



# Infant Bacterial Therapeutics

Corporate Presentation  
September 2018



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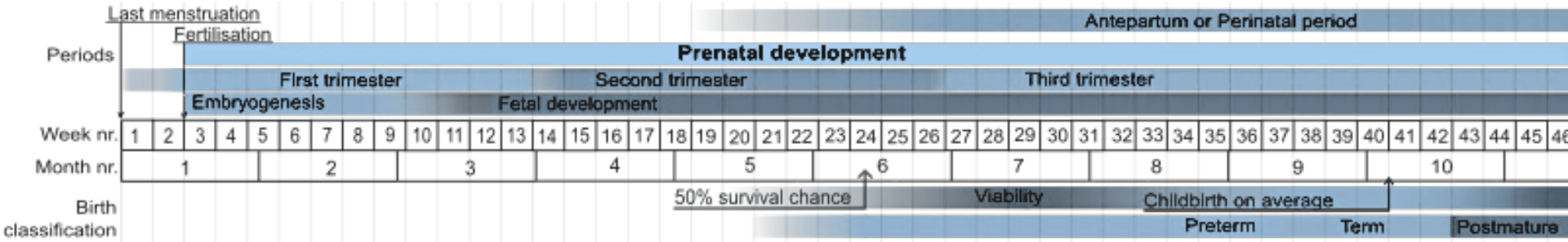
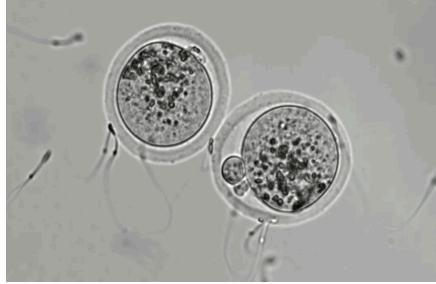
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# Infant Bacterial Therapeutics

## Corporate Overview

- Founded in 2013 in Stockholm, Sweden as subsidiary of BioGaia
- IPO in 2016 on Nasdaq First North, listing on Nasdaq Mid-Cap from September 10, 2018
- Among top 10 institutional shareholders and specialist investors: AP4, AP3, AMF, Swedbank Robur, Sectoral
- Total capital raised: 75 MUSD
- Cash end of Q2 2018: 63 MUSD, sufficient to fund IBP-9414 development until registration
- Market cap: 210 MUSD



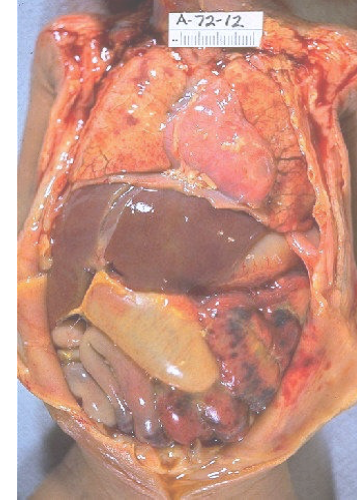
# The IBT concept

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- IBT focuses on concepts of altering the human microbiome to prevent or treat diseases
- Microbiome of the newborn infant is more dynamic than that of the mature human
- Utilize co-evolved human bacterial strains derived from human breast milk
- Published proof-of-concept clinical signal engaged IBT in development

# Necrotizing Enterocolitis

NEC is a deadly disease impacting the preterm infant

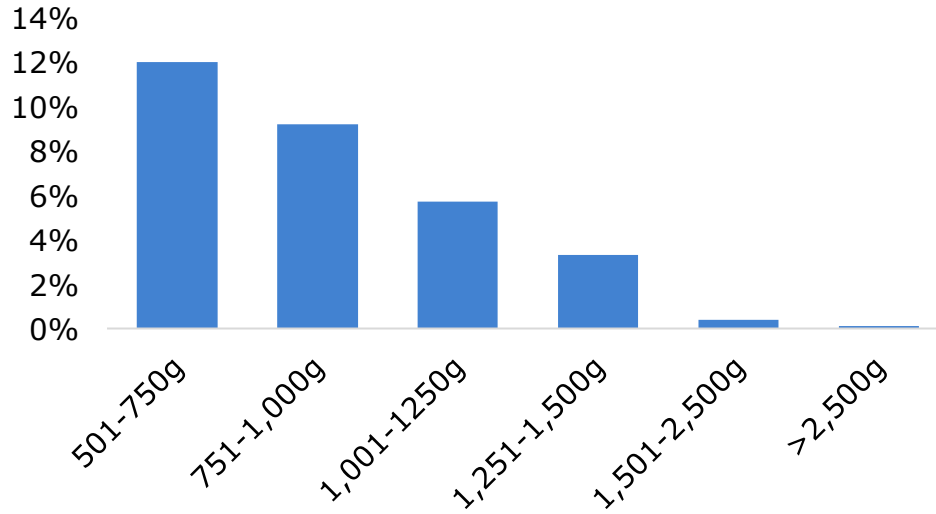


## True unmet medical need

- There is no therapy available today
- 20-40% need complicated and costly surgery
- One of the leading causes of death in the NICU (neonatal intensive care unit)
- Up to 40% death rate, 1500 US and 3700 EU infants lost every year

# NEC – a devastating disease

NEC incidence rate



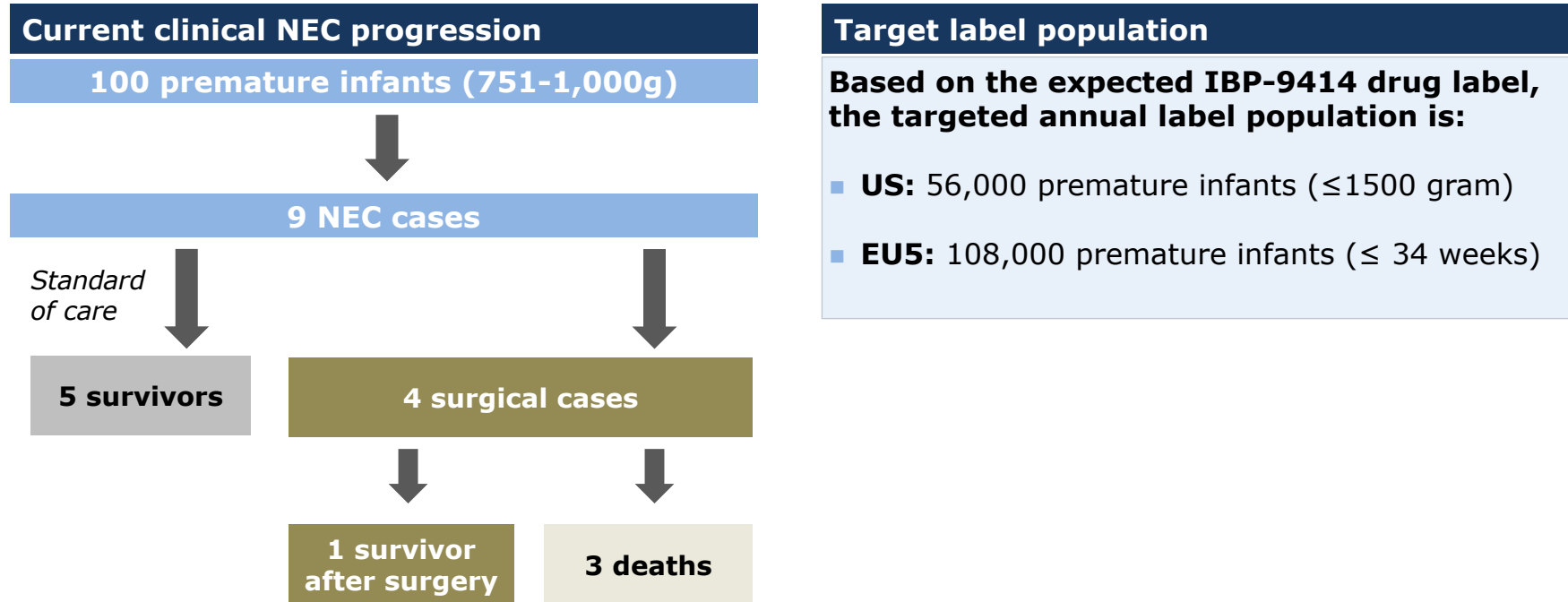
NEC mortality rate

501-750g	42.0%
751-1,000g	29.4%
1,001-1,250g	21.3%
1,251-1,500g	15.9%

**The smaller the premature infant is at birth, the more likely he/she will get NEC and die.**

# Target population

A preventive therapy for all preterm infants at risk of NEC



Approximately 162,000 premature infants at risk of NEC are born each year in US and EU5

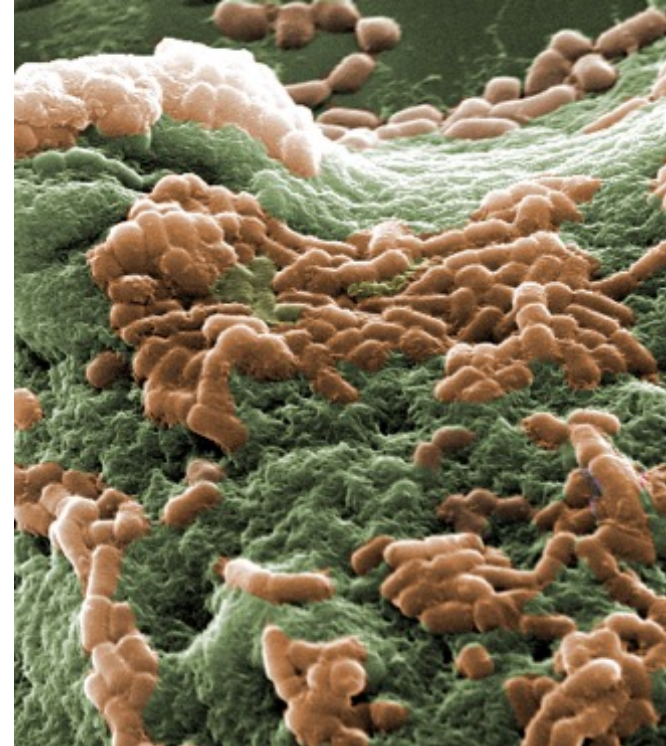


# *Lactobacillus reuteri*

Active pharmaceutical ingredient of IBP-9414



*Lactobacillus reuteri* present on women's breasts



*Lactobacillus reuteri* (orange) adhering to intestinal mucus

# *L. reuteri* an ideal candidate for NEC

*L. reuteri* has strain-specific attributes which affect the NEC pathogenesis

**Major processes involved in  
NEC**

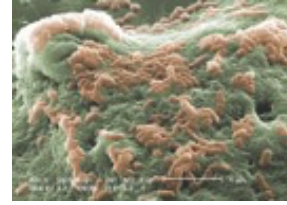


**Dysbiosis**

**Impaired gut motility**

**Unregulated  
Inflammation**

***L. reuteri* strain-specific  
benefits**



**Anti-pathogen effects**

**Improvement of gut  
motility**

**Anti-inflammatory  
effects**

# Clear efficacy signal from *L. reuteri*

All studies show clinically significant reduction of NEC

Study	Number of patients	Reduction in NEC incidence
Rojas et al. (2012)	■ 750 patients	■ 40% in the total study population ■ 37% in infants $\leq 1,500g$
Oncel et al. (2014)	■ 400 patients	■ 20% in the total study population ■ 38% in infants $\leq 1,000g$
Spreckels et al. (2018)	■ 104 patients	■ 53% in infants $\leq 1,000g$
Hunter et al. (2012) & Dimaguila et al. (2013)	■ 354 patients	■ 89% in the total study population
Sanchez Alvarado (2017)	■ 225 patients	■ 64% in infants $\leq 1,500g$
Rolnitsky et al. (2018)	■ 937 patients	■ 49% in the total study population
Jerkovic Raguz et al. (2016)	■ 100 patients	■ 50% in the total study population
Shadkam et al. (2015)	■ 60 patients	■ 82% in the total study population
Hernandez-Enriquez et al. (2016)	■ 44 patients	■ 92% in the total study population

## L. Reuteri demonstrates clear signal on improved feeding tolerance

Premature infants are extremely difficult to feed. In most cases intravenous fluid solutions are used on these infants for nutrition supply.

However, intravenous nutrition is inadequate, and IV nutrition (TPN) can also be toxic to the liver.

Study	Number of patients	Results	
Rojas et al. (2012)	■ 750 patients	■ 34% reduction in episodes of feeding intolerance (p=0.08)	
Oncel, et al. (2014)	■ 400 patients	■ 29% reduction in episodes of feeding intolerance (p=0.015)	
Oncel et al. (2015)	■ 300 patients	■ 36% reduction in episodes of feeding intolerance (p=0.004)	
Rolnitsky et al. (2018)	■ 937 patients	■ 52% reduction in episodes of feeding intolerance (p<0.01)	

**Improved feeding tolerance in preterm infants**

# Network of KOLs

IBT has developed IBP-9414 program with deep considerations of KOLs experience and clinical practice

## Some of the external participants

Aideen Moore, The Hospital for Sick Children, Toronto, Canada.  
Alexandre Lapillonne, Necker Hospital for Sick Children, Paris, France  
Andreas Repa, Medical University of Vienna, Austria  
Hans van Goudoever, VU University Medical Center and Emma Children's Hospital, Amsterdam, the Netherlands  
Jae Kim, University of California San Diego, CA  
Josef Neu, University of Florida College of Medicine, Gainesville, FL  
Kara Calkins, University of California Los Angeles School of Medicine, CA  
Lawrence Moss, Nationwide Children's Hospital, Columbus, OH  
Mario Rojas, University of Wake Forest University School of Medicine, NC  
Mark Underwood, University of California Davis Children's Hospital, CA  
Michael Caplan, North Shore Research Institute, Chicago, IL  
Miguel Sáenz de Pipaon, University Hospital "La Pa", Madrid, Spain  
Robert White, Memorial Hospital, South Bend MI  
Teresa del Moral, University of Miami School of Medicine, FL  
Thomas Abrahamsson, Linköping University Hospital, Sweden  
Walter Mihatsch, Harlaching Hospital, Munich, Germany

## Key Opinion Leader Meetings

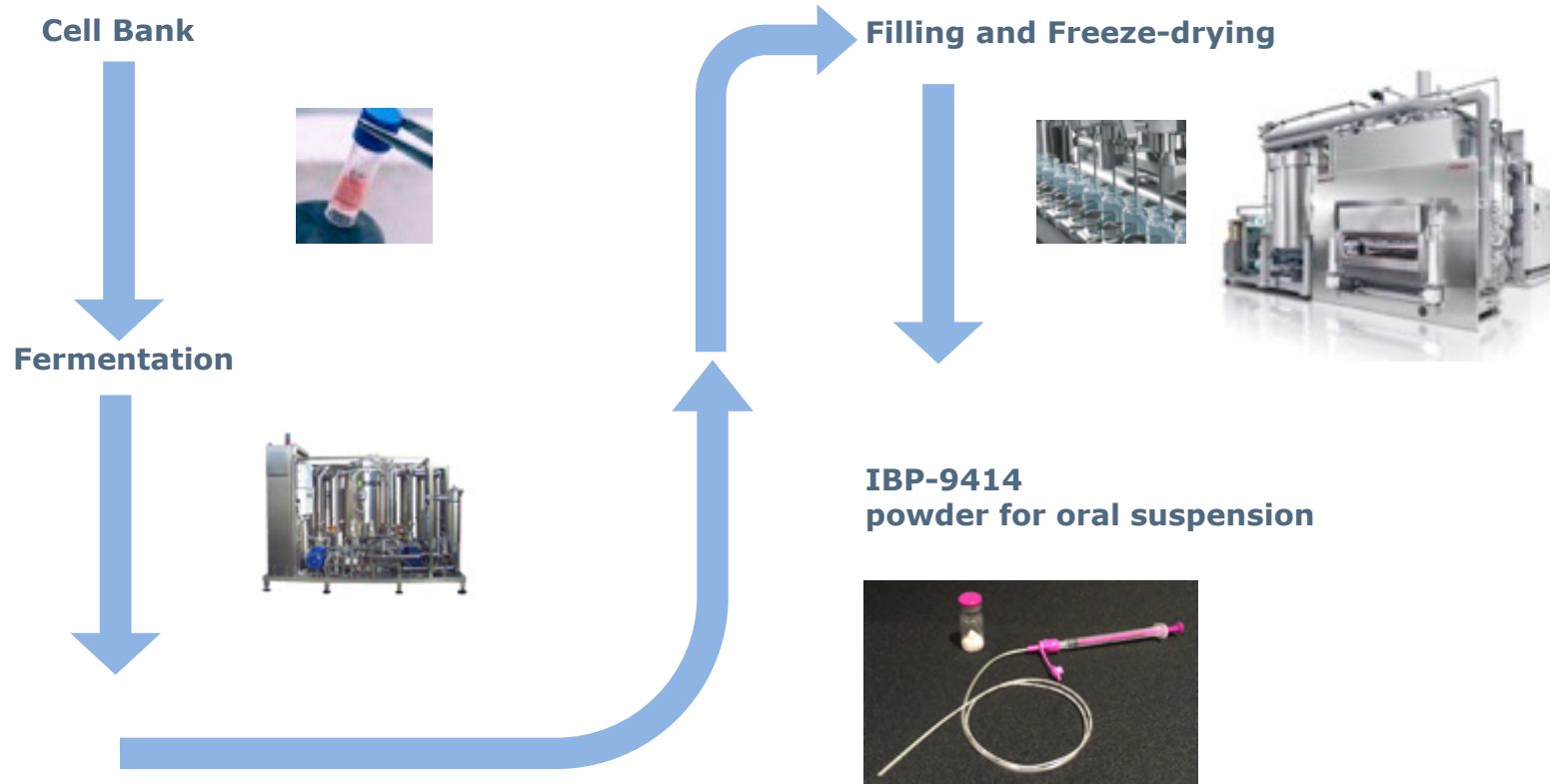
- Feb 2013: Atlanta, US
- Apr 2013: New York, US
- May 2014: Vancouver, Canada
- Sep 2014: Boston, US
- May 2015: San Diego, US
- Sep 2015: Budapest, Hungary
- May 2016: Baltimore, US
- Nov 2016: Stockholm, Sweden
- Mar 2017: San Diego, US
- Dec 2017: Washington DC, US

# IBP-9414 Development Plan

	Safety and tolerability study	Pivotal phase III study – The Connection Study
Timeline	2016-2017	2018-2020
Status	Completed	Planned
Clinical trial details	<ul style="list-style-type: none"><li>• A randomized, double blind, parallel-group, dose escalation placebo-controlled multicenter study to investigate the safety and tolerability of IBP-9414 administered in premature infants <math>\leq 2,000</math> grams birth weight</li><li>• 15 sites in the US</li><li>• Recruitment rate was higher than estimated</li><li>• Concluded with similar safety and tolerability profile in the active and placebo group</li></ul>	<ul style="list-style-type: none"><li>• A randomized, double blind, parallel-group, placebo-controlled multicenter study to evaluate the efficacy of IBP-9414 in premature infants <math>\leq 1,500</math> grams birth weight in the prevention of NEC</li><li>• 2056 premature infants</li><li>• 100 sites in US, France, Germany, the Netherlands, Spain, (Hungary, Czech Republic and Austria)</li><li>• Interim analysis planned</li></ul>

# Manufacturing Process of IBP-9414

## Stringent control of manufacturing environment



# Need for pharmaceutical grade product

## FDA concerned about use of dietary supplements

October 2014	November 2014	December 2014	Consequences
<ul style="list-style-type: none"><li>■ A premature infant given a Solgar product (ABC Dophilus Powder) died from gastro-intestinal fungal infection</li></ul>	<ul style="list-style-type: none"><li>■ Solgar issued a voluntary recall of the product</li><li>■ Investigators from the CDC identified the infecting fungus (<i>Rhizopus oryzae</i>) in unopened bottles of ABC Dophilus Powder</li></ul>	<ul style="list-style-type: none"><li>■ <b>FDA/CDC warning letter issued</b></li><li>■ Healthcare providers encouraged to submit an Investigational New Drug Application for FDA review</li></ul>	<ul style="list-style-type: none"><li>■ <b>Pressure to conform to FDA's rigorous standards due to risk of contamination</b></li><li>■ <b>Increased awareness of risk amongst healthcare providers</b></li></ul>



**June 2016** FDA issued a guidance document demanding pharmaceutical grade products.

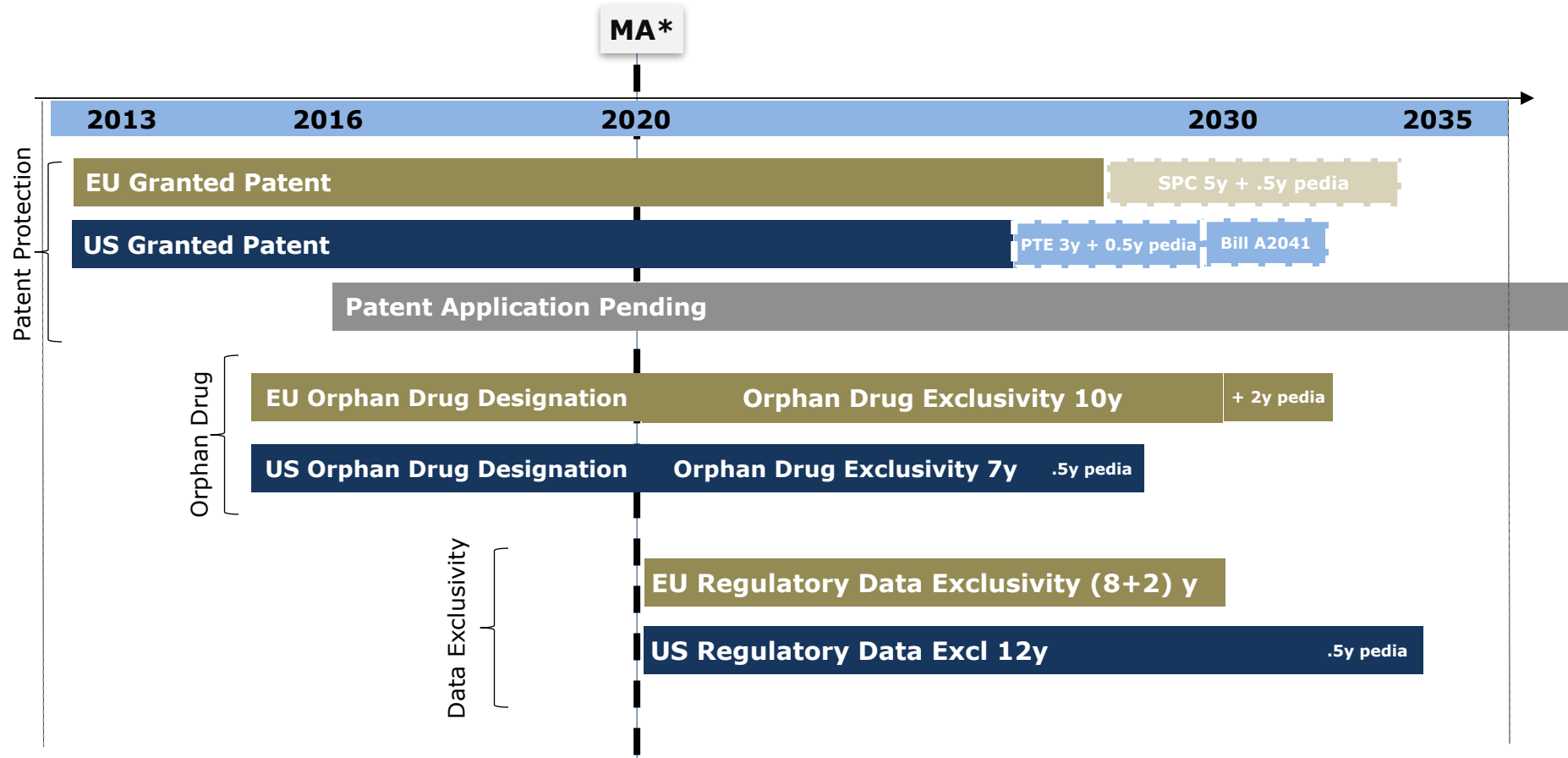
**August 16, 2018** FDA Commissioner Scott Gottlieb has reiterated the FDA's concern about the use of dietary supplements in this vulnerable population.

FDA – US Food and Drug Administration  
CDC – Centers for Disease Control and Prevention



# IBP-9414 Market Exclusivity

## Three layers of IP protection
























Timelines are indicative, this slides contains forward looking statements and may be subject to change

\* Market Approval

# IBP-9414's eligibility for a Priority Review Voucher

- FDA granted Rare Pediatric Disease product status to IBT for IBP-9414, which means that IBT should be awarded a priority review voucher at the time of approval
- A voucher is transferrable and does not expire. 23 vouchers have been awarded as of August 2018

## Known transactions as of August 2018

Year	Recipient	Price	Buyer
2018		\$80.6M	Undisclosed
2018		\$110M	 Jazz Pharmaceuticals
2017		\$125M	Undisclosed
2017		\$125M	 GILEAD
2017	Undisclosed	\$150M	
2017	Undisclosed	\$150M	
2017		\$130M	
2016		\$200M	 GILEAD
2015		\$350M	
2015		\$245M	
2014		\$67.5M	
2014		\$125M	  GILEAD

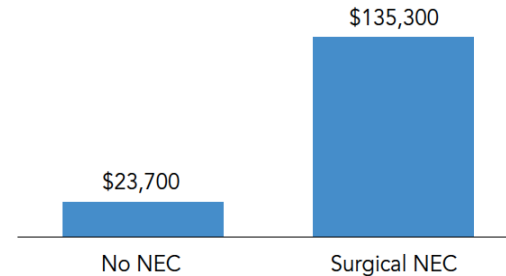
# Economic burden of NEC



NEC Economic Burden is estimated to be 20% of the total cost of initial care and  
USD 5 Billion spent annually on NEC in the US

## Costs continues after NICU discharge

Accumulated cost between 6–36 months



**And long term costs associated with sequelae such as  
impaired growth, short bowel syndrome, poor  
neurodevelopment**

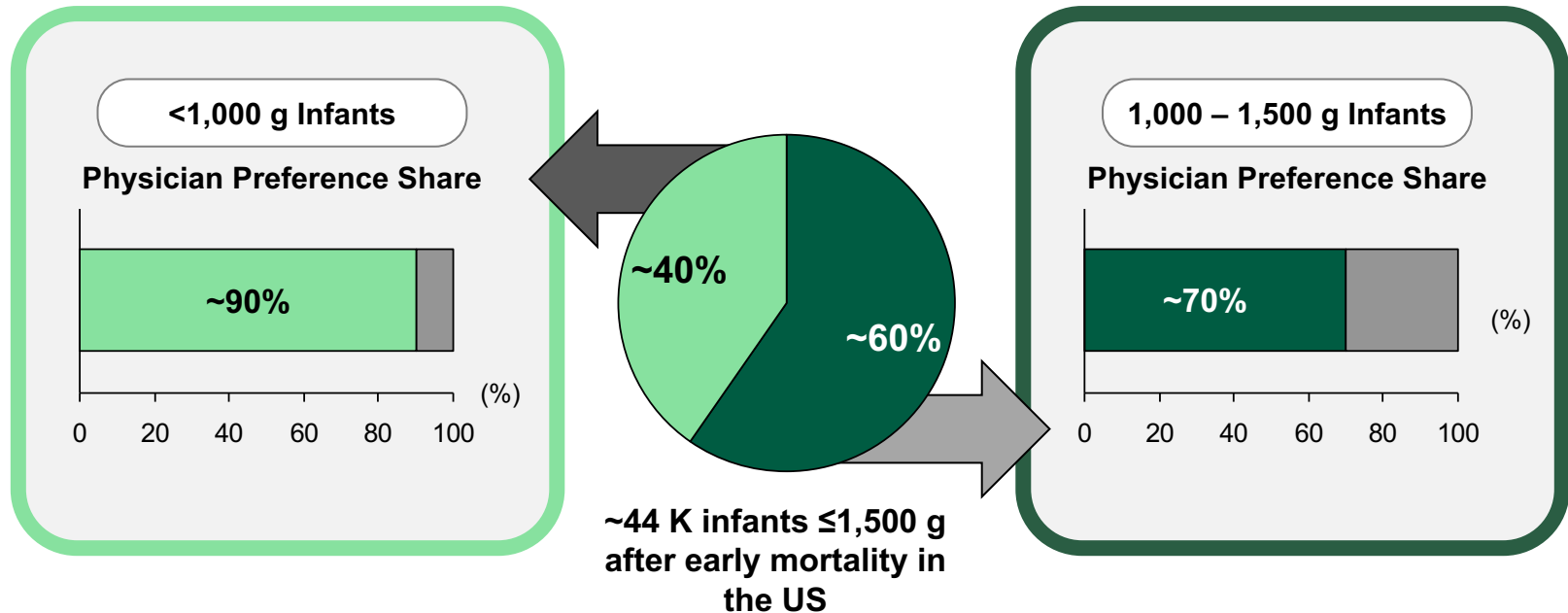
# IBP-9414 Target Product Profile

## For the prevention of necrotizing enterocolitis

<b>Product description</b>	<ul style="list-style-type: none"><li>■ Oral suspension</li><li>■ Supplied as a freeze-dried powder in a prefilled, clear, glass vial</li><li>■ To be reconstituted in sterile water and delivered in enteral syringe</li></ul>
<b>Administration</b>	<ul style="list-style-type: none"><li>■ Once daily until gestational age week 34</li><li>■ Administered enterally through the nasogastric or orogastric tube</li></ul>
<b>Product efficacy</b>	<ul style="list-style-type: none"><li>■ Demonstrates 33% reduction in the incidence of NEC compared to standard of care alone</li></ul>
<b>Safety profile</b>	<ul style="list-style-type: none"><li>■ Well tolerated with no known side effects</li><li>■ No increase in risk of sepsis or multi-resistance to antibiotics</li><li>■ No known contraindications</li></ul>

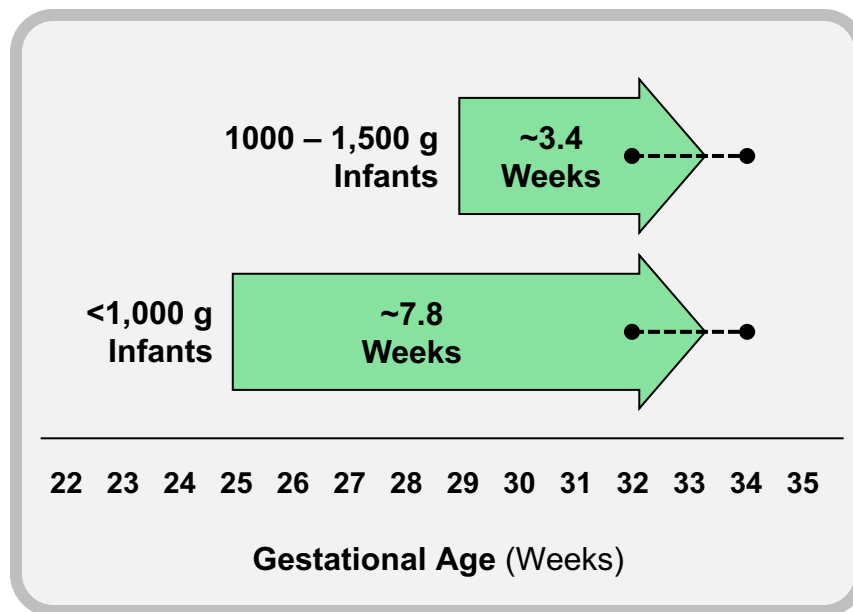
# Neonatologists show high willingness to prescribe IBP-9414

**Clearview US market research indicates an overall 78% physician preference share reflecting a high unmet medical need**



**CLEARVIEW**  
Healthcare Partners




# Treatment up to 34 weeks



●-----● *Physicians expected to halt IBP-9414 treatment once infants had reached 32 to 34 weeks postmenstrual age*

# Expected Formulary Inclusion by Institution Type

**In the United States, high adoption in hospitals is anticipated in institutions which have the biggest share of premature infants**

			
<b>Institution Type</b>	<b>Major Medical Centers</b>	<b>Medium Hospitals</b>	<b>Small Community Hospitals</b>
<b>Share of Premature Infants</b>	~60%	~30%	~10%
<b>Estimated Formulary Adoption</b>	~85%	~60%	~0%
<b>Overall Formulary Inclusion</b>	Approximately 70% of addressable patients are anticipated to receive care at an institution that includes IBP-9414 on formulary		

# Market potential for IBP-9414 assessment

IBT has mandated consultants to assess the market opportunity...



**CLEARVIEW**  
Healthcare Partners

...who have interviewed the relevant key stakeholders across US and Europe...

- Including 60 Neonatology Key Opinion Leaders interviews
- 15 Pharmacy and Therapeutics neonatologists and pharmacists (P&T members)
- Payers

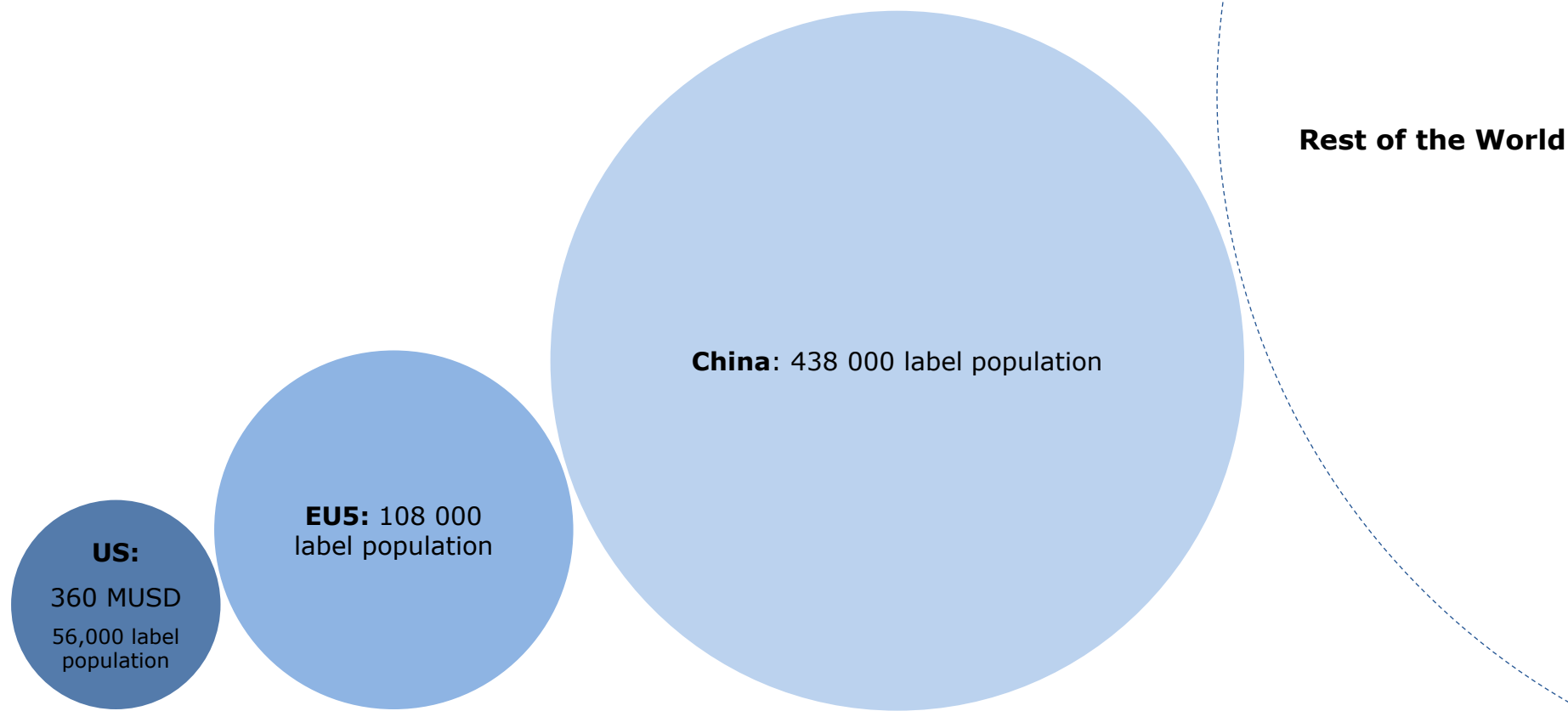
...resulting in significant market opportunity

- Estimated annual revenue potential of **USD200m – USD360m in US**



# A globally valuable pharmaceutical

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# IBP-9414 for the prevention of necrotizing enterocolitis

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## **IBP-9414 is based on all relevant pillars for the development of a successful drug**

- Medical need ✓
- Mechanism of action ✓
- Clinical data ✓
- Safe ✓
- Aligned regulatory agencies ✓
- GMP manufacture ✓
- Market exclusivity ✓
- Aligned payers ✓
- Priority review voucher eligibility ✓

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**Thank you!**



INFANT BACTERIAL THERAPEUTICS

**Visit us in Stockholm, Sweden**  
**Infant Bacterial Therapeutics AB Bryggargatan 10**

**[www.ibtherapeutics.com](http://www.ibtherapeutics.com)**

**☎: +46 (0) 8 410 145 55**

**[info@ibtherapeutics.com](mailto:info@ibtherapeutics.com)**