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Original Article

Assessing the use of anti–PD–1/PD–L1 cancer therapies in the Middle–Eastern Country of Lebanon: a single–center study

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Abstract

Background: Immunotherapy is an effective cancer treatment strategy. Immune checkpoint inhibitors (ICIs), such as anti–PD–1/PD–L1, have demonstrated promising clinical outcomes. In Lebanon, a lower–middle–income country with a history of economic collapse, oncologists began prescribing ICI therapy despite its high cost and the lack of clear evidence regarding the pattern of ICI clinical outcomes in Lebanese patients. The current status of ICIs use in Lebanon remains unclear.

Methods: This retrospective study involved cancer patients treated with programmed cell death–1 (PD–1/PD–L1) inhibitors at the Central Military Hospital in Beirut, Lebanon. Demographic and clinical data were collected from patients' records from 2016 to 2024.

Results: The study included 118 patients. The hospital covered the patient's treatment. Of those, 59.3% (n = 70) had received ICIs. They were distributed as follows: 58.6% received pembrolizumab; 24.3%, nivolumab; and 17.2%, atezolizumab. Of the patients, approximately 35.7% (n = 25) had undergone a PD–L1 immunohistochemistry (IHC) test prior to receiving the ICI. All PD–L1–positive patients responded to ICI treatment: three showed no tumor progression and 11 showed tumor size regression.

Conclusion: The study provided an overview of the use of ICIs at a single center in Lebanon. It revealed that ICI prescriptions were not consistently preceded by a PD–L1 positivity test. A significant proportion of patients responded to ICIs, and no association was found between demographics, clinical variables, and clinical outcomes to ICIs.

Keywords: Oncology; Immunotherapy; PD–1/PD–L1 Immune–checkpoint inhibitors; Middle–income country

Introduction

The development of immune–checkpoint inhibitors (ICIs) marked a significant milestone in cancer immunotherapy. Programmed death protein–1/ligand–1 (PD–1/PD–L1) inhibitor drugs, such as the anti–PD–1 antibodies pembrolizumab, nivolumab and the anti–PD–L1 antibody atezolizumab have shown promising long term clinical outcomes in various types of malignancies [1,2]. For example, pembrolizumab has been shown to produce positive outcomes lasting more than five years in patients with microsatellite instability–high or mismatch repair–deficient metastatic colorectal cancer (mCRC) [3]. In non–squamous non–small cell lung cancer (NSCLC), the combination of nivolumab and chemotherapy increased progression–free and overall survival rates compared with a placebo[4]. Furthermore, patients with urothelial carcinoma who received atezolizumab experienced longer survival rates and more manageable side effects compared to those who received chemotherapy [5]. Importantly, PD–L1 becomes an essential predictive biomarker for an effective ICI therapy [6]. Despite the unprecedented success of ICIs, there has been an increase in resistance to them among cancer patients, whether primary or acquired [7,8]. The main mechanisms of resistance are tumor heterogeneity, dynamics of the tumor immune microenvironment, modification of PD–L1 expression, the gut microbiome profile, and genetic and epigenetic mutations [9–11]. In addition, ICIs are very expensive, creating an economic challenge when it comes to prescribing them. [12] All this evidence makes it difficult to make clinical decisions about treatment with ICIs, especially in low– and middle–income countries. Lebanon, a lower–

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middle income country in the Middle East (World Bank Classification), has experienced an increasing number of cancer cases and a series of financial crises since 2019 (Globocan 2022). Recently, Lebanese oncologists have been prescribing immunotherapy drugs (ICIs) more frequently than before. However, there is no clear evidence regarding the pattern of ICI use and clinical outcomes during this period. This study investigated the use of ICIs (anti–PD–1/PD–L1) for cancer patients in Lebanon, as well as the relationship between clinical outcomes and patient characteristics.

Patients and Methods

Retrospective collection of clinical and demographic data was conducted for 118 cancer patients admitted to the Central Military Hospital in Beirut between 2016 and 2024. Patients diagnosed with an immunodeficiency disease were excluded. Socio–demographic data includes information on age, gender, and region of origin. Clinical data includes the following: types of immunotherapies; tumor size; genetic profiles; molecular diagnosis results (IHC, ISH, etc.); response to treatment (remission or relapse); other types of treatment (chemotherapy, surgery or radiotherapy); types of cancer; grade/stage; other diseases (comorbidities); and cancer onset.

Statistics

Statistical analysis was performed with SPSS version 24 for windows software. Chi–square test and Fisher's exact were applied in most contingency table cells. Anova test was used for comparing the different means of ages and response to treatment. P–value of < 0.05 was considered statistically significant.

Results

Characteristics of participants

118 cancer patients were identified, of whom 80 (67.8%) were male and 38 (32.2%) were female. The mean age of participants was 62.6 years. The most prevalent type was lung cancer, accounting for 53.4% of cases (63 patients). The remaining diagnoses were distributed as follows: Melanoma (13 patients, 11%), bladder cancer (11 patients, 9.3%), kidney cancer (eight patients, 6.8%), breast cancer (seven patients, 5.9%), Hodgkin's disease (four patients, 3.4%), laryngeal cancer (three patients, 2.5%), liver cancer (three patients, 2.5%), pancreatic cancer (two patients, 1.7%), and four patients with other cancers (one with colorectal cancer, one with ovarian cancer, one with stomach cancer and one with tongue cancer). Most patients (88.6%) had stage IV cancer. Thirty–four patients (28.8%) had other comorbidities, such as diabetes, heart disease and hypertension. 59.3 % (n=70) patients had received ICIs. They were distributed as follows: 58.6% received pembrolizumab, 24.3% received nivolumab and 17.2% received atezolizumab (Table 1). Very few patients had undergone chemotherapy or radiotherapy alongside their immunotherapy treatment.

PD–L1 IHC test

A PD–L1 immunohistochemistry (IHC) test is required to determine eligibility for ICIs. Approximately 35.7% of the patients (n=25) had undergone a PD–L1 IHC test prior to receiving the ICI. Of those patients, 22 (88%) tested positive and 3 (12%) tested negative.

Pattern of response to ICIs

Information about the response to ICIs was only available for 45 patients. Thirty–one participants responded with tumor regression, three had no disease progression, and 11 showed resistance to ICIs. There was no significant difference in response pattern among the three ICIs (p=0.920) (Table 2). Treatment response data was only available for 14 PD–L1–positive patients. All of the PD–L1–positive cases responded to ICI treatment: three patients showed no tumor progression, and 11 patients showed tumor size regression.

The study found no significant association between age, gender, type of ICIs, comorbidities, surgery prior to therapy, and immunotherapy response in kidney and lung cancer patients. Furthermore, there was no association between surgical history and comorbidities and difference in immunotherapy response (p>0.05) (Table 3).

Discussion

In this study, we examined the utilization of immune checkpoint inhibitors (ICIs), PD–L1 expression status, and treatment response among Lebanese patients with different types of cancers. More than half of the cancer patients enrolled in the study received ICIs, with pembrolizumab being the most frequently administered agent, followed by nivolumab and atezolizumab. This distribution reflects current therapeutic trends, where pembrolizumab and nivolumab are widely adopted due to their broad efficacy profiles and approval across multiple malignancies [13]. A PD–L1 immunohistochemistry (IHC) test was performed in approximately one–third of the cohort, with the majority of tested patients (88%) demonstrating PD–L1 positivity. The relatively low rate of PD–L1 testing highlights a gap in biomarker–guided therapy implementation, which remains a challenge in several clinical settings [14]. Selective testing practices may also explain the high proportion of PD–L1–positive results, as clinicians often prioritize testing in patients considered more likely to express the biomarker [15].

		Number (n)	Percentage (%)
Gender	Male	80	67.8
	Female	38	32.2
District	Beirut	12	10.2
	Bekaa	18	15.3
	South Lebanon	6	5.1
	Mount Lebanon	33	28
	North Lebanon	18	15.3
	Missing	31	26.3
Type	Bladder	11	9.3
	Breast	7	5.9
	Colorectal	1	0.8
	Hodgkin's	4	3.4
	Kidney	8	6.8
	Larynx	3	2.5
	Liver	3	2.5
	Lung and Bronchus	63	53.4
	Melanoma	13	11
	Ovarian	1	0.8
	Pancreatic	2	1.7
	Stomach	1	0.8
	Tongue	1	0.8
PD–L1 Status	Negative	4	3.4
	Positive	37	31.4
	Not been done	77	65.3
Surgery Pre–Therapy	No	72	61
	Yes	46	39
Comorbidities	No	84	71.2
	Yes	34	28.8
Immunotherapy Type	Pembrolizumab	41	58.6
	Nivolumab	17	24.3
	Atezolizumab	12	17.2

Table 1: Patients' characteristics.

Treatment response data showed that most patients benefited from ICIs: 68.9% experienced tumor regression, and 6.7% had stable disease. These results are more promising than those of a previous Lebanese study, in which only 38.2% of patients who took ICIs showed a good prognosis [16]. At that time, no PD–L1 testing had been performed, which could be a reason for the low benefit observed from ICIs. Importantly, all PD–L1–positive patients exhibited a favorable response, either through regression or disease stabilization. These findings reinforce the predictive value of PD–L1 expression for response to ICIs [17], in agreement with prior studies demonstrating that higher PD–L1 expression correlates with improved outcomes in non–small cell lung cancer (NSCLC) and renal cell carcinoma (RCC). The lack of significant differences in response among pembrolizumab, nivolumab, and atezolizumab ($p = 0.920$) further supports evidence that PD–1 and PD–L1 inhibitors yield comparable efficacy across various tumor types [18].

No significant associations were found between ICI response and age, gender, comorbidities, previous surgery, or cancer type. This suggests that patient demographics and general clinical factors exert limited influence on immunotherapy efficacy, which appears to be primarily determined by tumor–specific immunobiology. These observations align with the growing understanding that host immune modulation and tumor microenvironment factors, rather than traditional clinicopathological parameters, drive therapeutic response to ICIs. However, other studies, such as one conducted on IC–treated patients at Mount Sinai Hospital between 2011 and 2017, have found a link between certain clinical factors and outcomes [19].

The present study has several limitations. Its retrospective design and relatively small sample size restrict the statistical power and generalizability of the findings. Incomplete documentation of PD–L1 testing and response assessment may have also introduced selection bias. Furthermore, variability in IHC testing protocols and follow–up duration could influence the accuracy of response categorization. Despite these limitations, this study provides meaningful real–world insights into the predictive relevance of PD–L1 expression and the comparable efficacy of different ICI agents. These findings highlight the complexities of predicting immunotherapy

		Response			Total	p–Value
		No progression	Regression	Resistance		
ICI	Atezolizumab	0	6	2	8	.920
	Nivolumab	0	6	3	9	
	Pembrolizumab	3	19	6	28	

Table 2: Response pattern to ICIs.

Type	Characteristic	Tumor regression	Tumor with no progression	Resistance	p–value
Kidney Cancer	**Age** N (mean in years old)	3 (64.667)	0	2 (68.5)	0.690
	Gender (N) Male Female	2 1	0 0	2 0	1.000
	ICI Therapy (N) Pembrolizumab Nivolumab Atezolizumab	2 1 0	0 0 0	1 1 0	1.000
	Comorbidities (N) Yes No	0 3	0 0	2 0	0.100
	Surgery before therapy (N) Yes No	0 3	0 0	2 0	0.100
Lung Cancer	**Age** N (mean in years old)	18(62.278)	2(66.000)	5(62.000)	0.756
	Gender (N) Male Female	11 7	1 1	3 2	1.000
	ICI Therapy (N) Pembrolizumab Nivolumab Ateozlizumab	13 0 5	2 0 0	3 1 1	0.375
	Comorbidities (N) Yes No	3 15	0 2	3 2	0.119
	Surgery before therapy (N) Yes No	7 11	1 1	3 2	0. 804

Table 3: Association between clinical and demographic characteristics with response to ICIs.

responses, emphasizing the need for more detailed research. Factors influencing treatment outcomes may differ depending on the type of cancer, individual patient characteristics, and the immunotherapy regimen chosen. Additional research with larger sample sizes and more detailed data collection are required to better understand these relationships and improve treatment strategies.

Conclusion

This study is an important step toward understanding cancer immunotherapy in the Lebanese context. Lebanese oncologists are increasingly interested in prescribing ICIs. The response to ICIs in our Lebanese group was favorable, though no association was found with demographics or other clinical variables. Future studies should be conducted to further investigate the objectives of the current study and reduce the limitations encountered.

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The authors have no conflict of interest to declare. There was no fund for this study.

References

1. Shiravand Y, Khodadadi F, Kashani SMA, Hosseini–Fard SR, Hosseini S, Sadeghirad H, et al. Immune Checkpoint Inhibitors in Cancer Therapy. Current Oncology. 2022 May;29(5):3044–60.
2. Sharpe AH, Pauken KE. The diverse functions of the PD1 inhibitory pathway. Nat Rev Immunol. 2018 Mar;18(3):153–67.
3. André T, Shiu KK, Kim TW, Jensen BV, Jensen LH, Punt CJA, et al. Pembrolizumab versus chemotherapy in microsatellite instability–high or mismatch repair–deficient metastatic colorectal cancer: 5–year follow–up from the randomized phase III KEYNOTE–177 study. Ann Oncol. 2025 Mar;36(3):277–84.
4. Lee KH, Lee JS, Sugawara S, Kang JH, Kim HR, Inui N, et al. First–line nivolumab plus platinum chemotherapy and bevacizumab for advanced nonsquamous non–small cell lung cancer: A 3–year follow–up of the phase 3 randomized TASUKI–52 trial. Lung Cancer. 2025 Mar;201:108109.
5. Van der Heijden MS, Loriot Y, Durán I, Ravaud A, Retz M, Vogelzang NJ, et al. Atezolizumab Versus Chemotherapy in Patients with Platinum–treated Locally Advanced or Metastatic Urothelial Carcinoma: A Long–term Overall Survival and Safety Update from the Phase 3 IMvigor211 Clinical Trial. Eur Urol. 2021 July;80(1):7–11.
6. Zouein J, Kesrouani C, Kourie HR. PD–L1 expression as a predictive biomarker for immune checkpoint inhibitors: between a dream and a nightmare. Immunotherapy. 2021 Aug;13(12):1053–65.
7. Wang Z, Wu X. Study and analysis of antitumor resistance mechanism of PD1/PD–L1 immune checkpoint blocker. Cancer Medicine. 2020;9(21):8086–121.
8. Kato S, Goodman A, Walavalkar V, Barkauskas DA, Sharabi A, Kurzrock R. Hyperprogressors after Immunotherapy: Analysis of Genomic Alterations Associated with Accelerated Growth Rate. Clin Cancer Res. 2017 Aug 1;23(15):4242–50.
9. Gopalakrishnan V, Spencer CN, Nezi L, Reuben A, Andrews MC, Karpinets TV, et al. Gut microbiome modulates response to anti–PD–1 immunotherapy in melanoma patients. Science (New York, NY). 2018 Jan 1;359(6371):97.
10. Bai R, Chen N, Li L, Du N, Bai L, Lv Z, et al. Mechanisms of Cancer Resistance to Immunotherapy. Front Oncol [Internet]. 2020 Aug 6 [cited 2025 Sept 18];10. Available from: https://www.frontiersin.org/journals/oncology/articles/10.3389/fonc.2020.01290/full
11. Berland L, Gabr Z, Chang M, Ilié M, Hofman V, Rignol G, et al. Further knowledge and developments in resistance mechanisms to immune checkpoint inhibitors. Front Immunol. 2024 June 5;15:1384121.
12. Couchoud C, Fagnoni P, Aubin F, Westeel V, Maurina T, Thiery–Vuillemin A, et al. Economic evaluations of cancer immunotherapy: a systematic review and quality evaluation. Cancer Immunol Immunother. 2020 Oct;69(10):1947–58.
13. Divan HA, Bittoni MA, Krishna A, Carbone DP. Real–world patient characteristics and treatment patterns in US patients with advanced non–small cell lung cancer. BMC Cancer. 2024 Apr 6;24(1):424.
14. Leapman MS, Presley CJ, Zhu W, Soulos PR, Adelson KB, Miksad RA, et al. Association of Programmed Cell Death Ligand 1 Expression Status With Receipt of Immune Checkpoint Inhibitors in Patients With Advanced Non–Small Cell Lung Cancer. JAMA Netw Open. 2020 June 8;3(6):e207205.
15. Baretton GB, Lordick F, Gaiser T, Hofheinz R, Horst D, Lorenzen S, et al. Standardized and quality–assured predictive PD–L1 testing in the upper gastrointestinal tract. J Cancer Res Clin Oncol. 2023 Oct 24;149(17):16231–8.
16. Bou Akl I, Akl IB, Berro J, Tfayli A, Shamseddine A, Mukherji D, et al. Current Status and Future Perspectives of Immunotherapy in Middle–Income Countries: A Single–Center Early Experience. World J Oncol. 2020 Aug 10;11(4):150–7.
17. Xu Y, Wan B, Chen X, Zhan P, Zhao Y, Zhang T, et al. The association of PD–L1 expression with the efficacy of anti–PD–1/PD–L1 immunotherapy and survival of non–small cell lung cancer patients: a meta–analysis of randomized controlled trials. Transl Lung Cancer Res. 2019 Aug;8(4):413–28.
18. Huang Q, Zheng Y, Gao Z, Yuan L, Sun Y, Chen H. Comparative Efficacy and Safety of PD–1/PD–L1 Inhibitors for Patients with Solid Tumors: A Systematic Review and Bayesian Network Meta–analysis. J Cancer. 2021 Jan 1;12(4):1133–43.
19. Qin Q, Jun T, Wang B, Patel VG, Mellgard G, Zhong X, et al. Clinical factors associated with outcome in solid tumor patients treated with immune–checkpoint inhibitors: a single institution retrospective analysis. Discov Onc. 2022 Aug 12;13(1):73.

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