

Beneficial Microbes: Food, Pharma, Aqua & Beverages Industry

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Microbial fermentation: Enzymes, metabolic pathways and fermentation aspects

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The original definition of fermentation is the anaerobic conversion of sugars to ethanol and carbon dioxide by yeast. This original definition has been expanded over time to the conversion of organic materials by multiple diversities of organisms (bacteria, yeasts, molds, animal cells, or plant cells) under anaerobic or aerobic conditions into wide ranges of molecules types different. In general, fermentation can be divided into four types that are not necessary disjoint from each other:

- Production of biomass (viable cellular materials)
- Production of extracellular metabolites (chemical compounds)
- Production of intracellular components (proteins)
- Transformation of substrates into bio products

The key elements of fermentation industry are strain microbial/cells selection, media composition, and conditions optimization. Microbial fermentation will be highlighted in this presentation that includes microbial enzymes, metabolic pathways and fermentation process.

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The nature of prebiotics and the impact of prebiotics/probiotics on gut health

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Prebiotics are the fermentable, non-digestible carbohydrates that stimulate as nutrients the growth and the activity of beneficial bacteria (probiotics) in the digestive system. There are two prebiotics categories: Prebiotics fibers that are naturally occurred in whole grain, broccoli, asparagus, radish, cabbage, etc, and Prebiotics oligosaccharides such as Fructo-oligosaccharide (FOX), Galacto-oligosaccharides (GOS), Xylo-oligosaccharides (XOS), polydextrine etc. These prebiotics oligosaccharides are increasingly added to foods for their health benefits and are not labeled as fibers in the United States. Prebiotics oligosaccharides are synthetically manufactured or extracted from plants in pure forms. Probiotics are the beneficial bacteria in the colon such as Bifidobacteria and lactic acid bacteria. These probiotics bacteria assist in the maintenance of the natural balance of micro flora in the digestive system to reduce the effect of the harmful and pathogenic bacteria in the digestive system, suggesting that these probiotics bacteria can prevent gastrointestinal tract from infection diseases and reduce gut inflammation. It is also, assumed that probiotics bacteria strengthen the immune system. Synbiotics are products that contain both prebiotics and probiotics. These products have the non-digestible carbohydrates source (prebiotics) and the good bacteria (probiotics). Manufacturing of the major prebiotics oligosaccharides and the impact of synbiotics on gut health will be highlighted in this presentation.

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