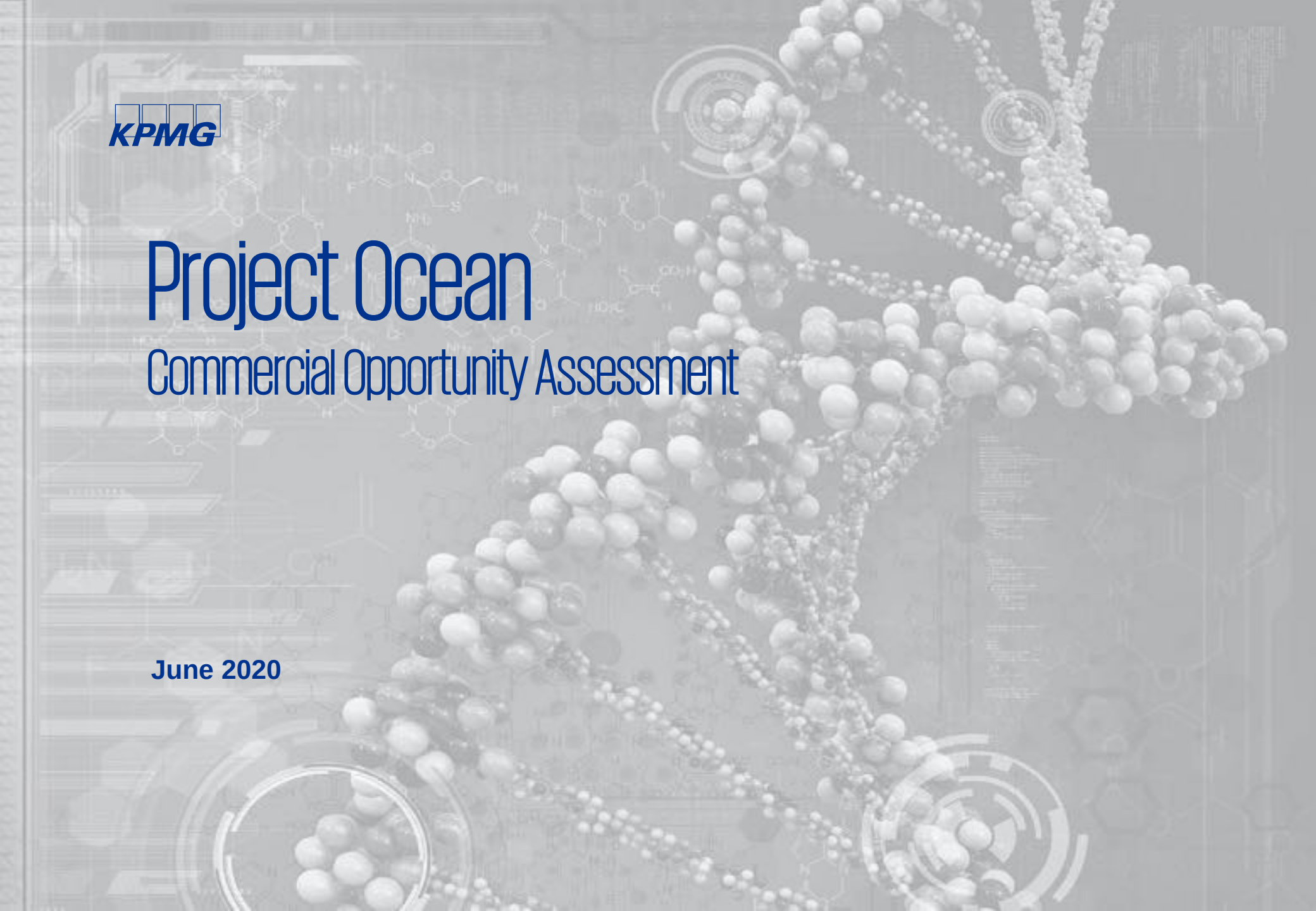


KPMG

Project Ocean

Commercial Opportunity Assessment

June 2020

Disclaimer

This report is provided to Ocean BioMedical Inc. pursuant to our statement of work, dated February 14, 2020 and is subject in all respects to the terms and conditions of that engagement letter, including restrictions on use of this report by third parties. If this report is received by anyone other than Ocean BioMedical Inc. the recipient is placed on notice that the report has been prepared solely for Ocean BioMedical Inc.'s benefit and its own use. KPMG does not authorize recipient or any other party to rely on this report and any such reliance shall be at recipient's sole risk. Therefore, KPMG LLP shall have no liability or responsibility in respect of the advice, recommendations, or other information in the report to recipient or any other party other than Ocean BioMedical Inc. Further, this report and its contents may not be shared with or disclosed by the recipient to anyone without the express written consent of Ocean BioMedical Inc.

****

In preparing this advice, we considered tax authorities that are subject to change, retroactively, prospectively, or both, and any such changes could affect the conclusions stated herein. This advice is based on the completeness and accuracy of any one or more of the facts, assumptions, and client representations on which we relied, relating to the matters to which this advice is addressed. Unless separately agreed in writing, we will not update our advice for subsequent changes or modifications to the law, regulations, or to the judicial and administrative interpretations thereof, nor to take into account your correcting, updating, or providing new or additional facts or information you supplied or any assumptions on which we relied in preparing our advice.

The advice or other information in this document was prepared for the sole benefit of KPMG's client and may not be relied upon by any other person or organization. KPMG accepts no responsibility or liability in respect of this document to any person or organization other than KPMG's client.

Contents

KPMG

Project Background

The project focused on assessing the commercial opportunity for Ocean's portfolio of assets

Context

- Ocean BioMedical, Inc. ("Ocean") is a pre-clinical stage biopharma that currently has an exciting portfolio of assets across:
  - Infectious Diseases (PfGARP Malaria Vaccine and PfGARP Malaria mAb)
  - Oncology (anti-Chi3l1 for both Non Small Cell Lung Cancer and Glioblastoma and anti-Chi3l1/anti-PD1 for NSCLC)
  - Pulmonary (anti-Chit1 for Idiopathic Pulmonary Fibrosis and Hermansky-Pudlak Syndrome)
- To fund subsequent clinical research phases and lay the groundwork for commercialization, Ocean is planning to raise equity funding through an IPO, in addition to a pre-IPO private placement
- To support this process, Ocean sought assistance from KPMG to develop an equity story it can use with prospective investors

What KPMG did

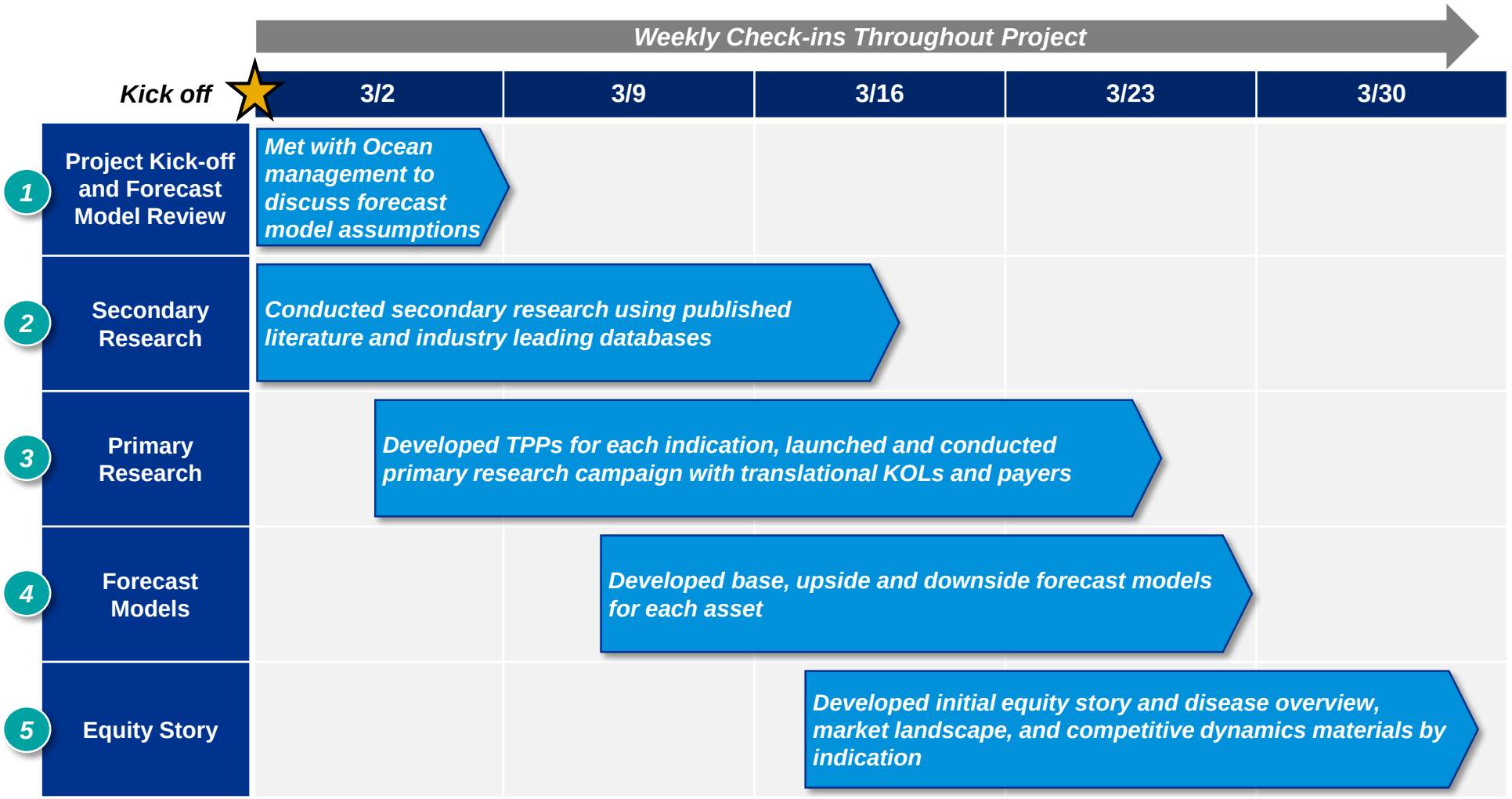
- Conducted a kick-off meeting with the Ocean team to understand more about the scientific value proposition of each of the assets
- Met with the Ocean management team to review forecast models and supporting assumptions for how they arrived at revenue projections for each asset in the portfolio
- Created interview guides and Target Product Profiles (TPPs) for each asset, with input from the Ocean team
- Conducted primary research with leading translational scientists in each disease area as well as payers to understand more about the unmet needs in each disease, pricing and market access issues, current and future treatment trends, competitive dynamics, as well as the value proposition of each asset and where it may fit in the treatment algorithm based on the TPPs
- Developed separate epi-based forecast models for each asset using inputs from the primary research and supplemented by the secondary research
- Developed an overall equity story that Ocean can use in its discussions with prospective investors

What KPMG did not do

- KPMG did not conduct an overview of the wider healthcare system and its potential regulatory changes and impacts on the assets
- KPMG did not conduct patient population surveys for the assets
- KPMG did not conduct a legal review of any contracts

Project Background – Timeline

Over the course of 5 weeks, KPMG conducted the activities below to develop detailed forecasts for each asset, and craft Ocean's equity story



Insights were gathered through secondary research as well as primary research with key opinion leaders and payers (n=25)

Interviews N=25

Malaria / Vaccines
- Professor of Infectious Diseases / Travel Clinician, Major University School of Medicine
- Former Vaccine Policy Advisor, WHO/GAVI/HHS
- Malaria Researcher, Major University
- Infectious Disease Specialist, Major University
- Pediatric Infectious Disease Specialist, Major University

IPF / HPS
- Professor of Genetic Medicine, Major University
- Professor of Medicine at Major Hospital
- Lung Disease Specialist, Major University
- HPS Clinician / Researcher, Major Hospital
- Professor-Microbiology / Immunology, Major University
- Interstitial Lung Disease Specialist, Major University

NSCLC
- Medical Oncologist, Major Cancer Center
- Professor of Medicine, Major University
- Oncologist, Translational Scientist, Major Cancer Center
- Medical Oncologist, Major University

Glioblastoma
- Clinical Neurologist, Major University
- Attending Physician, Neuro-oncology, Major Hospital
- Clinical neuro-oncologist, Major Cancer Center
- Director, Neurosurgery, Major University Hospital

Payers
- Chief Formulary & Procurement Officer, Major PBM
- VP, Pharma Strategy & Contracting, Major PBM
- Former National Pharmaceutical Contracting Leader, Major Health Insurance Provider
- Sr. Director, Pharma Strategy & contracting, Major Health Insurance Provider
- Principal Pharmacist, Major Health Insurance Provider
- Former VP, Strategic Product Development, Major Insurance Provider

Secondary Research

- America's Health Insurance Plans
- American Cancer Society
- American Thoracic Society
- Bill & Melinda Gates Foundation
- BioMedTracker
- BlueCross BlueShield, Humana, Aetna, Kaiser Permanente, Cigna company websites
- Cancer Research UK
- Cancer.org
- CDC
- Clinicaltrials.gov
- Datamonitor
- Decision Resources Group
- Eurasian Journal of Medicine
- European Medicines Agency
- EvaluatePharma
- FDA
- Federal Register - Best Pharmaceuticals for Children Act
- Federal Register - Pediatric Research Equity Act
- Frontiers in Immunology
- GAVI Website
- Global Burden of Disease
- GSK Websites
- Harvard Health Publishing
- HPS Network, Inc.
- Informa
- Institute of Medicine, National Academies
- Journal of Infectious Diseases
- Journal of Travel Medicine
- Medscape
- National Brain Tumor Society
- National Institutes of Health
- Nature
- NCCN Guidelines
- New England Journal of Medicine
- Orphanet
- Pepperdine University
- Pharmacoeconomics
- PubMed
- Rochester Institute of Technology
- Science
- Science Direct
- Statista
- UN Data Booklet
- Vaccine Journal
- WebMD
- Wolfe Research
- World Bank
- World Economic Forum
- World Health Organization

Company Data

- 10-Ks
- Annual reports
- Company websites
- Company press releases

KPMG

Infectious Diseases Portfolio

PfGARP Vaccine & mAb

Infectious Diseases Portfolio

- Malaria

Pulmonary Portfolio

Oncology Portfolio

Ocean's malaria vaccine is forecast to achieve peak-year revenues of ~$2.4B in base case from its adoption in the vast public segment

	Malaria Vaccine
Market and Disease Overview	**Malaria is a disease with massive unmet global need, with over 400K deaths per year and $12B in direct costs; Ocean's PfGARP represents the first new compelling vaccine target for malaria in recent years** • Economic impact of malaria can depress GDP by up to 1.3% in many affected countries • Significant prophylactic vaccine need, with 228M WW cases in 2018, concentrated in Sub-Saharan Africa
Competitive Landscape and Pipeline	**Large number of vaccine candidates in pipeline, with only GSK's Mosquirix licensed, but showing limited efficacy** • Mosquirix currently undergoing test in 3 African countries, with limited uptake predicted based on preliminary data • Sanaria vaccine set to begin Phase III trials, though its efficacy has been modest so far; currently 9 additional vaccines in Phase I/II trials
Market Access / Reimbursement	**Given low efficacy of Mosquirix, PfGARP can expect large public and private segment adoption in malaria endemic regions (MER)** • Addresses prophylactic need for frequent travelers to endemic regions • Global health stakeholders and endemic countries will embrace a vaccine with high efficacy
KOL / Payer Findings	**If vaccine was successful, KOLs predict stakeholder engagement in rollout which would drive uptake; compliance and complexity of rollout likely to present obstacles to greater adoption** • Target population dynamics could potentially limit or prolong rollout, offset by perceptions of high product efficacy • Expect pricing to be benchmarked against high-end travel vaccinations
Revenue Forecast	**Base forecast reaches peak revenue of ~$2.4B in 2034, driven primarily by adoption in public segment** • Forecast of 7-year ramp up period in endemic regions • Upside case sees higher pricing, adoption, and compliance driven by superior safety and efficacy profile

mAb peak-year revenues expected to total ~$1.4B from higher traveler segment penetration, with potential upside for a high-efficacy mAb in the military segment

	Malaria mAb
Market and Disease Overview	**Potential for novel short-term prophylactic with broad efficacy-driven appeal to travel and military segments** • Rapid and highly efficacious mAb aligns with military and clinical priority to address chemoprophylaxis compliance • Drug resistance to incumbent therapeutics could present an additional opportunity
Competitive Landscape and Pipeline	**Therapeutics pipeline is more mature and highly competitive, but less competition in prophylactic pipeline** • Currently only one additional malaria mAb in Phase I trials • NDA filed for an FDA-approved variant of preferred front-line therapeutic – IV artesunate – with approval expected in Q4 2020; artesunate and combination therapies currently preferred therapies
Market Access / Reimbursement	**Therapeutic viability limited by SoC efficacy and pricing, with broader travel segment uptake driving the bulk of product revenues** • Travelers largely not covered by most US/EU insurance, though ease of use and efficacy could drive adoption • Military planners have highlighted mAb tech as focus of R&D, would likely see broad use as adjunctive therapy
KOL / Payer Findings	**KOLs validate attractiveness of mAb driving adoption in military and travel segments, while payers indicate future price controls of travel vaccinations likely to broadly limit pricing power in segment** • Payers indicate broader industry trends toward tighter control of vaccine pricing which may impede adoption • Experts indicate military segment offers stable prices at high volume
Revenue Forecast	**mAb achieves peak revenue of ~$1.4B in 2032 from broader adoption in traveler segment, with potential military upside** • Single dosing schedule and lower total price vs. PfGARP vaccine drive higher adoption of mAb • Upside case assumes superior safety and efficacy profile increases viability in therapeutic segment, along with higher pricing and adoption in travel segment

Ocean's differential vaccine screening platform has already identified two viable candidates for the prevention and treatment of malaria

Malaria Platform

Peak Revenue: ~$3.5B / 2033F

- **Ocean's whole-proteome differential screening platform offers a unique method to identify pathogen targets recognized by protected humans in outbreak-afflicted populations**
- **The platform is potentially applicable across a broad spectrum of infectious diseases (viral, bacterial, protozoan, or metazoan) for which proportions of human-developed resistance persists after exposure**
- **Platform could readily be applied to high impact/high value infectious diseases**

Assets	Launch Year	Peak Revenue	Summary
Malaria Prophylactic Vaccine	**2027** *(Base Case)*	**~$2.4B / 2034F** *(Base Case)*	**Pioneering use of the screening platform to identify *P. falciparum* antigens recognized by antibodies expressed by children with relative resistance to malaria infection** ▪ The antigens represent rationally identified vaccine candidates ▪ Experts highlight this target - PfGARP - as the most promising candidate in several years ▪ Displays promising high levels of preclinical data that could translate into a game-changing tool in the massive global health effort to eradicate malaria in endemic regions; with additional applicability to the growing traveler segment
Antimalarial Monoclonal Antibody (mAb)	**2027** *(Base Case)*	**~$1.4B / 2032F** *(Base Case)*	**Ocean's mAb leverages the PfGARP vaccine candidate in a novel and attractive short-term prophylactic with broader application across the travel and military segments** ▪ A short-term prophylactic mAb is promising given its rapid uptake and efficacy, single dosing and elimination of compliance factors, which lead to most severe malaria cases in travelers ▪ The US DoD and other military planners highlight mAb attractiveness for deployed personnel ▪ Additional upside exists for pioneering the use of mAb candidates for other short-term prophylactics against a range of travel-related infectious diseases

Ocean's infectious disease portfolio includes two promising anti-malaria assets, a disease space with significant unmet need

1. Massive unmet public health need with no effective prophylactic vaccine
2. Current methods of reducing or preventing malaria showing limited progress
3. Large traveler and military populations in endemic regions at risk of malaria, with continued compliance issues with current prophylactics
4. Several vaccines in development, but no promising candidates on the horizon
5. Standard-of-care therapeutics have potential risk from drug-resistant strains of malaria, posing future risk to global health and the therapeutic treatment landscape

Source(s): KOL interviews

Interviews with KOLs indicate significant unmet need for an effective vaccine against malaria, with persistent unmet need for traveler and military segments

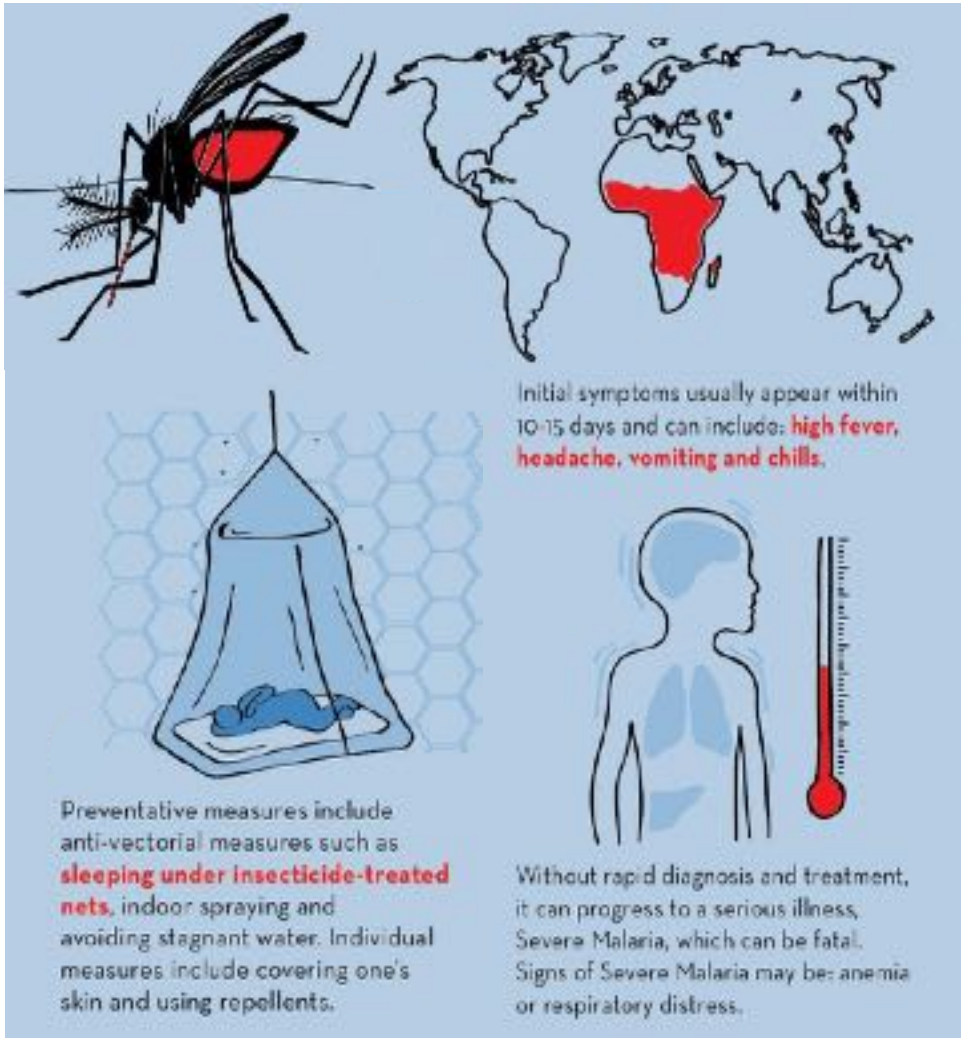
Market Driver	Summary of Driver Impact	Expected Future Impact to Market
Launch of an Effective Prophylactic Vaccine	▪ **There is only one approved vaccine for malaria (Mosquirix, GSK) that has shown limited efficacy, with no near-term vaccine candidate showing high efficacy, presenting opportunities for an effective vaccine** – *"Mosquirix is generally viewed as an incompetent and failed vaccine" – Infectious Disease Specialist, Major University* – *"We have not seen a promising vaccine candidate in several years, despite the desperate global need" – Malaria Researcher, Major University*	
Global Health Initiatives and Support for Malaria Eradication	▪ **The global fight against malaria will continue to be a focus of effort for global health NGOs, philanthropic stakeholders and affected governments, driving funding for development and rollout** – *"You have a malaria roadmap that all major stakeholders have signed onto" – Former Vaccine Policy Advisor, WHO/GAVI/HHS* – *"Big organizations like WHO and Gates will put a lot of money and effort into getting an effective vaccine into affected areas" – Former Vaccine Policy Advisor, WHO/GAVI/HHS*	
Global Traveler Trends to Malaria Endemic Regions	▪ **The World Economic Forum currently forecasts the number of international travelers from high-income countries to malaria endemic regions to grow by 1.9% a year, though this forecast is highly sensitive to global economic impacts, increasing development of endemic regions, or pandemic-related risks** – *"International tourist arrivals to Sub-Saharan Africa are expected to grow rapidly through 2030" – World Economic Forum* – *"The travel segment is particularly price sensitive" – Professor of Infectious Diseases / Travel Clinician*	
Drug Resistance to Current Anti-Malarial Therapeutics	▪ **In recent years, drug-resistant strains of malaria parasites have been seen in greater numbers in Southeast Asia, with potential for greater spread globally** – *"The drug resistance problem is alarming. We would have to look for new combination therapies to effectively treat severe malaria" – Malaria Researcher, Major University*	

Legend: Minimal Impact | Moderate Impact | Moderate-High Impact | High Impact

Source(s): KOL interviews

Malaria: Disease Overview (1/2)

Malaria is a devastating disease that results in massive cost to endemic countries, with ~405K annual deaths and an estimated $12B in direct costs



- **Malaria is a devastating infectious disease spread by mosquito-borne parasites of the genus Plasmodium (P.)**
- **There were an estimated 228 million cases of malaria in 2018, with nearly 213 million cases (93%) occurring in the WHO Africa region**
- **The direct costs of fighting and treating malaria are estimated at $12B, while the broader economic costs are as high as a 1.3% depression to GDP in some hardest-hit Sub-Saharan Africa regions**
- **The P. falciparium strain is the most widespread and deadly, accounting for nearly all cases in hardest-hit Africa and nearly all severe malaria cases**
  - Africa was home to 93% of malaria cases and 94% of malaria deaths (2018)
  - Worldwide malaria deaths stand at 405,000 (2018)
- **Malaria afflicts people across the age spectrum in endemic regions, but children are the hardest hit, particular infants and children <5 years old**
  - As recently as 2016, the WHO estimated that a child under the age of 5 dies from malaria every two minutes
  - Pediatric malaria cases accounted for ~2/3 of the deaths from severe malaria cases in recent years
- **The disease is endemic to tropical climates worldwide, and has been a target of eradication by global health organizations for decades**
  - Recent years have seen modest declines in the number of deaths and estimated global cases WW as a result of anti-malaria campaigns
- **While recent gains against malaria have been impressive, global health organizations still confront an enormous global health challenge and the level of progress is slowing**

Source(s): WHO World Malaria Report 2019

Ocean's prophylactic malaria vaccine addresses the strain of malaria responsible for 97.2% of global cases and 90% of deaths

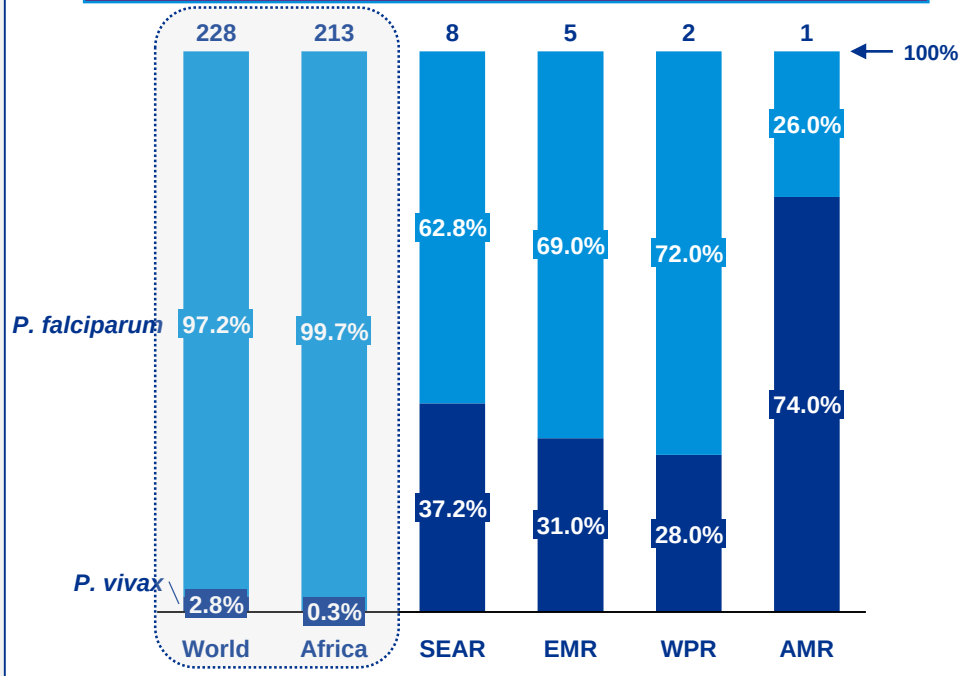
- **The Global Health Community and pharmaceutical industry confront an enormous challenge in combating the spread of malaria and the treatment and short-term prophylaxis of malaria has been the predominant focus**
- **Short-term prophylaxis use is most common for travelers visiting and military personnel deployed to malaria endemic regions**
  - There are numerous oral short-term chemoprophylaxis available at relatively low cost ($73 for an average dosing schedule), though compliance continues to be an issue, resulting in cases of malaria in both groups
- **The landscape of malaria therapeutics for the treatment of malaria cases post-infection is mature and features a broad range of well-established, largely effective therapeutic treatments**
  - While malaria therapeutics have achieved high levels of efficacy, in malaria endemic regions limited access to treatment or alternative therapies mean only ~40% of severe malaria cases are brought to hospital
  - Drug resistance to the most common therapeutics – artemisinin combination therapies (ACTs) – in Southeast Asia and in some African regions present a potentially growing threat to the therapeutic landscape
- **Experts agree the largest unmet need is an effective prophylactic vaccine against P. falciparum – therapeutics and prophylaxis are not enough:**

  "An effective P. falciparum vaccine is the only way to eradicate malaria worldwide." – Malaria Researcher – US University

  "The data from 2015-2017 indicate that there was no significant progress in reducing global malaria cases." – WHO World Malaria Report 2019
- There is currently only one vaccine approved – Mosquirix (GSK) with limited efficacy (30%) – that is generally perceived as a failed malaria vaccine

"PfGARP is the first new compelling vaccine target that we have seen in several years. It's a new mode of action, and worth exploring further." - Malaria Translational Researcher – US University

Breakdown of P. falciparum vs. P. vivax by region[(a)]



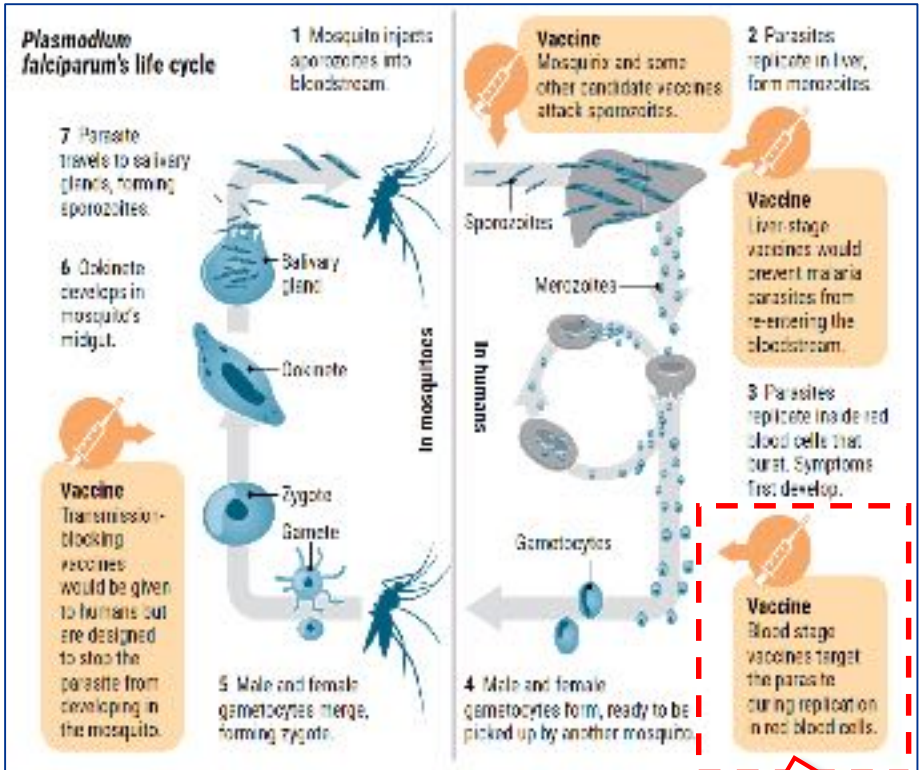
Available treatments are potentially inadequate in multiple categories:

- Widespread preventive measures such as mosquito netting, insecticide-treated clothing have only managed disease spread
- Treatment of severe malaria via effective, low cost drugs hampered by low levels of infrastructure and medical coverage in developing regions
- Short term oral prophylactics for travelers to malaria endemic regions are effective, but hampered by low adoption and compliance issues

Note: (a) SEAR – Southeast Asia Region; EMR – Eastern Mediterranean Region; WPR – Western Pacific Region; AMR – Americas Region
Source(s): WHO World Malaria Report 2019; KOL Interviews; EvaluatePharma; Informa PharmaProjects;

Due to the complexity of the disease, vaccine development has focused on all stages of the parasite life cycle; PfGARP would be positioned in the blood-stage

Disease and Treatment Overview



Ocean's PfGARP candidate is a blood-stage vaccine

Treatment Complications

- **The complexity of the malaria parasite makes development of a malaria clinically difficult**
- **The world's leading health organizations have developed the Malaria Vaccine Technology Roadmap for accelerating development of a highly effective malaria vaccine by 2030**
  - Target vaccines with protective efficacy >75%
  - Vaccines that reduce transmission and human infection
- **Despite WHO and NGO focus on transmission-blocking vaccines, no viable candidates are on the near-term horizon:**

  "Transmission-blocking vaccines are still early in development…they don't seem close to clinical success" – Malaria Researcher, Major University

- **Mosquirix and the most advanced vaccine candidate (Sanaria's PfSPZ) have negative KOL sentiment regarding efficacy and viability:**

  "Mosquirix and other sporozoite vaccines are incompetent vaccines and are likely to fail" – Infectious Disease Specialist, Major University

- **While effective prophylactic vaccines have proven elusive to date, therapeutic antimalarials have shown high levels of efficacy, though challenges from drug-resistant strains may increase in the future**

Source(s): WHO World Malaria Report 2019; KOL Interviews; EvaluatePharma; Science

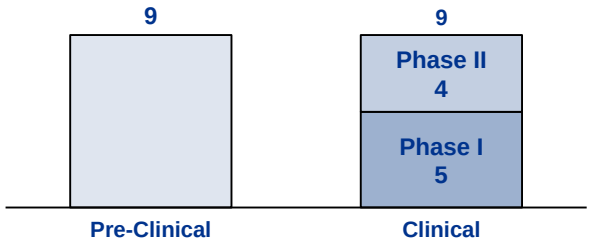
Malaria: Vaccine Competitive Landscape (1/3)

Currently there are a large number of vaccines in the development pipeline with only GSK's Mosquirix currently commercialized in 3 test African countries

Stage	Lead Company	Product Name[(a)]	Target Antigen[(a)]	Comments
Approved	**GSK**	Mosquirix	**CSP**	Undergoing Phase IV in 3 African countries
Clinical	**Sanaria**	PfSPZ	**CSP**	Phase II
	GSK	Mosquirix (MLP adjuvant)	**CSP**	Phase II
	VLP Therapeutics	VLPM01	**CSP**	Phase II
	GSK	Okairos	**CSP**	Phase II
	Imaxio	IMX313	**Viral Vector**	Phase I
	SEEK	AGS-v	**Viral Vector**	Phase I
	Mymetics	Malaria Transmission-Blocking Vaccine (MTBV)	**AMA-1/CSP**	Phase I
	Osivax	Osivax Malaria Vaccine	**CSP/Pfs25**	Phase I
	iBio, Inc.	Pfs25	**Pfs25**	Phase I
Pre-Clinical	**EpiVax**	Epivax Malaria Vaccine	**HLA**	Anti-infective vaccine
	IDRI	AnAPN1 Malaria Program	**AnAPN1**	Transmission-blocking vaccine
	IMV, Inc.	DepoVax-Malaria	**PfEMP1**	
	Aduro Biotech	Aduro/Protein Potential	**CSP**	
	Liquidia	Liqudia Malaria Vaccine	**HRP2/3**	
	GeoVax	MVA-VLP	**MVA**	Anti-infective vaccine
	Pfenex	Px533	**CSP**	
	CureVac	RNActive Prophylactic Vaccine	**mRNA**	Transmission-blocking gene therapy
	Inovio	SynCon Malaria Vaccine	**Viral Vector**	Synthetic DNA - multiple target antigens

Product Pipeline by Stage

As of March 2020, Product Count



Chemoprophylaxis Pipeline

- Short-term chemoprophylaxis landscape is relatively mature and crowded, with 4 short-term prophylactic antimalarial drugs currently in development:
  - Medicines for Malaria Venture – DSM-265 (Phase II)
  - Merck – WM-382 (Preclinical)
  - Lyndra Therapeutics – Ivermectin (Preclinical)
  - Titan Pharmaceuticals – Unnamed (Preclinical)

Note(s): (a) "Viral Vector" vaccines target multiple expressed target antigens

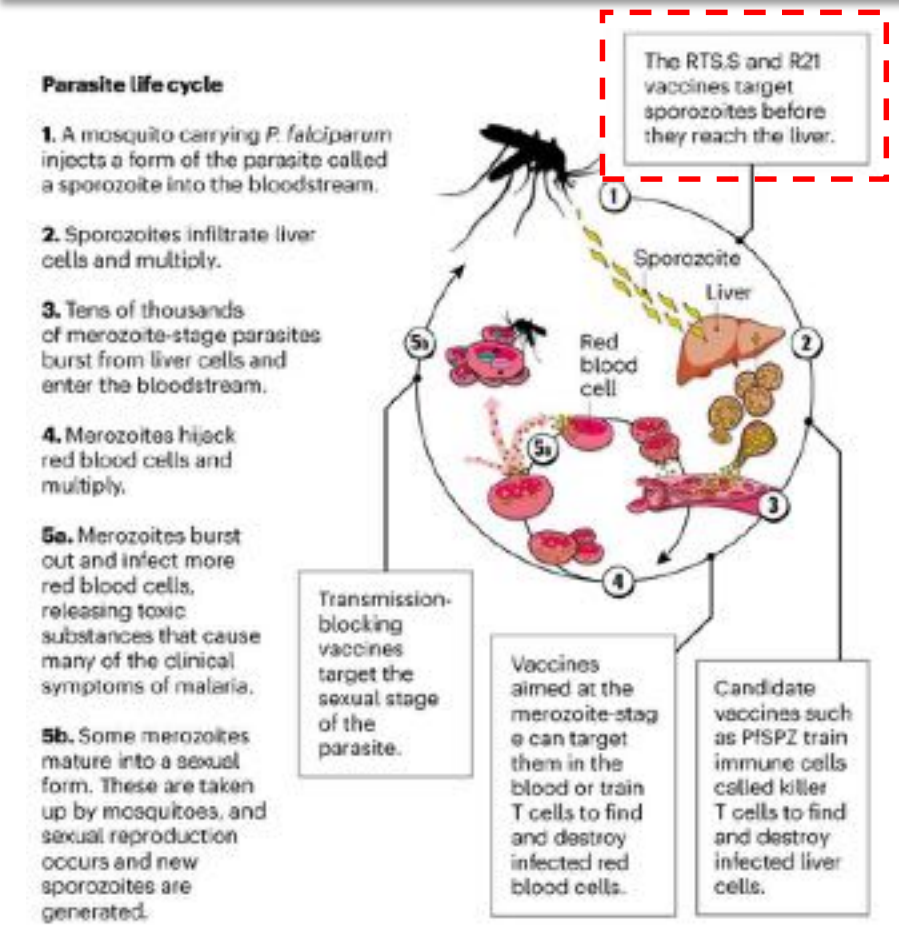
Source(s): Informa; Pharmaprojects; pharma company websites

GSK's Mosquirix is the only licensed malaria vaccine, but issues with the drug have limited its adoption to 3 test countries in Africa

About Mosquirix

- **World's first malaria vaccine approved beyond clinical testing**
- **Development started in 1980s, and has involved a direct partnership with the Bill & Melinda Gates Foundation since 2001**
- **Phase 3 trial of over 15k children across 11 sites in seven African countries concluded in 2014**
- **Mosquirix received a positive scientific opinion from the EMA in July 2015, followed by a WHO position paper in Jan 2016 recommending pilot introduction**
  - EMA's opinion stated "…*despite its limited efficacy*, *the benefits of Mosquirix outweigh the risks*…"
- **Malawi, Kenya, and Ghana have begun vaccination with a closely monitored pilot program to collect safety and efficacy data**
- **Plan for 360,000 children per year across the three pilot countries will receive RTS when they receive their routine childhood vaccinations**
- **Children receive the first vaccination at 5 or 6 months of age, and a final fourth dose at 2 years of age**
  - Compliance rates have proven difficult due to the lack of health infrastructure and patient tracking capabilities in pilot countries
- **GSK has stated that the price of Mosquirix will cover the cost of manufacturing with a return of five percent to be reinvested in R&D for next generation vaccines, at a per-dose cost of $5**
- **Doctors Without Borders stated in 2015 that it would not join any future pilot projects without a higher efficacy vaccine, as resources would be better spent on malaria preventive measures**

How Mosquirix Works



Source(s): Informa PharmaProjects; Pharma Company Websites; EMA

Sanaria's PfSPZ vaccine is the most advanced clinical candidate in Phase II, though its promising preclinical results have not translated into clinical success

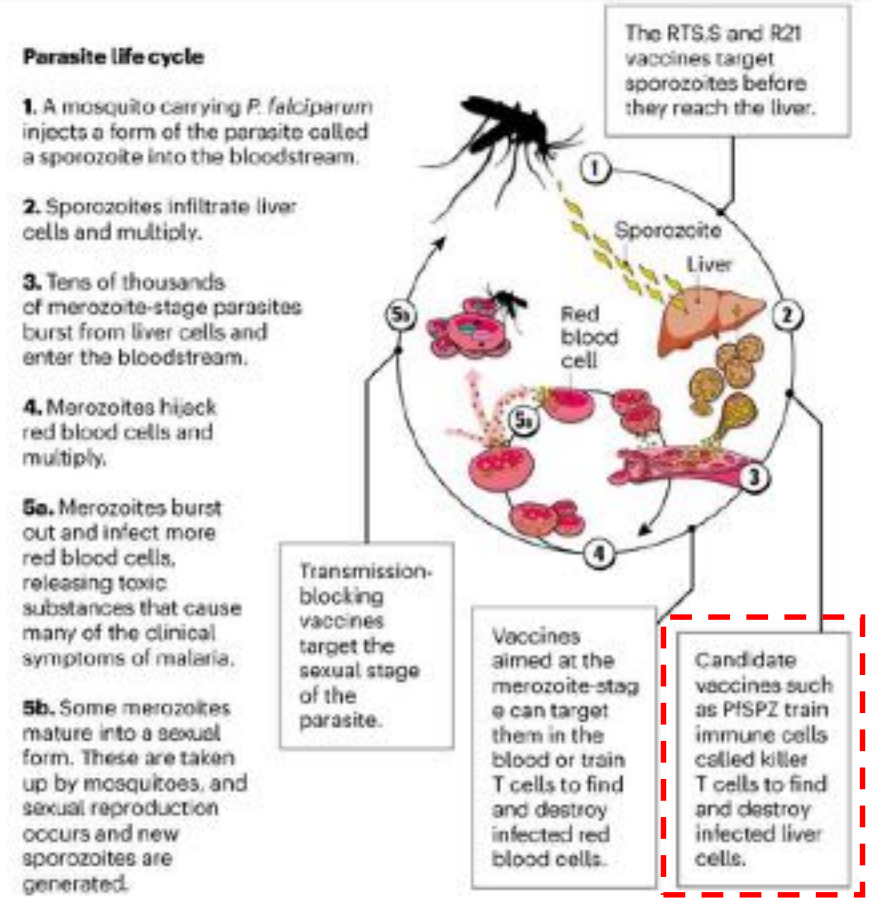
About PfSPZ

- **Manufactured by US biotech company Sanaria**
- **Currently completing Phase II – Phase III to begin in the first half of 2020**
  - Trial of 2,000 adults in partnership with government of Equatorial Guinea and three oil companies affected in high-malaria areas
- **Vaccine uses whole malaria parasites that are irradiated and then removed from the mosquitoes' salivary glands**
- **The vaccine has logistical and clinical limitations**
  - Delivered via intravenous injection
  - Must be stored in liquid nitrogen
  - Requires high doses of parasites
- **Efficacy has fluctuated significantly during development**
  - Early tests indicated nearly 100% efficacy in human volunteers (2013)
  - Later tests dropped to 55% efficacy in US volunteer group (2016)
  - 64% protection against homologous challenge (2017)
  - Trial of 100 adults in Mali saw efficacy drop to 29% (2017)
- **KOLs expressed skepticism regarding Sanaria's potential efficacy:**

"The data for that vaccine looked great initially but then it failed. It's probably going to fail in the field." - Malaria Translational Researcher

"The malaria field is very skeptical. We do not expect this is actually going to work in either a vaccine or mAb. They might get slightly better efficacy than Mosquirix, which is modest." - Infectious Disease Specialist

How PfSPZ Works



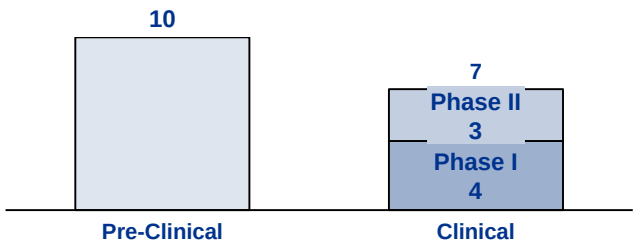
Source(s): Informa; Pharmaprojects; Pharma Company Websites; New York Times; KOL Interviews

Malaria: Therapeutic mAb Competitive Landscape (1/2)

The malaria therapeutics pipeline is more mature and highly competitive, with a severe malaria therapeutic product expecting near-term FDA approval

Stage	Lead Company	Generic Name[(a)]	RoA	Comments
Approved	**MMV**	Tafenoquine	**Oral**	Once weekly vs. daily antimalarial
	MMV	Artesunate + pyronaridine	**Oral**	
	Novartis	Artemether + lumefantrine	**Oral**	
	Leadiant BioSciences	Dihydroartemisinin + piperaquine	**Oral**	
	GSK	Atovaquone + proguanil	**Oral**	
	GSK	Halofantrine	**Oral**	
	Millenia Hope	Malarex	**Oral**	
	Roche	Mefloquine	**Oral**	
	Takeda	Quinine Sulfate	**Oral**	
Clinical	**La Jolla Pharmaceuticals**	IV Artesunate	**IV**	NDA Filed – Expected launch Q4'20
	MMV	Artefenomel	**Oral**	Phase II
	MMV	DSM-265	**Oral**	Phase II
	MMV	MMV-390048	**Oral**	Phase II
	Merck	DDD-498	**Oral**	Phase I
	Johnson & Johnson	P-218	**Oral**	Phase I
	Eisai	SJ-557733	**Oral**	Phase I
Pre-Clinical	**10 Additional antimalarial therapeutics in pre-clinical development**			

Product Pipeline by Stage
As of March 2020, Product Count



Severe Malaria Therapeutic Landscape in the US:

- IV artesunate available in limited quantities from CDC; current stockout leaving few treatments for severely ill patients in the US
- La Jolla's IV artesunate expected to become the standard efficacious severe malaria therapeutic if approved (NDA filed)
- Resistance to artemisinin therapies (which include artesunate) in some P. falciparum strains could limit its efficacy

Source(s): Informa; Pharmaprojects; pharma company websites; Clinicaltrials.gov

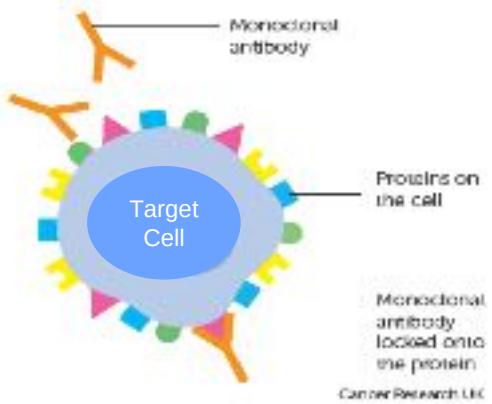
The potentially strong use case for a traveler or military monoclonal antibody is currently being validated in NIH clinical trials

About CIS43LS

- **Scientists at the National Institutes of Health Clinical Center started a Phase I study of the monoclonal antibody (mAb) CIS43LS in January 2020**
  - Designed to fight P. falciparum infection via passive immunity
  - Study to be administered to 73 malaria naïve adults
  - Treatment will include 3 separate dosage levels (5, 20 and 40mg/kg)
  - Controlled malaria infection between 10-45 days after mAb treatment
- The mAb was isolated from a volunteer who had received the PfSPZ (Sanaria) vaccine currently in Phase II trials

- Study authors state the antibody could be used to provide short-term prophylaxis for "**tourists, medical workers or military personnel**" traveling to malaria endemic regions, positioning it directly against Ocean's malaria mAb

How Therapeutic mAbs Like CIS43LS Work



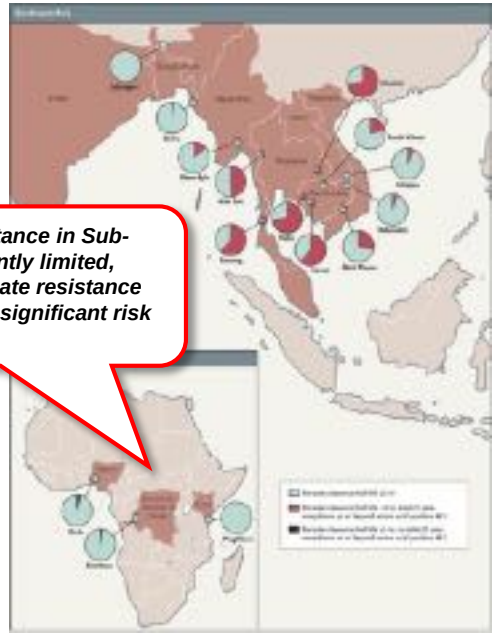
- **Monoclonal antibodies (mAb) are made to recognize specific target proteins on cells, and by attaching to parasitic cells, potentially allow the immune system to more effectively fight malaria infection**
- **Given rapid uptake, mAb therapies have potential for treatment of rapidly progressing severe malaria – though efficacy and reliance on current SoC treatments could present challenges for Ocean mAb as a therapeutic**
  - "**Artesunate** is currently very effective, is stocked across endemic regions, and is the **preferred therapy**." – Infectious Disease Specialist
  - "In areas where you might have some drug resistance to artesunate it would be a **possible adjunct therapy** – it would have to show **superior efficacy** in order to make governments and donors support the **additional cost**." – Malaria Researcher

Source(s): Informa; Pharmaprojects; Pharma Company Websites; ClinicalTrials.gov; KOL Interviews; Cancer Research UK

The current preferred antimalarial therapeutics are increasingly under threat by drug-resistant parasite strains; a PfGARP mAb could offer an effective alternative

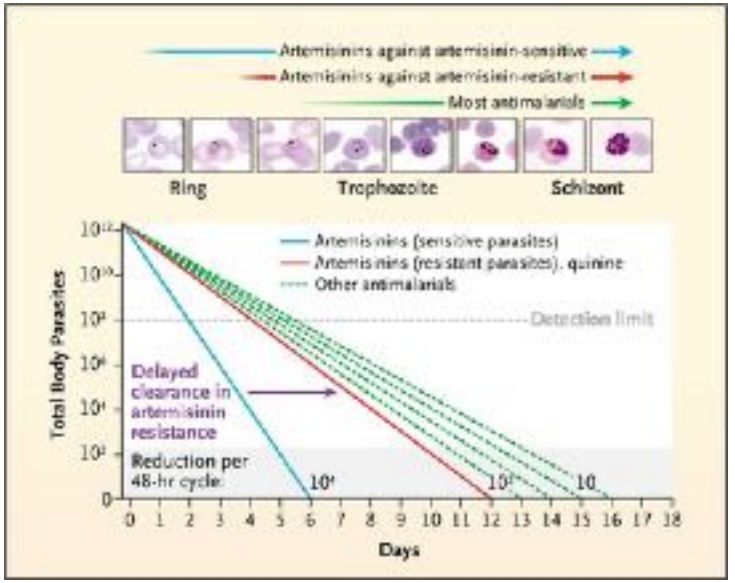
Current Extent of Drug Resistance

- **Artemisinin resistance in *P. falciparum* has emerged in Southeast Asia and now poses a threat to the control and elimination of malaria**
- **Artemisinin derivatives are highly potent, aridly eliminated antimalarial drugs with a broad stage specificity of action**
  - Artemisinin combination therapies (ACTs) are the current preferred therapeutic treatment for cases of severe malaria
  - Currently clear parasitemia more rapidly than all other available antimalarial agents



While artemisinin resistance in Sub-Saharan Africa is currently limited, historical analogs indicate resistance could spread and pose significant risk in the coming decade

Threat to Therapeutic Treatments



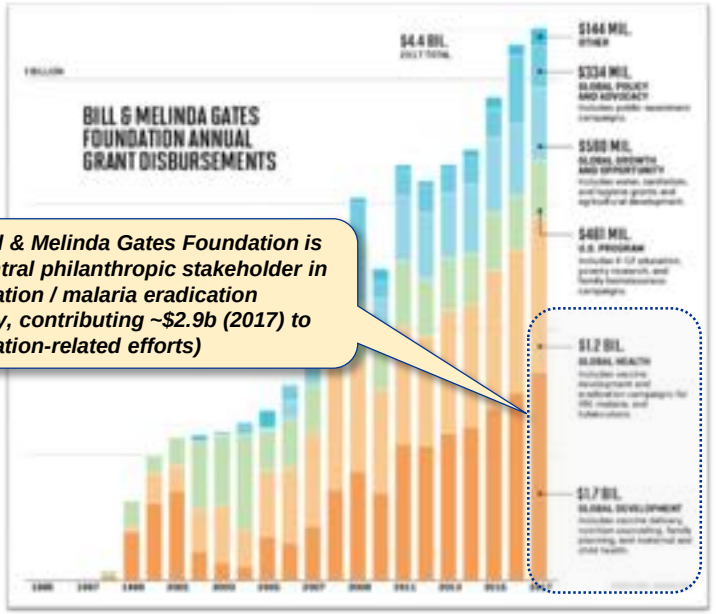
- **Risks to the current therapeutic treatment landscape would be severe if drug resistance were to spread to hardest-hit Sub-Saharan Africa**
- **Experts are concerned by the risk to effective therapeutics posed by drug resistance:**

> *"The drug resistance problem is alarming. We would have to look for new combination therapies to effectively treat severe malaria" – Malaria Researcher, Major University*

- **Ocean's PfGARP mAb could deliver an effective alternative to at-risk therapeutics given its novel MoA and rapid uptake**

Source(s): New England Journal of Medicine; KOL Interviews

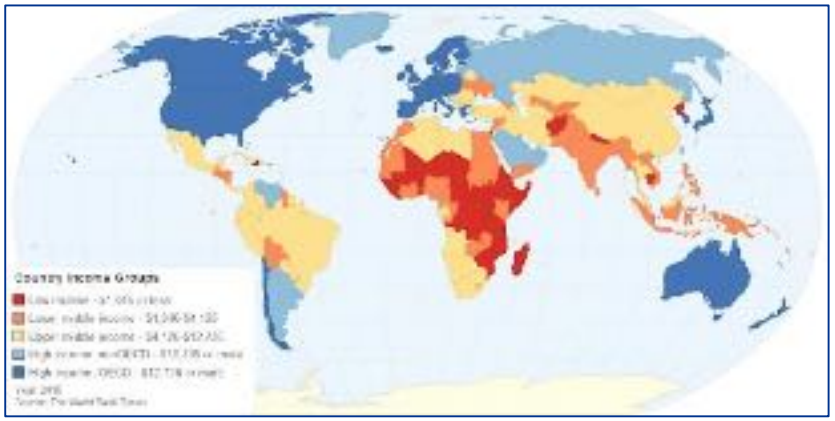
A network of key stakeholders such as Global Alliance for Vaccines-Immunization (GAVI) will be critical to vaccine commercialization in malaria endemic regions



The Bill & Melinda Gates Foundation is the central philanthropic stakeholder in vaccination / malaria eradication globally, contributing ~$2.9b (2017) to vaccination-related efforts)

<u>The Global Alliance for Vaccines-Immunization (GAVI) is the key stakeholder for global deployment of vaccines in malaria endemic regions</u>

- Coordinates global health efforts centered on vaccinations across a broad spectrum of NGOs, governments and philanthropic stakeholders
- GAVI is the key financial supporter / negotiator for pricing recommendations to lower-income countries while implementation is up to individual governments
- Countries with previous 3-year GNI <$1580 are eligible for GAVI support



Source(s): Bill & Melinda Gates Foundation; GAVI; Forbes; KOL Interviews

Ocean's mAb is a novel, attractive candidate for short-term prophylaxis that addresses significant unmet need in the traveler and military segments

PfGARP Short-Term Prophylactic mAb Value Proposition

Rapid, medium-term efficacy

- Rapid uptake of monoclonal antibodies would mean both travelers and military could utilize mAb injections with little required planning or notice prior to travel/deployments
- Forecast efficacy period of 3-6 months satisfies significant operational requirements for military planners, particularly in humanitarian and crisis response scenarios
- Broader segments of travelers would likely look to adopt a prophylactic with efficacy of 3-6 months, including VFR[(a)] travelers and health workers traveling to high risk regions

Single dosing

- KOLs and Travel Clinicians highlight compliance as a major obstacle for traveler vaccinations
- Military and DoD planners have voiced concern over poor compliance with existing once-daily prophylactics as an ongoing challenge for deployed service members
- Rapid efficacy combined with single-dosing schedule translate to broader adoption and eliminate compliance issues in travelers and deployed military segment

Suitability for adjunctive therapy

- Despite concerns around compliance, clinicians and KOLs indicate existing prophylactics are likely to retain significant use across the travel and military segments
- Given high efficacy of existing prophylactics, a mAb could see broad uptake as an adjunctive prophylactic to mitigate compliance risks
- Given high efficacy and well tolerated safety profile, a prophylactic mAb could function as an effective prophylactic option in traveler/military segments currently not indicated for current prophylactics (e.g. GDP6 contra-indication for Tafenoquine)

"The value prop with a single sub-cutaneous injection makes the travel mAb attractive…payers can be concerned around wasted medications, and if you eliminate compliance that's a positive" – VP, Pharma Strategy, Major PBM

"The military would use chemoprophylaxis and a mAb because chemoprophylaxis mainly fail due to compliance. The mAb would be an effective backup, with chemoprophylaxis as your first-line."– Malaria Researcher, Major University (familiar with DoD research & development)

Note(s): (a) VFR – Visiting Friends & Relatives

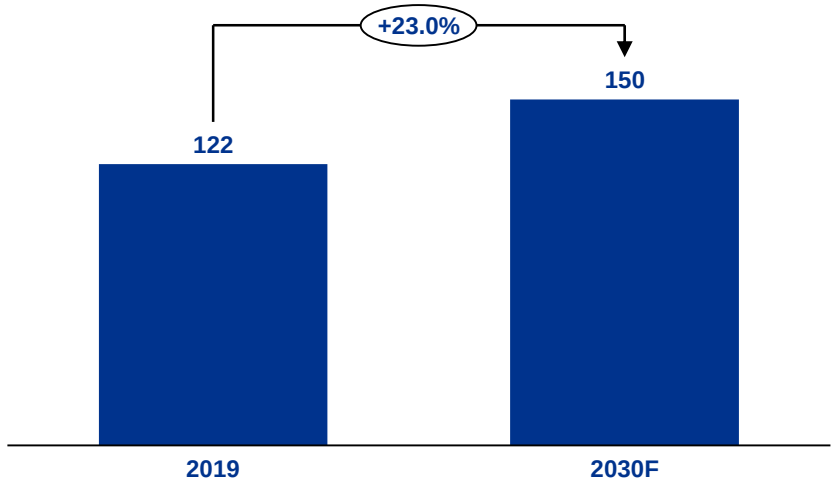
Source(s): KOL interviews; KPMG research

Travelers to malaria-endemic regions are forecast to increase to 150M by 2030F, Ocean's mAb can expect higher rates of adoption in segment vs. vaccine

- **International tourists from US/EU countries to malaria endemic regions total ~122m in 2019, with annual growth forecast of 1.9% reaching ~150m by 2030**
- **Global travel accelerates the potential risk for infection with malaria parasites among non-immune travelers, underscoring the importance of highly efficacious preventive interventions**
- **International travelers continue to acquire malaria while visiting endemic countries, with ~800 cases of severe malaria across US/EU countries**
  - 2000 reported malaria cases in US in 2016 – 300 severe cases
  - 5000 reported malaria cases in EU in 2016 – 500 severe cases
- **Nearly 80% of travel-related malaria cases in the US were acquired in Sub-Saharan Africa, where P. falciparum infection is most prevalent**
- **~30% of international travelers to Sub-Saharan Africa and endemic regions are likely adopters of a travel vaccine**
  - Nationals returning to visit friends and relatives (VFR travelers)
  - Frequent business travelers or foreign diplomats and families
  - Foreign aid workers at high risk of malaria infection
- **The majority of deaths have occurred among VFR travelers due to longer trips (avg 22 days), poor prophylaxis compliance or avoidance of preventive measures**
  - Only 18% of VFR travelers report pre-travel medical consultation
- **Multi-dose travel vaccine analogs indicate Ocean's travel vaccine can expect ~50% compliance assuming current dosing schedule**
- **Ocean's Traveler mAb has broader potential adoption and no compliance issues within the travel segment given its single dosing and ease of use**

Forecast of US/EU Travelers to Malaria Endemic Regions

2019-2030F, Millions



Despite the broad applicability of a malaria travel vaccine, experts and payers indicated that the scope of the travel vaccination market is limited by payer access and low rates of adoption in the general travel population:

"Most people don't have coverage, unless they are government or their business covers it, which limits traveler vaccine use" – Vaccine Researcher

"Wen people are told the price for vaccines they don't even show up because they say, I'll just take the pills or the risk – travelers are very price sensitive."– Tropical Disease Specialist / Clinician

Source(s): World Economic Forum; World Bank; CDC; Journal of Travel Medicine; KOL Interviews

Expert interviews and Defense Dept. priorities confirm Ocean's monoclonal antibody's potential applicability to military segment given operational needs

Military Operational Requirement for Malaria Prophylactics

- **Sifting global security landscape highlights the likelihood that large numbers of military personnel may be deployed to malaria endemic region**
  - Conflict zones in Middle East region
  - Humanitarian missions in Sub-Saharan Africa
  - Crisis response missions in Asia-Pacific region
- **Risk factors for deploying troops are compliance failure with currently prescribed chemoprophylaxis, inconsistent use of mosquito nets and other preventive measures**
- **Most malaria cases occur during first 5 weeks of deployment, highlighting the need for rapidly effective protection among troops deploying to endemic regions**

> ***Case Study: 2003 deployment of 225 U.S. Marines to Liberia:***
> - Despite only spending 10 days in country, 44 Marines were confirmed to contract malaria
> - 5 Marines developed severe malaria, requiring critical care and prolonged hospitalization

- Given rapidly evolving deployment cycles, multi-step vaccination regimens present challenges for military planners
- Single-step, simple prevention procedure is the desired goal of US DoD
- Given the high efficacy of current prophylactics when taken properly, a mAb would have to demonstrate superior efficacy or suitability as a backstop adjunct treatment to mitigate the risks from service member non-compliance

Military Monoclonal Antibody Use Case

- **An effective (>80%) monoclonal antibody** prophylaxis has been highlighted by US DoD as an attractive prevention option, with experts predicting a greater emphasis on research away from vaccines toward mAb development
  - "*The Department of Defense has shifted their focus from vaccine development against malaria to monoclonal antibodies because they're seen as a more feasible therapy.*" – *Vaccine Specialist, US Dept of HHS*
- Experts predict adjunctive use in concert with chemoprophylaxis as a likely usage scenario for an Ocean monoclonal antibody:
  - "The military would be willing to pay for an adjunct to chemoprophylaxis to prevent severe malaria in high-risk personnel." – Antimalarial Researcher
- Payers confirm that despite the military's significant pricing power, potential upside exists for a highly efficacious mAb as a short term prophylactic:
  - *"The military presents an opportunity for potentially millions of doses at reasonable prices given the operational need." – Infectious Disease Specialist*

Source(s): KOL Interviews; Rochester Institute of Technology; Institute of Medicine – National Academies; Vaccine Journal

Malaria: Vaccine KOL / Payer Findings

KOLs validate significant unmet prophylactic vaccine need; GAVI, WHO and other global stakeholders will be critical to vaccine commercialization

	Key Takeaways / Themes	Impact to Asset
Market Outlook & Access	▪ The massive unmet need will drive rapid adoption of a viable vaccine candidate ▪ Malaria market is a vast while generally poorer global market ▪ The social and geographic dynamics of malaria will present challenges to penetration ▪ Multi-dose vaccination programs typically have lower rates of compliance - *"This is a disease with massive unmet need and huge impact. Not a wealthy market, but a vast one" – Malaria Researcher, US University*	
Key Stakeholders	▪ The global malaria roadmap involves rollout of an effective vaccine against malaria ▪ Gates Foundation has set priority on transmission-blocking vaccine, but no current viable candidates ▪ GAVI is primary purchaser for malaria endemic regions, but individual countries decide implementation - *"There's a malaria roadmap – this would get Gates and GAVI financial and political support" – WHO/GAVI Vaccine Expert*	
Competitive Landscape & Pricing	▪ Current alternative vaccines have shown modest to low efficacy ▪ Large potential demand for an efficacious vaccine ▪ Public pricing in the $3.50-$7/dose range; Private endemic pricing in the $15-20/dose range ▪ Potential price ceilings given price sensitivity in traveler segment - *"The prevention of pediatric malaria with a vaccine will have powerful world bodies involved to offset costs of development and rollout to hard-hit areas" – Malaria Researcher, US University*	
Payer Insights	▪ Payers highlight travel vaccinations broadly moving to tighter price controls as a pharma benefit ▪ Discounting and gross-to-net adjustments are common in travel vaccination segment ▪ In general, travel vaccinations are not covered by insurance, presenting out of pocket costs to travelers ▪ Pricing will likely be benchmarked against high-end travel vaccinations ($250-400/dose) - *"Payers are looking to control this under a pharm benefit because of the cost structure" – VP, Cigna*	

Legend: *Negative* ○ ◢ ● *Positive*

Source(s): KOL / payer Interviews

Malaria: mAb KOL / Payer Findings

KOLs were skeptical of the mAb's viability as a therapeutic, but interviews revealed optimism for commercial success in the travel and military segments

	Key Takeaways / Themes	Impact to Asset
Market Outlook & Access	▪ Clear attractiveness of a mAb single-dose travel vaccination ▪ High potential clinical and traveler demand for high-efficacy, easy to use prophylactics ▪ Potential clinician hesitance to prescribe a mAb given its novel prophylactic use and familiarity with current chemoprophylaxis pills - *"If you can get high efficacy with one dose, travelers and physicians would be very interested" – US Travel Clinician*	
Current Therapeutics	▪ Most therapeutics in endemic regions are bought by the price-sensitive public sector ▪ High efficacy hurdles to be considered a viable alternative to current SoC therapeutics ▪ Low cost of current SoC therapeutics highlighted as additional barrier to consideration - *"It would have to show superior efficacy, and that doesn't even address the issue of cost. These countries have very little money to buy drugs" – Former WHO Malaria Expert*	
Traveler / Military Segments	▪ Validated high interest and demand for a single-dose short-term prophylactic in military segment ▪ Large operational need and risk when considering instability of malaria endemic regions ▪ Viability of an antimalarial mAb as an adjunctive to chemoprophylaxis to combat compliance risk - *"DoD has high interest in monoclonals as a backup to chemoprophylaxis that might have compliance issues in the field" – Malaria Researcher*	
Payer Insights	▪ Pricing will likely be benchmarked against high-end travel vaccinations ($250-400/dose) ▪ Military likely to exert significant pricing power in the form of discounting ▪ Despite pricing power, scale of military purchases present significant upside ▪ High efficacy as prophylactic will increase demand and pricing power of mAb - *"The military market could be big for this. They purchase a ton of doses at consistent prices" – VP, Express Scripts*	

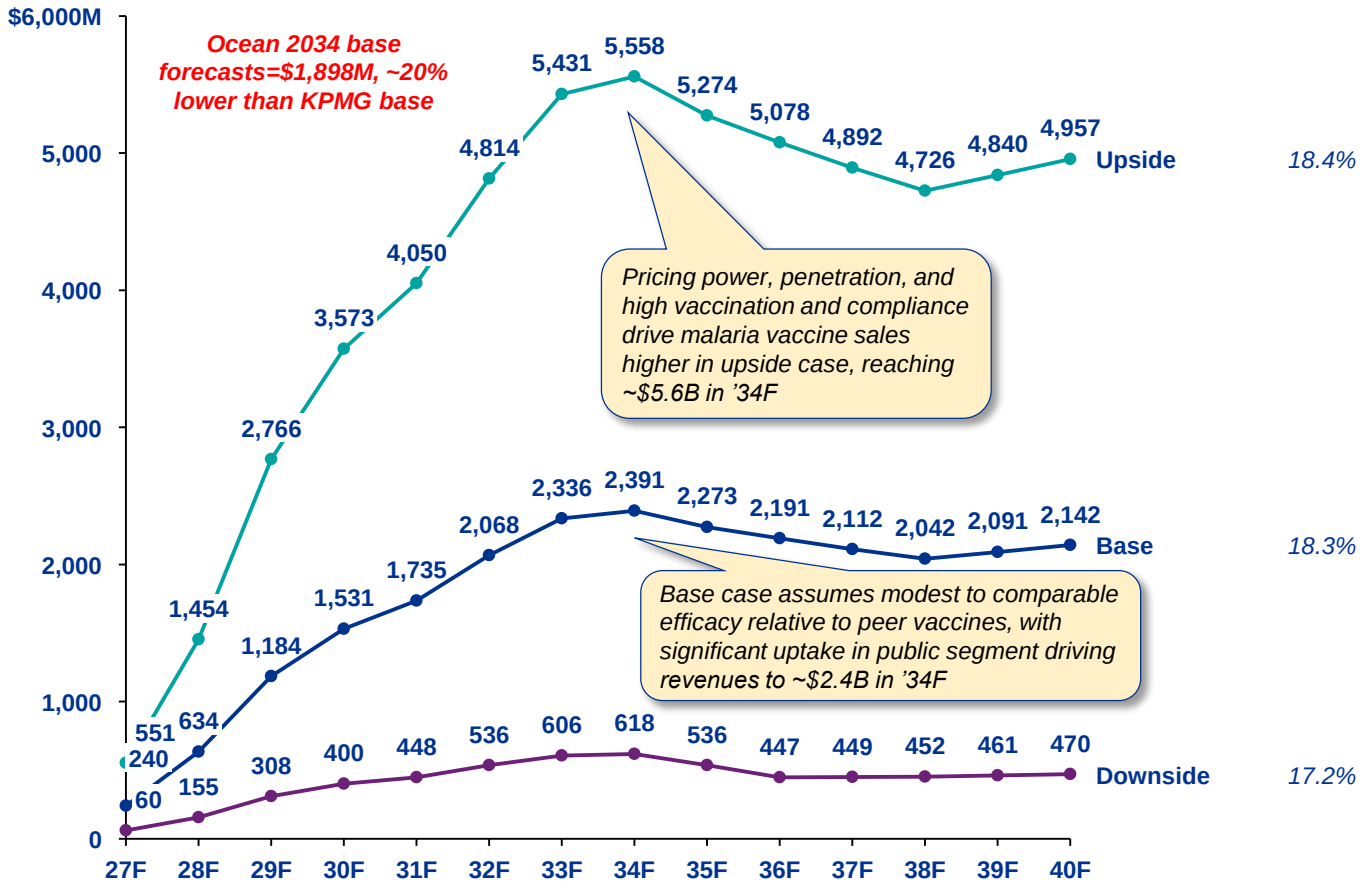
Legend: *Negative* ○ ◢ ● *Positive*

Source(s): KOL / payer Interviews

Vaccine base case forecast to reach ~$2.4B by 2034, driven by efficacy improvement over competitors & significant uptake in the endemic public segment

Ocean Malaria Vaccine Net Sales[(a)]

2027F-2040F, USD'$ Millions



	'27F-'40F CAGR
Upside	18.4%
Base	18.3%
Downside	17.2%

Note(s): (a) All cases assume 2027 launch and peak revenue in 2034

Observations

Upside Case:

- Ocean's peak penetration in the public segment reaches 70% in '34F, assuming asset has a superior safety and efficacy profile (>75%) in line with global health targets; KOLs believe a high efficacy vaccine would drive greater vaccination and compliance rates
- Net per dose list price at launch is ~$7 in the public segment, $20 in the private segment and $270 for travelers

Base Case:

- Ocean's peak penetration reaches 50% in the public segment, based on moderate improvement of safety and efficacy profile versus competitors, and achieves a significant share in the private and traveler segments
- Net per dose list price at launch is ~$5 in the public segment, $15 in the private segment and $180 for travelers

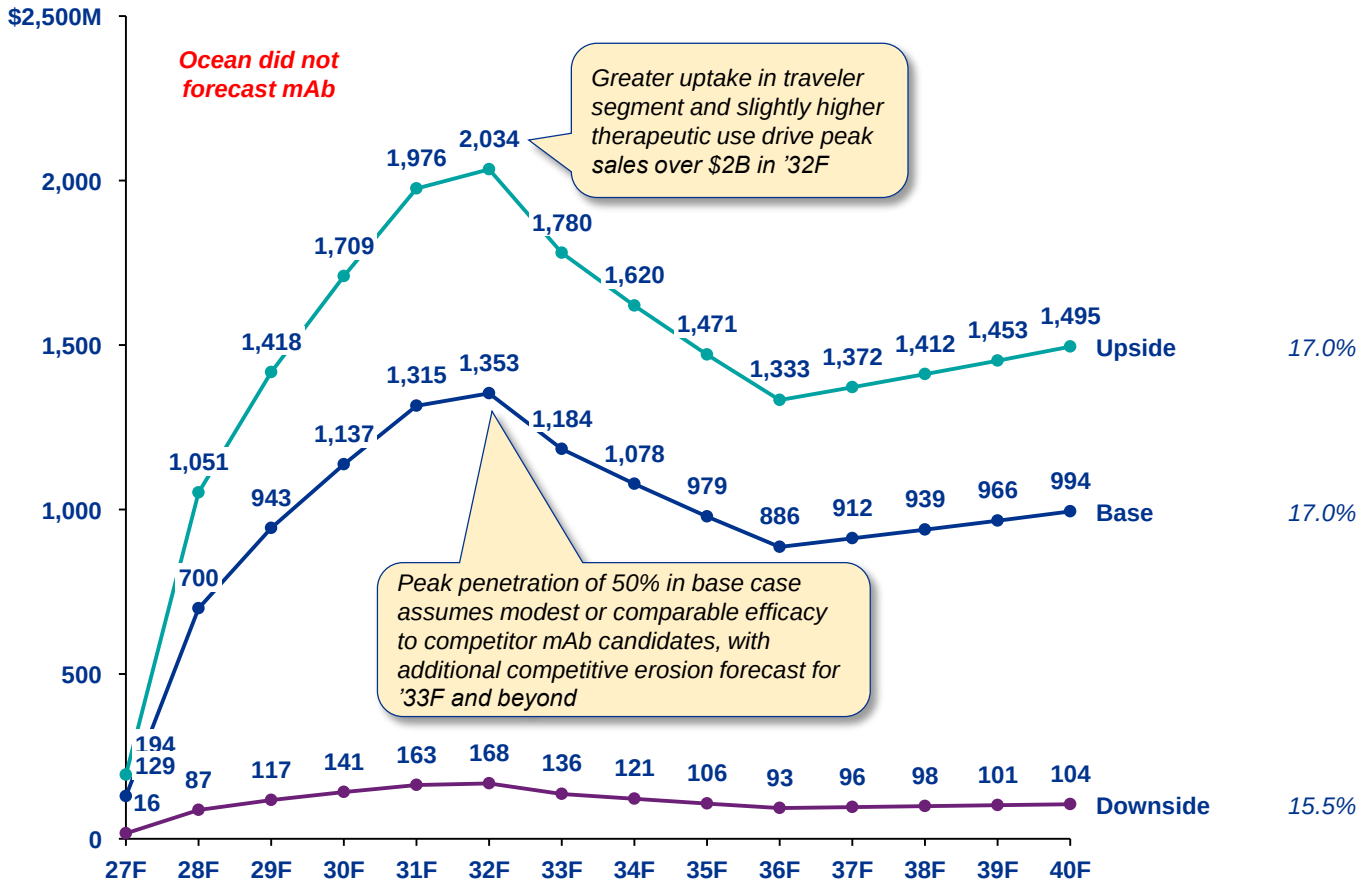
Downside Case:

- Ocean's peak penetration reaches 35%, assuming comparable safety and efficacy profile to current competition
- Net per dose list price at launch is ~$5 in the public segment, $12 in the private segment and $96 for travelers
- Compliance and vaccination rates suffer from lower perceived efficacy and vaccine value

Base case mAb sales are forecast to reach ~$1.4B by 2032, driven by significant uptake in the traveler segment

Ocean Malaria mAb Net Sales[(a)]

2027F-2040F, USD'$ Millions



'27F-'40F CAGR

Upside 17.0%

Base 17.0%

Downside 15.5%

Observations

Upside Case:

- Ocean's peak penetration in travel segment reaches 75% in '32F, driven by superior safety and efficacy profile, and significant traveler demand for a single-dose prophylactic
- US/EU average net price at launch is ~$450 based on superior efficacy and compliance, not forecast to increase over base estimate
- Achieves modest uptake in therapeutic segment given high efficacy

Base Case:

- Ocean's peak penetration in travel segment reaches 50%, based on moderate improvement of safety and efficacy profile versus competitors, but with suitability as adjunctive prophylactic
- US net price at launch is ~$450, in line with high-end travel vaccinations
- Achieves low uptake in therapeutic segment given modest efficacy

Downside Case:

- Ocean's peak penetration reaches 10% in travel segment, as product has little viability as an effective prophylaxis
- US/EU average net price at launch is ~$280
- Achieves no penetration in therapeutic segment due to non-viability

Note(s): (a) All cases assume 2027 launch and peak revenue in 2032

Ocean has an attractive, globally impactful infectious disease portfolio with current combined forecasted peak revenues of ~$3.5B in 2033

1. *Ocean's whole-proteome differential screening platform has already unlocked two promising malaria assets, a disease with massive unmet global need and a vast potential market*
2. *The malaria vaccine landscape has no effective candidates approved or promising candidates in the near-term pipeline*
3. *Travel or deployments to malaria endemic regions will likely continue to grow among the traveler and military segment, presenting significant revenue potential*
4. *KOLs and Payers indicate support for the promise of Ocean's vaccine candidate and the attractiveness of both assets in target market segments*
5. *Both PfGARP malaria assets contribute to the infectious disease portfolio with combined forecast peak malaria revenue of ~$3.5B*

KPMG

Pulmonary Portfolio

Anti-Chit1 for IPF & HPS

Ocean's pulmonary portfolio, led by anti-Chit1, is positioned to capture a foothold in the fibrotic treatment space, with the potential to generate ~$3.3B

Pulmonary Portfolio

Peak Revenue: ~$3.3B[(a)] / 2034F

- **Ocean's pulmonary portfolio, spearhead by its anti-Chit1 asset has strong potential to generate significant sales in IPF and HPS, with the potential to expand into adjacent disease areas such as Scleroderma**
- **KOLs believe that anti-fibrotic IPF assets can create value in other fibrotic indications, a network effect that could enable Ocean's portfolio to significantly grow over time and mitigate indication concentration risk**
- **IPF and HPS have significant unmet needs, anti-Chit1 could unlock material market tailwinds by increasing drug treatment rates with a better efficacy and safety profile versus standard-of-care**

Indications	Launch Year	Peak Revenue	Summary
Idiopathic Pulmonary Fibrosis (IPF)	**2028** *(Base Case)*	**~$3.2B / 2034F** *(Base Case)*	**Anti-Chit1 has the potential to achieve ~$3.2B in a base forecast as a novel therapy with strong efficacy (but not disease modifying), and a favorable side-effect profile** ▪ The current competitive landscape is a duopoly, however, it is expected to evolve in 2028 to 4-6 competitors – anti-Chit1 can enter the market as a combo-therapy with the potential to advance to a monotherapy replacement position after conducting head-to-head trials ▪ Side-effects are constraining drug treatment rates in the market today, anti-Chit1 can capture up to 30% market share in a base case scenario with a better side-effect profile
Hermansky-Pudlak Syndrome (HPS)	**2027** *(Base Case)*	**~$98M / 2035F** *(Base Case)*	**HPS pulmonary fibrosis is an ultra rare disease with no marketed therapies, no drugs in pipeline, and one interventional trial – anti-Chit1 can capture 80% market share and generate up to ~$98M in peak year net revenue under base case assumptions** ▪ The competitive environment is limited to some off-label use of one IPF therapy, and the landscape is not expected to materially change considering the pipeline and trials ▪ Rare disease pricing potential could be a challenge, but the combination of strong efficacy (but not disease modifying) and a better side-effect profile enables higher market penetration and partially offsets the impact from lower pricing power

Note(s): (a) Base Case forecast for IPF and HPS combined

Infectious Diseases Portfolio

Pulmonary Portfolio

- Idiopathic Pulmonary Fibrosis

- Hermansky-Pudlak Syndrome

Oncology Portfolio

IPF has significant unmet needs; anti-Chit1 offers a novel MoA that has the potential to achieve ~$3.2B in a base case forecast

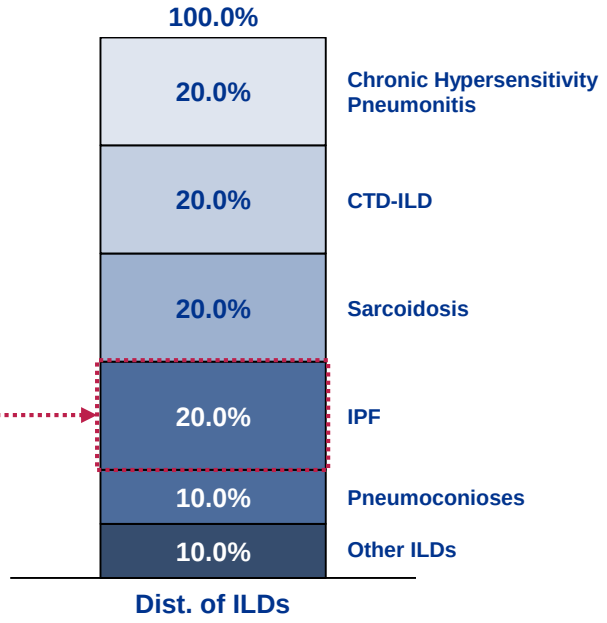
Market and Disease Overview	**IPF is a chronic incurable interstitial lung disease that primarily occurs in individuals of 50-60+ years of age – lung tissue becomes scarred over time and ultimately leads to death** • IPF is a rare disease - epidemiology suggests prevalence can range from 1-60 out of 100K depending on country, age, and risk factors; patients fall into mild, moderate, and severe categories • Diagnostic challenge – requires **excluding** other diseases, imaging, multidisciplinary panel and possibly lung biopsies
Unmet Needs & Treatment Algorithm	**Unmet needs are extremely high – current median survival after diagnosis is ~3-5 years, and the treatment paradigm is limited to the current SoC drug therapies that barely slow disease progression and have debilitating side-effects** • Treatment algorithm has opportunity for improvement – drug therapy utilization today only ranges from 50%-60% • Complex pathophysiology means future algorithm will likely utilize multi-modal approach
Competitive Landscape	**Current competitive landscape is a duopoly (Esbriet and Ofev) but pipeline is robust and fragmented** • There are 97 IPF assets in development: 56 preclinical (58%), 25 Phase I (26%), 14 Phase II (14%), 2 Phase III (2%) • ~46 assets (47%) claim disease-modifying efficacy, of which ~15% are across Phase II and III and 85% are preclinical / Phase I
KOL / Payer Findings	**KOL consensus is that Ocean's ant-Chit1 asset is a novel approach – an inhibitor that has demonstrated potential to reduce disease progression in *in vivo* models that would likely fit into the treatment algorithm as a combo-therapy** • KOLs believe that anti-Chit1 is a valid pathway, but caution that many pre-clinical models have not translated to clinical success • Payers believe pricing will vary based on efficacy, and launch of generics for current SoC therapies will constrain pricing potential
Revenue Forecast	**In a base case scenario, asset is projected to launch in 2027 and reach peak revenue of ~$3.2B in 2034** • Base case assumes 4-6 competitors at launch, peak market share of 30% based on strong safety and efficacy profile (but not disease-modifying) and a position as a combination therapy with SoC • In upside, peak revenue could reach ~$11.4B assuming disease modifying efficacy; downside scenario peak revenue is ~$1.6B • Scleroderma is an adjacent disease to IPF that KOLs believe anti-Chit1 could enter in the future (not included in revenue)

IPF is a progressive and incurable interstitial lung disease with significant unmet medical needs and limited treatment options

Idiopathic Pulmonary Fibrosis

- IPF is one of the interstitial lung diseases, a large group of diseases that cause scarring (fibrosis) of the lungs, leading to difficulty breathing and an inability of oxygen to get to the bloodstream
- IPF is thought to begin with repetitive alveolar epithelial cell injury and apoptosis, leading to an aberrant wound healing response and the release of pro-fibrotic cytokines; consequently, myofibroblasts accumulate in areas called fibroblast foci
- Myofibroblasts are responsible for the deposition of collagen and extracellular matrix proteins, which in excess not only compromise lung capacity and blood-gas exchange, but also promote further fibrotic activity

Distribution of ILDs in the US[a]
2018E, Percent



Epidemiology

- IPF occurs worldwide, the prevalence of the disease appears to be increasing, but it is not clear whether this reflects increased diagnosis or a true increase in incidence
- IPF is classed as a rare disease – prevalence in the US has been reported to range from 10 to 60 cases per 100,000, while IPF prevalence in Europe ranges from 1.25 to 32.5 cases per 100,000

Symptoms & Risk Factors

- Patients may not experience or recognize any symptoms during the early stages of the disease, however, they often become more noticeable as the disease progresses (most common is Dyspnea on exertion and dry cough; others may include fatigue, and discomfort or pain in the chest)
- Several risk factors have been associated with increased risk for IPF including exposure to metal dusts, wood dusts, tobacco, and GERD[b]

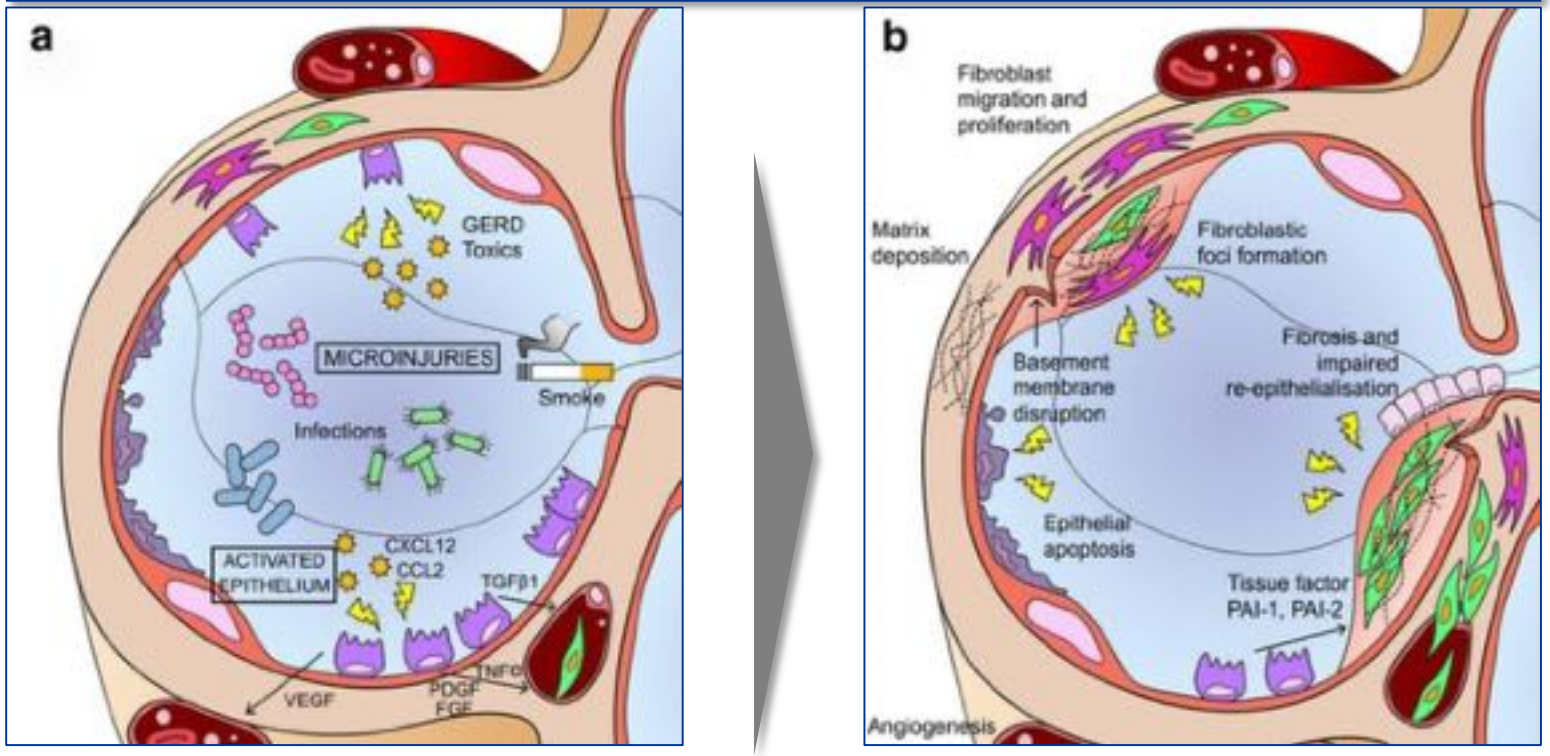
Patient Population

- Prevalence is much higher in patients >50, and is also higher in males
- Patients are most commonly segmented into three severity categories: Mild (~20%-70% of cases), Moderate (~25%-50%), and Severe (~5%-30%)
- These severity categories are based on two forms of lung function measurements (FVC and DL_{CO})[c]

Note(s): (a) ILD (interstitial lung disease); (b) GERD (gastroesophageal reflux disease); (c) FVC (forced vital capacity), DL_{CO} (diffusing capacity of the lung for carbon monoxide)
Source(s): Informa; Idiopathic Pulmonary Fibrosis – The New England Journal of Medicine, Lederer and Martinez; Raghu et al., 2016

The effects of IPF occur slowly over time – repeated injuries lead to myofibroblast proliferation and accumulation, impeding oxygen from entering the bloodstream

Schematic View of IPF Pathogenesis



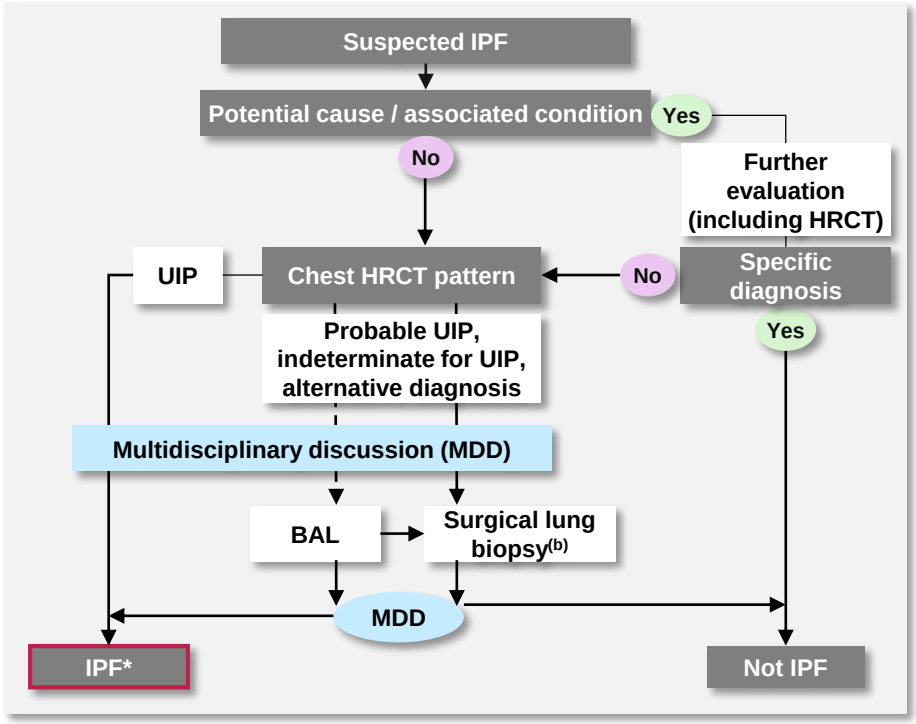
Repeated injuries over time lead to maladaptive repair process, characterized by AEC2s apoptosis, proliferation and epithelium-mesenchymal cross-talk

Following fibroblasts, myofibroblast proliferation and accumulation of extracellular matrix

Source(s): Raghu, Collard, Egan, Behr, et al.; American Thoracic Society – Diagnosis of Idiopathic Pulmonary Fibrosis

IPF is challenging to diagnose – the current paradigm is not linear, and is based on exclusion, imaging, lung biopsy and multidisciplinary discussions

Diagnostic Paradigm[a]



IPF Diagnosis Based upon HRCT and Biopsy Patterns

IPF suspected		Histopathology pattern			
		UIP	Prob. UIP	Indeterminate for UIP	Alt. diagnosis
HRCT pattern	UIP	IPF	IPF	IPF	non-IPF dx
	Prob. UIP	IPF	IPF	IPF (likely)	non-IPF dx
	Indeterm. For UIP	IPF	IPF (likely)	Indeterminate for IPF	non-IPF dx
	Alt. diagnosis	IPF (likely) / non-IPF dx	non-IPF dx	non-IPF dx	non-IPF dx

IPF per diagnosis based upon HRCT and biopsy patterns

IPF is very challenging to diagnose because

1. It requires the exclusion of other defined clinical entities or diffuse parenchymal lung diseases of known cause and;
2. The presence of a histological pattern of UIP in the examination of lung tissue obtained by surgical lung biopsy, or radiological evidence of a UIP pattern on the high resolution computed tomography (HRCT), or both; via
3. A Multidisciplinary assessment by experienced pulmonologists, radiologists and pathologists

Note(s): (a) UIP (usual interstitial pneumonia), BAL (bronchoalveolar lavage); (b) Surgical lung biopsy is not indicated in patients at high risk for intra-, peri-, or postoperative complications

Source(s): American Thoracic Society – Diagnosis of Idiopathic Pulmonary Fibrosis

Unmet needs are high in IPF due to disease pathogenesis, diagnosis, disease progression, lack of curative agents, and current SoC therapeutic side-effects

1. Poorly understood disease with a highly complex disease pathogenesis
2. Definitive diagnosis remains difficult – KOLs describe IPF as a disease of exclusion
3. Non-linear disease progression – mild patients can be stable for years or decline quickly
4. No disease-modifying agents available – standard-of-care (SoC) only slows decline in lung function
5. Standard-of-care therapeutics have significant side-effects, meaning a significant proportion of patients choose not to take drug therapy

Unmet needs are high across all IPF patients – the treatment landscape is limited to two non-curative therapies, and median survival is 3-5 years

IPF Unmet Needs, Treatment Landscape, and Prognosis

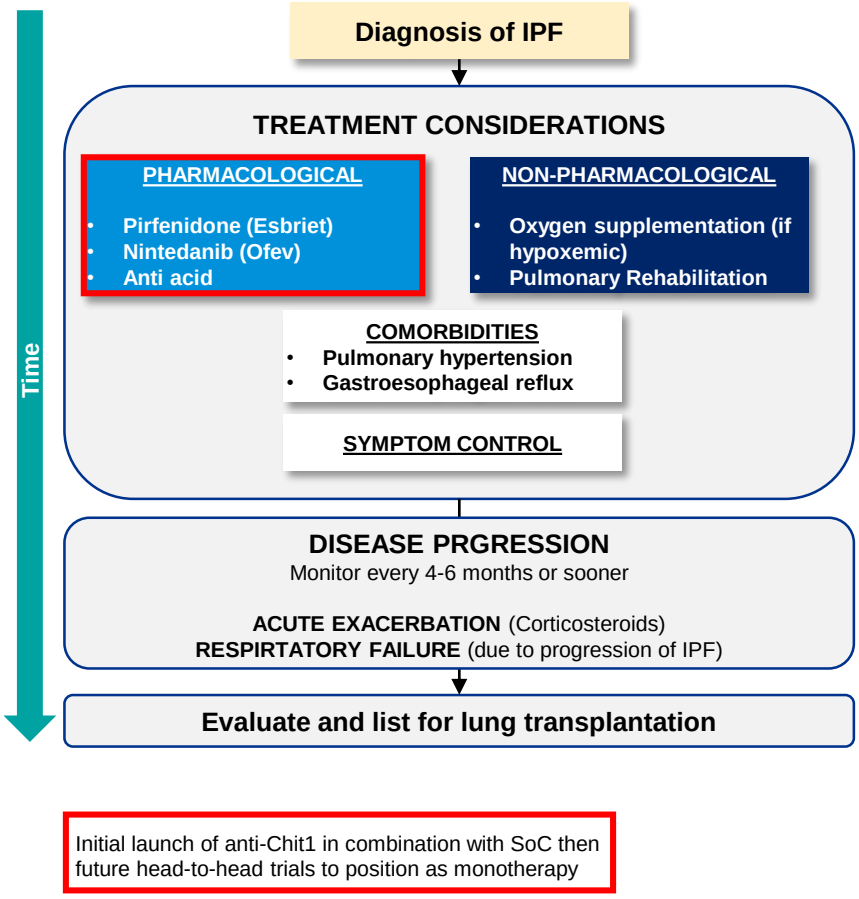
Patient Severity	Description	Median Survival	Treatment Landscape / Options	Level of Unmet Need
Mild	▪ Currently represents ~20%-70% cases, expected to be ~37%-85% in 10 years ▪ Patients with FVC >80%, DL_{CO}>60% ▪ Disease progression is non-linear, Mild patients may not experience symptoms for multiple years, the disease acceleration could occur *"You don't know how a mild patient is going to progress. That patient can basically have no change in FVC over the first two years after diagnosis" – Professor of Medicine, Researcher* *"The disease can accelerate, some people are slow, moderate, average or fast progressors…until you get that point and look backwards you can't tell who's what" – Interstitial Lung Disease Specialist, Major University*	*3-5 years following diagnosis* *(varies by patient and severity)*	▪ Pirfenidone and nintedanib can slow disease progression, however severe side-effects (e.g., nausea, vomiting, diarrhea) cause many patients to avoid these therapies. KOLs estimate that ~58% of patients take one of these therapeutics *"Mild patients aren't even being considered for a lung transplant, they really have to begin the moderate to severe population" – Professor of Medicine, Researcher*	
Moderate	▪ Currently represents ~25%-50% cases, expected to be ~14%-50% in 10 years ▪ Patients with FVC 50-80%, DL_{CO} 35-60%		▪ As their disease worsens patients are more likely to opt for pirfenidone or nintedanib; KOLs estimate that ~69% of patients take one of these therapeutics	
Severe	▪ Currently represents ~5%-30% cases, expected to be ~1%-20% in 10 years ▪ Patients with FVC <50%, DL_{CO} <35%		▪ These patients may have significant challenges in moving, and could be bedridden – as a result, they are less likely to take pirfenidone or nintedanib due to side-effects; KOLs estimate that ~54% of patients take one of these therapeutics	

"Unmet need is huge at each stage, the anti-fibrotics are barely better than control or placebo in all the groups, and the more advanced folks are all the more likely to have side-effects" – Professor-Microbiology / Immunology, Major University

Source(s): Archivos De Bronconeumologia; Prognosis and Follow-Up of Idiopathic Pulmonary Fibrosis – Estrella et al.; Informa; Management of Patients With Idiopathic Pulmonary Fibrosis, KOLs

KOLs highlight the positive impact pirfenidone and nintedanib have had on IPF treatment, but a significant proportion of patients cannot tolerate these drugs

Therapeutic Algorithm for IPF[(a)]



Initial launch of anti-Chit1 in combination with SoC then future head-to-head trials to position as monotherapy

Observations

Patient Segmentation:

- In practice, patients are diagnosed and categorized into three categories based on disease severity: mild, moderate, and severe – they are characterized based on two lung function measures FVC (forced vital capacity) and DL_{CO} (diffusing capacity of the lung for carbon monoxide)
- Various staging systems have been proposed to help segment patients and predict prognosis, however, no official staging system has been instated for IPF – a newer staging system called the GAP model has been used more recently, incorporating gender, age, FVC, and DL_{CO} to classify patients into stages I-III, although most interviewed KOLs still refer to mild, moderate and severe

Therapeutic Algorithm:

- Current therapeutic standard of care is centered around Esbriet (pirfenidone) and Ofev (nintedanib), both of which only slow the progression of the disease
- These drugs are primarily used in the moderate patient segment – both mild and severe patients view the negative side-effect profile as outweighing the benefits

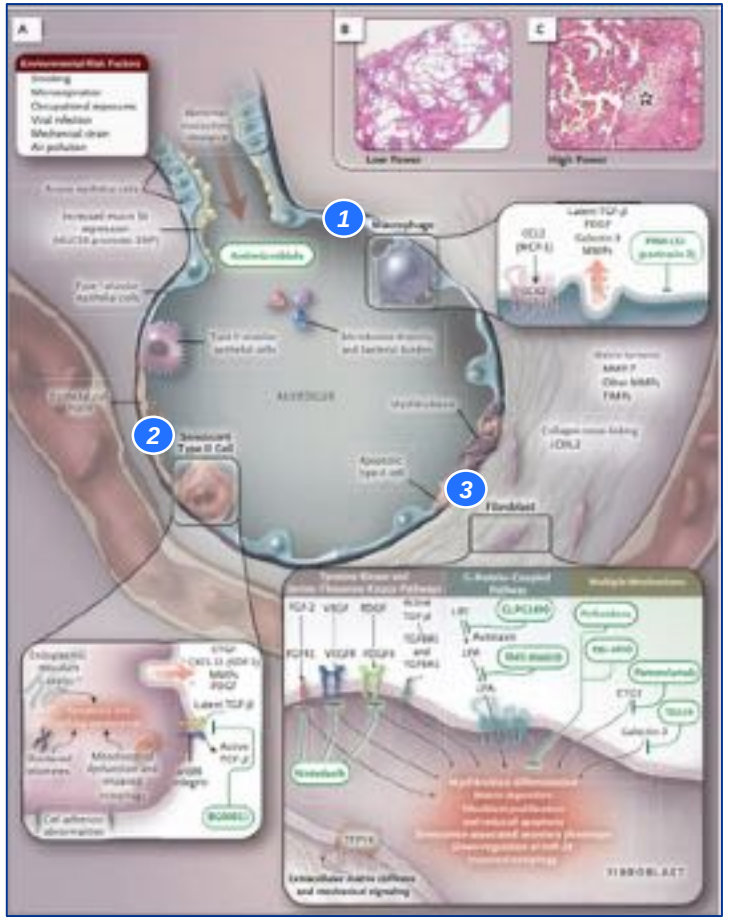
Potential Opportunities for anti-Chit1

- IPF has high unmet needs across all disease categories due to the side-effect profile of standard-of-care (SoC) and the fact that these drugs only slow the decline in lung function – a true disease-modifying agent could revolutionize SoC
- Current clinical trials are primarily focused on combinations with SoC
- Anti-Chit1 could initially enter the market in this way before conducting head-to-head trials vs. SoC in the future
    - *"In the near-term, I think this is probably going to be an add-on therapy, but if they can show incremental benefit vs. SoC then there would be follow-up head-to-head studies" – Professor of Medicine, Major Hospital*

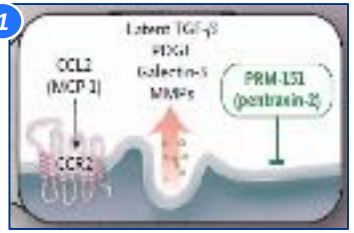
Note(s): (a) Guideline for the Medical Treatment of Idiopathic Pulmonary Fibrosis
Source(s): American Thoracic Society, Update 2019; Informa

IPF pathogenesis appears to involve multiple pathways, leading KOLs to believe that the therapeutic SoC in 10 years will comprise a multi-treatment approach

IPF Pathophysiology, Therapeutic Pathways, and Potential Therapeutic Interventions

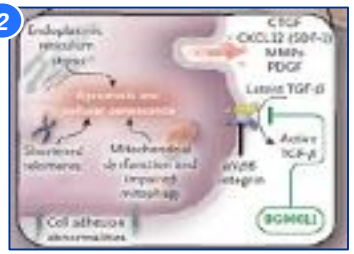


Therapeutic Pathways and Potential Therapeutic Interventions by Marketed and Select Pipeline Drugs



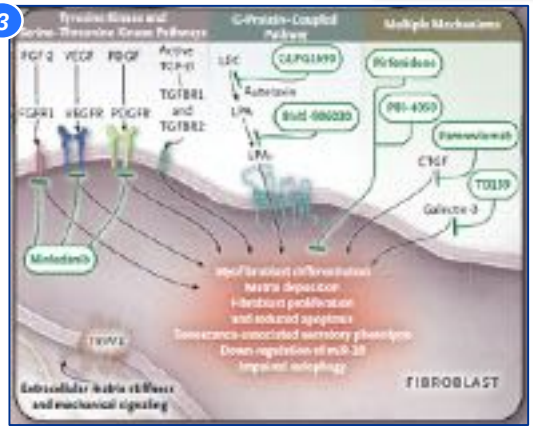
Macrophages / inflammation spectrum:

- PRM-151[(a)] is a phase II asset that claims to have "demonstrated both prevention and reversal of fibrosis" in a 2019 press release
- *"It's clear that macrophages are sources — TGF-β macrophages are involved in wound repair … insurfactant recycling, and all this other basic homeostatic mechanisms in the peripheral lung" – ILD Specialist, Major University*



Epithelial mechanisms:

- *"Conceptually, there are two (2) epithelial categories:*
  1) *…the impact that 'bad' epithelial cells have that activate 'bad' fibroblasts [senescence approach] and;*
  2) *…even further upstream, questioning how did epithelial cells end up there in the first place [mechanisms of epithelial dysfunction]" – Professor of Medicine at Major Hospital*



Mechanisms of fibroblast activation:

- Current SoC are part of the anti-fibrotic pathway
- This category can be segmented into:
  i. Tyrosine Kinase and Serine-Threonine Kinase pathways
  ii. G-Protein Coupled pathway
  iii. Multiple mechanism pathways (where Pirfenidone currently sits)
- *"…in 10 years time, the opportunity is likely to pair current pipeline drugs with something that inhibits fibroblast activation" – Lung Disease Specialist, Major University*

★ *Anti-Chit1 asset would fit here* ★

Note(s): (a) PRM-151 is owned by Roche, it acquired the asset during the acquisition of Promedior, "reversal and prevention" are claims per company's press release applicable to myelofibrosis and IPF

Source(s): New England Journal of Medicine – Idiopathic Pulmonary Fibrosis; KOL discussions; Informa

Interviews with KOLs suggests that the future market will involve treatment of earlier-stage disease using a multi-modal approach

Market Driver	Summary of Driver Impact	Expected Future Impact to Market
Launch of Therapeutics with Improved Side-effect Profiles	▪ **Drug treated population is under-penetrated today, primarily due to side-effects – as newer therapies with improved side-effect profiles emerge the drug treated population will increase** – *"Real world data suggests 25%-33% cannot tolerate either one [current SoC, Esbriet or Ofev]….., if there was something that had similar efficacy but better side-effects then everyone would take it tomorrow" – Lung Disease Specialist, Major University*	
Drug Development for a Multi-pathway Approach	▪ **IPF pathology is complex, combo-therapies are the likely next step in the treatment paradigm** – *"In 5 years we'll most likely see current SoC plus an additive therapy" – Professor-Microbiology / Immunology, Major University* – *"Fifteen years from now, I would anticipate that the approach to this is a combination of therapies designed to both target the fibroblast effector phenotype, but also address some of the upstream disease mechanisms…. I think that it is unlikely that just adding more drugs that target the fibrotic pathway is going to really be game-changing for this disease" – ILD Specialist, Major University*	
Increased Scientific Interest in IPF and Related Diseases	▪ **IPF trials and pipeline have expanded, and that trend is expected to continue due to high unmet needs, with applications to other fibrotic diseases** – *"There used to be a concern around developing a drug for a rare lung disease, but I think we've seen a shift, where you could use [the drug] for other fibrotic diseases" – Professor of Genetic Medicine*	
Earlier Diagnosis	▪ **The diagnostic paradigm is expected to improve over the next 5-15 years, which will lead to a shift in patient splits to the mild category, from moderate and severe, which can increase drug treatment rates** – *"…in 5 years, I'd think it's going to be largely in that mild category" – Lung Disease Specialist, Major University*	

Legend: Minimal Impact | Moderate Impact | Moderate-High Impact | High Impact

Source(s): KOL interviews

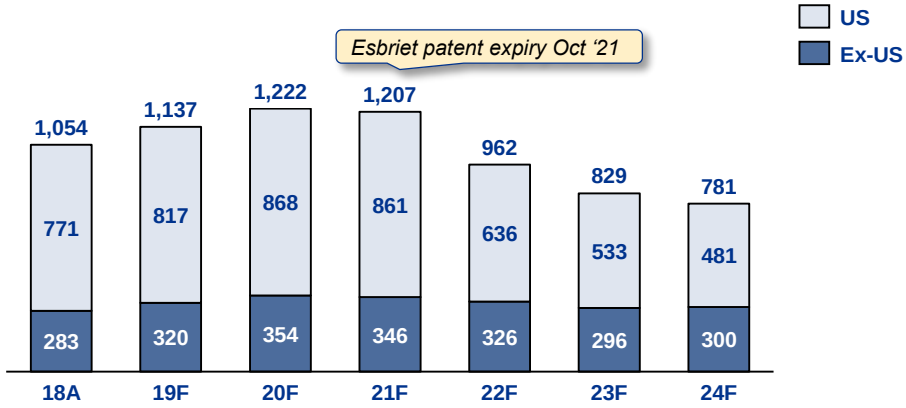
The current branded drug therapies are Roche's Esbriet (pirfenidone) and Boehringer's Ofev (nintedanib) that generated combined sales of ~$2.4B in 2018

IPF Branded Drug Landscape – Esbriet and Ofev

	OFEV	Esbriet
Company	Boehringer Ingelheim	Roche
Approval Date	US: Oct 2014 / Europe: Jan 2015	US: Oct 2014 / Europe: Feb 2011
Patent Expiration	Dec 2025	Oct 2021
WW 2018 Sales	$1.3B	$1.1B
MoA / RoA	Tyrosine kinase inhibition / Oral	Inhibition of TGB-β production and downstream signaling, collagen synthesis, and firbroblast proliferation (selected list) / Oral
Common side effects	Diarrhea	Anorexia, nausea, photosensitivity
Cautions	Risks of both bleeding and arterial thrombosis; risk of gastrointestinal perforation (rare); anticoagulant and prothrombotic drugs should be avoided	CYP 1A2 inhibitors (e.g., fluvoxamine and ciprofloxacin) can raise pirfenidone levels; CYP 1A2 inducers (e.g., omeprazole and smoking) can lower pirfenidone levels)
Other Indications *(marketed unless otherwise specified)*	Scleroderma (SSc-ILD); Pulmonary Fibrosis; NSCLC (Phase III); Colorectal Cancer (Phase III)	SSc-ILD (Phase II); HPS (Phase II)
Clinical strategies to minimize side effects	Use of antidiarrheal agents, temporary dose reduction	Slow dose increase over 14-day period, medication to be taken with food, use of antacids, use of antiemetic agents, sun avoidance

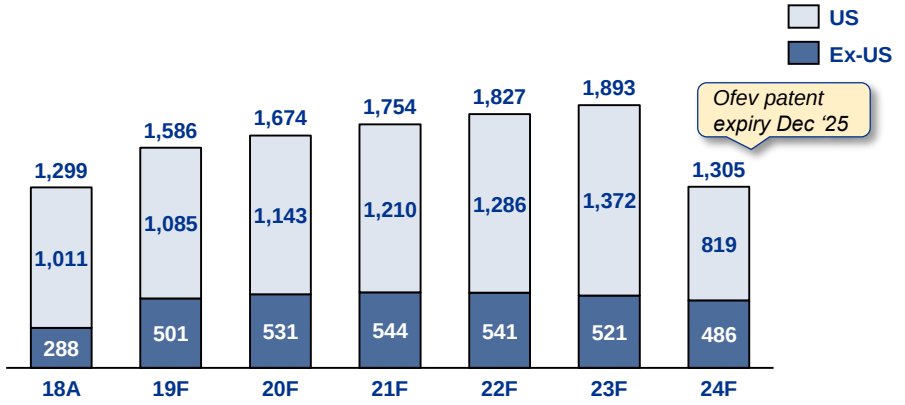
Esbriet US and Ex-US Net Sales Forecasts[(a)]

2018-2024F, USD'$ Millions



Ofev US and Ex-US Net Sales Forecasts[(a)]

2018-2024F, USD'$ Millions



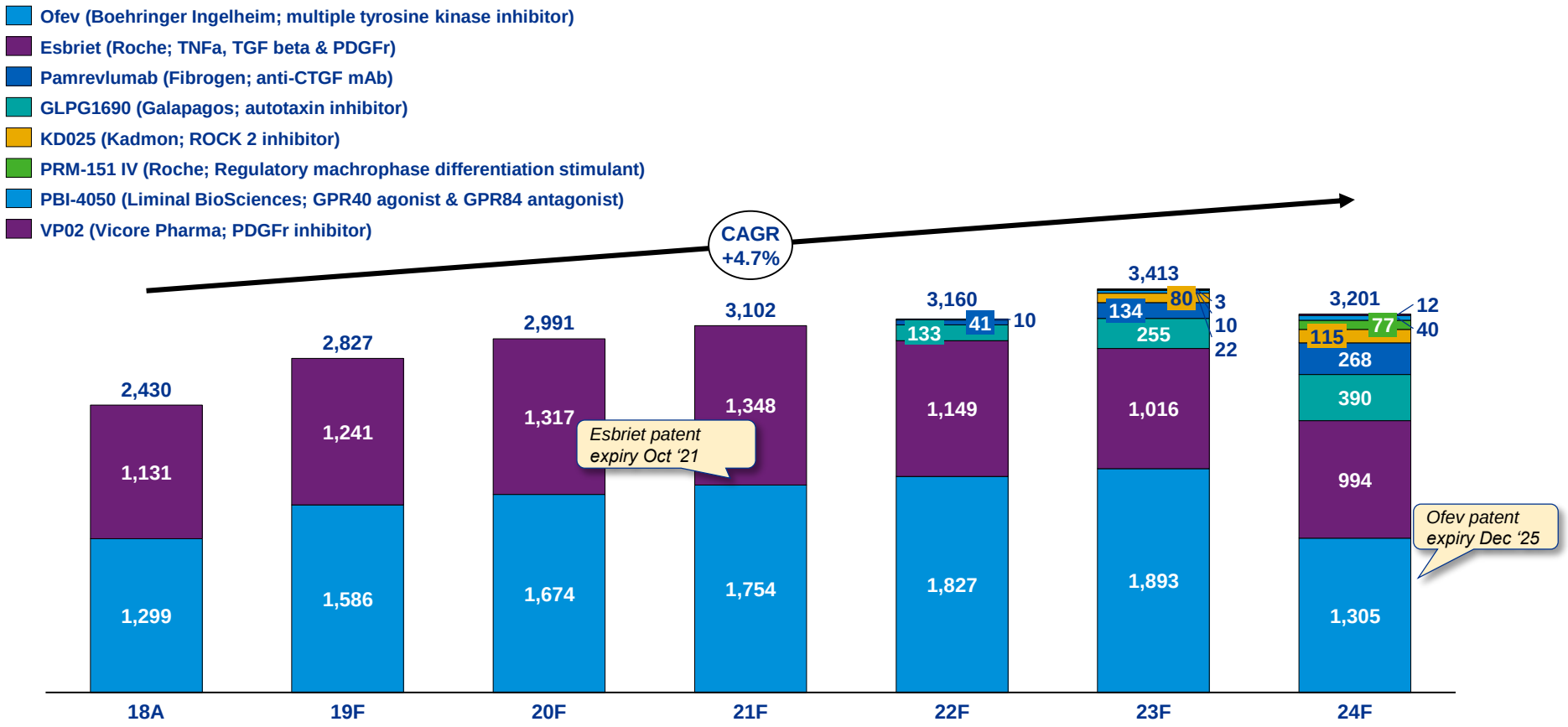
Note(s): (a) Net Sales data from EvaluatePharma

Source(s): Informa; EvaluatePharma; Eurasian Journal of Medicine - Acute Exacerbation of Idiopathic Pulmonary Fibrosis

The IPF competitive landscape is projected to evolve over the next four years from a duopoly to potentially seven competitors

Top 10 IPF Drug Worldwide Net Sales Forecasts[a]

2018-2024F, USD'$ Millions



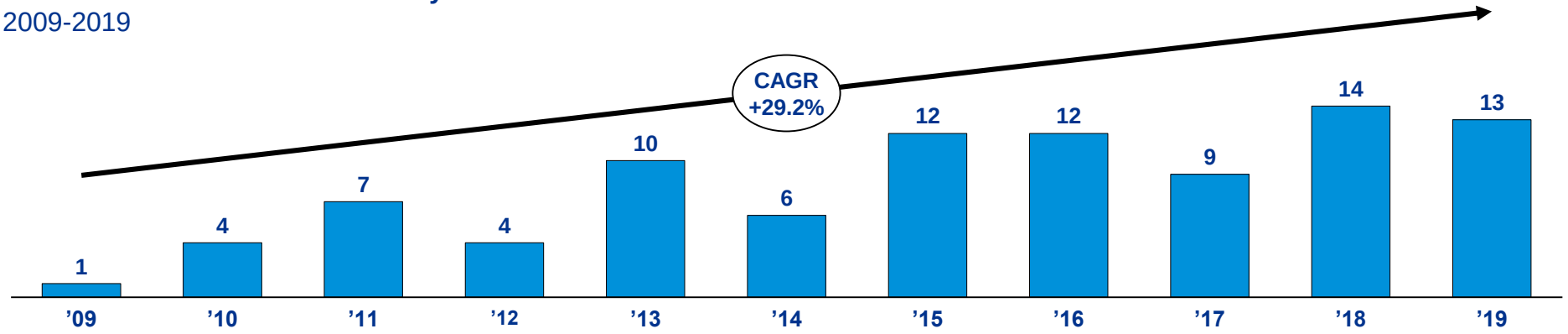
Note(s): (a) Net Sales data are estimates from EvaluatePharma; TNF (tumour necrosis factor alpha), TGF (transforming growth factor), PDGFr (platelet-derived growth factor receptor), ROCK (rho-associated coiled-coil kinase), CTGF (connective tissue growth factor); GPR (G-protein-coupled receptor)

Source(s): EvaluatePharma

The number of new IPF trials and scientific publications over the last decade highlights the growing interest in the disease

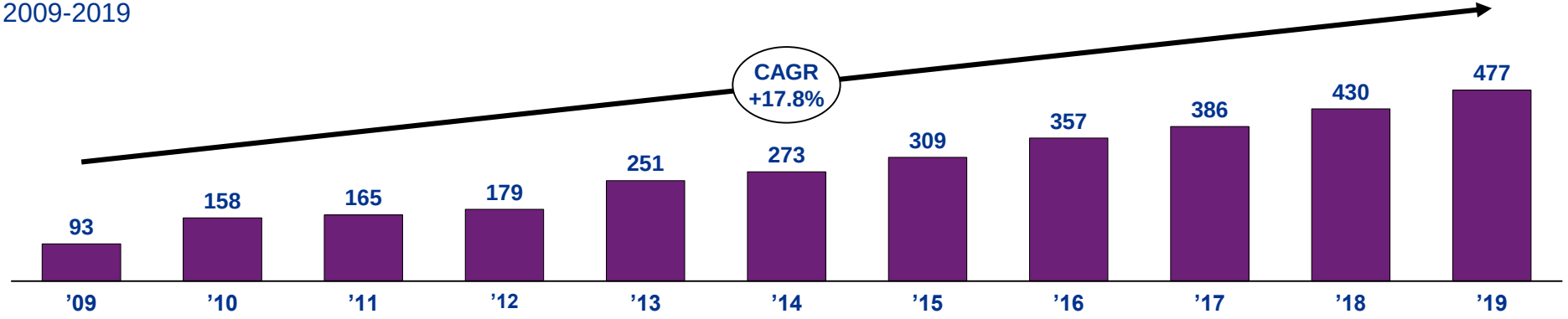
IPF Interventional Trials Started by Year[(a)]

2009-2019



Scientific Publications On IPF, 2009-2019

2009-2019



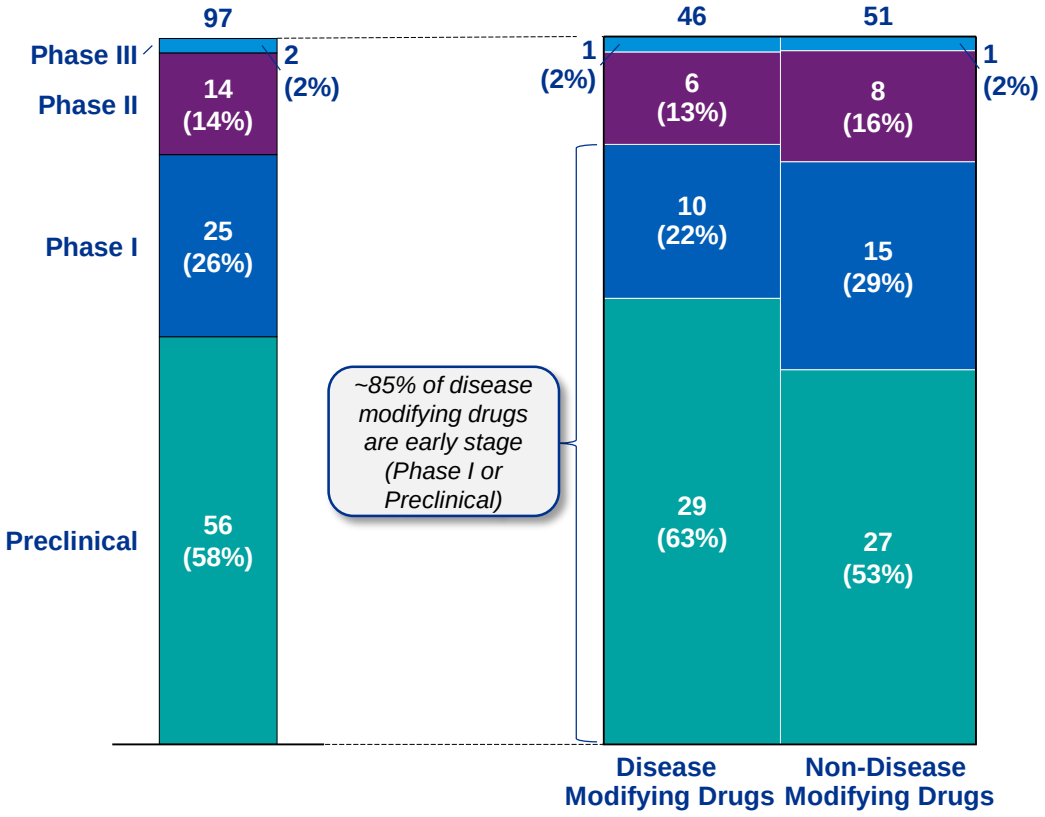
Note(s): (a) Filtered for trials with "IPF" or "Idiopathic Pulmonary Fibrosis" in Condition screener, trial Statuses filtered for: not yet recruiting, recruiting, enrolling by invitation, active not yet recruiting, and completed; trials with "Not Applicable" Phase status were excluded as they are trials without an FDA-defined phases

Source(s): ClinicalTrials.gov

Over 50% of the IPF pipeline is pre-clinical, with disease and non-disease modifying agents splitting the overall pipeline approximately 50/50

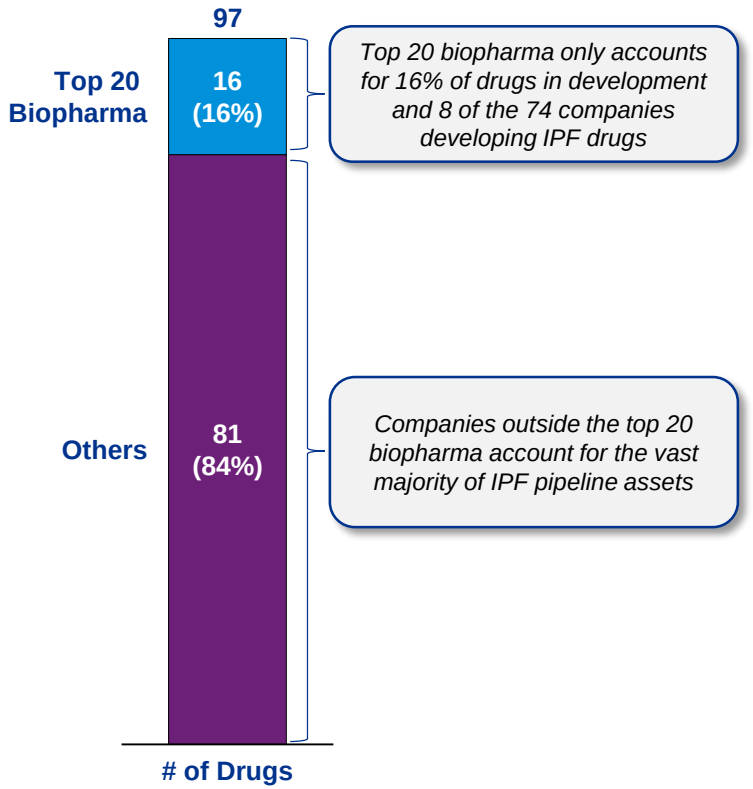
IPF Pipeline by Phase and Drug Category[(a)]

Drug Count



IPF Pipeline by Top 20 Biopharma[(a)]

Drug Count based on Worldwide Rx Sales in 2019E



Note(s): (a) Disease Modifying and Non-Disease Modifying tags based on whether asset claims to halt or reverse fibrosis; drugs queried for US and EU5 only

Source(s): Informa; EvaluatePharma

The IPF pipeline is fragmented, mostly comprised of small biotechs; ~70% of top 10 pipeline company assets are in development by companies outside the top 20

Top 10 pipeline companies – number of pipeline assets by phase and type of efficacy[(a)]											
Company	Top 20 Pharma?	# Pipeline Assets	Most advanced Phase in IPF as either monotherapy or combination								Comments
			Pre-clinical		Phase 1		Phase 2		Phase 3 / Filed		
BMS	Y	5			2	1	1	1			▪ One asset acquired from Celgene; one from Galecto
Galapagos	N	4	1	1				1	1		▪ Autotaxin inhibitor in Phase 3; G protein receptor 84 antagonist in Phase 2
AstraZeneca	Y	3	2		1						▪ One asset is a collaboration to develop a therapy; one is an RNA therapy
Pliant Therapeutics	N	3	2				1				▪ Pliant is vocal about pursuing disease modifying assets ▪ aVß1 and aVß6 integrin antagonist; EMT inhibitor; integrin inhibitor 2
Boehringer Ingelheim	Y	3	1		1	1					▪ Autotaxin inhibitor in Ph.1, partnering with LegoChem; IL-11 antagonist in Preclinical
Vicore Pharma	N	2		1				1			▪ Angiotensin II receptor type 2 in Ph. 2; EvaluatePharma projects revenue for this asset
Liminal BioSciences	N	2	1				1				▪ PBI-4050 in Phase 2; EvaluatePharma projects revenue for this asset
Relief Therapeutics	N	2				1		1			▪ Aviptadil, a vasoactive intestinal peptide receptor in Phase 2
Algernon Pharmaceuticals	N	2	2								▪ NP-120 (ifenprodil) is company's headline asset
HEC Pharma	N	2				2					▪ One asset that is a PI3 kinase inhibitor and mTOR kinase inhibitor
Total*		***28****	***9***	***2***	***4***	***5***	***3***	***4***	***1***	***-***	

Legend: **Disease Modifying** | **Non-Disease Modifying**

*5 companies with 2 assets not pictured – companies with multiple pipeline assets (38) only account for 40% of drugs in development

Note(s): (a) Disease Modifying and Non-Disease Modifying tags based on whether asset claims to halt or reverse fibrosis; drugs queried for US and EU5 only

Source(s): Informa; EvaluatePharma

A snapshot of select key assets in phases I-III suggests potential competition at launch from companies *claiming* disease-modifying capabilities

	Phase I	Phase II		Phase III	
Company	OncoArendi Therapeutics	PLIANT	Promedior / Roche	Galápagos	FibroGen
Asset	▪ OATD-01	▪ PLN-74809	▪ PRM-151	▪ GLPG1690	▪ Pamrevlumab (FG3019)
Indications *(active)*	▪ IPF, ILD, Asthma	▪ IPF, Primary Sclerosing Cholangitis (PSC)	▪ IPF, Myelofibrosis (MF)	▪ IPF, SSc-ILD	▪ IPF, Pancreatic Cancer, Duchenne Muscular Dystrophy
Modality	▪ Small molecule	▪ Small molecule	▪ Recombinant protein	▪ Small molecule	▪ Monoclonal antibody
RoA	▪ Oral	▪ Oral	▪ Intravenous	▪ Oral	▪ Intravenous (IV)
Mechanism of Action / Target	▪ AMCase / Chit1 ▪ Chit1 selective inhibitor	▪ Dual selective small molecule inhibitor of the aVß1 and aVß6 integrins	▪ Monocytes ▪ Unidentified pharmacological activity	▪ Autotaxin inhibitor; Cyclooxygenase 2 inhibitor ▪ Ectonucleotide pyrophosphatase / phosphodiesterase 2	▪ Connective tissue growth factor (CTGF) antagonist ▪ Cellular communication network factor 2
Claim Asset Is Disease Modifying?[(a)]	▪ Yes	▪ Yes	▪ Yes	▪ Yes	▪ No
Product Comments	▪ Developed a series of highly potent and selective inhibitors of CHIT1 as a novel therapy for ILDs including IPF and sarcoidosis ▪ The current work is focused on lead optimization ▪ Asset blocks AMCase and not just Chit1	▪ Integrins cause upstream activation of TGF-β1 in actively fibrotic tissue ▪ Inhibition will block TGF-β1 activation, thereby preventing the growth of fibrotic tissue ▪ Being evaluated in Phase IIa trials in patients with IPF ▪ BG00011 (Biogen) targeted aVß6, and suspended Phase IIb due safety	▪ Recombinant form of human pentraxin-2 protein under development by Roche (Promedior before acquisition) ▪ Promedior stated in a press release *"In Phase II, PRM-151 demonstrated both prevention and reversal of fibrosis"* ▪ Clinical results could be more promising for MF vs. IPF	▪ In the FLORA Phase IIa study in IPF, Galapagos reported a halt in disease progression, target engagement, and favorable safety and tolerability ▪ In January 2019, Galapagos initiated the Phase II NOVESA trial with GLPG1690 in systemic sclerosis patients	▪ In the Phase II randomized, placebo-controlled PRAISE study, the decline in percentage of predicted forced vital capacity (FVC) (the primary efficacy outcome) was significantly lower in the pamrevlumab group than in the placebo group ▪ KOLs note that a monthly IV could be logistically challenged
Additional Comments	▪ HQ: Poland ▪ Founded: 2012 (IPO 2018 on WSE) ▪ Total private funding:~$40M	▪ HQ: San Francisco, CA, USA ▪ Founded: 2015 ▪ Total private funding:~$207M ▪ Raised $144M in June '20 IPO	▪ HQ: Boston, MA, USA ▪ Founded: 2006 ▪ Acquired by Roche for ~$1.4B (completed on Feb. 2020)	▪ HQ: Belgium ▪ Founded: 1999 (IPO 2005) ▪ Gilead collaboration agreement provides rights to GLGP1690	▪ HQ: San Francisco, CA, USA ▪ Founded: 1993 (IPO 2014) ▪ Total private funding: ~$126M

Note(s): (a) Disease Modifying and Non-Disease Modifying tags based on company claims to halt or reverse fibrosis; WSE (Warsaw Stock Exchange)

Source(s): Company websites; Informa; Biomedtracker, Pharmaprojects; CrunchBase,

IPF: KOL / Payer Findings (1/2)

KOLs suggest addressing unmet needs in IPF could substantially increase drug treatment rates, and that IPF therapies could have use in broader ILD treatments

	Key Takeaways / Themes	Impact to Asset
Market Outlook & Landscape	▪ Current SoC therapies only target one pathway causing IPF pathogenesis ▪ KOLs do not expect a cure for IPF in the next 5 years, but they do expect drugs that work as well as current SoC without the side-effects ▪ The use of additive therapies is expected in the next 5-10 years, and IPF drugs could expand to broader fibrotic indications - *"I don't expect a cure for IPF in the next 5 years…I do expect there will be drugs that work at least as well as the SoC drugs now, but without the side effects" – ILD Specialist, Major University*	
Diagnostic Paradigm / Unmet Needs	▪ Today IPF diagnosis is both inclusion and exclusion, making it challenging for earlier diagnosis ▪ KOLs indicated there are efforts to improve the diagnostic paradigm and solve unmet needs in this area by developing biomarkers for diagnosis and prognosis – improved diagnosis is expected in the next 10-15 years ▪ Unmet needs are drastic in IPF – non-curative drugs, no symptom mitigation, and poor side-effects - *"I think there are a lot of unmet needs, current dugs don't halt or reverse any of the fibrosis that's occurred so patients are still dying taking those drugs…that's the biggest unmet need. The second biggest is that the current SoC drugs don't do anything to alleviate symptoms and they have a lot of side-effects" – Professor of Genetic Medicine, Major University* - *"There is a genomic classifier which has now been FDA-approved…It's not as invasive as a surgical lung biopsy…it's just starting to gain traction…in my mind it's very important [to diagnosing IPF very early on]" – Professor of Medicine*	
Patient & Drug Treatment Trends	▪ KOLs believe drug treatment trends could increase in the future if a therapy were to launch with a better side-effect profile ▪ With the improvement of earlier disease diagnosis and therapies, KOLs expect patient splits to shift towards the Mild population over time - *"Real world data outside of clinical trials suggests that somewhere between 25%-33% of patients can't tolerate either one [current SoC]. A huge proportion of patients who could potentially benefit from therapy aren't getting anything because of tolerability …even though these those two drugs have important but relatively modest impacts, if there was something that worked that well but didn't have side effects, everybody would take it tomorrow" – ILD Specialist, Major University*	

Legend: *Negative* ○ ◢ ● *Positive*

Source(s): KOL / payer interviews

IPF: KOL / Payer Findings (2/2)

The future competitive landscape is likely to include combo-therapies; pricing may be impacted by generics, but efficacy and side-effect profile can mitigate impact

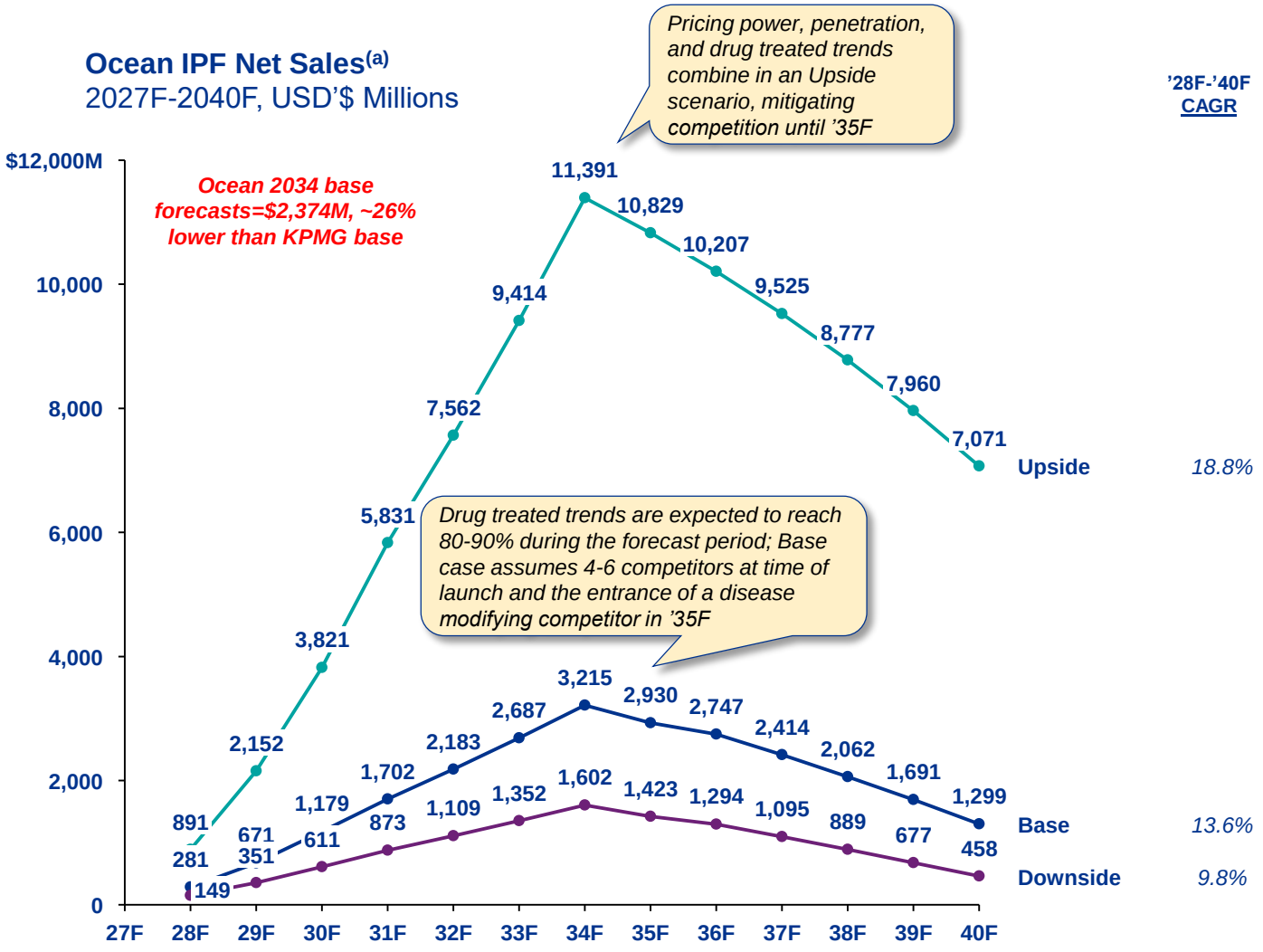
	Key Takeaways / Themes	Impact to Asset
Competitive Landscape	▪ KOLs believe the competitive landscape will evolve in the next 5-10 years to include new drugs that will likely function as combination therapies with the current SoC ▪ Disease modifying agents are not expected to reach the market until 15 years from now ▪ Payers believe that once the current SoC drugs patents expire, that pricing could be constrained and become a competitive lever - *"Trials are largely being done as add-on therapy to SoC. Although some of the studies include arms of patients that weren't able to tolerate those, so they're on nothing…I'd expect things coming through the pipeline are likely to gain at least initial approval as an add-on therapy rather than first-line therapy" – Professor of Medicine, Major Hospital*	
Pricing	▪ Payers stated there is currently very limited contracting in the IPF space today ▪ List prices for current SoC are ~$95k in the US today, payers believe there could be 30%-50% erosion once they turn generic ▪ Pricing power is tied to efficacy, but the upper bound for pricing on a disease modifying agent would be ~$95k plus 10% - *"If the asset had similar efficacy to current SoC, then price would be no more than $95k…if it has superior efficacy, then maybe a 10% increase, but the efficacy has to really resonate some outcome differentiation for me to go any higher, there would absolutely be step through controls placed on this asset [if not disease modifying]" – VP Pharma Strategy, Major PBM*	
KOL Opinion On Chit1	▪ KOLs overall feedback on the anti-Chit1 asset is that it's a promising target because of the mechanism of action ▪ Some KOLs had reserved optimism, but this was due to how early stage the asset is and the need for in-human data ▪ The anti-Chit1 asset would likely be used as a combo-therapy when it first enters the market - *"The chitinase story is one that I think probably falls into that concept of modulating fibroblast activation and the things like that. At least conceptually to me, I think of that as a therapy that slows progression, probably unlikely to reverse any underlying disease that's already there" – Professor of Genetic Medicine, Major University* - *""I'm excited about the chitinase MoA because the discovery of the gene was based on a non-biased approach…I think it has the potential to be a disease-modifier"* – Lung Disease Specialist, Major University	

Legend: *Negative* ○ ◢ ● *Positive*

Source(s): KOL / payer interviews

Base case Ocean IPF sales are forecast to reach ~$3.2B by 2034, enabled by market tailwinds and a superior safety and efficacy profile to standard-of-care

Ocean IPF Net Sales[(a)]
2027F-2040F, USD'$ Millions



	'28F-'40F CAGR
Upside	18.8%
Base	13.6%
Downside	9.8%

Observations

Upside Case:

- Ocean's peak penetration reaches 70% in '34F, **assuming the asset has disease modifying efficacy** and can eventually replace SoC; KOLs believe that drug treated rates will significantly increase with an asset that has this level of efficacy
- US list price at launch is ~$114K based on superior efficacy and side-effect profile, despite the presence of generics

Base Case:

- Ocean's peak penetration reaches 30%, based on superior safety and efficacy to SoC (but not disease modifying), and achieves a position as a combo-therapy in the disease algorithm
- US list price at launch is ~$84K because of pricing pressure due to presence of generic pirfenidone and nintedanib

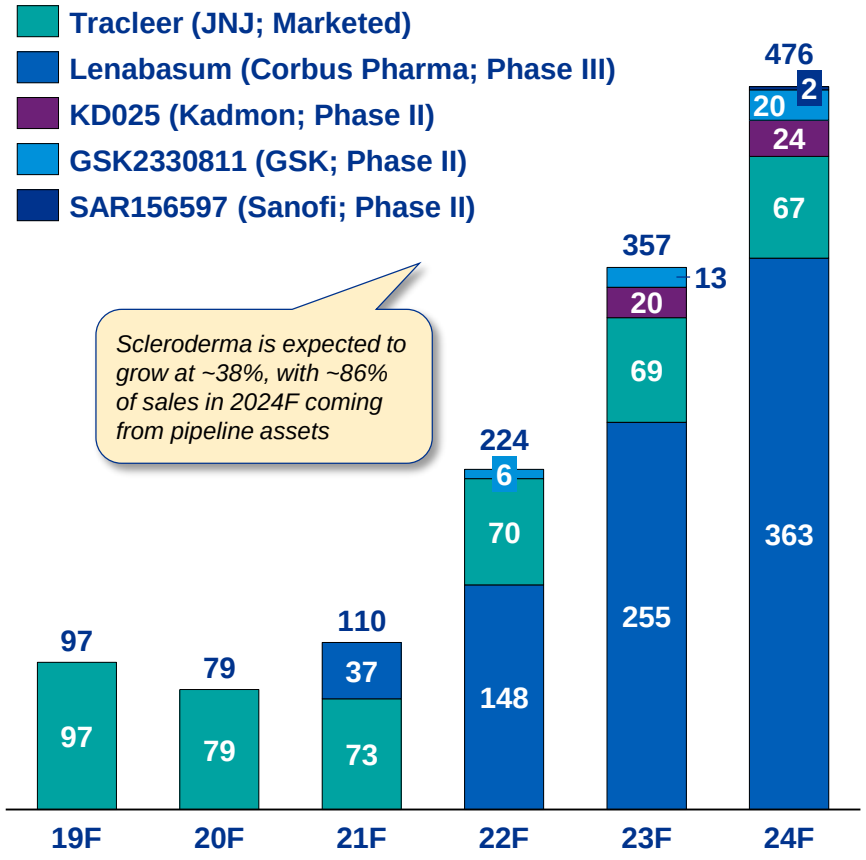
Downside Case:

- Ocean's peak penetration reaches 20%, assuming minor differentiation in safety and efficacy profile, and more competitive environment
- US list price at launch is ~$67K as the combination of comparable efficacy to a generic causes downward pressure on price, along with the presence of other combo-therapies

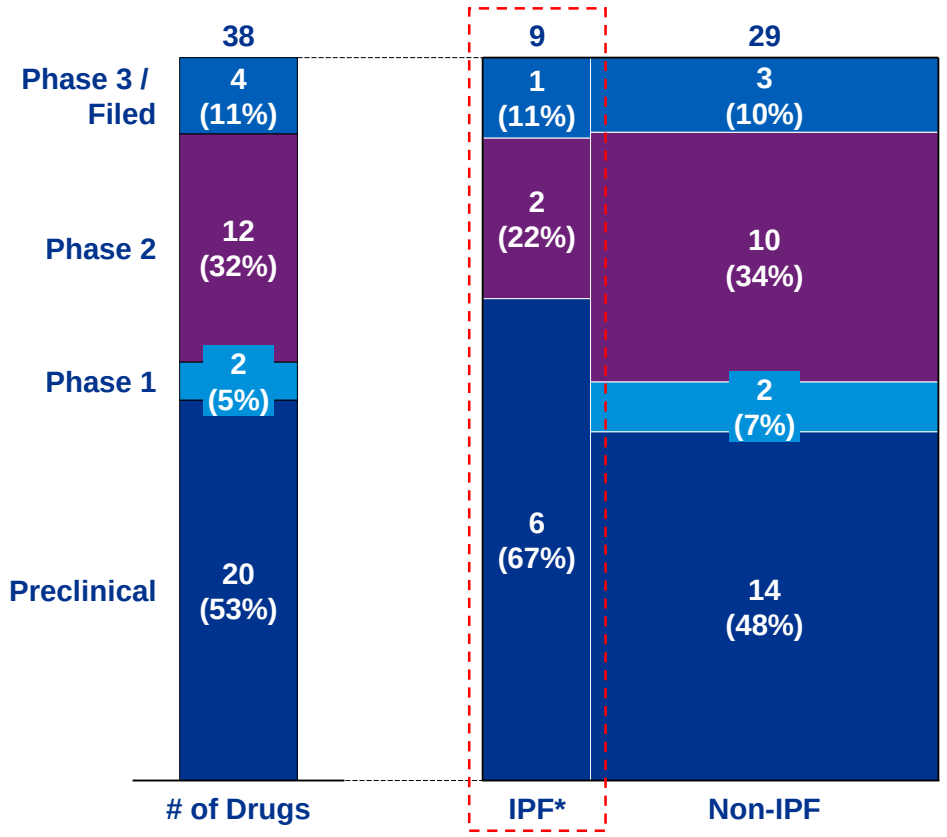
Note(s): (a) All cases assume 2028 launch and peak revenue in 2034, Ocean base forecast assumes 2027 launch

Scleroderma is an adjacent disease to IPF with high unmet needs where KOLs believe anti-Chit1 could also have utility

Scleroderma Forecasted Sales ($M)



Scleroderma Therapeutic Pipeline



**24% of pipeline also in development for IPF*

Source(s): EvaluatePharma; Pharmaprojects, Biomedtracker

In summary, Ocean's anti-Chit1 asset is positioned to effectively enter the IPF market and expand to the broader fibrotic treatment space

1. *IPF is an area with significant unmet needs that has gained much scientific interest over the last ~10 years across both large biopharma and small biotechs*
2. *The competitive landscape is fragmented, and not expected to materially change over the next 5-10 years as combo-therapies enter the market*
3. *Demonstrating PoC in the IPF space will enable Ocean to expand to other fibrotic diseases, further building out its pulmonary portfolio*
4. *KOLs viewed Ocean's anti-Chit1 as having a novel MoA, potentially giving it a competitive edge*
5. *KOLs and payers believe Ocean's anti-Chit1 asset could enter the therapeutic algorithm as a combo-therapy and advance upstream as an eventual replacement monotherapy to SoC*

Infectious Diseases Portfolio

Pulmonary Portfolio

- Idiopathic Pulmonary Fibrosis

- Hermansky-Pudlak Syndrome

Oncology Portfolio

HPS is an ultra rare disease with significant unmet needs and limited competition; anti-Chit1 has the potential to achieve ~$98M in a base case

Market and Disease Overview	**HPS is an ultra rare disease with a WW prevalent population of ~2,000-4,000, that disproportionately affects Puerto Ricans; HPS has 10 different subtypes, three of which have the potential to lead to pulmonary fibrosis** • The HPS diagnosis paradigm is defined by a combination of identifying signs of albinism, examining platelets, and / or genetic testing; however, early diagnosis of PF in HPS patients presents the same challenges as IPF diagnosis
Unmet Needs & Treatment Algorithm	**Unmet needs are extremely high for HPS related pulmonary fibrosis (HPS-PF) patients – there is no approved drug therapy, no treatment (except potential lung transplantation), and disease onset occurs as early as age 30** • The only option for patients is off-label use of Esbriet (pirfenidone, SoC for IPF) • Ofev (nintedanib) is thought to cause bleeding, so this therapy is avoided
Competitive Landscape	**Competitive landscape is limited to off-label use of Esbriet, but the future landscape is also scarce, with only one interventional clinical trial planned, a Phase II with Esbriet** • KOLs noted that Esbriet has limited data on efficacy in HPS patients, so gaining any data would provide an advantage
KOL / Payer Findings	**KOLs and payers highlighted the unmet needs and limited competitive environment in HPS, but underlined how high pricing could cause market access hurdles in Puerto Rico, potentially mitigated by The HPS Network (advocacy group)** • Off-label use of Esbriet today costs ~$95K, the potential to achieve rare disease prices in the ~$350K range could be a challenge due to the poor socioeconomic status of the majority of patients and the fact HCPs may choose off-label Esbriet instead
Revenue Forecast	**In a base case scenario, anti-Chit1 is projected to launch in 2027 and reach peak revenue of ~$98M in 2035** • Base case assumes 1-2 competitors at launch (Esbriet / generic pirfenidone), with anti-Chit1 capturing peak market share of 80% • In an upside scenario, Ocean's peak revenue could reach ~$167M assuming disease modifying efficacy; downside scenario peak revenue is ~$61M

HPS is a rare disease, with over 50% of the HPS patient population coming from Puerto Rico; HPS has 10 subtypes, three of which may lead to pulmonary fibrosis

Hermansky-Pudlak Syndrome (HPS)

- HPS is a rare autosomal recessive genetic disorder; it consists of a triad that includes tyrosinase-positive oculocutaneous albinism, bleeding diathesis, and systemic complications associated to ceroid-lipofuscin–like lysosomal storage disease
- There are 10 genetically distinct subtypes of HPS (HPS-1-10); in some types of HPS there is a lysosomal accumulation of ceriod lipofuscin, which may be associated with inflammatory bowel disease, pulmonary fibrosis, and kidney disease
- Interstitial lung disease (ILD) and pulmonary fibrosis (PF) have only been observed in subtypes HPS-1, HPS-2, and HPS-4

HPS Members and Reported Cases

To date, over 1,200 individuals with HPS have registered with The HPS Network, Inc.

Epidemiology

- HPS is rare disease, with a prevalence of 1 to 2 in 1,000,000 individuals worldwide (outside of Puerto Rico)
- Although HPS is ultra rare from a worldwide perspective, it has a much higher prevalence in Puerto Rico – where the prevalence of HPS-1 is roughly 1 in 1,800 in the northwest region of the island, accounting for the majority of all cases globally

Symptoms

- Symptoms of Hermansky-Pudlak Syndrome include oculocutaneous albinism (OCA), bleeding due to platelet dysfunction, and colitis and highly penetrant pulmonary fibrosis in some groups of young adults
- The severity of HPS ranges from very mild with few symptoms to severe and disabling. Since HPS is an autosomal recessive disorder, both parents are carriers of the abnormal gene

Patient Population

- Types 1 and 4 are the most severe form of the disorder, however ~100% of patients with HPS-1 develop HPS-PF (pulmonary fibrosis)
- One important difference between IPF and HPS-PF is the age at which pulmonary fibrosis is detected. IPF manifests in patients mostly over the age of 50 years, whereas HPS-PF occurs between 30 and 40 years

Source(s): Informa; HPS Network Inc; PubMed

The HPS diagnostic paradigm is multi-faceted and involves identifying signs of albinism and conducting platelet and genetic tests

HPS Diagnostic Paradigm

Clinical Features

All patients with HPS – regardless of subtype must have:

- Tyrosinase positive oculocutaneous albinism (OCA)
- OCA is characterized by hypopigmentation of the hair and skin. Retinal hypopigmentation is characterized by reduced iris and retinal pigment associated with a severe decline in visual acuity and horizontal nystagmus. Importantly, the degree of albinism is variable and can be subtle in HPS patients, potentially masked by use of hair-coloring products
- A bleeding disorder due to platelet dysfunction which ranges from mild to severe

Platelet Electron Microscopy

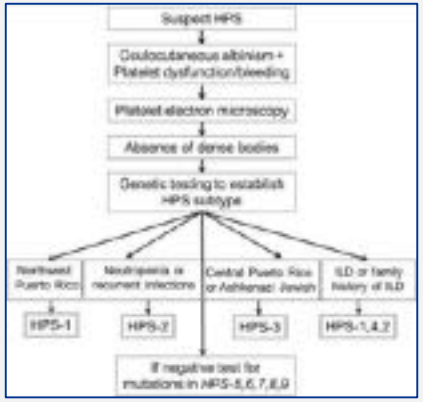
- The bleeding disorder in HPS stems from the absence of dense bodies in platelets despite normal platelet count
- Platelet storage granules release their content (ATP, ADP, serotonin) to attract other platelets after the initiation of the platelet aggregation cascade
- The most accurate diagnostic test remains the study of freshly isolated plasma with electron microscopy to establish the complete (or near-complete) absence of δ granules

Genetic Testing

- Genetic testing is recommended to determine the specific disease subtype in individuals with HPS because there are important phenotypic differences between subtypes that have critical implications for follow-up and prognosis
- However, not all patients with HPS have identified genetic mutations, suggesting that there are additional HPS disease–causing genes to be discovered
- Genetic testing has not been widely implemented for HPS because of the cost of next-generation sequencing

Ethnic Background

- A testing strategy focusing on the ethnic background or the specific phenotypic presentation of patients with OCA and a bleeding disorder may be appropriate in some cases



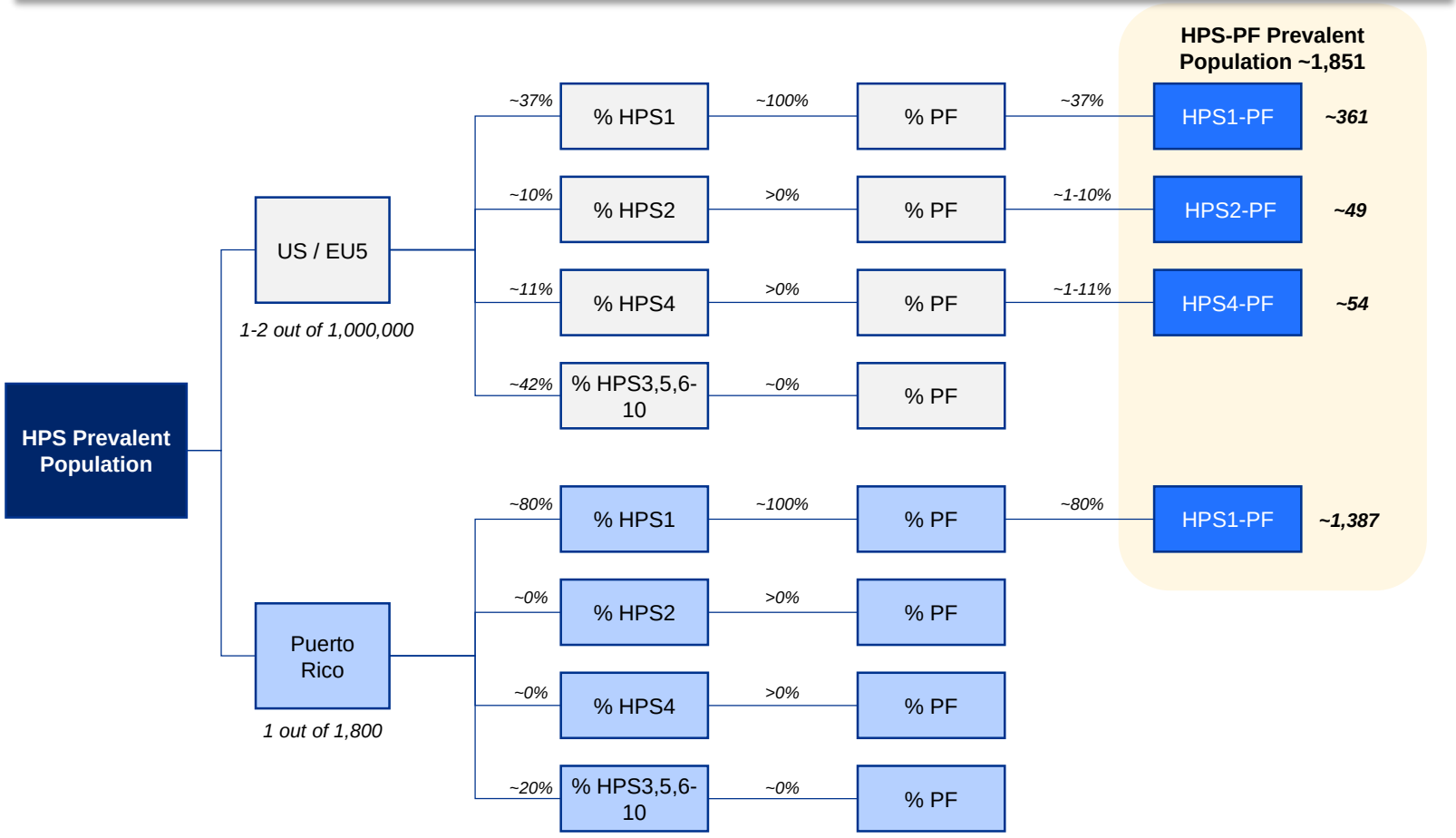
Diagnosing HPS-PF

- A high level of suspicion is required to identify pulmonary fibrosis at an early age in patients with HPS-1, HPS-2, and HPS-4
- Lung computed tomographic imaging is helpful in patients known to have HPS and who develop respiratory symptoms
- Bronchoscopy has been used for research purposes, but does not have proven benefits for the diagnosis of HPS-PF
- ***In contrast to IPF***, a lung biopsy is not recommended for patients with suspected HPS-PF because of the bleeding diathesis

Source(s): PubMed; HPS – Huizing, Malicdan, et al; Pulmonary Fibrosis in HPS – Vicary, Vergne, and Roman

Puerto Rico represents a majority of the HPS-PF patient population due to high prevalence of the HPS1 subtype

HPS Patient Population Dynamics – US, EU5, and Puerto Rico[(a)]



Note(s): (a) HPS segmentation by subtype is based on small studies; %PF (percent that develop pulmonary fibrosis); HPS-PF prevalent population is an estimate using midpoints for US, EU5, and Puerto Rico only

Source(s): PubMed; HPS – Huizing, Malicdan, et al; Orphanet; Badolato et al.; de Boer et al.; Di Pietro et al; Jung et al.

HPS has significant unmet needs – no approved therapies and a limited epidemiology that has constrained drug development and clinical trial interest

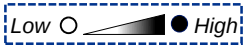
1. **No approved therapeutic agents for HPS related pulmonary fibrosis, patients currently have to seek off-label use of IPF SoC, which has poor side-effects**
2. **HPS subtypes linked to pulmonary fibrosis can be identified early, but diagnosing pulmonary fibrosis is still a challenge and nothing can be done to prevent it**
3. **HPS related pulmonary fibrosis occurs early in life (30's-40's) and has a 10-12 year mean survival rate**
4. **Over 50% of the prevalent population is in Puerto Rico, and may have issues accessing coverage due to socioeconomic conditions**
5. **There have been few HPS interventional clinical trials, and there is currently only one interventional trial planned**

Source(s): KOL interviews

Each HPS subtype that develops pulmonary fibrosis has high unmet needs, with many of these patients experiencing other symptoms prior to developing PF

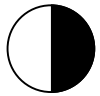
HPS Related Pulmonary Fibrosis Unmet Needs, Treatment Landscape, and Prognosis

HPS Subtype	Gene	Protein Complex	Prob. of PF	Est. Sensitivity % of Individuals with HPS	Profile and Prognosis	Treatment Landscape	Median Survival	Level of Unmet Need
HPS-1	HPS1	BLOC-3	~100%	▪ ~37% of non-Puerto Ricans ▪ ~80% of Puerto Ricans	▪ The most common subtype of HPS includes the 16bp duplication seen in Puerto Rico and presents with the classic phenotype of severe oculocutaneous albinism and bleeding diathesis ▪ Onset of lethal pulmonary fibrosis typically begins in the 30's ▪ Significant granulomatous colitis is also common in patients with BLOC-3 deficiency	▪ **Lung transplant** is the only known treatment for pulmonary fibrosis in HPS-1 and HPS-4 ▪ **Pirfenidone** may slow progression but only in patients who have significant residual lung function. Steroid therapy is not effective	***10-12 years*** *following PF diagnosis*	
HPS-4	HPS4	BLOC-3	>0	▪ ~11.5% of non-Puerto Ricans				
HPS-2	AP3B1	AP-3	>0	▪ ~10% of non-Puerto Ricans	▪ This subtype is associated with immunodeficiency in addition to the expected pigmentary and bleeding symptoms of HPS ▪ Impaired NK-cell cytotoxicity and congenital neutropenia increase risks for severe infection in patients ▪ Recently, pulmonary fibrosis has been described in some HPS-2 cases			



Source(s): PubMed; HPS – Huizing, Malicdan, et al; Pulmonary Fibrosis in HPS – Vicary, Vergne, and Roman; Orphanet; Badolato et al.; de Boer et al.; Di Pietro et al; Jung et al.

Interviews with KOLs suggest that the future market will be shaped by the launch of an approved therapy, improved patient advocacy and entry of generic Esbriet

Market Driver	Summary of Driver Impact	Expected Future Impact to Market
Launch of an Approved Therapeutic	▪ **The HPS drug treated population is significantly under-penetrated as they are limited to one off-label therapy (Esbriet) with horrible side-effects** – *"It's not unsafe to give Esbriet to HPS patients, there is no proof that it won't work…there are patients on it but I'm not sure how they get it" – HPS Clinician / Researcher, Major Hospital*	
Active Advocacy Group & Interest in HPS on Puerto Rico	▪ **The first HPS clinic in Puerto Rico was established in 2018, and The HPS Network was the catalyst – the clinic's presence will help with patient awareness and market access** – *"The HPS Network is really active, they were key in establishing the first clinic on the island" – HPS Clinician / Researcher, Major Hospital*	
Launch of a Generic Esbriet (pirfenidone)	▪ **The availability of a lower cost generic version of Esbriet could increase patient awareness and improve market access issues, ultimately expanding the addressable drug treated patient population** – *"Many patients seek Esbriet…but it is still a challenge to get them to pay $95K" – Professor of Genetic Medicine, Major University*	

Legend: Minimal Impact | Moderate Impact | Moderate-High Impact | High Impact

Source(s): KOL interviews

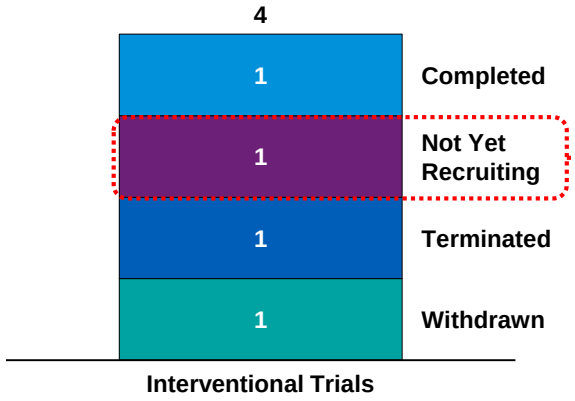
From a competitive perspective HPS is an attractive opportunity as there is only one trial currently planned, and there has been very limited interest from industry

Drug Therapies with Potential Off-label use by HPS-PF Patients

Drug / Company	Off-label Use	Comments
Esbriet (pirfenidone) Roche	◑	▪ *"Many HPS patients seek Esbriet, it's not unsafe to give to them…there is no proof that it won't work" – HPS Clinician / Researcher, Major Hospital*
OFEV nintedanib Boehringer Ingelheim	○	▪ *"The HPS Network has a fear against the use of Ofev because there was a suggestion of increase in bleeding during trials…you won't see HPS on Ofev" – Professor of Genetic Medicine, Major University*

Low ○ ◑ ● High

Hermansky-Pudlak Syndrome Trial Landscape



HPS Trial Details

Title	Funded By	Phase	Status	Start Date	Completion Date
Efficacy and Safety of Pirfenidone Treatment in HPS-ILD	Industry (Roche)	Phase 2	Not yet recruiting	Dec. 2019	Dec. 2022
Medical Treatment of Colitis in Patients With HPS	NIH	Phase 2	Withdrawn	Aug. 2007	Mar. 2011
Pilot Study of a Multi-Drug Regimen for Severe Pulmonary Fibrosis in Hermansky-Pudlak Syndrome	NIH	Phase 1 / 2	Terminated	April 2007	Nov. 2012
Oral Pirfenidone for the Pulmonary Fibrosis of Hermansky-Pudlak Syndrome	NIH	Phase 2	Completed	Sept. 2005	May 2016

PEARL Trial (Esbriet)

Source(s): ClinicalTrials.gov, KOLs

Roche's PEARL is the only interventional trial in the pipeline for HPS, it is an open-label Phase II study designed to evaluate the safety and efficacy of pirfenidone

PEARL Trial (Esbriet)

Phase II	Efficacy and Safety of Pirfenidone Treatment in HPS-ILD (PEARL – NCT04193592)	
Study Status	▪ Recruitment Status: Not yet recruiting ▪ First Posted: December 10, 2019 ▪ Last Update Posted: December 10, 2019	
Study Description	▪ An open-label clinical study designed to evaluate the efficacy and safety of administering pirfenidone for 52 weeks to subjects with HPS-ILD. Patients meeting the eligibility criteria without contraindications for the study will be provided pirfenidone 2403 mg/day. Efficacy will be evaluated through interval testing of pulmonary function tests, patient reported outcomes, adverse events and survival. Safety will be assessed by determining adverse events, hospitalizations, and all-cause mortality	
Study Design	▪ Study Type: Interventional ▪ Estimated Enrollment: 50 participants ▪ Intervention Model: Single Group Assignment ▪ Intervention Model Description: Open Label Drug	▪ Masking: None (Open Label) ▪ Primary Purpose: Treatment ▪ Estimated Study Start Date: December 1, 2019 ▪ Estimated Primary Completion Date: December 31, 2022 ▪ Estimated Study Completion Date: December 31, 2022
Arms and Interventions	**Arm:** ▪ Experimental: Oral Pirfenidone 2403 mg per day ▪ Enrolled subjects will receive oral pirfenidone 801 mg taken three times a day. Pirfenidone will be supplied in 267 mg capsules	**Intervention / Treatment:** ▪ Drug: Pirfenidone (Other Name: Esbriet) ▪ Pirfenidone will be titrated over 14 days, as tolerated, to the full dose of 2403 mg per day, as follows: Days 1 - 7: one capsule TID; Days 8 - 14: two capsules TID; Days 15 to week 52: three capsules TID. Dose may be reduced to manage an adverse event
Outcome Measures	**Primary Outcome Measures:** ▪ Change in Forced Vital Capacity (FVC) [Time Frame: baseline, 6 months, 12 months] ▪ The incidence of decline in percent predicted FVC of 10 % or greater from baseline measured at 6 and 12 months	**Secondary Outcome Measures:** 1. Change in Forced Vital Capacity (FVC) [Time Frame: week 52] ▪ The Incidence of decline from baseline in percent predicted FVC of 10% or greater during the 52 week treatment period 2. Change in Diffusion Capacity (DLCO) [Time Frame: week 52] ▪ The Incidence of decline from baseline in percent predicted DLCO of 15% or greater during the 52 week treatment period 3. Incidence of Treatment Emergent Adverse Events [Time Frame: week 52] ▪ The number of participants with and number of treatment emergent adverse events reported by the participant will be collected 4. Incidence of Treatment Emergent Serious Adverse Events [Time Frame: week 52] ▪ The number of participants with and number of treatment-emergent serious adverse events reported by the participants will be collected

Source(s): ClinicalTrials.gov

HPS: KOL / Payer Findings

KOLs and payers highlighted the unmet needs in HPS, but cited that rare disease pricing potential could be constrained

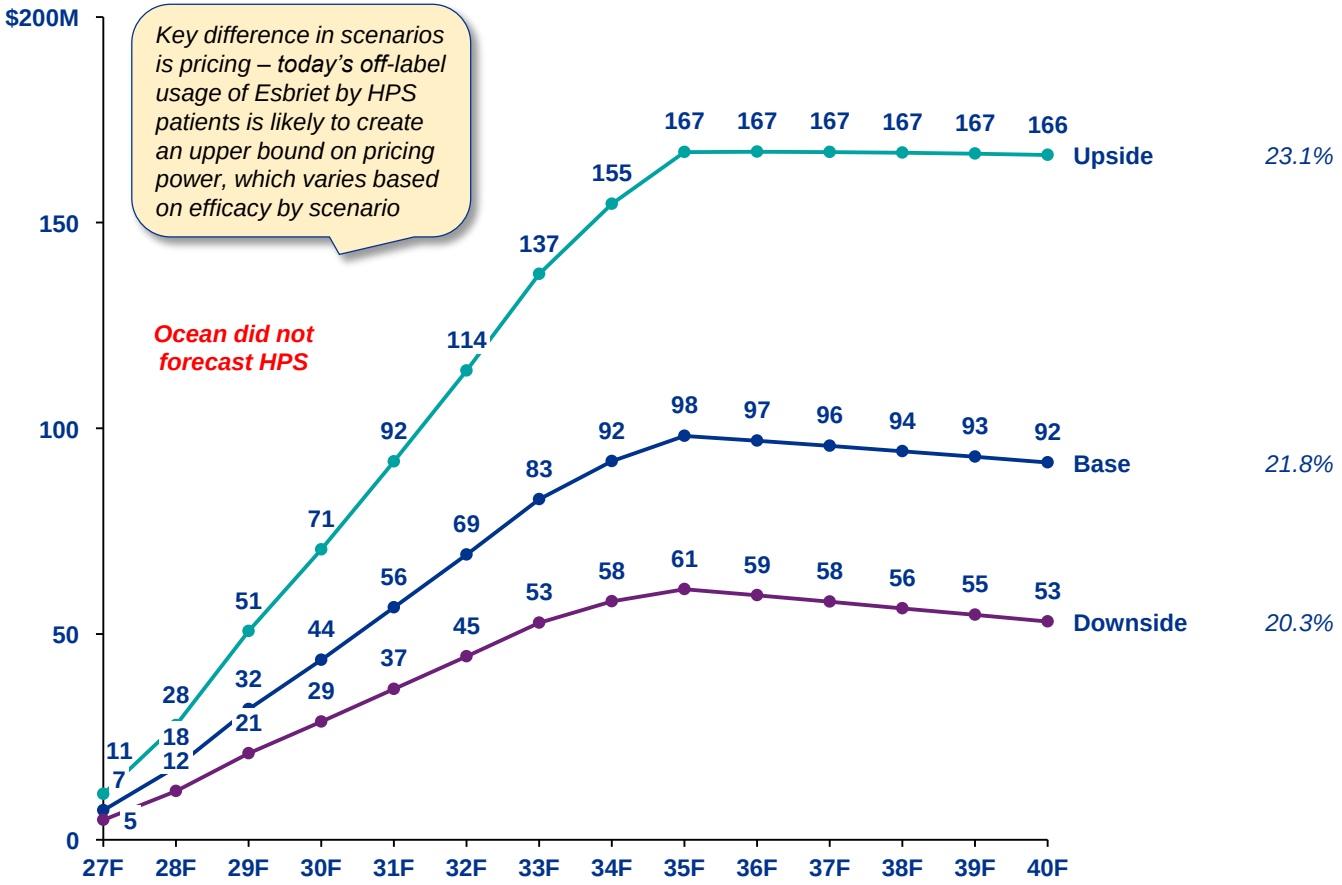
	Key Takeaways / Themes	Impact to Asset
Market Outlook & Landscape	▪ HPS related pulmonary fibrosis disproportionately affects Puerto Rico ▪ KOLs stated that the HPS community has a strong advocacy network (The HPS Network) ▪ Accurate epidemiology data for HPS is not available due to it being an ultra rare disease with a concentration in Puerto Rico - *"The majority of HPS concentration is in Puerto Rico…the data on epidemiology is rough, we don't have an exact breakdown of HPS by subtype, but the majority are HPS1" – HPS Clinician / Researcher* - *"The HPS Network helped with establishing the first HPS clinic on the island of Puerto Rico" – Professor of Genetic Medicine*	
Diagnostic Paradigm / Unmet Needs	▪ Diagnosing HPS-PF is extremely challenging ▪ Unmet needs are high, especially in the Puerto Rican patient population - *"HPS diagnostic testing is not required at birth in Puerto Rico, ~50% of patients I've seen have never had genetic testing done…the management of HPS and PF remains on expertise, there are no FDA approved drugs…unmet needs are extremely high" – HPS Clinician / Researcher*	
Competitive Landscape & Pricing	▪ There is no approved drug competition today, but KOLs indicated that patients use off-label Esbriet ▪ Payers and KOLs did not believe rare disease pricing in the ~$350K range was achievable, considering off-label options and market access hurdles for the Puerto Rican population - *"Pricing at $350K when there's off-label options at $95K is difficult, physicians could just prescribe the off-label, and in the end the physician is going to make the call…there's also the piece that Puerto Rico does not have incredible access to care" – VP, Pharma Strategy & Contracting, Major PBM*	
KOL Opinion On Chit1	▪ KOLs were intrigued by the anti-Chit1 pathway ▪ Additionally, KOLs believed that targeting the HPS indication could be a favorable market entry strategy - *" "I like this approach (chitinase), and the in vivo and in vitro data is exciting"* – HPS Clinician, US Academic Medical Center	

Legend: *Negative* ○ ◢ ● *Positive*

Source(s): KOLs / payer interviews

Base case Ocean HPS sales are forecast to reach ~$98M by 2035, driven by limited competitive intensity expected at launch

Ocean HPS Net Sales[(a)]
2027F-2040F, USD'$ Millions



	'27F-'40F CAGR
Upside	23.1%
Base	21.8%
Downside	20.3%

Observations

Upside Case:

- Ocean's peak penetration reaches 90% in '33 for US (ex. PR) / EU5, assuming anti-Chit1 has **disease modifying efficacy**; PR ramp occurs more slowly vs. US / EU5, reaching peak in '35; some competitor erosion modeled in outer years
- US list price at launch is ~$110K based on superior efficacy and side-effect profile and benchmarking to comparable IPF prices based on payer feedback

Base Case:

- Ocean's peak penetration reaches 80%, based on superior safety and efficacy profile to Esbriet (but not disease modifying)
- US list price at launch is ~$82K based on better efficacy, but more of an impact is realized from the presence of a generic on market

Downside Case:

- Ocean's peak penetration reaches 70%, based on comparable efficacy but better safety profile to Esbriet
- US list price at launch is ~$65K as the combination of comparable efficacy to a generic causes more of an adverse impact to price

Note(s): (a) All cases assume 2027 launch and peak revenue in 2035, except Upside is 2036

Ocean's anti-Chit1 asset is positioned to capture significant market share in the HPS space where unmet needs continue to go unaddressed

1. *HPS is an ultra rare disease that has had limited attention in terms of drug development*
2. *Unmet needs are high – there is no approved therapy and patients must rely on off-label IPF SoC therapy (pirfenidone) that has significant side-effects*
3. *Competitive intensity is low, as off-label pirfenidone is the only competition today*
4. *Ocean's anti-Chit1 has a novel therapeutic approach and will likely have a more favorable side-effect profile than pirfenidone, enabling high market penetration*
5. *Ocean can potentially enter the fibrotic disease space in an expedited manner by pursuing an ultra rare disease indication such as HPS before broadening to adjacent indications*

KPMG

Oncology Portfolio

Anti-Chi3l1 for NSCLC & GBM

Chi3l1/PD1 bi-specific for NSCLC

Ocean has a diverse oncology portfolio across NSCLC and glioblastoma, driven by its monotherapy anti-Chi3l1 and a bi-specific anti-Chi3l1 / anti-PD1

Oncology Portfolio

Peak Revenue: ~$19B[(a)] in 2040F, peak beyond 2040

- **Ocean's oncology assets are targeting NSCLC and glioblastoma multiforme (GBM), diseases with high unmet need**
- **The portfolio consists of an anti-Chi3l1 monotherapy for NSCLC and GBM, and an anti-Chi3l1 / anti-PD1 bi-specific for NSCLC**
- **Peak revenues in the NSCLC franchise are expected to reach ~$16B by 2040 and peak beyond the forecast period**
- **Peak revenues of ~$2.6B in the GBM franchise are expected in 2037**
- **Combined revenues for the oncology portfolio by 2040 are expected to reach ~$19B in the base case**

Indications	Launch Year	Peak Revenue	Summary
Non Small Cell Lung Cancer (NSCLC)	**2028** Anti-Chi3l1/anti-PD1 Bi-specific	**$11.4B in 2040F, peak beyond 2040F** *(Base Case)*	**The immune checkpoint inhibitors (ICIs) have revolutionized care in the NSCLC market, but significant unmet needs still exist as many patients progress after therapy with ICI** ▪ Given pre-clinical results, KOLs highlighted the utility of monotherapy anti-Chi3l1 in combination with an anti-PD1 therapy ▪ KOLs underlined the possible use of the anti-Chi3l1 / anti-PD1 bi-specific in monotherapy PD1 / PDL1 failures – an area of unmet need as these patients have few treatment options ▪ As a new MoA the bi-specific could provide a meaningful therapy option for these patients
	2028 Anti-Chi3l1 Monotherapy	**$4.9B in 2040F, peak beyond 2040F** *(Base Case)*	
Glioblastoma (GBM)	**2030** Anti-Chi3l1 Monotherapy (Intravenous)	**$1.6B / 2037F** *(Base Case)*	**GBM is a rare but devastating brain cancer - median survival is ~15 months and 5-year survival is just 5%; KOLs noted that a significant proportion of the GBM prevalent population is not actively treated (~25%), due to rapid disease prognosis** ▪ There has been little advance in new therapeutics in recent years although the pipeline is robust as the genetic and epigenetic drivers associated with the disease are gradually being identified and KOLs highlight that they ▪ Feedback from KOLs on anti-Chi3l1 was positive with utility in both the neoadjuvant (tumor shrinkage prior to surgery) and adjuvant settings (in combo with radiotherapy after surgery)
	2030 Anti-Chi3l1 Monotherapy (Intrathecal)	**$1.0B / 2037F** *(Base Case)*	

Note(s): (a) Base Case forecast combined for NSCLC and GBM

Infectious Diseases Portfolio

Pulmonary Portfolio

Oncology Portfolio

- Non-small Cell Lung Cancer

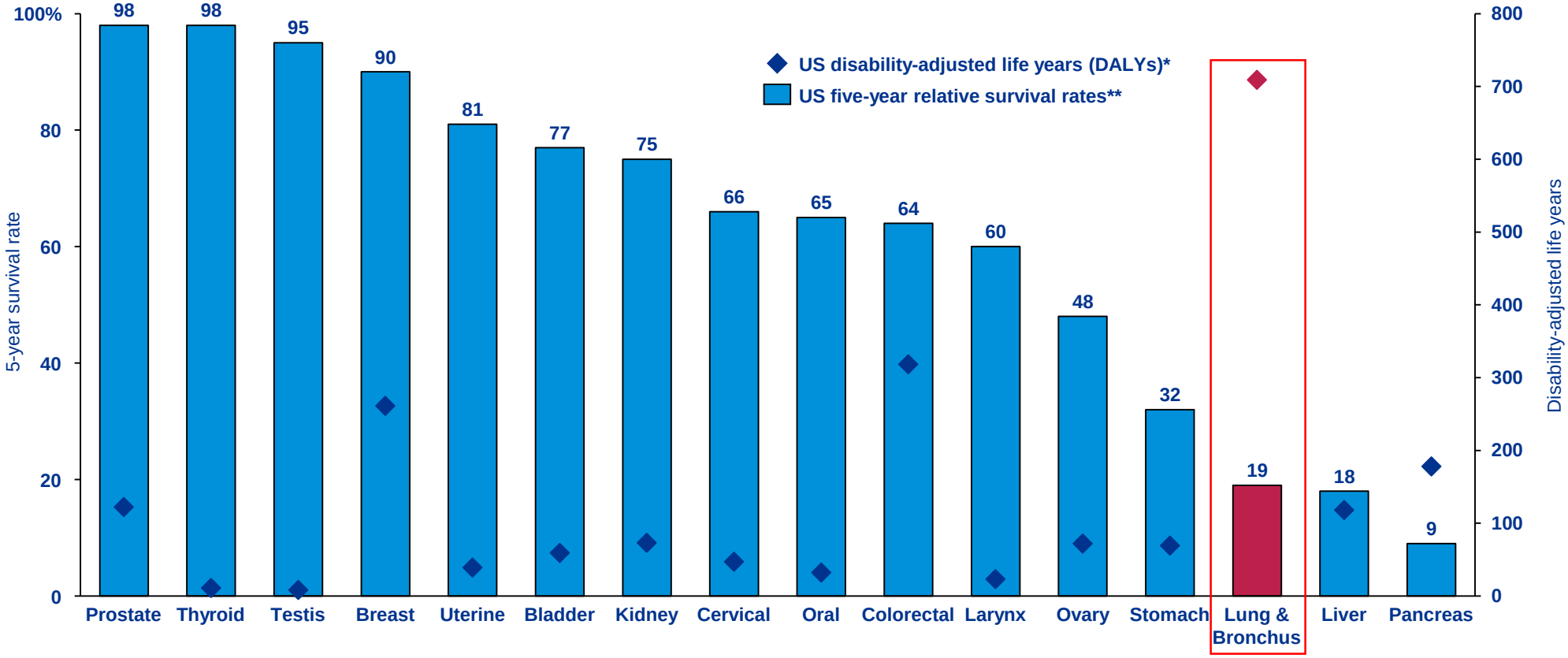
- Glioblastoma Multiforme

Anti-Chi3l1 monotherapy and Chi3l1/PD1 bi-specific could generate base case sales of ~$4.9B & ~$11.4B respectively in 2040, and continue growth beyond 2040

Market and Disease Overview	**NSCLC continues to rank among the cancers with the lowest 5-year survival rates, but has one of the largest disease burdens in terms of disability-adjusted life years** • The launch of targeted therapies have revolutionized management of metastatic disease and these molecules should start to have an impact on survival rates, particularly if they can gain a label in the earlier management of the disease
Unmet Needs & Treatment Algorithm	**A significant proportion (40-50%) of patients are still diagnosed with hard-to-treat Stage IV disease, so earlier diagnosis is essential – a number of companies are working on improving diagnostic tools** • The launch of targeted therapies has revolutionized management of metastatic disease and these molecules should start to have an impact on survival rates, particularly if they can gain a label in the earlier management of the disease • However, the fact remains that most patients will eventually progress even after targeted therapy – other options are needed
Competitive Landscape	**The competitive landscape is robust, with the emergence of immunotherapy expanding the competitive pipeline substantially in recent years, although many approaches such as CAR-T are not yet ready for 'prime time'** • Clinical trial analysis highlights how companies are pursuing a 'PD1/PDL1 plus X' combination approach for all lines and stages of disease – there were 1,600 combination trials in 2019 utilizing either Keytruda, Opdivo or Imfinzi as backbone PD1/PDL1 • Secondary research also suggests a small number of 'PD1/PDL1 plus X' bi-specifics in development
KOL / Payer Findings	**KOLs highlighted the significant unmet need for patients who progress following PD1/PDL1 therapy, and believe that the anti-Chi3l1 bi-specific could fill this gap** • The current treatment algorithm suggests that physicians do not use a second PD1/PDL1 if a patient fails on the first – these patients then have limited treatment options beyond second-line chemo, clinical trial or supportive care
Revenue Forecast	**In a base case scenario, anti-Chi3l1 monotherapy reaches ~$4.9B in 2040 as an add-on therapy to PD1, with the Chi3l1/PD1 bi-specific generating ~$11.4B in 2040** • Monotherapy use tracks PD1/PDL1 penetration, i.e. less use in Stage III and IV (competitors) and more use in Stage I and II • The bi-specific asset is projected to enter the market with use in PD1 failures in Stage III and IV before eventually moving further up the algorithm in Stage III and IV in the first-line setting

Despite advances in treatment, 5-year survival rates for lung cancer lag well behind other cancers, and the disease exacts a significant burden on society

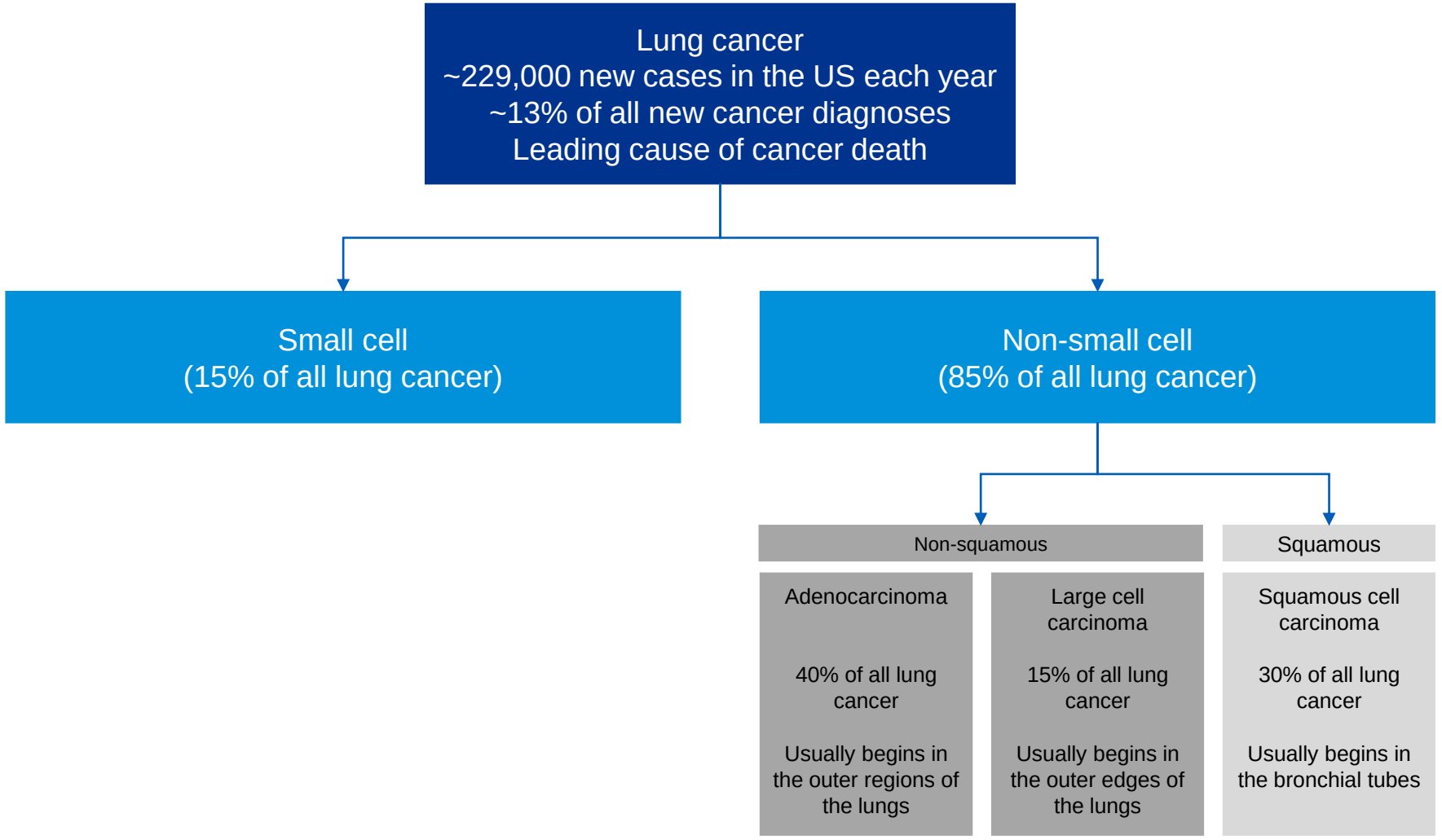
Five-Year Survival Rates & Disease Burden For Select Cancers



*Disability-Adjusted Life Years (DALYs) per 100,000 individuals. DALYs measure total burden of disease – both from years of life lost due to premature death and years lived with a disability. One DALY equals one lost year of healthy life; **five-year survival across all stages (local, regional and distant) with rates adjusted for normal life expectancy and based on cases between 2009 and 2015

Source(s): American Cancer Society, Global Burden of Disease

Non-small cell lung cancer (NSCLC) is the most common type of lung cancer, accounting for approximately 85% of new lung cancer cases each year



Source(s): American Cancer Society, cancer.net

Treatment options depend on the stage of disease and molecular characteristics of the tumor; targeted therapies and IO are now options in advanced disease

	Treatment Options By Stage Of NSCLC*				
	Surgery 	Radiotherapy 	Chemotherapy 	Targeted Therapies 	Immunotherapy 
Stage I	✓	✓ a	✓ a		
Stage II	✓	✓	✓		
Stage III	✓	✓	✓		✓ b
Stage IV	✓	✓	✓	✓ c	✓

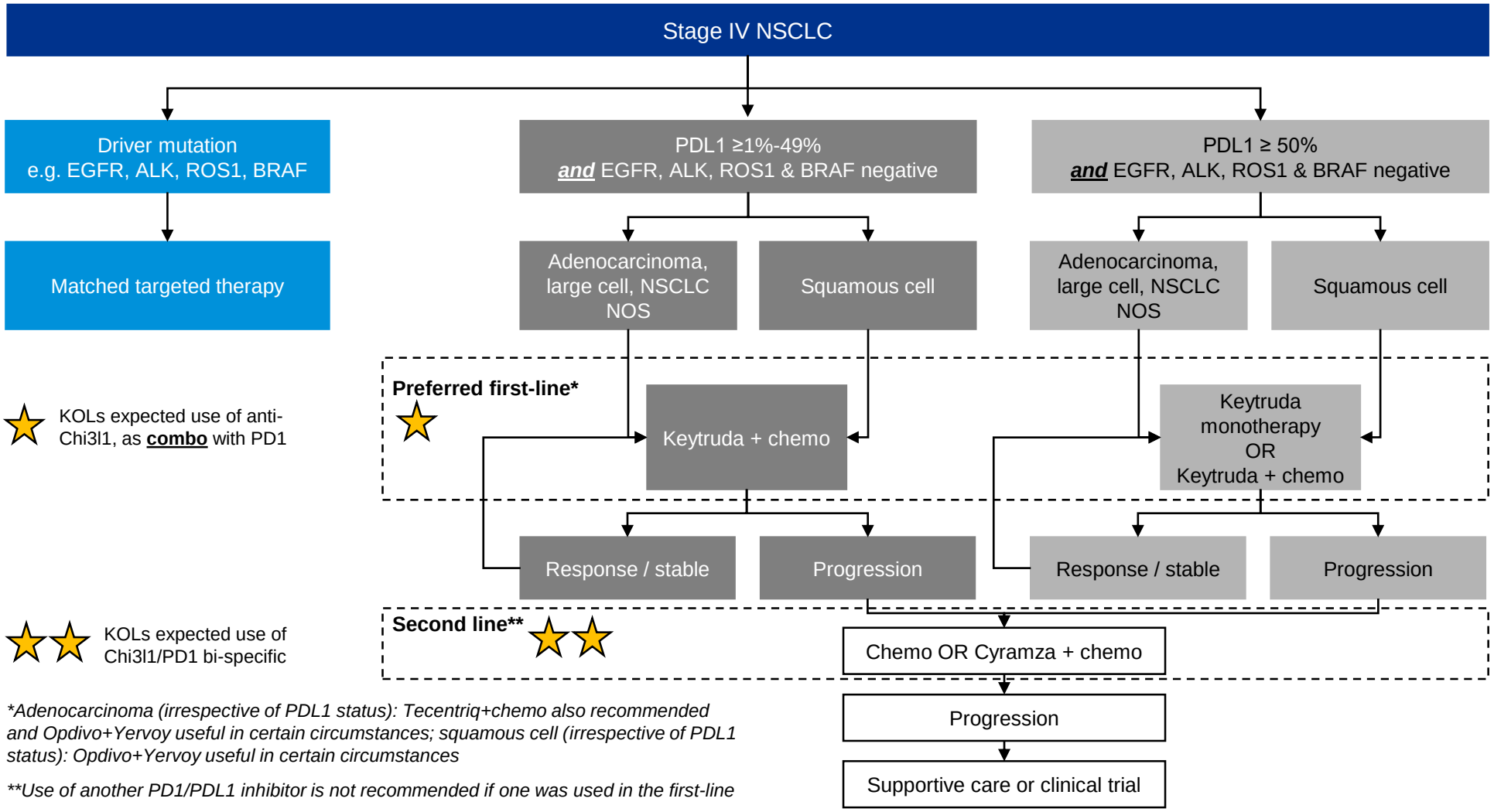
40-50% of NSCLC cases are diagnosed in Stage IV

*representative only – different options are given alone or in conjunction with one another depending on a variety of factors including how fit the patient is, risk of disease recurrence, molecular profile of the tumor etc.

a) Typically used if patient is at high risk of recurrence, b) if surgery, radiation or chemoradiation are not considered tolerable options, c) molecular testing will be done on advanced disease before treatment starts and patient will be started on an appropriate therapy if one is available to target that mutation

Source(s): Cancer.org

Molecular testing for driver mutations has revolutionized the treatment of NSCLC, with PD1/PDL1 therapies now emerging as standard-of-care in some settings



Adenocarcinoma (irrespective of PDL1 status): Tecentriq+chemo also recommended and Opdivo+Yervoy useful in certain circumstances; squamous cell (irrespective of PDL1 status): Opdivo+Yervoy useful in certain circumstances

***Use of another PD1/PDL1 inhibitor is not recommended if one was used in the first-line*

Source(s): NCCN guidelines for NSCLC, 2020

KOL consensus is that a major unmet need in NSCLC is patients who have failed PD1 / PDL1 therapy – these patients have limited treatment options

1. Lack of therapies for patients who progress and have previously used PD-1 / PDL-1
2. Better screening protocols, more accurate and earlier diagnosis
3. More effective and less invasive methods for monitoring patients post-treatment
4. Better understanding of who will respond to ICI therapies and also which patients should not receive ICI (e.g. EGFR positive due to issues with pneumonitis)
5. Continued need to understand the molecular drivers of the disease

KOLs expect the NSCLC market in the future to be largely driven by the launch of new MoAs, earlier diagnosis and improved survival rates

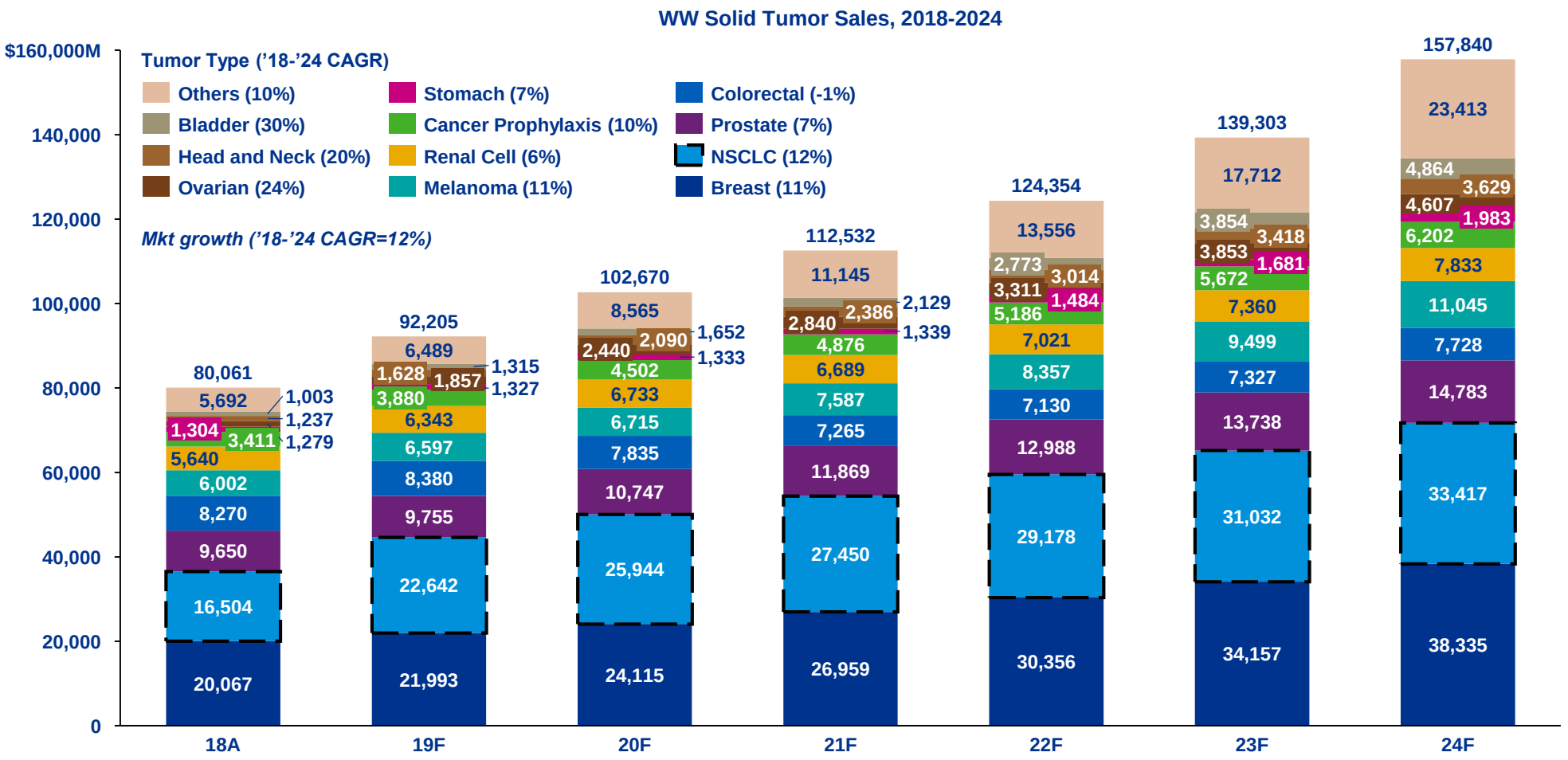
Market Driver	Summary of Driver Impact	Expected Future Impact to Market
Launch of Novel Pipeline Drugs	▪ **Success of the PD1s has fueled significant interest in the immunotherapy space which KOLs believe will be a key market driver for the future** – *"In 10 years, there'll be out of the box CAR-T cells…as time evolves, we're going to get better at producing CAR-T cells and better at targeting them" – Medical Oncologist, Major Cancer Center*	
Earlier and More Accurate Diagnosis	▪ **Earlier and more accurate diagnosis and less stigma about the disease will mean a greater number of patients being diagnosed, and being diagnosed earlier** – *"If we have better diagnosis, there will likely be a shift in patients to earlier stages. So, if lung cancer screening is effective, we should be seeing more patients being diagnosed in Stages one and two" – Medical Oncologist, Leading Academic Medical Center*	
PD1s Drive Improved Survival Rates	▪ **The checkpoint inhibitors are leading to sustained response and better survival rates, and are being tested in multiple combination trials** – *"Durvalumab is being used based on the PACIFIC trial, which showed that patients with Stage III NSCLC had increased overall survival by about 20%" – Researcher, Medical Oncologist* – *"PDL1 agents are showing there's a survival impact...you have 50%-60% of patients living probably three years or longer" – Oncologist, Major Cancer Center*	
Better Understanding of Molecular Drivers	▪ **Better understanding of the underlying genetics and molecular drivers of the disease could lead to new therapies targeting molecular drivers** – *"We use panels that are with more genes than what we have drugs for. This is with an eye towards in six months or in a year, there will be an available treatment" – Medical Oncologist, Major Cancer Center*	

Legend: Minimal Impact | Moderate Impact | Moderate-High Impact | High Impact

Source(s): KOL interviews

NSCLC: Overall Solid Tumor Market

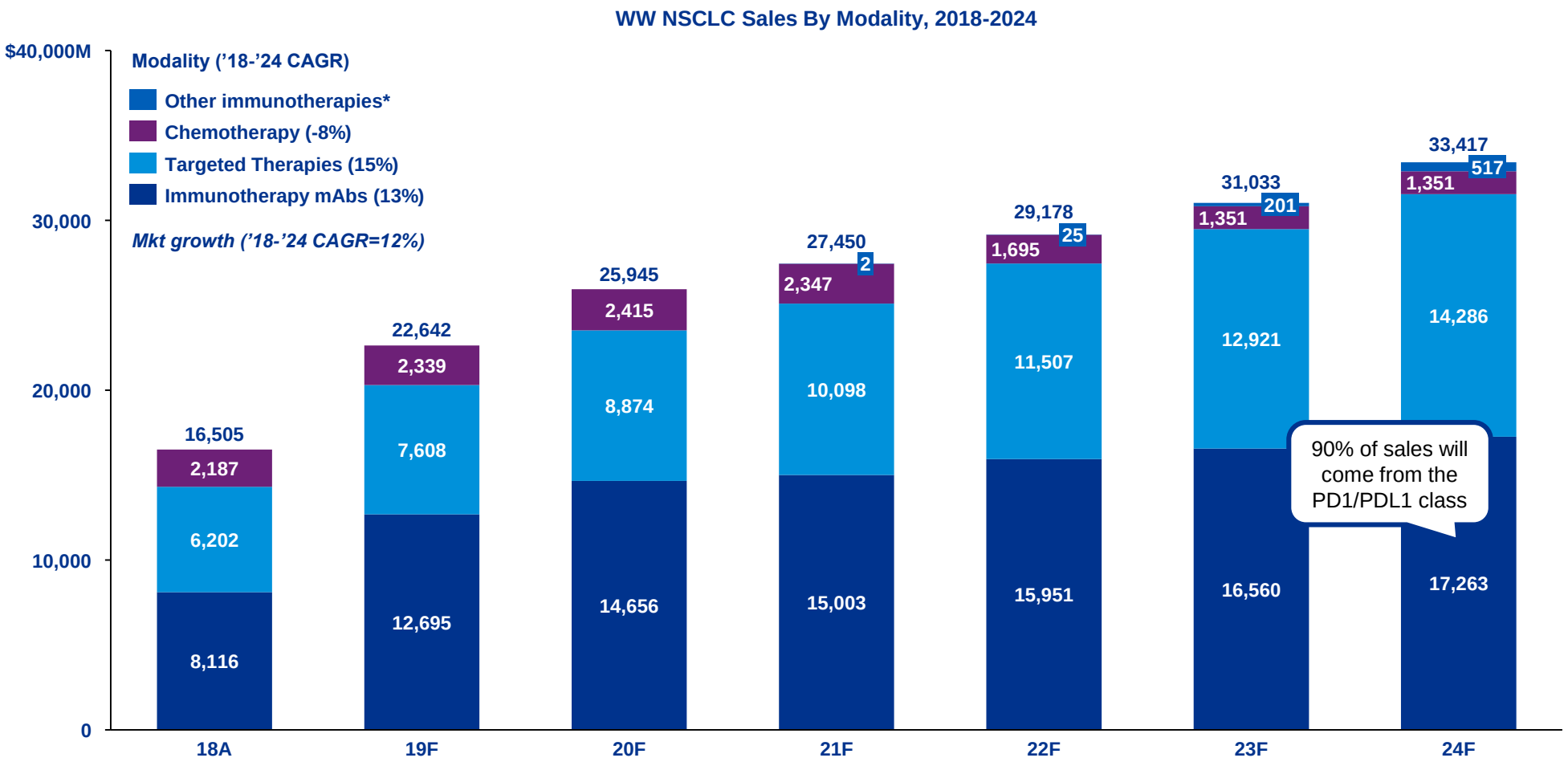
At ~$16.5B in 2018 NSCLC was the second largest solid tumor market by sales, and will grow in line with the overall market out to 2024 to reach ~$33.5B in 2024



Source(s): Evaluate Pharma, KPMG analysis

NSCLC: Market by Modality

This is being fueled by double-digit growth in the targeted agents and the immunotherapies, with the latter being driven by the PD1/PDL1 mAbs

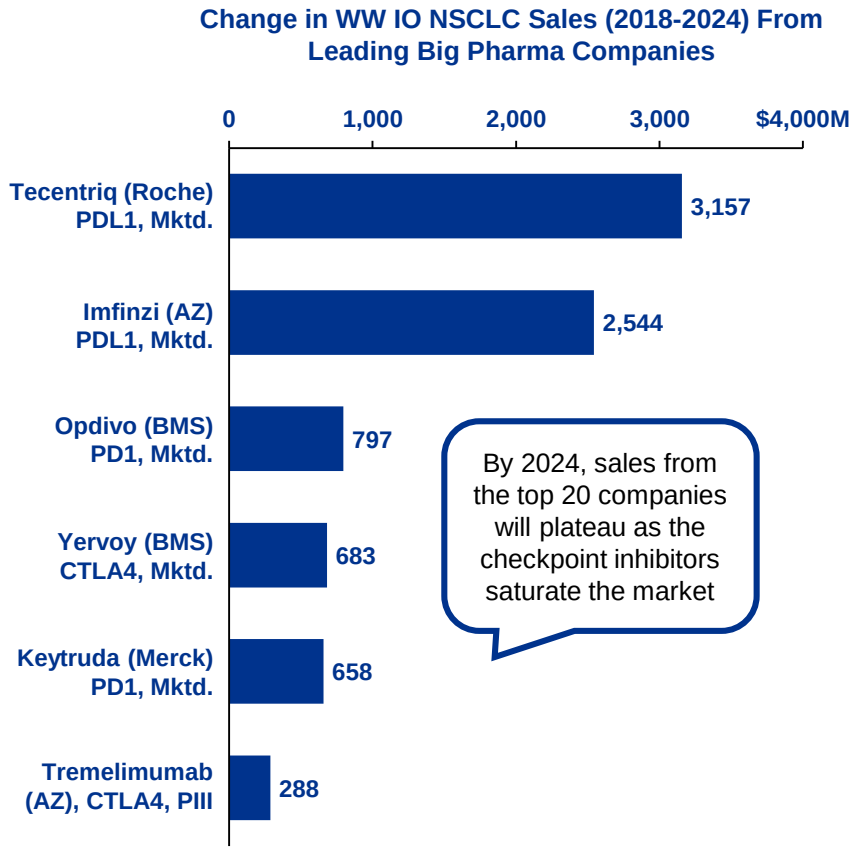


*Includes vaccines and lytic viruses

Source(s): Evaluate Pharma, KPMG analysis

NSCLC: Immunotherapy Market By Company Type

Although still dominated by top 20 pharma, an increasing portion of sales out to 2024 in the NSCLC immunotherapy market will come from small biotechs



Source(s): Evaluate Pharma, company websites, clinicaltrials.gov, KPMG analysis

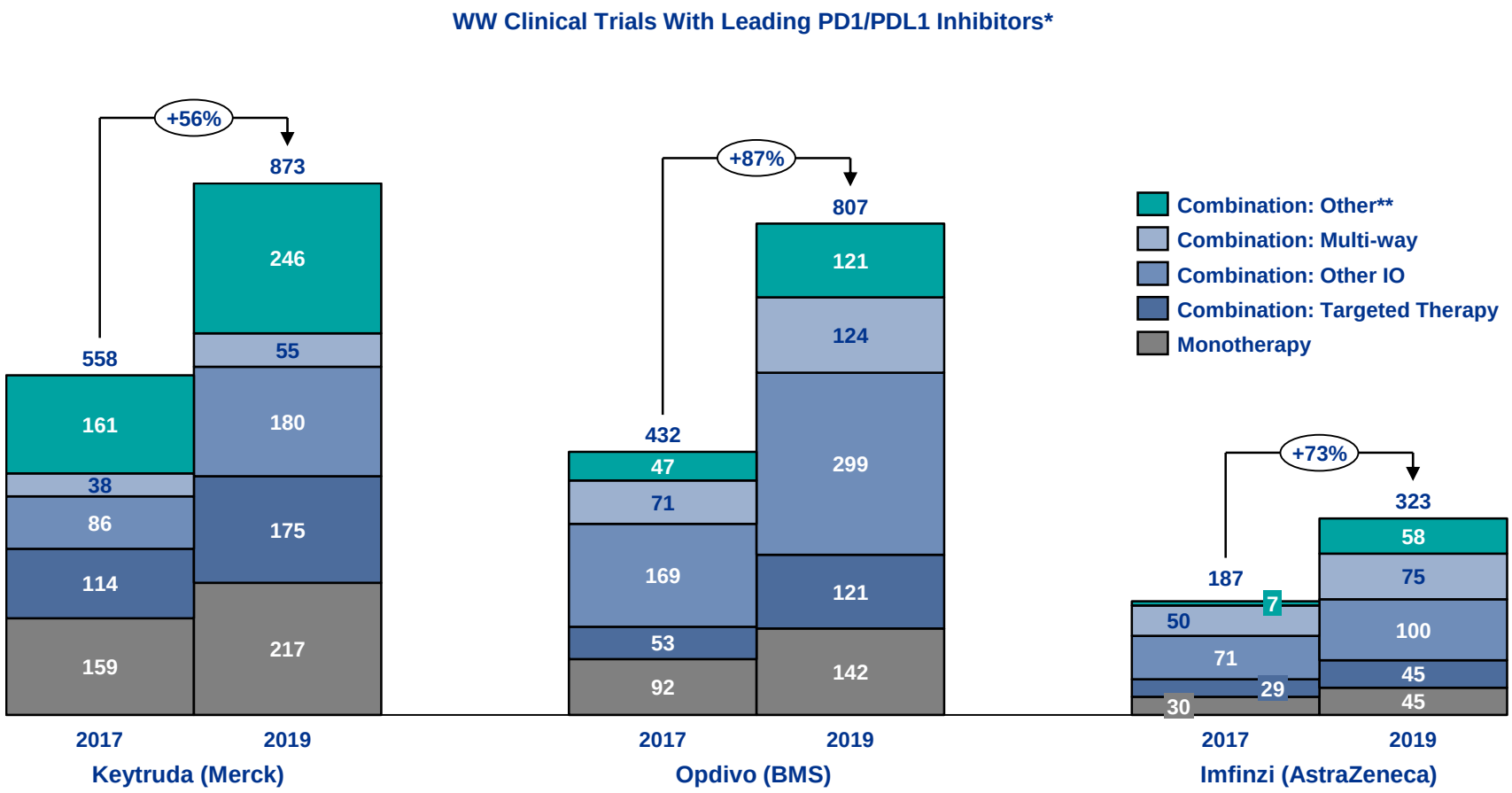
NSCLC: Immunotherapy Sales From Small Biotechs

Interestingly, many of the smaller companies that will have the largest sales in 2024 are investigating their agents in combination with checkpoint inhibitors

Leading Small Biotechs In The NSCLC Immunotherapy Market				
Drug (Company)	**Most Advanced NSCLC Phase**	**In Combination NSCLC Trials?**	**Modality (Mechanism)**	**Forecasted 2024 Sales**
NC318 (NextCure)	I / II	No	MAb (SIGLEC-15 inhibitor)	$452M
AB928 (Arcus)	II	With Arcus's own anti-PD1, zimberelimab	Small molecule (Adenosine A2A & A2B receptor antagonist)	$244M
VX-15 (Vaccinex)	I / II	With Merck KGaA's PDL1 Bavencio	MAb (Semaphorin 4D inhibitor)	$214M
JTX-2011 (Jounce)	II	With BMS's CTLA4 Yervoy	MAb (Inducible T-cell costimulatory)	$156M
Libtayo (Regeneron)	III	No	MAb (PD1 inhibitor)	$138M
Eftilagimod (Immutep)	II	With Merck's PD1 Keytruda	Recombinant protein (Antigen presenting cell activator)	$111M

Source(s): Evaluate Pharma, company websites, clinicaltrials.gov, KPMG analysis

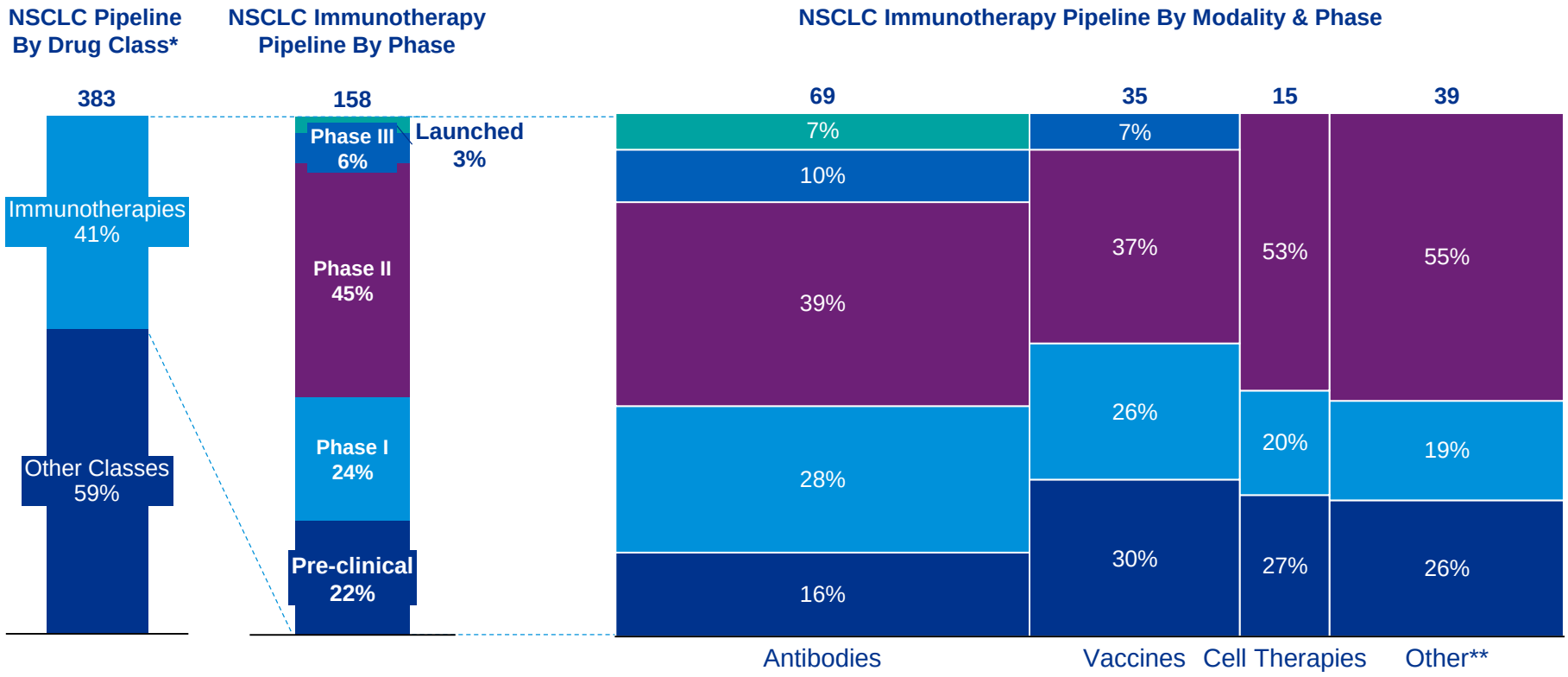
There is a common trend playing out across the broader oncology market, with an explosion in the number of PD1/PDL1 combination trials in recent years



*Across all indications, not just NSCLC; **includes combination trials with chemotherapy, radiotherapy or chemoradiotherapy

Source(s): Nature Reviews Drug Discovery, March 2020; Trends in clinical development for PD-1/PD-L1 inhibitors; KPMG analysis

The NSCLC immunotherapy pipeline is still very early-stage, with nearly 50% of assets in pre-clinical & Phase I; antibodies constitute ~45% of the immunotherapies



*Active drugs across EU5 and US, pre-clinical through marketed, duplicates removed (i.e. only one drug was entered even if it was being developed by multiple companies); **Includes lytic viruses, nucleic-acid therapies, small molecule checkpoint inhibitors

Source(s): Pharmaprojects, KPMG analysis

NSCLC: Immunotherapy Pipeline for Leading Companies

Small biotechs are particularly active in the NSCLC IO pipeline, and their portfolios tend to be more diversified from a modality perspective than many big pharma

Top 10 pipeline companies – number of pipeline assets by phase and type of immunotherapy*																			
Company	Top 20 Pharma?	# Pipeline Assets	Most advanced Phase in NSCLC as either monotherapy or combination																
			Pre-clinical				Phase 1				Phase 2				Phase 3 / Filed				
BMS	Y	9		1			1		2	1	1		1	1	1				
Novartis	Y	4					2				1				1				
Boehringer	Y	4					3					1							
NantWorks	N	4		2	1									1					
Roche	Y	3					1				1				1				
Eli Lilly	Y	3									1			2					
J&J	Y	3					1				2								
Advaxis	N	3		1				1						1					
Regeneron	N	3					1				1				1				
Incyte	N	3									1			2					
Total		***39***	***-***	***4***	***1***	***-***	***9***	***1***	***2***	***1***	***8***	***1***	***1***	***7***	***4***	***-***	***-***	***-***	

*Excludes reformulations, e.g. both BMS and Roche are working on subcutaneous formulations of nivolumab and atezolizumab, respectively

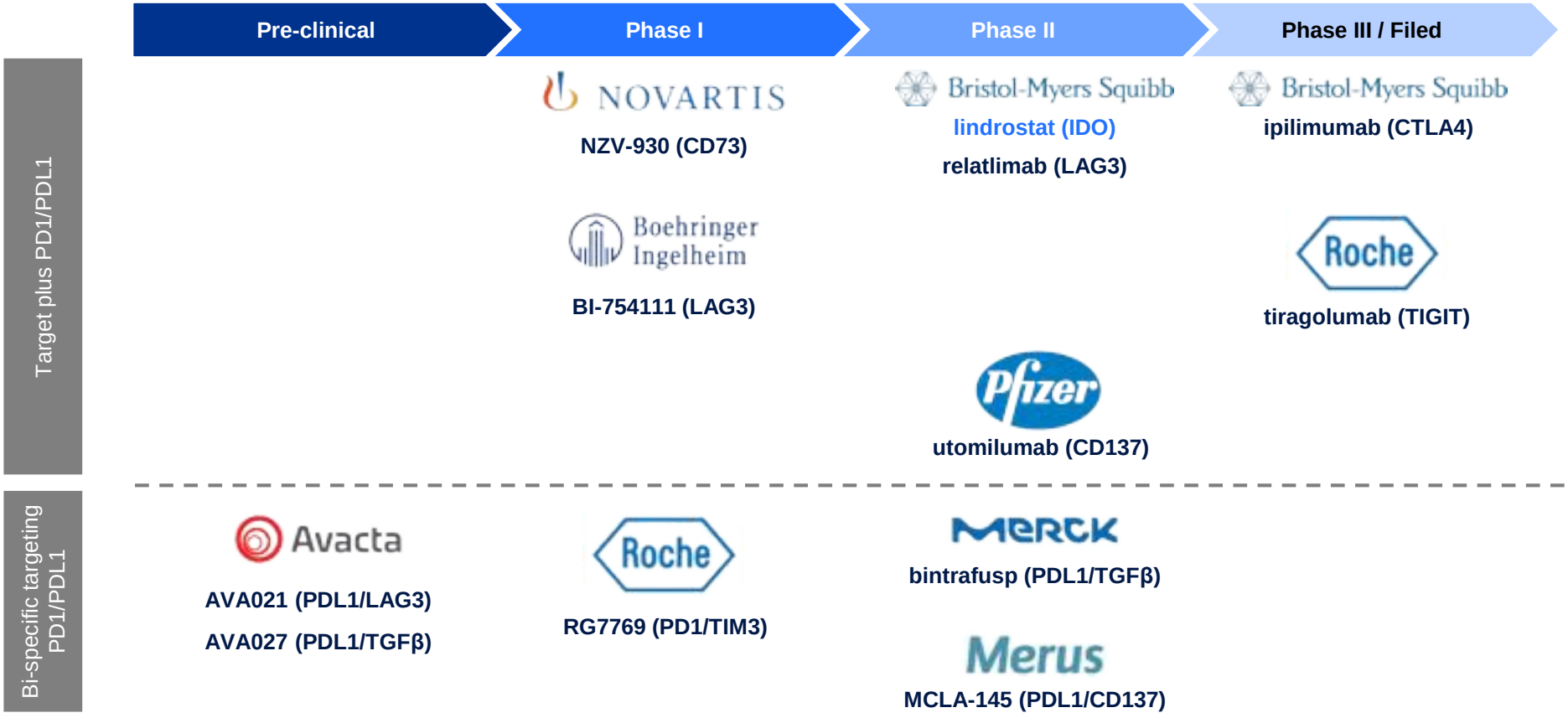
Legend

Antibody	Vaccine	Cell	Other

Source(s): Pharmaprojects, clinicaltrials.gov, company websites, KPMG analysis

A number of companies are developing assets in combination with PD1/PDL1 as well as bi-specifics to PD1/PDL1, although none appear to be targeting Chi3l1

Select pipeline competitors: monotherapies as part of PD1/PDL1 combination and bi-specifics targeting PD1/PDL1



Legend **Antibody**; **Other**

Source(s): Pharmaprojects; Clinicaltrials.gov; company websites; KPMG analysis

There is diversification in the combination of MoAs being investigated with PD1/ PDL1, which demonstrates that a optimal pathway has yet to be discovered

Company	Drug (NSCLC Phase)	Rationale for Target	Most Advanced NSCLC Clinical Trial (Click hyperlink for details)
BMS	Ipilimumab (Filed)	• Cytotoxic T-lymphocyte antigen 4 (CTLA4) • First checkpoint receptor that was discovered; upregulated on T-cells and leads to suppression of T-cell activity	• Ipilimumab/Opdivo granted priority review by FDA in January 2020 in first-line metastatic or recurrent NSCLC with no ALK or EGFR mutations
	Lindrostat (II)	• Indoleamine 2,3-dioxygenase (IDO) • Tumors upregulate IDO to cause tryptophan depletion, starving cytotoxic T cells	• 504 patient study started in May '16
	Relatlimab (II)	• Lymphocyte-activation gene 3 (LAG3) • Expressed on activated T-cells and upregulation is associated with T-cell exhaustion	• 504 patient study started in May '16
Roche	Tiragolumab (III)	• T-cell immunoglobulin and ITIM domain protein (TIGIT) • Similar to PD1, TIGIT is overexpressed on T-cells and acts in an inhibitory fashion on T-cells	• 500 patient study started in Feb. '20
Pfizer	Utomilumab (II)	• CD137 (4-1BB) is a member of the TNF receptor family • Stimulation leads to enhanced T-cell and NK cell activity	• 620 patient trial started in Nov. '15
Boehringer	BI-754111 (I)	• Lymphocyte-activation gene 3 (LAG3) • Expressed on activated T-cells - upregulation is associated with T-cell exhaustion	• 215 patient trial started in June '17
Novartis	NZV-930 (I)	• CD73 is a cell surface enzyme • Upregulation by cancer cells increases adenosine production, leading to inhibition of T- and NK-cell activity	• 344 patient trial started in July '18

Source(s): Pharmaprojects, clinicaltrials.gov, company websites, BMS; IDO pathway fact sheet, KPMG analysis

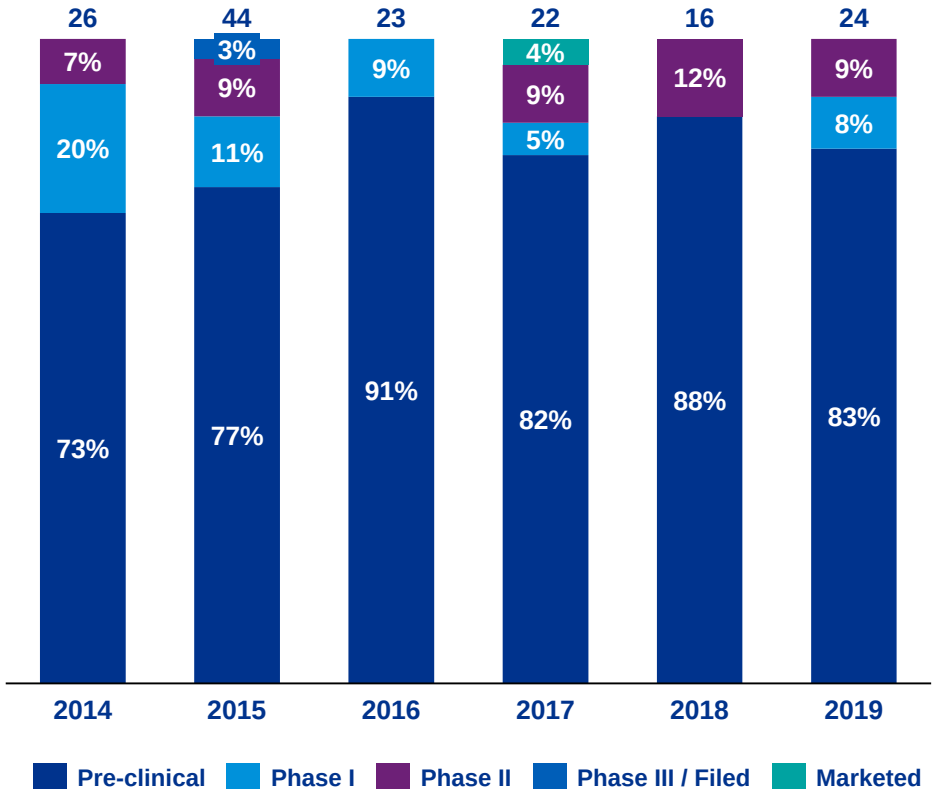
Merck KGaA is going head-to-head with Keytruda, but KOL feedback suggest bi-specifics should initially be used in PD1/PDL1 monotherapy failures

Company	Drug (NSCLC Phase)	Rationale for Target	Most Advanced NSCLC Clinical Trial (Click hyperlink for details)
Merck KGaA	Bintrafusp (II)	• PDL1/TGFβ • PDL1 is the ligand presented by cancer cells to block PD1 on T-cells; TGFβ is known to play a role in creating a favorable microenvironment for tumor cells to grow	• 300 patient head-to-head trial vs. pembrolizumab began in Oct. '19
Merus	MCLA-145 (II)	• PDL1/CD137 • PDL1 is the ligand presented by cancer cells to block PD1 on T-cells; CD137 (4-1BB) is a member of the TNF receptor family and stimulation leads to enhanced T-cell and NK cell activity • MCLA-145 would therefore act in an antagonist (PDL1) / agonist (CD137) manner	• 118 patient trial started in May '19
Roche	RG7769 (I)	• PD1/TIM3 • PD1 is upregulated on T-cells and acts as an inhibitory mechanism; T-cell immunoglobulin and mucin-domain containing-3 (TIM3) is known to mediate the exhaustion of T-cells	• 300 patient trial started in Oct. '18
Avacta	AVA021 (Pre-clinical)	• PDL1/LAG3 • PDL1 is the ligand presented by cancer cells to block PD1 on T-cells; Lymphocyte-activation gene 3 (LAG3) is expressed on activated T-cells and upregulation is associated with T-cell exhaustion	• Pre-clinical
	AVA027 (Pre-clinical)	• PDL1/TGFβ • PDL1 is the ligand presented by cancer cells to block PD1 on T-cells; TGFβ is known to play a role in creating a favorable microenvironment for tumor cells to grow	• Pre-clinical

Source(s): Pharmaprojects, clinicaltrials.gov, company websites, BMS; IDO pathway fact sheet, KPMG analysis

Big Pharma companies have been active deal participants in IO as they seek a competitive edge, with ~70-90% of deals struck in pre-clinical development

Number Of Immunotherapy Product Licensing Deals Done By Top 20 Biopharma By Phase, 2014-2019*



Top 5 Pre-clinical Immunotherapy Product Licensing Deals Done By Big Pharma**

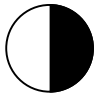
Year	Licensee / Licensor	Description	Upfront Payment
2017	J&J / Legend Biotech	For Legend's LCAR-B38M in multiple myeloma	$350M
2016	Celgene / Jounce	For JTX-2011, Jounce's ICOS MAb for solid tumors	$225M
2016	Merck / Moderna	Combination with Moderna's mRNA vaccines & Keytruda	$200M
2016	Novartis / Xencor	For access to Xencor's bi-specific technology	$150M
2015	Novartis / Aduro	For access to Aduro's STING agonist programs	$200M

*Defined as in-licensed product deals where the licensee is a top 20 biopharma; **Note that the deal was often part of a broader ***platform*** strategic alliance

Source(s): Evaluate Pharma, KPMG analysis

NSCLC: KOL / Payer Findings (1/2)

Novel therapies have reshaped the NSCLC market, KOLs believe the biggest unmet need is second-line therapy for patients who have failed PD1s / PDL1s

	Key Takeaways / Themes	Impact to Asset
Market Landscape & Outlook	▪ Novel treatments such as targeted therapies and PD1s/PDL1s have improved survival rates & reshaped the treatment algorithm ▪ KOLs expect the treatment algorithm to continue to evolve as the use of immunotherapy moves into earlier stages of disease - *"I believe it (IO) will be active in earlier stage disease. I expect in the near future that I will be using a checkpoint, probably with chemotherapy or following chemotherapy in early stage disease" – Professor of Medicine, Major University*	
Diagnostic Paradigm	▪ In the future, KOLs expect earlier and more accurate diagnosis, which will lead to a shift in patient splits to earlier stages and increasing use of immunotherapies - *"I'm hoping that in 5-10 years, everything is driven earlier by liquid biopsy, and then patients get appropriate treatment such as immunotherapy" – Oncologist, Translational Scientist, Major Cancer Center*	
Pricing	▪ Payers indicated price points above $200K need to show primary endpoint improvements of +20% but that the bi-specific could prove good value given the separate prices of monotherapy IOs that are being used in combination - *"$230K [Bi-specific] is tough but it could be good considering the combined price point of IOs + add-ons could be higher, it boils down to life expectancy and how that compares" – Former VP Strategic Product Development, Major PBM*	
KOL Opinion on Anti-Chi3l1 Monotherapy	▪ Anti-Chi3l1 monotherapy would positioned best in combination with PD1s - *"It has to be developed in combination…if it has the same effects of a PD1 as a monotherapy single agent, I would have little incentive to switch from a PD1 to this drug" – Medical Oncologist, Major University*	
KOL Opinion on Anti-Chi3l1/PD1 Bi-specific	▪ Anti-Chi3l1/PD1 bi-specific would most likely enter the market as a second-line therapy in metastatic disease for patients who have failed PD1/PDL1, then eventually move earlier disease stages over time - *"It would be interesting to study in the second-line setting for patients who have had progression after pembrolizumab" – Medical Oncologist, Major University*	

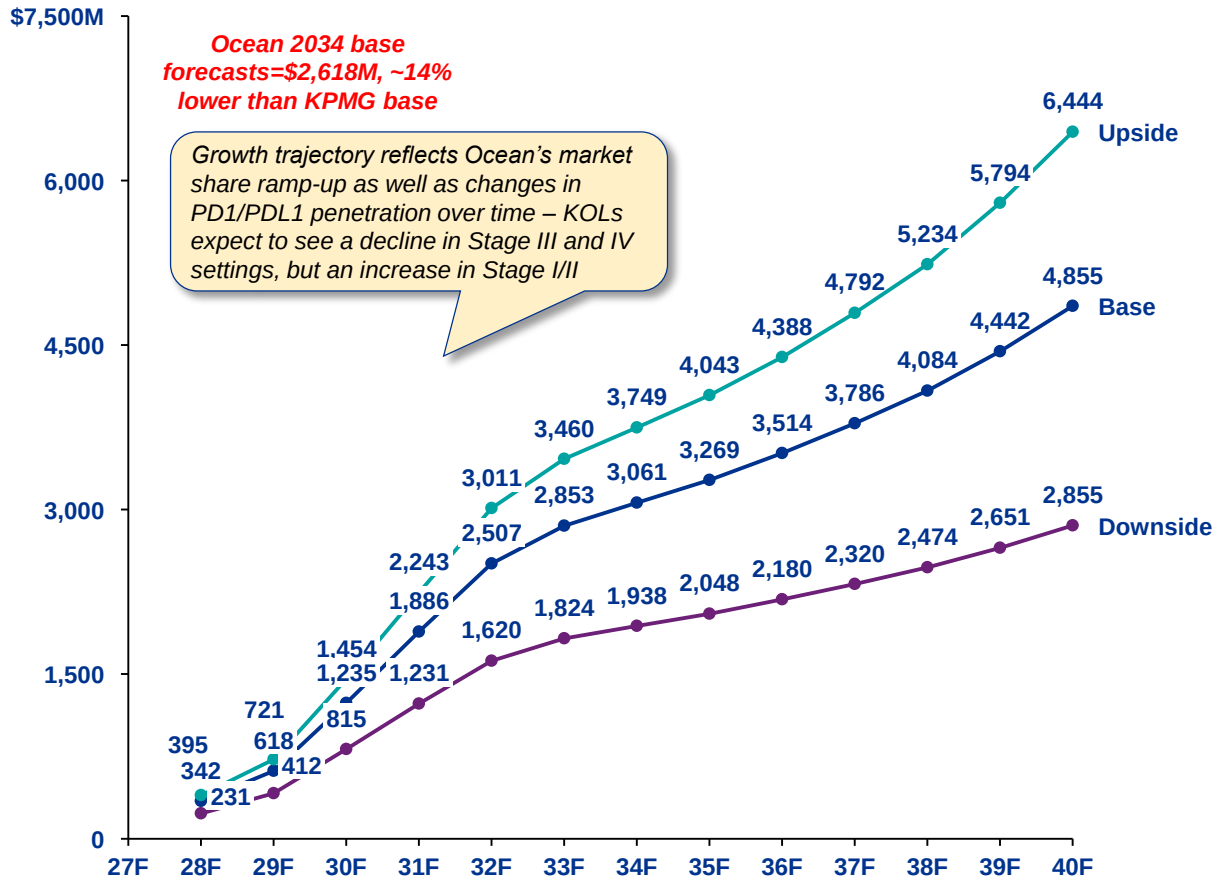
Legend: *Negative* ○ ◔ ● *Positive*

Source(s): KOLs / payer interviews

Base case anti-Chi3l1 monotherapy sales are forecast to reach ~$4.9B by 2040, and are expected to continue growing beyond the forecast period

Ocean NSCLC Net Sales[(a)]

2027F-2040F, USD'$ Millions



	'28F-'40F CAGR
Upside	26.2%
Base	24.7%
Downside	23.3%

Observations

Upside Case:

- Increased penetration of PD1 into Stage I and II and slower decline in Stage III and IV along with less competitive environment and superior safety and efficacy to competitors
- US list price at launch is ~$178K, EU5 is ~$132K

Base Case:

- KOLs expect use as add-on to PD1
- Penetration rates recognize that asset will likely be entering after other monotherapy add-ons to PD1. Trajectory will follow PD1s - Stage IV then Stage III and then finally Stage I/II
- Assume comparable safety and efficacy to competitors
- US list price at launch is ~$165K, EU5 pricing is ~70% of US pricing (~$122K)

Downside Case:

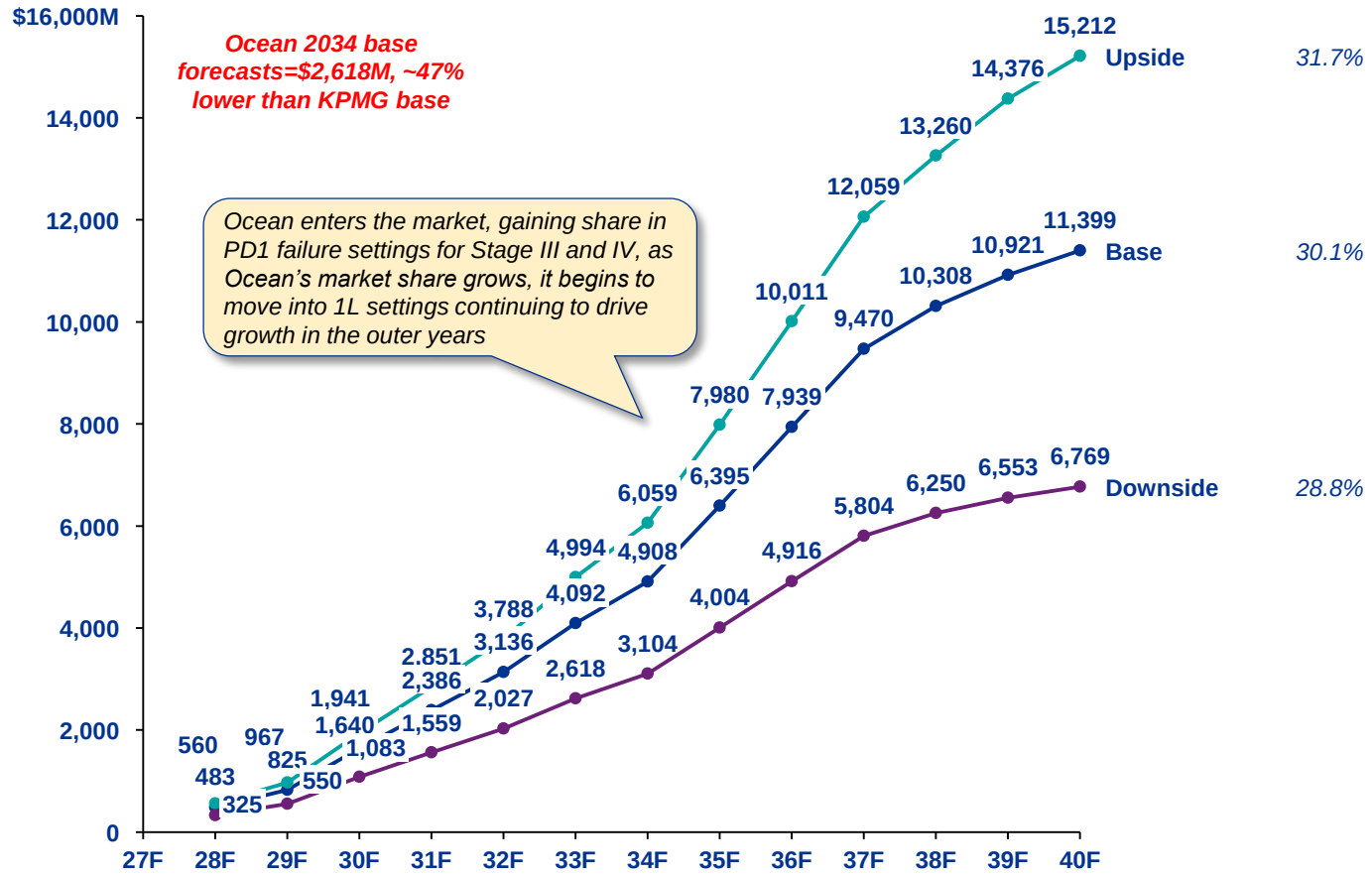
- Downside assumes a more intense competitive environment versus base, inferior safety and efficacy to competition and less penetration of PD1s into all disease stages
- US list price at launch is ~$152K, EU5 is ~$113K

Note(s): (a) All cases assume 2028 launch, Ocean base forecast assumes launch in 2029

Base case bi-specific sales are forecast to reach ~$11.4B by 2040, and similar to the monotherapy, are expected to continue growing beyond the forecast period

Ocean NSCLC Net Sales[(a)]

2027F-2040F, USD'$ Millions



	'28F-'40F CAGR
Upside	31.7%
Base	30.1%
Downside	28.8%

Observations

Upside Case:

- Assume better PD1 penetration and that bi-specific faces less intense competitive environment and so gains slightly higher market share vs. base
- Assume superior safety and efficacy to competitors
- Upside has slightly higher inflation vs. base (4% US and 3% EU5) leading to US list price at launch of ~$274K / EU5 of ~$203K

Base Case:

- KOLs expect initial use in PD1 failures (an area of high unmet need) before eventually making it into 1L setting in stage III and IV. Not expected to be used in 1L in Stage I/II during forecast period
- Assume comparable safety and efficacy to competitors
- US list price anchored to current price for Blincyto (~$200K) and then adjusted for inflation (3% in US, 2% in EU5), ~$253K at launch US / ~$187K in EU5

Downside Case:

- Downside assumes lower PD1 penetration and more intense competitive environment
- Assume inferior safety and efficacy vs. competitors
- US list price anchored to Blincyto with just 2% YoY inflation in US (1% in EU5), giving at launch cost of ~$234K in US and ~$173K in EU5

Note(s): (a) All cases assume 2028 launch, Ocean base forecast assumes launch in 2030

Ocean's anti-Chi3l1 monotherapy and bi-specific are uniquely positioned to address unmet needs in the NSCLC market, and drive growth past 2040

OCEAN BIOMEDICAL

1. *Significant unmet needs remain for NSCLC patients with metastatic disease as the majority progress over time and treatment options are limited in later lines of therapy*
2. *In the future, the diagnostic paradigm is expected to improve, leading to earlier and more accurate diagnosis, shifting the treated patient population to earlier stages*
3. *Checkpoint inhibitors are leading to sustained response and better survival rates, but majority of patients will still relapse over time*
4. *Given the promising pre-clinical results, Ocean's anti-Chi3l1 monotherapy is positioned to enter the treatment algorithm in combination with PD1s/PDL1s*
5. *Ocean's anti-Chi3l1/PD1 bi-specific can address second-line treatment unmet needs in the metastatic population before moving into earlier stages of disease*

Infectious Diseases Portfolio

Pulmonary Portfolio

Oncology Portfolio

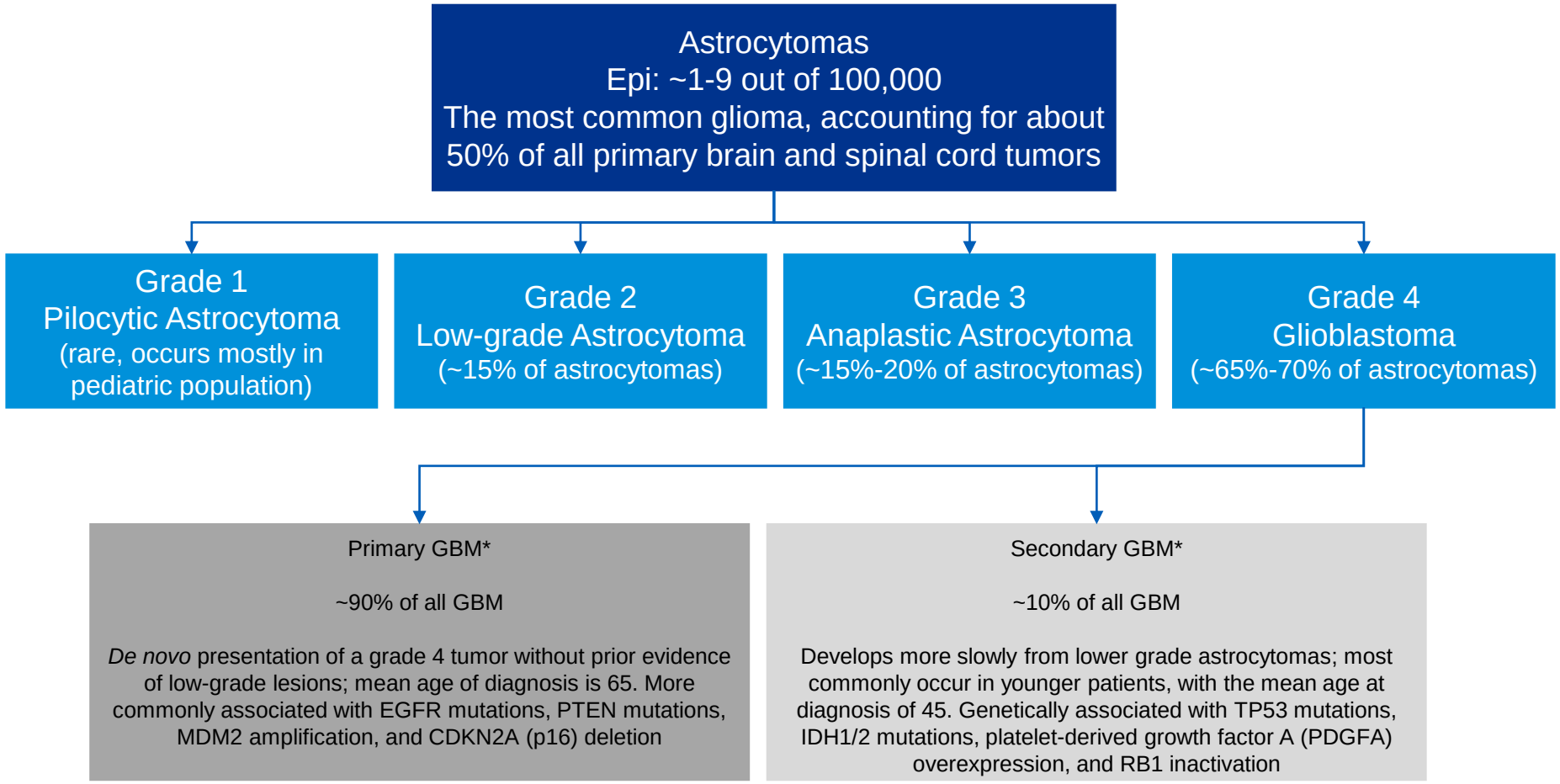
- Non-small Cell Lung Cancer

- Glioblastoma Multiforme

Huge unmet need in GBM means that if anti-Chi3l1's pre-clinical efficacy can be replicated in the clinic it could achieve ~$2.6B peak sales in 2037

Market and Disease Overview	**GBM is a rare disease, with a prevalence of 1-9 out of 100,000 individuals depending on country; patients can be split into two subtypes - primary (de novo) and secondary** • Primary GBM accounts for 90% of cases, mostly occurring in older individuals, while secondary develops more slowly and occurs in relatively younger patients; IDH mutation is another way to segment the disease – wild type have a worse prognosis vs. mutant
Unmet Needs & Treatment Algorithm	**Unmet need is high - median survival is ~15 months and 5-year survival is just 5%; KOLs noted that a significant proportion of the GBM prevalent population is not actively treated (~25%), due to rapid disease prognosis** • The current treatment algorithm consists of surgery, radiation therapy, chemotherapy, and targeted therapies (such as Avastin), however this drug is mostly used to help with swelling of the brain • KOLs stated that in second-line therapy, physicians reach for "whatever they can find"
Competitive Landscape	**The pipeline for GBM is robust with 258 drugs in development, of which ~28% are immuno-oncology therapies (IOs)** • Multiple approaches are being utilized by companies, from vaccines to cell therapies and viral delivered nucleic acid technologies • Delivery remains a challenge and KOLs highlight the challenge that residual disease is often far from the main site and often spread right through the brain – "like sand in jelly"
KOL / Payer Findings	**KOLs highlighted that an IV anti-Chi3l1 would have higher adoption in both academic and community hospital settings vs. intrathecal due to challenges with intrathecal administration** • KOLs believe anti-Chi3l1 could have utility in both the neoadjuvant (tumor shrinkage prior to surgery) and adjuvant settings (in combination with radiotherapy after surgery)
Revenue Forecast	**Anti-Chi3l1 revenues were forecasted under IV and intrathecal models – in a base case IV revenue is projected to reach ~$1.6B in 2037, while the intrathecal formulation is projected to achieve ~$1.0B, total portfolio sales of ~$2.6B** • Given unmet need, price sensitivity in this population is less significant vs. other diseases, with annual per patient base case pricing around $226K in the US, $164K in EU5 • Additional upside may be achieved in terms of pricing based on rare disease benchmarks (not modeled in any scenario)

GBM is a grade 4 astrocytoma, accounting for ~65%-70% of all astrocytoma; cases can be further segmented into primary (*de novo*, ~90%) and secondary (~10%)



**IDH1/2 mutations are only found in ~10% of all GBM cases, and have been identified as prognostic factors; IDH1/2 mutations are found in ~80% of Secondary GBM cases and only ~5% of Primary GBM cases*

Source(s): braintumor.org; Informa, Data Monitor; American Association of Neurological Surgeons

Standard-of-care has changed very little over the years - surgery, typically followed by radiotherapy or chemotherapy

	Treatment Options By Stage Of Astrocytoma*					
	Surgery 	Radiotherapy 	Chemotherapy 	Tumor-Treating Fields (TTFs) 	Targeted Therapies 	Immunotherapy 
Grade I	✓	✓ a	✓ a			
Grade II	✓	✓ b	✓ b			
Grade III	✓	✓ c	✓ c			
Grade IV (GBM)	✓	✓ c	✓ c	✓ d	✓ e	

*Almost all Grade II tumors eventually progress to Grade III, and almost all Grade III tumors progress to Grade IV tumors. Despite the best treatments with surgery, radiation and chemotherapy, almost all Grade IV tumors will eventually recur

a) If the tumor cannot be completely resected, radiation or chemotherapy may be given

b) Some patients with Grade II astrocytomas may be considered to have a slightly higher risk of progression, and radiation or chemotherapy may be considered

c) Radiation and chemotherapy are standard treatments following surgery for Grade III and IV astrocytomas

d) Devices (Optune) that deliver low-intensity, alternating electrical fields which interfere with cell division, causing the death of tumor cells. Optune is used in newly diagnosed GBM patients following surgery, or in recurrent GBM patients who have experienced disease progression following surgery and chemoradiotherapy

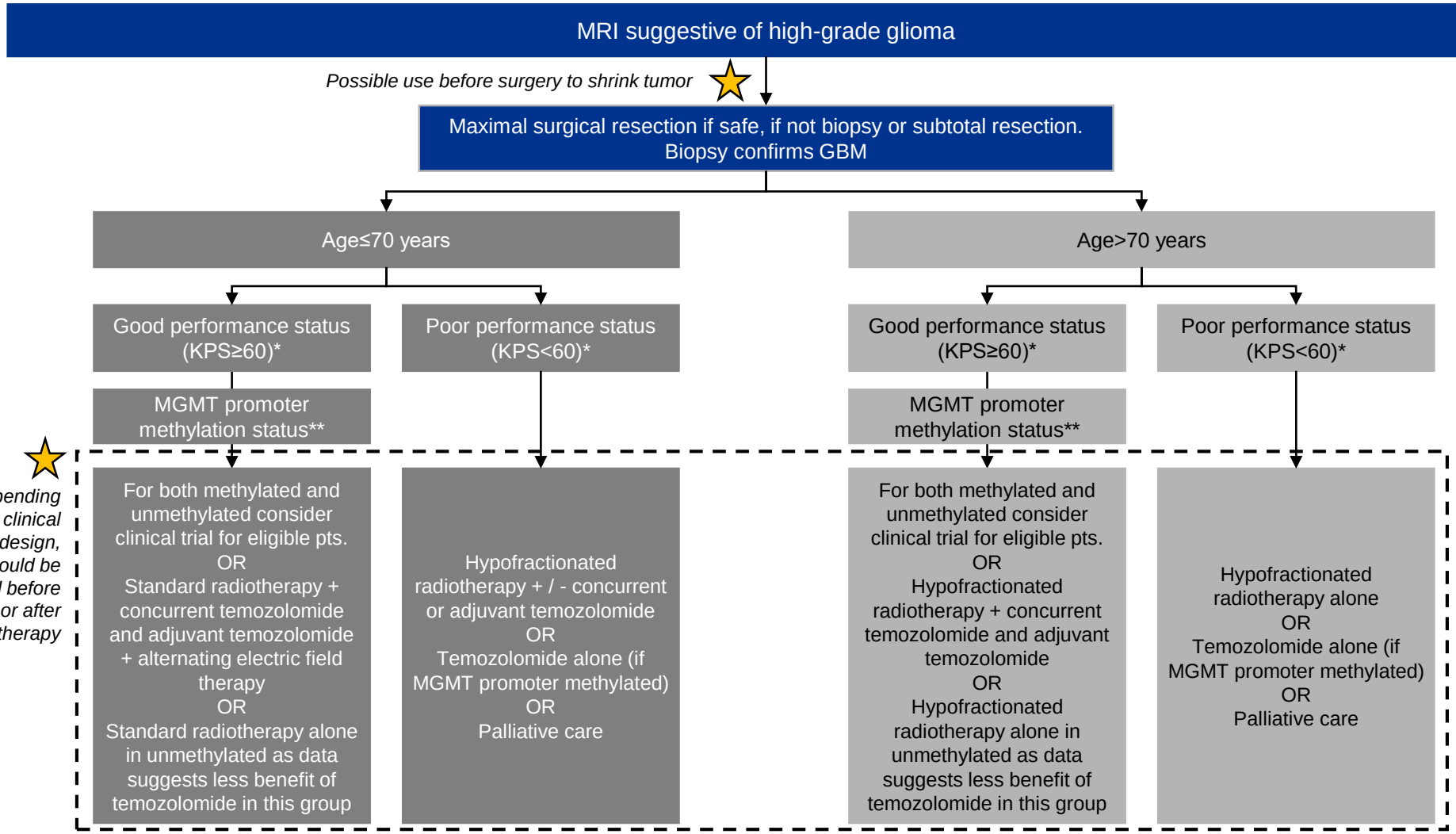
e) Avastin (bevacizumab) is approved for the treatment of patients with recurrent GBM and prior treatment

Source(s): American Association of Neurological Surgeons; braintumor.org; Informa; Data Monitor

Unmet needs exist in front-line and second-line settings, along with hurdles in tailoring treatments and actively treating more patients

1. No curative therapies exist for GBM
2. Median survival in GBM is ~15 months, and 5 year survival is just 5%
3. ~25% of GBM patients cannot be actively treated due to rapid disease progression
4. Very limited treatment options for second-line therapy (recurrent setting), KOLs state that physicians reach for “whatever they can find”
5. Despite some recent advances, GBM still lags other tumor types in terms of understanding the underlying molecular drivers of disease

KOL feedback suggests possible use of anti-Chi3l1 across the treatment algorithm



**Karnofsky Performance Status (KPS) is used to assess the functional status of a patient; **O6-methylguanine-DNA methyltransferase (MGMT) – if methylated then tumor is more likely to respond to temozolomide, an alkylating agent*

Source(s): NCCN guidelines for GBM, 2020

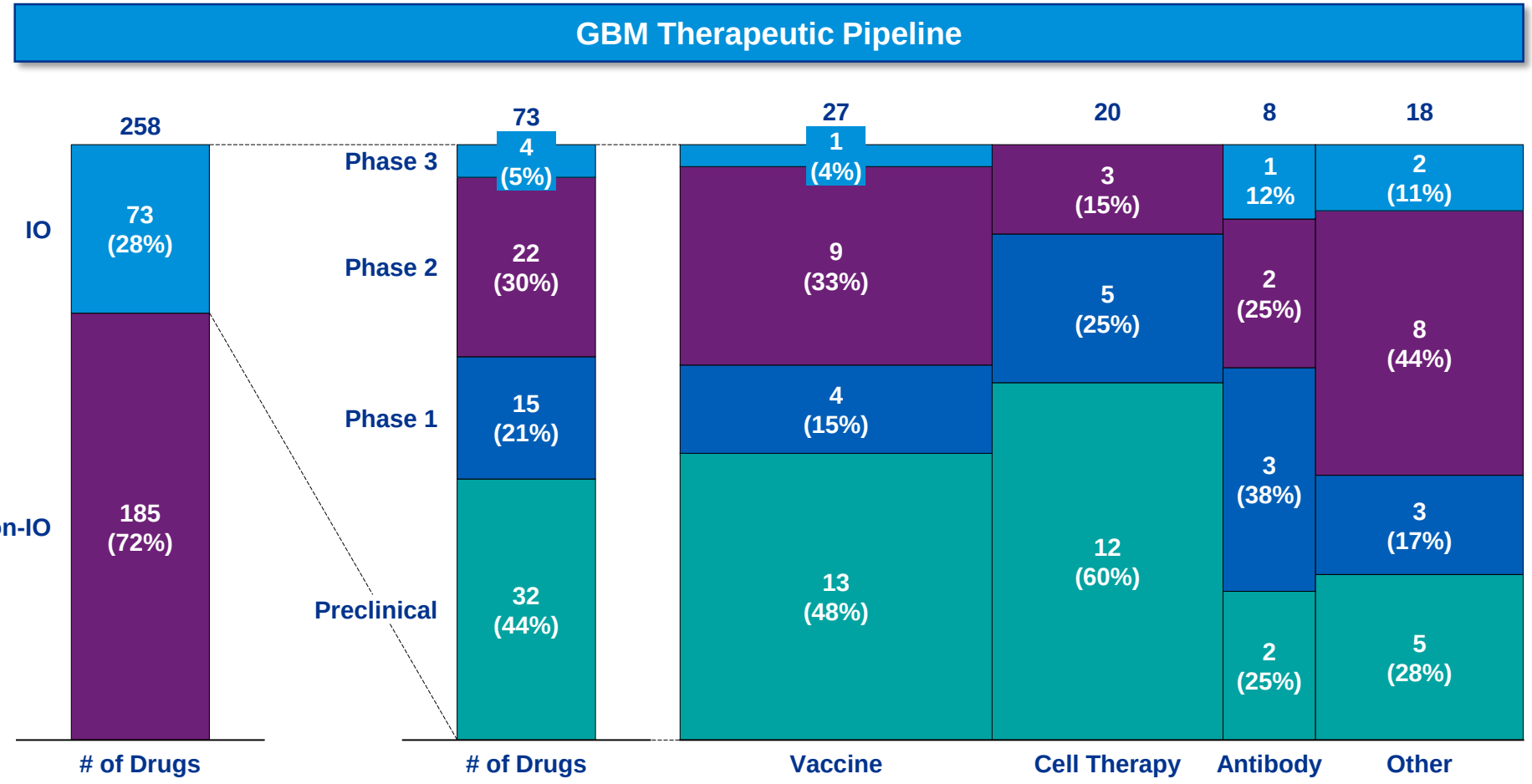
KOLs see the emergence of new treatment options, use of combination therapies, and better stratification of the patient population as key market drivers

Market Driver	Summary of Driver Impact	Expected Future Impact to Market
Emerging New Treatment Options and Algorithms	▪ **Novel and innovative therapies (e.g. cell therapies, vaccines, oncolytic viruses, gene therapies) are being investigated and will help shape the future treatment algorithm and drive broader use of therapeutics** – *"Our field is desperately in need of novel and innovative therapies…I think there would be a lot of interest for clinical investigators to embrace a study where the drug is given prior to surgery and that can impact the future treatment algorithm" – Professor and Neuro-Oncologist*	
Increased Interest in Combination Therapies	▪ **Historical trials have mostly been a failure and KOLs are keen to try a multi-modal approach similar to what is being used in NSCLC** – *"Tumor heterogeneity makes it difficult to target with a single agent. I see a shift in demand for multi-modal treatment approaches that go after multiple targets, combined in a very sophisticated manner" – Top Neuro-Oncologist* – *"I do see the field changing…there are tons of IO studies on GBM, most have gone away from single IO…I think there will be a combination of multiple modalities" – Professor, Neurosurgeon*	
Focus on Individualized Treatments / Patient Stratification	▪ **Patient stratification could enable individualized treatment approaches – recent understanding of the impact of IDH and MGMT methylation are examples of how the field is starting to stratify patient populations** – *"In the future I'm hopeful for a personalized medicine approach where we can stratify diagnosis to better understand the patient and choose appropriate therapies" – Clinical Neurologist*	

Legend: Minimal Impact | Moderate Impact | Moderate-High Impact | High Impact

Source(s): KOL interviews

Despite historical setbacks the therapeutics pipeline is robust, reflecting the unmet need and emergence of immunotherapy in recent years



Source(s): Pharmaprojects; Clinicaltrials.gov; company websites; KPMG analysis

GBM: Immunotherapy Pipeline for Leading Companies

The GBM IO pipeline is fragmented, with small biotech companies accounting for a majority of the top IO pipeline companies, with a concentration on vaccines

Leading pipeline companies – number of pipeline assets by phase and type of immunotherapy																		
Company*	Top 20 Pharma?	# IO Pipeline Assets	Most advanced Phase in NSCLC as either monotherapy or combination															
			Pre-clinical				Phase 1				Phase 2				Phase 3 / Filed			
Fortress Biotech	N	3							2	1								
Tmunity Therapeutics	N	2			2													
DNAtrix	N	2								1				1				
VBI Vaccines	N	2		1								1						
China Medical System	N	2		2														
Northwest Biotherapeutics	N	2		1												1		
Total **		**13**	**-**	**4**	**2**	**-**	**-**	**-**	**2**	**2**	**-**	**1**	**-**	**1**	**-**	**1**	**-**	**-**

Legend: **Antibody** | **Vaccine** | **Cell** | **Other**

*Multiple companies with one IO asset in development

**Small biotechs represent the bulk of the IO pipeline, however, when comparing top companies across all modalities, ~50% are top 20 pharma

Source(s): Pharmaprojects, KPMG analysis

GBM: KOL / Payer Findings (1/2)

The treatment paradigm hasn't changed, but advancements enabling patient stratification could improve treatment rates and outcomes

	Key Takeaways / Themes	Impact to Asset
Market Landscape & Outlook	▪ The treatment landscape has not changed in recent years, surgery is SoC followed by radiation and follow-up with chemo, if that does not work then physicians may think of a second line such switching chemo monotherapies - *"Unfortunately the GBM treatment paradigm hasn't changed with time" – Director, Neurosurgery, Major University Hospital*	
Diagnostic Paradigm	▪ Biopsy is the primary mode for carrying out diagnosis, but the diagnostic paradigm has evolved from to also assess biomarker data, such as IDH mutations and MGMT methylation ▪ KOLs believe patient stratification to be the future, leading to personalized treatment approaches - *"There has been a dramatic change, over the last 10 years in the understanding that GBM as an entity is a very, very mixed bag that includes numerous different disorders, that are associated with varying outcomes and responses to treatment accordingly…" – Clinical Neurologist, Major University*	
Competitive Landscape & Pricing	▪ Future therapeutic landscape is likely to consist of a combination of multiple modalities ▪ Payers are excited about anti-Chi3l1, pricing could be in the $200K range, but would depend on endpoint performance - *"GBM is a complex and heterogeneous disease…a multimodal approach is needed or a drug that could target multiple pathways… the disease is just going to outsmart any single agent strategy" – Clinical Neurologist* - *"I like GBM for [anti-Chi3l1], it could fit pre-surgery or post, the upper bound is likely $200K but depends on trial performance, it could be higher considering it's a rare disease" – Chief Formulary & Procurement Officer, Major PBM*	
KOL Opinion on Anti-Chi3l1 Monotherapy	▪ KOLs believe anti-Chi3l1 could achieve a position as a neoadjuvant therapy to surgery and / or adjuvant therapy ▪ Endpoint success would be defined by a 20% reduction and / or improving overall survival by 2 months or more ▪ Route of administration is very important, uptake varies by hospital setting – an IV therapy would see ~85% uptake in both academic and community hospital settings, whereas intrathecal RoA would be ~55% for academic and ~10-20% for community - *"The target is very exciting because it is involved in many features…it could have an impact as a monotherapy but combine nicely with things that drive apoptosis or angiogenesis"* – Clinical neuro-oncologist, Major Cancer Center - *"If you have 20% reduction that you can show radiographically, that is a success. In terms of overall survival, anything beyond two months is a strong finding" – Attending Physician, Neuro-oncology, Major Hospital*	

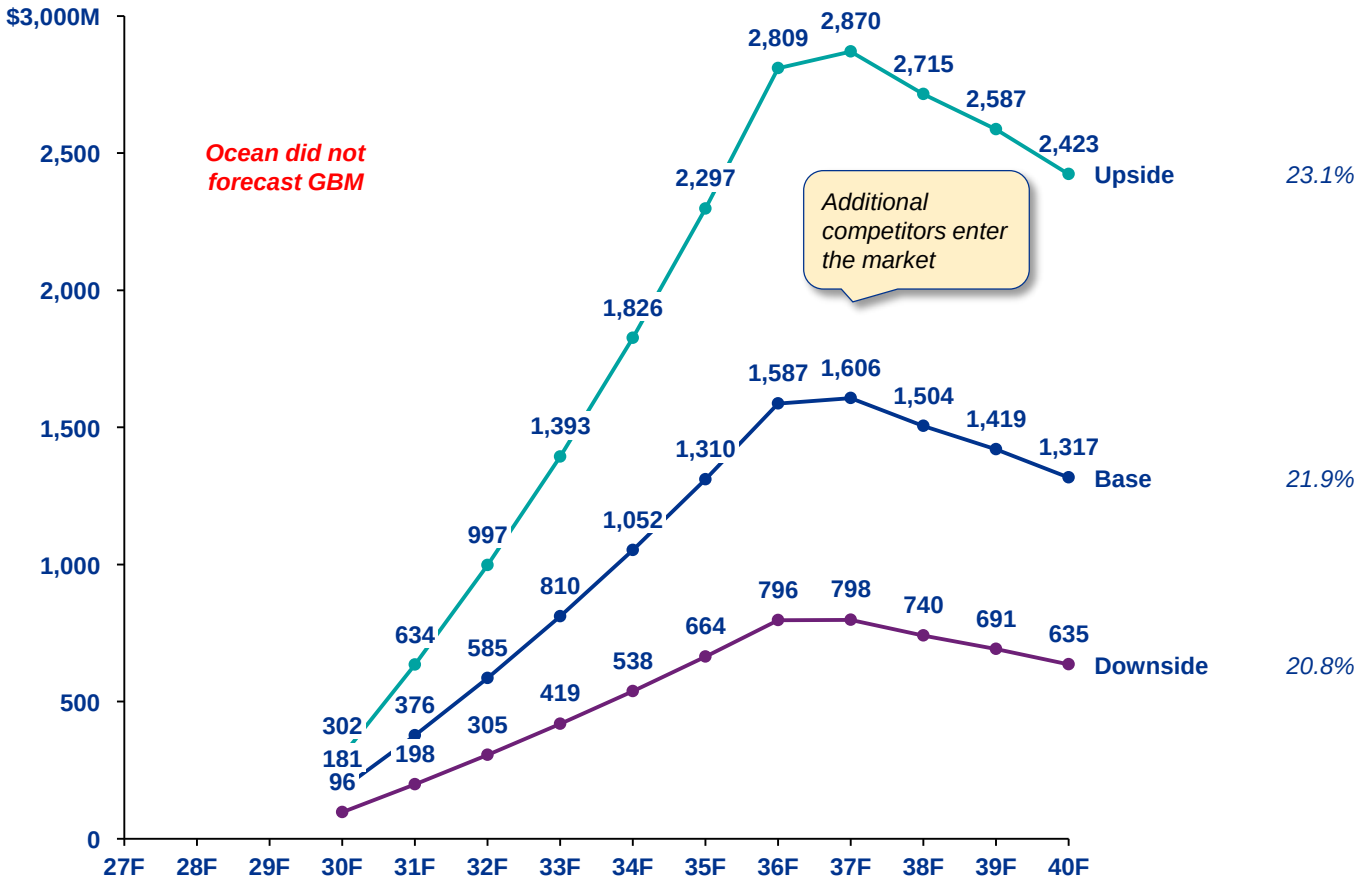
Legend: *Negative* ○ ◢ ● *Positive*

Source(s): KOLs / payer interviews

Base case anti-Chi3l1 GBM IV sales are forecast to reach ~$1.6B by 2037 due to high unmet need and use across adjuvant and neo-adjuvant settings

Ocean GBM Net Sales[(a)]

2027F-2040F, USD'$ Millions



'30F-'40F CAGR

Upside 23.1%

Base 21.9%

Downside 20.8%

Observations

Upside Case:

- Peak penetration reaches 45% in 2036, assuming 1-2 competitors at launch but Chi3l1 has superior safety and efficacy profile
- US list price at launch is ~$293K using the high end of the range provided by payers, EU5 pricing is ~73% of US pricing

Base Case:

- GBM pipeline is robust - assume 1-2 competitors are present at launch and 1-2 competitors enter during the forecast period, but assume anti-Chi3l1 is used as neo-adjuvant and adjuvant therapy
- Assume comparable safety and efficacy profile vs. competitors
- Assume actively treated population increases in forecast years as more therapies launch and penetration of IV into AMCs and community expands as well
- US list price at launch is ~$226K using the midpoint of payer feedback

Downside Case:

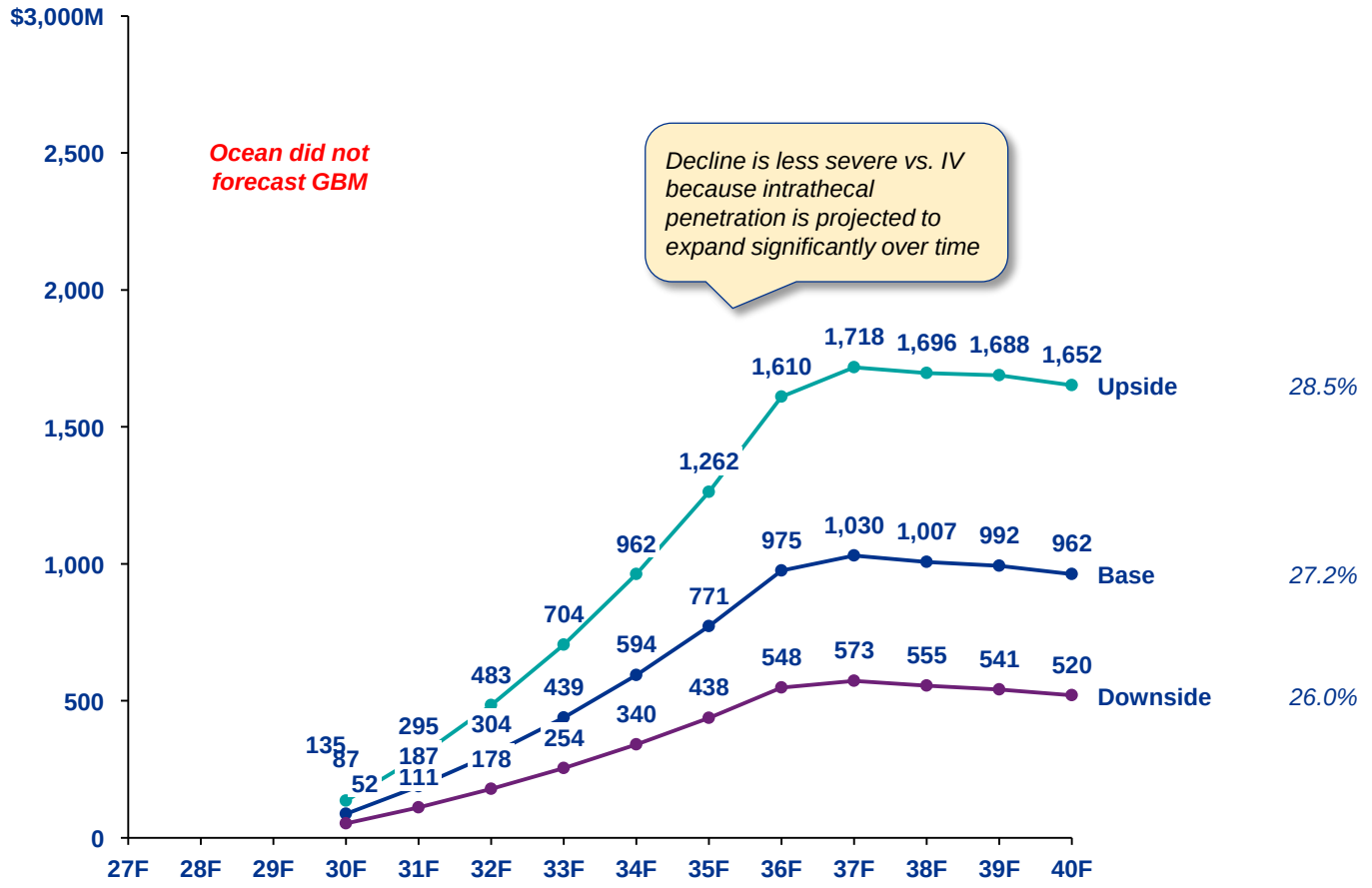
- Ocean's peak penetration reaches 25%, assuming intense competitive headwinds at launch and inferior safety and efficacy vs. competitors
- US list price at launch is ~$168K, which is the low end of payer estimates

Note(s): (a) All cases assume 2030 launch and peak revenue in 2037; 2027 starting point shown to provide relative context to Ocean's other assets

Base case intrathecal sales are forecast to be somewhat lower than IV due to adoption headwinds with RoA, but still reach ~$1B by 2037

Ocean GBM Net Sales[(a)]

2027F-2040F, USD'$ Millions



'30F-'40F CAGR

Upside 28.5%

Base 27.2%

Downside 26.0%

Observations

Upside Case:

- Upside assumes less competition and superior safety and efficacy profile vs. competitors
- US list price at launch is ~$293K using the high end of the range provided by payers, EU5 pricing is ~73% of US pricing

Base Case:

- Assume IV competitors compete with intrathecal, but intrathecal has similar safety and efficacy profile
- Assume actively treated population increases in forecast years as more therapies launch and penetration of intrathecal into AMCs and community expands significantly as well due to HCPs becoming more comfortable with the RoA
- KOL feedback suggests slightly lower compliance rate with intrathecal vs. IV, but assume this improves in the out years
- US list price at launch is ~$226K using the midpoint of payer feedback, ~$164K in EU5

Downside Case:

- Assume intense competition and inferior safety and efficacy vs. competitors
- US list price at launch is ~$168K, which is the low end of payer estimates, ~$122K in EU5

Note(s): (a) All cases assume 2030 launch and peak revenue in 2037; 2027 starting point shown to provide relative context to Ocean's other assets

GBM unmet needs are high and KOLs believe that any new therapy can extend survival by just a few months would be a clinical success

1. *Glioblastoma multiforme is an rare disease with no curative therapies and extremely poor survival prospects*
2. *Despite some advances in recent years in understanding the molecular drivers, much still needs to be done to better understand the genetic underpinning of the disease*
3. *Given the challenges in treating the disease physicians believe that a multi-modal approach would be best as no one MoA is likely to be sufficient*
4. *KOLs believe anti-Chi3l1 is a novel approach and could find a position in the treatment algorithm in both the neoadjuvant and adjuvant settings*
5. *KOLs believe anti-Chi3l1 leverages a novel approach to treating GBM, and could gain traction through IV and / or intrathecal RoA, potentially generating a combined ~$2.6B in peak sales*

OCEAN BIOMEDICAL

kpmg.com/socialmedia