

A Note on Metabolites

Preeti Kattokola

Department of Microbiology, Kakatiya University, Warangal, India

Short Communication

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***For Correspondence:**

Preeti Kattokola, Department of Microbiology, Kakatiya University, Warangal, India

Tel: 9652343508

Email:

preetisony.608@gmail.com

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ABSTRACT

Plant metabolites are unproved against several diseases: cancer (the alkaloids camptothecin and homoharringtonine, a simple acetogenin, 4-ipomeanol, the shikimate-derived NK-611, the diterpenoid prostratin, the meroterpene lapachol, and tea , which is rich offlavonoids), bacterial infections (a flavolignan, 5'-methoxyhydnocarpin), cardiovascular dysfunctions (a polyacetylene, cunaniol), dermatological problems (ten-herb-extract), stomachic problems (columbin, a clerodane diterpene), wound healing (turmeric and Balsam Peru), and CNS dysfunctions (caffeine and nicotine).

INTRODUCTION

Generally, metabolites are the plant produced substances (i.e, small molecules with different functions) which are either used for its life process or is regarded as by-products.

These metabolites are of two types:

- Primary
- Secondary

Primary metabolites are compounds that are directly involved within the growth and development of a plant whereas secondary metabolites are compounds produced in other metabolic pathways that, although important, are not essential to the functioning of the plant.

Metabolites can be of varying compositions and functional groups

The primary metabolites contain the vitamins, amino acids, nucleosides and organic acids, which are necessary at the time of logarithmic phase of microbial growth. But the products like alkaloids, steroids, antibiotics, gibberellins, toxins are the secondary metabolite compound produced during the stationary phase of the cell growth.

USES:

Primary and secondary metabolites are often utilized in industrial microbiology for the assembly of food, amino acids, antibiotics, vaccines, cosmetics and to isolate chemicals in organic synthesis.

Primary metabolites:

Primary metabolites are involved in growth, development, and reproduction of the organism. ... Additionally, primary metabolites like amino acids- including L-glutamate and L-lysine, are commonly used as supplements- are isolated via the production of a selected bacterial species, *Corynebacteria glutamicum*.

The process of primary metabolism produces primary metabolites. These are the metabolites required for the maintenance and growth of cellular functions and hence are produced in the growth phase. It is initiated when the nutrients required are present in the medium for an organism to grow. Furthermore, primary metabolites are divided into Primary essential metabolites and first metabolic end products

Secondary metabolites:

Secondary metabolites often play an important role in plant defense against herbivore and other interspecies defenses. Humans use secondary metabolites as medicines, flavorings, pigments, and recreational drugs.

Secondary metabolites are those which are not required for the growth and maintenance of the cellular functions and are the resultant products of the process of primary metabolism. They are the organic compounds not directly involved in the normal growth, development or the process of reproduction of the organism.

Secondary metabolites even have a robust impact on the food humans eat. Some researchers believe that certain secondary metabolite volatiles are responsible for human food preferences which can be evolutionarily based in nutritional food. This area of interest has not been thoroughly researched, but has interesting implications for human preference. Many secondary metabolites aid the plant in gaining essential nutrients, like nitrogen. For example, legumes use flavonoids to signal a symbiotic relationship with nitrogen fixing bacteria (*rhizobium*) to increase their nitrogen uptake. Therefore, many plants that utilize secondary metabolites are high in nutrients and advantageous for human consumption.

Many drugs utilized in modern medicine are derived from plant secondary metabolites.

The most commonly known alkaloids that are used as drugs are

- Terpenoids
- Morphine
- Codeine
- Atropine
- Resveratrol
- Digoxin

The Differences between Primary Metabolites and Secondary Metabolites

PRIMARY METABOLITES

- Primary metabolites are small chemical compounds that are directly involved within the growth, development and reproduction of living organisms.

- Primary metabolites are usually produced in relatively large quantities and can easily be extracted from the plants.
- Metabolites are same in all plant species.
- Primary metabolites are a neighborhood of the essential molecular structure of an organism.
- Primary metabolites are highly useful in metabolic process of organisms.
- Examples of primary metabolites include Alcohol, amino acids, nucleotides, antioxidants, organic acids, vitamins and polyols.
- Primary metabolites are formed during the expansion phase which is additionally referred to as trophophase.
- Primary metabolites are directly involved in growth, development and reproduction.

SECONDARY METABOLITES

- Secondary metabolites are organic compounds produced by bacteria, fungi or plants which are not directly involved within the traditional growth, development or reproduction of the organism.
- Secondary metabolites are produced in small quantities and their extraction from the plant is difficult.
- Metabolites are unique in different plant species.
- Secondary metabolites are not part of the basic molecular structure of an organism.
- The absence of secondary metabolites does not show any significant change in metabolism.
- Examples of primary metabolites, pigments, alkaloids, drugs, essential oils, antibiotics, ergot alkaloids, nucleosides, quinolines, peptides, phenazines, naphthalenes, terpenoids, lectins, polymeric substances and lectins.
- Secondary metabolites are formed during stationary phase which is also known as idiophase.
- Secondary metabolites play a role in ecological functions such as helping in defense mechanisms, serving as antibiotics and producing pigments.

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