Reducing Mortality from Malignant Neoplasms: The Promising Role of Modern Antineoplastic Drugs in Lung Cancer Treatment

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BACKGROUND

- Recently a number of drugs that improve overall survival have become available for lung cancer treatment.

- Since 2019, the Federal project «Cancer control» is being implemented in Russia. The main goal of the Federal project is to reduce mortality from malignant neoplasms by 2024.

- As a result of the Federal initiative, there has been a marked enhancement in the availability of innovative drugs for lung cancer within the Russian Federation. Nevertheless, the quantifiable potential impact of increased drug coverage on mortality rates needs further investigation.

OBJECTIVES

- The aim of this study was to assess potential impact of using innovative drugs for lung cancer treatment on reducing cancer mortality in Russia.

METHODS

- Based on clinical guidelines for lung cancer, we selected medications registered in Russia, which have demonstrated proven overall survival benefits in clinical trials.

- The target patient population size was assessed for each selected medication and clinical scenario based on statistical data. Allocation of patients between therapy schemes was determined based on expert survey. Both newly diagnosed patients and those with recurrent disease were considered.

- Using this information and overall survival data from clinical trials (IMpower133 [1], CASPIAN [2], PACIFIC [3], KEYNOTE-024 [4], IMpower110 [5], IMpower150 [6], KEYNOTE-189 [7], KEYNOTE-407 [8], CheckMate 9LA [9], NCT00021060 [10], FLAURA [11], ALEX [12], KEYNOTE-010 [13], OAK [14], CheckMate 017 and 057 [15]), we estimated the difference in patient cohort size after 1 year of treatment between the modern medication and its standard alternative.

- As in the example in figure 1, if 3,273 patients with NSCLC stage III after chemo-radiation therapy are available for durvalumab therapy, providing all of them with this drug could prevent 278 deaths (cohort population after one year of durvalumab therapy: 2,720 patients, compared with cohort population without therapy: 2,442 patients).This difference represents the medication's contribution to reducing mortality and was calculated for every clinical situation.
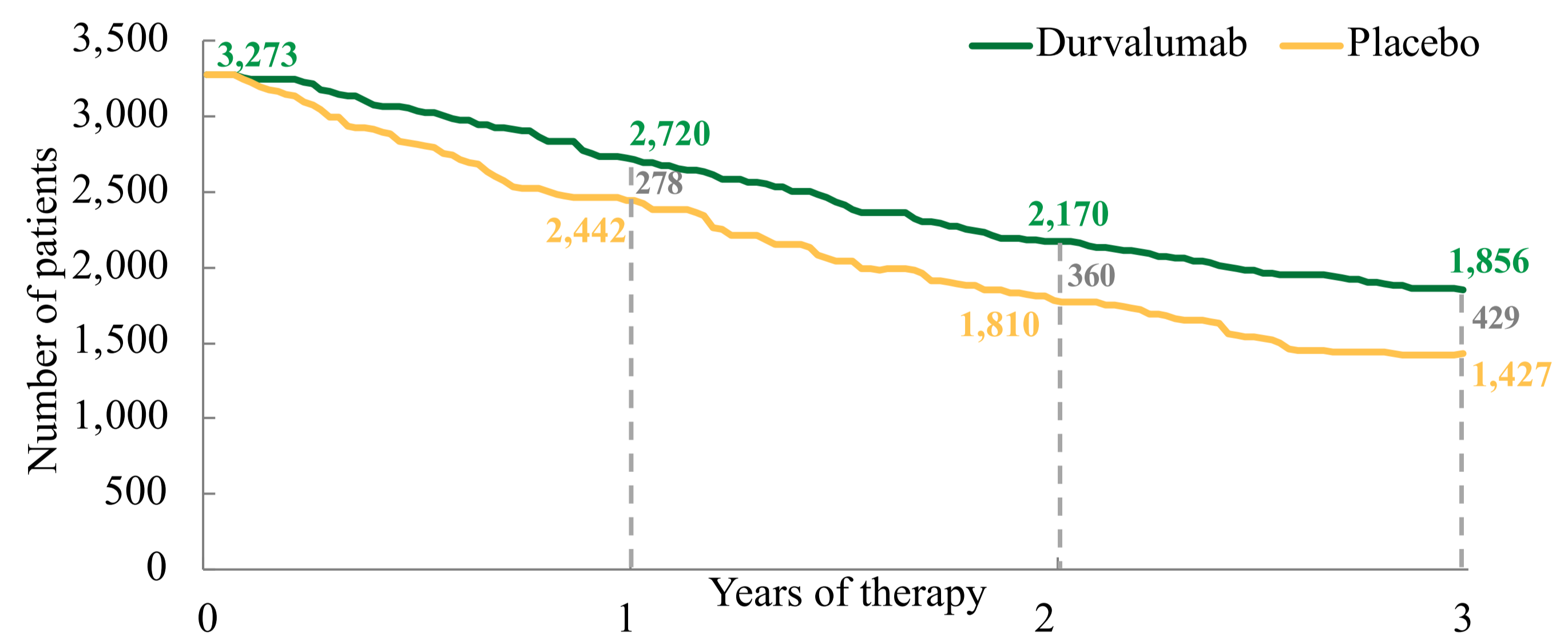

Figure 1. Estimation of prevented deaths due to the use of innovative drug (example for NSCLC stage III post-CRT cohort).

RESULTS

- Selected drugs have the potential to benefit a total of **23,232 patients** annually, ranging from 521 individuals (ALK inhibitors) to 8,561 individuals (combination of immunotherapy and chemotherapy, table 1). This patient population represents **41%** of the newly diagnosed cases of lung cancer in 2021, totaling 56,328 cases.

- Among the selected drugs, pembrolizumab+chemo (NSCLC 1st line) exhibits the most significant impact, with an estimated benefit of **1,116 prevented deaths**, followed by atezolizumab (NSCLC 1st line (PD-L1≥50%) and 2nd+ line: **350 deaths**) and nivolumab (NSCLC 2nd+ line: **316 deaths**, table 1).

- Collectively, the considered medications have the potential to prevent **3,064 deaths over one year**, accounting for approximately 7% of the total deaths from lung cancer in Russia in 2021 (46,798 cases).

CONCLUSIONS

- Using modern medications for the treatment of lung cancer demonstrates a notable reduction in mortality from neoplasms even over 1-year time horizon.

- However, their contribution varies significantly due to differences in patient population size and variations in the comparative effectiveness of these drugs.

Clinical Situation	Highly Effective Drug	Standard Therapy	Target population, people	Prevented deaths, cases
NSCLC 1st line	Pembrolizumab + Paclitaxel + Carboplatin	Paclitaxel + Carboplatin	3424	517
	Pembrolizumab + Pemetrexed + Carboplatin	Carboplatin + Pemetrexed	1712	351
	Atezolizumab + Paclitaxel + Carboplatin + Bevacizumab	Bevacizumab + Carboplatin + Paclitaxel	1712	140
	Pembrolizumab + Pemetrexed + Cisplatin	Cisplatin + Pemetrexed	1455	298
	Paclitaxel + Carboplatin + Bevacizumab	Paclitaxel + Carboplatin	692	53
	Nivolumab + Ipilimumab + Chemo	Carboplatin + Pemetrexed/Paclitaxel or Cisplatin + Pemetrexed	257	42
NSCLC 2nd line and beyond	Nivolumab	Docetaxel	2306	316
	Atezolizumab	Docetaxel	2306	323
	Pembrolizumab	Docetaxel	1153	156
NSCLC (stage III) post-CRT	Durvalumab	Placebo	3273	278
PD-L1 >50% NSCLC 1st line	Pembrolizumab	Cisplatin/Carboplatin + Pemetrexed/Gemcitabine or Carboplatin + Paclitaxel	1651	268
	Atezolizumab	Carboplatin/Cisplatin + Pemetrexed or Cisplatin/Carboplatin + Gemcitabine	183	27
SCLC (stages III-IV)	Durvalumab + Cisplatin/Carboplatin + Etoposide	Cisplatin/Carboplatin + Etoposide	859	122
	Atezolizumab + Carboplatin + Etoposide	Carboplatin + Etoposide	859	111
EGFRmut NSCLC 1st line	Osimertinib	Gefitinib or Erlotinib	869	52
ALKmut NSCLC 1st line	Alectinib	Crizotinib	521	9

Table 1 – Considered drugs, target population size and number of prevented deaths

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