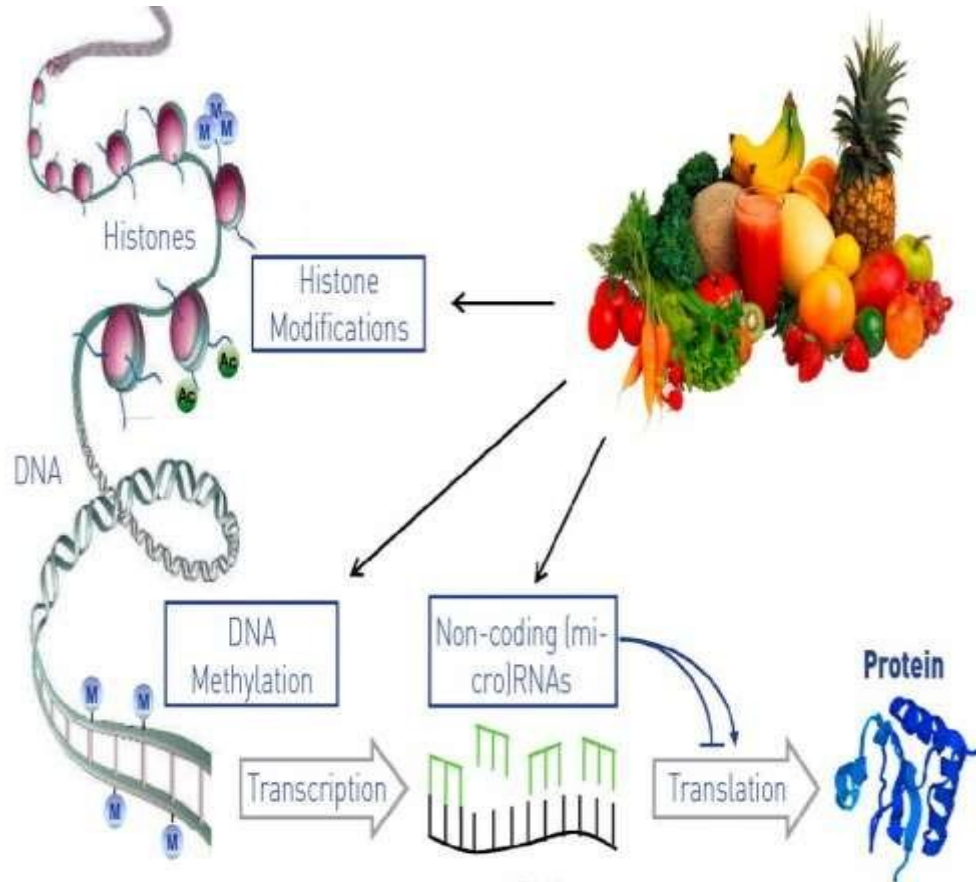
✓ Those Variation In Gene – Explain Why No Two People Are Same And Everyone Is Unique.



➤ **Nutritional Genomics**
Helps Explain The Different Individual Responses People Have
When Given The Same Nutritional Treatment

➤ **By Understanding How Each Individual Reacts To Specific Nutrient We Can Enhance Patient Care**

INTERACTION BETWEEN NUTRIENT AND GENE



- 1. DIRECT INTERACTIONS
 - Nutrients interact with receptor and behave as transcription factors which can
 - bind at DNA level, causing acute
 - expression of gene.

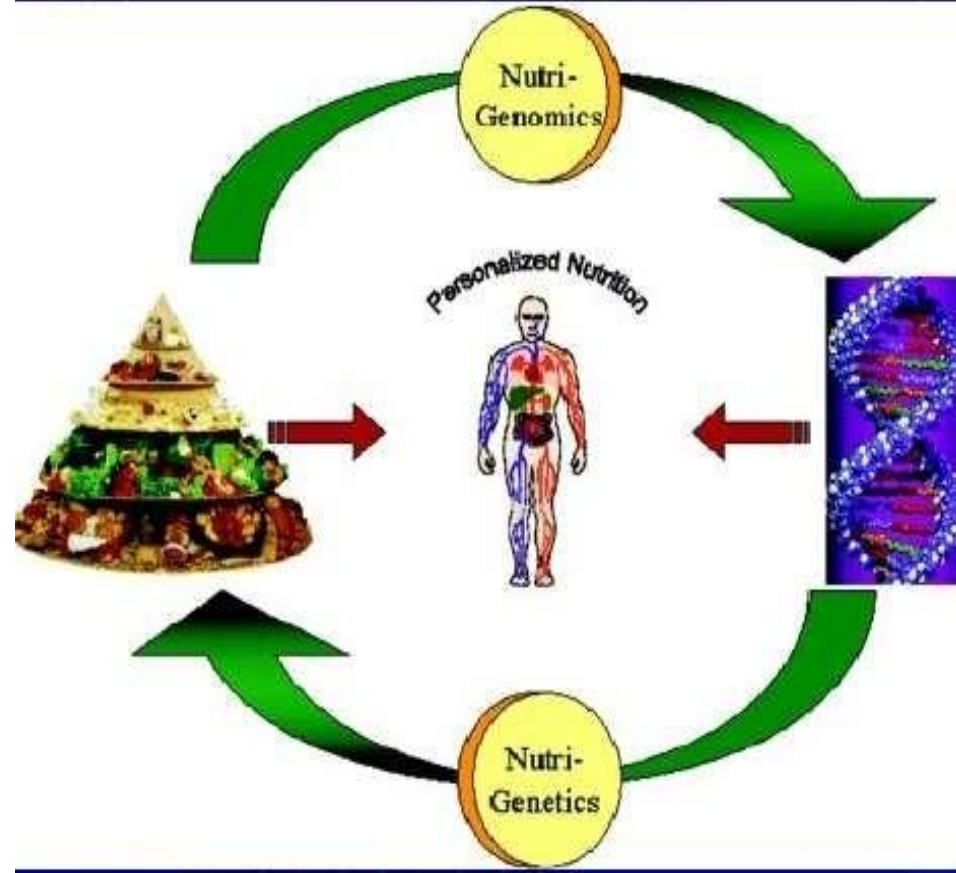
2. EPIGENETIC INTERACTIONS

- **Nutrients modify DNA structure –which alters the particular gene expression and become chronic**

CLASSIFICATION

1. NUTRIGENOMICS

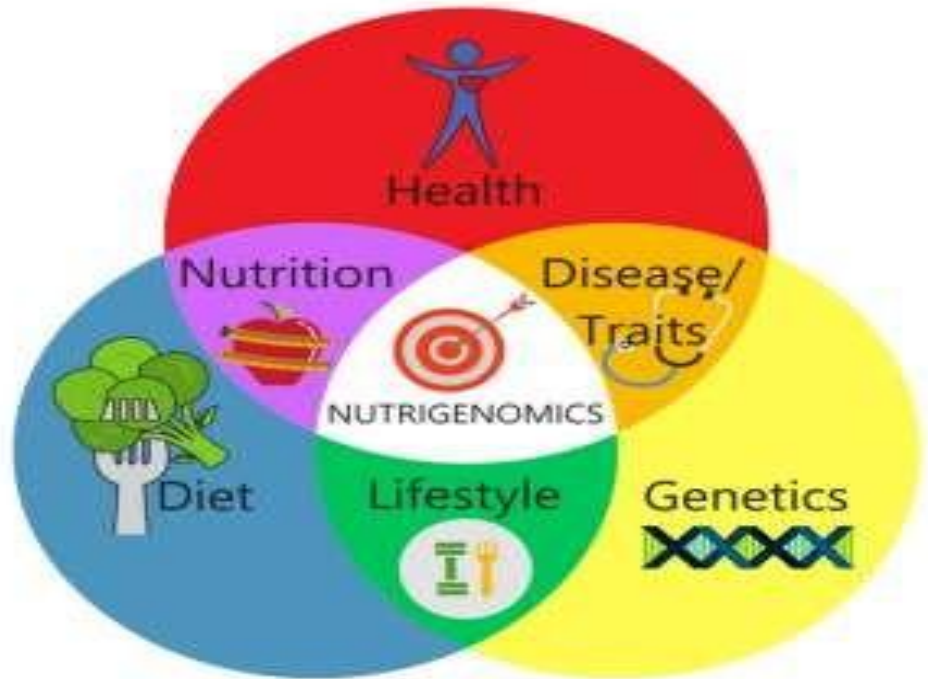
- ❑ Focuses on the effect of nutrients and other food components on **GENES, PROTEINS AND OTHER METABOLIC PROCESS**



2. NUTRIGENETICS

- ❑ It determines the mechanism by which individual genetic variation affects interaction between diet and disease

NUTRIGENOMICS



- **From a nutrigenomic perspective- bioactive food components are dietary signals detected by cellular sensory systems, that influence gene expression, protein synthesis and metabolic production**

✓ **Genes are dietary targets**

- **Nutrigenomics seeks to examine these dietary signals in specific cells, tissues and helps to understand how it affect gene expression**

FOUR BASIC TENETS OF NUTRIGENOMICS

1. Improper diets are risk factor for disease

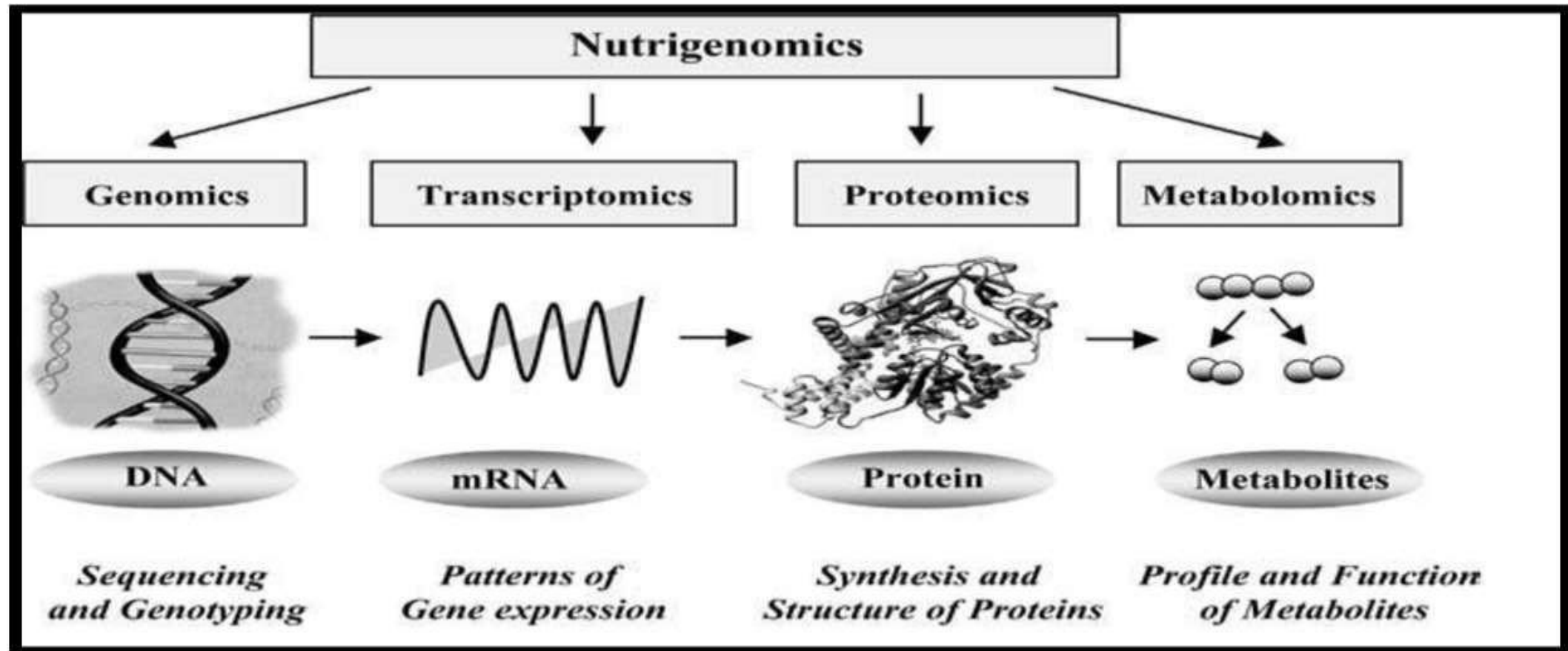
2. Dietary chemicals alter expression/ change gene structure

3. The degree to which the diet influences the balance between healthy disease status depends on the individual genetic makeup

4. Some diet regulated genes likely to play a role in onset, incidence, progression/ severity of chronic disease



TOOLS OF NUTRIGENOMICS



NUTRIGENETICS

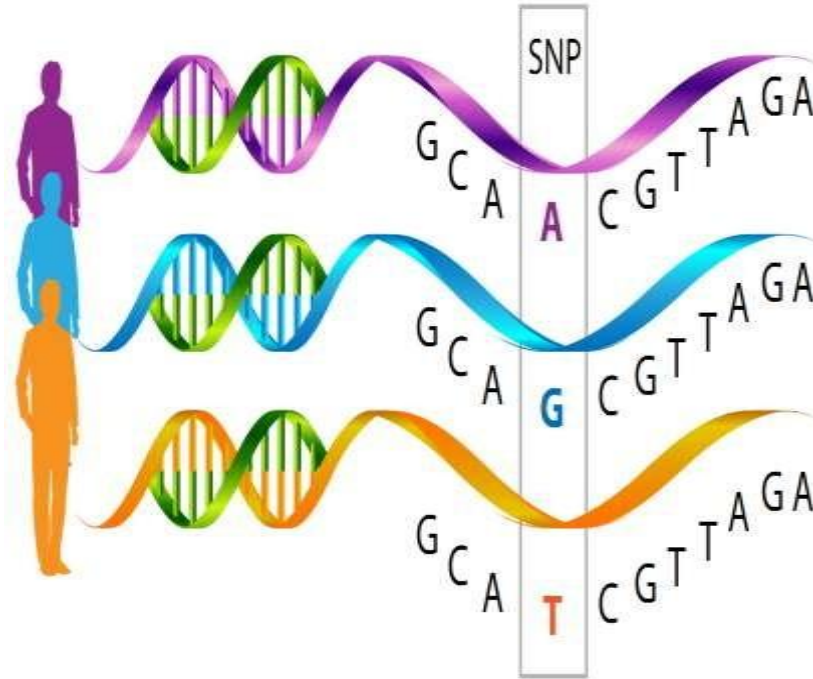


- **NUTRIGENETICS** identifies how the genetic makeup of a particular individual coordinates his/her response to various dietary nutrients
- It reveals why and how people respond differently to same nutrient

Ultimate goal- provide nutritional recommendations for individual according to their genetic makeup

GENE VARIATION

- ✓ All humans-99.9% identical at gene sequence level
- ✓ 0.1% variation in sequence produce difference in phenotype
- ✓ Most common type-
**SINGLE
NUCLEOTIDE
POLYMORPHISM**



- ✓ **SNPs**- changes occur at single base
- ✓ **SNPs** make 90% of all variation identified in humans
- ✓ Because of these SNPs individual respond differently to same diet

Gene diet disease interaction

- Nutrigenetic diseases 97 per cent of the genes have known to be associated with human diseases result in monogenic diseases.
- Modifying the dietary intake can prevent some monogenetic diseases e.g., in phenylketonuria (PKU) food containing the amino acid phenylalanine, --including high protein food such as fish, chicken, eggs, milk, cheese, dried beans, nuts and tofu must be avoided
- In case of defective aldehyde dehydrogenase enzyme, alcohol must be avoided
- Patients having galactosemia (lack of a liver enzyme to digest galactose) should avoid diets which contain lactose or galactose, including milk and milk products

Advantages of Nutrigenomics



- ✓ Increased focus on a healthy diet and lifestyle.
- ✓ Increased awareness of risk of certain conditions.
- ✓ Improved health quantity of life.
- ✓ Focus on prevention of diseases.
- ✓ Decreased morbidity and premature mortality.
- ✓ Reduced health care costs.
- ✓ Better understanding of the mechanisms involved in disease susceptibility .



Namrata K. Bhirud. 21

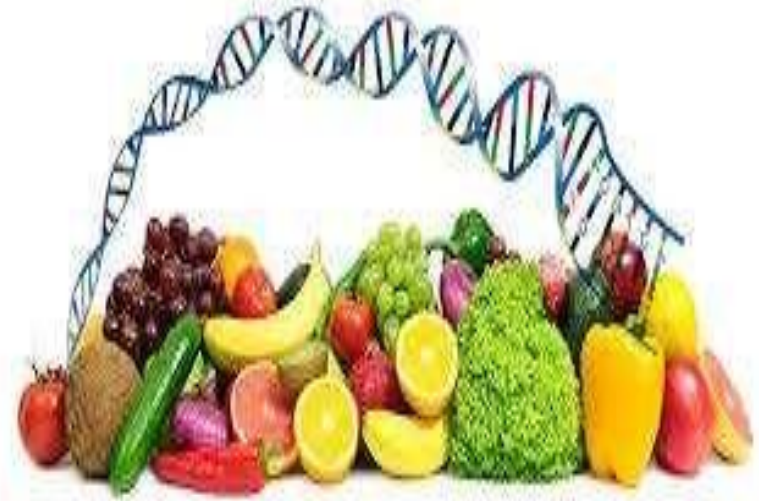
Disadvantages of Nutrigenomics



- Attention is drawn away from other modifiable risk factors.
- Focus only specific nutrients/foods.
- Misleading claims.
- Increased costs associated with personalized diets and designer foods.

CONCLUSION

- Nutritional genomics provides a great opportunity for dietitians as they will be able to provide reliable, science-based evidence on how to improve one's gene expression through whole food consumption rather than relying on supplementation.
- Registered dietitians will be able to provide personalised nutrition information to help improve patients' overall health and minimize their risk for disease which will be more accurate by knowing their unique genetic make up.



Thank You