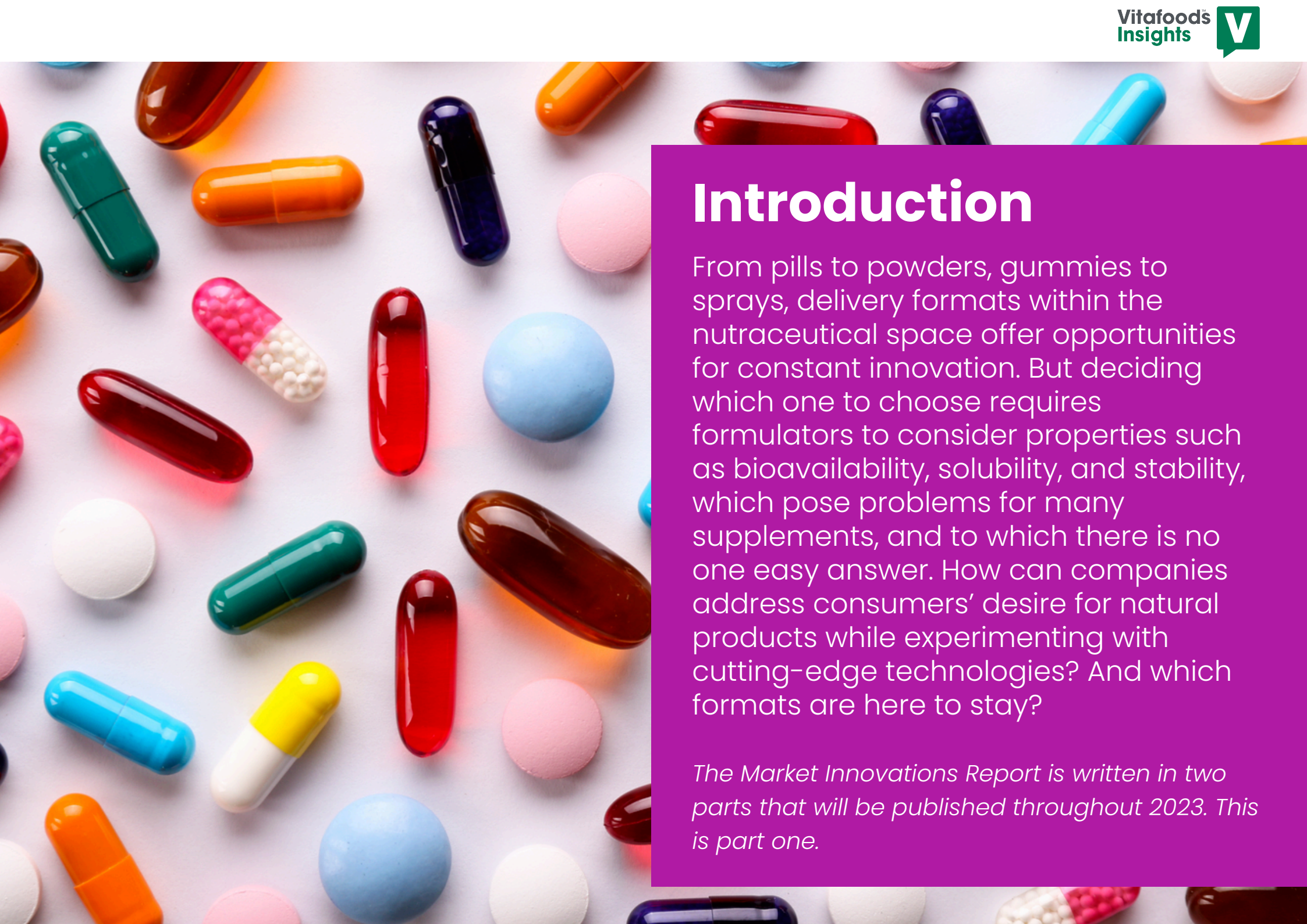




Market Innovations, Part 1: Disruptive delivery systems for better bioavailability

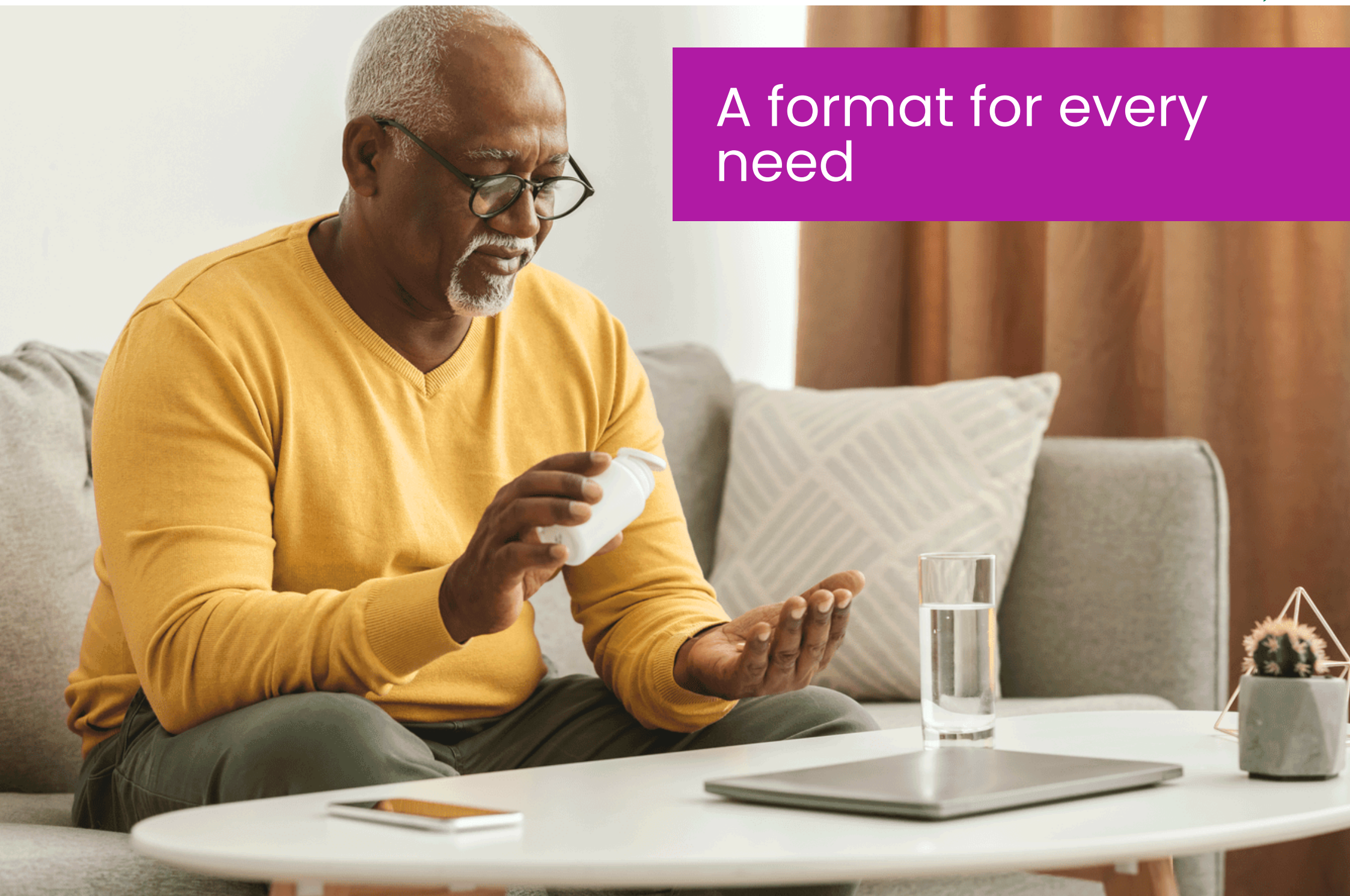


Introduction

From pills to powders, gummies to sprays, delivery formats within the nutraceutical space offer opportunities for constant innovation. But deciding which one to choose requires formulators to consider properties such as bioavailability, solubility, and stability, which pose problems for many supplements, and to which there is no one easy answer. How can companies address consumers' desire for natural products while experimenting with cutting-edge technologies? And which formats are here to stay?

The Market Innovations Report is written in two parts that will be published throughout 2023. This is part one.

A format for every
need



New digital technologies and increasing personalisation are helping to drive novel approaches within the nutraceutical sector, and demand is continuing to grow: the global vitamin and minerals market is expected to reach \$24.69 billion in 2026, at a compound annual growth rate (CAGR) of 3.7%.¹

But public attitudes and market analyses with regard to delivery formats paint a mixed picture. Tablets and capsules remain the most popular format for supplement users, FMCG Gurus research shows, with 63% of consumers showing a preference for tablets and 67% choosing capsules.²

However, looking at new product launches, powders

(30%) beat capsules (28%) as the top delivery format, according to Innova Market Insights.³

The Innova research shows gummies to be a rising star,⁴ with 54% average annual growth in global supplement launches between 2017 and

2022. However, again, there is a discrepancy with consumer data: just 26% state a preference for jellies or gummies.⁵

But tablets, while popular, do not offer much room for innovation, and with many consumers experiencing “pill

fatigue”, there will always be a need for alternatives.

And while new formats, such as chews, sachets, and shots, may be at the forefront of innovation, they account for small players when it comes to sales volume; the *Nutrition Business Journal* (NBJ) predicts that in the US, lollipops will be “a \$3 million speck in a \$69.76 billion market in 2024”, with effervescent, lozenges, and liquids all expected to drop in sales.⁶

Different audiences appreciate different attributes

Maria Pavlidou, partner and senior strategy consultant at the Healthy Marketing Team (HMT), a specialist branding agency, said it was important for brands to reflect on who they were innovating for.



She outlined the HMT's FourFactors Brand Acceleration System, which segments consumers into four groups according to their attitude towards innovation: very early adopters, or "technology consumers"; influencers, or "lifestyle stakeholders"; and mass market consumers – with a distinction drawn between early and late – who are the last to adopt innovations, and who



like products that are familiar, convenient, and acceptably priced.

"When innovating, it's important to ask ourselves the question: do we innovate for the early adopters?" Pavlidou said.

"The entry barriers are [fewer] for this group, and we see the highest levels of innovation for this consumer segment – but admittedly, it is only a small part of the population.

"For the majority of the population, the most traditional delivery formats remain still the most popular.

"The interesting question, therefore, for brand owners is how to break the barrier to mass market and make new [innovative] formats accessible



and available amongst the late adopters' consumer group and get out of the niche.

"It is not about inventing yet new ones, but it is about making the existing ones accessible and [providing] options to a bigger consumer pool."

These sentiments were echoed by FMCG Gurus, who suggested that diversifying offerings might help to address this problem.

“When innovating, it’s important to ask ourselves the question: do we innovate for the early adopters?”

Maria Pavlidou, partner and senior strategy consultant, The Healthy Marketing Team

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"If brands are to create alternative supplement formats, they must promote desirable traits, such as added sensory appeal or ease of digestion, to encourage consumers to try out different supplement formats," they said.⁷

But there can be no one solution, argued Pavlidou, who emphasised that "different audiences appreciate different product attributes".

She said: "For the mass market consumers, taste, cost, and convenience are key for new product acceptance and purchase."

"However, for the early adopters, the decision criteria are different. This group is motivated by how a product nourishes them individually and supports and indulges their self-image."

Efficacy is very important to these consumers, who might also be driven by ethics and "the feeling that their personal choices have a larger political responsibility", said Pavlidou.

"Therefore, when taking brand decisions, it is important to be very clear from the beginning about who is your target audience," she added.



Consumers crave convenience

Convenience is proving to be a major priority for consumers, along with growing interest in formats that are "closer to nature". This has driven innovation within easy-to-take formats in active nutrition, which continue to grow, while

functional foods offer ample opportunities for novel approaches; many consumers value cross-functional ingredients that can be consumed as part of a meal or snack.

But this must still be balanced with efficacy.

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There is a thirst for more knowledge – especially by younger consumers, who are born digital native”

Maria Pavlidou, partner and senior strategy consultant, The Healthy Marketing Team

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Oral sprays, for example, offer convenience and have been demonstrated in some studies to be as effective as taking a capsule;⁸ however, a concern for consumers is ensuring they are ingesting the recommended dosage, meaning that these kinds of products have not proven to be the preferred choice.

Pavlidou said this came back to a question of education, suggesting that packaging

could play a role in countering consumer hesitance.

“Many of the consumer concerns around supplement usage, such as dosage ... can be addressed by industry players taking a leadership position in consumer education,” she said.

“There is a thirst for more knowledge – especially by younger consumers, who are born digital native.

“Transparency as well as education can further build trust in the category and innovative packaging formats can also help address dosage concerns.

“This is an opportunity for change-makers in the industry to take the lead and shape the conversation around supplements and drive

category growth in the post-pandemic era.”

Effervescent fail to feel the fizz factor

The NBJ highlights effervescent as an example of how novelty in alternative formats can drive success – but also run the risk of creating a flash-in-the-pan effect.

Sales growth of these products was huge even before Covid hit, when interest in immunity products soared, with US sales spiking by 43.2%.

But the novelty effect eased when the pandemic did, with growth slowing to just 1% in 2021 by NBJ estimates, and a decline of 3.2% predicted this year.⁹

Having said that, it depends on what the delivery method is

designed to achieve, according to Raphaëlle O'Connor, founder and director of inewtrition, a consultancy specialising in new food product development.

“Other innovation in delivery systems could be a strip or mouth spray, which is especially beneficial if the ingredient used must be absorbed quickly and easily... Liquids and syrups are a fantastic delivery method,

especially for the younger generation and the elderly where having to swallow a tablet or capsule can be difficult,” she said.

Meanwhile, she pointed out that effervescent tablets are “a very fast way of ensuring active absorption” which, in some regions, remain a popular method of taking paracetamol and for sports nutrition.





Hotbed health categories

Consumer health concerns are a major driver for delivery format innovation, according to Pavlidou.

“During the pandemic we saw great product launches addressing immunity and, since then, with the rise of mental health, we see many innovative products coming in that space which is of growing interest to consumers,” she said.

Which health categories offer the most opportunities?

Functional beauty claims have seen increased launch activity in Europe in the years since the pandemic, a Mintel report shows, with gummies proving particularly popular among launches targeting skin, nail, and hair health.¹⁰



Meanwhile, immunity support claims continue to grow among functional vitamin and mineral supplement (VMS) launches, with support being offered in a variety of ways – notably, the chew/gummy format. Mintel

notes that powders have lost share, possibly relating to lower convenience appeal.

Immunity claims are also increasing among launches of functional food, with claims

most common among launches of drinking yoghurts, infant nutrition products, and cold cereals, according to a separate Mintel report.¹¹

Claims referring to stress have also seen a steady growth in share of VMS launch activity, with a particular focus on children’s sleep health: sleep disorders shot up among younger generations during the pandemic, with one systematic review and meta-analysis describing the prevalence of these problems as “alarming”.¹²

While global launches of food, drink, and VMS products with a stress/sleep claim suitable for children (five- to 12-year-olds) are on the rise, total launches still account for less than 1%, presenting an opportunity for brands to innovate, say Mintel.¹³

Boosting bioavailability



Consumer preferences can never be the only consideration; there is little point in choosing a desired format that is ineffective.

Oral bioavailability – the amount of an ingested nutrient that reaches the blood while still in an active form – is a

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An innovative delivery system is about ensuring that end-users get value for money, and the product they consume helps to deliver the benefits where it is needed in a quantity that is beneficial to their health”

Raphaëlle O'Connor, founder and director, newtrition

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common problem for nutraceuticals, which can display limited bioaccessibility – that is, poor absorption and/or chemical transformation in the gastrointestinal tract.¹⁴

This presents a major challenge: while supplements can be an effective means for addressing many health concerns, only those nutrients that are

bioavailable can be distributed to the tissues or organs where their benefit can be realised.

O'Connor said the choice of delivery system was key to ensuring a product's efficacy.

“An innovative delivery system is about ensuring that end-users get value for money, and the product they consume helps to

deliver the benefits where it is needed in a quantity that is beneficial to their health,” she said.

“Without some of these delivery systems, the product we consume could be of very little benefit at all.”

Higher bioavailability is a win-win for businesses and consumers alike: it results in improved efficacy, faster onset of action, and lower doses – all of which lead to improved user compliance and, in turn, better quality-of-life outcomes.

Going tiny: Micro- and nanoencapsulation

One way of tackling this problem is via microencapsulation, a process by which a protective coating, or matrix, is applied around a



small particle – the active ingredient – to keep it isolated from the external environment until it is desired to be released.

When the diameter of such particles is less than a micron, allowing for these structures to be manipulated at the atomic and molecular level, the encapsulation process is referred to as nanoencapsulation. This opens up all sorts of new possibilities, as materials at the nanoscale have very different properties to those at the macroscale.¹⁵

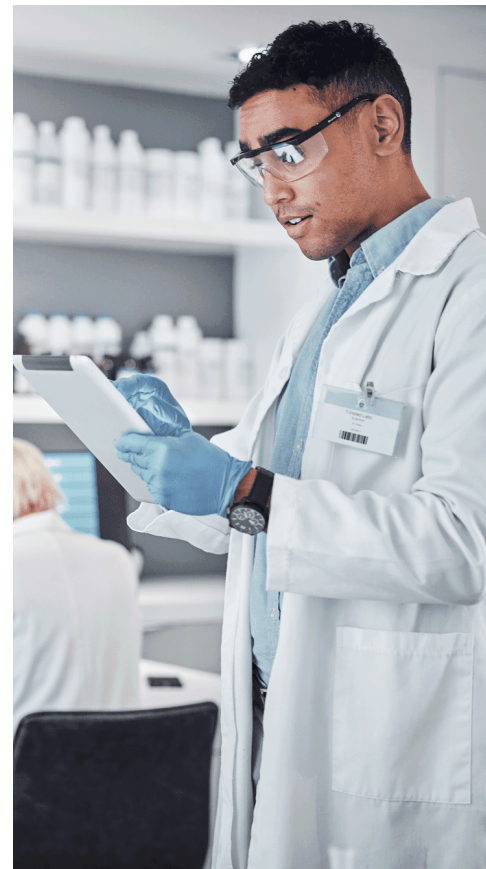
Nanoparticles are excellent carriers for transporting and facilitating the release of drugs in specific body sites, and nanoencapsulation can present as “an excellent tool for modification of parameters of bioactive agents”, according to

the authors of one study.¹⁶

It can be used to enhance the bioavailability and solubility of active substances; “nano” forms of vitamins, for example, act much faster in the body than conventional forms, due to there being a larger surface area. This allows for the controlled release and protection of micronutrients, enhancing the product’s beneficial action,¹⁷ while many formulations also protect bioactive molecules from degradation.

“In terms of processing and technology, note that being nano in particle size provides a higher and quicker absorption, sustained over a period of standard time, ensuring maximum concentration of ingredients,” said O’Connor.

Martina Vakarelova is co-CEO of Sphera Encapsulation, an Italian company specialising in micro- and nanoencapsulation. She explained that another benefit



of working at the cellular level was a decrease in waste, as the increased bioavailability means “you need to use less [of the active compound] in order to get to the same point, because the bioavailability is actually bigger”.

Using smaller amounts of substances allows for a decrease in dose, while a process that produces less waste is also more cost-efficient.

Despite these appealing characteristics, concerns remain about possible toxicity associated with the direct incorporation of engineered nanoparticles into foods, including those used as delivery systems for nutraceuticals.¹⁴

Stability, solubility, and sensory characteristics



In addition to bioavailability concerns, nutraceuticals often exhibit low water solubility and stability, limiting their incorporation into functional foods and beverages. Bio-based delivery systems can not only be used to enhance their bioavailability but offer the possibility of stabilising and enhancing their functionality within food products.¹⁹

Encapsulation also helps to increase the stability of ingredients due to the protective shell, said Vakarelova. She added: "It's very useful with molecules that are, for example, heat-sensitive, or sensitive to oxidation, or sensitive to light, and so it protects it from the environment because you are creating a barrier."

O'Connor agreed that microencapsulation could be "highly useful" for ingredients that "need to be released or active later in the 'acid' form in the body".

"Microencapsulation technology also has an additional benefit of reducing the undesirable

organoleptic attributes of some nutrients, like iron, that have a metallic taste," she added.

Vakarelova gave the example of the fish oil in omega-3, which is "incredibly unpleasant to take as a nutraceutical, especially early in the morning", adding that taste-masking was a "huge

thing" Sphera was working on.

She highlighted encapsulated turmeric as something you probably "cannot imagine having in your sports drink. But if Sphera does good taste-masking, this is a great molecule that has incredible anti-inflammatory properties".



Competing priorities

However, while encapsulation can be an excellent approach, “often its complexity is heavily underestimated”, warned O’Connor.

“To create a successful product, the total life cycle of the product has to be considered: creation of the ingredient,

processing of the product, shelf life, and for the utilisation phase, storage, kitchen processing, passage through the mouth and stomach, release at the right location in the intestine,” she said.

“Through this life cycle a wide range of aspects should be considered, for example: heat

resistance; oxygen resistance; mechanical resistance; dehydration/rehydration; acid, bile, enzyme resistance; osmotic effects.”

Vakarelova agreed there were many competing priorities to be balanced. Asked which property was most important, she said: “Different polymers react to different things, so you have to engineer the capsule first.

“You have to understand where it needs to open... This capsule needs to break somewhere to deliver because it’s a delivery system, so it can be mechanical breaking, it can be because you’re chewing it, it can be acidic breaking – so pH, because of the gastrointestinal tract – it can be a lot of things. So, first, you need to understand your product.”

The issue, she admitted was that many molecules “have a lot of problems” – for example, having an unpleasant odour as well as being unstable.

“Normally encapsulation will benefit all of these features, but depending on what we’re using as a technology and as a polymer, it will benefit some over others,” she added.

In search of solutions: Solving insolubility

Sphera is currently working on making oils that are completely soluble in water.

It comes as part of an attempt to address a “huge problem” in the industry, Vakarelova said, “because sometimes you would like to incorporate molecules that are not water soluble in a water-soluble product, which is



almost everything in the food industry”.

She highlighted the booming trend for functional beverages and sports drinks. “A lot of molecules – for example, vitamin D – [are] completely insoluble in water,” she said. “This is why you use ... nanoencapsulation, because you're actually capable of introducing [the molecule] inside a beverage, even if it's not soluble.”

Capsoil FoodTech is another startup looking to solve the problem of solubility. It says its proprietary technology can be used to transform any oil or oil-soluble ingredient into a self-emulsifying powder.

The process – which does not involve the use of any

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Different polymers react to different things, so you have to engineer the capsule first”

Martina Vakarelova, co-CEO,
Sphera Encapsulation

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chemicals or solvents, or exposure to heat – results in a dry, free-flowing powder that dissolves easily in any aqueous matrix. The company has tested the process on more than 50 oils and oil-soluble ingredients so far, according to scientific director Dr Itay Shafat.

“From edible oils such as avocado oil and medium-chain triglycerides (MCT) to oil-soluble vitamins like A, D, E, and K, omegas, CBD, and many more, [our] innovative technology

creates powders with high oil content (up to 60%) [and] easy water solubility, while enhancing the bioavailability of the oils,” he said. “Because our production process is mechanical rather than chemical, no solvents or other chemicals are being used in our powders.”

The powders dissolve in water to create a stable emulsion, “expediting the absorption and bioavailability of the oil”, he added. “The increase in bioavailability has been proven



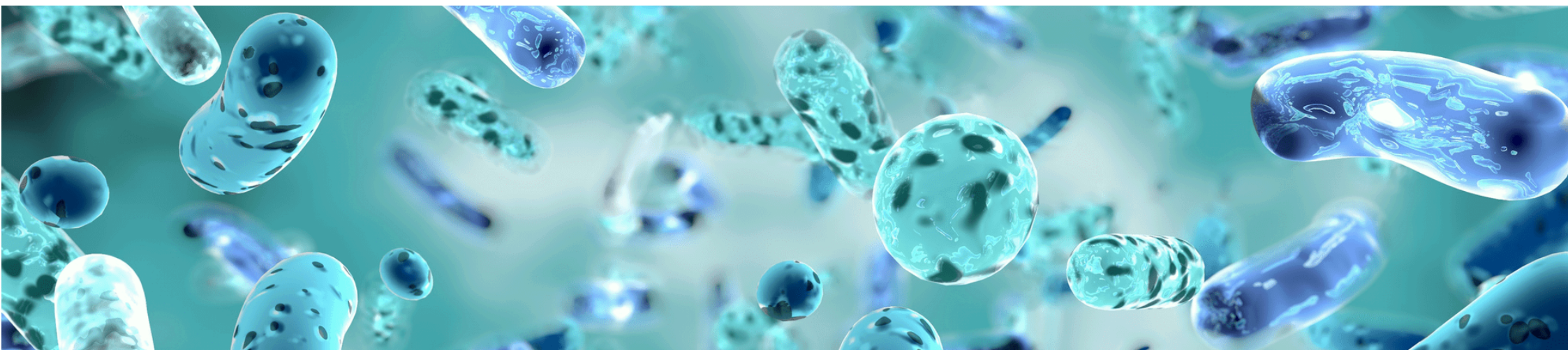
in a set of studies using different ingredients, and the main reason for increased bioavailability is the very small droplet size of our actives,” he explained.

“This smaller size means that numerous small droplets are more readily available for absorption throughout the gastrointestinal tract. The absorption of oils happens very quickly, expediting the effect of the oil and a larger amount of oil being absorbed.”

The technology can be used with any type of oil, giving flexibility in oil type, but also allowing for innovative formulations and dosage forms that were not previously possible, Shafat said, such as stick packs, sachets, shots, and gummies.



Balancing biotics: A
bitter pill to swallow



Ingredients such as probiotics pose an interesting challenge for developers for reasons other than bioavailability. Nina Vinot, international sales and marketing director at TargEDys, a French biotech startup that created what it says is the first precision probiotic, said more often, the problem was related to stability.²⁰

“Contrary to vitamins or other nutrients, probiotics are not nutrients; you’re not supposed

to absorb them into the bloodstream – they’re supposed to stay put in the gut. So there is no absorption and bioavailability question,” she said. “There are questions of activity – you want them to be alive all through the stomach, so there are the questions of resistance, of acidity and so on – but ... for probiotics, it’s more a question of stability.”

For example, tablets are a convenient delivery format as they generally increase

products’ stability and shelf life. However, tableting “is always a challenge” for probiotics, Vinot said, as compression during the process can damage the cells, leading to a loss of viability.

“If you do too little compression, then you have a friable thing that can break when you open the blister, for example – but if it’s too tight, then you kill the strains,” she explained.

In addition, formulation and processing factors such as

heat, pH, moisture, mechanical stress, and chemical reactions have the potential to degrade or inactivate ingredients.

Enteric-coated capsules – wherein a polymer is applied to the capsule to act as a barrier – present another option,²¹ as they protect the probiotics while they travel through the upper gastrointestinal tract, but other formats are less promising: bacterial stability tends to be greater in tablets than in powders,²² while

gummies – despite their popularity – have a high moisture content, which presents problems for strains such as *Lactobacilli* and *Bifidobacteria*.

Holistic solutions present new challenges

Vinot said the question of combining ingredients was “definitely a hot topic” in the sector, adding that she was seeing a trend towards holistic solutions; there is growing demand for gut health products that combine probiotics and prebiotics, for example.

However, combining biotics further complicates matters, as delivery matrices and the processing steps involved in their production have the potential to affect their

functionality²³ – but it is unknown how these alter their effects, and clinical trials directly comparing delivery formats are rare.

“In some cases, the efficacy of the combination [of pre- and probiotics] is lesser than the efficacy of the probiotic alone,” Vinot explained. “Thus it is important for formulating companies to ensure efficacy of a combo on a case-to-case basis.”

One study, for example, acknowledged that while the probiotic strain *Bifidobacterium longum* NT can improve constipation symptoms, its combination with galactooligosaccharides in synbiotic treatment “seemed to diminish this improvement of constipation induced by

“Probiotics are not nutrients; you're not supposed to absorb them into the bloodstream – they're supposed to stay put in the gut”

Nina Vinot, international sales and marketing director, TargEDys

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probiotics”, indicating that there is a “possibility of attenuation of beneficial effects from probiotics by the use of synbiotics, contrary to synbiotics theory”.²⁴

“We knew already that when you make a combination with other ingredients, especially plant extracts or chemicals, you need to check that the compatibility with the strain is good, that you don't affect the



stability of your product – and this is something that in Europe we've grown good at, because we've had to do so many combinations,” said Vinot.

But she added: “A synbiotic is not just any prebiotic with any probiotic – you have to test it on a case-to-case basis...”

“You could even reduce the efficacy of your probiotic if you put the wrong prebiotic there.”

Safeguarding live ingredients

What delivery formats could be used to counter these challenges? Vinot mentioned capsule-in-capsule technology – wherein a formulated capsule is nested within an outer liquid-filled capsule, with each one designed to achieve a specific formulation aim – as being “interesting for probiotics, because you could put the probiotics on the small, inside capsule and some fat ... like omega-3 fish oil, for example, in the bigger capsule”.

She added: “There, you would have double the combination of the effects, because having omega-3 with probiotics is really interesting and, at the same time, you would have the functional effects of protecting the probiotic from humidity – so

improving stability and improving functionality.”

She also highlighted multilayer tablets, wherein each layer is characterised by a specific active formula or method of releasing the active, as another format suitable for probiotic

delivery. But she pointed to functional foods as an area that required more research.

“The use of probiotics in foods is interesting but also raises some preliminary questions: if they are delivered as probiotics, they are meant to be delivered alive,

which is a challenge for a lot of food matrices, liquids, acidic fruit juices, or solids, especially when a heat treatment like baking is applied,” she said. “How are dosage and stability ensured?

“For fermented foods, the question of identity is crucial: a lot of fermented foods like kombucha and kefir not only don’t label the strains to the strain level, but don’t even declare the species.”

“
A synbiotic is not just any prebiotic with any probiotic – you have to test it on a case-to-case basis”

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Vinot highlighted some previous research she carried out on kombucha's benefits as "disappointing".²⁵

"There's a lot of fuss and marketing around them, but critically little science – and when there is science, it points also to the risks," she said.

"When choosing probiotics, strain identity and quantity should always be a prime consideration, and it is missing from a lot of food vehicles."

Postbiotics: A door to new possibilities?

"A hot topic in our space, which relates to dosage forms, is postbiotics," said Vinot. "The advantage of postbiotics [is] that you don't have to take care of stability, so it really opens up a lot of doors for food matrices,

gummies, and a lot of things that were until now not really open for probiotics."

The definition is still evolving, but the International Scientific Association of Probiotics and Prebiotics (ISAPP) currently considers a postbiotic is a "preparation of inanimate microorganisms and/or their components that confers a health benefit on the host".

Vinot admitted that in the field "there's still a lot of polemic because we don't have an approved definition. There's the ISAPP consensus, but there's a lot of polemic".

Earlier this year, the International Probiotics Association (IPA) announced it was broadening its remit to add prebiotics, postbiotics, and synbiotics.²⁶



Innovation is a learning process



There are many considerations to take into account when choosing a delivery system, and developers will find themselves in the position of having to choose which aspects to prioritise.

“Each application will require a customised bioactive solution for bespoke criteria for efficiency: taste-masking and aroma retention, extended and targeted release, moisture, light, oxygen protection, effectiveness improvement, any chemical, preservative-free solution,” said O’Connor.

“It is not enough to concentrate on one of these conditions.”

Ultimately, innovation is an ongoing learning process, said Vakarelova, who added that



feedback was crucial to improving a product, as it allows you to “make it better, you tailor it, you know what’s wrong – if you have to make a smaller capsule, a more resistant shell, or the delivery has to be prolonged”.

“Everything that we do is with a lot of feedback, a lot of help,

from our customers,” she added.

“There is no right or wrong delivery system, but the ingredient could be wrong for the delivery system, and this is where it could get challenging,” said O’Connor. “Success relies upon a balanced combination of formulation and technology.”

Key takeaways

- **Tablets and capsules remain the most popular delivery format, but with many consumers experiencing “pill fatigue”, there will always be a need for alternatives.**
- **Convenience is proving to be a major priority for consumers, driving innovation within easy-to-take formats.**
- **Bioavailability, stability, and solubility present challenges for many nutraceuticals, and the choice of delivery system is key to ensuring efficacy.**
- **Probiotics present with their own problems, while combining biotics further complicates matters, as delivery matrices have the potential to affect their functionality.**

Lubrizol delivers bioavailable iron supplements without the drawbacks

Interview with Isabel Gomez, Global Marketing Manager for Nutraceutical Ingredients, and Alan Connolly, Global R&D Nutraceuticals Manager, Lubrizol

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Interview with Isabel Gomez, Global Marketing Manager for Nutraceutical Ingredients, and Alan Connolly, Global R&D Nutraceuticals Manager, Lubrizol

Delivering effective iron supplementation in a manner that appeals to consumers has proven to be a challenge for formulators. To address this, Lubrizol has pioneered microencapsulation technology that can increase bioavailability without the side effects often associated with iron.

Iron deficiency is a recognised cause of several health issues, including anaemia and a weakened health system. Pregnant women and young children can be especially susceptible. However, while supplementation is known to be an effective way of preventing iron deficiency, brands have often struggled to overcome challenges such as low bioavailability, unpleasant side-effects, and a metallic taste. The inclusion of iron in formulations can also impair the appearance of products, making them less appealing to consumers.

Potential in the iron supplementation market

The frustration for many brands is knowing that the market for iron supplementation is there. “Consumers are increasingly seeking nutritious products that support healthier and more active lifestyles,” notes Isabel Gomez, global marketing manager for nutraceutical ingredients at Lubrizol. “And maintaining adequate iron levels is known to be critical for a healthy body.”

This is supported by research. According to a 2022 FMCG Gurus survey, some 69% of consumers are looking for iron in the products they purchase, because of its associations with aiding the immune system. Importantly though, consumers are also looking for products that are not only effective, but also appealing and in line with current lifestyles.

“Iron deficiency during pregnancy, for example, is known to be a leading cause of anaemia in infants and young children,” says Gomez. “At this important stage in life, women need products that are easy to incorporate into their lifestyles. This is why they often prefer convenient formats such as gummies or other chewable formats. They certainly don’t want products that have a bad metallic taste, or deliver undesirable side effects such as stomach upset, constipation, and nausea.”

Cutting-edge microencapsulation technology

Lubrizol developed its pioneering LIPOFER

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technology to address these very issues. The aim was to help formulators meet this market demand for consumer-friendly and effective iron supplementation.

“This delivery system was specifically developed to overcome the issues associated with traditional iron sources,” says Alan Connolly, global R&D nutraceuticals manager at Lubrizol. “LIPOFER combines multiple technologies to ensure supplementation with optimum performance.”

Connolly explains that the iron pyrophosphate is first micronised to reduce the mean particle size and increase the bioavailability of different nutrients. This allows for greater absorption within the body. The micronised iron pyrophosphate is then encapsulated in protective matrices to impart additional functionality. “Encapsulation with lecithin

has a dual role,” continues Connolly. “Firstly, it allows the product to overcome the surface tension of the liquid, while also increasing the absorption of iron in the body after gastrointestinal digestion. Micronized iron pyrophosphate can also be encapsulated in different starches or maltodextrins, to protect the iron further.”

Better bioavailability, improved absorption

Several studies have demonstrated the efficacy of LIPOFER products, underlining improved bioavailability and increased iron absorption compared to standard iron salts and other commercially medically prescribed products.

The technology also offers improved functional properties for formulators, including improved water dispersibility, improved organoleptic properties, and reduced interactions with other active ingredients. These technical advantages can enable formulators to develop more complex applications than other iron

forms, resulting in lower overages and more stable products.

“In summary, LIPOFER supports formulators at every stage of product development, through the combination of our technological added-value ingredients and applications expertise with current market trends,” says Connolly.



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New innovation possibilities

Lubrizol's LIPOFER innovation therefore opens the door to a whole new world of formulation possibilities when it comes to iron supplementation. "Formulators need a way of meeting demand for innovative iron products that promote well-being and boost the immune system, while at the same time delivering a pleasant consumer experience," says Gomez. "LIPOFER provides both the benefits of iron, along with desired organoleptic effects in a single product."

Potential applications include the fortification of liquid products such as dairy milk, fruit juices, vegan milks, gels and drops. Powder applications include premixes, stick packs, sachets, and reconstituted sport drinks. LIPOFER also offers potential for better-tasting chewable tablets, effervescent tablets, and capsules.

"In fact, we recently developed great-tasting LIPOFER iron-fortified gummies," says Connolly. "These can help consumers take their whole daily iron intake in a sensory-appealing, fun, and convenient format. It's also worth noting that most iron products currently on the market are not suitable for kids and babies. LIPOFER, however, makes it possible to develop good-tasting iron drops or syrups."

LIPOFER is available in four different formats, each of which have been tailored for specific applications. LIPOFER NA for example is the standard grade used in many applications while LIPOFER NA Dispersible Plus has been designed for specific liquid applications. For other more

traditional applications such as tablets and capsules, the LIPOFER NA Granulated is an ideal option due to its superior flow properties. Finally, there is also LIPOFER Infant, which is specifically targeted towards infant food applications.

"We are convinced that an increasingly iron-deficient population – along with growing awareness about the importance of maintaining healthy iron levels – will continue to drive growth in iron supplements into the future," says Gomez.

"And we expect to see more focus on innovative delivery formats in new product launches, which provide a great-tasting, easy-to-use experience for consumers."





References

1. www.prnewswire.com/news-releases/vitamin-and-minerals-global-market-to-reach-24-69-billion-by-2026--301621104.html
 2. www.fmcggurus.com/blog/fmcg-gurus-nutritional-supplement-trends-in-2023/
 3. www.innovamarketinsights.com/trends/personal-best-for-dietary-supplements/
 4. www.innovamarketinsights.com/trends/personal-best-for-dietary-supplements/
 5. www.fmcggurus.com/blog/fmcg-gurus-nutritional-supplement-trends-in-2023/
 6. New Hope Network, *Nutrition Business Journal Delivery Format Report 2022*, nutritionbusinessjournal.com
 7. www.fmcggurus.com/blog/fmcg-gurus-nutritional-supplement-trends-in-2023/
 8. www.nature.com/articles/s41430-019-0503-0
 9. New Hope Network, "Delivery Format Report 2022".
 10. Mintel, *A year of innovation in VMS, 2022*, www.mintel.com
 11. Mintel, *A year of innovation in functional food and drink, 2022*, www.mintel.com
 12. www.pubmed.ncbi.nlm.nih.gov/34182354/
 13. Mintel, *Nutrition watch: Children's sleep health*, www.mintel.com
 14. www.researchgate.net/publication/325927032_Advances_in_nutraceutical_delivery_systems_From_formulation_design_for_bioavailability_enhancement_to_efficacy_and_safety_evaluation
 15. www.ifst.org/resources/information-statements/nanotechnology
 16. www.ncbi.nlm.nih.gov/pmc/articles/PMC6409737/
 17. www.researchgate.net/publication/363469693_Role_of_Nanotechnology_in_Fortifying_Nutraceuticals
 18. www.ncbi.nlm.nih.gov/pmc/articles/PMC6548419
 19. www.researchgate.net/publication/325927032_Advances_in_nutraceutical_delivery_systems_From_formulation_design_for_bioavailability_enhancement_to_efficacy_and_safety_evaluation
 20. www.vitafoodsinsights.com/startups/precision-probiotics-working-backwards-towards-targeted-health-solutions
 21. www.internationalprobiotics.org/supplement-formats/
 22. www.pubmed.ncbi.nlm.nih.gov/25128853/
 23. www.sciencedirect.com/science/article/pii/S0924224421002612
 24. www.ncbi.nlm.nih.gov/pmc/articles/PMC8878738/
 25. www.medium.com/in-fitness-and-in-health/kombu-what-f19be6239009
 26. www.vitafoodsinsights.com/probiotics-prebiotics-postbiotics/ipa-we-want-eliminate-confusion-around-new-categories-biotics
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