goetzpartners SECURITIES

COMPANY NOTE

Optibiotix (OPTI-GB)

Microbiome-targeting, evidence-based food ingredients

OUTPERFORM

Target Price 97.00p
Current Price 43.00p

KEY TAKEAWAY

We initiate coverage on life sciences company OptiBiotix Health plc ("OPTI") with an OUTPERFORM recommendation and a target price ("TP") of GBp97 per share. OPTI discovers and develops targeted microbiome-modulating probiotics, prebiotics and other functional food ingredients backed by scientific and clinical evidence. Since its founding in 2014, the company has developed four products for cardiovascular lifestyle diseases and entered >45 commercial deals with corporate partners through which it generates revenues throughout the value chain. The first two ingredients, LP_{LDL} for cholesterol reduction and SlimBiome for weight loss were launched in May 2017 and are already generating revenues. We expect total revenues including those of late-stage assets SweetBiotix (calorie-free sweet fibres for sugar replacement) and LP_{GOS} (prebiotic that enhances the effect of LP_{LDL}) to exceed £50m by 2025E.

Two marketed products with broad applications have started to generate revenues
LP_{LDL} is a probiotic bacterial strain which offers a natural solution for the treatment of elevated cholesterol and in the future high blood pressure. OPTI has already signed 27 deals for LP_{LDL} with partners mainly in the food industry who market the ingredient under both OPTI's own and white label brands. We expect revenues from these and additional deals to grow from c.£400k in 2018A to >£10m in 2024E. The second marketed product is SlimBiome, a patented formulation which reduces hunger and cravings for sweet and savoury foods. It is available as a food ingredient and CE marked medical device that targets the $200bn weight management market. We expect 16 existing commercial deals and many new ones over the coming years to drive strong revenue generation, which in our models exceeds £15m in 2025E.

Early commercial traction lays groundwork for sustained revenue generation
Commercial deals fall into three major categories: manufacturing, formulation and distribution - all of which generate revenues for OPTI. As these agreements can run over many years, OPTI is laying the foundations for sustained, long-term revenue generation. Based on the company's strong track record, we model nearly 320 cumulative deals for LP_{LDL}, SlimBiome, SweetBiotix and LP_{GOS} during the period 2017A – 2030E. We assume that revenues begin 1 - 2 years after signing and take 5 - 6 years to peak in a range of £100k and £1m per year, depending on partner size and annual sales. Manufacturing deals are the smallest but most profitable category, while the lower-margin distribution deals are the most frequent, accounting for c.70% of all deals in our forecasts.

Targeting the trillion dollar microbiome market with evidence-based food ingredients
Microbiome-modulating approaches have focused on probiotics in foods and supplements to support gut health and general wellbeing. Major technological advances in gene sequencing over the past 20 years have led to the understanding that the microbiome plays a central role in human health overall. Since imbalances of the microbiome cause diseases in many organ systems, its modulation is thought to hold transformational potential in healthcare. This has attracted many players to a market expected to be worth $1tn by 2025E, driven largely by pharma products with specific health claims. Developing these is complex and costly, due to the need for rigorous clinical trials. OPTI decided to focus on functional food ingredients that are supported by scientific evidence including human studies. This provides differentiation in markets where most products have unsubstantiated health claims.

SoTP-derived TP of GBp97 per share suggests significant upside potential
Our TP is based on a sum-of-the-parts ("SoTP") valuation that includes risk-adjusted net present values ("rNPVs") for LP_{LDL} (food and pharma applications), SlimBiome, SweetBiotix, LP_{GOS}, OPTI's 37.6% share in SkinBiotherapeutics (SBTX) and net cash at YE2019E. In our view, recent share price weakness provides an attractive entry point to take advantage of OPTI's long-term growth potential.

FINANCIAL SUMMARY

Net Cash/Debt (M):	0.30

MARKET DATA

Current Price:	43.00p
Target Price:	97.00p
52 Week Range:	105.50p - 42.50p
Total Enterprise Value:	37
Market Cap (M):	37
Shares Out (M):	85.4
Float (M):	85.4
Average Daily Volume:	360,391

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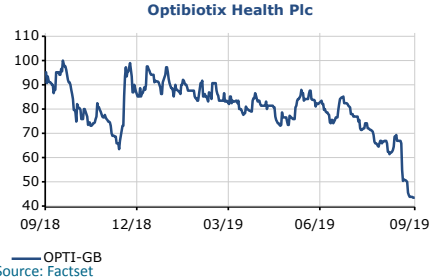
PRICE PERFORMANCE



Source: Factset

Contents

Investment summary

We initiate coverage on life sciences company OptiBiotix Health plc ("OPTI") with an OUTPERFORM recommendation and a TP of GBp97 per share. OPTI develops targeted microbiome-modulating probiotics, prebiotics and other functional food ingredients backed by scientific and clinical evidence uncommon in the food industry. This allows for product differentiation in crowded markets. In its short existence, the company has already developed four products for cardiovascular ("CV") lifestyle diseases and entered >45 commercial deals, through which it generates revenues throughout the value chain. The first two ingredients, LP_{LDL} for cholesterol reduction and SlimBiome for weight loss, were launched in May 2017 and have started to generate revenues. Share price performance (CHART 1) has historically been driven by deal activity, which lays the groundwork for recurring future revenues. We expect this to remain an important driver in the near to mid-term as OPTI continues to sign deals for all products across many geographies, which on our estimates will drive sustained revenue generation for many years to come and potentially operating profitability from 2020E.

CHART 1: OptiBiotix share price (GBp)*

*OPTI is listed on the Alternative Investment Market ("AIM") in London
Source: FactSet

Pure player in the rapidly expanding microbiome space

Most microorganisms in the human body reside in the gut

Microbiota refers to all microorganisms that inhabit the human body and the microbiome is their combined genomic content. Approaches to modulate the microbiome have historically focused on probiotics in foods and supplements to support gut health and general wellbeing. Thanks to major technological advances in gene sequencing over the past 20 years, it is now understood that the microbiome plays a central role in human health overall, e.g. by enhancing immune function, aiding the nutrient absorption, acting on the brain through the gut-brain axis and potentially preventing cancer. Since imbalances of the microbiome cause diseases in virtually all organ systems, modulation of the microbiome is thought to hold transformational potential in healthcare, attracting industry players and investors alike to a market expected to be worth $1tn by 2025E, driven largely by novel microbiome modulators developed as pharmaceutical products with specific health claims.

Evidence-based functional food ingredients and supplements

CHART 2: Evidence-based approach

Laboratory work	Human studies
Presentations at conferences	Journal publications
Endorsement by KOL	

Source: goetzpartners Research

The findings from the human studies have been corroborated by product reviews

Developing pharmaceutical products with specific health claims is complex and costly, due to the need for rigorous clinical trials. OPTI decided to focus on food ingredients and supplements. These ingredients are used as the "intel inside" multiple product presentations and formulations targeted at large consumer markets in food, food supplements, beverages and dairy. To achieve differentiation, OPTI follows a science-driven approach where every ingredient is supported by scientific evidence, including extensive laboratory work and independent human studies appropriate for over-the-counter ("OTC") products and the anticipated return on investment (CHART 2). These are published in peer reviewed scientific journals and presented at leading industry meetings by industry key opinion leaders ("KOL"). OPTI has a broad portfolio of >90 patents across 17 patent families and >40 trademarks.

Tech platforms for targeted probiotics and prebiotics

CHART 3: Three proprietary platforms

1	OptiScreen	Probiotic bacterial strains
2	OptiBiome	Functional foods, incl. prebiotics
3	OptiBiotics	Targeted prebiotics and synbiotics

Source: Company data

OPTI has three proprietary technology and screening platforms to identify and develop natural, sustainable, microbiome-modulating products (CHART 3). The main differentiating factor between the platforms is the level of underlying scientific work and innovation. At the lowest level are functional foods from the OptiBiome platform, and at the highest targeted prebiotics from the OptiBiotics platform, but also potentially live biotherapeutic products ("LBP") developed based on bacterial strains developed from the OptiScreen platform. OPTI can combine products from different platforms to create new product concepts, e.g. combinations of a probiotic with a targeted prebiotic.

LP_{LDL} for cholesterol reduction the first OptiScreen-derived probiotic

CHART 4: LP_{LDL} is the active ingredient in CholBiome$_{X3}$ food supplement

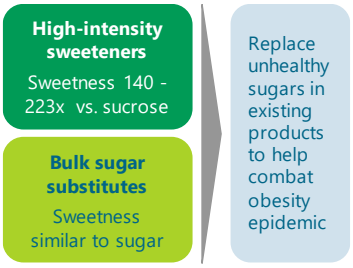
Source: OptiBiotix online

The OptiScreen platform within the ProBiotix Health subsidiary allows for the discovery and development of targeted probiotics, i.e. live bacterial strains that impact specific health biomarkers. The first product is LP_{LDL}, marketed to partners since May 2017 (Europe) / October 2017 (US) as a food ingredient and supplement (CholBiome / CholBiome$_{X3}$, CHART 4) for the reduction of LDL ("bad") cholesterol. It is also in development to lower blood pressure. Based on a probiotic strain from the *Lactobacillus plantarum* species, LP_{LDL} offers a natural, non-pharmaceutical solution devoid of the side effects associated with statins, the gold standard therapy. OPTI has already signed 27 deals for LP_{LDL} and we expect revenues from these and additional deals to grow from c.£400k in 2018A to >£10m in 2024E.

CHART 5: SlimBiome Medical is a CE-marked food supplement

Source: goetzpartners Research

CHART 6: SweetBiotix is a natural sweetener without calories



Source: goetzpartners Research

CHART 7: Two major reasons underly focus on CV lifestyle diseases

Why CV lifestyle diseases?	
Demographic	**Clinical**
▪ Favourable demographics ▪ Shifting attitudes towards prevention	▪ CV health can be assessed through validated biomarkers, e.g. Chol, BP, weight

Abbreviations: BP, blood pressure; Chol, cholesterol
Source: goetzpartners Research

CHART 8: Select OPTI commercialisation partners

Source: Company data

Marketed weight management product SlimBiome reduces hunger and food cravings

The OptiBiome platform is used to screen and develop functional foods and prebiotics that modulate the microbiome. They are used together with other nutraceuticals to target specific health disorders. Award-winning weight-loss product SlimBiome reduces hunger and cravings for sweet foods, and its consumption led to weight loss of 2-3lbs per week in a human study. It is a patented formulation that combines a prebiotic fibre, glucomannan and chromium picolinate, the two latter of which have approved European Food Safety Authority ("EFSA") health claims for weight loss and the maintenance of normal blood glucose, respectively. SlimBiome is formulated as a functional food and a CE-marked medical device (CHART 5) and has been subject to 17 partnering deals since launch in May 2017. These and additional deals should drive strong revenue growth, which in our models exceed c.£15m in 2025E.

SweetBiotix for sugar replacement the most promising OptiBiotics ingredient

OptiBiotics is a high-throughput screening platform that generates oligosaccharides that are specific for a microbial target associated with a defined health benefit. These can either be used individually to modulate the microbiome, or in combination with the target probiotic to enhance its health benefits. The two most advanced projects are SweetBiotix, calorie-free fibres with natural sweetness intended to replace sugar (CHART 6), and LP_{GOS}, a fibre that activates the LP_{LDL} strain. OPTI has signed two deals for SweetBiotix and one for LP_{GOS} that are expected to start generating revenues in 2020E. We are optimistic about the market potential for SweetBiotix and therefore expect it to be OPTI's largest product, achieving peak revenues to the company of >£40m in 2029E based on >80 deals signed in total by 2030E. For LP_{GOS}, we expect peak revenues of >£15m in 2029E.

Focus on prevalent cardiovascular lifestyle diseases

OPTI focuses on chronic, potentially life-threatening lifestyle diseases of the CV system, particularly high cholesterol, obesity and diabetes. There are two main reasons underlying this choice: (1) CV health can be assessed through the measurement of validated biomarkers, e.g. cholesterol, blood pressure and weight, increased levels of which have been demonstrated to be associated with an increased risk for heart disease and stroke. Hence, clinically meaningful reductions in any of these reduce CV risk. This contrasts with other main areas of focus in the microbiome space, e.g. general gut health, which is very difficult to prove due largely to the lack of objective measures; (2) public health policy is shifting towards prevention of CV disease through the adoption of healthier lifestyles, which invariably includes better nutrition. The underlying drivers are the ageing of the population, increasingly sedentary lifestyles and unhealthy diets, all of which cause obesity and increased CV risk, which also drive medical costs.

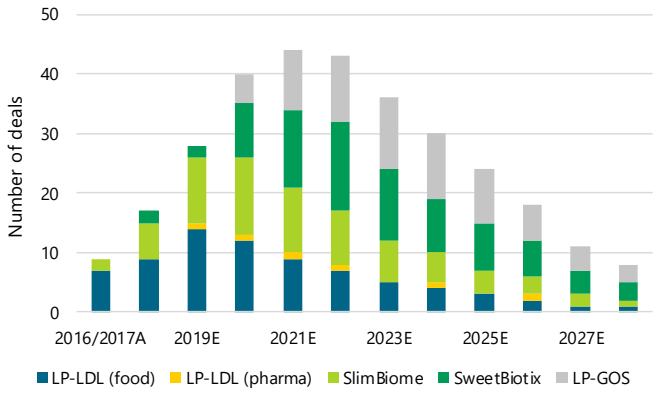
Commercial deals yield revenues throughout the value chain

Management operates a semi-virtual business focused on generating IP, with all cost-intensive activities carried out by corporate partners. These partnerships allow OPTI to generate revenues throughout the value chain, including (1) manufacturing, (2) formulation / application, and (3) distribution. Since 2017, OPTI has entered >45 deals with partners in the food, health & wellbeing and pharma industries (CHART 8) who have established distribution networks within target markets and sell LP_{LDL} and SlimBiome in >30 countries worldwide. OPTI also sells select own brands through its web portal (optibiotix.online).

Laying the groundwork for sustainable revenue generation for many years to come

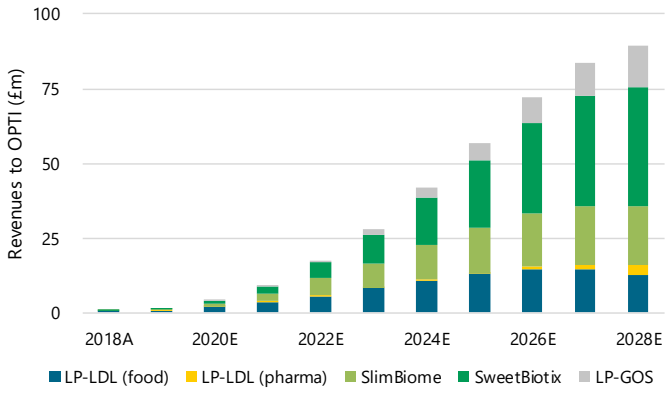
By entering partnership agreements that have the potential to generate revenues for up to ten years, OPTI is laying the foundations for sustained, long-term revenue generation (CHART 10). Based on the company's impressive track record in closing deals, we model nearly 320 cumulative deals for all existing products during the period 2017A – 2030E (CHART 9). Revenues for each individual deal typically start within 1 - 2 years after signing and should take 5 - 6 years to peak in a range of £100k and £1m. Revenue potential is typically a function of the size and annual revenues of the partner company. Manufacturing deals are the smallest, but most profitable category, as the company typically enters profit sharing agreements with a 100% gross margin ("GM"), while the lower margin distribution deals with a 50% GM on average are by far the most frequent, accounting for c.70% of all deals in our forecasts. We expect SweetBiotix to lead to more deals than any other product due to increasing awareness of the benefits of healthier lifestyles and rising pressures on food and beverage companies to reduce sugar content across widely used consumer goods.

CHART 9: OPTI has entered >45 commercial agreements since 2017…



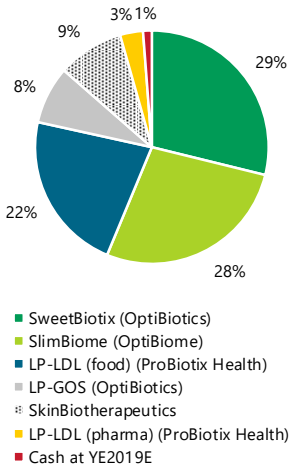
Source: Company data, goetzpartners Research estimates

CHART 10: … which should lead to sustained revenue generation for many years



Source: Company data, goetzpartners Research estimates

CHART 11: SweetBiotix is OPTI's most valuable asset, in our view



Source: goetzpartners Research estimates

Sum-of-the-parts valuation yields TP of GBp97 per share

Our GBp97 per share TP is based on a sum-of-the-parts ("SOTP") valuation (CHART 12), which in our view is the most suitable valuation tool for an emerging company whose revenues are largely expected to occur in the future. We include risk-adjusted net present values ("rNPVs") for all marketed and commercially validated products, based on detailed free cash flow ("FCF") models to 2040E where revenues per product are calculated based on existing and potential future commercialisation deals. FCFs are discounted at an estimated WACC of 10.5%. We apply risked adjustments to account for commercial risk, based on the assumption that two-thirds of deals meet their full potential and one-third are terminated early. SweetBiotix and LP_{GOS} higher risk-adjustments reflect the fact that they are not yet marketed and only a few deals have been signed for each. Our SoTP valuation also includes net cash at YE2019E and a rNPV for SkinBioTherapeutics ("SBTX"), the former subsidiary where OPTI retains a 37.6% share. We have also built a group-level DCF model, analysed trading comparables and identified relevant M&A transactions to support our analysis.

CHART 12: OptiBiotix sum-of-the-parts valuation

Product	Use	Stage	Peak sales (GBPm)	Year	NPV (GBPm)	Prob.	Adj. NPV (GBPm)	GBp per share
LP_{LDL} (food) (ProBiotix Health)	Chol & BP reduction	Market	14.4	2027E	24.4	75%	18.3	21.4
LP_{LDL} (pharma) (ProBiotix Health)	CV disease	Development	17.8	2035E	26.2	10%	2.6	3.1
SlimBiome (OptiBiome)	Weight loss	Market	19.8	2027E	30.2	75%	22.6	26.5
SweetBiotix (OptiBiotics)	Sugar replacement	Development	41.6	2029E	59.5	40%	23.8	27.8
LP_{GOS} (OptiBiotics)	Chol & BP reduction	Development	15.5	2029E	20.3	33%	6.6	7.7
SkinBiotherapeutics	Dermatology	Clinical	105	2040E	30.3	25%	7.6	8.9
Cash at YE2019E					1.0	100%	1.0	1.2
Equity value per share					**191.8**		**82.5**	**97**
Current Share Price								50.8
Upside								*90%*

Abbreviations: BP: blood pressure; chol: cholesterol; CV: cardiovascular
Source: goetzpartners Research estimates. Warning Note: Forecasts are not a reliable indicator of future performance or results. The return may increase or decrease as a result of currency fluctuations.

Key investment risks

CHART 13: Key investment risks

Type	Examples
Commercial	▪ Deal activity slows down and fails to meet our expectations ▪ More than one-third of deals are terminated early due to poor performance ▪ Product revenues fall short of our forecasts, for example due to insufficient differentiation in the marketplace or inability to keep up with the marketing muscles from larger competitors
Financial	▪ Inability to raise funds required to fund working capital requirements
IP	▪ Key patents are invalid, leading to copycats entering the market early
HR	▪ Difficulties attracting the right people to expand the organisation and manage the rapidly growing number of agreements with corporates

Source: goetzpartners Research

Company background

CHART 14: Company strategy

- Microbiome products based on three platforms
- Food ingredients and supplements, pharma products
- Scientific and clinical evidence base
- Address markets worth >£100m, growing at >10% CAGR
- Commercialise through partners (>45 deals already signed)

Source: Company data, goetzpartners Research

OPTI is a life sciences company formed in 2012 that discovers and develops products that modulate the human microbiome to prevent and manage chronic human lifestyle diseases based on three proprietary technology platforms. The company develops microbial strains and other compounds used as active ingredients for functional foods, drinks and supplements. All products are backed by scientific and clinical evidence. The first two products were launched in 2017 and are marketed worldwide through a large network of partners in the food, health & wellbeing and pharma industries, with OPTI receiving revenues throughout the value chain. The company also sells directly to consumers through its web portal. OPTI was listed on AIM in 2014 and has raised £7.3m in equity from investors (CHART 15).

CHART 15: Equity capital raises since IPO

Date	Gross raise (£)	Description	Price (GBp)	Use of Proceeds
Jul-14	3,229,200	IPO	0.08	Asset financing, general corporate purposes
Dec-15	1,500,000	Private placement	0.75	R&D, SweetBiotix development, acquired rights from Manchester University for SBTX
Feb-16	1,000,000	Follow-on (ABB)	0.78	SBTX public listing
May-18	1,500,000	Private placement	0.62	Retail launch, GMP manufacture, accreditation for LP_{LDL} as a biotherapeutic

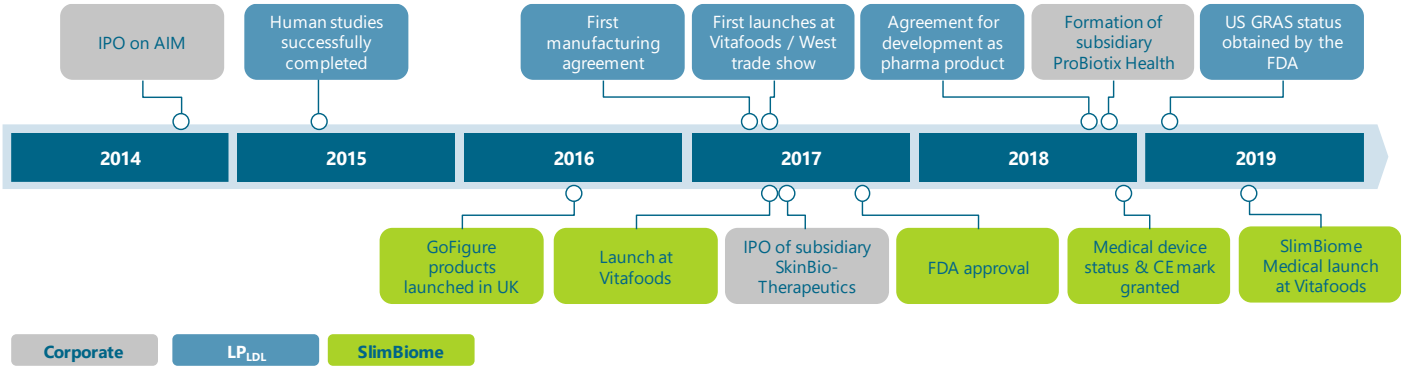
Abbreviations: ABB, accelerated bookbuild; IPO, initial public offering
Source: Company data

Transition from technology and R&D to commercial entity

LP_{LDL} and SlimBiome, were launched in May 2017 at the VitaFoods trade show in Geneva, one of the leading trade fairs for the food and drinks industry with >16,500 industry participants from the functional foods and beverage, supplements and nutraceutical industries

In the first few years of its existence, OPTI focused on developing its technology platforms and first products. The first human studies for lead asset LP_{LDL} were successfully completed in 2015 and the product was officially launched at the VitaFoods tradeshow in Geneva in May 2017 together with SlimBiome, which had been introduced in the UK as part of the GoFigure range of foods in 2016. Since 2017, OPTI has signed >45 deals with many corporate partners to commercialise these and other products, reflecting strong interest from industry in high-value ingredients. This has allowed the company to transition to a commercial, revenue-generating entity. CHART 16 below shows key corporate and product-related events since the IPO in 2014.

CHART 16: Key milestones since IPO



Source: Company press releases

Technology platforms yield many product opportunities

A former fourth subsidiary, SkinBioTherapeutics, was listed on AIM in 2017. OPTI owns 37.6%

OPTI has three proprietary technology and screening platforms to identify and develop natural, sustainable products that modulate the human microbiome (CHART 17). All products are sold as food ingredients or supplements with specific and / or general health claims, in line with requirements from the regulatory authorities. The main differentiating factor between the platforms is the level of scientific work and innovation underpinning them. At the lowest level are functional foods derived from the OptiBiome platform and at the highest prebiotics from the OptiBiotics platform, the most scientifically advanced of which are the SweetBiotix sweet fibres. There is potential for synergies as OPTI can combine products from different platforms to create new product concepts. One example is LP_{GOS}, which combine a targeted prebiotic with the respective probiotic.

CHART 17: OPTI identifies and develops products based on three technology platforms

Subsidiary	1 ProBiotix Health Ltd	2 OptiBiome	3 OptiBiotics	
Screening platform	OptiScreen®	OptiBiome®	OptiBiotics®	
Approach	Identify microbial pathways that interact with human pathways	Identify & develop microbiome modulators	Generate and screen novel oligosaccharides for their ability to modulate the microbiome	
Active ingredient	Probiotic microbial strains	Functional foods, including prebiotic fibres	Functional / targeted prebiotic fibres	
First products	LP_{LDL}® Launched May 2017	SlimBiome® Launched May 2017	SweetBiotix®	LP_{GOS}®
Own brands	CholBiome	$CholBiome_{X3}$	GoFigure® range	SlimBiome® Medical	In development
Applications	Cholesterol and BP reduction, vascular health improvement	Weight management / loss	Sugar replacement	
Regulatory status	GRAS status in the US	Medical device status & CE mark in Europe FDA approved	n.a.	
Corporate plans	Potential IPO on AIM in 2020E	Potential merger to create a unified prebiotics platform		

Source: Company data, goetzpartners Research

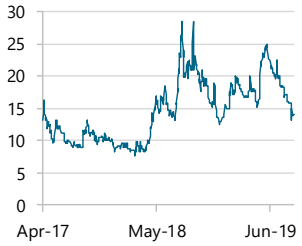
Each platform to become a self-sustaining business for independent exit

Each platform is being developed as a self-sustaining business unit with its own IP, products and revenues, led by experienced commercial directors with the skills and experience to exploit the full revenue potential. The goal is for each unit to become a wholly owned separate legal entity with its own identity and potential for an independent exit, e.g. through a trade sale or a separate listing.

SkinBioTherapeutics listed in 2017, Probiotix Health may be next

The first subsidiary to be spun off was SkinBioTherapeutics, which focuses on bacterial extracts for skin applications. Acquired in March 2016 for c.£250k, it was listed on AIM in April 2017 at a valuation of £11m, with OPTI owning 41.9%m (£4.6m). The shares have since appreciated (CHART 18). Last year management disclosed that the wholly owned subsidiary Probiotix Health may be next in line. To this end OPTI (1) raised £1.025m through the issue of convertible loan notes in December 2018 and (2) appointed probiotics veteran Stephen Prescott as CEO in May 2019, based in the US. He joined from probiotics company Probi AB and spent much of his career at Dupont, Johnson Matthey and Pfizer.

CHART 18: SkinBioTherapeutics share price performance (GBp)



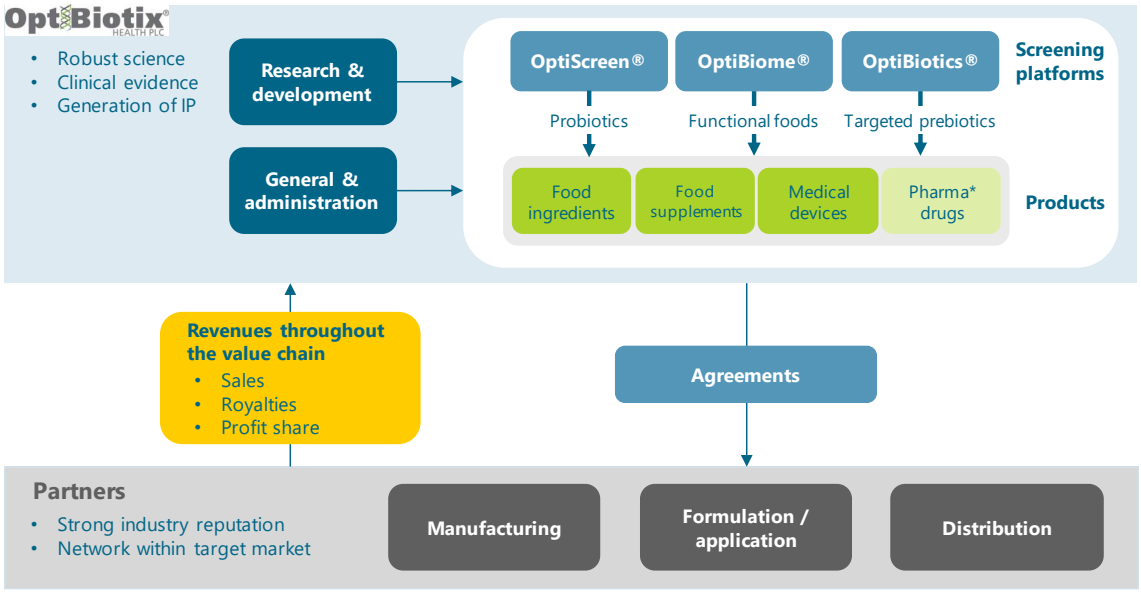
Source: FactSet

While OptiBiotix focuses on food ingredients and supplements, the company is also exploring the development of LP_{LDL} as a live biotherapeutic product through collaborations with pharma companies

IP rich, low-risk business model and strategy

Developing innovative microbiome modulators with specific health claims is complex and costly, due to the need for rigorous clinical trials coupled with uncertain regulatory pathways. Hence, OPTI decided to focus on food ingredients and supplements that can be shown to have beneficial effects on human health with limited development work including human studies. Risk reduction is further achieved by using functional ingredients as the "intel inside" multiple presentations and formulations that are targeted at large consumer markets in the foods, beverages, dairy and food supplements. Higher-risk pharmaceutical products are only developed in partnership with specialised companies, allowing OPTI to participate in the potential upside without incurring costs. The cost base is minimised by operating a semi-virtual business focused on generating IP, with cost-intensive activities such as manufacturing, formulation work, sales, marketing and distribution carried out by corporate partners (CHART 19).

CHART 19: Asset-light business model where resource-intensive activities are outsourced to partners

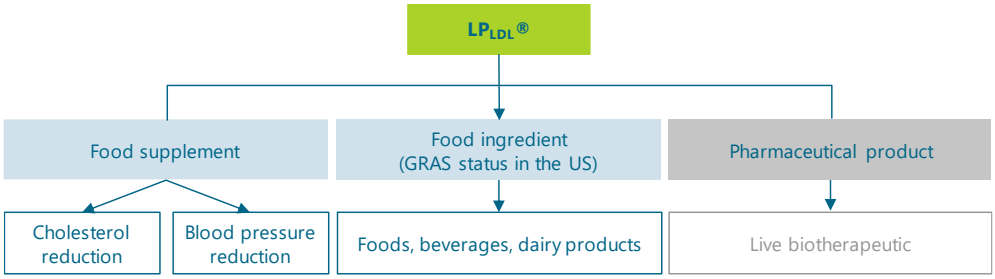


*Developed and funded by industry partners
Source: goetzpartners Research

The "intel inside"

CHART 20 shows example for how LP_{LDL} can be used across multiple product opportunities.

CHART 20: LP_{LDL} is the "intel inside" a number of products



Source: goetzpartners Research

Evidence-based approach provides differentiation

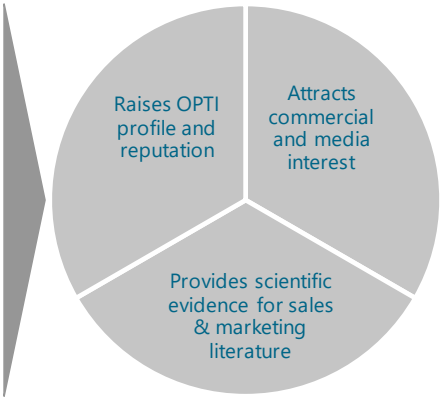
When CEO Stephen O'Hara first looked at overall development practices and marketing activities in the food industry, he was surprised by the lack of scientific rigor, as even large and well-established food manufacturers often claim health benefits for their products in the absence of scientific evidence. Instead, the food industry largely relies on marketing to sell its products. To differentiate its products and be able to compete against established players, OPTI embarked on a science-driven approach where every ingredient discovered and developed is supported by robust scientific evidence. This is largely achieved through the process shown in CHART 21.

Broad portfolio of patents and trademarks

OPTI has a broad portfolio of >90 patents across 17 patent families, consisting of a mix of formulation and application patents. These are continually being extended to include new application opportunities as they are identified. OPTI also has >40 trademarks, allowing the company to build and protect recognisable brands. This is particularly important in countries such as China where patent enforcement is weak. Once a brand becomes established and consumers develop loyalty to it, the threat of competition from similar products declines substantially.

CHART 21: OPTI employs a science-driven approach to differentiate its products

1	Laboratory work	■ Lab work conducted at in-house research laboratories enables detailed understanding of mechanism of action allowing for optimisation and identification of application opportunities
2	Clinical studies in humans	■ Establish safety and efficacy in humans through small clinical studies appropriate for low-cost OTC products
3	Endorsement by KOL	■ Studies are presented at conferences and published in scientific journals ■ Work with leading key opinion leaders who support the science behind OptiBiotix's products



Source: goetzpartners Research

Approach rewarded by multiple industry awards…

The success of this approach is reflected in multiple nominations and industry awards for individual OPTI products at leading probiotics and food conferences (CHART 22), plus positive reviews posted by customers online.

CHART 22: OPTI's products have won multiple industry awards and received nominations

Source: Company data

… and is a key component of the business development process

The rigorous scientific approach and the resulting presentations at conferences and publications in scientific journals are key components of the business development process, as they generate awareness among industry. Combined with the large network of the management team, it limits the effort required to win business. Instead, OPTI is in the privileged position of receiving incoming approaches from interested industry players. Much of the time is therefore spent assessing individual opportunities and negotiating deals, bringing efficiencies to a process that can be time-consuming.

Increasingly stringent regulation an opportunity, not a threat

OPTI's evidence-based approach should allow it to benefit from the increasingly stringent regulatory environment, which is clamping down on unsubstantiated health claims currently contained on many food labels. The European Food Safety Authority ("EFSA") particularly has taken a stringent approach through the introduction in 2017 of new regulation across the food market including probiotics, which demands that packaging cannot include any unsubstantiated health claims.

Partnerships yield revenues throughout the value chain

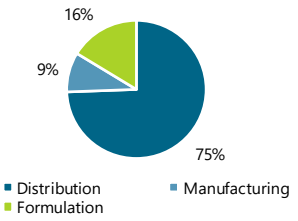
OPTI monetises its products through commercial agreements with industry partners. These range from small, local players to large, multinational corporations. OPTI generates revenues from manufacturing formulation / application and distribution deals.

CHART 23: OPTI has three types of revenue-generating deals in place

	Type of agreement	Activities	Product	Source of revenues to OPTI	Economics	Selected partners
1	Manufacturing	▪ Manufacture ▪ Supply ▪ Sales	▪ Raw ingredient (e.g. bacterial strain, prebiotic fibre)	▪ Sale of raw ingredient	▪ Royalties ▪ Profit share	SACCO, NUTRILINEA
2	Application / Formulation	▪ Formulation ▪ Encapsulation ▪ Packaging	▪ Final product	▪ Sale of white label & branded product formulations	▪ Royalties ▪ Profit share	Cereal Ingredients, Inc., FINEFOODS
3	Distribution	▪ Marketing and distribution	▪ Final product	▪ Final product (retail) sales	▪ Royalties ▪ Sales	DKSH, AGROPUR

Source: Company data, goetzpartners Research

CHART 24: Distribution deals account for the lion share of existing deals



Source: Company data

Three major types of deals

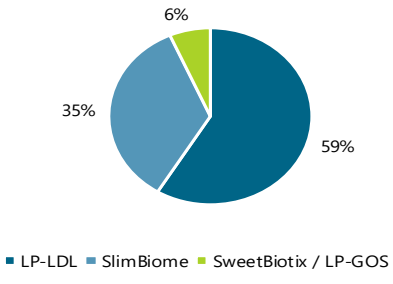
OPTI classifies the deals into three major categories (CHART 23), although each agreement is tailor-made and most cover multiple activities. The internal classification is based on the dominant activity.

- **Manufacturing deals the most profitable:** cover mainly production of the raw ingredient. OPTI typically receives a 50% share of profit at the point of sale to a formulation / application partner, with a 50% GM;
- **Application / formulation deals are few and far in between:** production of white label (partner brands) and OPTI branded products. These deals are usually either royalty-bearing license deals or profit shares. An example would be a deal signed with Nutrilinea, who buys LP_{LDL} from Sacco, prepares the CholBiome capsules and subsequently sells these to OPTI for a specified price. OPTI then sells the capsules through its online portal at a c.80% profit. For white-label products, the GM falls into a wide range, we estimate 65% on average;
- **Distribution deals the most common** (CHART 24): here the dominant activity is distribution to retailers or, in rare cases, direct sale to consumers, but most deals also include production and packaging of the final product. OPTI usually receives royalties on retail product sales with a c.50% GM on average unless OPTI sells directly to the retailer, in which case the profitability is marginal. Hence, retail deals have only been signed in select regions outside of the UK, e.g. Bulgaria, Spain.

>45 deals signed since 2017 have been fuelling revenue growth

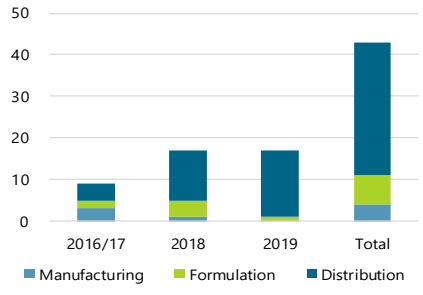
Management has been able to sign >45 deals in less than three years, including 10 in 2017, 18 in 2018, and 18 in 2019 YTD (CHART 26), which have started to generate revenues (CHART 27). Most deals relate to LP_{LDL} (CHART 25).

CHART 25: Deals by product



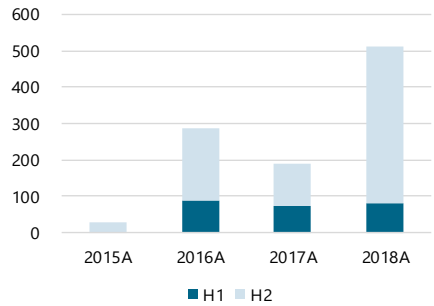
Source: Company data, goetzpartners Research

CHART 26: Deals by type*



*Excluding pharma and development deals
Source: Company data, goetzpartners Research

CHART 27: OPTI revenues, 2015A – 2018A



Source: Company data, goetzpartners Research. Warning Note: Past performance are not a reliable indicator of future performance or results. The return may increase or decrease as a result of currency fluctuations.

We note that the deal signed with UK sales and marketing company BioEnergiser for SlimBiome creates an opportunity to build a direct to market consumer health division for the UK market

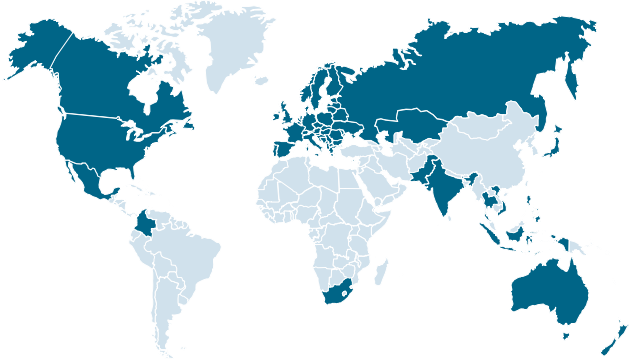
Retail the main sales channel, online platform intended as a shop window

OPTI also sells products directly to consumers through its online store. However, the site is designed mainly as a shop window for marketing and information purposes, including all clinical trial data and information that is not permitted on the packaging. Revenues are therefore expected to be modest compared to those generated through partners. However, given the high number of industry awards and excellent customer feedback there may be a future opportunity to build the existing online platform in direct to consumer sales.

Partners in food, health & wellbeing and pharma provide broad geographic coverage

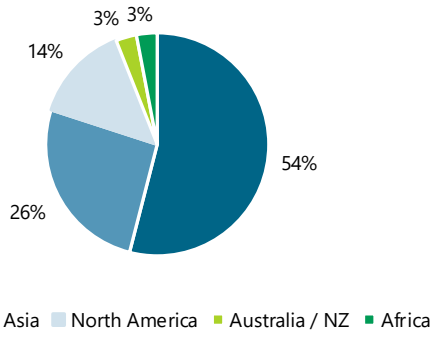
OPTI targets mainly companies in the food and health & wellbeing industries and has signed deals with corporates worldwide. Food companies generally operate on relatively low profit margins in the single digits, due largely to the high level of commoditisation, and are therefore genuinely interested in high-value functional ingredients that can make their products stand out to allow for higher price points and gaining market share. This allows OPTI to develop multiple formulations and / or applications that have the science, cost structure, and synergistic mode of action to create a broad product range suitable for multiple territories in consumer health, pharma and retail. Through its partnerships, OPTI is present in >30 countries across all continents (CHART 28), including all strategically important regions. Europe, Asia and the US account for 54%, 26% and 14% of all deals, respectively (CHART 29).

CHART 28: Current agreement cover >30 countries around the world



Source: Company data

CHART 29: Europe the leading geography at present



Source: Company data

UK and Europe first, but Asia and the US the key markets in the long term

OPTI tends to launch first in its home market, as it allows the company to spot and resolve any issues quickly. The next step is to focus on Europe, then the US, and finally Asia. The US is a key market due to its large size and growth, with prebiotics in particular experiencing very high growth. Asia is an important region because of the sheer size of its population. Initially the company intends to focus on India, where the ongoing rise in obesity and cardiovascular disease, the increasing interest in health & wellbeing, and the growth of an affluent middle class generate favourable market dynamics. China is further down on the list due to the need to build brand recognition prior to launching to minimise the risk of copycats.

CHART 30: Larger partners usually translate to higher revenue potential

Partner sales	OPTI revenue potential	% of deals
≥$1bn	c.£1m	>10%
Medium	c.£500k	up to 20%
Small	£100-200k	>80%

Source: Company data, goetzpartners Research estimates

Larger partner = higher revenue potential

>10% of the deals signed are with companies whose annual sales are >$1bn. Larger partners represent higher revenue potential, since they have a higher threshold for a deal to make commercial sense. CHART 30 provides a rough correlation between revenue potential of a deal based on a partner's sales.

Non-exclusive deals preferred. Exclusive deals come with strings attached

OPTI prefers non-exclusive deals, as they allow for more freedom to negotiate additional deals in the same region (thus mitigating the risk of a partner not delivering in a territory), give the company more control over its products, increase the visibility of revenue streams and prevent partners from underreporting ingredient sales. Where exclusive deals are signed, the following restrictions apply: (1) Specification of the scope as precisely as possible, e.g. particular supplement or formulation; and (2) inclusion of specific targets that need to be met for the exclusivity to be maintained. An example is the 3-year extension signed with HLH Biopharma for Germany in March 2019, which includes the requirement for order volume commitments to double every year for exclusivity to be maintained.

Most deals are performing in line with or ahead of expectations

Most deals have a duration of three years, although some are shorter, while others run over ten years. Given most deals were done within the last three years, around half are not yet generating revenues. We understand that typically around one-third of deals tend to perform ahead of expectations, while a similar amount fails to live up to contract terms and may be replaced in the coming 1 - 2 years. Of those that perform, those that come up for renewal are then extended on an annual basis.

The microbiome holds transformational potential

The human microbiota contains bacteria, microbes, archaea, fungi and protozoa, equating to roughly 10^{14} cells, comparable to the number of human cells. Bacteria are by far the most common microorganism

Technological advances in gene sequencing over the past 10 - 20 years have led to the understanding that the microbiome influences human health overall, with imbalances known to cause diseases across virtually all organ systems. Modulation of the microbiome is thought to hold transformational potential in healthcare, thus attracting industry players and investors alike to a market that is expected to be worth $1 trillion by 2025E. Historically, approaches to modulate the microbiome have focused on the use of probiotics in foods and supplements to support gut health and overall wellbeing, which have grown in popularity in recent years despite limited clinical evidence for most products. The past decade has witnessed the emergence of biotech companies racing to develop specific bacterial strains or their metabolites as *bona fide* pharmaceutical drugs with specific health claims, initially focused on gastrointestinal diseases, but also autoimmune diseases and cancer.

A highly dynamic collection of symbiotic microorganisms

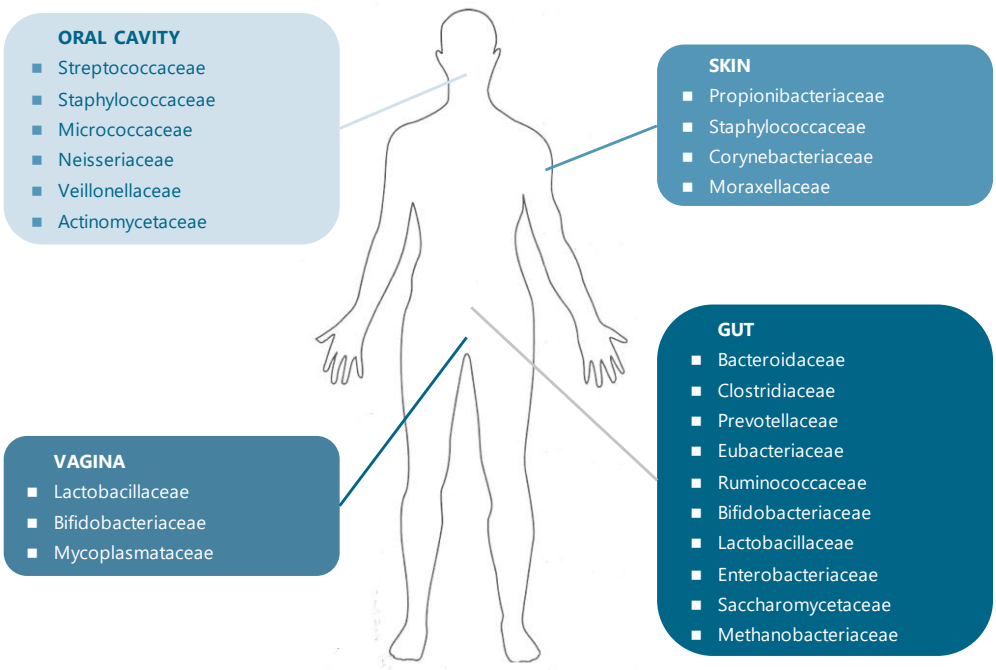
CHART 31: Nomenclature for *Lactobacillus acidophilus* KU41

Domain	Bacteria
Kingdom	Eubacteria
Phylum	Firmicutes
Class	Bacilli
Order	Lactobacillales
Family	Lactobacillaceae
Genus	Lactobacillus
Species	Acidophilus
Strain	KU41

Source: goetzpartners Research

The human microbiota describes the complex system of microorganisms which inhabit our bodies, including bacteria, viruses, fungi and others. The symbiotic relationship has led to the coevolution of humans and microbiome alike. The collective genomic content of these organisms –the microbiome -is thought to be approx. 100x - 150x larger than that of humans. In turn, the human immune system has adapted to prevent full microbial colonisation of the body, restricting the microbiota to the body's exterior epithelial surfaces (CHART 32). Whilst the microbiota as a whole plays a critical role in several general functions such as immunity and resistance to pathogens, the ecosystem of the gut, and more specifically the colon (large intestine), has been the most intensively studied, due to the large diversity between individuals and a microbial density of an order of magnitude higher than the rest of the body.

CHART 32: The dominant microbiome phyla are bacteroidetes, proteobacteria, firmicutes and actinobacteria



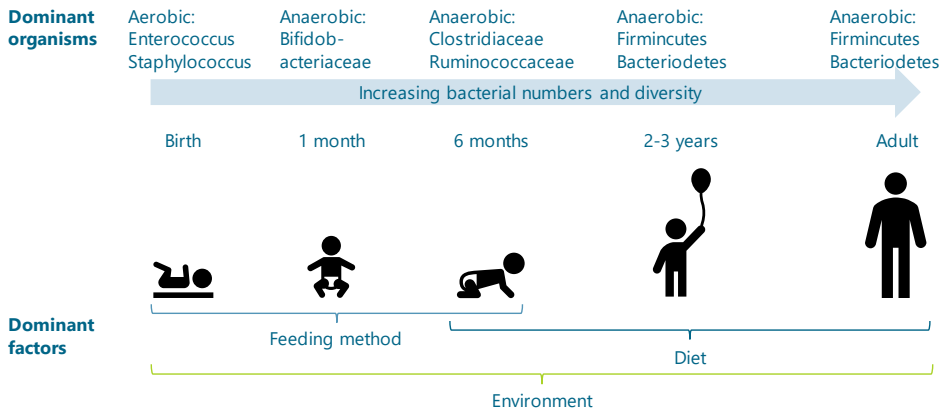
Source: goetzpartners Research

The microbiome is inherited from the mother, stabilising at 2 - 3 years of age

A caesarean section, preterm birth or use of antibiotics during pregnancy can inhibit early post-natal colonisation and development of an infant's microbiome, although the effects are less detectable after approx. 6 months.

Primordial commensal microbes are inherited directly from the mother during labour when neonates are exposed to the mother's microbes, and colonise the skin, mouth and gut. These bacteria then prime the development of the microbiota, immune, metabolic, hormonal and nervous systems. The presence of a functioning microbiota is thought to be critical to normal development, as gnotobiotic (germ-free) rats, mice, chicken and pigs have shown to develop with abnormal phenotypes. As infants develop, the composition of the gut microbiome is influenced by the modality of feeding, as indigestible lactose and oligosaccharides in milk act as a prebiotic substrate to feed the commensal bacteria acquired during and after birth. As solid foods and hence new substrates are introduced, the microbiota composition continues to diversify during the first three years of life, after which it remains relatively stable, but still reactive to factors such as diet, disease, antibiotics and the environment (CHART 33).

CHART 33: Gut microbiome development over a human's lifetime



Source: goetzpartners Research, Mohajeri et al., 2018

An individual's microbiome is unique and is analogous to a fingerprint

Environmental factors are the predominant driver of intra individual variability

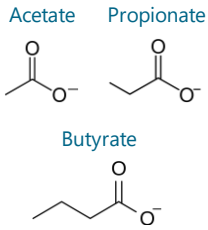
Whilst a core human microbiome is common across most humans, there is a large interpersonal diversity and individuals have unique microbiome taxonomies. An individual's microbiome (enterotype) is analogous to a fingerprint. Microbial communities are more similar within than between habitats across individuals (e.g. oral communities share greater commonality with oral communities in other people than with other habitats within the same person), but the inter-individual differences within habitats are also greater than intra-individual variation with time. The human microbiome is a dynamic system that evolves during a person's life to react to changes in environment, diet, disease and medication.

Western lifestyles impact the ecological diversity needed for a healthy microbiome

Defining a "healthy" microbiome is challenging and true consensus is yet to be achieved. One definition outlines a "core" healthy microbiome which includes specific microbial gene family combinations, metabolic modules and regulatory pathways which together promote a stable host-associated ecology. Ecological diversity is seen as a key feature of a healthy microbiome, as a lack of diversity is apparent in the gut microbiome in diseases such as obesity, inflammatory bowel disease ("IBD") and diabetes. Factors that impact microbiome diversity and have led to the rise of chronic diseases particularly in developed countries include Western diets high in fat and refined sugar as well as low in fibre, the use of toothpaste and soaps, the consumption of chlorinated water and an increase in the use of both prenatal and postnatal antibiotics.

Functions extend beyond maintaining gut health

CHART 34: Most important SFCAs contributing to host functions



Source: goetzpartners Research

Historically, owing to observable symptoms such as antibiotic-associated diarrhoea caused by gut dysbiosis, the microbiome was thought to be confined to the gut. However, developments in genetic sequencing over the last 10 - 20 years have shed new light on the deep relationship between the microbiome and human health overall. Commensal (native) microorganisms in the gut play a critical role in maintaining a healthy digestive tract through the production of key metabolites, the absorption and storage of nutrients, intestinal homeostasis, and protection against injury.

Critical modulator of the immune system and the CNS through the gut-brain axis

More recently, the gut microbiome has been shown to affect the function of other organs through the production of enzymes, metabolites, wound repair and defence against pathogens, with early research focusing on the immune system, metabolic pathways and skin health. The gut microbiota has also been linked to the CNS through the gut-brain axis, modulating our emotional behaviour.

Increased diversity of the colonic microbiota has been shown to lead to a contemporaneous increase in the number of SFCAs produced, which is associated with healthy gut function

SFCAs among the most important metabolites produced

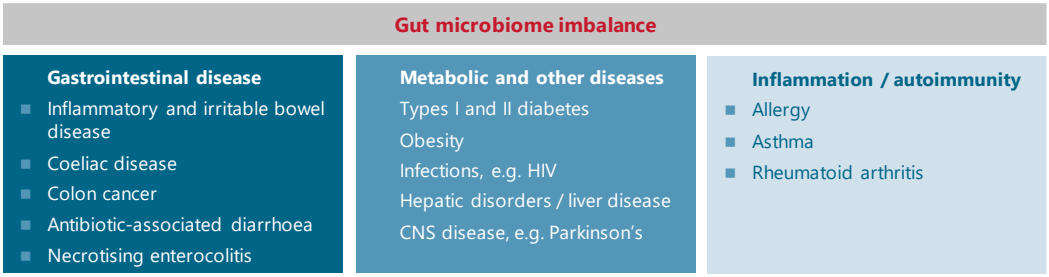
Indigestible proteins and carbohydrates pass into the colon, where they act as substrates for colonic bacterial fermentation, resulting in the production of many metabolites. The most important are short chain fatty acids ("SFCAs"), which contribute to several critical host functions: 1) Improvement of electrolyte and water absorption in the colon, 2) enhancement of hepatic blood flow, 3) increase in the solubility and absorption of calcium, 4) maintenance of colonic mucosal integrity. Other important metabolites are branched chain fatty acids, ammonia, amines, phenolic compounds and gases such as hydrogen and methane.

Dysbiosis causes a variety of diseases

A key culprit in the causes for dysbiosis is the (over)use of (broad-spectrum) antibiotics

Dysbiosis describes an imbalance of the intestinal microbiota where its composition or function microbiota has deviated from the normal homeostatic state, which has been implicated in many diseases (CHART 35). The mechanisms which lead to several conditions associated with the gut microbiome have been linked to the pivotal mutualistic relationship between the colonic microbiota, their metabolic products and the host immune system. In such a state, the microbiota produces harmful effects through 1) qualitative and quantitative changes to the composition of the intestinal microbiota itself, 2) changes in the metabolic activity of the intestinal microbiota, and 3) changes in the local distribution of the microbiota.

CHART 35: Diseases associated with altered gut microbiota



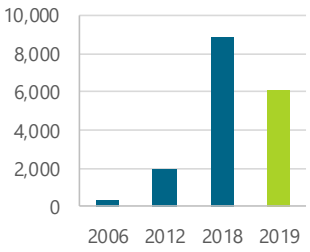
Source: goetzpartners Research

Relationship is clear, but cause and effect is yet to be established

The level of clinical evidence and understanding of the mechanisms through which the microbiome acts vary widely across specialties, and the relationship between cause and effect is yet to be established. Examples include: (1) Intestinal disorders such as IBD and irritable bowel syndrome ("IBS") have been shown to be directly related to dysbiosis of the gut microbiome; (2) there is evidence that perturbations in the gut microbiome and the resulting metabolic products are involved in the development of colorectal cancers; (3) metabolic disorders such as obesity and diabetes have been linked to the level of Firmicutes and Bacteroidetes in humans; (4) metabolomic analyses have revealed that a suite of small molecules produced in the gut microbiome modulate a range of CNS disorders via the gut-brain axis.

Technological advances underpin increased understanding

CHART 36: Microbiome research publication volume



Source: PubMed

Elie Metchnikoff is considered the "father" of microbiome therapeutics

Humans have long established the link between the bacterial content of the gut and health. Ancient societies such as the Greeks, Egyptians and Indus Valley Civilisation are documented as having consumed various sources of lactic acid bacterial strains through fermented milk and yoghurt foods. Despite this, the underlying mechanisms were not truly understood until the last two decades. Rapid advances in DNA sequencing and metagenomics complemented by developments in the analysis of transcriptomes, proteomes, metabolomes and immunomes have vastly improved our ability to understand the structure and function of the microbiome in both healthy and diseased states. This has led to an exponential growth of microbiome publications over the last few decades (CHART 36).

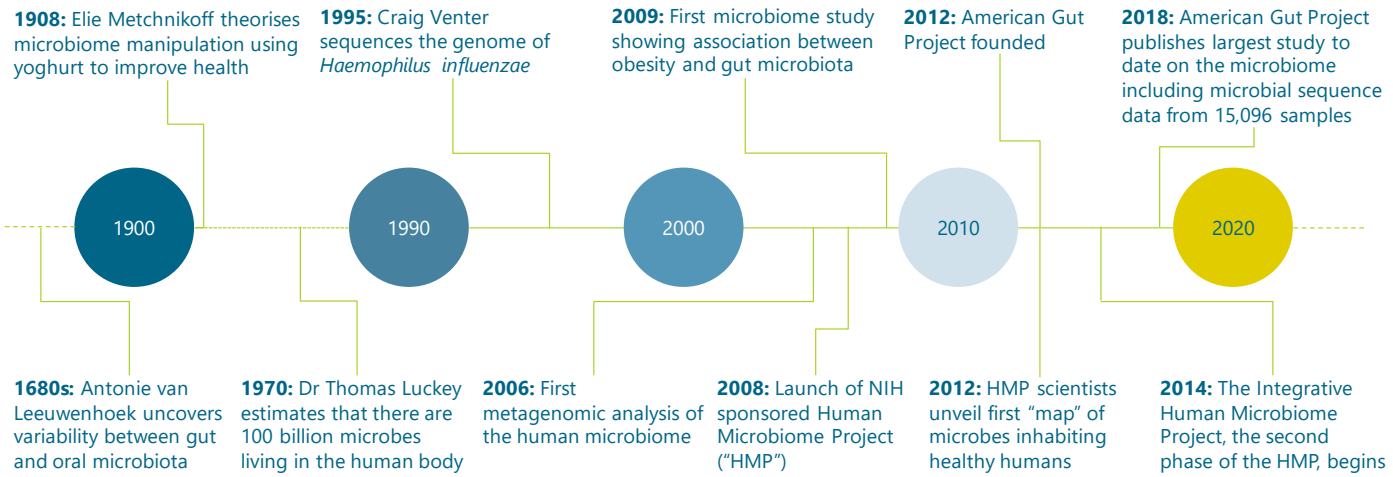
Progress was historically limited by archaic experimental techniques

Historically, microbes had to be cultured in the lab prior to identification and characterisation by microscopy, biochemistry and other techniques. Gut microbiotas were typically obtained from faecal samples, with the inherent limitation that the microorganisms found in faeces do not necessarily represent the sub-habitats in individual segments of the gut, e.g. the small intestine. The process is time-consuming and inaccurate, since not all species found in the gut microbiome can be successfully cultivated in a lab. The 20th century played witness to several key events (CHART 37). In 1908, Elie Metchnikoff argued that ageing could be prevented by the cultivation of beneficial bacteria in the gut through the consumption of yoghurt and other sour milks. Analysis of the microbiome continued to proceed slowly until the advent of genomic sequencing in the 1990s.

Genomic sequencing caused a paradigm shift in microbiome understanding

In 1995 Craig Venter decoded the genome of the first free-living organism, the bacterium *Haemophilus influenzae*, triggering the advent of the modern age of microbiome research. Venter's efforts alongside those of the Human Genome Project led to the establishment of the Human Microbiome Project ("HMP") in 2008, and subsequently the American Gut Project in 2012, which aimed to comprehensively characterise the human microbiome and analyse its role in human health and disease. The resulting genomic data has fuelled exponential interest in the microbiome and its potential for novel treatments.

CHART 37: Human microbiome research timeline



Source: goetzpartners Research

The Human Microbiome Project launched in 2008 with an initial budget of $115m vs. c.$3bn for the Human Genome Project

HMP has unveiled the complexities of the human microbiome

Following the example set by the Human Genome Project, the HMP is characterising the microbial population of the gut and other habitats to uncover the link between composition and function of the microbiome with human health. As the critical relationship between the microbiome and various conditions has become increasingly clear, commercial interest in the field has increased significantly.

The simultaneous identification of thousands of 16S rRNA sequences within hours allows for metagenomic studies

16S rRNA sequencing a valuable technique for fast bacterial identification

The emergence of 16S rDNA sequencing and corresponding polymerase chain reaction techniques as mainstream tools in the mid-1990's has been a significant enabler for the rapid and cost-effective identification and quantification of different species and subspecies of bacteria without the need for culturing. It has shown to be a valuable addition to high-throughput sequencing, which enables clustering and analysis of large data sets.

CHART 38: Microbiome modulators have been evolving from generic probiotics for general gut health to targeted pharmaceutical drugs

	OTC Probiotics	Live biotherapeutic products ("LBP")	Postbiotics	Prebiotics
Active ingredient	Live bacterial strains		Small molecules	
			Probiotic metabolites / modulators	Substrates used as "food" by probiotics
Application	Food ingredient or supplement	Pharmaceutical drug / therapeutic agent with defined clinical benefit claim		Food ingredient or supplement / med device
Development	Short, low cost, low risk	Long, costly, high risk		Short, low cost, low risk
Route to market	Straightforward	Requires formal review by regulatory authorities, e.g. FDA and EMA. Pathways remains to be established		Straightforward
Status	Large number of marketed products	Currently in late-stage clinical development, first product remains to be approved		Large number of marketed products
OptiBiotix HEALTH PLC	Marketed products	Early-stage programme with US partner	*No activities*	Marketed products

Source: goetzpartners Research

Shift to targeted products with specific health benefits

As the role of the microbiome beyond the gut has been clarified, microbiome therapeutics for extraintestinal disorders have been gained increasing traction, including autoimmune diseases, immuno-oncology, kidney disease, liver disease and CNS disorders

The increased understanding of the composition and function of the microbiome has been fuelling new approaches targeting its modulation. Historically, the microbiome was targeted through OTC probiotics (bacterial strains) and prebiotics (oligosaccharides) for general health and well-being. Since the 1950s, therapeutic methods have been developed which move beyond administering bacteria to the gut via the GI tract. One such development, pioneered by Eisman *et al.*, involves the transfer of faecal matter from healthy individuals to those where the microbiota has been depleted or disrupted. This treatment, known as faecal microbiota transplantation ("FMT"), is a common treatment for *C. difficile* infection where antibiotics prove inadequate. Current research is exploring targeted approaches, employing specific bacterial strains (LBPs) or their metabolic products (postbiotics) for therapeutic use. CHART 38 provides an overview of the different approaches and their applications.

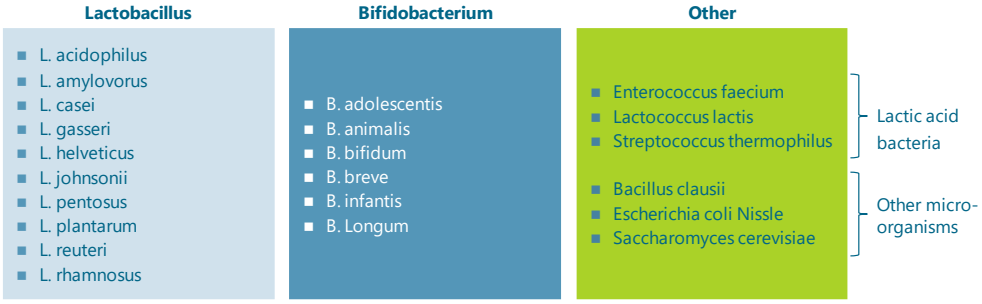
Probiotics are a booming industry despite limited evidence

Probiotics, from the Greek "for life", are defined as "live strains of strictly selected microorganisms which, when administered in adequate amounts confer a health benefit to the host"

Historically, the dairy industry used to market yoghurts as healthy products

Probiotics are live strains of bacteria that confer a health benefit to their host. While the concept of altering the contents of the microbiome by consuming live bacteria dates to ancient civilisations, much of the progress has been made over the 50 years. Many bacteria can potentially be used as probiotics (CHART 39), but the vast majority are commensal lactic acid-producing bacteria that are employed in a variety of products, ranging from cosmetics to food supplements and animal feed. In humans, probiotics are used mainly to maintain a healthy gut and to prevent or manage disease. Despite limited evidence for the claimed probiotic effects of most marketed products, their adoption is widespread, fuelling a market thought to be worth c.$48bn and expected to grow at a CAGR of 7%. Regulators have intervened and are tightening regulations to protect consumers. We expect this to benefit companies such as OPTI who employs a more scientific approach including small human studies.

CHART 39: Commonly used probiotic microorganisms for human nutrition



Source: Markowiak, 2017

CHART 40: Criteria for probiotics

1. Well-defined live bacterial strains
2. Suitable viable count at end of shelf life
3. Suitable evidence for health benefit at strain-specific or group level

Source: ISAPP

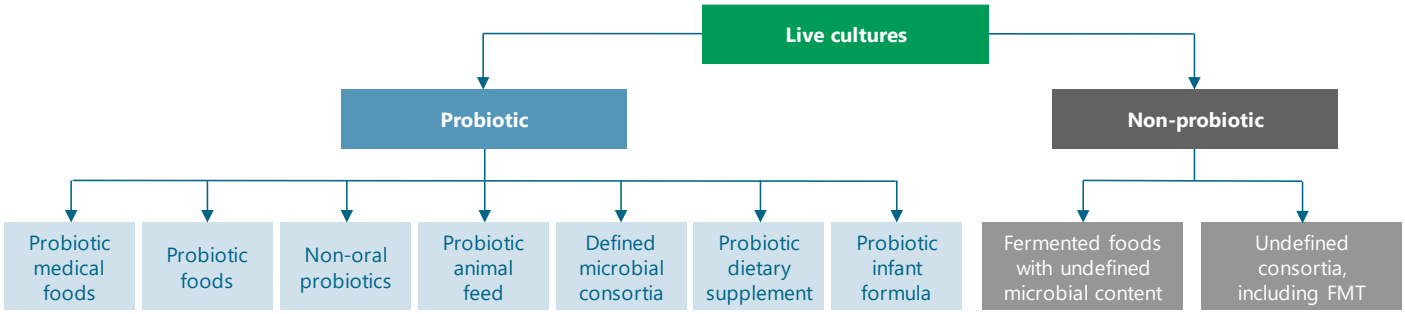
Classification requires meeting strict criteria

Advances in the ability to identify and characterise individual strains of microorganisms have led to a detailed set of criteria to define what can and cannot be considered a probiotic (CHART 40). The official definition for the word probiotic provided by the UN Food and Agriculture organisation dictates that probiotics are "live strains of strictly selected microorganisms which, when administered in adequate amounts confer a health benefit to the host".

Probiotics are more than just live bacteria

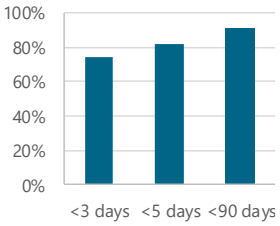
Whilst there are many products in the market that carry the label "probiotic", many do not meet the necessary criteria. Probiotics fall into a range of categories with applicability across species and target sites. The framework for live cultures outlined below (CHART 41) highlights the necessity for the microbial contents of a probiotic to be well defined, but simultaneously remain differentiated from live biotherapeutics which are developed to carry defined clinical benefit claims. Notable exclusions under this framework include fermented foods and FMT, which fall short of the criteria owing to the microbial communities not being well defined in terms of strain composition and stability.

CHART 41: Probiotic framework



Source: International Association for Probiotics and Prebiotics ("ISAPP"), goetzpartners Research

CHART 42: Complete response rates for patients with recurrent *C. diff* infection treated with FMT



Source: Lawrence *et al.*, 2012

Commensal bacteria under FMT are not probiotics

Although commensal bacteria naturally present in the gut are often a source of probiotic strains, these strains cannot be considered as "probiotics" until they have been isolated, characterised and a credible case presented for their health effects. Faecal matter derived from human samples contains an undefined mixture of microbes and hence is excluded under the probiotic framework. Despite concerns over risk and long-term safety, the FDA has overturned an original decision to ban FMT, allowing use of for the treatment of *C. diff* infection in recurrent cases given compelling clinical data (CHART 42).

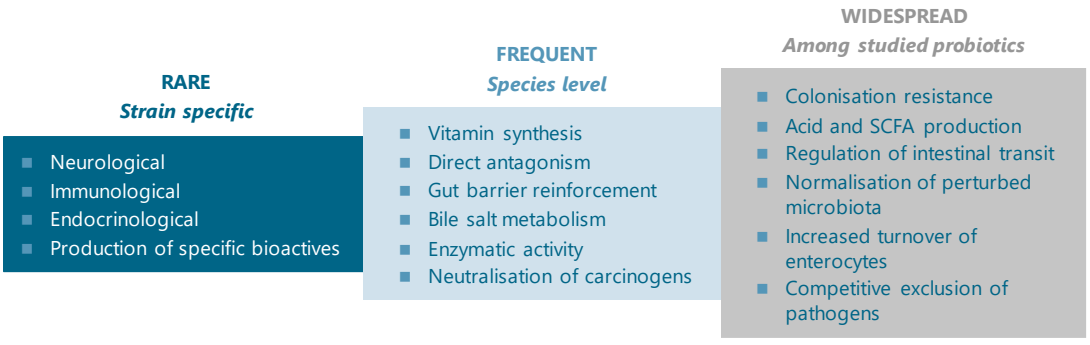
Probiotics proven beneficial, but transient nature limits sustained efficacy

Convincing evidence of the benefits of probiotics has been provided by many well conducted randomised clinical trials ("RCTs") and high-quality systematic meta analyses. The general benefits of probiotics on gut microbiota are due to the creation of a more favourable gut environment, supporting a healthy digestive tract and immune system. A meta-analysis performed by Ritchie & Romanuk including 84 studies, 74 trials and 10,351 patients concluded that probiotics are beneficial in the treatment and prevention of gastrointestinal disease. The main drawback is that the benefits have been shown to be temporary typically lasting up to two weeks, as probiotics are transient organisms that do not colonise the GI tract permanently, due to the environmental pressures from the large number of commensal (native) organisms. On the flipside, this increases the long-term commercial potential.

Mechanism of action unclear due to large inter-strain variations

Probiotics exert their beneficial effects through a variety of mechanisms. Some mechanisms are widespread and observed across commonly employed probiotic taxonomic groups, whiles others are thought to be strain specific and hence much rarer. While the benefits to gut health and immune response are supported by a large body of available research, the potential benefits for supporting the health of the oral cavity, lungs and gut brain axis remain to be confirmed, and evidence of the effects being shared across a broad cross-section of probiotics has not yet emerged.

CHART 43: Functions of probiotics



Source: goetzpartners Research, Hill *et al.*, 2014

OPTI has deposited three strains under the Budapest treaty, including LP_{LDL}

Registration with a depository authority provides some IP protection

Live microorganisms cannot be patented as is the case with pharmaceutical products. However, they can be registered with an international depository authority ("IDA"). According to the Budapest Treaty concluded in 1977 and which entered into force in 1980, all states part to it recognise a deposit made in any of certain culture collections as sufficient for the purposes of their own patent procedure. CHART 44 provides examples of the nomenclature adopted for some of the most commonly available strains.

CHART 44: Examples for the use of nomenclature for probiotic microorganisms

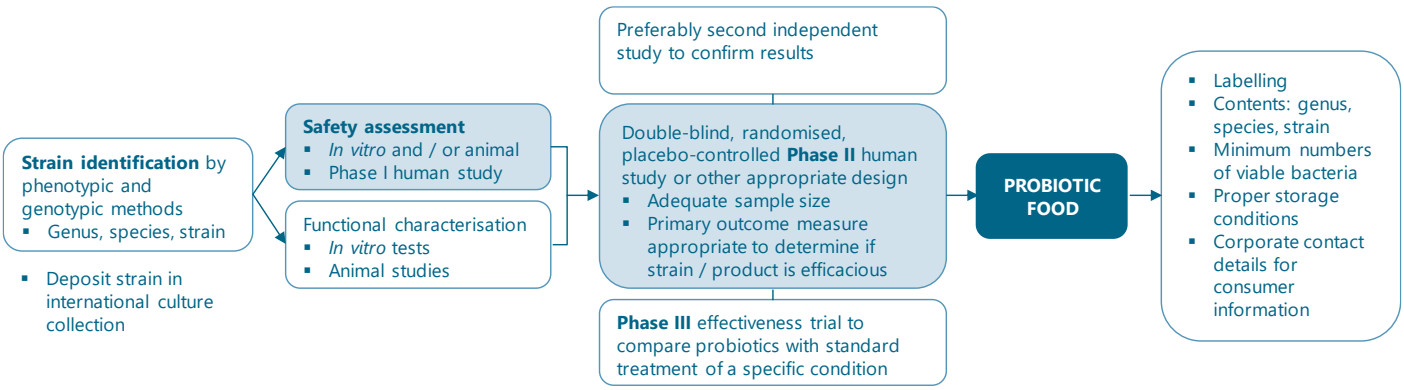
Genus	Species	Sub-species	Strain designation	IDA designation	Strain nickname	Product
Lactobacillus	rhamnosus	none	GG	ATTC 53103	LGG	Culturelle
Bifidobacterium	animalis	*lactis*	DN-173010	CNCM I-2494	Bifidus regularis	Activia
Bifidobacterium	longum	*longum*	35624	NCIMB 41003	Bifantis	Align
Lactobacillus	plantarum	none	B2830	ECGC 13110402	LP_{LDL}	CholBiome

Source: goetzpartners Research

Development involves human studies

The development of probiotics generally follows the process shown in CHART 45. It is less stringent and rigorous than for pharmaceutical drugs, and the recommended human trials are fewer and smaller.

CHART 45: Process for the development of probiotics for food products



Source: Joint FAO / WHO Working Group Report on Drafting Guidelines for the Evaluation of Probiotics in Food, London, Ontario, Canada, 30 April – 1 May 2002

CHART 46: Requirements for QPS status in Europe

Taxonomy well defined
Available body of knowledge to establish safety
Lack of pathogenic properties established and substantiated
Intended use must be clearly described

Source: EFSA

Tightening regulation following probiotic misuse should benefit OPTI

The increasing clinical evidence and legitimisation of probiotics has also caused misuse of the term. Some products are well defined and properly evaluated in controlled clinical studies, while others have unsubstantiated claims of efficacy and fail to meet the minimum requirements. Validation of probiotic contents in commercial products is needed to ensure consumer confidence; hence regulators are enforcing stricter rules to ensure that the term is used only for products that meet the specific criteria.

- In the US, microorganisms for consumption are regulated by the Food and Drug Administration ("FDA") and should have GRAS status. The standards are high and only 3% - 5% of probiotics have obtained this designation, including OPTI's LP_{LDL}. The FDA has also recently moved to require investigational new drug applications for functional endpoints for probiotic foods and supplements;

- In Europe, the European Food Safety Authority ("EFSA") introduced the Qualified Presumption of Safety ("QPS") measure in 2016. It applies additional criteria including historical demonstration of safety and absence of risk of acquired resistance to antibiotics for bacterial supplements (CHART 46).

OPTI performs full genomic analyses of all probiotic bacterial strains to ensure safety

The dark side of probiotics

Despite the well-publicised benefits of probiotic use, there is potential for adverse effects at both the local and systemic levels. Most microbes possess hostile factors capable of suppressing or destroying eukaryotic host mechanisms. By ingesting probiotics, a potential survival struggle is created between the inhabitant microbiome and the transient probiotic species. Examples of such pathomechanistic pathways include horizontal gene transfer and the production of bacteriophages containing virulent genes. OPTI has performed whole genomic analysis of the bacterial strains developed, screening for potential virulent factors to ensure safety and reduce the likelihood of adverse effects.

The probiotics market is expected to reach $70bn by 2025E. Beverages represent the fastest-growing segment, aided by the growing popularity of kombucha (fermented tea) and kefir (fermented milk)

$48bn market growing at c.7% CAGR, driven by increasing awareness and self-care

Once dominated by digestive health, the probiotics market has diversified to include products for immune support, women's health and skincare. It is valued at c.$48bn in 2018 and expected to grow to more than $70bn by 2025E, thus outpacing other OTC categories. The rise of a holistic approach to self-care amongst consumers has been driving much of the market growth as probiotics are increasingly used to maintain a healthy lifestyle. Digestive health products have grown in line with this trend, and brands such as Yakult and Activia have raised consumer awareness about the benefits of probiotics. Beverages represent the fastest growth area of the market. This segment will continue to accelerate in growth with the arrival of major players such as Pepsi Company through its acquisition of KeVita.

Prebiotics have a more permanent effect on gut bacteria

The current consensus definition of prebiotics is "a substrate that is selectively utilised by host microorganisms conferring a health benefit. Thus, the concept encompasses three crucial parts: a substance, a physiological effect, and a mechanism

By selectively encouraging growth of beneficial commensal microorganisms, prebiotics are expected to have a more permanent effect than transient probiotics. They are selectively fermented by a strictly defined group of microorganisms, distinguishing them from dietary fibres. Selectivity is critical for substrates to be termed "prebiotic"

Prebiotics are substrates that are selectively utilised as nutrients by beneficial microorganisms including both probiotics and host organisms. First defined in 1995, the concept – which was initiated to build on probiotics – has gained significant traction. The benefits associated with their consumption have been shown in numerous RCTs across a range of populations, including both healthy individuals and those with acute chronic diseases. By selectively stimulating the growth of beneficial endogenous bacteria, they are able to modulate the microbiome on a long-term / permanent basis. This is in contrast to probiotics, which remain in the gut for a relatively short period of time.

Undigestible carbohydrates selectively utilised by host microorganisms in the gut

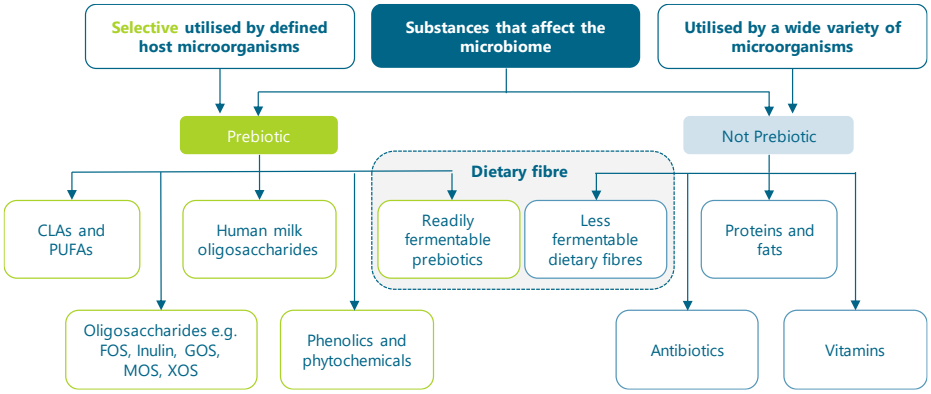
Most identified prebiotics are dietary fibres, i.e. fermentable carbohydrates of various molecular structures which naturally occur in fruits, vegetables, cereals and other edible plants. Other prebiotics include oligosaccharides, fructans and galactans. Although the terms prebiotic and dietary fibre are often used interchangeably for naturally occurring food components not digested in the gastrointestinal tract, there are important differences (CHART 48). A key feature is that prebiotics are selectively fermented by a *strictly defined* group of gut microorganisms, whereas other dietary fibres encourage the growth of a *wide variety*. Therefore, prebiotics can also be dietary fibres, but dietary fibres are not always prebiotics (CHART 48). Prebiotics can also be artificially produced (see CHART 47). Early culture-based methods to analyse the microbiome were insufficient to reveal the complexity of prebiotic induced changes. Molecular-based methods and the advent of high throughout sequencing have enabled a better understanding of the selectivity of certain bacteria to utilise certain prebiotics and hence a more targeted selection approach to elicit the desired beneficial response.

CHART 47: Artificially produced prebiotics

Lactulose
Oligosaccharides
Cyclodextrins
Lactosaccharose

Source: Markowiak, 2017

CHART 48: Selectivity of prebiotics is a distinguishing feature



Abbreviations: CLA: conjugated linoleic acid; PUFA: polyunsaturated fatty acid; FOS: fructooligosaccharides; GOS: galactooligosaccharides; MOS: mannanoligosaccharides; XOS: xylooligosaccharides
Source: ISAPP, 2017, goetzpartners Research

Oligosaccharides show greatest promise

The majority of *in vitro* and *in vivo* studies on prebiotics have focused on oligosaccharides, with mixed results across a wide range of indications. The most promising of these which fulfil the prebiotic criteria are outlined in CHART 49. Oligosaccharides play an important role particularly in early human development, with high contents found in human milk. Human milk oligosaccharides ("HMOs") are important in the development of a newborn's intestinal microbiota and immune system. Consumption of human milk containing HMOs has been shown to selectively increase the proportion of HMO consuming Bifidobacteriaceae and Bacteriodaceae.

CHART 49: Promising oligosaccharides fulfilling prebiotic selection criteria

Fructooligosaccharides
Galactooligosaccharides
Isomaltooligosaccharides
Xylooligosaccharides
Transgalactooligosaccharides
Soybean oligosaccharides

Source: Markowiak, 2017

Five major criteria for use in nutrition

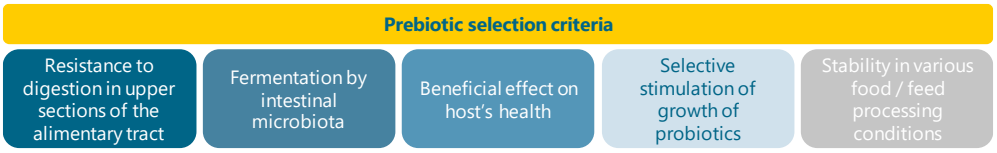
Like probiotics, prebiotics must meet a specific set of criteria in order to be classified as such, as outlined in CHART 51. Most commensal bacteria in the gut microbiome reside in the large intestine. To reach the beneficial bacteria, prebiotics cannot be digested (partially or fully) in the upper sections of the alimentary tract. Hence, when used as food additives, a key requirement is that prebiotics withstand food processing conditions and remain unchanged, non-degraded or chemically altered. Prebiotics confer multiple health benefits through selective fermentation by intestinal bacteria, the most important of which are shown in CHART 50.

CHART 50: Health benefits associated with prebiotics

Increased production of SFCAs
Vitamin absorption
Increased stool mass
Reduction in colonic pH
Improvement of the immune system
Lowers risk of carcinogenesis
Reduction of "bad" (LDL) cholesterol
Inhibition of pathogenesis

Source: goetzpartners Research

CHART 51: Prebiotic selection criteria for human nutrition



Source: Markowiak and Śliżewska, 2017

Major side effects include flatulence and diarrhoea

Notably, neither Bifidobacterium nor Lactobacilli manufacture gas in their metabolism, whereas clostridium do

Although the known detrimental side effects of prebiotics are limited, selection criteria must account for potential adverse effects which may arise. Well documented side effects related with an overdose of prebiotics include flatulence and diarrhoea. In order to avoid flatulence for example fermentation must be selective and preferably include genera that are not gas formers.

Combinations of prebiotics and probiotics

An optimised prebiotic is known as an Optibiotic, a term defined and trademarked by OPTI

Prebiotics can be combined with probiotics to improve the survival of healthy bacteria in the gastrointestinal tract, an approach which aims to ensure a superior effect over the probiotic or prebiotic alone. The benefits have yet to be quantified, but show large potential given the variety of combinations. Some examples used in human nutrition are highlighted in CHART 52 below.

CHART 52: Prebiotics and probiotic combinations for human nutrition

Prebiotics	Prebiotic / probiotic combinations
FOS GOS Inulin XOS Lacticol Lactosucrose Lactulose Soy oligosaccharides TOS	*Lactobacillus* genus bacteria + inulin *Lactobacillus, Streptococcus* and *Bifidobacterium* genus bacteria + FOS *Lactobacillus, Bifidobacterium, Enterococcus* genus bacteria + FOS *Lactobacillus* and *Bifidobacterium* genus bacteria + oligofructose *Lactobacillus* and *Bifidobacterium* genus bacteria + inulin

Abbreviations: FOS, fructooligosaccharides; GOS, galactooligosaccharides; TOS, transgalactooligosaccharides; XOS, xylooligosaccharides

Abbreviations: FOS: fructooligosaccharides; GOS: galactooligosaccharides; TOS: transgalactooligosaccharides; XOS: xylooligosaccharides
Source: Markowiak, 2017, goetzpartners Research

Nutritional prebiotics are regulated by the EFSA

The regulation of prebiotics for human use varies significantly with geography. As a food additive, nutritional prebiotics fall under the EFSA in the European Union and hence require authorisation to be marketed as conferring a health benefit. For example, chicory root inulin has been authorised to carry a health claim by demonstrating a cause and effect relationship with improved bowel function. Inulin dominates the prebiotic industry, accounting for around 40% of global revenue in 2015. Considered safe food ingredients, FOS and GOS have been authorised for use in the EU since before 1997. Prebiotic substances created after 1997 are considered novel and require safety clearance.

FDA yet to recognise prebiotics, but potential beyond probiotics is clear

All non-digestible carbohydrates with a DP3 and above are now classified as fibres in the US and Europe. In the US, the FDA has classified GOS and FOS as fibres

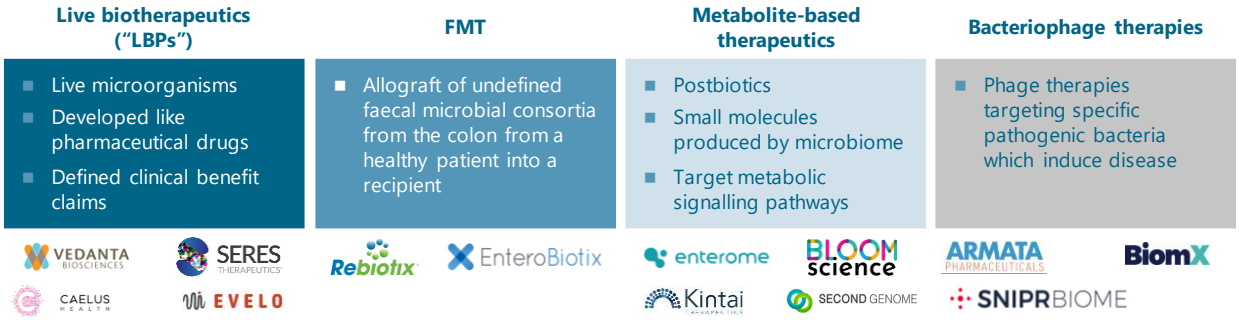
In the US, prebiotics as such are not recognised by the FDA. They are therefore regulated based on the category of product they are intended for: food ingredients and dietary supplements. The FDA has also displayed resistance to acknowledging prebiotics as dietary fibres, as this requires health benefits beyond microbiome changes (GOS and FOS are now classified as fibres). Given the potential to alter the contents of the gut microbiome on a more permanent basis vs. probiotics, we are optimistic about the potential applications of prebiotics.

Targeting the microbiome with pharmaceutical drugs

The absence of established regulatory pathways presents a significant hurdle

The improved ability to interrogate the microbiome has enabled a greater mechanistic understanding of the relationship between the human microbiome in health and disease. This has enabled targeted therapeutic approaches to modulate the microbiome that are developed with the same rigour as traditional pharmaceutical drugs, including comprehensive clinical trials and regulatory reviews. The four most common approaches are shown in CHART 53 below. However, although many companies have entered the field, significant challenges remain, since regulatory pathways are not yet established – particularly for products containing live bacteria – and no products have therefore been approved.

CHART 53: Multiple modalities are being explored by pharmaceutical companies to modulate the microbiome



Source: goetzpartners Research

CHART 54: Characteristics of LBPs

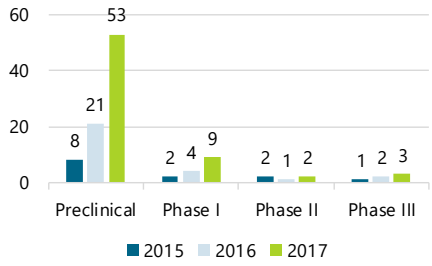
Biological products
Contain microorganisms, e.g. bacteria, yeast
Naturally occurring, recombinant and clonally selected
Not an immunogen-specific vaccine

Source: Drug Information Association

The live biotherapeutics pipeline has grown exponentially in the last four years

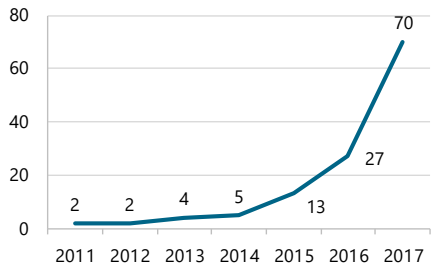
LBPs are transient microorganisms that meet a specific set of conditions as set out in CHART 54 and are designed for the prevention, treatment or cure of diseases and health conditions. They differ from probiotics in that LBP strains are characterised as pharmaceutical drugs with defined clinical benefit claims. The use of LBPs in clinical application has shown great promise for reducing infection, stimulating innate immune responses and modulating the gastrointestinal metabolism. Activities began in 2011, and the number of companies actively developing drug candidates has increased by more than 10-fold since. There are >70 candidates currently in the pipeline (CHART 56), most of which are in preclinical development (CHART 55). The leading therapy areas is infectious disease, particularly *C. difficile* given the strong results seen with FMT, followed by GI diseases and metabolic disorders (CHART 57).

CHART 55: LBPs at each development phase



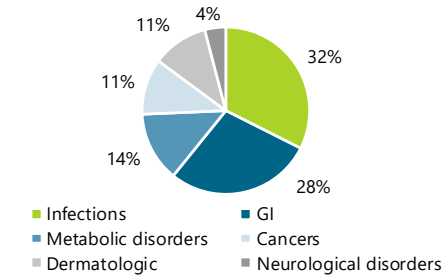
Source: Pharmaprojects, January 2018

CHART 56: LBPs in active development



Source: Pharmaprojects, January 2018

CHART 57: LBPs by therapeutic area



Source: Pharmaprojects, January 2018

CHART 58: Postbiotic have multiple advantages vs. LBPs

No issue of colonisation resistance
Eliminates inter-individual variability
Target specific physiological effects
Direct mechanism of action

Source: goetzpartners Research

Directly targeting metabolic products through a postbiotic approach

Postbiotics focus on direct intervention using metabolites that are secreted, modulated or degraded by the microbiome. These impact host physiology by modulating both cellular and organismal functions. Instead of targeting the microbiome composition, postbiotic approaches directly target the downstream signalling pathways of the microbiome, thus mitigating the effects of an excess, scarcity or dysregulation of metabolites, with the aim of correcting the harmful effects of dysbiosis. Key advantages compared to LBPs are summarised in CHART 58. OPTI is developing targeted prebiotics that can effectively increase the growth rate of specific bacteria such as propionic acid bacteria which selectively increase SCFAs to produce a health benefit to enhance satiation, e.g. through the glucagon-like peptides GLP1 and GLP2.

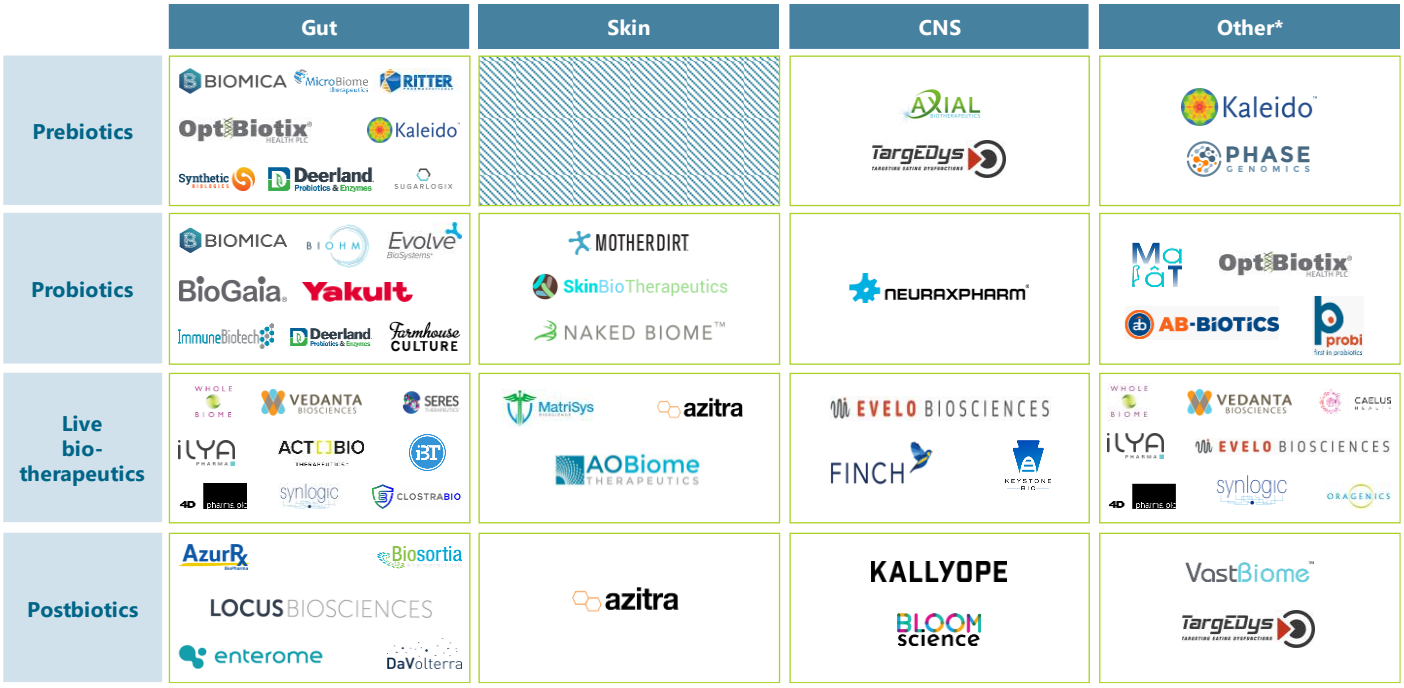
Promise of microbiome has attracted many new entrants

The therapeutic potential of the microbiome has attracted a wide range of companies including OTC players, pharma, biotech, food suppliers and retailers, some of which are shown in CHART 59.

Biotechs have taken the initiative, with pharma exposed through partnerships

OTC probiotic companies have historically made up the lion share of players in the microbiome field. However, as the focus has shifted from traditional OTC to targeted approaches over the last 10 years, many biotech companies have entered the field to focus on developing novel therapeutics. Several of these have late-stage assets in Phase II and III. The potential of this nascent market has not gone unrecognised by large pharmaceutical companies, who have been dipping their toes into the space largely through partnerships with microbiome-focused start-ups (CHART 61). Most projects target infectious diseases, IBD, other GI diseases and immuno-oncology, where proof-of-concept is likely to be easier to achieve due to the strong link to the microbiome.

CHART 59: Select companies active in the microbiome space



* includes inflammatory disease, metabolic disease, oncology, infectious disease, allergy, immune suppression, cardiovascular disease, hepatic disease

Source: goetzpartners Research

VCs are deeply immersed

The prospects of large returns have also attracted many VCs, some of which dedicate significant funds to this field. In Europe, one of the pioneers is Seventure, a well-established life science investor who identified the microbiome as a key area for future development as early as 2008. In March this year, the fund closed its second dedicated microbiome fund with a target of >€200m, which follows in the footsteps of the €160m fund launched in 2014. Its current portfolio includes over 20 microbiome companies, including Enterome and Vedanta, two of the most advanced players in the pharmaceutical field. Other active funds include Lundbeckfonden in Europe, Flagship Pioneering in the US, and many corporate venture funds including those of Novartis, J&J, Boehringer Ingelheim and BMS.

CHART 60: The last 12 months has witnessed a number of high profile fundraises

Date	Company	Investors	Fundraise	Use of proceeds
Jul-19	Finch Therapeutics	Unknown	$53.5m Series C	Not disclosed
Jun-19	Synlogic	Ginkgo Bioworks	$80m equity investment	Development of novel therapeutics in partnership with Gingko
May-19	Vedanta Biosciences	Partners Investment, Invesco, Seventure, BMS, Bill and Melinda Gates Foundation, Symbiosis Group	$45.5m Series C	Advance Vendanta's clinical portfolio through Phase I and II clinical development
May-19	Whole Biome	True Ventures, Sequoia Capital, Mayo Clinic, Khosla Ventures, AME Cloud Ventures	$35m Series B	Commercialisation and expansion of discovery pipeline
Mar-19	Kaleido Biosciences	Public Market	$75m IPO	Advance lead candidate KB195 into Phase II trials for urea cycle disorder
Mar-19	Snipr	Lundbeckfonden, Life Science Partners, Wellington Partners	$50m Series A	Development of Snipr's CRISPR Cas technology into clinical stage
Feb-19	BiomX	OrbiMed, J&J Innovation, Takeda Ventures, Mirae AM, Seventure, SBI Japan-Israel Innovation Fund, RM Global Partners	$32m Series B	Fund clinical development of pipeline
Dec-18	Kallyope	Bill Gates, Lux Capital, The Column Group, Polaris Partners, Illumina Ventures, Alexandria Venture Investments, Euclidean Capital, Two Sigma Ventures.	$87m Series B	Advance gut brain axis targeting portfolio
Jul-18	Assembly Biosciences	Public Market	$166m IPO	Fund clinical trials, non-clinical studies, R&D

Source: goetzpartners Research

Recent financing events showcase investor appetite

The high level of investor interest in the microbiome sector is reflected in the large volume of recent financing events for companies developing microbiome-targeting therapeutics (CHART 60). Several companies have individually raised in excess $100m in both public and private markets, including Assembly Biosciences ($327m), Seres Therapeutics ($194m) and Enterome ($120m).

CHART 61: Pharma's exposure to microbiome is through partnerships with biotech players

Date	Biotech	Pharma partner	Tx area	Description
Jul-19	CHAINbiotech	Oxford Vacmedix	Oncology	The partnership aims to develop live biotherapeutics that support oral delivery for Oxford Vacmedix's recombinant overlapping peptide cancer vaccines
Jun-19	ARMATA PHARMACEUTICALS	MSD	ID	Develop proprietary synthetic phage candidates designed to target an undisclosed ID agent
Jun-19	synlogic	GINKGO BIOWORKS	Multiple	Synlogic commits up to $30m to source synthetic biology services from Ginkgo over a five-year period. Ginkgo bought a stake in Synlogic for $80m at a 44% premium to the share price
Mar-19	SERES THERAPEUTICS	AstraZeneca	I-O	Elucidate potential of microbiome therapeutics to augment I-O treatment for cancer. Seres to receive $20m and financial support for research activities
Jan-19	LOCUS BIOSCIENCES	janssen	ID	Develop and commercialise CRISPR-Cas3-enhanced bacteriophage candidates that target two bacterial pathogens. Janssen will initially pay $20m. Potential value>$798m
Dec-18	BiomX	janssen	IBD	Collaboration to utilise BiomX's XMarker platform, a microbiome-based biomarker discovery platform, to stratify responders and non-responders to IBD therapeutics
Dec-18	VEDANTA BIOSCIENCES	Bristol-Myers Squibb	I-O	Clinical trial collaboration to evaluate BMS's Opdivo in combination with Vedanta's VE800, a human bacterial consortium, in patients with advanced or metastatic cancers. Vedanta will maintain control of its VE800 program, including global R&D and commercial rights
Oct-18	enterome	Takeda	IBD	Global licensing, co-development and co-promotion agreement Enterome's drug candidate EB8018 in patients with Crohn's disease. Enterome is eligible to receive up to $640m in clinical development, regulatory and commercial milestones in addition to a $50m upfront
Jun-18	KALLYOPE	novo nordisk	MD	Research collaboration to discover peptide therapeutics to treat obesity and diabetes via the gut-brain axis
Jun-18	microbiotica	Genentech	IBD	Microbiotica to apply its metagenomics microbiome platform to analyse patient samples from clinical trials of Genentech's investigational IBD candidates, to identify microbiome biomarker signatures, novel IBD drug targets and LBPs. Total potential deal value up to $534m with Microbiotica eligible for additional royalties on sales of resulting products
Jan-18	ADAPSYN	Pfizer	n.a.	Pfizer will use Adapsyn's platform to test natural products from its collection of microbial strains. Both companies have exclusive rights to pursue select novel compounds identified through the collaboration. Total deal value of up to $162m
Jun-17	Serimmune	MSD	ID	Merck will use Serimmune's repertoire characterisation platform to its clinical and preclinical specimens. Merck will lead preclinical and clinical development and commercialisation of candidates identified from the collaboration
Apr-17	FINCH	Takeda	IBD	Joint development of FIN-524, a live biotherapeutic aimed at the treatment of IBD. Takeda made an upfront payment of $10m for the exclusive worldwide rights to develop & commercialise FIN-524 and rights to follow-on products in IBD
Jan-17	assemblybio	Allergan	IBD	Licensing agreement provides Allergan with WW rights to two preclinical assets targeting UC and CD, and two compounds to be identified by Assembly for IBS. Allergan made an upfront payment of $50m with further potential development and commercial milestone payments
Nov-16	enterome	Bristol-Myers Squibb	I-O	Discovery and development of microbiome-derived biomarkers, drug targets and bioactive molecules. Enterome received an upfront payment of $15m for access to its technology plus R&D funding with milestones and royalties for development and commercialisation
Feb-16	synlogic	abbvie	IBD	AbbVie to use Synlogic's synthetic biotics platform to develop a Synthetic Biotic medicine for the treatment of IBD
Jan-16	enterome	janssen	IBD	Collaborative research agreement to discover novel targets and bioactive molecules from the gut microbiome for the treatment of Crohn's. Enterome received an upfront payment plus R&D funding. Janssen received an option to take an exclusive license to further develop and commercialise candidates that may arise from the collaboration
Jan-16	SERES THERAPEUTICS	Nestlé HealthScience	ID/IBD	Agreement to support the expansion of Seres' portfolio outside the US & Canada. Seres retains full commercial rights to portfolio of product candidates in the US & Canada. Deal involved an upfront payment of $120mw with a total deal value in excess of $1.9bn
Jun-15	ORAGENICS	intrexon	I-O	Oragenics will use Intrexon's technologies to develop products for the treatment of oral mucositis or genetically modified *Lactococcus lactis*
Jan-15	VEDANTA BIOSCIENCES	janssen	IBD	Licensing agreement for Vendanta's bacterial consortia drug candidate VE202 for IBD. Potential milestone value of up to $339m in addition to royalty payments
Feb-14	RedHill Biopharma	Salix	GI disease	Salix licensed exclusive world-wide rights to RedHill's RHB-106 encapsulated formulation for bowel preparation. Upfront payment of $7m plus potential for $5m in subsequent milestone payments and single to low double-digit tiered royalties

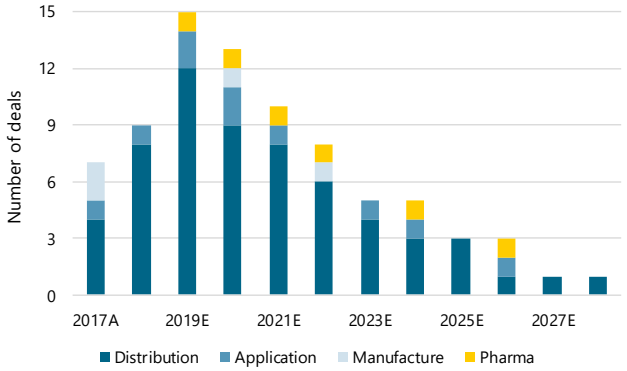
Abbreviations: CD: Crohn's disease; GI: gastrointestinal; IBS: irritable bowel disease; ID: infectious disease; I-O: immune-oncology; UC: ulcerative colitis; MD: Metabolic disease
Source: goetzpartners Research

Probiotix Health: evidence-based probiotics

OptiScreen is a high-throughput screening technology platform used to identify microbes that harbour metabolic pathways of interest, based on their ability to mediate specific health benefits in humans. Phylogenetically distinct strains of these bacteria are screened for their biological activity, with the most attractive selected for development

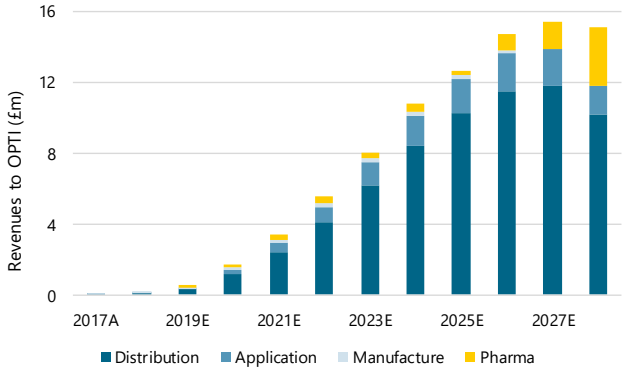
The ProBiotix Health division was created in 2018 to focus on targeted probiotics that impact specific health biomarkers discovered based on the OptiScreen technology platform. These are sold in a variety of formulations, presentations and applications as foods, supplements, and in the future potentially pharmaceutical products, and commercialised through partners. Lead asset LP_{LDL} is commercialised for the reduction of cholesterol since 2017. Through agreements with partners, OPTI is extending the application of LP_{LDL} to dairy foods and beverages, the reduction of blood pressure, and for development as a pharmaceutical product. The latter is being done in collaboration with an undisclosed US company who funds all the development costs, with OPTI entitled to milestones and royalties on potential product sales. OPTI has already signed 27 deals for LP_{LDL} and we expect revenues from these and additional deals (CHART 62) to grow from c.£400k in 2018A to c>£10m in 2024E and >£14m at peak (CHART 63).

CHART 62: LP_{LDL} deals (food and pharma), 2017A – 2028E



Source: Company data, goetzpartners Research estimates

CHART 63: LP_{LDL} revenues (food and pharma), 2017A – 2028E



Source: Company data, goetzpartners Research estimates

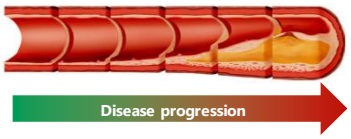
LP_{LDL} is a safe and natural option for cholesterol reduction

***Generally recognised as safe ("GRAS") status** is an important step that allows for the use of an ingredient into food and drinks*

***Statins** work by inhibiting HMG-CoA reductase, an enzyme that plays a central role in the production of cholesterol. They have been shown to reduce the incidence of first and recurrent CHD events*

OPTI has been focusing on CV disease, the leading cause of morbidity and mortality worldwide. Elevated cholesterol and blood pressure levels increase the risk of coronary heart disease ("CHD"). Statins such as atorvastatin (Lipitor) and rosuvastatin (Crestor) are the gold standard therapy, but compliance is poor with a approx. half of patients discontinuing therapy within two years, and they can cause serious side effects, including muscle pain, diabetes, elevated liver enzyme levels, and in rare cases muscle damage. This has led to growing interest in natural evidence-based therapies. A comprehensive screening programme allowed OPTI to identify the bacterial strain *Lactobacillus plantarum* ("LP") ECGC 13110402, branded LP_{LDL}. The strain was tested for multiple factors that make it suitable for human use prior to the completion of aa human intervention trial, which showed that LP_{LDL} lowered unhealthy biomarkers such as LDL and total cholesterol and may therefore be used as an alternative or supplement to existing treatments to reduce CV risk. It was launched in Europe at Vitafoods in May 2017 and in the US at the Supply Side West trade show in August. It is sold as a food supplement and since receiving GRAS status in February 2019 can now be sold as a functional ingredient in food products.

CHART 64: The build-up of LDL cholesterol on arterial walls causes atherosclerosis



Source: Company data

High cholesterol increases risk of CHD. Reducing the LDL fraction reduces the risk

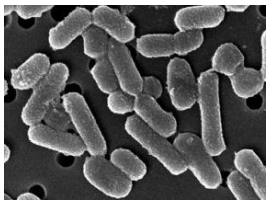
CHD is expected to cause up to 40% of deaths by 2020 (World Health Organisation). Large clinical and epidemiological studies have shown that elevated total serum cholesterol ("TC") levels are a key risk factor for CHD onset, as it gets deposited in the arterial walls leading to plaque formation, one of the initial steps in atherosclerosis development. It has been shown that a 1% reduction in serum cholesterol is associated with a 2.3% reduction in artery disease risk. The primary target for reducing CV risk is low-density lipoprotein ("LDL"), i.e. commonly known as "bad" cholesterol. High-density lipoprotein ("HDL") on the other hand is known as "good" cholesterol and an increase of this fraction is desirable. TC, LDL and HDL are powerful biomarkers whose changes can be monitored to infer changes in the risk of CHD.

Its robustness and versatility have made LP a popular ingredient for industrial applications. It is contained in many fermented foods, such as sourdough bread, sauerkraut and kimchi

LP is a robust, versatile organism that is widely used in the food industry…

LP is a gram positive, rod-shaped member of the lactic acid producing genus Lactobacillus (CHART 65) and the species most commonly found in oral and intestinal human mucosae. It has a relatively long genome and is regarded as robust, flexible and versatile. Its ability to grow at a wide temperature range from 12°C to 40°C and withstand a pH ranging from 3.4 to 8.8 has made it particularly suitable for the human body, allowing it to survive stomach acid and pass through the human gastrointestinal. It is also able to establish itself in the intestine after prolonged ingestion.

CHART 65: *Lactobacillus plantarum*



Source: goetzpartners Research

LPLDL is a safe and stable strain

- *Active in high concentrations of bile salts, survives freeze-drying and temperatures of 5°-25°C for 24 months*
- *Fully sequenced genome*

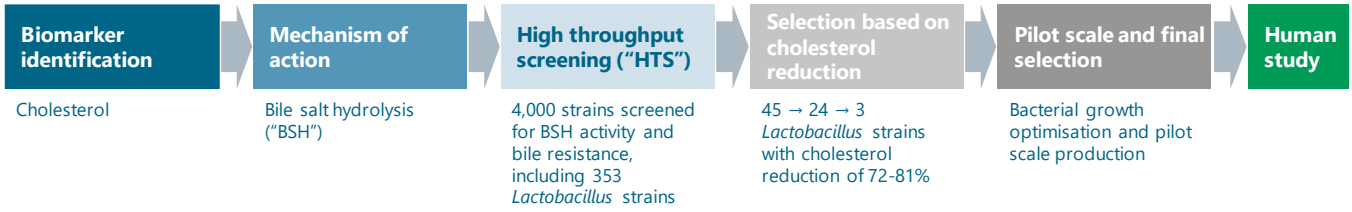
…and delivers benefits beyond general gut health and wellbeing

Even though LP colonises the colon in a transient fashion, its beneficial effects can be long lasting, including improvement of gut health, immunity and overall health. They are thought to be achieved through major metabolites it produces, such as antibiotics that target "bad" bacteria in the gut, making room for endogenous bacteria to grow; the essential amino acid lysine; and organic acids (e.g. acetic, succinic and lactic). LP also has antioxidant, anti-inflammatory, antiproliferative, immunomodulatory and antiglycemic effects, among others, which have led to rising interest in the medical field. Hence, LP has been applied to treat multiple chronic conditions, such as the neurodegenerative conditions Alzheimer's and Parkinson's, and CV diseases including hypertension, diabetes and obesity.

The identification of the unique LP_{LDL} strain is the result of a multi-step scientific process

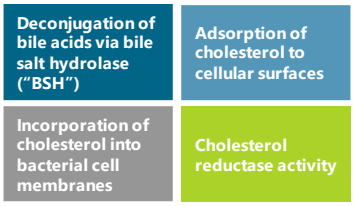
To identify the naturally occurring *Lactobacillus plantarum* ECGC 13110402 (LP_{LDL}) strain, OPTI screened 4,000 bacterial strains based on the superior capacity to hydrolyse bile salts (CHART 66). This yielded 3 *Lactobacillus* strains able to lower cholesterol by 72% - 81%. The final isolated strains were tested for stability including their ability to survive passage through the gut and sequenced to confirm the absence of dangerous endotoxins or resistance elements. Finally, OPTI tested if the strain could readily be manufactured to high yields in large fermenters. The strain was registered at the European Culture General Collection ("ECGC") and is protected worldwide by five patent families and three trademarks.

CHART 66: Discovery and development of LP ECGC 13110402 strain



Source: Company data

CHART 67: Probiotics may reduce cholesterol through four mechanisms

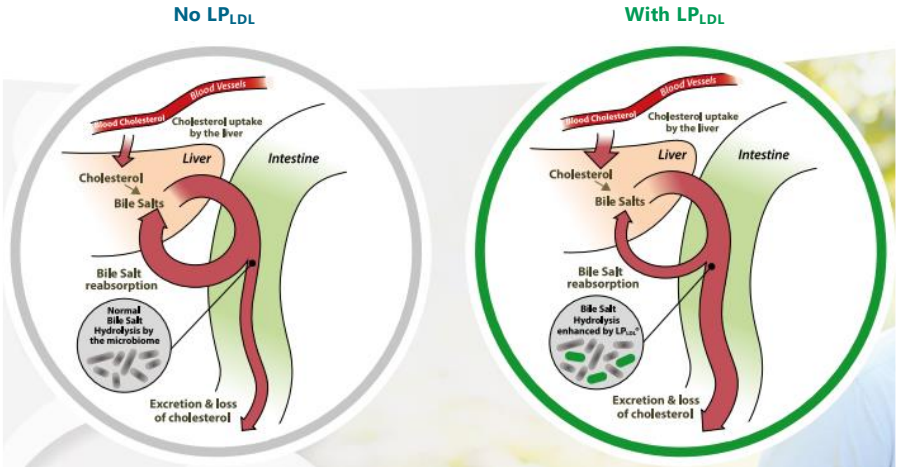


Source: Costabile *et al.* 2017

Mechanism of action relies on activity of bile salt hydrolase enzyme

There are four mechanisms through which probiotics are thought to lower cholesterol levels (CHART 67). While LP_{LDL} may work through a combination of all four, it was selected based on its ability to absorb cholesterol and produce bile salt hydrolase ("BSH"), the enzyme that catalyses the deconjugation of bile salts leading to their enhanced excretion (CHART 68). Bile salts are detergent-like molecules synthesised from blood-derived cholesterol in the liver and incorporated into bile, which is necessary for physiological processes such as digestion and break-down of fats, absorption of fat-soluble vitamins and the elimination of waste products. Following the deconjugation of bile salts through BSH, bile acids are less soluble and hence absorbed into the intestine to be excreted in faeces. Serum cholesterol is then required for the *de novo* synthesis of bile acids to make up for the shortfall, thus lowering circulating cholesterol and preventing deposition in arteries.

CHART 68: LP_{LDL} enhances the excretion of bile salts, whose synthesis uses serum cholesterol



Source: Company data

Human study helps raise interest from industry players

CHART 69: LP_{LDL} has earned multiple nominations and awards

Conference	Achievement
ProBiota 2017	Best scientific abstract
ProBiota 2018	
Vitafoods 2018	Probiotic of the year finalist

Source: Company data

Once LP_{LDL} had been optimised for activity, stability, safety and manufacturability, OPTI embarked on an independent randomised, placebo-controlled human intervention trial. The results suggest that LP_{LDL} exerts beneficial effects on lipid biomarkers and blood pressure, without causing any side effects. The authors concluded that (1) LP_{LDL} is a well-tolerated, natural probiotic that may be used as an alternative or supplement to existing treatments to reduce CV risk, and (2) that the results in healthy adults suggest efficacy similar to 1.5g - 2.4g plant sterols / stanols (Costabile *et al.* 2017). The combined effect on lowering both cholesterol and blood pressure has greater potential with respect to reducing a person's lifetime risk of CV disease than either effect on its own, based on remarks made by the European Cardiovascular Society in 2016. The data, which has been presented at multiple conferences, where it was well received and led to multiple nominations and awards (CHART 69), plays an important role in raising awareness among industry players, with whom the company enters revenue-generating commercial agreements.

12-week trial in 49 overall healthy individuals

The study was conducted by Prof. Glenn Gibson, one of the world leaders in the field

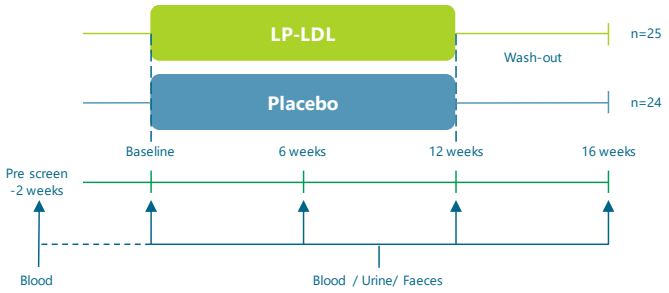
The study was conducted in the UK in 2016 in collaboration with the University of Reading, a globally recognised leader in this field. The trial enrolled 49 patients with normal to mildly elevated cholesterol levels (CHART 70) who were treated for 12 weeks and followed for a total of 16 weeks. A detailed description of the design is provided in CHART 70 and CHART 71.

CHART 70: Study protocol

Parameter	Description
Patient population	49 normal to mildly hypercholesterolaemic adults aged 30-65 years
Stratification according to baseline TC	▪ Low: <5mM ▪ Mildly elevated: 5-5.9mM ▪ High: ≥6mM
Location	UK
Design	Single-centre, prospective, randomised, parallel group
Dose and admin.	$2x10^9$ CFU LP_{LDL} 2x daily before breakfast & dinner
Comparator	Placebo
Treatment period	12 weeks
Overall duration	16 weeks (incl. 4-week wash-out and follow-up)
Primary endpoints	▪ Effect on blood lipids (TC, LDL, HDL, TG) ▪ Safety (inflammatory biomarkers, GI side effects)
Secondary endpoints	▪ Effect on blood pressure and immune biomarkers (IL-6, IL-10, TNF-α), ▪ Gut microbiome changes

Abbreviations: CFU: colony-forming units; HDL: high-density lipoprotein; LDL: low-density lipoprotein; mM: millimolar; TAG: triacylglycerides; TC: total cholesterol
Source: Costabile *et al.* 2017

CHART 71: Study intervention

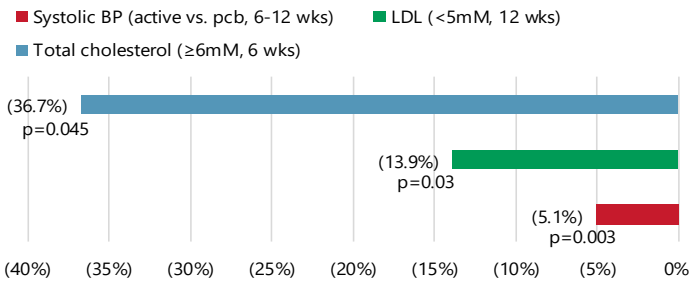


Source: Costabile *et al.* 2017

Encouraging reduction in multiple lipid biomarkers, including LDL cholesterol

Overall, the study results show improvements across active groups for all biomarkers tested, with LP_{LDL} causing reductions in unhealthy biomarkers (e.g. LDL, total cholesterol) and increases in healthy biomarkers (e.g. HDL). Some effects were stronger in certain patient sub-groups than others and in select time periods, with the best results observed summarised in CHART 72. LP_{LDL} was also safe and well tolerated, with no gastrointestinal side effects, differences in stool morphology and frequency, or changes in immune and inflammatory biomarkers.

CHART 72: LP_{LDL} led to reductions in unhealthy biomarkers



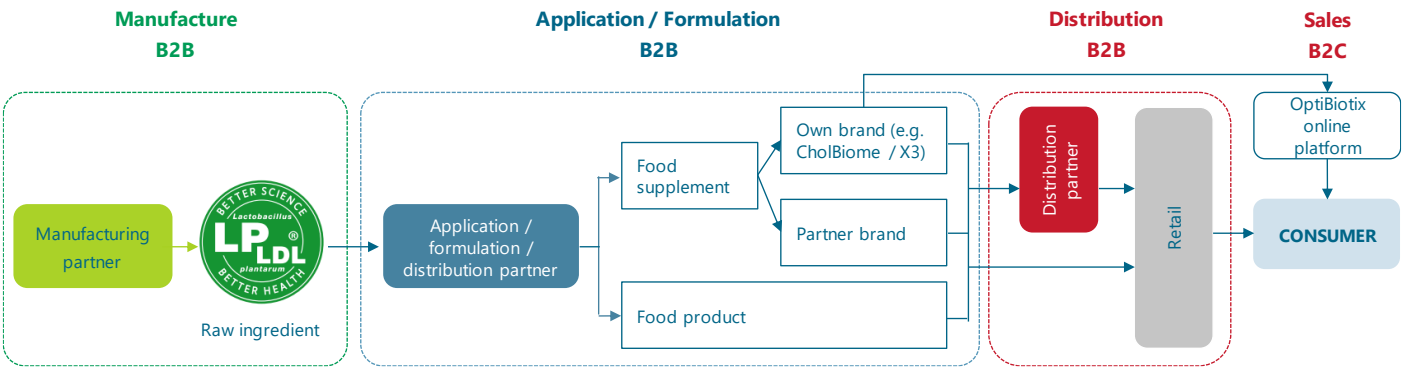
Source: Costabile *et al.* 2017

The most relevant findings relate to LDL, the primary target for reducing CV risk, with a consistent trend towards lower LDL values observed across all active groups. The results show reductions in the active group compared to the placebo across the 0 - 6, 6 - 12 and 0 - 12-week periods, with changes ranging from -7.2% overall to -13.9% in the group with normal cholesterol levels at baseline (<5mM). However, the study groups were small and hence larger trials would be required to draw firm conclusions.

Revenue generated throughout the value chain

OPTI generates revenue from LP_{LDL} through commercial agreements with multiple partners. CHART 73 shows the value chain from raw ingredient to retail products, which include OPTI's own brands (CHART 73) as well as products produced by partners under their own brands. A key application is in dairy foods, a market estimated to be worth $35.5bn, which OPTI accesses through a manufacturing deal with Sacco.

CHART 73: LP_{LDL} value chain



Source: goetzpartners Research

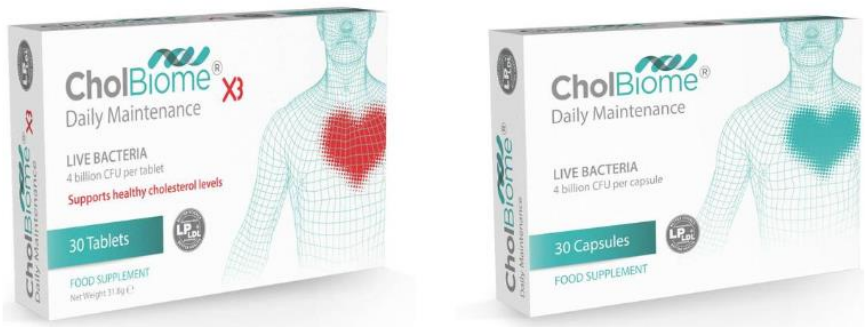
CHART 74: Partners for LP_{LDL}

Source: goetzpartners Research

Distribution deals dominate in food and supplement applications

Since 2017, OPTI has signed 27 agreements with companies of all sizes. Each deal helps build brand recognition, enhance brand value and create demand by partners to include LP_{LDL} as the functional ingredient in a wide range of products. Distribution deals dominate the list, a few are formulation deals, and one deal relates to the manufacture of the raw ingredient in freeze-dried format. An important formulation deal is the one with Nutrilinea, which produces CholBiome and CholBiomeX3 (CHART 75), the LP_{LDL} supplement OPTI sells both through its website and through partners in select countries, e.g. Russia, Bulgaria, Greece, Cyprus and Vietnam.

CHART 75: LP_{LDL} is the probiotic strain used in two products marketed by OptiBiotics



Source: https://optibiotix.online/collections/cholbiome-range

The 50/50 profit sharing agreement encourages Sacco to help find application / formulation partners, as these then become customers for both companies

Sacco srl manufactures raw ingredient to GMP standard in 50/50 profit share

In March 2017, OPTI entered an exclusive manufacturing agreement with Sacco srl, a family-owned Italian company that focuses on healthy, natural and functional foods. The company manufactures LP_{LDL} as a freeze-dried raw ingredient to GMP standard for both the food and pharma industries that it then sells on to other companies further down in the value chain that formulate the strain into food products – mainly dairy – and supplements. Under the terms of the deal, OPTI does not buy any material, but instead receives a 50% profit share with a min. price / kg based on ingredient sales to third parties. Sacco has facilities in the US, Europe and Asia, which reduces the risk of interruptions to the manufacturing. We understand that OPTI intends to find additional manufacturing partners in the US and Asia.

CHART 76: Commercial agreements for LP_{LDL} in supplements and food applications

Date	Product	Partner	Regions	Exclusive	Type	Description
Mar-17	LP_{LDL}	Sacco srl	Europe	Yes	M	Manufacture and supply of raw ingredient, in return for 50% of the profit with a min. price / kg
May-17	CholBiome, CardioBiome	Nutrilinea srl	Europe	No	F	Production and commercialisation of final packaged product
Jun-17	LP_{LDL}	HLH Biopharma	DE	No	D	3-year supply agreement for production, packaging and commercialisation of LP_{LDL} capsules, branded as part of Lactobact brand
Jul-17	LP_{LDL}	Pharmabiota	Aus/NZ	n.a.	D	Development, packaging and supply of three products containing LP_{LDL}. Min. initial purchase of 10,000 boxes each
Aug-17	LP_{LDL}	Sacco srl	US/RoW	Yes	M	Extension of previous deal, including into dairy applications
Sep-17	LP_{GOS}	TATA Chemicals	Asia	Yes	D	Scale-up and manufacturing for use in food and OTC products
Oct-17	LP_{LDL}	Galenicum	ES, CL, PE Middle East	No	D	3-year supply and commercialisation agreement. LP_{LDL} to be sold as part of STOP&GO product range branded as Cardiocare
Mar-18	LP_{LDL}	Fine Foods & Pharmaceuticals	Europe	Yes	F	Production and supply of 5 new formulations containing LP_{LDL} (1x glucose control, 1x ↓ of high BP, 1x ↓ of cholesterol levels, 2x ↓ of CV risk). Royalties and commitment to maximise financial return for both parties
Apr-18	CholBiome / CholBiome X3	Trigen Pharma (part of Shahnawaz Group)	Pakistan	Yes	D	5-year distribution and commercialisation agreement for CholBiome / X3. Trigen covers costs for product registration with DRAP. First agreement covering CholBiome range of own label products
May-18	LP_{LDL}	Akums	India	Yes	D	5-year manufacturing and supply of LP_{LDL}-containing products. Akums to contribute to human trials if required
May-18	LP_{LDL}	Seed Health	US	No	D	Produce, promote, market and commercialise LP_{LDL}-containing products. LP_{LDL} to be commercialised in an innovative product concept which combines multiple strains of different probiotics selected based on strong clinical data
Jun-18	LP_{LDL}	AlfaSigma S.p.A.	IT	Yes	D	10-year manufacturing and supply agreement for LP_{LDL}-containing food supplements. Upfront, royalties, 5-figure annual payments guaranteed
Sep-18	LP_{LDL}	*Not disclosed*	US, w/ option to develop ex-US	Yes	F	US pharmaceutical deal for the use of *LP* as a drug product. Partner responsible for development, preclinical and clinical tests, regulatory approvals, manufacture, marketing, product sales in the US. OPTI responsible for the manufacture of *LP* strain to pharma drug standards. Partner has an option to obtain a WW license excl. India, Pakistan
Sep-18	LP_{LDL}	Bened Biomedical Ltd	Taiwan	No	D	3-year agreement to produce, package, promote, market and commercialise products containing LP_{LDL} in Taiwan
Sep-18	CholBiome	*Bulgarian company*	Bulgaria	Yes	D	3-year distribution and commercialisation of own label CholBiome products. First revenues expected in Q1/2019
Oct-18	LP_{LDL}	US Pharma Lab ("USPL")	US	No	F	Manufacturing and supply agreement for formulations containing LP_{LDL} First agreement completed through new subsidiary ProBiotix Health Ltd
Nov-18	CholBiome	*ND*	GR, CY	Yes	D	3-year distribution and commercialisation agreement for own label CholBiome products. Company covers registrational costs
Jan-19	CholBiome	SilvEXPO	RU, KZ	No	D	3-year distribution and commercialisation agreement for own label CholBiome products
Feb-19	LP_{LDL}	Biolat JSC	Baltics (EE, LV, LT)	No	D	3-year packaging & commercialisation agreement for own capsular food products containing LP_{LDL}
Feb-19	LP_{LDL}	EIWA Trading Corporation	JP	Yes	D	3-year import, marketing and distribution agreement for LP_{LDL}. Exclusivity linked to min. annual volumes
Mar-19	LP_{LDL}	HLH Biopharm	DE	Yes	D	3-year extension of original supply agreement for LP_{LDL} capsules. order volume commitments doubling every year. Includes order volume commitments which double each year to maintain exclusivity in Germany
Mar-19	LP_{LDL}	HLH Biopharm	AT, CH, UAE	No	D	3-year license to produce, package, commercialise products cont. LP_{LDL}
May-19	LP_{LDL}	IENP	ES	No	D	3-year agreement to manufacture, market food supplements cont. LP_{LDL}
May-19	LP_{LDL}	Nutrilinea Srl.	Europe	Yes (Europe ex-UK)	F	License agreement for use of LP_{LDL} in a food supplement (TensRed) for reduction of high blood pressure. Nutrilinea covers cost of product development, manufacturing & human studies, has 12 mos exclusivity in Europe. ProBiotix has exclusivity for UK & all other markets ex-Europe
Jun-19	CholBiome, CholBiome®$_{x3}$	Biovagen Healthcare Pte.	Vietnam	Yes	D	3-year license agreement to commercialise CholBiome® / CholBiome®$_{X3}$. Biovagen covers the costs of registering the products with local health authorities. Exclusivity linked to min. sales orders. CholBiome® / CholBiome®$_{x3}$ to be marketed as BioStatin / BioStatin Platinum
Jul-19	LP_{LDL}	Kappa Bioscience AS	27 countries (Europe, RU, SG)	No	D	License agreement for LP_{LDL} in new application area within CV health, in combination with Kappa's K2VITAL® (pure, active Vit K2) + Vit B_1. Nutrilinea covers costs of development and manufacture of final product (ProK2Heart). Kappa and ProBiotix to commercialise
Jul-19	LP_{LDL}	Tenshindo	Japan	No	D	License agreement to use LP_{LDL} as active ingredient in a novel in CV food supplement. Companies will work to obtain authorised CV health claim

[1] The Healthy Weight Loss Company (now 64% majority-owned)

Abbreviations: BP: blood pressure; CV: cardiovascular; DRAP: Drug Regulatory Authority of Pakistan; IENP: Instituto Español de Nutrición Personalizada; Vit: vitamin

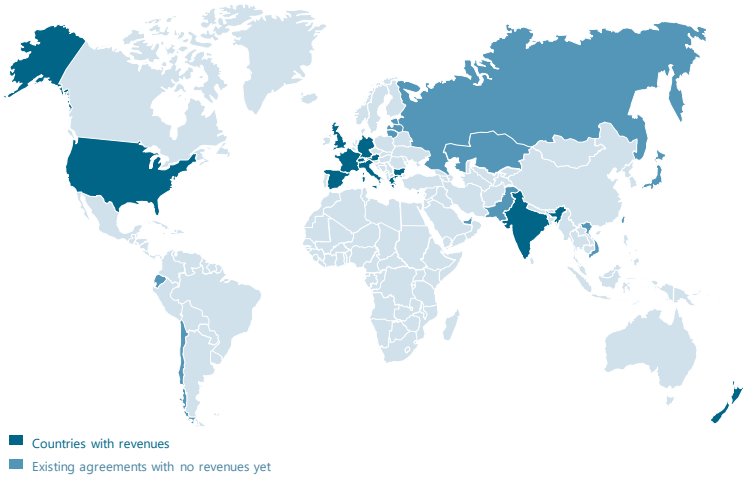
Source: Company press releases

- *The **US is the world's largest probiotics market** and one of the fastest growing, with an estimated value of $7.1bn, of which supplements alone account for c.$2bn. This figure is expected to expand by 55% to $3.3bn by 2021E*
- ***Italy is the largest probiotic supplement market in Europe** and the second in the world with an estimated size of >$500m, growing at c.25% p.a.*
- ***Japan** accounts for nearly half of the market in the high-growth Asia-Pacific region;*
- ***India** is one of the most important markets in Asia*

Broad geographical footprint, including in key US, European and Asian markets

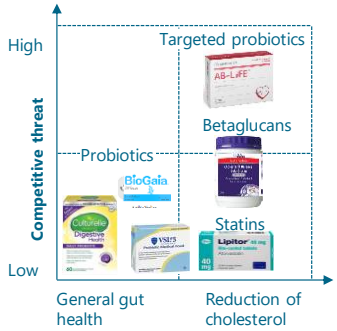
Through its partners, OPTI's products are or will be marketed in all important probiotic markets, including in Europe, the US and Asia Pacific (see margin comment).

CHART 77: OPTI has agreements for LP_{LDL} in all key regions worldwide



Source: Company data

CHART 78: Competitors for LP_{LDL} fall into different groups



Source: goetzpartners Research

Limited direct competition from other probiotics, statins and betaglucans

Although the probiotics market is large and includes hundreds of products for different uses, most are for general gut health and hence do not directly compete with LP_{LDL}. This includes Culturelle, DSM's best-selling brand marketed for digestive support, and Ferring's VSL#3, a polybiotic with eight different strains that claims to be the most concentrated polybiotic containing 450 billion (4.5×10^{11}) bacteria in every sachet (CHART 78). In the cholesterol-lowering group, one of the key competitors is AB Biotics's AB-Life, a probiotic based on three selected strains of *Lactobacillus plantarum*. A lower competitive threat is represented by betaglucans, a type of dietary fibre found in e.g. oats that has an approved cholesterol-lowering health claim. We see the lowest competitive threat in this group from statins, as they are pharmaceutical products that require a prescription and are associated with side effects.

Potential future applications include as pharma product

OPTI's strategy is to expand the use of LP_{LDL} into other applications to maximise its revenue potential. The three most advanced are (1) reduction of blood pressure, (2) development as an LBP, and (3) use as antimicrobial agent, based on preliminary *in vitro* work that has shown antimicrobial activity against many relevant pathogens (e.g. *C. diffi*, *candida albicans*, *E. choli*, *campylobacter*.

- *Hypertension is one of the strongest risk factors for almost all CV diseases*
- *Public awareness about the associated risk is increasing*
- *New guidelines suggest that up to 14m adults in the UK and >100m in the US are hypertensive*
- *There are virtually no other targeted ingredients / products on the market for blood pressure reduction*

Impact on blood pressure the next priority

The encouraging effect on blood pressure observed in the human trial conducted by the University of Reading (see CHART 70), coupled with positive feedback received from consumers through post-market surveillance led OPTI to pursue a separate application for LP_{LDL}, initially in collaboration with Nutrilinea and Fine Food & Pharmaceuticals, who are helping with the development and formulation work. The development will include a study in Milan, conducted and financed by Nutrilinea. The potential market opportunity is very large, for a variety of reasons.

Development as live biopharmaceutical product with US partner

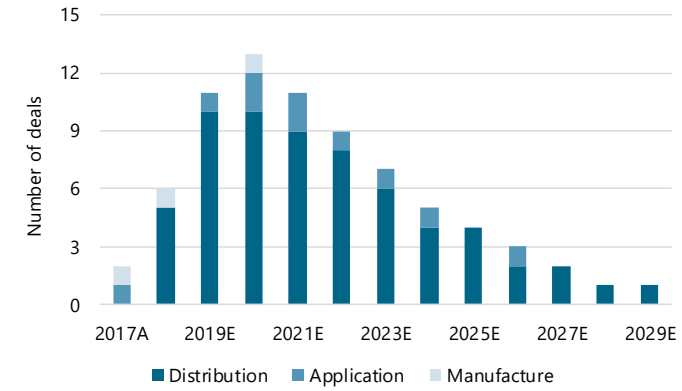
OPTI has three agreements to develop LP_{LDL} as pharmaceutical product. Two of these covering India (Akums) and Pakistan (Trigen Pharma) are more akin to use as a pharmacy food supplement. In contrast, the agreement with an undisclosed US Pharma company signed in September 2018 is designed to develop LP_{LDL} as a live biotherapeutic product. We understand that the deal includes success-based (six-figure) milestone payments and royalties on potential product sales to OPTI, who will be responsible for the manufacture to GMP pharmaceutical standards through its partner Sacco srl. This opportunity is included in our valuation for OPTI, albeit with a very high risk-adjustment.

OptiBiome: functional foods and supplements

SlimBiome reduces hunger and cravings for sweet and savoury foods

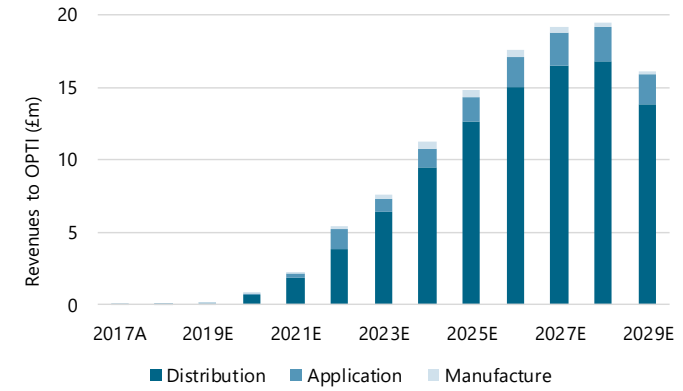
The OptiBiome platform is used to screen and develop functional foods for the prevention and management of chronic lifestyle diseases. These foods are selected for their ability to modulate the microbiome and are used with other nutraceuticals to target specific health disorders where their benefits have been well established. By utilising ingredients which do not require further study, OPTI is able to de-risk commercial execution and bring new products to market in a short period of time. The platform has already yielded award-winning weight-loss product SlimBiome, the consumption of which led to weight loss of by 2lbs - 3lbs per week in a human study. Launched in May 2017, the product is sold through partners and OPTI's online portal based on 17 existing deals. These and many additional ones (CHART 79) should drive strong revenue growth in excess of c.£15m by 2025E (CHART 80).

CHART 79: SlimBiome deals, 2017A – 2029E



Source: Company data, goetzpartners Research estimates

CHART 80: SlimBiome revenues, 2017A – 2029E



Source: Company data, goetzpartners Research estimates

Developmental projects could lead to future upside

OPTI is developing other products including CardioBiome for CV health, ImmunoBiome to improve immune health and reduce allergy symptoms, and PsychoBiome to improve cognitive health, target anxiety and alleviate stress-related conditions. These are currently excluded from our forecasts pending additional data and commercial validation.

SlimBiome supports healthy weight loss by reducing hunger

CHART 81: SlimBiome's strong profile has earned it a prestigious awards

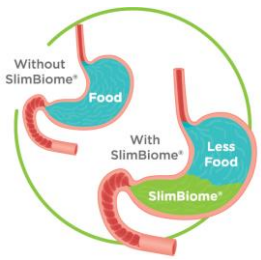
Source: Company data

SlimBiome has won numerous industry awards including as best weight management ingredient at Food Matters in November 2017 and Vitafoods in May 2018. It is formulated both as a functional food that is incorporated into third party products and OPTI's own brands, and a CE-marked OTC medical device.

Two of the three constituents have approved health claims in Europe

SlimBiome is a patented formulation that combines three base ingredients: chicory root fibre, glucomannan and chromium picolinate. Both glucomannan (derived from the Konjac plant) and chromium have approved EFSA health claims for weight loss and the maintenance of normal blood glucose, respectively (CHART 83). SlimBiome is 93.6% fibre, with human studies showing it reduces hunger and cravings for sweet and savoury foods with weight loss of 2-3lbs, predominantly from around the waste and hips.

CHART 82: Mechanism of action



Source: Company data

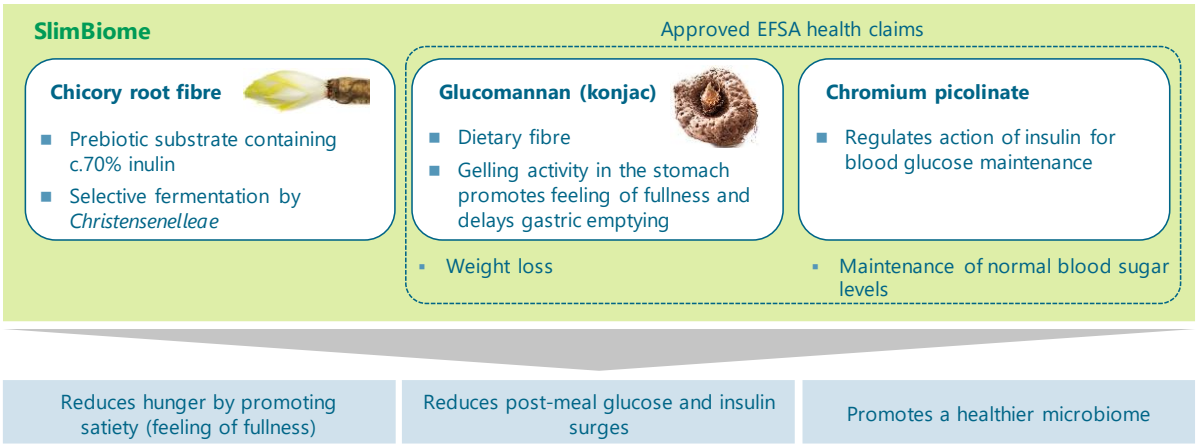
Three mechanisms promote weight loss

SlimBiome is thought to promote weight loss via three complementary mechanisms: (1) reduction of hunger by promoting satiety (feeling of fullness), in essence expansion in the stomach so that the consumer eats less food and promotion of gelling to provide satiety for a longer period (CHART 82); (2) reduction of post meal glucose and insulin surges; and (3) promotion of a healthier microbiome.

Functional food in many white label products and own GoFigure brand

As a food additive, SlimBiome can be incorporated into a range of products, such as cereals, muesli, protein shakes, dairy products and baked goods. OPTI has generated significant commercial interest for SlimBiome and has signed partnerships with companies including Knighton Foods and Cambridge Commodities in the UK, and dairy conglomerate Agropur for distribution in the US market. Alongside providing SlimBiome to third parties, OPTI incorporates SlimBiome into its own range of products under the GoFigure range (CHART 84), which consists of meal replacement shakes, mueslis and snack bars sold both on OPTI's own webstore and via retail partners in select regions (e.g. Extensor in Poland).

CHART 83: SlimBiome has three constituents, two of which have approved EFSA health claims



Source: Company data, goetzpartners Research

CHART 84: SlimBiome is the functional ingredient in the GoFigure product range for weight management

Source: Optibiotix online store

CHART 85: Medical device

Source: Company data

SlimBiome Medical is a medical device with a CE mark – a rarity for a food supplement

SlimBiome Medical is an OTC weight loss supplement classed as a medical device in Europe. It provides the same benefits as SlimBiome, but is formulated as a powder designed to be dissolved in water and consumed 30 minutes before meals and designed to be consumed as part of a calorie-restricted diet. The product received the CE mark in December 2018 and was then launched in May 2019 at the Vitafoods Europe conference. We note that the CE mark designation, which means that "products sold in the European Economic Area have been assessed to meet high safety, health, and environmental protection requirements" is unusual for a food supplement and provides differentiation for SlimBiome in the crowded weight management market. We view the grant of a CE mark as a major driver for future sales as it provides a "stamp of approval" for consumers.

Human studies show meaningful weight loss

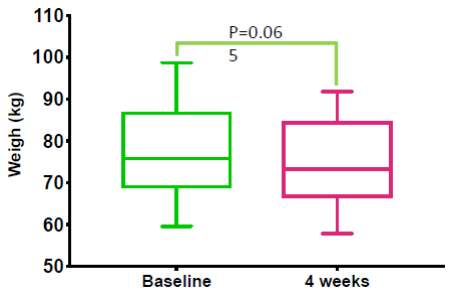
Unlike many companies active in the c.$200bn weight management industry, OPTI has conducted independent human studies to provide clinical validation for SlimBiome.

SlimBiome led to a weight loss of 2-3lbs per week on average

12-patient study shows beneficial effects on weight, size, mood and microbiome

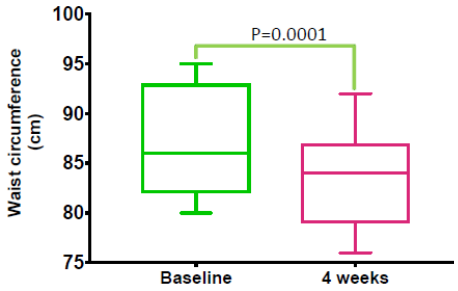
The first study, conducted by the University of Roehampton, analysed the effect of SlimBiome in overweight and obese women for a 4-week period. The key findings include: (1) Weight loss of 2lbs -3lbs per week on average (CHART 86); (2) reductions in waist circumference (P=0.0001, CHART 87), hip circumference (P=0.029) and savoury cravings (P<0.003); (3) improvements in mood; and (4) increased abundance of *Christensenellaceae* bacteria (CHART 88), which are associated with lean body mass index in multiple large sample (>500 patient) genomic analyses. While the results are encouraging, we note that the sample size was small with 12 patients. Hence, larger studies would be needed to demonstrate more rigorous changes to the variables under observation.

CHART 86: Reduction in weight at 4 weeks



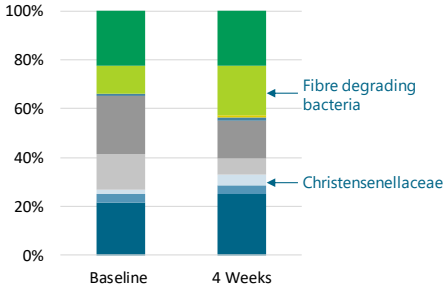
Source: Company data

CHART 87: Reduction in waist size at 4 weeks



Source: Company data

CHART 88: SlimBiome selectively promotes the growth of Christensenella in the gut



Source: Company data

SlimBiome left trial subjects feeling fuller for longer and decreased food cravings, suggesting that SlimBiome removes the reliance on willpower alone, thus enabling more effective means of weight loss

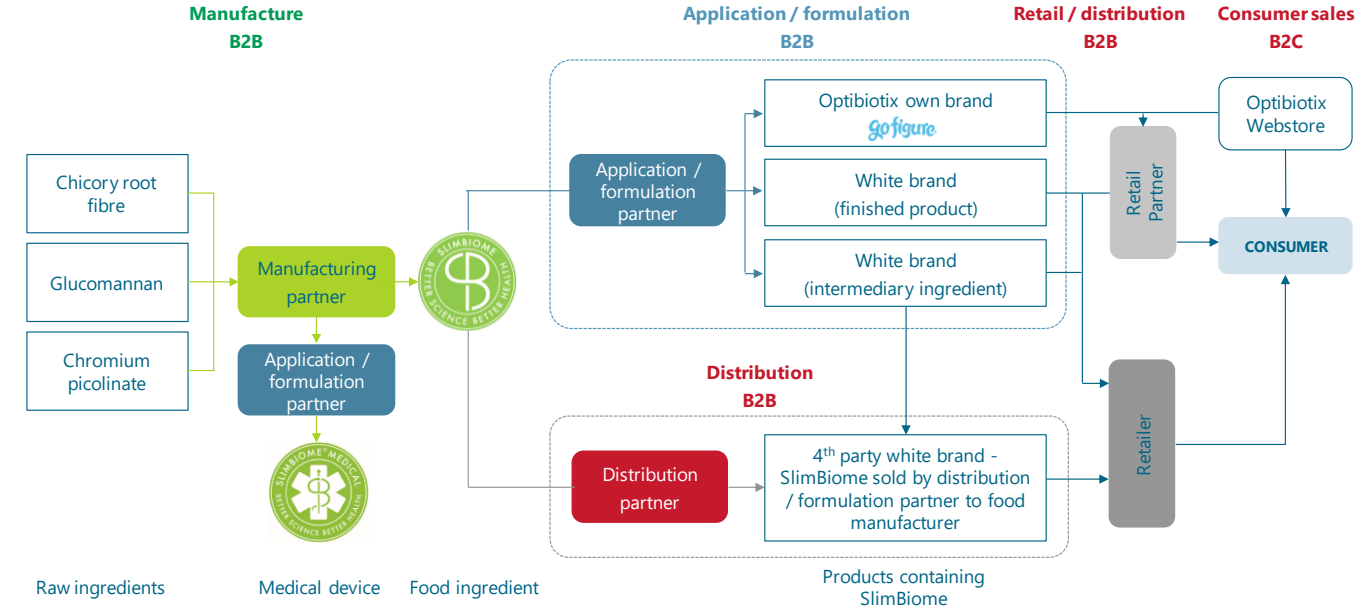
SlimBiome removes dependence on willpower alone in 20-patient study

Many products marketed for weight loss rely on self-control to comply with a restricted calorie diet. This often leads to high failure rates or frequent relapses. A study conducted by Oxford Brookes University in 2018 used visual analogue scales to evaluate the impact of SlimBiome on satiation (fullness), satiety (hunger and cravings between meals) and food intake / choice for 20 overweight to obese women over a 4-month period. The results show that SlimBiome left trial subjects feeling fuller for longer, decreased food cravings, and had a positive impact on the choice of food vs. placebo. These findings are further supported by customer feedback and consumer studies.

B2B and B2C opportunities in a $200bn market

The ability to incorporate SlimBiome into many products provides OPTI with multiple revenue opportunities. The company commercialises SlimBiome both alone in its GoFigure range and through corporate partners (CHART 89), allowing OPTI to tap into a c.$200bn market.

CHART 89: OPTI maintains control over a significant portion of the SlimBiome value chain



Source: goetzpartners Research

16 agreements with corporate partners since 2017, dominated by distribution deals

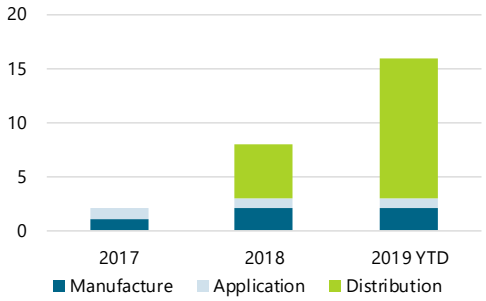
CHART 90 provides an overview of the deals OPTI has signed since OptiBiome was officially launched, the number of which grew from 8 at YE2018 to 16 in 2019 YTD. Distribution deals make up the largest share of partnerships (CHART 91). OPTI manufactures SlimBiome with a select number of partners to maintain control both over quality and supply of the product. Most deals are related to SlimBiome (CHART 92), as it was launched earlier than SlimBiome Medical and is more versatile with regards to possible applications.

CHART 90: Commercial agreements for SlimBiome -containing products

Date	Product	Partner	Regions	Exclusive	Type	Description
Nov-17	SlimBiome	Knighton Foods (Premier Foods)	UK	Yes	M	Manufacturing, supply and profit-sharing (50%). Agreed cost of manufacture and min. sales price / kg
Dec-17	SlimBiome	Cereal Ingredients	US	n.a.	A / F	Manufacturing and supply (50% profit share) for extruded product in a range of cereals. Agreed cost of manufacture min. sales price / kg
Apr-18	SlimBiome	Cambridge Commodities	UK	No	D	Distribution. Complementary to Knighton deal, extending commercial reach into new applications, e.g. sports, health & wellbeing, ingredients
Jun-18	SlimBiome	John Morley Foods	UK	Yes	A / F	Manufacturing, supply and profit sharing (50%) for use in muesli (GoFigure)
Oct18	SlimBiome	CTC Holding BV	PH, VN, ID, CO	No	D	Distribution. CTC conducted a trial of SlimBiome in GoFigure products which showed an average weight loss of 3lbs (c.1.5kg) per week
Oct-18	SlimBiome	Formulation Creations	ZA	No	D	Distribution
Nov-18	SlimBiome Medical	Nutrilinea	Europe	Yes	M	Manufacturing, packaging and supply of boxes with 3- single sachet doses
Dec-18	SlimBiome Medical	*ND*	GR, CY	Yes	D	3-year distribution and commercialisation. First right of refusal for Gulf states
Jan-19	SlimBiome	Zeon LifeSciences	IND	Yes	D	Manufacturing, supply and profit sharing (50%) agreement for SlimBiome. Zeon covers costs for registration/product with FSSAI
Mar-19	SlimBiome	DKSH International	IT, ES	Yes	D	Distribution. Market exclusivity linked to sales orders
Apr-19	SlimBiome Medical	*ND*	BUL	Yes	D	3-year distribution and commercialisation
May-19	SlimBiome	Primo Trading Co.	THD	Yes	D	Distribute and commercialise SlimBiome and SlimBiome-containing ingredients. Commitment to purchase a min. of 500kg in the first 12 months, rising to 5,000kg in the 3rd year. 100kg initial purchase order on signing
May-19	GoFigure	Extensor	PO	Yes	D	Distribution agreement to import, market and distribute GoFigure range of meal replacements, flapjacks and mueslis. Initial modest five figure order and registration of gofigure.pl for online promotion
Jun-19	SlimBiome	Agropur MSI	US, CA, MX	Yes	D	Manufacturing, supply, distribution. Supplied as a specialised functional ingredient for a wide range of applications incl. food, beverages, dairy, dietary supplements, sports nutrition (excl. extruded product in cereal particulates)
Jul-19	SlimBiome Medical	BioEnergiser	UK	Yes	D	Distribution of SlimBiome Medical online whilst allowing OPTI to continue to sell the product on its online store. Exclusivity linked to min. sales orders
Aug-19	SlimBiome	Maxum Foods	AU, NZ	Yes	D	Manufacture, supply, distribution as a specialised functional ingredient for applications in food & beverages, dairy, supplements, sports nutrition

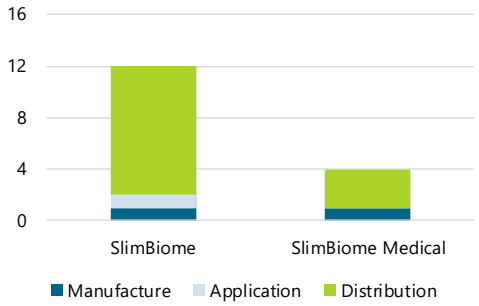
Source: Company data

CHART 91: Cumulative SlimBiome deal flow[1]



[1] Commercial agreements only
Source: Company data

CHART 92: Deal split between SlimBiome and SlimBiome Medical[1]



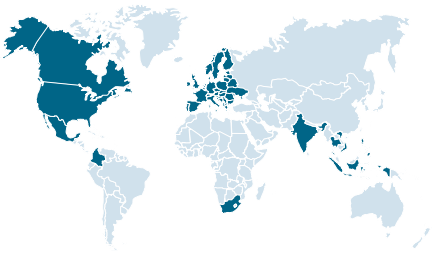
[1] Commercial agreements only
Source: Company data

Continued expansion of global footprint

Building a global brand for commercial success

SlimBiome is marketed worldwide (CHART 93) through both regional and global partners (CHART 94). The agreements cover all relevant markets in Europe, Asia and North America (CHART 95), the latter following the recent addition of Agropur MSI, a North American dairy leader with $6.4bn in 2018 sales. OPTI requires that products containing SlimBiome carry the product's logo. In the fiercely competitive retail market, this helps raise the profile of the brand, reinforces a positive association for consumers, and provides the potential to grow brand loyalty. A strong brand is also critical for geographic expansion into markets such as China where western brands are high in demand and copycats are likely to flood the low end of the market.

CHART 93: Agreements in all key regions worldwide

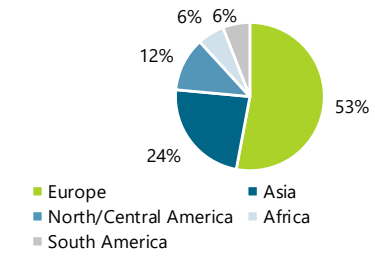


Source: Company data

CHART 94: Select commercialisation partners

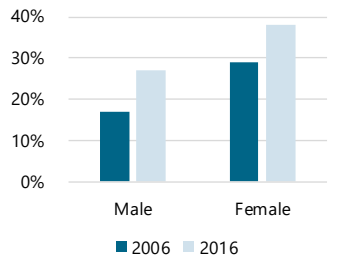
Source: Company data

CHART 95: Deal split by geography



Source: Company data

CHART 96: Obesity prevalence in India



Source: British Medical Journal

Occurrence of obesity epidemic in Asia highlights opportunity

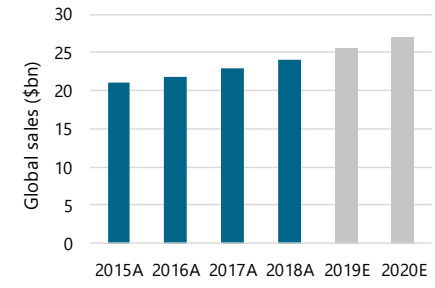
OPTI has also nurtured strong relationships with local champions in Asian countries such as India and Thailand, where the incidence of chronic diseases including heart disease, obesity and diabetes is high. Zeon Lifesciences, OPTI's distribution partner in India, is a leading contract manufacturer which has previously partnered with food companies such as Danone. The prevalence of obesity in India has grown significantly in the last 20 years (CHART 96). Thailand, where OPTI has partnered with Primo Trading, is also experiencing an obesity wave. Public health education and awareness of the need to make diet and lifestyle changes is increasing in these highly populated geographies. We view OPTI as being well positioned to take advantage of the large need for weight management products in these regions and note that Asian partnerships account for the second largest share after Europe (CHART 95).

Highly fragmented c.$25bn addressable market

The dietary weight management industry accounts for >10% of the $200bn weight management industry

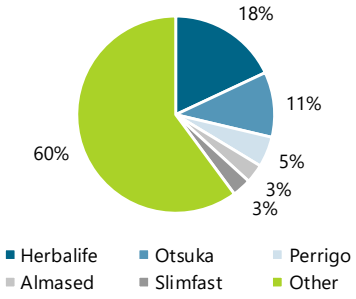
The dietary weight management industry is valued at c.$25bn and growing at a CAGR of 5.2% (CHART 97). It is highly fragmented, with a mixture of large corporates and smaller players. CHART 98 shows some of the most dominant companies and CHART 99 a selection of leading brands. In Europe, Herbalife Nutrition and the company's synonymous brand leads the field, accounting for 18% of 2018 revenues, followed by Otsuka Holdings (Gerlinea, biManan) and Perrigo (XL-S).

CHART 97: Dietary weight management industry



Source: Technavio

CHART 98: Key industry players and European market share



Source: Euromonitor

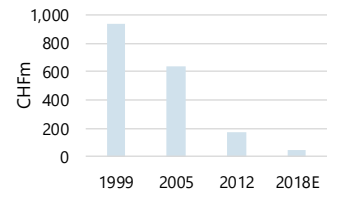
CHART 99: Selection of leading brands

Source: goetzpartners Research

Most dietary products have none to limited scientific evidence backing claims

Many products advertised for weight loss rely heavily on brand awareness and marketing. Low-calorie foods offering few catalysts to weight loss beyond simply consuming fewer calories are the staple of the industry. Nonetheless, sales of individual brands are often significant. For example, SlimFast recorded 2018 sales of $212m.

CHART 100: Xenical causes diarrhoea, potentially contributing to declining sales



Source: Roche, Cheplapharm

Weight loss supplements often come with unwanted side effects

Whilst SlimFast leads the meal replacement category, XLS Medical dominates the weight loss supplement market. It demonstrated modest but significant weight loss in clinical trials, and despite causing unpleasant side effects, sales are estimated to be c.$100m. XLS Medical contains Litramine, a fibre which binds to dietary fats in the gut preventing uptake by the intestinal digestion process and reduces fat absorption. However, this leaves the intestinal contents with a high fat content, leading to loose oily stools which cause diarrhoea over the entire treatment period. The severity of reported side effects of XLS and other fat binders such as orlistat (brand name Xenical) result in low rates of patient retention. A 2007 study found that only c.6% of patients continued to use orlistat after one year, falling to 2% a year later. In contrast, OPTI has a customer retention rate of 72% for SlimBiome.

OptiBiotics: targeted, high-value prebiotics

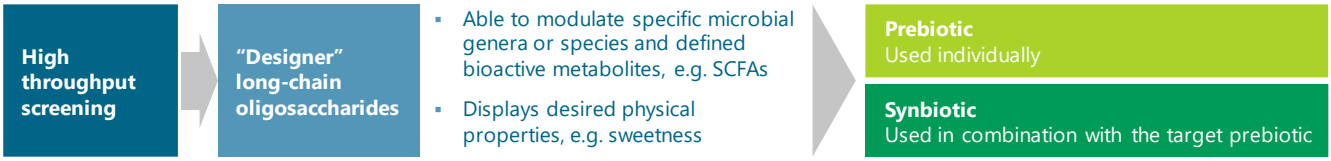
OptiBiotics oligosaccharides are designed to (1) optimise the growth of a specific probiotic, (2) modulate specific commensal microbial genera in the gut so that they change the SCFA ratio in the gut, or (3) create sweet oligosaccharides

Although prebiotics have only been around as such since the 1990s, a large number of products are already on the market, most of which are undifferentiated. OPTI developed the OptiBiotics platform to develop innovative, targeted prebiotic fibres that can modulate specific probiotic bacteria to achieve defined health benefits, including: (1) SweetBiotix – healthy, calorie-free fibres with natural sweetness intended to replace sugar; and (2) LP_{GOS}, a fibre that acts as an activator of the company's LP_{LDL} strain. OPTI intends to commercialise its OptiBiotics products through deals with large corporates able to use these ingredients in a range of applications in dairy, cereal and beverage consumer products. OPTI has signed two deals for SweetBiotix and one for LP_{GOS} that are expected to start generating revenues in 2020E. We are optimistic about the market potential for SweetBiotix and therefore expect it to be OPTI's largest product, achieving peak revenues to the company of >£40m in 2029E based on >80 deals cumulative deals by 2029E. For LP_{GOS}, we expect peak revenues of >£15m in 2029E.

Designer oligosaccharides to stimulate specific microbes

OptiBiotics is essentially a high-throughput screening platform that generates oligosaccharides and screens for (1) their ability to modulate specific microbial genera or species and defined bioactive metabolites they produce, particularly SCFAs (e.g. acetate, propionate, butyrate) and (2) their physical properties, such as sweetness for SweetBiotix (CHART 101). This process yields "designer" oligosaccharides specific for a microbial target associated with a defined health benefit. The oligosaccharides generated can be used individually or as synbiotics.

CHART 101: The OptiBiotics platform generates designer oligosaccharides



Source: Company data, goetzpartners Research

SweetBiotix: sweet fibres without calories or aftertaste

SweetBiotix consists of healthy dietary fibres that have been demonstrated in five human volunteer taste studies to have natural sweetness without calories or a bitter aftertaste and possess gut microbiome functionality. This distinguishes them from traditional sugars and other natural and artificial sweeteners (CHART 102). The aim is to replace sugar, a highly calorific, natural sweetener that causes obesity, diabetes, tooth decay and cancer. It has become clear that sugar (not fat) is the primary driver of the global obesity epidemic. We understand that OPTI has multiple SweetBiotix products with different properties suitable for different markets.

CHART 102: Comparison of commonly used sweeteners

Sweetener	Examples	Positives	Negatives	Companies / brands
Sucrose	White table sugar, raw cane sugar, brown sugar, beet sugar, saccharose	▪ Natural sweetness, no bitter aftertaste, texture	▪ High in calories: 4kcal/g, intake causes spike in blood sugar levels. Excessive use causes dental decay, obesity, diabetes and cancer	AB Sugar, British Sugar, Südzucker
Fructose	Natural fruit sugar, agave syrup	▪ Natural sweetness, no bitter aftertaste	▪ High in calories, intake causes spike in blood sugar levels	Silver Spoon
Other natural	Stevia, raw honey, maple syrup, coconut sugar, mogrosides	▪ Natural sweetness, contain enzymes, minerals, and vitamins	▪ High in calories and carbohydrates (except mogrosides, which are high-intensity sweeteners)	Pure Via, Sun Crystals, SweetLeaf, Truvia, Cweet, Lakanto, NuStevia, PureFruit, Sweet Sensation, Talin, Indigo Nutrition Raw Organic
Artificial	Saccharine, aspartame, acesulfame potassium	▪ High-intensity sweetness, very low in calories, do not affect blood glucose levels	▪ Heat may affect taste, some have bitter aftertaste, cannot be used as bulking agents	Canderel, Flix, Natrena, Sweetex, Sweet'N Low, NutraSweet, Splenda, Aclame, Candarel, EZ-Sweetz, NatraTaste, NutraSweet, Sweetzfree
Polyols	Xylitol, sorbitol, maltitol, isomalt	▪ Low in calories, used in confectionary, slightly lower glycaemic response, provide 2.4 kcal/g	▪ Half as sweet as sucrose, excessive consumption can cause GI side effects	NKD Living, ZSweet, Zerose, Xylosweet, SweetPearl, Polysweet, Maltisweet, Lacty, ClearCut, C*Eridex

Source: goetzpartners Research

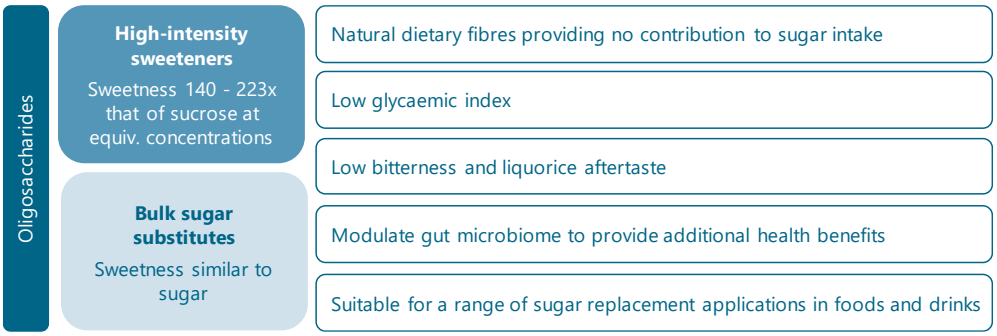
The tide is turning on sugar, a global market worth >$110bn

Growing concerns over the detrimental effects of white sugar have provided the necessary impetus for action. For example, in 2014 the UK introduced a tax on sugar-sweetened beverages and foods high in sugar. We would expect the legislation to become more stringent as the industry has been failing to hit targets to reduce the amount of sugar in popular foods while the share of the population considered obese and hence at risk of a host of diseases has continued to rise. Hence, there is a strong financial incentive for industry to find healthy, low-calorie sweeteners that have a pleasant taste and may replace unhealthy sugars in existing products. The stakes are high, since the global sweetener market, which is still dominated by sugar, is expected to exceed $110bn by 2022E (Mordor Intelligence, 2017).

Platform yields high-intensity sugars and bulk sugar substitute

The SweetBiotix technology yields both (1) high intensity sweeteners that are substantially sweeter than sugar and (2) bulk sugar substitutes (CHART 103) that have similar sweetness and texture, but no calories due to not being digested in the gut, allowing their use as bulking agent in foods such as confectionary.

CHART 103: SweetBiotix yields two types of sweeteners



Source: goetzpartners Research

Sweetness and taste studies show favourable results vs. sugar and sweeteners

OPTI has completed five human taste studies that consistently showed the high sweetness, low off flavours and microbiome-modulating effects of SweetBiotix. The key findings were presented at the Probiota 2019 conference, thus helping to generate interest from potential industry partners. The most important studies conducted by the University of Reading are briefly summarised below.

CHART 104: Sweetness study

Parameter	Description
Date reported	11 July 2017
Location	The Flavour and Sensory Science Centre, University of Reading
Substances	Six customised oligosaccharides derived from Stevia
Comparator	Sucrose
Tasting panel	10 experienced panellists
Results	• Sweetness: 140x to 223x that of sucrose at equivalent concentrations • Bitterness: large reduction vs. Stevia

Source: Company data

CHART 105: Human taste study

Parameter	Description
Date reported	23 January 2018
Location	The Flavour and Sensory Science Centre, University of Reading
Substances	Customised oligosaccharide
Comparator	Seven existing sugars and probiotics
Tasting panel	11 experienced panellists
Task	Rated 11 attributes
Results	• 8 attributes were significantly different between samples. The most substantial differences were in sweet taste, strength of off-flavour, sweet aftertaste • OPTI oligosaccharide was significantly sweeter than all other samples and low in all off-flavours, including bitterness, sourness, staleness, saltiness

Source: Company data

Two deals with large corporates currently being negotiated

In 2018, OPTI signed two agreements with large global corporates, one for use in dairy products (CHART 106). We understand that the other agreement included an upfront payment of £50k for the granting of exclusivity and we anticipate additional revenue streams to commence within the next 12 - 18 months. Multiple discussions with other potential partners are ongoing and we are therefore optimistic about additional deal announcements in the near future.

CHART 106: Commercial agreements for SweetBiotix

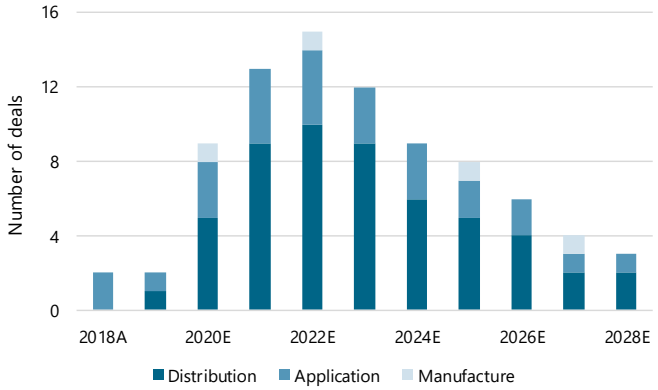
Date	Product	Partner	Regions	Exclusive	Description
May-18	SweetBiotix	*Global dairy company with >$10bn sales*	*ND*	No	Evaluation agreement to explore the potential for using SweetBiotix technology to reduce the sugar content in a range of dairy food products. Partner is a global brand and one of the world's largest providers of dairy products
Jun-18	SweetBiotix	*Global corporate with >$100bn sales*	*ND*	Yes	6-month period to negotiate a license agreement for scale up, manufacture and distribution of SweetBiotix. OPTI receives monthly payments. Partner is a global supplier of nutritional and agricultural products to companies.

Source: press releases

Revenue potential likely to exceed that of other products

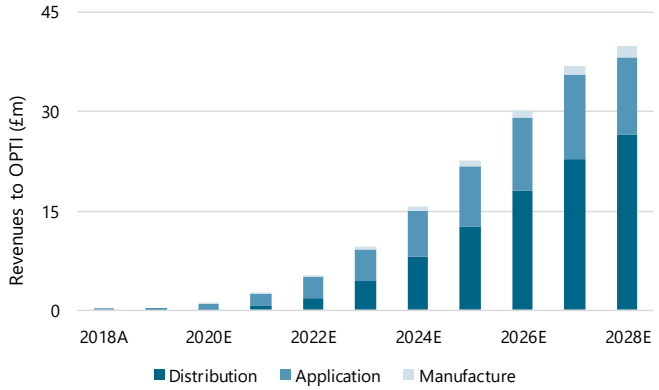
Although OPTI has only signed two deals for SweetBiotix thus far, we think that the attractive profile of the product coupled with the large addressable market opportunity should lead to many additional deals and believe that it could be OPTI's most successful product. We therefore model 85 deals in total over the period 2018A – 2029E (CHART 107) driving peak revenues to OPTI of >£40m (CHART 108).

CHART 107: SweetBiotix deals, 2018A – 2028E



Source: Company data, goetzpartners Research estimates

CHART 108: SweetBiotix revenues, 2018A – 2028E



Source: Company data, goetzpartners Research estimates.
Warning Note: Past performance and forecasts are not a reliable indicator of future performance or results. The return may increase or decrease as a result of currency fluctuations.

Targeted prebiotic LP_{GOS} enhances LP_{LDL} biological activity

The biological activity of probiotics that have been shown to confer a specific health benefit can be further enhanced through targeted prebiotics. The combination of the two is called a synbiotic. OPTI develops these products leveraging the know-how of its OptiBiotics platform. The first targeted prebiotic the company developed is LP_{GOS}, galactooligosaccharides ("GOS") produced by *Lactobacillus plantarum* owing to its β-galactosidase enzymes. Lab studies have shown that LP_{GOS} enhances LP_{LDL}'s cholesterol-lowering activity. OPTI is therefore exploring the use of the product in a range of food products, to modify an individual's microbiome to improve health, both on its own and in combination with LP_{LDL}. This is facilitated by the fact that LP_{GOS} ingredients withstand high temperatures and are stable during processing.

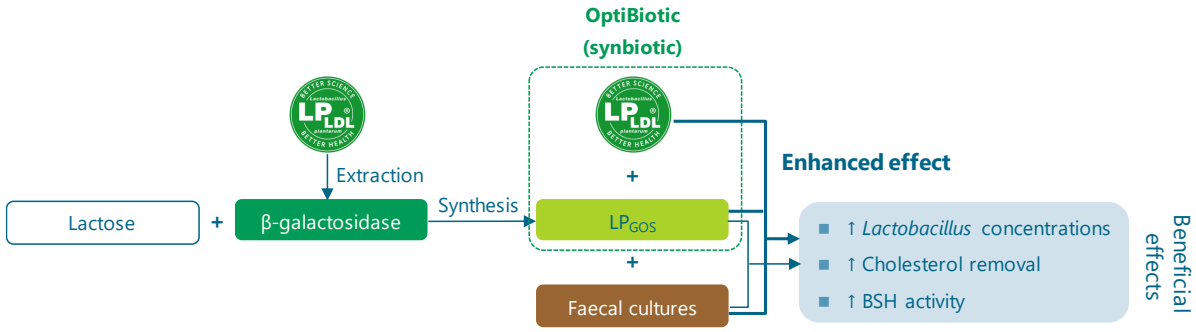
Scientific work completed shows that LP_{GOS} has multiple beneficial effects *in vitro*

Lab studies have shown that LP_{GOS} (produced with the use of β-galactosidase enzymes extracted from LP_{LDL}) mixed with human faeces in gut models has multiple beneficial effects, including those shown in CHART 109 overleaf. Importantly, these effects were all enhanced when LP_{LDL} was added to the mix, due to both enhancing the growth of LP_{LDL} and increasing its biological activity. The superior effect of the two products in combination compared to either used on its own provides a sound rationale.

Ongoing work streams with large global partners

The first deal was signed with TATA Chemicals in September 2017 – an exclusive agreement for scale-up and manufacturing for use in food and OTC products in Asia. OPTI also started a collaboration with DSM on the development of a prebiotic which selectively enhances the growth of *Lactobacillus rhamnosus GG*, the conglomerate's popular LGG strain, research that was presented at ProBiota 2018.

CHART 109: Targeted prebiotic LP_{GOS} enhances the beneficial biological effects of probiotic LP_{LDL}

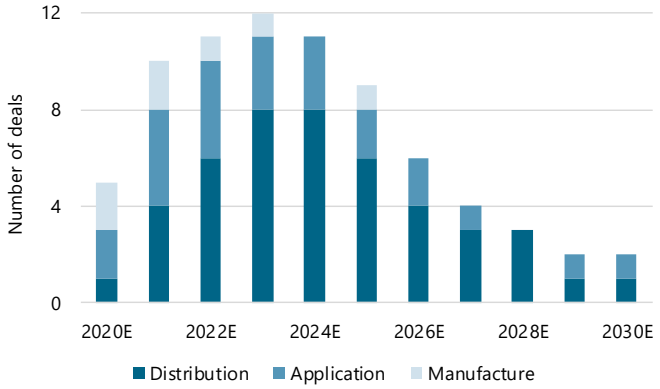


Source: Kolida *et al.* 2017, Kachrimanidou *et al.* 2018, goetzpartners Research

Peak revenues of >£15m based on enhanced deal activity from 2020E

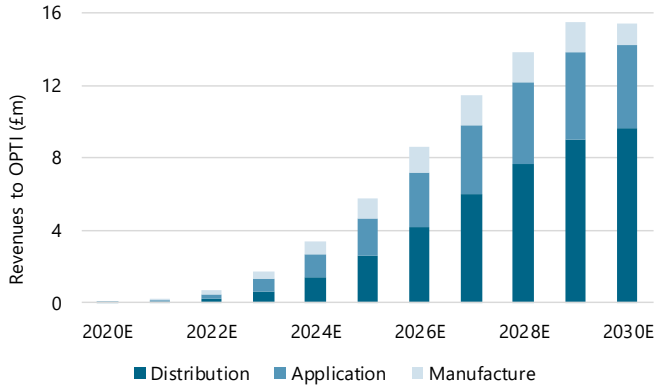
LP_{GOS} product remains to be validated as OPTI has only signed one deal, with Tata, who are looking to develop LP_{GOS} using their existing fermentation processes. We understand that the company is in discussions with potential partners and therefore expected enhanced deal activity from 2020E (CHART 110), which on our estimates should drive peak revenues in excess of £15m by 2029E (CHART 111).

CHART 110: LP_{GOS} deals, 2020E – 2030E



Source: Company data, goetzpartners Research estimates

CHART 111: LP_{GOS} revenues, 2020E – 2030E

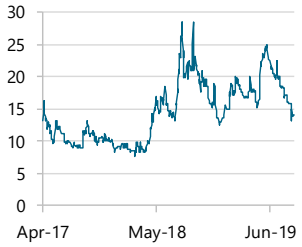


Source: Company data, goetzpartners Research estimates.
Warning Note: Forecasts are not a reliable indicator of future performance or results. The return may increase or decrease as a result of currency fluctuations.

SBTX: probiotics for skin health, backed by data

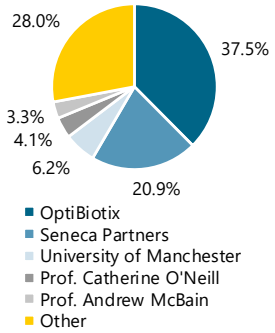
OPTI retains a 37.6% stake in its former subsidiary SkinBioTherapeutics ("SBTX"), a company based on the SkinBiotix platform and focuses on creams made for use in cosmetics, eczema and infection control. The company was an early mover in the topical use of lysates (extracts) of probiotic bacteria, its core technology, which was developed by Prof. Cath O'Neill and her team at the University of Manchester. Following the successful development of a cosmetic formulation suitable for human use, SBTX recently completed a first study in 129 healthy individuals. The results confirmed SkinBiotix's clean safety profile and showed encouraging efficacy signals on skin barrier function and moisturisation, thus providing the necessary validation for continued development. The company now plans to find partners with specialist skin divisions and able to commercialise products targeting the consumer, health and well-being sectors. We estimate that first revenues could be generated in 2021E and profitability achieved in 2025E.

CHART 112: SkinBioTherapeutics share price (GBp) since IPO on AIM



Source: FactSet

CHART 113: OPTI is SBTX's largest shareholder



Source: SkinBioTherapeutics

Tight junctions control the passage of fluid and electrolytes in and out of the surrounding tissue of skin cells

Spin-off from the University of Manchester initially led by a distinguished biologist

OPTI is SBTX's largest shareholder (CHART 113). The company originally acquired the technology together with its intellectual property (two patent families) and extensive known-how for £250k in March 2016 to create a newly owned subsidiary, SkinBiotix, of which OptiBiotox was the majority shareholder with 52%. The newly created subsidiary was then listed on AIM in April 2017, raising £4.5m at 9p from institutional and private clients. The share price has since appreciated (CHART 112), creating value for OPTI's shareholders. SkinBiotix was initially led by Prof. O'Neill herself, a distinguished biologist with strong expertise in human-bacterial interactions. She had previously founded a specialist dermatology business and has worked as an advisor for multiple skincare businesses. In July 2019, Prof. O'Neill transitioned from CEO to CSO with the appointment of Stuart Ashman, a CEO with industry commercial experience.

Improving skin barrier health and function with probiotics

In 2009, Prof. O'Neill and her team began a research project to explore ways in which to improve the barrier function of skin cells with probiotic bacteria. This led to the discovery that certain strains can benefit the skin through multiple mechanisms, including by modulating the tight junctions of skin cells. The team decided to focus on bacterial cell extracts rather than live bacteria because the effect of live bacteria on skin – particularly wounds – is not well understood, and from a practical point of view it facilitates formulation work and longer shelf life. The aim is for the technology to be used to improve the natural barrier effect of the skin, initially for the use in cosmetics and eczema treatments, although the company also started exploring applications in the oral cavity, the scalp, and other skin conditions such as psoriasis.

Bacteria protect skin cells in multiple ways

Extensive research has shown that the communities of bacteria benefit human skin in multiple ways, particularly through: (1) the improvement of natural skin barriers to prevent water loss and the entry of harmful microbes, (2) the production of antimicrobials that kill competing disease-causing bacteria, and (3) education of the immune system to prevent it from overreacting and causing skin allergies and other autoimmune conditions (CHART 114). Thus, in addition to protecting the skin from insults, they are also able to aid repair. Hence, there could be applications in skin health / cosmetics, healthcare-acquired infections, eczema and wound healing. The initial focus of the company is on skin health and cosmetics due to the lower barriers to entry and the commercial value of a functional ingredient in the low science cosmetics industry.

CHART 114: The lysates of probiotic bacteria have been shown to act via three mechanisms

Improve barrier function	Protect skin from infection	Enhance skin healing
Enhance formation of tight junctions to prevent the passage of toxins, molecules, ions	Reduce Staph aureus load in and prevent attachment to skin cells	Increase proliferation and migration of keratinocytes across the wound site

Source: Company data

Cosmetics set the stage for more valuable eczema products

SBTX focuses on the development of products used as cosmetics, for the alleviation of eczema, and for infection control. Management sees eczema as the largest opportunity in the longer term. The aim would be to use the cream as part of daily skin care to prevent flairs and infections. However, since the route to market is longer and likely to involve studies in eczema sufferers, the initial focus is on the development of evidence-backed cosmetics, which may lead to off-label use in those looking for natural OTC products to relieve eczema symptoms. Hence, while the company has achieved proof of principle / mechanism for all three indications (CHART 115), the most advanced programme is focused on the application of SkinBiotix in managing sensitive skin.

CHART 115: Focus on dermatology applications targeting large markets

	Proof of mechanism	Development Formulation	Proof of concept Human studies	Potential commercialisation	Market opportunity
Cosmetic	✓	✓	✓	2019E	>$100bn
Infection	✓	✓	H2/2019E	2020E	>$17bn
Eczema	✓	Q1/2020E	2021E	2021E/2022E	>$4bn

Source: SkinBioTherapeutics, goetzpartners Research estimates

Science-led approach includes human studies

Key milestones achieved prior to human studies:

- *Stable cream formulation*
- *Manufacture scale-up*
- *Production of cosmetic grade product by a 3rd party*
- *Freeze-drying method to provide longer shelf-life and ease transportation*
- *Safety and lack of irritancy*

Similar to OPTI, SBTX aims to differentiate its products through scientific evidence. In addition to extensive laboratory work, this also includes comprehensive human studies. This is in contrast to what is the norm in the cosmetics industry, where the use of unproven claims is widespread. Prior to embarking on any human studies, SBTX demonstrated proof of principle in human skin organ culture models which confirmed the technology's three modes of action (skin protection, management and restoration) – a critical technical hurdle that needed to be overcome prior to starting human studies. In parallel, the company also achieved compliance with regulatory requirements and completed multiple key workstreams (see margin comment).

Three-part study in nearly 200 healthy volunteers established safety & lack of irritation…

SBTX then embarked on a comprehensive human testing programme focused on skin irritancy, moisturisation and impact on skin barrier (CHART 116). Once safety had been established, the company commenced an efficacy trial in 129 patients, bringing the total number of people treated with the cosmetic formulation close to 200.

CHART 116: SBTX conducted a human trial with three elements

	1. Skin irritation	2. Moisturisation potential	3. Efficacy
Participants	■ Short test: 30 ■ Longer duration test: 31	■ 21	■ 129
Duration	■ 24 – 72 hours ■ 12 days	■ 12 hours	■ 29 days
Dosing	■ 5 doses in increasing concentration ■ Repeated application of 5 doses	■ N.a.	■ 2x per day on both legs, with each leg receiving a different treatment
Assessment	■ Signs of irritation	■ Moisture content	■ Safety, multiple objective measures of efficacy
Key findings	■ Only one subject experienced irritation	■ SkinBiotix provided non s.s. higher moisturisation vs. control. No irritation	■ Safe, encouraging efficacy signals

Abbreviations: s.s.: statistically significant
Source: SkinBioTherapeutics

The efficacy study included multiple objective measurements

…followed by encouraging efficacy signals

The efficacy portion started in November 2018 and was completed in April 2019. The trial, which was conducted in 129 healthy volunteers (CHART 117) treated for 4 weeks with either the active ingredient, the vehicle only or nothing included multiple objective measures of efficacy, including trans-epidermal water loss ("TEWL", measures loss of water through the skin), corneometry (skin hardness), erythema (redness), elasticity (ability of the skin to snap pack after being pinched) and microbiome analyses. The results demonstrate that the product was safe. There were also encouraging signals on some measures in select patient sub-groups, including increase in skin hydration and a reduction in water loss, providing evidence to further optimise the technology and start discussions with potential commercialisation partners.

CHART 117: First human trial shows safety and first efficacy signals

Parameter	Description
Test group	129 healthy individuals
Design	Double-blind
Formulations	• Active: cream containing SkinBiotix • Vehicle: cream only
Dosing schedule and administration	2x per day. Patients were divided into 3 groups. Each leg received a different Tx: • Group 1: active / nothing • Group 2: vehicle / nothing • Group 3: vehicle / active
Duration of treatment	29 days
Primary objective	Effect of SkinBiotix on the barrier of healthy skin, measured on days 15 and 29
Primary measurements	• Corneometry (measures skin hydration) • Trans-epidermal water loss ("TEWL") (measures water loss through the skin)
Secondary objectives	Safety and tolerability, skin elasticity
Positive findings	• No adverse skin reactions • Significant increase in skin hydration at day 15 with the active, which was better than that produced by the vehicle in the group <50 years • Small but significant decrease in TEWL with the active at day 29 in the group >60 years

Source: SBTX press release

Addressing large markets where data can make a difference

The three applications being pursued target three established and growing multibillion US$ global markets (CHART 115) where scientific evidence – even if modest – can make a difference. Like OPTI, SBTX's business strategy is to run a lean, virtual operation that owns IP and manages development work. The aim is to then out-license to partners early on for commercialisation. To this extent, SBTX is entertaining discussions with potential partners that could translate to commercial agreements and hence future revenues. We understand that the company signed a material transfer agreement ("MTA") with a global consumer goods company in April 2018 to test the use of SBTXs technology in its products, but this has transitioned to a commercial deal to date.

The Boots No7 Protect & Perfect study appears to be the first reliable clinical trial of any anti-wrinkle cream available on the high street to show a reduction of wrinkles

Boots No 7 Protect & Perfect sets the stage for evidence-backed products

The cosmetics industry is characterised by a very large number of OTC products with unproven claims. This changed with Boots's anti-ageing cream "No7 Protect and Perfect". In a first for the cosmetics industry, a trial conducted by scientists at the University of Manchester comparing No7 Protect & Perfect with a moisturiser showed that volunteers who used the cream saw some improvement in their skin compared to those applying a placebo moisturising cream. The study was conducted in 60 individuals (49 women, 11 men) aged 45 - 80 years. At the end of the six-month treatment period, 43% of those who used No7 Protect and Perfect saw an improvement in the condition of their skin vs. 22% of those who used the placebo cream. Interestingly, tests on the volunteers' skin showed that those who used No7 Protect and Perfect produced fibrillin-1, known to make skin more elastic. This led to a year's supply disappearing from shelves in a matter of weeks and was welcomed by scientists for raising the bar on the type of tests cosmetic companies should conduct before making claims for their products.

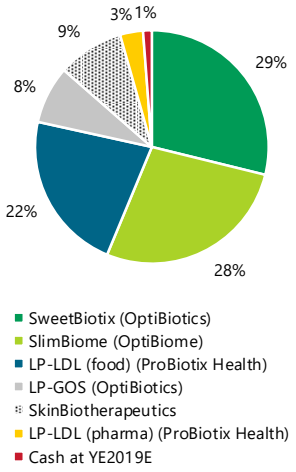
FV of GBp97 per share yields significant upside

Our GBp97 per share TP is based on a SoTP valuation, which in our view is the most appropriate valuation tool for an emerging company such as OPTI whose revenues are largely expected to occur in the future. We have also built a group-level DCF model and complemented our analysis with trading comparables and relevant M&A transactions.

Sum-of-the-parts valuation yields TP of GBp97 per share

Our SoTP valuation includes NPVs for all marketed and commercially validated products (CHART 119), based on detailed FCF models to 2040E where revenues per product are calculated based on existing and potential future commercialisation deals. FCFs are discounted at the company's estimated WACC of 10.5%. We apply risked adjustments to account for commercial risk, which assume that two-thirds of deals meet their full potential and one-third are terminated early. SweetBiotix and LP_{GOS}'s higher risk-adjustments reflect the fact that they are not yet marketed and only a few deals have been signed for each (two for SweetBiotix and one for LP_{GOS}). We also apply a very high risk-adjustment for the development of LP_{LDL} as an LBP, which is being done in collaboration with a partner. While the potential is very high, no LBPs have yet been approved, hence the risk of failure is high. The most valuable product is SweetBiotix, in our view (CHART 118), given the broad range of possible applications, and we therefore assume more deals than for the other products and a higher share of larger partners. We also include an rNPV for SBTX, which OPTI spun off in 2017 and in which it retains a 37.6% stake.

CHART 118: SweetBiotix is the most valuable asset, in our view



Source: goetzpartners Research estimates

CHART 119: OptiBiotix sum-of-the-parts valuation

Product	Use	Stage	Peak sales (GBPm)	Year	NPV (GBPm)	Prob.	Adj. NPV (GBPm)	GBp per share
LP_{LDL} (food) (ProBiotix Health)	Chol & BP reduction	Market	14.4	2027E	24.5	75%	18.4	21.5
LP_{LDL} (pharma) (ProBiotix Health)	CV disease	Development	17.8	2035E	26.3	10%	2.6	3.1
SlimBiome (OptiBiome)	Weight loss	Market	19.8	2027E	30.2	75%	22.7	26.5
SweetBiotix (OptiBiotics)	Sugar replacement	Development	41.6	2029E	59.6	40%	23.9	27.9
LP_{GOS} (OptiBiotics)	Chol & BP reduction	Development	15.5	2029E	20.3	33%	6.6	7.7
SkinBiotherapeutics	Dermatology	Clinical	105	2040E	30.3	25%	7.6	8.9
Cash at YE2019E					1.0	100%	1.0	1.2
Equity value per share					**192.3**		**82.7**	**97**
Current Share Price								43.0

Source: goetzpartners Research estimates

Warning Note: Forecasts are not a reliable indicator of future performance or results. The return may increase or decrease as a result of currency fluctuations.

Revenue forecasts assume nearly 320 deals signed by 2030E

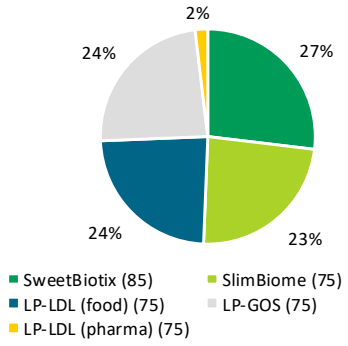
We have modelled revenues for each product by assuming a certain number of deals signed between now and 2030E (CHART 121). We expect most deals to be distribution agreements and only 6% manufacturing deals (CHART 122). We model existing deal size as a function of partner sales (CHART 120) and future deals based on a weighted average of existing deals. We assume that it takes seven years to reach peak sales, with revenue declining in years 8 – 10 (CHART 123). Our total deal and revenue forecasts can be found in the investment summary in CHART 9 and CHART 10, respectively.

CHART 120: GPSLe revenue per deal

Partner sales	OPTI revenues
≥$1bn	£1m
$100m to <$1bn	£500k
<$100m	£125k

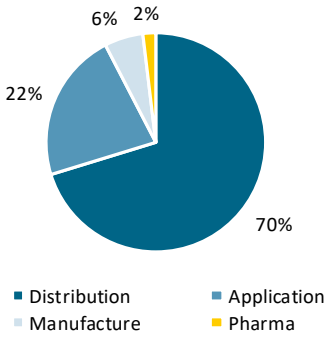
Source: goetzpartners Research estimates

CHART 121: Cumulative deals by product, 2017A – 2030E



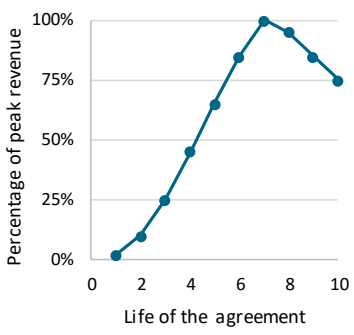
Source: goetzpartners Research estimates

CHART 122: Cumulative deals by type of agreement, 2017A – 2030E



Source: goetzpartners Research estimates

CHART 123: Revenue ramp-up over the assumed life of the agreement (GPSLe 10 years)



Source: goetzpartners Research estimates

Profitability assumptions: GM, R&D, SG&A

Our FCF forecasts incorporate operating expenses as outlined in CHART 124. Briefly, we estimate a gross margin for each deal depending on type. R&D costs are estimated as a percentage of total company R&D expenditure based on the status of the product, i.e. we allocate more R&D expenses to SweetBiotix and LP_{GOS} as they are still being developed. We assume that c.50% of all SG&A expenses are directly related to products and allocate these depending on status and number of existing deals. We apply a tax rate of 18% (UK corporate tax rate) from 2020E when we forecast sustainable profitability.

CHART 124: Overview of key assumptions underlying FCF forecasts

Subsidiary	Product	Application	Gross margin	Operating expenses	EBIT margin
Probiotix Health	LP_{LDL} (pharma)	CV disease	90%	▪ R&D: steady decline over the years ▪ Admin: increase for next 7 - 8 years before declining	Fluctuates depending on timing of milestone income and royalties
	LP_{LDL} (food)	Cholesterol reduction	*Type of deal* ▪ Manufacturing: 100% ▪ Application / formulation: 65% ▪ Distribution: 50%		Declines from 65% to 53% as contribution from distribution deals increases over time
OptiBiome	SlimBiome	Weight loss			Declines from 67% to 54% as contribution from distribution deals increases over time
OptiBiotics	SweetBiotix	Sugar replacement			Steady increase to 65% as deal activity picks up, including with large companies
	LP_{GOS}	Enhance effect of LP_{LDL}			Increases to between 54% and 58% as deals are signed and generate revenues

Source: Company data, goetzpartners Research estimates

SkinBioTherapeutics accounts for c.9% of our fair value

To value OPTI's 37.6% share in SBTX, we built a free cash flow model to 2040E based on publicly available information. Key assumptions include the following: (1) Revenues begin in 2021E, ramping up to £4.5m in 2025E, >£50m in 2030E and >£100m in 2037E; (2) gross margin of 65% from 2024E; (3) profitability is achieved in 2025E with the EBIT margin rising to 48% at steady state. Since SBTX needs to conduct further clinical trials before launching its first product, we use a probability of success of 25%.

ProBiotix Health IPO could value the subsidiary at over £20m

OPTI is exploring a potential IPO for the ProBiotix Health subsidiary, which includes LP_{LDL} as both food ingredient and pharmaceutical product. Based on our analysis, the subsidiary could be worth at least £20m, depending on how the pharma product opportunity is valued.

DCF analysis supports SoTP valuation

Our DCF analysis is sown in shown in CHART 125. We forecast cash flows to 2030E and set a terminal value using an exit multiple of 5.0x. All FCFs are discounted using the estimated company WACC of 10.5%. The calculated terminal value accounts for approx. one-third of our DCF-based valuation.

CHART 125: OptiBiotix DCF analysis

Dec YE (GBPm)	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
Total revenue	**0.9**	**3.9**	**8.8**	**17.4**	**27.6**	**41.8**	**56.7**	**71.9**	**83.8**	**89.1**	**89.8**	**83.6**
ProBiotix Health - LP-LDL foods	0.6	1.7	3.3	5.5	8.1	10.7	12.8	14.3	14.4	12.3	10.5	8.1
ProBiotix Health - LP-LDL pharma	0.2	0.2	0.3	0.4	0.2	0.5	0.3	0.9	1.5	3.3	5.8	8.6
OptiBiome - SlimBiome	0.2	1.0	2.4	5.6	7.9	11.5	15.2	17.9	19.5	19.8	16.5	13.5
OptiBiotics - SweetBiotix	0.1	1.0	2.5	5.2	9.7	15.7	22.7	30.2	37.0	39.9	41.6	38.0
OptiBiotics - LP-GOS	-	0.0	0.2	0.7	1.8	3.4	5.7	8.6	11.4	13.8	15.5	15.4
EBIT	**(1.4)**	**0.1**	**2.7**	**7.2**	**11.5**	**17.4**	**23.4**	**29.8**	**34.6**	**37.3**	**38.5**	**36.7**
% margin	(145%)	3%	30%	41%	42%	42%	41%	41%	41%	42%	43%	44%
Tax	0.1	0.0	(0.1)	(0.8)	(2.0)	(3.1)	(4.3)	(5.6)	(6.8)	(7.7)	(8.3)	(8.3)
Depreciation & amortisation	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Change in working capital	(0.1)	(0.3)	(0.3)	(0.7)	(0.8)	(1.2)	(1.2)	(1.2)	(1.0)	(0.4)	(0.1)	0.5
Capex	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Operating free cash flow	**(1.3)**	**(0.0)**	**2.4**	**5.9**	**8.9**	**13.3**	**18.1**	**23.1**	**27.0**	**29.3**	**30.3**	**29.0**
growth		(99%)	(16867%)	142%	51%	50%	36%	28%	17%	8%	4%	(4%)
CF date	30/11/2019	30/11/2020	30/11/2021	30/11/2022	30/11/2023	30/11/2024	30/11/2025	30/11/2026	30/11/2027	30/11/2028	30/11/2029	30/11/2030
Discount rate	0.978	0.885	0.801	0.725	0.656	0.593	0.537	0.486	0.440	0.398	0.360	0.326
PV FCFF	**(1.2)**	**(0.0)**	**1.9**	**4.2**	**5.8**	**7.9**	**9.7**	**11.2**	**11.9**	**11.7**	**10.9**	**9.5**
Exit multiple												5.0x
Terminal value												**145**
PV TV												**47**

PV of FCFs	83
PV Terminal value	47
Enterprise value	**131**
Probability rate	65%
Enterprise value (risk-adjusted)	**85**
plus net cash	(0.0)
+ short term Financial Investment	-
Equity value (risk-adjusted)	**85**
Equity value per share (GBp)	**99**

Source: Company data, goetzpartners Research estimates
Warning Note: Forecasts are not a reliable indicator of future performance or results. The return may increase or decrease as a result of currency fluctuations.

Below we show the sensitivity of the equity value to exit multiple, probability of success and WACC.

CHART 126: Sensitivity of equity value to exit multiple and probability of success

Probability rate \ Exit multiple	3.5x	4.0x	4.5x	5.0x	5.5x	6.0x	6.5x
45%	61	64	66	69	71	74	76
50%	68	71	74	77	79	82	85
55%	75	78	81	84	87	90	93
60%	82	85	88	**92**	95	98	102
65%	89	92	96	99	103	107	110
70%	95	99	103	107	111	115	119
75%	102	106	111	115	119	123	127

Source: Company data, goetzpartners Research estimates

CHART 127: Sensitivity of equity value to exit multiple and WACC

WACC \ Exit multiple	3.5x	4.0x	4.5x	5.0x	5.5x	6.0x	6.5x
12.0%	79	82	85	88	91	94	97
11.5%	82	85	88	92	95	98	101
11.0%	85	89	92	95	99	102	106
10.8%	87	90	94	**97**	101	104	108
10.5%	89	92	96	99	103	107	110
10.0%	92	96	100	104	107	111	115
9.5%	96	100	104	108	112	116	120

Source: Company data, goetzpartners Research estimates

Exit multiple based on comparable trading companies

Our analysis suggests that there are very few public companies with the same focus as OPTI. Many of the companies active in probiotics and prebiotics are large, diversified companies that sell many products into the food, food supplements, beverages and dairy markets. Of the specialised / pure-play companies, most focus on probiotics and very few on prebiotics, probably a reflection of the relative maturity of these markets. We have chosen to exclude companies developing pharmaceutical products from this list as none of the therapies have yet reached the market and the business models regarding development period and risk / reward are very different. Our analysis suggests an exit value around 5x, although this may be substantially higher if OPTI succeeds in building the brand.

CHART 128: Comps list

	Company	HQ	FX	Mkt cap Local (m)	Mkt cap (£m)	Cash Local (m)	Net debt	06/08/2019 EV (local m)	Revenues 2018A	Revenues 2019E	Revenues 2020E	EV/Sales 2018A	EV/Sales 2019E	EV/Sales 2020E
	Probiotics													
CHR-DK	Chr. Hansen Holding	DK	DKK	77,556	9,144	510	5,526	82,966	8,172	8,716	9,381	10.2x	9.5x	8.8x
BIOG.B-SE	BioGaia	SE	KR	6,829	574	160	(135)	6,999	742	824	936	9.4x	8.5x	7.5x
PROB-SE	Probi	SE	KR	3,493	290	145	(125)	3,293	604	692	794	5.5x	4.8x	4.2x
049960-KR	Cell Biotech	KR	W	169,670	115	64,849	(64,096)	71,351	62,544			1.1x		
8279-TW	Syngen Biotech	TW	NT$	3,315	84	111	245	3,560	1,080	1,368		3.3x	2.6x	
6553-TW	glac Biotech	TW	NT$	3,219	82	518	(518)	3,061	989			3.1x		
238200-KR	BIFIDO Corp.	KR	W	94,888	63	27,899	(27,806)	67,082	14,870			4.5x		
3164-TW	GenMont Biotech	TW	NT$	2,329	60	909	(875)	1,559	407			3.8x		
ABB-ES	AB Biotics	ES	€	63	56	3	(2)	60	12	14	19	5.0x	4.1x	3.1x
BLT-NZ	BLIS Technologies	NZ	NZ$	47	24	1	(0)	46	8			5.7x		
BXN-AU	Bioxyne	AU	A$	12	7	2	(2)	10	2			4.9x		
	Median											**4.9x**	**4.8x**	**5.8x**
	Mean											**5.1x**	**5.9x**	**5.9x**
	Prebiotics													
300149-CN	Quantum Hi-Tech (China) Biological Co	CN	Y	7,037	823	167	714	7,764	990			7.8x		
002604-CN	Shandong Longlive Bio-Technology Co	CN	Y	1,175	133	100	2,687	3,864	844			4.6x		
BGA-CA	BioNeutra Global Corp.	CA	C$	7	5	1	7	17	38			0.4x		
	Median											**4.6x**		
	Mean											**4.3x**		
	Functional foods & supplements													
USNA-US	USANA Health Sciences	US	$	1,564	1,280	234	(215)	1,330	1,189	1,043	1,100	1.1x	1.3x	1.2x
531335-IN	Zydus Wellness	IN	RS	96,740	1,185	2,104	13,589	110,329	8,424	17,953	20,360	13.1x	6.1x	5.4x
1707-TW	Grape King Bio	TW	NT$	25,826	663	1,280	(484)	26,183	9,183	9,491	10,304	2.9x	2.8x	2.5x
092040-KR	Amicogen	KR	W	435,999	287	22,785	14,248	483,019	94,522			5.1x		
MDC-AU	Medlab Clinical	AU	A$	101	57	11	(10)	91	5			16.7x		
BIO-ES	Biosearch	ES	€	59	52	1	3	63	27	25	29	2.4x	2.5x	2.2x
ANR-AU	Anatara Lifesciences	AU	A$	10	5	5	(5)	4	0.66	3	6	6.7x	1.3x	0.7x
	Median											**5.1x**	**2.5x**	**2.2x**
	Mean											**6.9x**	**2.8x**	**2.4x**
	Large food comglomerates													
BN-FR	Danone	FR	€	56,068	49,236	5,038	12,851	67,324	24,651	25,365	26,303	2.7x	2.7x	2.6x
1216-TW	Uni-President Enterprises Corp.	TW	NT$	438,083	11,461	105,392	48,537	550,637	431,446	449,707	467,386	1.3x	1.2x	1.2x
2267-JP	Yakult Honsha Co.	JP	¥	#######	7,763	153,543	(36,866)	962,556	407,017	408,708	419,272	2.4x	2.4x	2.3x
TATE-GB	Tate & Lyle	GB	£	3,452	3,390	285	312	3,731	2,755	2,872	2,925	1.4x	1.3x	1.3x
	Median											**1.9x**	**1.8x**	**1.8x**
	Mean											**1.9x**	**1.9x**	**1.8x**
	Biotech/Pharma													
ASMB-US	Assembly Biosciences	US	$	284	230	174	(161)	110	15	14	14	7.4x	7.8x	7.6x
KLDO-US	Kaleido Biosciences	US	$	267	220	100	(85)	182	-	15	25		12.1x	7.3x
MCRB-US	Seres Therapeutics	US	$	257	214	102	(80)	154	28	34	34	5.5x	4.6x	4.6x
IBT.B-SE	Infant Bacterial Therapeutics	SE	KR	2,403	197	539	(539)	1,947	-					
RDHL-IL	RedHill Biopharma	IL	NIS	817	182	124	(110)	707	30	33.4	118.2	23.5x	21.1x	6.0x
EVLO-US	Evelo Biosciences	US	$	190	157	113	(99)	91	-	0	0		911.7x	364.7x
MDC-AU	Medlab Clinical	AU	A$	101	57	11	(10)	91	5			16.7x		
DDDD-GB	4d Pharma	GB	£	50	50	26	(26)	24	-	-	-			
ARMP-US	Armata Pharmaceuticals	US	$	47	38	13	(10)	34	-	-	-			
AZRX-US	AzurRx BioPharma	US	$	26	21	1	1	27	-	-	-			
OGEN-US	Oragenics	US	$	19	17	26	(25)	0	-	-	-			
RTTR-US	Ritter Pharmaceuticals	US	$	11	9	4	(4)	11	-	-	-			
	Median											**12.1x**	**12.1x**	**7.3x**
	Mean											**13.3x**	**191.5x**	**78.0x**

Source: FactSet, Market data as of 9th September 2019

Select M&A deals

We have identified a number of relevant M&A transactions outlined in CHART 129 involving companies that operate within the probiotic and prebiotic markets. Like OPTI, many of the transactions involve companies with specific IP ownership over individual strains of bacteria or acquisition of such individual assets. We also note the prevalence of large multinationals making strategic acquisitions in order to gain entry into the fast-growing probiotic market, such as the purchase of Kevita by PepsiCo in 2016 followed by the takeover of Organic & Raw by The Coca Cola Company.

CHART 129: Precedent M&A deals involving probiotics and / or prebiotics

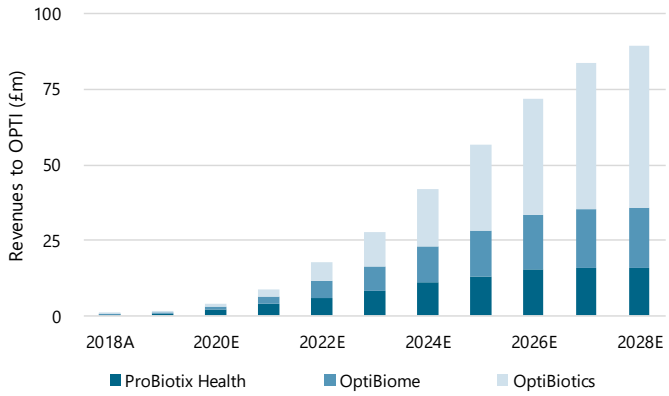
Date	Target	Description	Acquirer	Value (£m)	Sales multiple	Rationale
Jul-19	AURELIA PROBIOTIC SKINCARE	Premium probiotic skincare brand	H&H Group	21	-	Complement care segment of H&H's Adult Nutrition and Care business
Jul-19	AB-BIOTICS	Focus on probiotics and precision medicine	KANEKA	54	5.1x	Acquire probiotic strain portfolio
Jun-19	glac	Integrated provider of services and proprietary strains to full probiotic value chain	Ausnutria	68	2.8x	Leverage R&D capabilities to expand Ausnutria's nutritional products business
Sep-18	Organic & Raw	Production of naturally fermented, live culture, organic kombucha drinks	Coca-Cola	n.d.	n.a.	Expand into the probiotic drinks market
Jun-18	Probiotics International	Probiotic supplements for human and animal use	ADM	185	4.7x	Acquire Protexin brand and its products (e.g. Bio-Kult) to widen Health & Wellness offering
Apr-18	NEBRASKA CULTURES	Manufactures ProDura brand of probiotic products	UASLabs	n.d.	n.a.	Provide UAS exclusivity over *Lactobacillus acidophilus* DDS-1, one of the most studied probiotic strains
Jan-19	life·space	One of the largest probiotic companies in Australia, with a diversified brand portfolio	BY-HEALTH	384	70x	Acquire established probiotic brand in China to take advantage of growing Chinese market
Dec-17	BioCare COPENHAGEN	Provider of white label probiotic supplements	DSM	n.d.	n.a.	Expand offering in gut health ingredients segment with addition of probiotic products
Nov-17	CAMBROOKE	Medical foods company	AJINOMOTO	49	5.2x	Enter US medical foods market
Oct-17	Ganeden	Probiotic ingredient manufacturer for food and beverage products containing the BC30 strain	KERRY	n.d.	n.a.	Expand Kerry's taste and nutrition portfolio in addition to acquisition of Red Arrow Products, Island Oasis and Wellmune
Jan-17	up4 PROBIOTICS	Probiotic brand owned by UAS Laboratories	i-Health	n.d.	n.a.	Complement I-Health's (DSM subsidiary) Culturelle brand and accelerate leading position in the probiotic category
Nov-16	KEVITA	Producer of coconut-based organic probiotic beverages	PEPSICO	240	7.3x	Expand health and wellness product offers in the premium chilled beverages space
Sep-16	Valio LGG® strain	Valio's *Lactobacillus rhamnosus* GG strain utilised in food products in over 50 countries	CHR. HANSEN	64	8.2x	Capture full potential of LGG® brand across markets for dietary supplements and infant formula combined with own strains e.g. BB-12®
Jul-16	Florajen	Probiotic dietary supplement to maintain digestive health	Clarion brands	n.d.	n.a.	Expand OTC health product portfolio
Jun-16	NUTRACEUTIX	Operations of US probiotic company TNT Gamble	probi	72	3.1x	Increase market share in North America and add new technologies and partners
May-16	RenewLife	Leader in US natural probiotics market. Focus on digestive health	CLOROX	200	2.7x	Accelerate growth through bolt-on acquisitions of leading brands into fast-growing markets
Dec-15	PROMOVITA	Production of GOS as prebiotics for use in infant formula	DAIRY CREST	12	38.7x	Acquire remaining 50% stake of JV with Fayrefield Foods to control GOS business

Abbreviations: GOS: galactooligosaccharide; JV: joint venture
Source: goetzpartners Research, Company data

Key financial assumptions

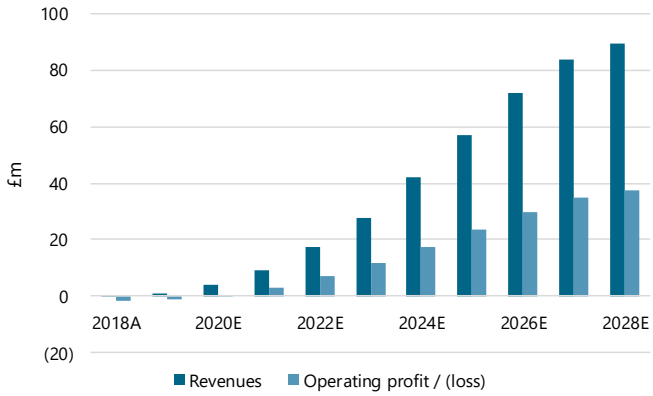
Our revenue estimates shown in CHART 130 are based on individual forecasts for individual deals OPTI has already signed and future deals that we expect the company to sign, based on nearly 320 deals in the period 2017A - 2030E. Since OPTI operates a semi-virtual business model, we expect the cost base to remain low, with increasing personnel costs partially offset by declining R&D and IP expenses. This may allow the company to break even as early as 2020E at the EBIT level, albeit starting from a low base. Revenues and profitability are expected to ramp up quickly as an increasing number of deals start to generate revenues and these grow over the life of the agreement (CHART 131).

CHART 130: Revenues by subsidiary, 2018A – 2028E



Source: goetzpartners Research estimates

CHART 131: Revenues and operating profit, 2018A – 2028E



Source: Company data, goetzpartners Research estimates
Warning Note: Past performance and forecasts are not a reliable indicator of future performance or results. The return may increase or decrease as a result of currency fluctuations.

Profit and loss model

Revenues are expected to be several-fold larger in H2/2019 vs. H1/2019. Contributing factors include first revenues from SlimBiome Medical, a milestone payment related to manufacturing of LP_{LDL} to FDA pharmaceutical standards, and license or royalty payments

Below we briefly summarise key assumptions underlying our financial forecasts.

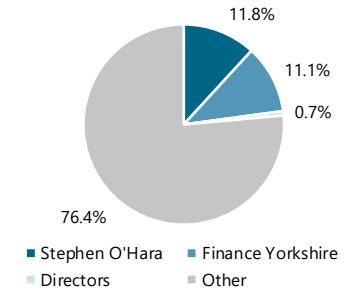
- **Revenues:** we expect revenues to reach nearly £1m in 2019E, close to £4m in 2020E and grow to >£25m in 2023E, driven by growing revenues from existing and new agreements for all products, as well as the entry into new regions, particularly the US and Asia. Revenues are lumpy as many partners pay once or twice pear year, and revenues tend to be higher in H2 vs. H1;
- **Gross margin:** the increasing contribution of lower-margin manufacturing deals over time is expected to gradually lower the gross margin from 68% in 2018 to 60% in 2021E and 57% in 2024E;
- **Depreciation and amortisation:** since OPTI is an asset-light business, we model depreciation and amortisation expenses of £100k - £200k per year;
- **Administrative costs:** the increase in personnel expenses is expected to more than offset the decline in R&D and IP-related expenses, leading to rising administrative expenses throughout the forecast period, stabilising at 15% of revenues in the longer term;
- **Finance expenses:** in 2018 OPTI issued convertible loan notes ("CLNs") that carry an interest rate of 3% above the Bank of England base rate. We therefore assume an interest rate of 3.75% p.a. until the CLNs mature in December 2023;
- **Share of loss from associate:** OPTI accounts for its 37.6% share in SBTX using the equity method. Our estimates are based on an abbreviated FCF model for SBTX;
- **Income taxes:** since OPTI has been accumulating tax loss carryforwards, we expect the company to start paying taxes at a low rate in 2021E and only pay income tax at the UK's standard corporate tax rate of 18% from 2023E.

Balance sheet & cash flow

- **Liquidity:** based on our estimates, OPTI should have sufficient cash through to profitability. That said, we expect the cash balance to fall to <£500k in 2020E and it is therefore possible that the company may wish to raise funds to have greater financial flexibility and support further sales growth;
- **Convertible loan notes:** in December 2018, OPTI raised £1.025m through the issue of CLNs. The proceeds are earmarked for a potential IPO of the ProBiotix subsidiary, in which case the CLNs can be converted at a 50% discount to the issue price of ProBiotix shares. Since we cannot predict the timing or pricing of a potential IPO, we assume that the CLNs are held to maturity (December 2023).

Executive Management and Board of Directors

CHART 132: OPTI shareholders



Source: Company data

Stephen O'Hara | CEO

Stephen O'Hara founded OPTI in 2012, has served as CEO since and remains the largest individual shareholder (CHART 132). He trained as a scientist and worked in pharma and medical devices. He worked on many publications and has several patents to his name. In 2000, he formed Acolyte Biomedica, sold to 3M for £40m in 2007. He remained Director of Microbiology until 2009. Since then, he has worked for small and large companies. Mr O'Hara holds an MBA from Bournemouth University, a Master in Biomedical Sciences from the University of West England, and a Master of Science in Medical Microbiology and Bacteriology from University of Surrey.

Fred Narbel | Managing Director, Prebiotics

Fred Narbel joined as a Managing Director of prebiotics in March 2019. He has >10 years' of experience in the medical devices and food industries and brings extensive experience of selling speciality food ingredients in international markets, particularly China and the US. Prior to joining OPTI, he worked for Canadian dairy company Agropur, including as VP of Sales – Nutrition Solutions and Director of International Sales. Mr Narbel has also been a project and business development manager in Russia and Kazakhstan. He served in the Swiss Air Force as a sergeant in 2004. Mr Narbel holds Bachelor, Master and PhD degrees in Business Administration from Business School Lausanne.

Stephen Prescott | CEO, ProBiotix Health

Stephen Prescott joined in July 2019 from a position as VP of Marketing and Applications from Swedish probiotic company Probi AB. Prior to this role, Stephen spent four years as Global Probiotic Product Manager at Dupont. Stephen brings extensive experience of commercialising probiotics in international markets, a wide network of industry contacts and a strong track record of rapidly growing sales.

Dr Sofia Kolyda | Research & Development Director

Sofia Kolyda became R&D Director at OPTI in July 2018. She has 10 years' post-doctoral experience as a research assistant at the Reading University Department of Food and Nutritional Sciences. She is widely published within the microbiome field. Dr Kolyda was previously OPTI's Head of Research and her expertise has been instrumental in the development of OPTI's technology through laboratory studies, human studies and manufacturing scale up. In the past, she also undertook contract work for organisations such as GlaxoSmithKline, Proctor & Gamble, and Tate & Lyle.

Neil Davidson CBE | Chairman

Neil Davidson has over 30 years of operational and board experience as Chairman and Chief Executive of FTSE 50, AIM and private companies in both an executive and non-executive capacity. He is currently non-executive Director at Morrison Supermarkets. Before taking on multiple board positions in FTSE listed and private companies, he was Chief Executive of Express Dairies and Arla Foods. In 2006, Sir Davidson was awarded a CBE for services to the food and dairy industry. He holds a Bachelor of Arts from the University of Nottingham and a Master of Science in Psychology from the University of London.

Peter Wennström | Non-Executive Director

Peter Wennström has over 25 years of experience in international brand management and consultancy in nutrition, health and wellness. He is regarded as one of the world's leading experts in functional foods innovation and marketing. In 2007, he founded The Healthy Marketing Team ("HMT"), an international and multicultural brand strategy consultancy focused on innovation, marketing and branding in food and health. He graduated from Lund University in Communication, Sociology, Psychology and English.

Sean Christie | Non-Executive Director

Sean Christie is a Non-Executive Director at Turner & Townsend, Applied Graphene Materials and Accsys Technologies. From 2006 to 2015 he was Group Finance Director of Croda International, a global manufacturer of speciality chemicals. Prior to joining Croda, he was Group Finance Director of Northern Foods. Sean Christie also served as a Non-Executive Director at several private companies. He is a Fellow of the Chartered Institute of Management Accountants and of the Association of Corporate Treasurers. Sean Christie graduated from the University of Reading with a Bachelor of Science in Mathematics.

Financial models

CHART 133: OptiBiotix profit and loss model

Profit & Loss Statement	2016A	2017A	2018A	H1/19A	H2/19E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E
Nov YE (GBPk except EPS)	30-Nov-16	30-Nov-17	30-Nov-18	31-May-19	30-Nov-19	30-Nov-19	30-Nov-20	30-Nov-21	30-Nov-22	30-Nov-23	30-Nov-24	30-Nov-25	30-Nov-26
Revenue	**288**	**191**	**514**	**149**	**794**	**942**	**3,902**	**8,778**	**17,437**	**27,611**	**41,832**	**56,716**	**71,901**
growth	922%	(34%)	169%	85%	83%	83%	314%	125%	99%	58%	52%	36%	27%
Probiotix Health - LP_{LDL} (Food)			402	82	471	553	1,728	3,319	5,474	8,077	10,717	12,814	14,258
% sales			78%			59%	44%	38%	31%	29%	26%	23%	20%
growth							213%	92%	65%	48%	33%	20%	11%
Probiotix Health - LP_{LDL} (Pharma)						150	150	338	394	244	464	267	900
% sales						16%	4%	4%	2%	1%	1%	0%	1%
growth							0%	125%	17%	(38%)	90%	(42%)	237%
OptiBiome - SlimBiome			82	67	95	162	984	2,429	5,643	7,881	11,484	15,165	17,935
% sales			16%			17%	25%	28%	32%	29%	27%	27%	25%
growth							507%	147%	132%	40%	46%	32%	18%
Optibiotics - SweetBiotix / LP_{GOS}			30			78	1,040	2,693	5,926	11,410	19,166	28,470	38,809
% sales			6%			8%	27%	31%	34%	41%	46%	50%	54%
growth							1242%	159%	120%	93%	68%	49%	36%
Cost of Sales	**(38)**	**(74)**	**(163)**	**(87)**	**(211)**	**(298)**	**(1,510)**	**(3,525)**	**(7,151)**	**(11,664)**	**(17,828)**	**(24,483)**	**(30,980)**
% sales	13%	39%	32%	58%	27%	32%	39%	40%	41%	42%	43%	43%	43%
growth		93%	121%	131%	69%	83%	406%	134%	103%	63%	53%	37%	27%
Gross profit	**250**	**117**	**352**	**62**	**582**	**644**	**2,392**	**5,252**	**10,286**	**15,947**	**24,004**	**32,233**	**40,921**
% sales	87%	61%	68%	42%	73%	68%	61%	60%	59%	58%	57%	57%	57%
growth	786%	(53%)	199%	45%	89%	83%	271%	120%	96%	55%	51%	34%	27%
Share-based payments	(34)	(57)	(128)	(74)	(61)	(135)	(137)	(140)	(143)	(146)	(149)	(152)	(155)
% sales	12%	30%	25%	50%	8%	14%	4%	2%	1%	1%	0%	0%	0%
growth	(88%)	67%	125%	51%	(23%)	5%	2%	2%	2%	2%	2%	2%	2%
Depreciation & amortisation	(114)	(120)	(142)	(83)	(53)	(137)	(131)	(142)	(162)	(173)	(183)	(190)	(183)
% sales	39%	63%	28%	56%	7%	14%	3%	2%	1%	1%	0%	0%	0%
growth	0%	5%	18%	42%	(36%)	(4%)	(4%)	9%	14%	7%	6%	3%	(4%)
Other administrative costs	(1,618)	(2,067)	(1,580)	(868)	(870)	(1,738)	(1,999)	(2,299)	(2,790)	(4,142)	(6,275)	(8,507)	(10,785)
% sales	562%	1082%	307%	583%	110%	184%	51%	26%	16%	15%	15%	15%	15%
growth	55%	28%	(24%)	(5%)	30%	10%	15%	15%	21%	48%	52%	36%	27%
Administrative expenses	**(1,766)**	**(2,244)**	**(1,850)**	**(1,025)**	**(984)**	**(2,010)**	**(2,267)**	**(2,581)**	**(3,094)**	**(4,460)**	**(6,607)**	**(8,849)**	**(11,122)**
% sales	613%	1175%	360%	689%	124%	213%	58%	29%	18%	16%	16%	16%	15%
growth	22%	27%	(18%)	0%	19%	9%	13%	14%	20%	44%	48%	34%	26%
Operating profit/(loss)	**(1,516)**	**(2,127)**	**(1,499)**	**(963)**	**(402)**	**(1,365)**	**125**	**2,671**	**7,191**	**11,487**	**17,397**	**23,384**	**29,799**
% sales	(526%)	(1113%)	(291%)	(647%)	(51%)	(145%)	3%	30%	41%	42%	42%	41%	41%
growth	7%	40%	(30%)	(1%)	(23%)	(9%)	(109%)	2041%	169%	60%	51%	34%	27%
EBITDA	**(1,402)**	**(2,007)**	**(1,357)**	**(880)**	**(349)**	**(1,229)**	**256**	**2,813**	**7,353**	**11,660**	**17,580**	**23,574**	**29,981**
% sales	(487%)	(1050%)	(264%)	(591%)	(44%)	(130%)	7%	32%	42%	42%	42%	42%	42%
Financial expenses, net	**0.2**	**3,816**	**(448)**	**(298)**	**(264)**	**(562)**	**(585)**	**(656)**	**(693)**	**(580)**	**(228)**	**430**	**1,512**
Finance cost	-	(6.2)	-	(50)	(18)	(68)	(26)	(26)	(26)	-	-	-	-
Finance income	0.2	0.1	0.2	-	-	-	-	-	-	-	-	-	-
Share of loss from associate	-	(294)	(448)	(248)	(246)	(494)	(560)	(630)	(668)	(580)	(228)	430	1,512
Other financial income	-	4,116	-	-	-	-	-	-	-	-	-	-	-
Profit before tax	**(1,516)**	**1,689**	**(1,947)**	**(1,261)**	**(666)**	**(1,927)**	**(461)**	**2,015**	**6,498**	**10,908**	**17,169**	**23,814**	**31,311**
growth	6%	(211%)	(215%)	6%	(12%)	(1%)	(76%)	(538%)	222%	68%	57%	39%	31%
Income Taxes	175	228	54	43	11	54	13	(101)	(780)	(1,963)	(3,090)	(4,287)	(5,636)
Tax rate	(12%)	14%	(3%)	(3%)	(2%)	(3%)	(3%)	(5%)	(12%)	(18%)	(18%)	(18%)	(18%)
Adjusted tax rate	(12%)	(9%)	(3%)	(3%)	(2%)	(3%)	(3%)	(5%)	(12%)	(18%)	(18%)	(18%)	(18%)
Profit / (loss) for the period	**(1,341)**	**1,918**	**(1,893)**	**(1,218)**	**(655)**	**(1,873)**	**(448)**	**1,915**	**5,718**	**8,944**	**14,079**	**19,527**	**25,675**
Non-controlling interests	(43)	10	27	(0.8)	28	27	28	28	29	29	30	31	31
Owners of the company	(1,298)	1,907	(1,919)	(1,217)	(683)	(1,900)	(475)	1,886	5,689	8,915	14,049	19,497	25,643
EPS calculation													
Earnings/(loss) per share (basic)	**(1.67)**	**2.43**	**(2.33)**	**(1.43)**	**(0.80)**	**(2.23)**	**(0.56)**	**2.21**	**6.68**	**10.47**	**16.49**	**22.89**	**30.11**
growth	(4.5%)	(245.3%)	(196.2%)	4.7%	(18.4%)	(4.4%)	(75.0%)	(496.7%)	201.6%	56.7%	57.6%	38.8%	31.5%
Earnings/(loss) per share (diluted)	**(1.44)**	**2.17**	**(2.33)**	**(1.43)**	**(0.80)**	**(2.23)**	**(0.56)**	**2.21**	**6.68**	**10.47**	**16.49**	**22.89**	**30.11**
growth	(3.0%)	(250.6%)	(207.5%)	18.3%	(28.3%)	(4.4%)	(75.0%)	(496.7%)	201.6%	56.7%	57.6%	38.8%	31.5%
Number of shares (basic)	77.68	78.59	82.23	85.18	85.18	85.18	85.18	85.18	85.18	85.18	85.18	85.18	85.18
Number of shares (diluted)	90.01	87.83	82.23	85.18	85.18	85.18	85.18	85.18	85.18	85.18	85.18	85.18	85.18

Source: Company data, goetzpartners Research estimates.

Warning Note: Past performance and forecasts are not a reliable indicator of future performance or results. The return may increase or decrease as a result of currency fluctuations.

CHART 134: OptiBiotix balance sheet model

Balance Sheet	2016A	2017A	2018A	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E
Nov YE (GBPk)	30-Nov-16	30-Nov-17	30-Nov-18	30-Nov-19	30-Nov-20	30-Nov-21	30-Nov-22	30-Nov-23	30-Nov-24	30-Nov-25	30-Nov-26
ASSETS											
Non-current assets	**2,207**	**6,123**	**5,997**	**5,604**	**5,502**	**5,612**	**5,662**	**6,025**	**6,884**	**8,275**	**10,992**
Intangibles	2,196	1,927	2,253	2,353	2,809	3,547	4,259	5,193	6,266	7,212	8,398
Property, plant & equipment	11.8	6.6	3.1	3.6	5.1	7.6	13.5	22.3	35.5	51.0	70.4
Investments	-	4,189	3,741	3,247	2,687	2,057	1,390	810	582	1,012	2,523
CURRENT ASSETS	**3,456**	**1,546**	**2,032**	**1,343**	**1,346**	**3,646**	**10,077**	**18,796**	**33,204**	**52,613**	**76,821**
Inventories	27	9	30	49	248	580	1,175	1,917	2,931	4,025	5,093
Trade and other receivables	194	106	374	304	581	880	1,596	2,437	3,611	4,840	6,093
Current tax asset	120	184	304	313	322	332	342	352	363	374	385
Cash and cash equivalents	3,115	1,247	1,324	677	194	1,854	6,963	14,089	26,300	43,375	65,250
TOTAL ASSETS	**5,664**	**7,669**	**8,030**	**6,948**	**6,847**	**9,257**	**15,739**	**24,821**	**40,088**	**60,888**	**87,813**
LIABILITIES											
CURRENT LIABILITIES	**254**	**239**	**521**	**375**	**571**	**912**	**1,518**	**2,270**	**3,294**	**4,399**	**5,478**
Accounts payable	-	10	116	61	248	580	1,175	1,917	2,931	4,025	5,093
Accrued expenses	254	211	207	213	220	226	233	240	247	255	262
Amount due to director	0	0	0	0	0	0	0	0	0	0	0
Other payables	-	18	198	100	103	106	109	113	116	119	123
NON-CURRENT LIABILITIES	**407**	**384**	**446**	**1,142**	**1,156**	**1,170**	**1,184**	**517**	**533**	**549**	**565**
Convertible loan notes	-	-	-	682	682	682	682	-	-	-	-
Deferred tax liability	407	384	446	460	473	488	502	517	533	549	565
TOTAL LIABILITIES	**660**	**623**	**967**	**1,517**	**1,727**	**2,082**	**2,703**	**2,787**	**3,827**	**4,948**	**6,043**
EQUITY											
SHAREHOLDERS EQUITY (DEFICIT)	**5,003**	**7,046**	**7,062**	**5,431**	**5,121**	**7,175**	**13,037**	**22,034**	**36,261**	**55,941**	**81,770**
Called up share capital	7,196	1,587	1,694	1,709	1,709	1,709	1,709	1,709	1,709	1,709	1,709
Share premium	6,144	6,280	1,604	1,604	1,604	1,604	1,604	1,604	1,604	1,604	1,604
Share based payment reserve	418	475	603	737	875	1,015	1,158	1,303	1,452	1,604	1,758
Merger relief reserve	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Retained earnings	(10,346)	(2,805)	1,624	(276)	(751)	1,135	6,824	15,739	29,788	49,285	74,928
Non controlling interest	91	10	37	64	92	120	149	179	209	239	271
Convertible loan reserve	-	-	-	93	93	93	93	-	-	-	-
TOTAL LIABILITIES & SHAREHOLDERS' EQUITY	**5,664**	**7,669**	**8,030**	**6,948**	**6,847**	**9,257**	**15,739**	**24,821**	**40,088**	**60,888**	**87,813**
GEARING											
Gross debt	**-**	**-**	**-**	**682**	**682**	**682**	**682**	**-**	**-**	**-**	**-**
Cash and cash equivalents plus investments	**3,115**	**5,436**	**5,065**	**3,924**	**2,881**	**3,912**	**8,353**	**14,899**	**26,882**	**44,500**	**67,891**
Net debt/(cash)	**(3,115)**	**(5,436)**	**(5,065)**	**(3,242)**	**(2,199)**	**(3,229)**	**(7,671)**	**(14,899)**	**(26,882)**	**(44,500)**	**(67,891)**

Source: Company data, goetzpartners Research estimates.

Warning Note: Past performance and forecasts are not a reliable indicator of future performance or results. The return may increase or decrease as a result of currency fluctuations.

CHART 135: OptiBiotix cash flow model

Cash Flow Statement	2016A	2017A	2018A	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E
Nov YE (GBPk)	30-Nov-16	30-Nov-17	30-Nov-18	30-Nov-19	30-Nov-20	30-Nov-21	30-Nov-22	30-Nov-23	30-Nov-24	30-Nov-25	30-Nov-26
OPERATING CASH FLOW											
Operating profit/(loss)	(1,516)	(2,127)	(1,499)	(1,365)	125	2,671	7,191	11,487	17,397	23,384	29,799
Depreciation	1	7	2	1	1	2	2	2	1	2	2
Amortisation	113	113	140	135	129	140	160	170	182	188	180
Share option expense	34	57	128	135	137	140	143	146	149	152	155
Change in operating assets/liabilities											
Decrease/(increase) in trade and other receivables	(132)	(172)	(268)	70	(277)	(298)	(716)	(841)	(1,174)	(1,229)	(1,253)
Increase/(decrease) in trade and other payables	128	209	282	(146)	196	341	606	752	1,024	1,105	1,079
Decrease in inventories	(27)	18	(22)	(19)	(199)	(331)	(596)	(742)	(1,013)	(1,094)	(1,068)
Loss on disposal of tangible and intangible assets	-	-	3	-	-	-	-	-	-	-	-
Interest received/(paid)	0	0	0	(68)	(26)	(26)	(26)	-	-	-	-
Taxation	152	142	-	58	17	(96)	(775)	(1,959)	(3,086)	(4,281)	(5,631)
Net cash outflow from operating activities	**(1,246)**	**(1,753)**	**(1,234)**	**(1,199)**	**105**	**2,543**	**5,989**	**9,016**	**13,480**	**18,226**	**23,263**
CASH FLOW FROM INVESTING											
Purchase of PP&E	(11)	(2)	(3)	(2)	(3)	(4)	(8)	(11)	(15)	(17)	(22)
Purchase of intangible assets	(162)	(43)	(470)	(236)	(585)	(878)	(872)	(1,104)	(1,255)	(1,134)	(1,366)
Investment in subsidiaries	134	-	-	-	-	-	-	-	-	-	-
Disposal of subsidiary net of cash balances	-	(228)	2	-	-	-	-	-	-	-	-
Net cash outflow from investing activities	**(39)**	**(273)**	**(471)**	**(237)**	**(588)**	**(882)**	**(880)**	**(1,115)**	**(1,270)**	**(1,151)**	**(1,388)**
CASH FLOW FROM FINANCING											
Share issues	2,359	159	1,781	14	-	-	-	-	-	-	-
Debt issuance / repayment	-	-	-	775	-	-	-	(775)	-	-	-
Net cash inflow from financing activities	**2,359**	**159**	**1,781**	**789**	**-**	**-**	**-**	**(775)**	**-**	**-**	**-**
Increase/(decrease) in cash and equivalents	1,074	(1,868)	77	(647)	(484)	1,661	5,109	7,126	12,211	17,075	21,875
Cash and cash equivalents at beginning of year	2,041	3,115	1,247	1,324	677	194	1,854	6,963	14,089	26,300	43,375
Cash and cash equivalents at end of year	**3,115**	**1,247**	**1,324**	**677**	**194**	**1,854**	**6,963**	**14,089**	**26,300**	**43,375**	**65,250**
Cash (burn)/generation	**(1,285)**	**(2,027)**	**(1,704)**	**(1,437)**	**(484)**	**1,661**	**5,109**	**7,901**	**12,211**	**17,075**	**21,875**

Source: Company data, goetzpartners Research estimates.

Warning Note: Past performance and forecasts are not a reliable indicator of future performance or results. The return may increase or decrease as a result of currency fluctuations.

COMPANY DESCRIPTION

OptiBiotix Health Plc ("OPTI") is a life sciences company operating in one of the most progressive areas of biotechnological research. Developing technologies that modulate the human microbiome – the collective genome of the microbes in the body – OptiBiotix identifies and develops microbial strains, compounds and formulations for use in food ingredients, supplements and active compounds that can impact human physiology, deriving potential health benefits. The company has already discovered and developed four functional food ingredients for lifestyle diseases, two of which - LP_{LDL} for elevated cholesterol and SlimBiome for weight loss - are already generating revenues through agreements with corporate partners in the food and health & wellbeing industries. Two additional ingredients are in late stages of development, SweetBiotix (calorie-free sweet fibres for sugar replacement) and LP_{GOS} (prebiotic that enhances the effects of LP_{LDL}). OPTI completed its IPO on the alternative investment market ("AIM") in London in 2014.

SCENARIOS

Base Case - GP Investment Case

OPTI signs nearly 320 cumulative deals for LP_{LDL}, SlimBiome, SweetBiotix and LP_{GOS} in the period 2017A - 2030E. Total revenues exceed £50m in 2025E. Profitability is achieved in 2021E.

Bluesky Scenario

The total number of deals exceeds 320 before 2030E, revenues ramp up faster than we forecast, peak sales exceed our expectations, margins are larger than anticipated.

Downside risk

Deal activity slows down, revenue growth is slower than anticipated, profitability is delayed beyond 2021E.

Peer Group Analysis

Peer Group - Grid 1

AB Biotics, Probi AB, BioGaia

Peer Group - Grid 2

Chr. Hansen, Winclove Probiotics, Yakult Honsha Co.

Peer Group - Grid 3

Danone, DSM

SWOT

Strengths: Functional food ingredients are backed by scientific and clinical evidence, which provides differentiation in crowded markets where most products have unproven claims. Asset-light business model focused on the generation of IP. Strong IP protection through >90 patents and >40 trademarks. Strong track record in closing deals, with >45 agreements signed since 2017. Revenues are generated throughout the value chain, including manufacturing, application / formulation and distribution.

Weaknesses: Limited own marketing, hence revenue generation is highly dependent on the commitment and activities of partners. Products are marketed in highly competitive markets. Many competitors are large companies with strong marketing capabilities.

Opportunities: Increasing awareness of consumers about the importance of preventing lifestyle diseases though healthy nutrition. Expansion of geographic footprint into large and fast-growing markets in the US and Asia. Successful development of LP_{LDL} as a pharmaceutical product.

Threats: Increasing competition from similar products. Revenues of corporate partners fall short of expectations due to insufficient effort. Agreements are terminated earlier than expected.

INDUSTRY EXPECTATIONS

Modulation of the microbiome is thought to hold transformational potential in healthcare, thus attracting industry players and investors alike to a market that is expected to be worth $1 trillion by 2025E. OPTI's main target markets are probiotics, prebiotics and other functional foods for chronic lifestyle diseases. Public health policy is shifting towards prevention of lifestyle diseases through the adoption of healthier lifestyles, which invariably includes better nutrition. The underlying drivers are the ageing of the population, increasingly sedentary lifestyles and unhealthy diets. The probiotics market is thought to be worth c. $48bn and expected to grow at a CAGR of 7%. The prebiotics market is smaller and still emerging, but could potentially grow to a similar size. SlimBiome targets the c.$25bn dietary weight management market, while SweetBiotix could play an important role in the sugar market, worth >$110bn.

Important Disclosures: Non-Independent Research

Analyst Certification

I, Kieron Banerjee, hereby certify that the views regarding the companies and their securities expressed in this research report are accurate and are truly held. I have not received and will not receive direct or indirect compensation in exchange for expressing specific recommendations or views in this research report.

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NEUTRAL - Describes stocks that we expect to provide a relative return (price appreciation plus yield) of plus 15% or minus 10% within a 12-month period.

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Companies Mentioned in this report

- (AB-BIOTICS SA (ABB SM))
- (AGROPUR INC (PRIVATE COMPANY))
- (AKUMS DRUGS & PHARMACEUTICALS LTD (PRIVATE COMPANY))
- (ASSEMBLY BIOSCIENCES INC (ASMB US))
- (BOEHRINGER INGELHEIM GMBH (PRIVATE COMPANY))
- (BRISTOL-MYERS SQUIBB CO (BMY US))
- (CAMBRIDGE COMMODITIES LTD (PRIVATE COMPANY))
- (DANONE SA (BN FP))
- (ENTEROME (PRIVATE COMPANY))
- (EXTENSOR (PRIVATE COMPANY))
- (FERRING PHARMACEUTICALS INC (PRIVATE COMPANY))
- (FINE FOODS & PHARMACEUTICALS NTM SPA (PRIVATE COMPANY))
- (FLAGSHIP PIONEERING INC (PRIVATE COMPANY))
- (HERBALIFE NUTRITION LTD (HLF US))
- (HLH BIOPHARMA (PRIVATE COMPANY))
- (JOHNSON & JOHNSON (JNJ US))
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- (NUTRILINEA SRL (PRIVATE COMPANY))
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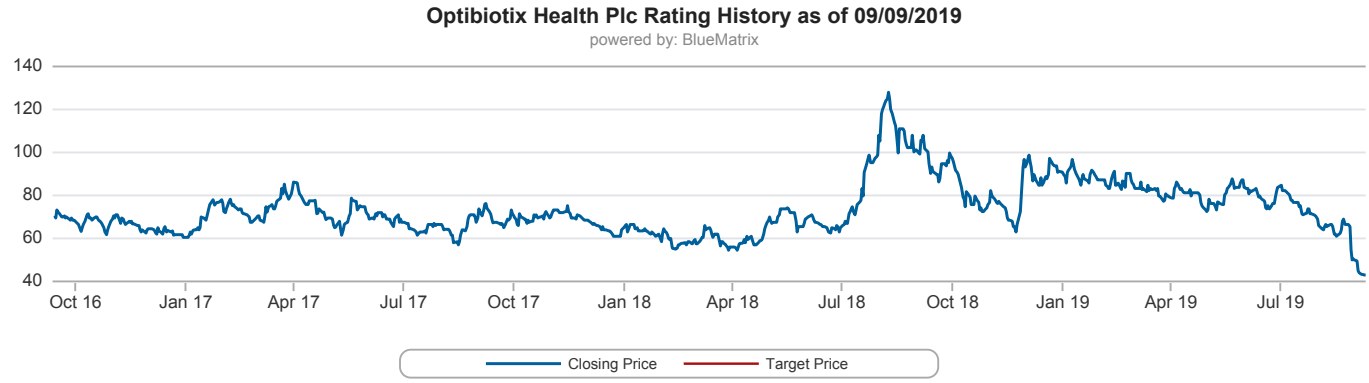

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