

The study on estimating market size of immunotherapy and chemotherapeutics in 2018

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Research question

- What is market size of cancer drugs in USA
- What therapy area is the contributing most in terms of annual revenues

Objective

- To estimate the market potential of Immunotherapy and Chemotherapy in terms of market share
- To calculate revenue share contribution of Immunotherapy and Chemotherapy for the year 2018

Methodology

- Study was conducted in the department of market research in PharmaAce Innovations, Pune to understand the market potential of various oncology therapy areas in terms of market share.
- To estimate the revenues major inputs and assumptions are identified and processed to give a market size distribution in terms of revenues (US Billion dollars).

Study design: Descriptive cross-sectional

Study Area: U.S. pharmaceutical market

Duration: Feb 2019-Apr 2019

The potential of immunotherapy is then represented as market share or market penetration that distributes the patients in each segment accordingly.

- Epidemiological data provides the basis of identifying the market, after applying various treatment rates targeted market is calculated and price assumptions are considered to get the revenue estimation.

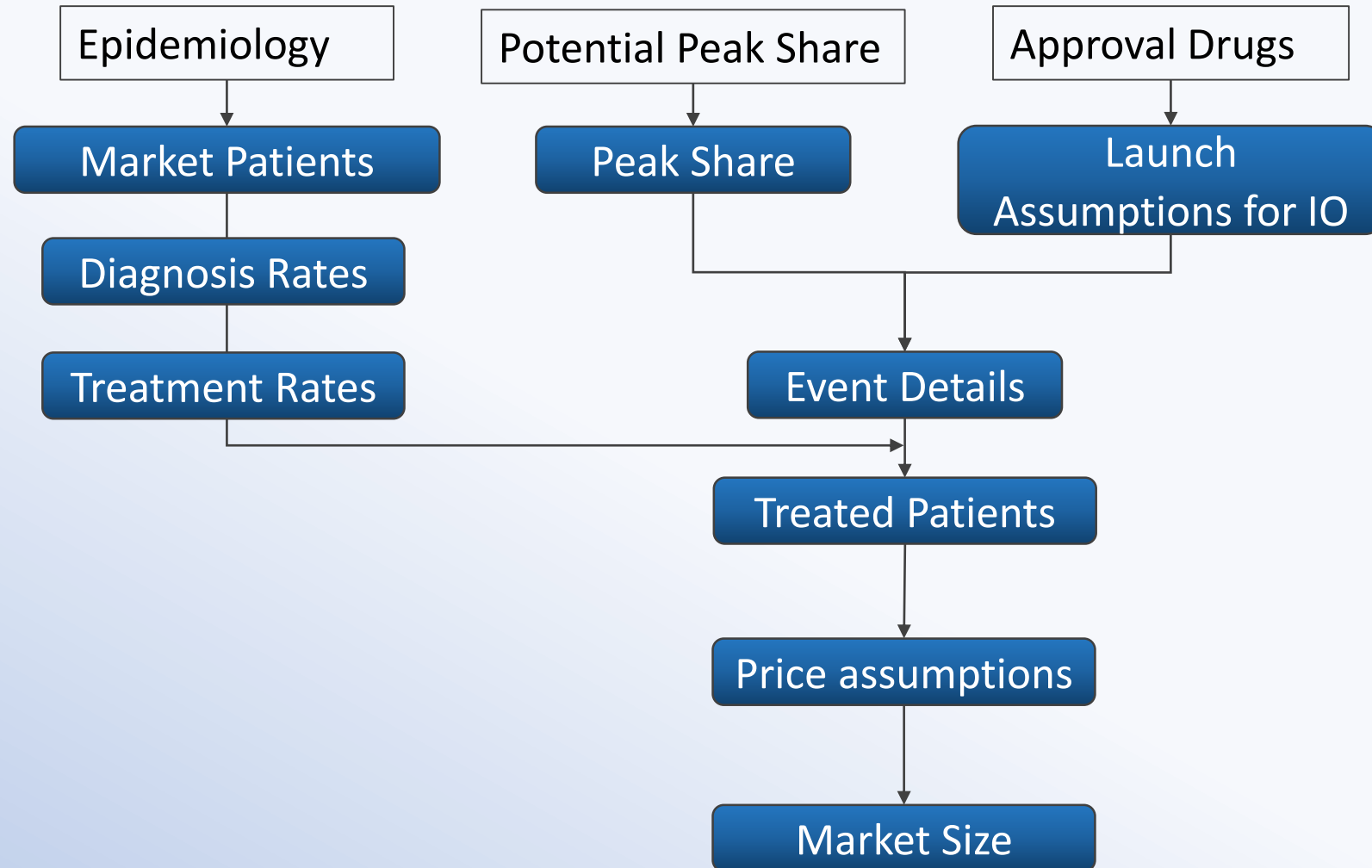
Criteria's to Assess Market Share

- Descriptive study is performed to identify the potential of different cancer therapy areas available to the patients on the basis of certain characteristics drug have to be an effective treatment.
 1. First criteria considered is the effectiveness proved in clinical trials before the drug is approved by FDA as the more effective drug gains major position in the market.
 2. Second criteria is the appearance of side effects due to the treatment.
 3. Third is the length of the treatment that a patient must undergo in a hope to get treated.
 4. Finally, the fourth criteria is the average cost of the treatment which the patient or the reimbursement agencies has to bear.

Inputs required are

- Epidemiological data of major cancer indications
- Potential peak share of the therapy area
- Approved drugs under each therapy area
- Diagnosis rates and Treatment rate
- Average length of the treatment (DoT)
- Average cost of the treatment in major indications

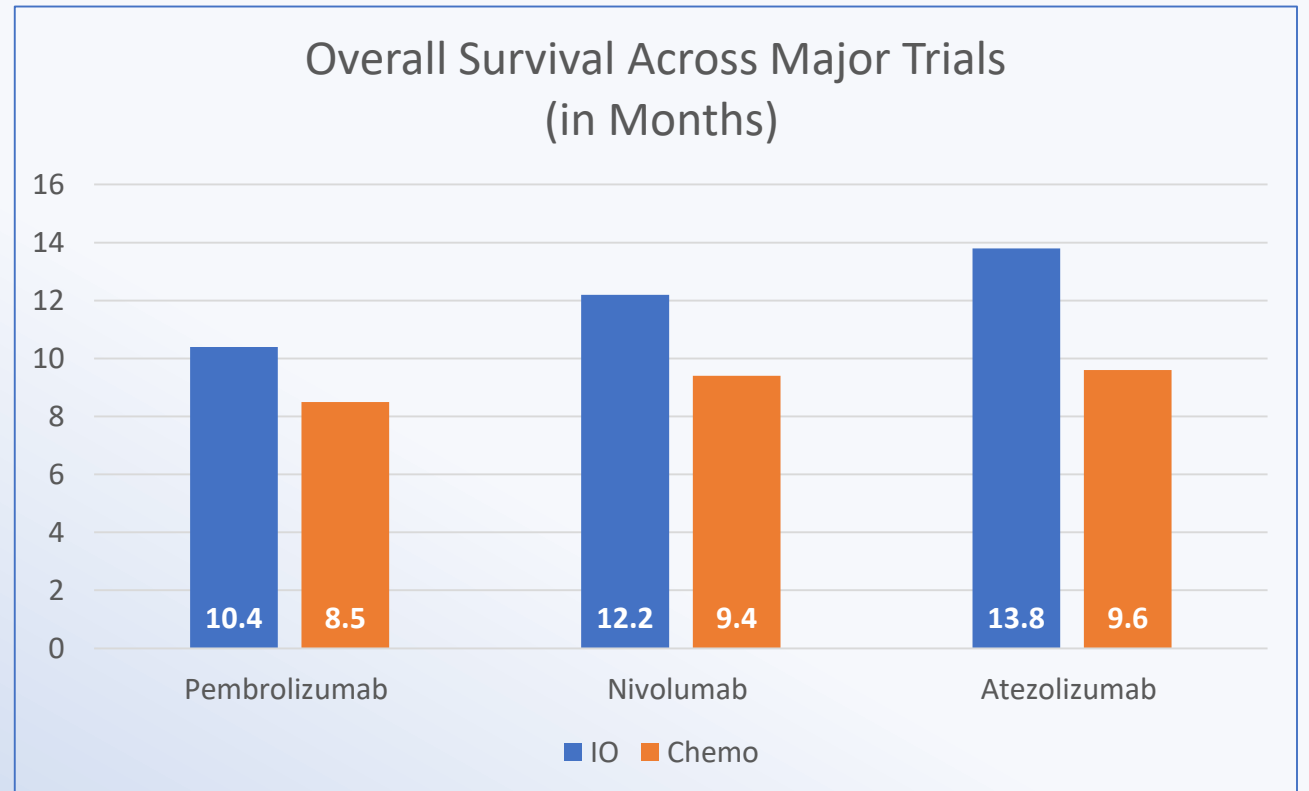
Process Flow



Criteria 1. Chemotherapy Vs Immunotherapy – Effectiveness

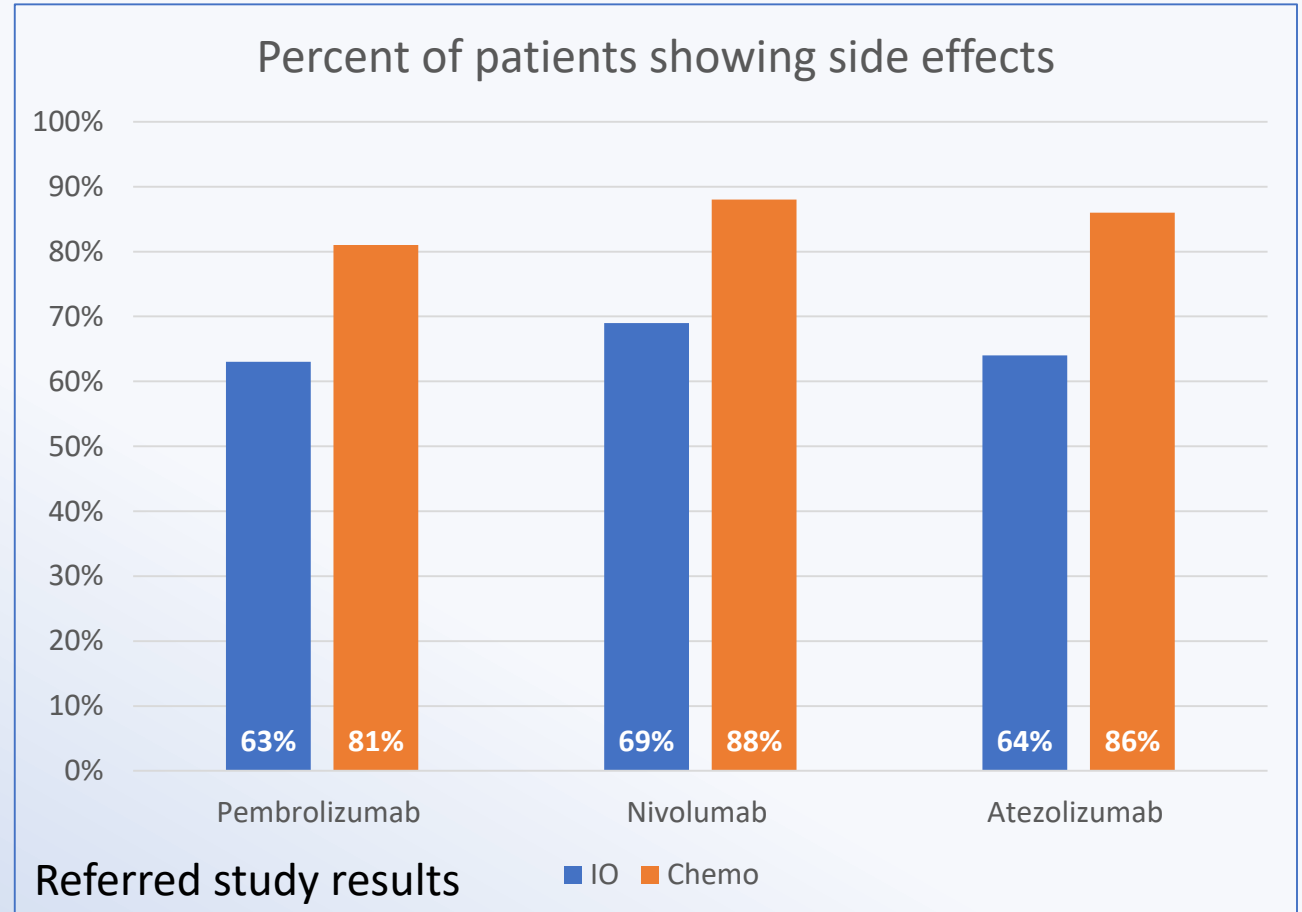
- Major Immunotherapeutic agents approved cancer include Pembrolizumab (Keytruda), Nivolumab (Opdivo), and Atezolizumab (Tecentriq).

The overall survival of immunotherapy drugs has shown an edge over chemo drugs



Criteria 2. Chemotherapy Vs Immunotherapy - Side Effects

- As the second-line treatment options pembrolizumab, nivolumab, and atezolizumab all have better safety profiles than chemotherapy



Criteria 3. Chemotherapy Vs Immunotherapy - Length of treatment

- Length of the treatment also called the duration of the treatment is calculated on applying a factor of 90% to the progression free survival of the disease which represents patients has progressed to the advanced stages of cancer while on drugs.

IO Drugs	Indication	Dot (months)	PFS		Chemo Drugs	Indication	Dot (months)	PFS
Opdivo	Melanoma	4.59	5.1		Temozolomide	melanoma	6.93	7.7
	Squamous non-small cell lung cancer	5.04	5.6		Cisplatin	squamous non-small cell lung cancer	4.23	4.7
	Renal cell carcinoma	10.44	11.6		Sunitinib	Renal cell carcinoma	7.56	8.4
	Colorectal cancer	8.64	9.6		Folfox4	colorectal cancer	6.66	7.4
	Hepatocellular carcinoma				Sorafenib	hepatocellular carcinoma	3.33	3.7
Pembrolizumab	Merkel-cell carcinoma	15.12	16.8		Cisplatin	Merkel-cell carcinoma	4.14	4.6
	Primary mediastinal B-cell lymphoma	1.98	2.2		Doxorubicin	primary mediastinal B-cell lymphoma	3.24	3.6
	Stomach cancer	4.5	5		Paclitaxel	stomach cancer	4.95	5.5
Average Length		7.19			Average Length		5.13	

Criteria 4. Chemotherapy Vs Immunotherapy - Cost Comparison

Immunotherapies in particular cost more than \$100,000 per patient per year

Indication	Year	Yearly Cost IO	Yearly Cost Chemo
Head and neck cancers	2017	\$73,463	\$26,133
	2018	\$174,800	\$57,000
Non-small cell lung cancer	2016	\$107,631	\$30,049
	2017	\$100,791	\$48,182
Recurrent RCC	2017	\$211,407	\$167,405
	2018	\$197,089	\$163,902
Melanoma	2017	\$206,435	\$146,775
Average cost		\$101,574.8	\$26,078.65

Assessing market potential

- Major clinical trials and past launched products provided the insight to score the criteria out of 1.
- Each criteria is subjectively weighted according to their impact the inputs from information on previous market researches.
- Each score is then normalized to gain the final market potential in terms of market share in percentages.

Scoring Market Potential	Chemo	IO	IO Combination
Criteria 1 (Effectiveness)	0.25	1	-
Criteria 2 (Side Effects)	0.25	0.5	-
Criteria 3 (DoT)	0.25	0.25	-
Criteria 4 (Cost Comparison)	0.75	0.25	-

Weightage given	
Criteria 1 (Effectiveness)	50%
Criteria 2 (Side Effects)	20%
Criteria 3 (DoT)	10%
Criteria 4 (Cost Comparison)	20%

Calculating market share

- The percentage score is then normalized to get IO Vs Chemo Vs IO-Chemo Combination Final Potential to Gain the Market

	Criteria 1	Criteria 2	Criteria 3	Criteria 4
Chemo Therapy	8%	3%	2%	10%
IO Therapy	33%	7%	2%	3%
Combination Therapy	20%	5%	2%	7%

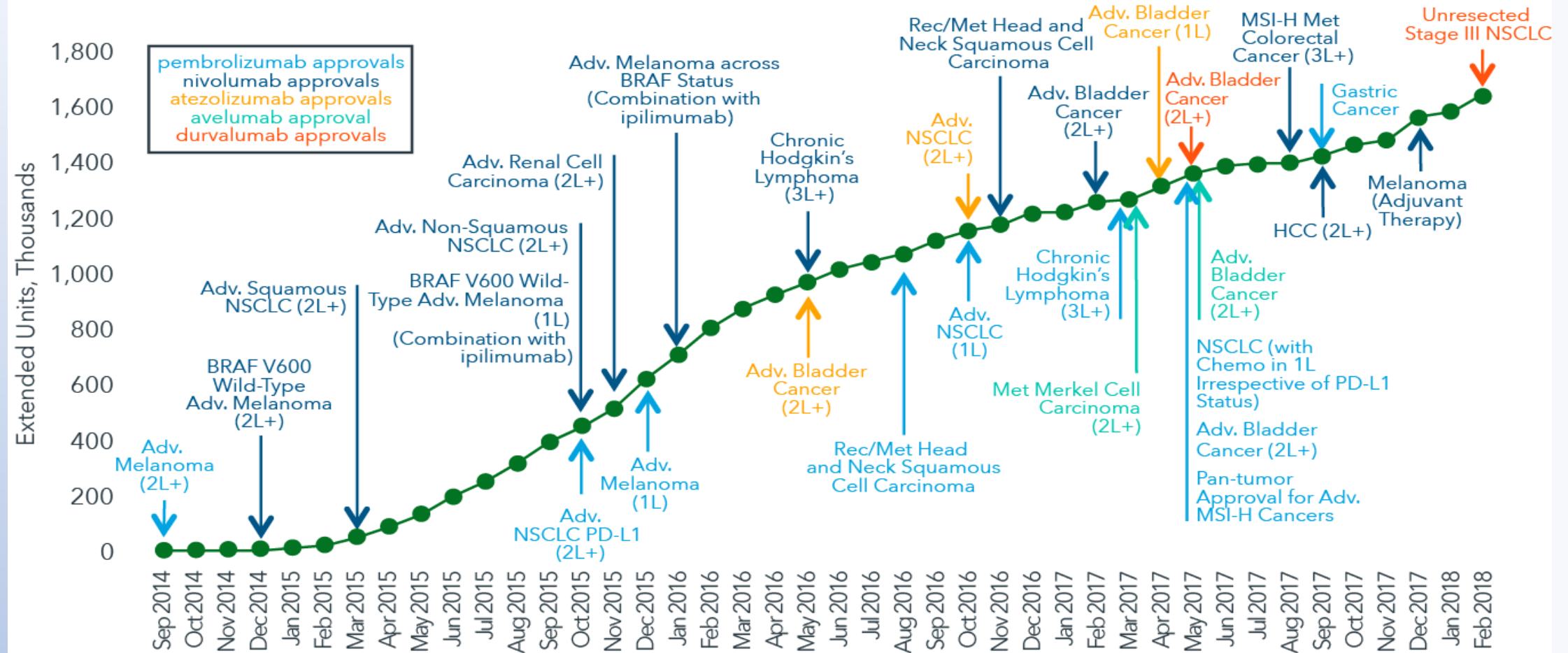
- Final Proposed Market share

IO	IO + Chemo	Chemo
44%	33%	23%

- IO + Chemo represents combination therapies in which Immuno as well as Chemo drugs are prescribed thus this segment contributes to the revenues of both chemotherapy and immunotherapy

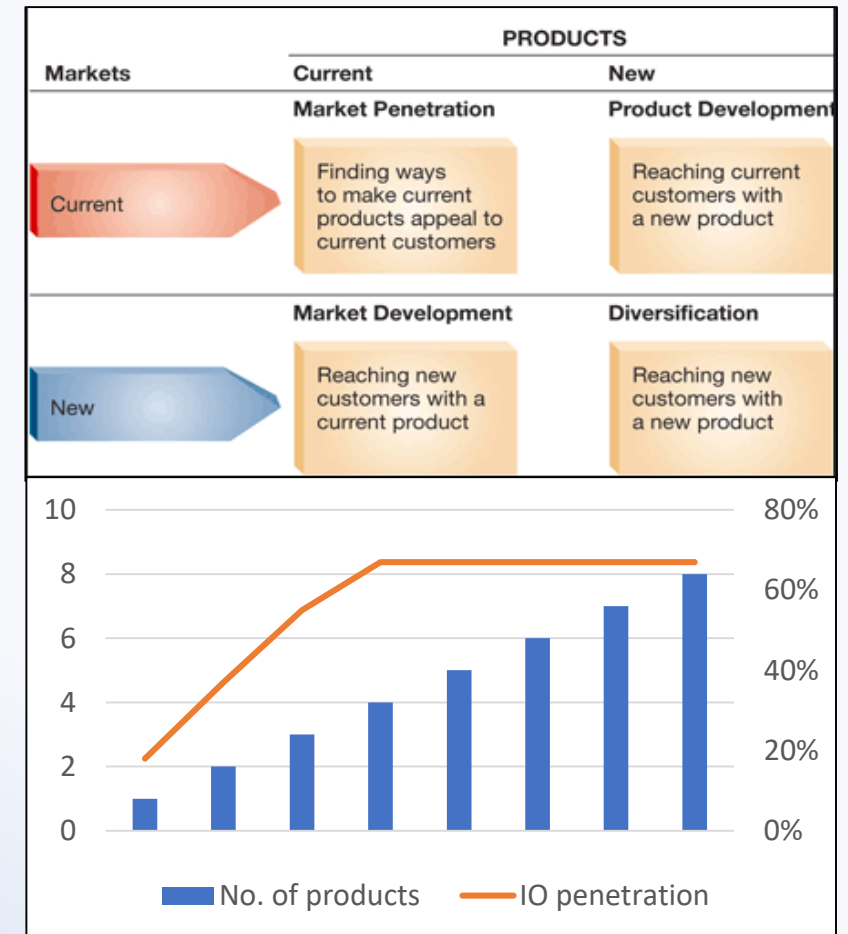
Growth of Immuno-therapy

Immuno-Oncology PD-1 and PD-L1 Inhibitor Uptake in the United States



Market Penetration

- The growth of Immuno-therapy market starts from the approval of first IO drug for any indication.
- Every new approval expands the market of IO and starts taking the patients which were earlier given the chemotherapy or established treatments.
- The pattern of growth is variable across the indications but usually rise with increase in the number of products approved in the indication.
- The penetration into the market reaches its peak until 4 or 5 products are launched and the products beyond 5 usually takes patients from current IO drugs due reason that new launched IO drugs need to show greater effectiveness over chemotherapy as well as current IO drugs in clinical trials



Epidemiology: Segmenting the Market

Defining the market

- Major segments under the umbrella term cancer are identified by type of cancer also called indication and recording the incidence cases which will form an undifferentiated market

Target Market

- Over the incidence treatment rate is applied to reduce the number of patients who are not getting the treatment
- Treatment rates of 70 % is applied to reduce the number of patients who are not getting the treatment due to various reasons ie. affordability, bio-marker testing, age, uninsured etc.

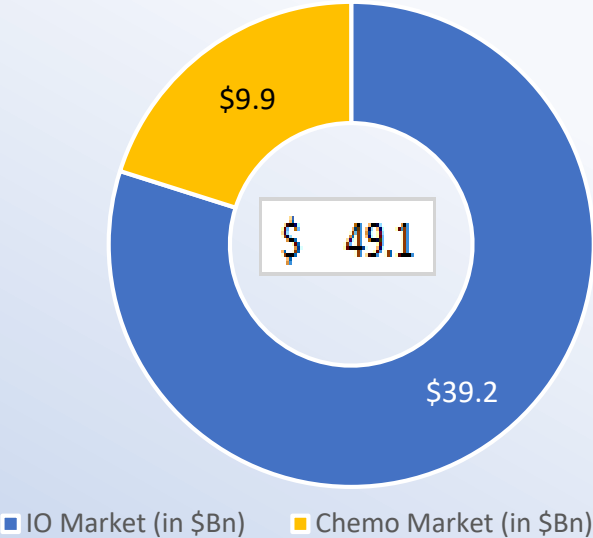
Indication	Incidence (2018)	Treatment Rates	Treatment Rates
Female Breast	270,000	70%	189000
Prostate	183,529	70%	128470
Lung and Bronchus	218,527	70%	152969
Colon and Rectum	140,788	70%	98552
Corpus and Uterus, NOS	54,644	70%	38251
Melanomas of the Skin	91,000	70%	63700
Urinary Bladder	81,000	70%	56700
Non-Hodgkin Lymphoma	83,000	70%	58100
Kidney and Renal Pelvis	65,000	70%	45500
Thyroid	48,761	70%	34133
Cervical cancer	13,000	70%	9100
Thyroid	17,000	70%	11900
Head and neck	65,000	70%	45500
Leukemia	60,000	70%	42000
Liver	42,000	70%	29400
Myeloma	31,000	70%	21700
Ovarian	22,000	70%	15400
Pancreatic	55,000	70%	38500
Gastric	26000	70%	18200

Drug Approval Status

Indication	Immuno therapy launched	NO. of IO drugs approved	IO Penetration in the Market
Female Breast	Y	4	67%
Prostate	Y	1	18%
Lung and Bronchus	Y	6	67%
Colon and Rectum	Y	6	67%
Corpus and Uterus, NOS	N	0	0%
Melanomas of the Skin	Y	7	67%
Urinary Bladder	Y	6	67%
Non-Hodgkin Lymphoma	Y	9	67%
Kidney and Renal Pelvis	Y	4	67%
Thyroid	N	0	0%
Cervical cancer	Y	2	37%
Thyroid	Y	3	55%
Head and neck	Y	3	55%
Leukemia	Y	10	67%
Liver	Y	2	37%
Myeloma	Y	2	37%
Ovarian	Y	1	18%
Pancreatic	N	0	0%
Gastric	Y	3	55%
Average Number of IO drugs Launched per indication		4	

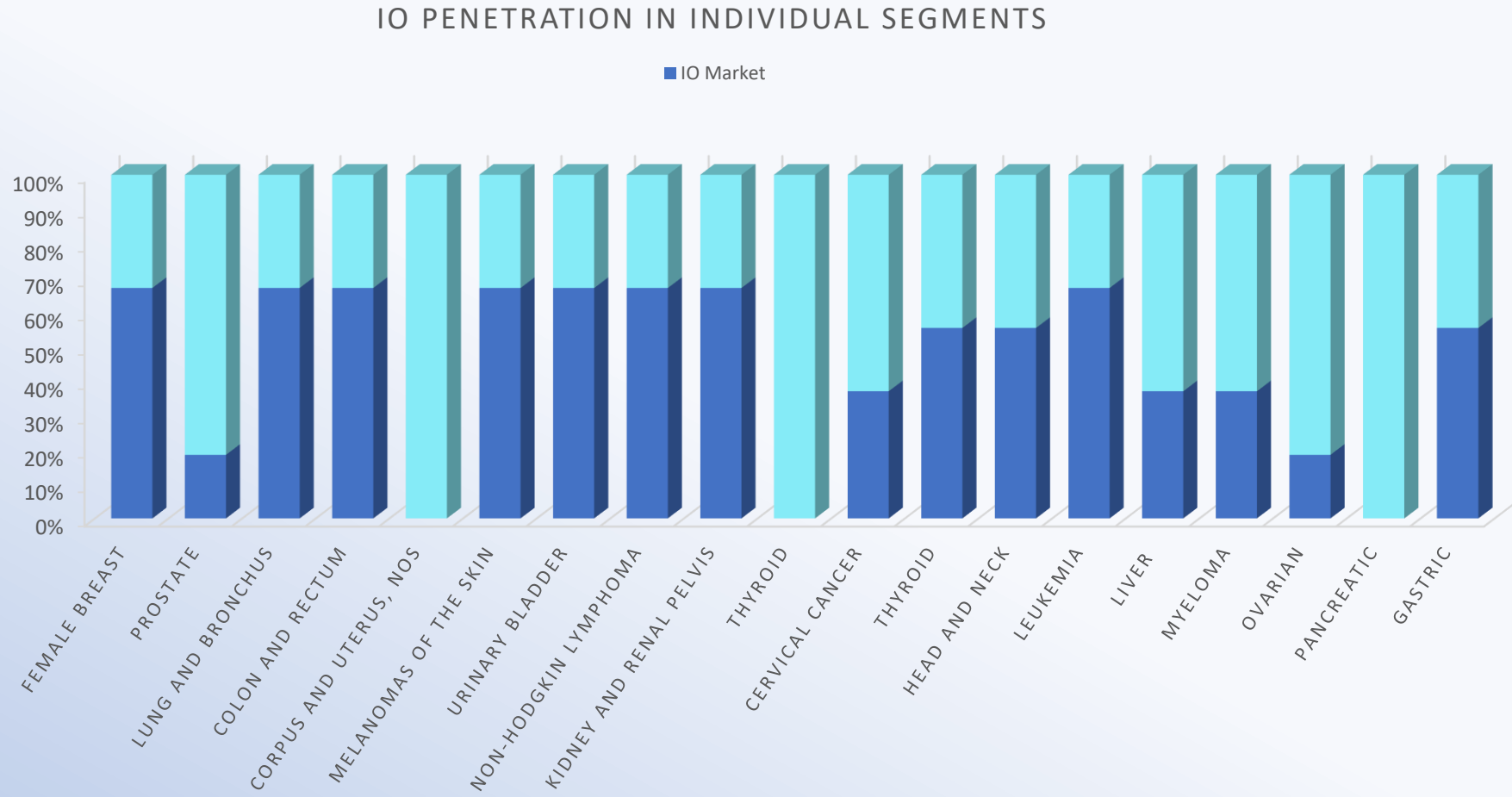
Market Size in terms of Revenue distribution

Canner Therapeutics Market Size in Revenues

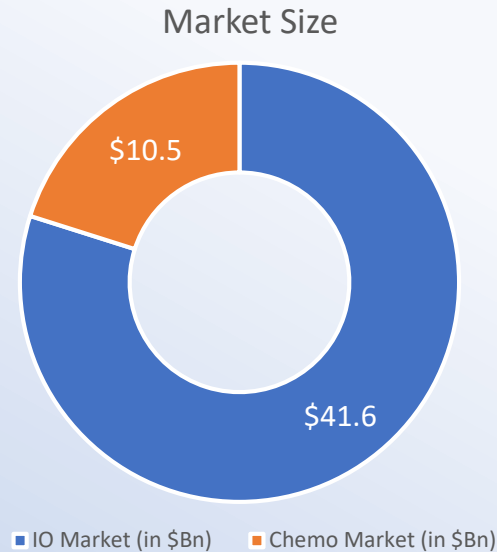


Indication	IO Market	Chemo Market
Female Breast	\$ 8.8	\$ 1.6
Prostate	\$ 1.6	\$ 1.3
Lung and Bronchus	\$ 7.1	\$ 1.3
Colon and Rectum	\$ 4.6	\$ 0.8
Corpus and Uterus, NOS	\$ -	\$ 0.5
Melanomas of the Skin	\$ 3.0	\$ 0.5
Urinary Bladder	\$ 2.6	\$ 0.5
Non-Hodgkin Lymphoma	\$ 2.7	\$ 0.5
Kidney and Renal Pelvis	\$ 2.1	\$ 0.4
Thyroid	\$ -	\$ 0.4
Cervical cancer	\$ 0.2	\$ 0.1
Thyroid	\$ 0.5	\$ 0.1
Head and neck	\$ 1.8	\$ 0.3
Leukemia	\$ 2.0	\$ 0.4
Liver	\$ 0.8	\$ 0.2
Myeloma	\$ 0.6	\$ 0.2
Ovarian	\$ 0.2	\$ 0.2
Pancreatic	\$ -	\$ 0.5
Gastric	\$ 0.7	\$ 0.1
Total	\$ 39.2	\$ 9.9

State IO market contributing to revenues



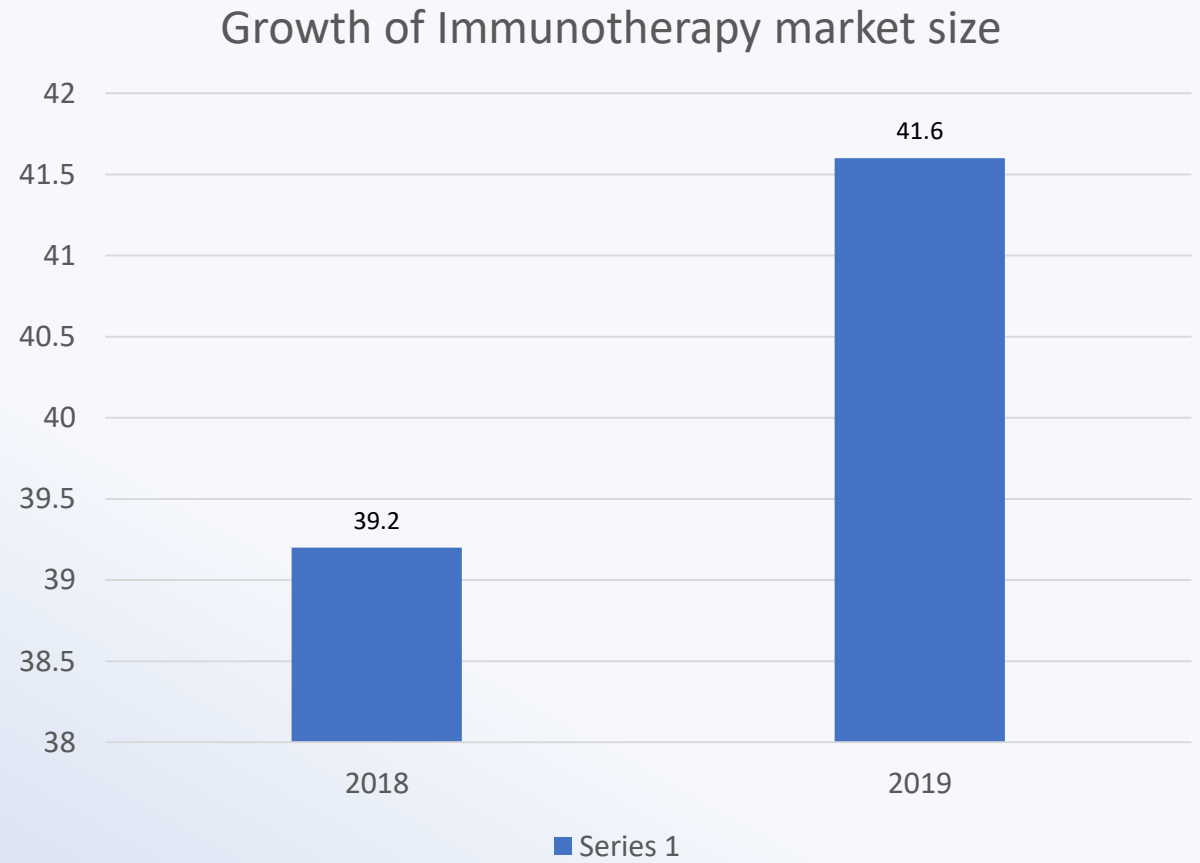
Forecasted revenues for the year 2019



Indication	IO Market	Chemo Market
Female Breast	\$ 9.3	\$ 1.7
Prostate	\$ 1.7	\$ 1.4
Lung and Bronchus	\$ 7.6	\$ 1.4
Colon and Rectum	\$ 4.9	\$ 0.9
Corpus and Uterus, NOS	\$ -	\$ 0.5
Melanomas of the Skin	\$ 3.1	\$ 0.6
Urinary Bladder	\$ 2.8	\$ 0.5
Non-Hodgkin Lymphoma	\$ 2.9	\$ 0.5
Kidney and Renal Pelvis	\$ 2.2	\$ 0.4
Thyroid	\$ -	\$ 0.5
Cervical cancer	\$ 0.2	\$ 0.1
Thyroid	\$ 0.5	\$ 0.1
Head and neck	\$ 1.9	\$ 0.3
Leukemia	\$ 2.1	\$ 0.4
Liver	\$ 0.8	\$ 0.3
Myeloma	\$ 0.6	\$ 0.2
Ovarian	\$ 0.2	\$ 0.2
Pancreatic	\$ -	\$ 0.5
Gastric	\$ 0.7	\$ 0.1
Total	\$ 41.6	\$ 10.5

Growth of Immunotherapy from 2018 to 2019

The immunotherapy market is expected to rise Upto \$41.6 billion dollors with the growth rate of 6.12%



• *Thank you*