

Epidemiology and costs of non-small cell lung cancer (NSCLC) in Austria

Evelyn Walter^a, Sophie-Christin Hausberger^a, Alexandra Lazic-Peric^a

^aIPF Institute for Pharmaeconomic Research, Vienna, Austria. Project sponsored by Takeda Austria GmbH, Vienna, Austria

Objectives

In Austria every year around 30 out of 100,000 people are diagnosed with lung cancer and about 25 out of 100,000 die of it. For men, however, the trend is falling, while it is rising among women as a result of changing lifestyles. Currently, the age-standardized incidence rate of men is 44 per 100,000 and therefore still more than twice that of women with 20 per 100,000. If the current trend continues, the indicator with 31 new cases per 100,000 will be the same for men and women in 2030. The aim of this health economic analysis is the presentation of epidemiology and the determination of the costs of non-small cell lung cancer (NSCLC) in Austria.

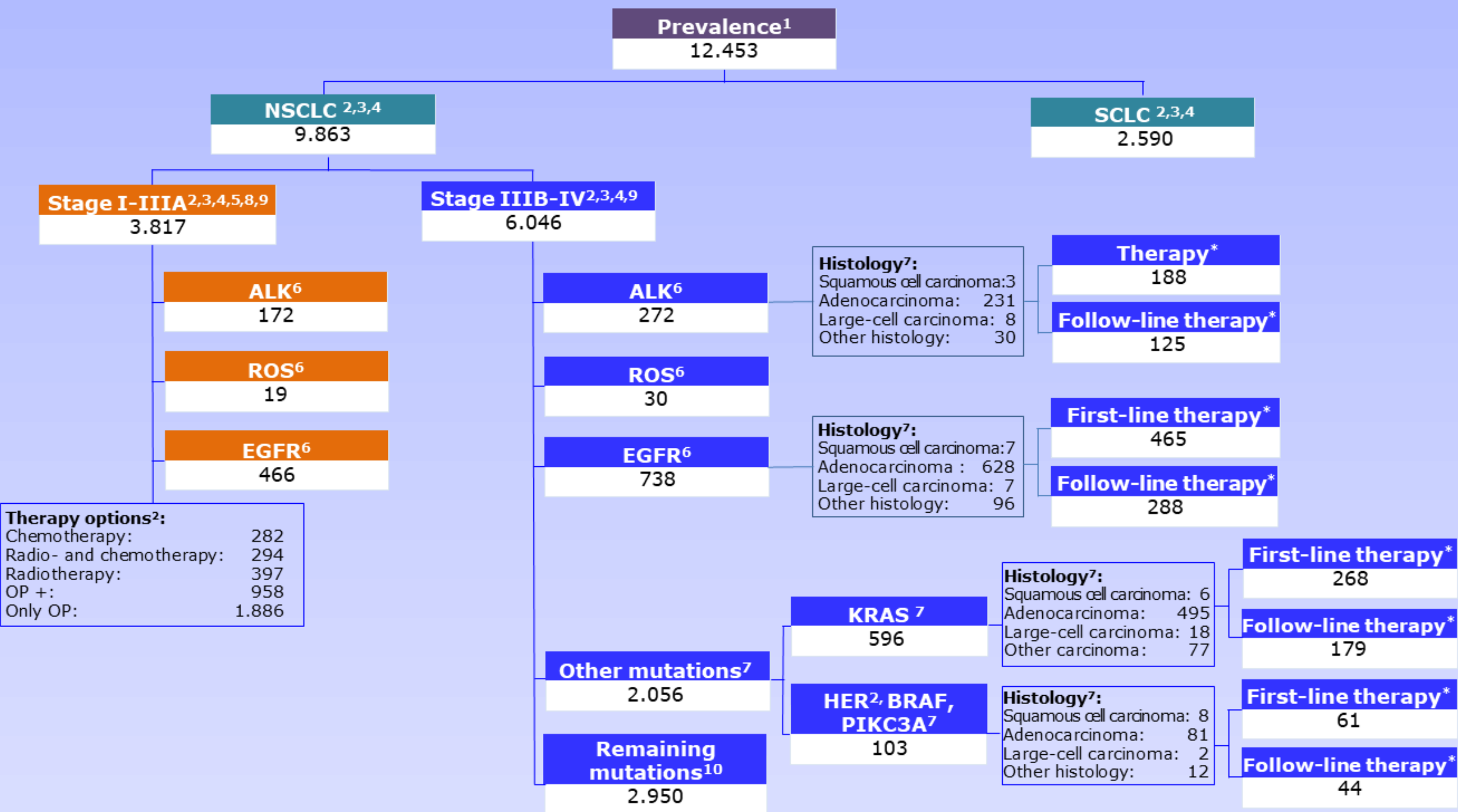
Methods

The analysis consists of two research areas: (1) the creation of a patient's flow to define the population of NSCLC patients in terms of age, histological classification, translocations, mutations and staging based on a systematic literature review. (2) Additionally, based on the patient's flow, a cost-of-illness model was developed to calculate the total annual costs of NSCLC in Austria. Resource utilization and direct cost data were derived from the Austrian DRG system for inpatient treatments and from outpatient sales data, so that total costs correspond to actual refunds for the year 2016 from the payer's perspective.

Results - Epidemiology

The epidemiological patient's flow as in **Figure 1** results in 12,453 patients suffering from lung cancer. 79.2% of these patients are affected by non-small cell lung cancer (NSCLC). Based on the guideline's I to IV NSCLC stages, the patients in the model were divided into two groups: the first group of 3,817 patients (38,7%) represent the stages I-IIIa and the second group of 6,046 patients (61,3%) the stages IIIB-IV. This subdivision was made because of the different treatment procedures per stage. Due to the still relatively small progression of the disease, operations at stage I-IIIa are first choice, as of stage IIIB-IV, treatment with targeted therapy, immunotherapy, chemo- and radiotherapy is placed at the forefront of the treatment. In addition to the mutation distribution per group, consideration was also given to the explicit therapy methods (stage I-IIIa) as well as the distribution of the histology (stage IIIB-IV).

Figure 1: The epidemiological patient's flow



*Number of patients includes persons within one year who receive both first-line therapy.

¹Statistics Austria; ²Association of German Tumor Centers and Cooperation Association Quality Assurance through Clinical Cancer Registries; ³Robert Koch Institut; ⁴Austrian Society of Hematology and Medical Oncology; ⁵Howington et al, 2013; ⁶Holzer et al, 2017; ⁷Barlesi et al, 2016; ⁸Vansteenkiste et al, 2014; ⁹Tumor Registry Munich; ¹⁰IPF own calculation; CH = chemotherapy; RT = radiotherapy; OP = operation

Source: own developed

Results - Cost-of-illness

The analysis depicts total direct costs of €199.3 million for 9,863 NSCLC patients. Almost 90% of costs (€178 million) relate to inpatient care. Treatment of the 3,817 patients in Stage I-IIIa costs €64.8 million and the 6,046 patients in stage IIIB-IV required €134.5 million. The average annual costs per patient amount to €20,206; in Stage I-IIIa the average annual cost is €16,977 and in Stage IIIB-IV €22,245; depending on the mutation between €20,441 and €39,551.

Table 1 provides an overview of the individual cost components included in the result:

Table 1: Overview of the individual cost components

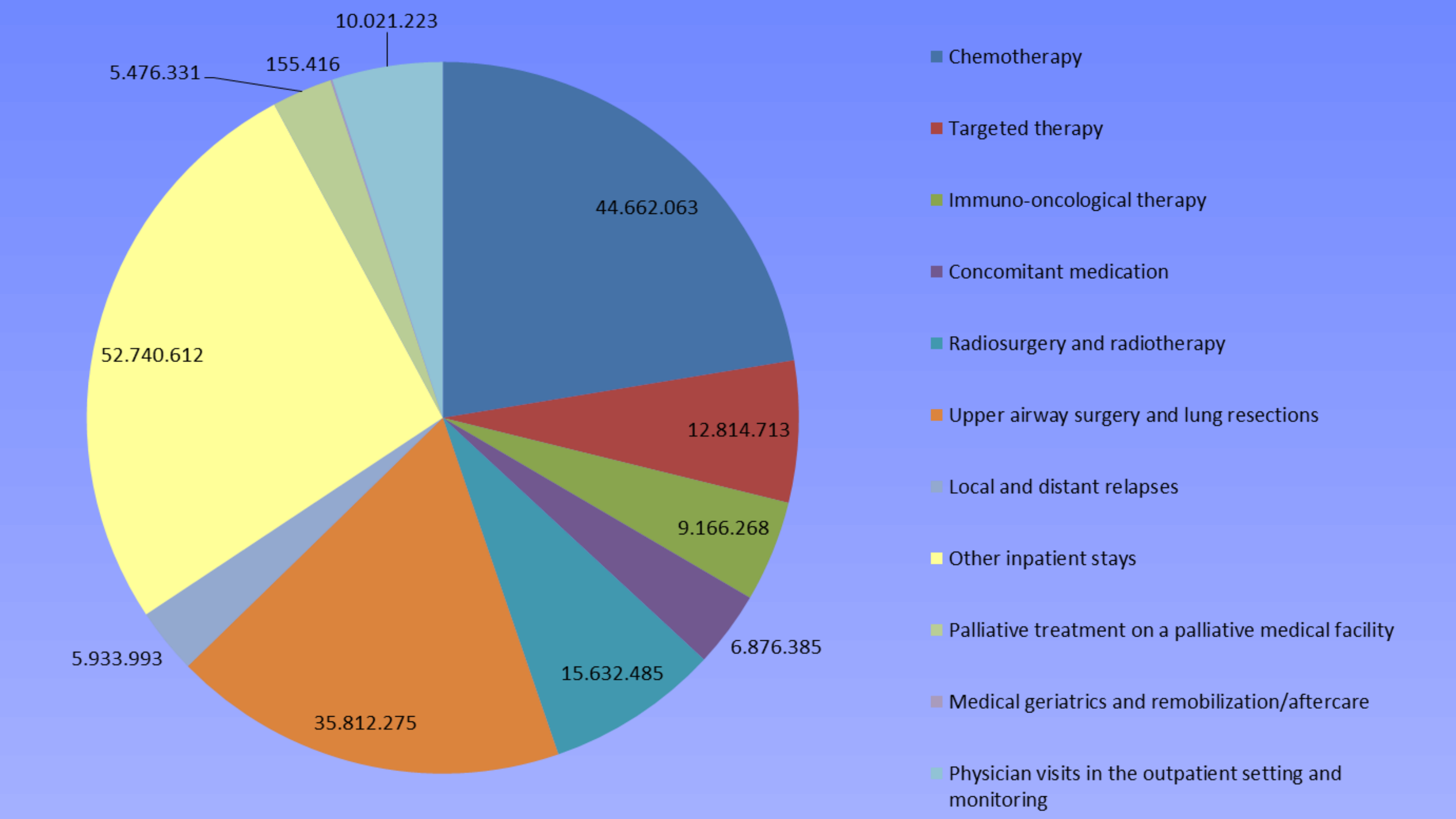
Cost components	Costs stage I-IIIa	Costs stage IIIB-IV					
		ALK	ROS	EGFR	Other mutations like HER2, BRAF, PIK3CA	Rest	Total
Patients (n)	3.817	272	30	738	2.056	2.950	6.046
Chemotherapy	5.613.420,45	1.756.736,83	193.757,74	4.766.440,37	13.278.863,68	19.052.844,29	39.048.642,91
Targeted therapy		5.695.868,97	614.768,44	4.464.946,48	2.039.129,13		12.814.713,02
Immunological therapy					3.764.651,79	5.401.616,13	9.166.267,92
Concomitant medication		309.357,73	34.120,34	839.360,31	2.338.380,49	3.355.166,56	6.876.385,44
Radiosurgery and radiotherapy	3.604.832,45	541.105,13	59.680,71	1.468.145,54	4.090.118,19	5.868.603,43	12.027.652,99
Upper airway surgery and lung resections	27.276.214,39	384.023,90	42.355,58	1.041.947,21	2.902.768,91	4.164.965,13	8.536.060,73
Local and distant relapses	33.860,60	265.694,58	29.304,55	720.891,90	2.002.626,93	2.881.613,96	5.900.131,92
Other inpatient stays ¹	23.730.636,33	1.305.113,02	143.946,29	3.541.078,72	9.865.119,03	14.154.718,45	29.009.975,51
Palliative treatment on a palliative medical facility	1.011.670,42	200.858,03	22.153,46	544.975,10	1.518.250,41	2.178.423,50	4.464.660,50
Medical geriatrics and remobilization/aftercare	20.359,09	6.075,98	670,14	16.485,56	45.927,25	65.897,57	135.056,51
Physician visits in the outpatient setting and monitoring	3.510.079,61	292.926,05	32.308,02	794.777,29	2.214.176,30	3.176.955,30	6.511.142,96
Total costs	64.801.073,35	10.757.760,22	1.173.065,27	18.199.048,48	44.060.012,12	60.300.804,32	134.490.690,41
Total costs per patient	16.976,96	39.550,59	39.102,18	24.659,96	21.429,97	20.440,95	22.244,57
95%-CI	16.768 - 17.186	37.217 - 41.885	32.111 - 46.093	23.797 - 25.523	21.011 - 21.849	20.125 - 20.757	22.040 - 22.449

¹ Includes inpatient stay for biomarker tests, treatment of side effects and immunotherapies without MEL

Institut für Pharmakoökonomische
IPF Forschung
CONTACT:
Dr. Evelyn Walter
IPF Institute for Pharmaeconomic Research
Wolfengasse 4/7
1010 Vienna, Austria
Tel +43-1-5132007-13
Fax +43-1-5132007-15
Email: e.walter@ipf-ac.at
Web: www.ipf-ac.at

Looking at the direct cost components of NSCLC costs, it can be seen that the other inpatient stays (without lung surgery interventions) accounted for the largest share of expenditure at € 52.7 million. Chemotherapies rank second with € 44.7 million. Third in terms of expenditure are surgery on the upper respiratory tract and lung resections of € 35.8 million. This is followed by radiotherapies (€ 15.6 million), targeted cancer therapy (€ 12.8 million), visits to physicians and monitoring in the field of private practice (€ 10 million) and immunotherapies (€ 9.2 million) (see **Figure 2**).

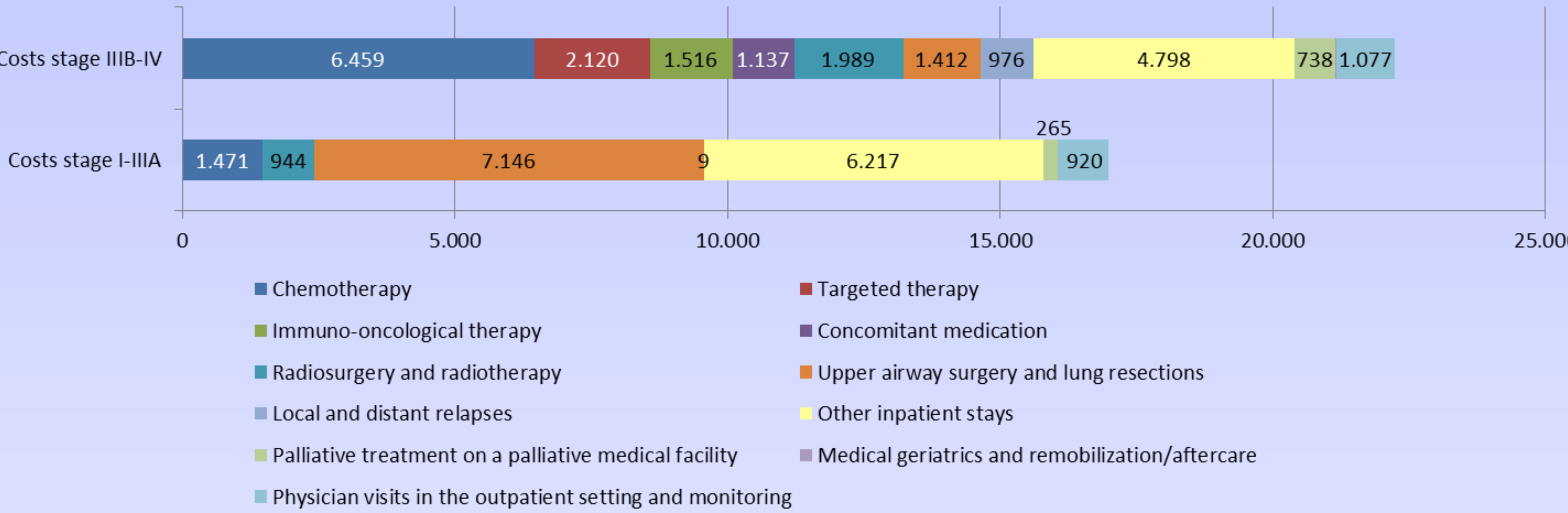
Figure 2: Composition of the medical NSCLC expenses



Source: own calculations

When looking at the cost components broken down by staging, it can be seen that in stage I-IIIa the largest cost component of annual expenditures is the upper respiratory tract and lung resection (€ 7,146), followed by other hospital stays (€ 6,217). The adjuvant and neoadjuvant chemotherapies follow in third place (€ 1,471). In stage IIIB-IV, chemotherapy represents the largest expenditure item (€ 6,459), followed by other hospital stays (€ 4,798). Expenditure on targeted cancer therapies takes third place and amounts to € 2,120; followed by radiotherapy (€ 1,989) and immuno-oncology (€ 1,516) (see **Figure 3**).

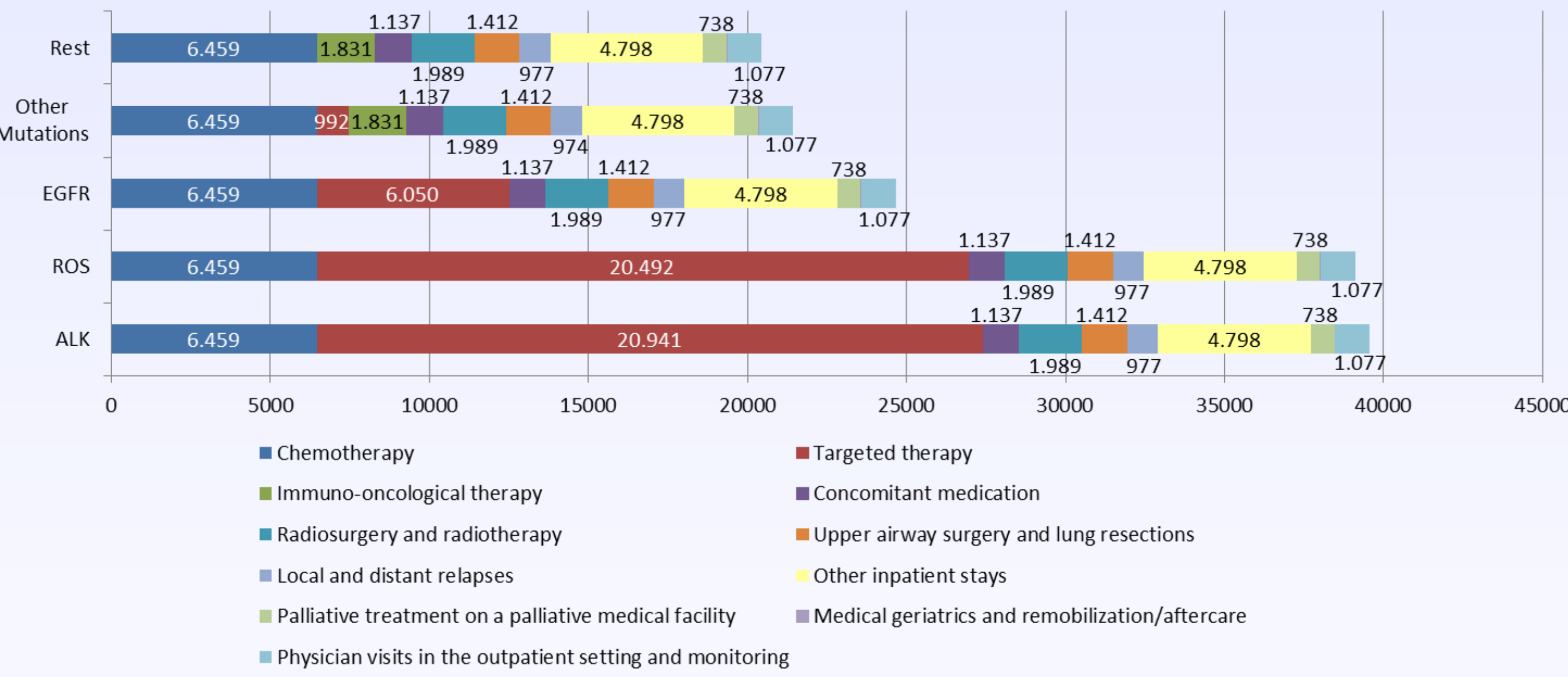
Figure 3: Costs per patient in stage I-IIIa and IIIB-IV



Source: own calculations

For patients in stage IIIB-IV with ROS 1 and ALK mutations targeted and immuno-oncological therapies accounts for highest proportion of annual health expenditures. Even in patients with an EGFR mutation, these products are increasingly used. For a detailed overview, see **Figure 4**.

Figure 4: Average annual costs per patient in stage I-IIIa and IIIB-IV (according to mutations)



Source: own calculations

Conclusion

Worldwide the costs of cancer drugs have risen by 34% to €90 billion over the last five years. In Austria the expenditures have developed to a similar extent, most recently reaching €471 million. However, the costs of treating the NSCLC represent only 0.6% of the total health-expenditure.

References

Walter, E., Batista, A. 2007. Medikamentenkosten im Bereich Onkologie im Gesundheitsökonomischen Kontext. Wiener Medizinische Wochenschrift. 7-8/08. Springer-Verlag. 2007
Krankenanstalten in Zahlen. Überregionale Auswertung der Dokumentation der landesgesundheitsfondsfinanzierten Krankenanstalten. 2016
The pharmaceutical market, Austria (DPMOE). QuintilesIMS. 2016
Bundesministerium für Gesundheit (BMG). Trends der Entwicklung von Krebserkrankungen in Österreich. Eine Prognose bis 2030. 2015
Bundesministerium für Gesundheit (BMG). LKF Punkte und Aufenthalte, 2016