

# Frequently Asked Questions

## Q 1. What are functional foods?

The **World Health Organization (WHO)** refers to Functional foods as foods aiming for specific health purposes, including mental and physical performance.

According to **Functional Food Science in Europe (FUFOSE)** the functional food is one that has satisfactorily demonstrated beneficial effects on one or more target functions in the body, beyond adequate nutritional effects, in a way that is relevant to either an improved state of health and well being and/or reduction of risk of diseases.

According to **Food Safety Standard Authority of India (FSSAI)** functional foods mean foods which provide benefits beyond basic nutrition and may play a role in reducing or minimizing the risk of certain diseases and other health conditions, as described in these regulations.

## Q 2. What are the different categories of functional foods?

Functional foods are divided into two categories:

- First are **Natural Foods** which consist mainly fruits and vegetables which are loaded with antioxidants, phytochemicals and physiologically active components that protect humans from illness or enhance their health.
- Second are **Foods which are processed and modified for bioactive ingredients.** Processed functional foods enhance, add, remove or replace one or more of the components in food with special qualities by enzymatic, chemical, or technological means or increase the bioavailability of these components.

## Q 3. What makes foods functional?

The bio components present in the food make it functional. It includes both **biochemical** ingredients (antioxidants, phytochemicals and physiologically active compounds) and **bioactive** ingredients such as probiotics and prebiotics.

## Q 4. Name few compounds present in functional foods which provide health benefits?

Compounds present in Functional Foods which provide health benefits are:

- **Antioxidants** such as Vitamin C, Vitamin A etc.
- Plant pigments such as **polyphenols, phytoestrogen, phytosterols** and **phytophenols**
- **Omega 3** fatty acids and **Omega 6** fatty acids
- **Probiotics**
- **Prebiotics**

## Q 5. List some of the foods with their functional components

Foods with their functional components are:

- **Tomato-Lycopene**
- **Soyabean-Phytosterols, Isoflavones, Saponins, Phenolic Acids, Phytic acid**
- **Linseed/ Flax seed- A-linolenic Acid, Omega-3 fatty acid**
- **Garlic- Allicin, Diallyl Sulfide**
- **Oats-Beta Glucans, Saponins, Terpenoids, Phytic Acid**
- **Yoghurt- Bifido Bacteria**
- **Goose Berry (Amla)- Hydrolsable Tannins, Vitamin A , Vitamin C**
- **Barley- Fructo-oligosaccharides**
- **Soybean- Stacchyose, Raffinose**
- **Human Milk-Gakacto-oligosaccharides**

## Q 6. What do you understand by microbiome?

The microbiome has been defined as “the **combined genetic material** of the **microorganisms** in a **particular environment**”.

## Q 7. What do you mean by human microbiome?

The human microbiome is the **communities of bacteria** (and viruses and fungi) that **reside** in the **human body** and **interact** with the **host to perform** a variety of **functions** and interactions both in health and disease.

## Q 8. Why gut microbiome is unique?

Gut Microbiome is unique because it has a **specialized function** in **nutrition, energy metabolism, immune development** and **host defense**.

## Q 9. What are Probiotics?

The term “**Probiotics**”, means “**for life**” and is derived from the Greek language. According to **World Health Organization (WHO)**, probiotics are **live microorganisms** which when **administered** in **adequate amounts** **confer** a **health benefit on the host**.

According to **FAO/WHO**, 2002 Guidelines a **probiotic food** is a **processed product** **containing viable probiotic microorganisms in amounts of about  $10^6$ - $10^7$  cfu/g**. These levels will be able to maintain their characteristics during the production and commercialization of the product. At this recommended level the organism will be able to survive during passage in the GIT of the consumer.

### Q 10. Name some common species of bacteria and yeast used in probiotics?

The common **bacteria species** used as a probiotics are *Lactobacillus*, *Bifidobacterium*, *Streptococcus*, *Lactococcus lactis* and some *Enterococcus species*. The **yeast species** used as a probiotic is non-pathogenic *Saccharomyces boulardii*.

### Q 11. What are Prebiotics?

According to Gibson to perform as **prebiotics**, the **components of functional foods and supplement** must be **able to with stand the digestive processes**, before they **reach the colon** and preferably **persist** throughout the **large intestine**.

**Prebiotic** are **non-digestible dietary ingredients** that beneficially affect the host by selectively stimulating the growth or activity of a limited number of bacteria in the colon.

### Q 12. Name some foods which have prebiotic properties?

Oligosaccharides are short chain carbohydrates which have prebiotic properties. Foods which contain oligosaccharides are:

- Fruits –**watermelon, pomegranate, grapefruit, custard apple, dry fruit (eg. dates, figs)**
- Vegetables- **onion, beetroot, green peas, sweet corn, garlic, chicory**
- Legumes- **chickpea, lentils, red kidney beans, soyabeans**
- Cereals- **barley, wheat bran**
- Nuts- **cashew, pistachio**
- **Milk**
- **Honey**

### Q 13. What is Synbiotics?

The term **synbiotic** is used for a **product** which **beneficially affects the host in improving the survival and implantation of live microbial dietary supplements** in the **gastrointestinal tract** by selectively **stimulating the growth** and/or activating the metabolism of one or a limited number of **health-promoting bacteria**.

### Q 14. Do probiotics have beneficial health effects if yes what are they?

Yes probiotics has effect on human system. Probiotics have three major activities:

1. **Antimicrobial activity**- Probiotics decreases luminal pH, secretes antimicrobial peptides, inhibit bacterial invasions and block bacterial adhesion to epithelial cells.
2. **Enhancement of barrier function**- Probiotics increase mucus production and also enhance barrier integrity.

3. **Immunomodulation**- It has effect on epithelial cells, dendritic cells, monocytes/ macrophages and also on lymphocytes- B lymphocytes, NK cells, T cells and T cells redistribution.

*The clinical benefit of probiotic is species/ strain specific and depends on numerous factors including dosing, duration, diet and host.*

### Q 15. How probiotics function?

Probiotics function in the following manner:

- **Inhibit growth** or reduce the activity of **pathogenic bacteria** in intestine by **colonizing the gut**.
- Aid in **increasing immunity** due to this **antimicrobial activity**,
- **Improve the secretion of digestive enzymes** and helps in proper digestion.
- Increase the **production of lactic acid and regulate pH balance** in intestine and other parts of body.
- **Promote acidic pH** which facilitates the absorption of protein and minerals like calcium, copper, magnesium, iron and manganese.
- Act as **anti-inflammatory agent**.
- **Ferment fructo-oligosaccharides** which thereby results in **reduced pH balance**. This increases acidity in gut, enables better absorption of calcium and allows it to get into blood stream.

### Q 16. What are the health attributes of probiotics?

Health attributes of probiotics are:

- **Inflammatory Bowel Syndrome (IBS)**
- **Lactose metabolism**
- **Coronary heart disease**
- **Oral health**
- **Diabetes**
- **Antioxidative activity**
- **Urinary tract infection**
- **Reduction in blood pressure**
- **Cholesterol normalization**
- **B Vitamins**
- **Constipation and ulcers**
- **Immune response and parasitic infection**
- **Antibiotic associated diarrhea**

## Q 17. What are the emerging applications of probiotics for improving health?

Research has been undertaken to explore and scientifically substantiate use of probiotics in a number of health conditions including the following:

- **Gastroenteritis and other intestinal diseases** such as: acute diarrhea, antibiotic associated diarrhea (AAD), constipation, inflammatory bowel symptoms (IBS), inflammatory bowel diseases (IBD), clostridium difficile infection, shigella dysenteriae infection, vibrio cholera infection, lactose digestion, colic, helicobacter pylori infection, crohn's disease, enterococcus spp. infection and gut pain sensation.
- **Liver diseases**:- chronic liver diseases (CLD), hepatic encephalopathy (HE), adrenoleukodystrophy (ALD) and nonalcoholic steatohepatitis (NASH).
- **Allergy**: atopic dermatitis and asthma
- **Heart disease and cholesterol** reduction
- **Cold and respiratory** infections
- **Oral microbiology**: dental caries
- **Skin microbiology**: inflammation, eczema
- **Clearance of infectious** agents
- **Metabolic syndrome**: obesity, hyperammonia, phenylketonuria disease and diabetes (both type 1 and type22)
- **Vaginal infections**
- **Lactose or gluten intolerance**
- **Cancer and HIV**
- **Hypertension**
- **Immune modulation**
- **Mycobacterium tuberculosis infection, P. aeruginosa infection and dust mite allergy.**
- **Brain heath**: neuropsychiatric disorders and central nervous system (CNS) disorders.
- **Probiogenomics**
- **Psychotropics**: alleviating symptoms of depression and chronic fatigue syndrome.
- **Psychobiotic**: treating symptoms in mood, neurodevelopmental disorders, and neurodegenerative diseases.

**Probiotics applications in areas other than health** are also being explored. These include floor cleaning, hand sanitation, sanitary napkins, skin care, shampoos and conditioners, apiculture (bee keeping) and probiotics for plants and fish

## Q 18. What NPG's stands for?

NPGs stand for Next Generation Probiotics (NPG's). These are those probiotic microorganisms that have not currently been used as agents to promote health and R&D is going on. These include:

**Akkermansia muciniphila** (obesity, diabetes, intestinal inflammation, liver diseases), **Faecalibacterium prausnitzii** (inflammatory bowel disease, asthma, eczema, type 2 diabetes), **Bacteroides fragilis** (clearance of infectious agents), **Lactococcus lactis trefoil factor 1 or IL-10** (allergen sensitivity and autoimmune diseases- type 1 diabetes), **Bacteroides ovatus D-6** (cancer), **Bacteroides dorei D8** (heart disease) and **Bacteroides ovatus V975** (intestinal inflammation).

### Q 19. Why regulations are required on probiotics?

Regulations are required to **ensure safety, stability and efficacy** of the probiotic organisms during the production and storage of the product.

### Q 20. How probiotics are regulated across the globe?

Probiotics are regulated differently across the globe under four main categories:

- **Food**
- **Dietary Supplements**
- **Drugs**, and
- **Medicinal Foods**

### Q 21. Name probiotics subcategories used across the globe?

Probiotics Subcategories used in Different Countries are:

S. No.	Country	Category
1.	Denmark/Sweden/Finland	<b>Food Supplements</b>
2.	Canada	<b>Natural health products</b>
3.	Italy	<b>Dietary food</b>
4.	European Countries/ Belgium/ Germany	<b>Biotherapeutic agent</b>
5.	Japan/ India/ China/ Malaysia	<b>Functional Foods</b>
6.	USA	<b>Dietary Supplements/Drugs/ Live Biotherapeutic agents/ Medical food</b>

### Q 22. Are Indian traditional diets rich in probiotics?

Indian **traditional fermented foods** are considered to be containing probiotic which have **functional properties and are beneficial for health**. However, there is **limited knowledge**

has been obtained regarding the **probiotic impact of these foods** and hence **more research is required** in this area.

### **Q 23. How often probiotic product should be consumed?**

Probiotic products should be **consumed regularly** for health benefits.

### **Q 24. Which authority regulates functional foods and probiotics in India? Briefly explain the regulation?**

Food Safety Standard Authority of India (FSSAI) regulates functional foods and probiotics in India. The main regulation is: **Food Safety and Standards (Food or Health Supplements, Nutraceuticals, Food for Special Dietary Purpose, Functional Food and Novel Food) Regulation, 2016**. It is applicable to foods which cover under nutraceuticals, food with added probiotic ingredients and food with added prebiotic ingredients.

For more details [https://www.fssai.gov.in/upload/uploadfiles/files/Nutraceuticals\\_Regulations.pdf](https://www.fssai.gov.in/upload/uploadfiles/files/Nutraceuticals_Regulations.pdf)

### **Q 25 Which Indian organizations are conducting research on functional foods including probiotics and prebiotics?**

The major Indian organizations include:

- **Central Food Technology Research Institute (CFTRI)**
- **Indian Council of Medical Research (ICMR)**
- **Institute of Microbial Technology (IMTECH)**
- **National Centre for Cell Science (NCCS)**
- **National Dairy Research Institute (NDRI)**
- **National Institute of Nutrition (NIN)**
- **Translational Health Sciences and Technology Institute (THSTI)**

### **References and Further Reading:**

- **Status paper on Role of Probiotics In Promoting Healthy Microbiome For Health And Immunity.**  
[http://www.ilsindia.org/PDF/Status\\_Paper\\_On\\_Role\\_of\\_Probiotics\\_In\\_Promoting\\_Healthy\\_Microbiome\\_For\\_Health\\_And\\_Immunity/Status\\_Paper\\_On\\_Role\\_of\\_Probiotics\\_In\\_Promoting\\_Healthy\\_Microbiome\\_For\\_Health\\_And\\_Immunity.pdf](http://www.ilsindia.org/PDF/Status_Paper_On_Role_of_Probiotics_In_Promoting_Healthy_Microbiome_For_Health_And_Immunity/Status_Paper_On_Role_of_Probiotics_In_Promoting_Healthy_Microbiome_For_Health_And_Immunity.pdf)

- **Monograph on Functional Foods: Beyond Basic Nutrition.**  
<http://www.ils-india.org/publication/Functional-Food-for-Mail/Functional%20Food%20for%20Mail.pdf>
- **Monograph on Prebiotics In Foods And Their Beneficial Effects.**  
<http://www.ils-india.org/publication/Functional-Food-for-Mail/Functional%20Food%20for%20Mail.pdf>