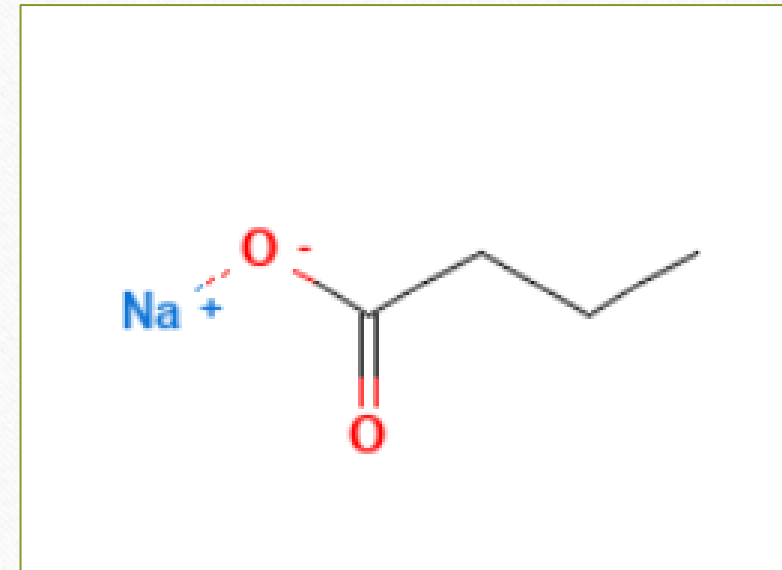


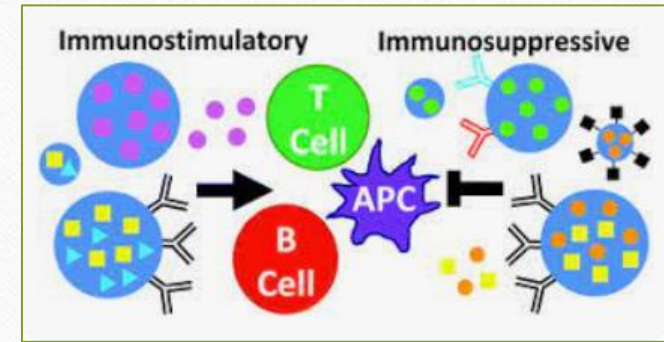
Sodium Butyrate

Chemical Structure

- Sodium Butyrate is the sodium salt of butyrate with potential antineoplastic activity. Butyrate, a short chain fatty acid, competitively binds to the zinc sites of class I and II histone deacetylases (HDACs). This binding affects hyperacetylation of histones, resulting in a modified DNA conformation, which subsequently leads to the uncoiling or relaxing of chromatin. Enhanced accessibility of chromatin to transcription-regulatory complexes leads to increased transcriptional activation of various epigenetically suppressed genes. Butyrate, a HDAC inhibitor, induces cell cycle arrest in G1 or G2/M and also increases the expression of other genes and proteins involved in cellular differentiation and apoptotic signaling.



Sodium butyrate supplement for immune-modulation



- A. Short chain fatty acids (SCFA), specifically butyrate, play an important role in mediating the effects of the gut microbiome on local and systemic immunity. Gut microbial alterations and depletion of luminal butyrate have been well documented for a number of systemic and GI inflammatory disorders¹.
- B. Sodium butyrate is well-known for its immune-modulatory properties. Oral butyrate supplementation is beneficial in reducing the overall inflammatory status of circulating monocytes in patients with metabolic syndrome, such as obesity¹.
- C. Applicability of butyrate in irritable bowel disease (IBD) is considered as an add-on supplementary therapy at best. One area in which butyrate has shown more consistent effectiveness is in cases of diversion colitis, a post-surgical manifestation when a part of colon is out of continuity and butyrate depletion is thought to be the major factor for driving inflammation. Butyrate enema has been shown to have therapeutic value when medical management is considered in these cases².
- D. Patients with colorectal cancer have been reported to have low levels of SCFA including butyrate. Sodium butyrate has been shown to induce apoptosis in human colonic cancer cell lines in a p-53 independent pathway. Butyrate also provides protection against oxidative stress and DNA damage².

Butyrate in animal feed



- With the advent of recent molecular techniques, the role of GI tract microbiota in the livestock health and production has been redesigned. The delicate balance of beneficial microbes and pathogens is the primary determinant of GIT health which in turn directly regulates the efficiency of nutrient utilization and net return. The abundance of specific bacteria gets influenced by feed composition, nature of ingredients and managerial practices. Clostridiosis is presumed to be the most devastating disease in poultry and pig by means of its havoc economic thrust. Clostridium perfringens is a naturally occurring commensal usually found in the hind gut in low numbers. Clostridiosis often predisposes the birds to Necrotic Enteritis. After the imposition of regulatory bans on use of ‘anti-microbial growth promoters’ (AGPs), nutritionists are focused for finding out the suitable alternatives to culminate such threats³.
- The pH of GIT is a pre-requisite for establishment and multiplication of any microbes. Hence acidifiers are tried with an aim for lowering the pH of GIT so that harmful microbes (like Clostridium perfringens) could not proliferate. Several short chain fatty acids like butyric acid and its derivatives (like iso-butyric acid) have been tried for this purpose. Sodium Butyrate is claimed to be derived from iso-butyric acid. Hence it may have the efficacy against establishment of the Clostridium perfringens like infections in GIT⁴.

References

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