

News AT A GLANCE



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Vitafoods India 2026: Shaping future of health and nutrition

OUR BUREAU, MUMBAI

INDIA'S nutraceutical sector is entering a defining decade, and Vitafoods India 2026 is poised to capture this momentum. Scheduled from 11-13 February 2026 at the Jio World Convention Centre, Mumbai, the three-day expo will bring together the entire value chain—ingredient suppliers, product manufacturers,

distributors, solution providers, and thought leaders—under one roof.

With more than 10,000 trade visitors expected and 200+ exhibitors showcasing innovations, the event promises to be a central hub for knowledge-sharing, networking, and business opportunities. Beyond the exhibition floor, the conference program will spotlight the theme "Nutraceuticals 2030: Science, Standards,

and Scale for India's Global Significance."

India's Health-Conscious Consumer Landscape

The Indian consumer has undergone a profound transformation in recent years. Preventive healthcare is no longer a niche concept—it is becoming mainstream. Supplements

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ENRICHING WORLD WITH
ENZYMES & PROBIOTICS!

Pellets for Food & Nutraceutical

- Menthol Pellets
- Bacillus Coagulans Pellets
- Bacillus Clausi Pellets
- Simethicone Pellets
- Pancreatin Pellets
- Activated Charcoal Pellets
- Alpha Lipoic Acid Pellets
- Sorbitol Pellets
- Sugar Spheres
- Dried Ferrous Sulphate
- Folic Acid Pellets
- Carbonyl Iron,
- Folic Acid Pellets Blend

PHARMA ENZYME

- Bromelain 600-2400 GDU
- Serratiopeptidase IP
- Trypsin Chymotrypsin Mix (6:1)
- Trypsin USP/BP
- Pancreatin USP/IP/BP/EP
- Veg Pancreatin
- Pepsin IP
- Fungal Diastase IP
- Papain IP/USP

FOOD ENZYME

- Fungal Amylase 10000 - 150000 SKB U/g
- Rennet 2000-15000 IMC U/g
- Bromelain 600-2400 CDU/g
- Lactase 2000-100000 ALU/g
- Papain 50-1000 TU/mg
- Bacterial Amylase 2000 - 50000 BAU/g
- Phospholipase 2000 - 10000 U/g
- Acid Protease 20000-600000 HUT/g
- Alkaline Protease 5000-500000 u/g
- Neutral Protease 25000-500000 u/g
- Lipase 10000-200000 FIP U/g
- Maltogenic Amylase 2000-15000 MAN U/g
- Alpha Galactosidase 1500-30000 GAL U/g
- Acid Cellulase 10000-200000 CNC U/g
- Bromelain 600-2400 GDU/g
- Neutral Cellulase 5000-50000 U/g
- Pectinase 10000-200000 U/g
- Polygalacturonase 5000-40000 PCU/g
- Xylanase 5000-200000 U/g
- Polygalaturunase 5000-40000 PGU/g
- Xylanase 5000-200000 XU/g
- Dextranase 5000-100000 U/g
- Beta Glucanase 5000-100000 BGU/g
- Transalutaminase 100-2000 U/g
- Laccase 2000-50000 U/g
- Veg Pancreatin
- Lysozyme 2000-30000 U/mg
- Glucose Isomerase 1000-10000 U/gm

PROBIOTICS FOR NUTRACEUTICAL & ANIMAL FEED

- Bacillus Clausii 10-150 BN
- Bacillus Coagulans 10-200 BN
- Bacillus Subtilis 10-200 BN
- Bifidobacterium Adolescentis 10-150 BN
- Bifidobacterium Animalis 10-200 BN
- Bifidobacterium Animalis Lactis 10-150 BN
- Bifidobacterium Longum 20-200 BN
- Bifidobacterium Infantis 10-150 BN
- Enterococcus Faecium 10-200 BN
- Lactobacillus Brevis 10-200 BN
- Lactobacillus Buchneri 10-200 BN
- Lactobacillus Bulgaricus 10-300 BN
- Lactobacillus Casei 10-300 BN
- Lactobacillus Crispatus 10-100 BN
- Lactobacillus Delbruecki 10-150 BN
- Lactobacillus Fermentum 10-300 BN
- Lactobacillus Gasseri 10-300 BN
- Lactobacillus Johnsonii 10-200 BN
- Lactobacillus Paracasei 10-400 BN
- Lactobacillus Plantarum 10-500 BN
- Lactobacillus Pentosus 10-100 BN
- Lactobacillus Sakei 10-100 BN
- Lactobacillus Salivarius 10-300 BN
- Lactobacillus Lactis 10-300 BN
- Lactobacillus GG 10-200 BN
- Pediococcus Acidilactici 10-200 BN
- Pediococcus Pentosaceus 10-150 BN
- Streptococcus Thermophilus 10-100 BN
- Streptococcus Faecium 10-100 BN
- Saccharomyces Cerevisiae 5-20 BN
- Saccharomyces Boulardii 5-20 BN

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Novel delivery systems in nutraceuticals: Enhancing bioavailability and efficacy



DR SANJAY AGRAWAL

NUTRACEUTICALS have moved far beyond the “vitamin bottle” era. Today, they sit at the intersection of preventive health, personalized wellness, and clinically backed supplementation- often targeting cardiometabolic health, gut function, cognitive performance, immunity, and healthy aging. But there’s a stubborn, very pharma-like problem standing in the way of many nutraceutical products delivering real-world outcomes: bioavailability.

Many nutraceutical actives look excellent on paper (and in marketing decks), yet underperform in the body due to low solubility, poor permeability, degradation in the gastrointestinal (GI) tract, first-pass metabolism, or instability during storage. In other words, the ingredient might be “premium,” but the body treats it like a guest who never got past the lobby.

This is where novel delivery systems are changing the game- borrowing proven drug delivery principles and adapting them for nutraceutical formats. The goal is simple: protect the active, improve absorption, control release, enhance patient experience, and ultimately improve efficacy.

Why Bioavailability Is the Bottleneck in Nutraceuticals?

Bioavailability refers to the fraction of an active ingredient that reaches systemic circulation in an unchanged form and is available to exert a biological effect. Nutraceutical actives frequently struggle because many are:

- Poorly water-soluble (e.g., curcumin, CoQ10, fat-soluble vitamins like A, D, E, K)
- Chemically unstable (e.g., omega-3 fatty acids prone to oxidation; probiotics sensitive to moisture and heat)

- Degraded in gastric conditions (acid-sensitive compounds, some peptides, certain botanicals)
- Limited by intestinal permeability (large molecules or those not easily transported across membranes)
- Rapidly metabolized (first-pass metabolism reducing circulating levels)

Even when absorption occurs, variability can be high depending on food intake, microbiome differences, and individual physiology- making consistent outcomes difficult. Novel delivery systems aim to reduce these constraints and deliver more predictable performance.

Key Novel Delivery Systems Transforming Nutraceuticals

1) Lipid-Based Delivery Systems: From Softgels to Self-Emulsifying Platforms

Lipid-based systems are among the most widely adopted because they align well with lipophilic actives. Traditional softgels already leverage oils, but modern platforms go further with self-emulsifying drug delivery systems (SEDDS) and self-microemulsifying systems (SMEDDS).

How they work:

These systems contain oils, surfactants, and co-solvents that spontaneously form fine emulsions in the GI tract, producing micro/nano-sized droplets that increase surface area and improve solubilization.

Best suited for: Curcumin, CoQ10, omega-3 concentrates, carotenoids (lutein/zeaxanthin), CBD (where legal), fat-soluble vitamins.

Benefits:

- Enhanced dissolution and absorption
- Reduced food effect in some cases
- Potential dose reduction while maintaining efficacy
- Better consistency across users

2) Nanoemulsions and Microemulsions: Smaller Droplets, Bigger Impact

Nanoemulsions (typically 20–200 nm) improve bioavailability by increasing dispersion and facilitating absorption pathways including lymphatic transport for lipophilic compounds.

Why they matter: Many nutraceuticals fail not because they are inactive- but because they never reach adequate concentrations in the bloodstream. Nanoemulsions increase “effective delivery,” often improving onset and consistency.

Applications: Omega-3 delivery with reduced fishy aftertaste, curcuminoids, fat-soluble vitamins, botanical extracts, and functional beverages that need clear or stable dispersions.

Bonus: Improved mouthfeel and consumer acceptability- because nobody is trying to have a wellness moment while tasting rancid oil.

3) Liposomes and Phytosomes: Bio-Inspired Encapsulation

Liposomes are vesicles made of phospholipid bilayers- similar to cell membranes- capable of encapsulating both hydrophilic and lipophilic actives. Phytosomes are specialized complexes where plant actives (often polyphenols)

These systems stabilize lipophilic actives within a solid lipid matrix. NLCs improve upon SLNs by incorporating a blend of solid and liquid lipids, increasing payload capacity and reducing drug expulsion during storage.

Advantages:

- Improved stability vs. traditional emulsions
- Controlled release potential
- Better protection against oxidation (useful for sensitive actives)

Use cases: CoQ10, curcumin, omega-3 derivatives, and other lipophilic antioxidants.

5) Cyclodextrin Complexation: The Solubility Hack

Cyclodextrins are ring-shaped molecules that can “host” hydrophobic compounds in their cavity, improving aqueous solubility and masking unpleasant taste or odor.

Best suited for: Flavors, certain vi-



tamins, polyphenols, and volatile or poorly soluble actives.

Benefits:

- Improved solubility and dispersion
- Taste masking and odor reduction
- Better stability in powders, tablets, and beverages

Benefits:

- Protection from degradation
- Enhanced absorption through membrane affinity
- Potentially improved cellular uptake
- Good fit for premium, clinically positioned products

4) Solid Lipid Nanoparticles (SLNs) and Nanostructured Lipid Carriers (NLCs)

6) Polymeric Nanoparticles and Biopolymer Encapsulation

Using polymers (synthetic or natural), actives can be encapsulated for protection and controlled release. Biopolymers such as alginate, chitosan, and pectin are particularly relevant for nutraceuticals due to consumer preference for “cleaner” materials.

Dubai–India healthcare synergy: Building...

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including preventive care, managing chronic illnesses, providing an immediate response to an emergency, and conducting specialist consultations via video.

The primary emphasis should be on the moral use of data, system compatibility, and gaining patient confidence factors on which the success of any digital collaboration rests.

Mobility of talent and the sharing of knowledge

Human resources ultimately create an impetus for creativity and innovation in healthcare. Not only do international networks allow for the exchange of medical technology and products, but they also facilitate the sharing of expertise among practitioners.

Programs such as joint training programs/clinician exchanges/research fellowships and the development of leadership capabilities provide op-

portunities for equal access among practitioners to develop a common culture of healthcare and the im-

A collaborative future in healthcare A dynamic strategic partnership has evolved between the United



provement of patient care standards in both systems. Workforce shortages can be alleviated by the mobility of talent, as the exchange of ideas between countries enhances the development of global perspectives in providing healthcare.

Arab Emirates and the Republic of India, characterised by cooperation, rather than a one-dimensional transactional relationship. As global healthcare continues to escalate in complexity, individual nations or markets are unable to

meet many needs alone. A collaborative effort provides the scale and speed, as well as the additional resiliencies, necessary to address global challenges.

Collaboration among stakeholders (governments/industry/academia, and providers) must embrace a long-term orientation in order for this relationship to reach its full potential. Demonstrating investment in trust, transparency, and mutual benefits will be benchmarks for success.

No healthcare solutions will come through a "non-partner" of healthcare; rather, solutions will be created based on partnerships, which view diversity as an asset and collaboration as a process. Thus, the UAE and India are co-creators of the future, to a very accessible, innovative, and globally connected healthcare ecosystem.

(The author is Managing Director & Co-Founder at Abhay Group)

Novel delivery systems in nutra...

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Applications:

- Targeted delivery in the gut
- Protection of probiotics & enzymes
- Sustained release formulations for chronic wellness categories

7) Targeted and Controlled Release: Time, Place, and Purpose

Not every nutraceutical should be released immediately in the stomach. For example:

- Enteric coating helps deliver acid-sensitive compounds to the intestine.
- Colon-targeted systems support gut-health ingredients, prebiotics, and microbiome-modulating compounds.
- Sustained-release matrices support steady plasma levels for ingredients like magnesium, caffeine + L-theanine stacks, or certain botanicals where smoother kinetics improve tolerability.

Controlled release approaches increase the odds that consumers feel the benefit consistently- improving adherence and repeat purchase.

8) Probiotic Delivery Innovations: Keeping Live Cells Alive

Probiotics are uniquely challenging because they are living organisms sen-

sitive to heat, moisture, oxygen, and gastric acid. Modern systems include:

- Microencapsulation using alginate or lipid coatings
- Acid-resistant capsules and enteric delivery
- Synbiotic designs combining prebiotics for survival and colonization support
- Improved packaging (desiccants, blister packs, oxygen barriers)

The outcome is higher viable counts reaching the gut and better product reliability over shelf life.

Measuring Success: Claims, Evidence, and Compliance

Novel delivery is only valuable if it translates into demonstrable outcomes. For nutraceutical brands operating in a pharma-adjacent ecosystem, credibility comes from measurable proof:

- In vitro dissolution and stability data (acid stability, oxidation resistance, moisture sensitivity)
- Pharmacokinetic or bioavailability studies where applicable (AUC, Cmax, Tmax comparisons)
- Clinical endpoints aligned to the category (inflammation markers, lipid profile, sleep metrics, microbiome changes)

- Real-world outcomes supported with post-market studies or consumer adherence data

However, advanced delivery systems also bring regulatory and quality expectations. Manufacturers must ensure consistent particle size distribution (for nano systems), excipient safety, contamination controls, and stability across batches. For global-ready brands, documentation aligned with GMP practices and region-specific nutraceutical regulations becomes non-negotiable.

Market Impact: Where Novel Delivery Is Heading Next

Three trends are shaping the next wave:

1. **Personalized nutraceuticals:** Delivery systems tailored to needs like age, gut sensitivity, or metabolic profiles.
2. **Hybrid formats:** Gummies, sticks, oral strips, functional beverages- paired with delivery tech to maintain potency.
3. **Pharma-grade validation:** Nutraceuticals increasingly adopting clinical study designs and bioavailability benchmarking as differentiators.

Consumers are also getting smarter. "500 mg" on a label doesn't impress anyone anymore if results don't show.

Delivery technology becomes the quiet hero: not flashy, but decisive.

Conclusion: The Future of Nutraceutical Efficacy Is Formulation-Led

Nutraceutical innovation can't depend solely on sourcing trendy ingredients. The next era is formulation-led, where delivery science determines whether an active ingredient becomes effective- or stays expensive filler.

The real impact of novel delivery systems lies in how effectively science is translated into scalable, patient-friendly solutions. Industry leaders like Dr. Sanjay Agrawal, pharmaceutical consultant and innovator, highlight the importance of formulation strategy in unlocking the true potential of nutraceutical actives. With extensive experience across pharma and nutraceutical product development, his work reinforces a simple truth: efficacy doesn't begin with ingredients alone- it begins with intelligent delivery design. As the sector moves toward clinically driven wellness, such expertise will remain central to building products that are not only marketable, but meaningfully effective.

(The author is Scientific Advisor of ALKOMEX GBN PHARMA GROUP U.S.A.)