''बेटी बचाओ, बेटी पढ़ाओ''

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

Faculty of Pharmaceutical Science

Faculty Name - JV'n Dr. Parveen Parihar

Course - B. Pharm (5^{th} sem)

Session - Pharmacognosy – (Acetate pathway)

Academic Day starts with –

- Greeting with saying **'Namaste'** by joining Hands together following by 2-3 Minutes Happy session, Celebrating birthday of any student of respective class and **National Anthem**

Acetate Melonate Pathway

Acetate Malonate Pathway:

- Acetate pathway operates with the involvement of acyl carrier protein (ACP) to yield fatty acyl thioesters of ACP.
- These acyl thioesters forms the important intermediates in fatty acid synthesis. These C2 acetyl CoA units at the later stage produces even number of fatty acids from n-tetranoic (butyric) to n-ecosanoic (arachidic acid).
- Unsaturated fatty acids are produced by subsequent direct dehydrogenation of saturated fatty acids. Enzymes play important role in governing the position of newly introduced double bonds in the fatty acids.

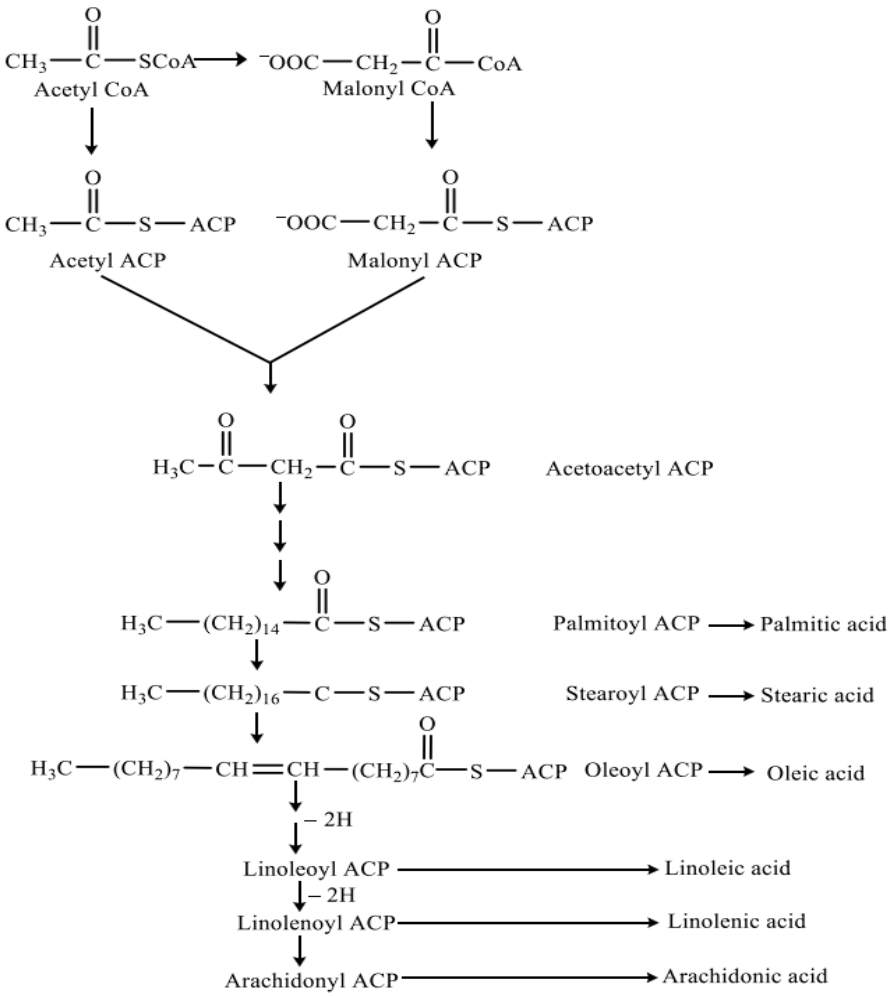

Figure 1.5: Acetate-Malonate Pathway

1.4 Amino acid pathway

- Plants and bacteria can synthesize all 20 of the amino acids. Whereas humans cannot synthesize 9 of them. These 9 amino acids must come from our diets and are called essential amino acids.
- The essential amino acids are Histidine, Isoleucine, Leucine, Lysine, Methionine, Phenylalanine, Threonine, Tryptophan, and Valine.
- The 11 amino acids are called non-essential amino acids like Alanine, Arginine, Aspargine, Aspartate, Cysteine, Glutamate, Glutamine, Glycine, Proline, Serine and Tyrosine.
- The non-essential amino acids are synthesized by simple pathways, whereas biosynthesis of the essential amino acids are complex. All 3

aromatic amino acids are derived from shikimate pathway.

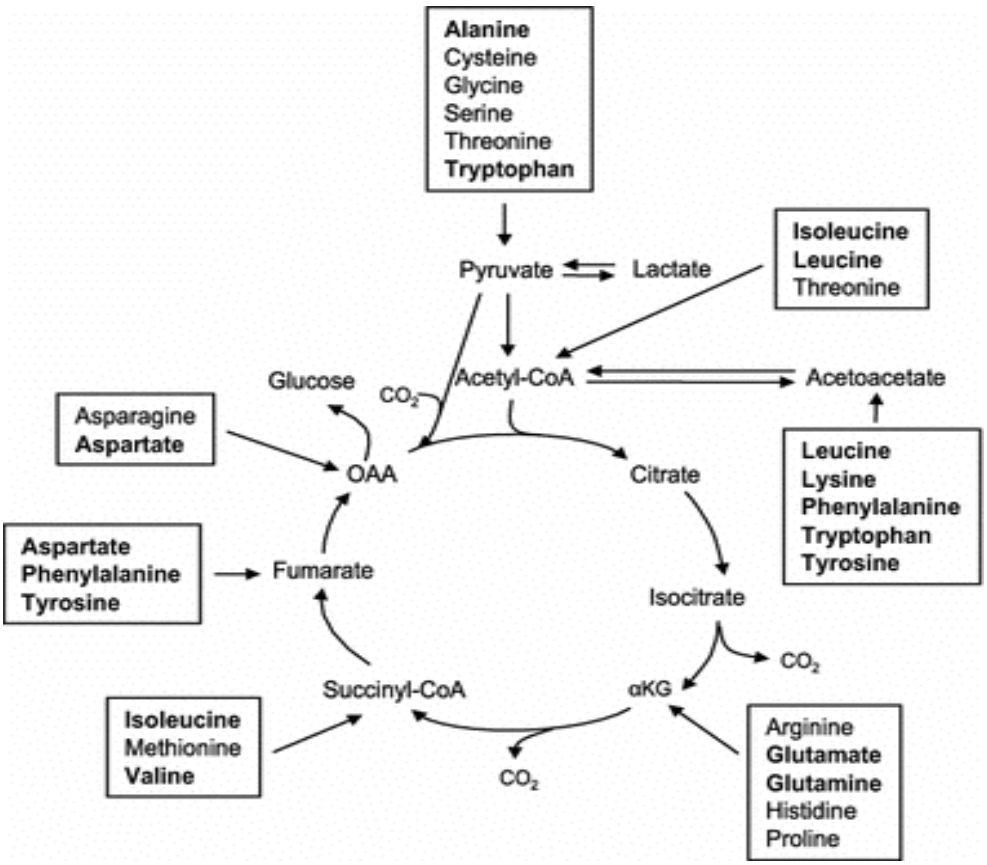

Figure 1 Amino acid pathway

b) Study of utilization of radioactive isotopes in the investigation of Biogenetic studies.

There are 5 techniques used for the investigation of biosynthetic pathway of primary and secondary metabolites.

1. Tracer technique
2. Use of isolated organ and tissues
3. Grafting method
4. Use of Mutant strains
5. Enzymatic studies

Out of the above 5 methods, in Tracer technique method radioactive isotopes are used for the investigation of biogenetic studies.

2.1 Tracer technique:

Tracer techniques utilizes radioactive isotope labelled compound to find out or to trace the different intermediates and various steps in biosynthetic pathways in plants, at a given rate & time. When the labelled compounds are administered to the plants, they become a part of metabolic pool (Collective term for all the substances involved in the metabolic process in a biological system) and undergo reaction characteristics.

Elements existed with identical chemical properties or same atomic no. but different atomic weights/ mass no. are called isotopes. In other words, isotopes are atoms of same element whose nuclei contain same no. of protons but different no. of neutrons. Stable isotopes- They are stable and do not emit radiation, e.g- 2H, 13C, 15N, 18O

Radioactive isotopes-

They are unstable and emit radiations. The phenomenon of emitting radiation is called radioactivity and such isotopes are called radioactive isotopes. Significance of tracer techniques-

- Applicable for living systems. Wide ranges of isotopes are available.
- High sensitivit More effective Simple administration and isolation.
- Shows accurate results when enough metabolic time & technique is used.
- Position & Quantity of compound containing tracer isotope 14C marked glucose is used for glucose determination in the biological system.
- For different studies, different tracers can be used. For studies on nitrogen and amino acid, Labelled nitrogen gives specific information than carbon.
- Biosynthetic pathway can be traced by incorporating radioactive isotopes

into the precursor or starting material. e.g- By incorporation of 14C to phenyl alanine, the biosynthesis of cyanogenetic glycosides, prunacin can be traced.

- Location and quantity can be determined in biological system.

Different trace elements used for different studies

1. For studies on protein, alkaloids and amino acid, nitrogen atom gives more specific information than carbon.
2. For studies on glycosidic linkage- O, N, S and C atom.
3. For studies on terpenoids- O atom.

2.2 Steps involved in tracer techniques

1. Preparation of labelled compound
2. Incorporation of labelled compound
3. Separation and isolation of labelled compound
4. Determination of nature of metabolites in various biochemical fractions.

1. Preparation of labelled compound

In biological investigation, the use of bioactive isotopes enables the metabolism of compounds to be followed in living organisms for detection and estimation of soft and easily absorbed radiation from labelled compound.

- Labelled compounds may be prepared by use of radioactive isotopes and stable isotopes e,g- Radioactive isotopes- 14C, 3H, 32P, 131I Stable isotopes- 2H, 15N, 13C, 18O
- Radioactive carbon and hydrogen are mostly used in biological investigation.
- Radioactive isotopes having long half-life are used.

- Criteria for selection of trace elements- Starting concentration of trace element must be sufficient to withstand dilution in the course of metabolism.
- Physical and chemical nature of compound must be known.
- Half-life should be sufficiently long.
- Should not damage the tissue system
- Should have low radiation energy.
- Instruments used to detect properties of metabolites are Scintillation chamber, GM counter, Autoradiography, NMR and MS- ionization technique.

- **Next Topic-**

- Pharmacognosy – (radio active tracer)

- **Academic Day ends with-**

National song 'Vande Mataram'