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INTERNATIONAL JOURNAL OF
Immunotherapy and Cancer Research

ISSN: 2455-8591 DOI: https://dx.doi.org/10.17352/ijicr

Research Article

Understanding immunotherapy and its management

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Received: 04 January, 2021
Accepted: 11 January, 2021
Published: 12 January, 2021

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Keywords: Immunotherapy; PD-1/PD-L1 mechanism; Tumor stroma role in PD-1/PD-L1; Immune resistance; Challenges and new approach; Combination immune therapy

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Abstract

A few tumours are exceptionally stubborn to oral chemotherapy. The endurance of tumours in a few cases is helped by checkpoint immunomodulation to keep up the unevenness between resistant reconnaissance and disease cell division. Checkpoint counteracting agent inhibitors, for example, against PD-1/PD-L1, are another class of inhibitors that capacity has tumour stifling element using a balance of resistant cell/tumour cell communication. These checkpoint inhibitors are quickly turning into a profoundly encouraging malignancy helpful methodology that shows astounding antitumor reaction with restricted symptoms. As of late over four checkpoint inhibitors have been utilized for focusing on PD-1, PD-L1 and CTLA-4. Despite the immense achievement and viability of hostile to PD treatment reaction, it is restricted to explicit kind of malignant growths, which credits to the lacking and heterogeneous articulation of PD-1 in the tumour miniature condition. Thus, we audit the current extent of the PD-1/PD-L1 instrument function in tumour invulnerable avoidance and helpful result for malignant growth treatment.

Abbreviations

PL /PL-1: Programmed Cell / Programmed Cell-1; CTLA-4: Cytotoxic T Lymphocyte Associated Protein-4; ACT: Ascending T Cell Treatment; HPV: Human Papilloma Virus; ASCO: American Society of Clinical Oncology Journal; IMD: Different Immunomodulator; CAR –T-Cell: Chimeric Antigen Receptor-T cell; FDA: Food Drug Association

Introduction

Immunotherapy is a kind of malignancy therapy that enables your safe framework to battle disease. The resistant framework enables your body to battle contaminations and different infections. It is comprised of white platelets and organs and tissues of the lymph framework. Immunotherapy is a sort of natural treatment. Natural treatment is a sort of therapy that utilizes substances produced using living life forms to treat malignant growth. Immunotherapy is a therapy that utilizes certain pieces of an individual resistant framework to battle illnesses, for example, malignancy this should be possible in two different ways. Stimulating your insusceptible framework to work more diligently or more brilliant to assault malignancy cells. Giving you insusceptible framework parts, for example, man-made safe framework proteins. In the most recent couple of decade, immunotherapy has become a significant piece of treating a few kinds of malignant growth. Fresher kinds of safe therapies are currently being contemplated, and they will affect how we treat malignant growth later on. Immunotherapy incorporates treatment that works in various manners. Some lift the body insusceptible framework in an overall way. Others help train the invulnerable framework to assault disease cells explicitly. The immune framework works better for certain kinds of disease than for other people. It's utilized without anyone else for a portion of these tumours, yet for other people, it appears to work better when utilized with different kinds of treatment.

Current trends

There are a few developing patterns in immuno-oncology, including checkpoint inhibitors and Assenting T-Cell Treatment (ACT). Invulnerable checkpoint segments, for example, Cytotoxic T Lymphocyte antigen 4 (CTLA-4) and customized cell Passing 1 (PD-1) and its ligand (PD-L1)- are communicated on tumour-penetrating lymphocytes and numerous kinds of tumour cells, and they permit dangerous cells to sidestep cytotoxic insusceptible reactions. Ipilimumab, a neutralizer focusing on CTLA-4 endorsed by the FDA for use in patients with melanoma, represses this cycle and encourages T-cell actuation against tumour cells. Antibodies focusing on PD-1 and PD-L1 are likewise being tried in stage III preliminaries

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against a few sorts of tumours. This year in Japan nivolumab turned into the first PD-1 inhibitor to accomplish administrative endorsement in melanoma. Promising outcomes have likewise been posted for the trial against PD-L1 counteracting agent MPDL3280A in melanoma, cellular breakdown in the lungs and bladder malignant growth. ACT, T cells enacted against tumour-explicit antigens are confined from the patient, extended *ex vivo*, and afterwards once again introduced into the patient. A stage I study introduced at the 2014 ASCO Annual Meeting tried Human Papillomavirus (HPV)- explicit T cells in patients with metastatic cervical malignant growth and created a few sturdy complete reactions.

Literature review

Cancer has clarified on the essential component of the insusceptible framework as it identifies with the disease has been expanding quickly which zeroed in on inspecting flow information and future bearings of exploration identified with tumour immunology and malignant growth immunotherapy, remembering meetings for inborn invulnerability, versatile resistance, helpful methodologies (dendritic cells, receptive T-cell treatment, against tumour antibodies, malignancy immunizations and safe checkpoint barricade), challenge to driving an enemy of tumor safe reaction, observing safe reactions and the eventual fate of immunotherapy clinical preliminary plan [1]. Immunotherapy has clarified the advancing function of immunotherapy medicines in India alongside the security and adequacy identified with kinds of immunotherapy medicines accessible [2]. Cancer Immunotherapy gave a short survey on the history prospects and difficulties ahead on malignant growth immunotherapy [3].

Cancer Immunotherapy examined the present and eventual fate of disease immunotherapy: A tumour miniature ecological point of view. Despite accomplishment in focusing on non-tumour cell segments, including insusceptible checkpoint blockage, focussing on a solitary invulnerable suppressive objective is insufficient in most of the patient with the malignant growth. Following obstructing or hindering of one invulnerable suppressive sign, the tumour will repay through another component to produce the opposition and decrease the proficiency of immunotherapy. The relationship between the heterogeneity of the tumour microenvironment and the immunotherapy reaction stays a critical test. Later on, immunotherapy might be needed to be customized for every patient with the disease as per the tumour microenvironment. The utilization of novel safe biomarkers [4] PD-L1 examined on the improvement of resistant checkpoint inhibitor has changed the therapy worldview for cutting edge diseases across numerous tumour type. Notwithstanding promising and now and then strong reactions in a subset of patients, most [5]. Immunotherapy has clarified the expanding utilization of different Immunomodulatory (IMD) agence for malignant growth treatments (eg: antibodies focusing on a resistant checkpoint, by explicit antibodies and illusory antigen receptor ((CAR)- T-cell). The advantage showed as far as long-haul reactions and infection control by endorsed IMD treatments and significance of adequately executing these treatment methodologies [6].

Cost of Immunotherapy in India: Its cost around 1 lakh to 1.3 Lakh for one treatment of Immunotherapy in India. In like clockwork, another treatment is needed to been given to the patient, if necessary. The expense of immunotherapy in India is just about 8–10 times lower than the expense of immunotherapy in western nations though there is no adjustment in the outcome and the cycle of treatment of both the parts. Cancer Immunotherapy isn't advanced in India due to the reasoning and their perspectives on natively constructed sub-atomic medications and treatments. Along these lines, the absence of prevalence is one of the explanation that why immunotherapy isn't advanced in India. Sometimes, it is seen that the immunotherapy sets aside a long-range of effort to regard malignancy when contrasted with other treatment techniques. Immunotherapy doesn't take a shot by any stretch of the imagination. Cost is likewise an issue in a portion of the cases [7-15].

Objectives of a research

Immunotherapy is the most evolving treatment for cancer management.

a. To find out the institute-wise protocol

b. To find out how do doctors choose different immune therapy

c. To understand the different {PD-1 and PDL-1} Immunotherapy agents.

d. To understand the challenges faced by patients

Research methodology

Type of research: Exploratory and Descriptive

Research design: Qualitative and Quantitative

Sample size – 80

The present work includes mainly three steps

1. To prepare a questionnaire for doctors
2. Collect the responses from the Doctors
3. Analyse the results and to give the conclusion

Hypothesis: Every hospital has a cancer immunotherapy treatment protocol however poor adherence to protocol.

Data analysis

Descriptive Statistics					
Hospital Name	N	Minimum	Maximum	Mean	Std. Deviation
	80	1	4	2.51	1.079
1. How do you choose therapy for patients? (order of priority)	80	1	3	2.16	.803
2. Why do you choose immunotherapy?	80	1	2	1.48	.503
3. What is your way of treatment of immunotherapy?	80	1	2	1.41	.495

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4. On what parameters you choose different immunotherapy molecules?	80	1	6	4.15	1.584
5. What are your goals for immunotherapy when you prescribe for a patient?	80	1	4	2.31	1.132
6. How long does it take immunotherapy to start?	80	1	4	2.36	1.139
7. Start and what is the duration of therapy?	80	1	3	2.16	.818
7. Which medicine has a good activity of immune checkpoint?	80	1	4	2.41	1.052
Generaly, prescribe PDL inhibitors	80	1	4	2.31	1.132
Generally, prescribe PDL-1 inhibitors	80	1	4	2.53	1.136
8. What are the side effects of immunotherapy and how do you control them?	80	1	4	2.35	1.008
9. What is the success rate of (%) immunotherapy and how effective you feel?	80	1	5	2.56	1.483
10. would you like to suggest?	80	1	3	1.94	.785
Valid N (listwise)	80				

Case Processing Summary for cross tabs

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
1. How do you choose therapy for patients? (order of priority)	80	100.0%	0	0.0%	80	100.0%
2. Why do you choose immunotherapy?	80	100.0%	0	0.0%	80	100.0%
3. What is your way of treatment of immunotherapy?	80	100.0%	0	0.0%	80	100.0%
4. On what parameters you choose different immunotherapy molecules?	80	100.0%	0	0.0%	80	100.0%
5. What are your goals for immunotherapy when you prescribe for a patient?	80	100.0%	0	0.0%	80	100.0%
6. How long does it take immunotherapy to start?	80	100.0%	0	0.0%	80	100.0%
7. what is the duration of therapy?	80	100.0%	0	0.0%	80	100.0%
8. Which medicine has a good activity of immune checkpoint? 8.1Generally, prescribe PDL inhibitors 8.2Generally, prescribe PDL-1 inhibitors	80	100.0%	0	0.0%	80	100.0%
9. What are the side effects of immunotherapy and how do you control them?	80	100.0%	0	0.0%	80	100.0%
10. What is the success rate of (%) immunotherapy and how effective you feel?	80	100.0%	0	0.0%	80	100.0%
11. would you like to suggest any other therapies?	80	100.0%	0	0.0%	80	100.0%

1. How do you choose therapy for patients?(order of priority)

		1	2	3	
Hospital Name	Apollo	3	6	9	18
	Basavaturakam Indo american	5	6	10	21
	Omega	7	8	8	23
	Yashodha	5	7	6	18
Total		20	27	33	80

This table allows us to understand that Hospitals VS Choosing therapy for patients to 1, 2 and 3.

Hypothesis

H0 = There is no significant association between Choosing therapy and Hospitals

H1 = There is a significant association between Choosing therapy and Hospitals.

Chi-Square Tests

	Value	df	Asymp. Sig (2-sided)
Pearson Chi-Square	2.202[a]	6	.900
N of Valid Cases	80		

When reading this table we are interested in the results of the "Pearson Chi-Square" row.

We can see here that $\chi^2 = 2.202$, $p = 0.90$. This tells us that there is no statistically significant association between Choosing therapy and Hospitals.

2. Why do you choose immunotherapy?

		1	2	
Hospital Name	Apollo	10	8	18
	Basavaturakam Indo american	10	11	21
	Omega	11	12	23
	Yashodha	11	7	18
Total		42	38	80

This table allows us to understand that Hospitals VS why do you Choose immunotherapy to 1 and 2.

Hypothesis

$H0_2$ = There is no significant association between Choosing immunotherapy and Hospitals

$H1_2$ = There is a significant association between Choosing immunotherapy and Hospitals.

Chi-Square Tests

	Value	Df	Asymp. Sig (2-sided)
Pearson Chi-Square	1.005[a]	3	.800
N of Valid Cases	80		

When reading this table we are interested in the results of the "Pearson Chi-Square" row.

We can see here that $\chi^2 = 1.005$, $p = 0.80$. This tells us that there is no statistically significant association between Choosing immunotherapy and Hospitals.

3. What is your way of treatment of immunotherapy?

		1	2	
Hospital Name	Apollo	14	4	18
	Basavaturakam Indo American	16	5	21
	Omega	9	14	23
	Yashodha	8	10	18
Total		47	33	80

This table allows us to understand that Hospitals VS treatment of immunotherapy to 1 and 2.

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Hypothesis

Ho_3 = There is no significant association between treatment of immunotherapy and Hospitals

$H1_3$ = There is a significant association between treatment of immunotherapy and Hospitals.

Chi-Square Tests			
	Value	df	Asymp.Sign (2-sided)
Pearson Chi-Square	10.498[a]	3	.015
N of Valid Cases	80		

When reading this table we are interested in the results of the "Pearson Chi-Square" row.

We can see here that $\chi^2 = 10.498$, $p = 0.15$. This tells us that there is a statistically significant association between treatment of immunotherapy and Hospitals.

4. On what parameters you choose different immunotherapy molecules?								
		1	2	3	4	5	6	
Hospital Name	Apollo	1	3	0	1	8	5	18
	Basavaturakam Indo American	0	3	2	5	5	6	21
	Omega	1	4	3	5	5	5	23
	Yashodha	3	2	4	2	4	3	18
Total		5	12	9	13	22	19	80

This table allows us to understand that Hospitals VS different immunotherapy molecules to 1, 2, 3, 4, 5 and 6.

Hypothesis

Ho_4 = There is no significant association between immunotherapy molecules and Hospitals

$H1_4$ = There is a significant association between immunotherapy molecules and Hospitals.

Chi-Square Tests			
	Value	df	Asymp. Sign (2-sided)
Pearson Chi-Square	14.882[a]	15	.460
N of Valid Cases	80		

When reading this table we are interested in the results of the "Pearson Chi-Square" row.

We can see here that $\chi^2 = 14.882$, $p = 0.46$. This tells us that there is no statistically significant association between immunotherapy molecules and Hospitals.

5. What are your goals for immunotherapy when you prescribe for a patient?						
		1	2	3	4	Total
Hospital Name	Apollo	6	2	6	4	18
	Basavaturakam Indo American	11	6	2	2	21
	Omega	6	5	6	6	23
	Yashodha	3	6	5	4	18
Total		26	19	19	16	80

This table allows us to understand that Hospitals VS when you prescribe for a patient for immunotherapy to 1, 2, 3 and 4.

Hypothesis

Ho_5 = There is no significant association between when you prescribe for a patient and Hospitals

$H1_6$ = There is a significant association between when you prescribe for a patient and Hospitals.

Chi-Square Tests			
	Value	df	Asymp Sign (2-sided)
Pearson Chi-Square	10.717[a]	9	.296
N of Valid Cases	80		

When reading this table we are interested in the results of the "Pearson Chi-Square" row.

We can see here that $\chi^2 = 10.717$, $p = 0.29$. This tells us that there is no statistically significant association between when you prescribe for a patient for immunotherapy and Hospitals.

6.How long does it take immunotherapy to start?						
		1	2	3	4	
Hospital Name	Apollo	4	8	1	5	18
	Basavaturakam Indo merican	5	8	2	6	21
	Omega	9	5	2	7	23
	Yashodha	3	9	3	3	18
Total		21	30	8	21	80

This table allows us to understand that Hospitals VS How long does it take immunotherapy to start to 1, 2, 3 and 4.

Hypothesis

Ho_7 = There is no significant association between immunotherapy to start and Hospitals

$H1_7$ = There is a significant association between immunotherapy to start and Hospitals.

Chi-Square Tests			
	Value	df	Asymp. Sign (2-sided)
Pearson Chi-Square	6.791[a]	9	.659
N of Valid Cases	80		

When reading this table we are interested in the results of the "Pearson Chi-Square" row.

We can see here that $\chi^2 = 6.791$, $p = 0.65$. This tells us that there is no statistically significant association between How long does it take immunotherapy to start and Hospitals.

7. What is the duration of therapy?					
		1	2	3	
Hospital Name	Apollo	7	7	4	18
	Basavaturakam Indo american	4	4	13	21
	Omega	6	8	9	23
	Yashodha	4	6	8	18
Total		21	25	34	80

This table allows us to understand that Hospitals VS the duration of therapy to 1, 2 and 3.

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Hypothesis

$H0_8$ = There is no significant association between duration of therapy and Hospitals

$H1_8$ = There is a significant association between duration of therapy and Hospitals

Chi-Square Tests			
	Value	df	Asymp. Sign (2-sided)
Pearson Chi-Square	6.755[a]	6	.344
N of Valid Cases	80		

When reading this table we are interested in the results of the "Pearson Chi-Square" row.

We can see here that $\chi^2 = 6.755$, $p = 0.34$. This tells us that there is no statistically significant association between the duration of therapy and Hospitals.

8. Which medicine has a good activity of immune checkpoint?						
		1	2	3	4	Total
Hospital Name	Apollo	5	4	5	4	18
	Basavaturakam Indo american	9	2	6	4	21
	Omega	3	8	9	3	23
	Yashodha	4	4	8	2	18
Total		21	18	28	13	80

This table allows us to understand that Hospitals VS good activity of immune checkpoint to 1, 2, 3 and 4.

Hypothesis

$H0_9$ = There is no significant association between the good activity of immune checkpoint and Hospitals

$H1_9$ = There is a significant association between the good activity of immune checkpoint and Hospitals

Chi-Square Tests			
	Value	Df	Asymp. Sign (2-sided)
Pearson Chi-Square	8.998[a]	9	.437
N of Valid Cases	80		

When reading this table we are interested in the results of the "Pearson Chi-Square" row.

We can see here that $\chi^2 = 8.998$, $p = 0.43$. This tells us that there is no statistically significant association between medicines has a good activity of immune checkpoint and Hospitals.

8.1 Generally, prescribe PDL inhibitors						
		1	2	3	4	
Hospital Name	Apollo	4	6	2	6	18
	Basavaturakam Indo american	9	2	6	4	21
	Omega	6	6	5	6	23
	Yashodha	6	8	3	1	18
Total		25	22	16	17	80

This table allows us to understand that Hospitals VS Generally, prescribe PDL inhibitors to 1, 2, 3 and 4.

Hypothesis

$H0_{10}$ = There is no significant association between Generally, prescribe PDL inhibitors and Hospitals

$H1_{10}$ = There is a significant association between Generally, prescribe PDL inhibitors and Hospitals

Chi-Square Tests			
	Value	Df	Asymp.Sign (2-sided)
Pearson Chi-Square	11.424[a]	9	.248
N of Valid Cases	80		

When reading this table we are interested in the results of the "Pearson Chi-Square" row.

We can see here that $\chi^2 = 11.424$, $p = 0.24$. This tells us that there is no statistically significant association between Generally, prescribe PDL inhibitors and Hospitals.

8.2 Generally, prescribe PDL-1 inhibitors.						
		1	2	3	4	
Hospital Name	Apollo	6	4	2	6	18
	Basavaturakam Indo american	6	6	4	5	21
	Omega	4	5	7	7	23
	Yashodha	4	4	7	3	18
Total		20	19	20	21	80

This table allows us to understand that Hospitals VS Generally, prescribe PDL-1 inhibitors to 1, 2, 3 and 4.

Hypothesis

$H0_{11}$ = There is no significant association between generally, prescribe PDL-1 inhibitors and Hospitals

$H1_{11}$ = There is a significant association between generally, prescribe PDL-1 inhibitors and Hospitals.

Chi-Square Tests			
	Value	Df	Asymp. Sign (2-sided)
Pearson Chi-Square	5.997[a]	9	.740
N of Valid Cases	80		

When reading this table we are interested in the results of the "Pearson Chi-Square" row.

We can see here that $\chi^2 = 5.997$, $p = 0.74$. This tells us that there is no statistically significant association between Generally, prescribe PDL-1 inhibitors and Hospitals.

9. What are the side effects of immunotherapy and how do you control them?						
		1	2	3	4	Total
Hospital Name	Apollo	4	7	5	2	18
	Basavaturakam Indo American	4	9	5	3	21
	Omega	7	5	10	1	23
	Yashodha	5	2	6	5	18
Total		20	23	26	11	80

This table allows us to understand that Hospitals VS side effects of immunotherapy and control to 1, 2, 3 and 4.

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Hypothesis

$H0_{12}$ = There is no significant association between side effects of immunotherapy and control and Hospitals

$H1_{12}$ = There is a significant association between side effects of immunotherapy and control and Hospitals

Chi-Square Tests			
	Value	df	Asymp.Sign (2-sided)
Pearson Chi-Square	10.737[a]	9	.294
N of Valid Cases	80		

When reading this table we are interested in the results of the "Pearson Chi-Square" row.

We can see here that $\chi^2 = 10.737$, $p = 0.29$. This tells us that there is no statistically significant association between side effects of immunotherapy and control and Hospitals;

10. What is the success rate of (%) immunotherapy and how effective you feel?							
		1	2	3	4	5	Total
Hospital Name	Apollo	5	5	4	0	4	18
	Basavaturakam Indo American	11	6	0	1	3	21
	Omega	7	7	4	3	2	23
	Yashodha	2	4	3	3	6	18
Total		25	22	11	7	15	80

This table allows us to understand that Hospitals VS success rate of (%) immunotherapy and effective to 1, 2, 3, 4 and 5.

Hypothesis

$H0_{13}$ = There is no significant association between the success rate of (%) immunotherapy and effective and Hospitals

$H1_{13}$ = There is a significant association between the success rate of (%) immunotherapy and effective and Hospitals

Chi-Square Tests			
	Value	Df	Asymp. Sign (2-sided)
Pearson Chi-Square	17.186[a]	12	.143
N of Valid Cases	80		

When reading this table we are interested in the results of the "Pearson Chi-Square" row.

We can see here that $\chi^2 = 17.186$, $p = 0.14$. This tells us that there is no statistically significant association between the success rate of (%) immunotherapy and effective and Hospitals

11. Would you like to suggest any improvement in existing immunotherapy					
		1	2	3	Total
Hospital Name	Apollo	6	9	3	18
	Basavaturakam Indo american	7	7	7	21
	Omega	7	10	6	23
	Yashodha	7	5	6	18
Total		27	31	22	80

This table allows us to understand that Hospitals VS you like to suggest on existing immunotherapy to 1, 2 and 3.

Hypothesis

$H0_{14}$ = There is no significant association between you like to suggest on existing immunotherapy and Hospitals

$H1_{14}$ = There is a significant association between you like to suggest on existing immunotherapy and Hospitals

Chi-Square Tests			
	Value	df	Asymp. Sign (2-sided)
Pearson Chi-Square	2.924[a]	6	.818
N of Valid Cases	80		

When reading this table we are interested in the results of the "Pearson Chi-Square" row.

We can see here that $\chi^2 = 2.924$, $p = 0.81$. This tells us that there is no statistically significant association between you like to suggest on existing immunotherapy and Hospitals.

Conclusion

Based on primary and secondary research the researcher can conclude that a few null hypotheses were estimated previously, their results after the data analysis were estimated. Doctors still need long term studies and observations on immunotherapy to have a specific protocol instead of a global protocol because the immunotherapy came into India in the year between 2013 to 2014. The percentage of people willing to undergo immunotherapy treatment is less. The doctors may choose immunotherapy molecules based on the economic factors and its cost involved in the therapy. They mainly choose immunotherapy because it can be given with any other therapy and has good potential action. In the future, the success rate of immunotherapy will be increasing if it can be used along with any other therapy i.e combination therapy. This would be the upcoming future in immunotherapy. The achievement saw with disease immunotherapy medicines stresses the significance of understanding tumor immunology—especially the parts of tumor antigens and the immunosuppressive tumor microenvironment. Fortunately, numerous new immunotherapy techniques and specialists are being explored and tried in clinical preliminaries, which will ideally give new compelling medicines to patients living with backslid or obstinate malignancies.

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Citation: Kumar NR, Alvi S (2021) Understanding immunotherapy and its management. Int J Immunother Cancer Res 7(1): 001-007.
DOI: https://dx.doi.org/10.17352/2455-8591.000030