

Evaluation of the Effects of Cancer Diagnosis on Smoking Behavior in Cancer Patients and Their Relatives

 Zeynep Kahyaoglu¹,  Filiz Çay Şenler²

¹ Department of Geriatrics, University of Health Sciences, Adana City Training and Research Hospital, Adana, Türkiye

² Department of Department of Medical Oncology, Ankara University Faculty of Medicine, Ankara, Türkiye

Abstract

Aim: Smoking plays a role in the development of many diseases, such as atherosclerotic cardiovascular diseases, COPD, and cancer. We aimed to examine the smoking behaviors of patients and their relatives who are followed up and treated after cancer diagnosis and to identify associated factors.

Methods: Between August 2012 and January 2013, 211 patients and 208 relatives of patients admitted to the medical oncology department of Ankara University Faculty of Medicine were included. A survey of 25 questions was applied to patients and 24 to their relatives. The Beck Depression Inventory was added to the last part of the questionnaire in both groups. Three months after the completion of the forms, the participants were called again, and their smoking behaviors were questioned again.

Results: Pre-diagnosis smoking prevalence was higher among patients than their relatives (62.6% vs. 45.7%). Patients started smoking at an earlier age, and their daily cigarette consumption was significantly higher. The amount of cigarettes smoked per day increased significantly as the age of initiation decreased in both groups. The rate of smoking cessation/reduction was significantly higher in patients than in relatives (97.2% vs. 26.6%). Physicians were significantly more likely to recommend smoking cessation to patients than relatives (41.9% vs. 20%). Beck depression scores were significantly higher in patients and singles than in relatives and married patients. No significant difference was found between smoking attitude and depression scores.

Conclusions: Smoking is one of the most important preventable factors that threaten human health. It is imperative to develop effective strategies in the fight against smoking rapidly. Physicians' recommendations for smoking cessation are as effective as many other methods. After cancer diagnosis, both patients and their relatives showed a tendency to quit or reduce smoking, with patients being significantly more likely.

Keywords: Cancer patients; smoking cessation; relatives of cancer patients; depression

1. Introduction

Tobacco and tobacco products, especially cigarettes, are widely used in the world and our country. According to the 2020 data from the World Health Organization (WHO), the rate of tobacco and tobacco product use is 22.3%, and according to the 2022 data from the Turkish Statistical Institute (TÜİK), it is 28.3% in Turkey. While the prevalence of tobacco use is decreasing in developed countries due to public awareness and legal measures taken, it is still increasing in developing countries. As in these countries, smoking is a severe problem in our country.¹⁻² Today, smoking appears to be one of the most important health problems, leading to many diseases, especially cancer and premature deaths.

WHO has reported that smoking causes the death of five million people annually, and this number is expected to double in the next

20 years. The three main causes of smoking-related mortality are atherosclerotic cardiovascular diseases, chronic obstructive pulmonary disease (COPD) and lung cancer.¹ The relationship between smoking and cancer has been known for a long time. It has been shown that there are more than 4000 carcinogenic substances and that they harm not only the smoker but also those exposed to smoke.³⁻⁴ Approximately 43 carcinogenic compounds have been described.⁵⁻⁷ In particular, the risk of lung cancer increases 10-20 times with smoking.⁸ Smoking has been found to be associated with many cancers, including not only lung cancer but also head and neck, bladder, stomach and esophageal cancer. Its relationship with breast, colon, and similar cancers is also being investigated. (Table-1)

Table 1

Uses of some substances found in cigarettes (9).

Arsenic	Poison manufacturing
Methanol	In rocket gas production
DDT	In the production of insecticides
Carbon Monoxide	Present in the exhaust gas
Cadmium	Available in vehicle accumulators
Hydrogen cyanide	In the gas chambers
Butane gas	Cylinder and lighter gas
Acetone	Nail polish and chemical remover
Naphthalene	Moth spraying
Ammonia	Chemical cleaning works

Among cancer prevention policies, smoking has been shown to be the most important preventable cause of approximately 21% of cancer deaths worldwide.² The most important measure to be taken to reduce lung cancer cases is to reduce smoking in the community. In developed countries where anti-smoking policies are implemented, and smoking is reduced, it has been found that the incidence and mortality rates of smoking-related diseases have gradually decreased over the years.^{2,9-11} Most smokers know the association of smoking with cancer and premature mortality. Despite this, many people continue to smoke. The difficulty in perception explains this behavior due to the fact that the severe threat does not appear immediately and cannot be observed concretely. In addition, the strong addictive effect of nicotine makes it difficult to quit smoking. According to many studies, a close relationship has been found between smoking and depression.¹²⁻¹³

Important data have been obtained on the effectiveness and responsibility of physicians in smoking cessation studies. According to the literature, only 5% of people quit smoking with a physician's recommendation. Repeated treatments are recommended until permanent cessation is achieved. In the world and our country, in recent years, some decrease in the number of smokers has been achieved with public education and legal measures limiting smoking areas.¹⁴⁻¹⁵

Table 2

The relationship between smoking and cancer (18)

Cancers with a proven etiological relationship with smoking	Cancers suspected to be related to smoking
Lung cancer	Breast cancer
Head and neck cancers	Basal cell cancer
Esophageal cancer	Squamous cell carcinoma of the skin
Mesothelioma	
Colorectal cancer	
Renal pelvis, ureter, bladder cancer	
Pancreatic cancer	
Myeloid leukemia	
Penile cancer	
Cervix cancer	
Stomach cancer	

Patients diagnosed with cancer and undergoing treatment are advised to quit smoking, regardless of whether it is related to smoking or not. In addition to reducing additional morbidities, smoking cessation has also contributed positively to survival in some studies. Smoking cessation prolongs survival in patients with

small cell lung cancer undergoing thoracic radiotherapy and in operated early-stage non-small cell lung cancer. There is strong data that smoking cessation increases survival.¹⁶ Approximately 50% of smokers will die from tobacco-related diseases, and smokers will lose approximately 13 years of their lives because of this habit.^{1,17-18} (Table-2)

Physicians who carry out the follow-up and treatment of patients with cancer have responsibilities for smoking cessation for these patients and their relatives. Obtaining information about the smoking attitudes of these patients and their relatives will guide physicians in the fight against smoking. In this study, the smoking behavior of patients and their relatives followed at Ankara University Faculty of Medicine, Department of Medical Oncology, and the situation that occurred after the diagnosis of cancer were analyzed. In this study, which was designed as a questionnaire, it was planned to learn the demographic determinants for example income level, education and place of residence and to determine the relationship between them and smoking behavior. In addition, the informing behaviors of healthcare workers about smoking were also questioned in the questionnaires.

In the PSYCOG (Psychosocial Collaborative Oncology Group) study conducted by Derogatis et al., 47% of cancer patients were reported to have a diagnosable mental disorder. This rate is around 20-40% in cancer and non-cancer patients.¹⁹ Many people associate smoking with stress and state that they smoke to relax. Considering that the situation may be similar for oncology patients, it was planned to define this situation scientifically with the Beck Depression Inventory in the last part of the study. The depression score of the participants was calculated, and it was aimed to evaluate the relationship between these scores and smoking behavior and demographic data.

2. Materials and Methods

Patients and their relatives who applied to Ankara University Faculty of Medicine, Department of Medical Oncology between August 2012 and January 2013 and whose follow-up and treatment continued in the clinic or outpatient clinic were included in this study. Questionnaires regarding demographic data and smoking behavior were administered to patients and their relatives. Beck depression test was performed on patients and their relatives to screen for depression. Participants whose health status or education level was not suitable were read the questions in the questionnaire forms. Three months after the completion of the forms, the participants were called again, and their smoking attitudes were questioned again. In addition, comorbidities and medications used by the participants were questioned. According to the oncologic disease stage, participants were grouped as metastatic and non-metastatic.

2.1. Statistical Analysis

The data obtained in the study were analyzed with the SPSS-15 program. Statistics were expressed as mean $\pm$ standard deviation for variables with normal distribution, median value (min-max) for variables with non-normal distribution, number of cases and (%) for nominal variables. The significance of the difference in terms of means between two groups was analyzed by t-test, and the significance of the difference in terms of medians between groups was analyzed by Mann-Whitney U-test. In cases where there were more than two groups, the difference in means between the groups was evaluated with the ANOVA analysis of variance test, and the significance of the difference in terms of median values was evaluated with the Kruskal-Wallis test. For nominal variables, Pearson's Chi-Square or Fisher's exact test was used. Results were

considered statistically significant at $p<0.05$. Ethics committee approval for our study was received on June 24, 2013, number 10-416-13.

3. Results

A total of 208 relatives (112 male and 96 female) and 211 patients (123 male and 88 female) were included in the study. The characteristics of patients and relatives are summarized in Table 3. The majority of the patients included in the study were primary school graduates, with a rate of 44.1%, while 34.1% of the relatives were primary school graduates and 33.2% were university graduates. 6.6% of the patients and 2.4% of the relatives were illiterate. The majority of the working population in both groups were civil servants. The majority of patients and their relatives lived in metropolitan areas, and in both groups, married patients were more common than single patients. The majority of patient relatives were spouses, followed by children. The characteristics of patients and their relatives were similar except for age and gender. The relatives were younger than the patients, and the majority of them were women. (Table-3)

Table 3

Demographic characteristics of patients and relatives

	Patient	Patient relatives
Gender		
• Woman	88	112
• Male	123	96
Median Age	57 (19-89)	43 (18-80)
Marital Status		
• Married	%82,9	%79,7
• Single	%17,1	%20,3
Education Status		
• Literate	%15,2	%6,7
• Primary - high school	%66,8	%60,1
• University	%18	%33,2
Job Status		
• Employee	%48,6	%49,8
• Not working	%51,4	%50,2
Place of Residence		
• Village-town	%26,2	%21,8
• Province - metropolitan	%73,8	%78,2
Total Number of Participants	211	208

In the study, malignancies were divided into two groups: smoking-related malignancies and malignancies that were less or not associated with smoking. Smoking-related malignancies included lung, head and neck, stomach, esophageal and bladder cancers. Other malignancies were considered as the second group. In terms of malignancy, 42.6% of the patients had cancer closely related to smoking. 45.9% of the patients were in the metastatic stage.

37.4% of patients and 54.3% of relatives had never smoked ($p<0.001$). Pre-diagnosis smoking prevalence was found to be significantly higher among patients than among their relatives. Among the non-smokers, 87.3% had second-group malignancies that were not grouped as smoking-related. Of these, only 12.7% had one of the smoking-related cancers. Table 4 shows the daily cigarette consumption of the patients and their relatives before the diagnosis. When the amount of cigarettes consumed per day is

analyzed, the amount of cigarettes consumed per day is higher in patients than in their relatives. Patients and relatives accounted for 80.4% and 71.0% of those with 21-30 or >30 cigarettes per day, respectively ($p<0.001$). The daily cigarette consumption of patients was found to be significantly higher than that of their relatives. (Table-4)

Table 4

Number of cigarettes smoked before diagnosis

Number of cigarettes	Patient	Patient relatives
1-5	%10.1	%17,2
6-10	%10.1	%16,1
11-20	%34.1	%47.3
21-30	%28.7	%9.7
>30	%17.0	%9,7

The age at initiation of smoking in patients and relatives was as follows: The median age at initiation of smoking was 15.0 in patients and 18.0 in relatives ($p:0.002$). Significantly, patients started smoking at an earlier age than their relatives. As the age at initiation of smoking decreased, the number of cigarettes smoked per day increased. While the median age at initiation was 15 years for those who smoked more than 30 cigarettes per day, the median age at initiation was 18 years for those who smoked 1-5 cigarettes per day ($p:0.021$). Similarly, the group with the highest daily cigarette consumption had the youngest age at initiation, and the median age was 16 years ($p:0.076$). Among the patients, 79.7% of never-smokers were women. Among the relatives of the patients, 73.2% of never-smokers were women ($p<0.05$). Smoking among women was found to be significantly less in both groups. When educational status and smoking habits were compared, the primary school-high school group constituted the majority of never-smokers (54.4%) ($p<0.001$).

Similarly, the highest proportion of never-smokers was found in the primary school-high school group (64.6%) ($p:0.035$). When patients and relatives were asked why they smoked, 48.8% and 43.2% of both groups stated that they smoked out of habit. The rate of those who thought that they did not suffer any harm was 4.1% in patients and 6.8% in relatives. When smoking behavior was examined according to income level, the rate of never smoking increased as the income level decreased in patients (55.1%). Similarly, in relatives, the group with the lowest income level had the highest rate of never smoking (39.8%).

After the diagnosis of malignancy, 31.3% of the patients showed a change in attitude towards reducing the number of cigarettes smoked per day or quitting smoking completely. The rate of those who continued smoking in the same way was 2.4%. After the diagnosis, 97.2% of the patients showed a positive behavior model in smoking. Among relatives of patients who smoked, 26.6% were positively influenced to reduce or quit smoking after diagnosis. Of these, 64.9% did not change their smoking behavior ($p<0.001$). The rate of smoking cessation and reduction was found to be significantly higher among patients than among their relatives. Smoking cessation rates were 80.3% in patients with smoking-related malignancies, compared to 40% in patients with other malignancies. Among current smokers, 78.9% had non-smoking-related malignancies ($p<0.001$). The rate of smoking cessation and reduction was significantly higher in patients with smoking-related cancer than in patients with other malignancies.

Among the relatives of patients who reduced or quit smoking,

70.5% were relatives of patients with other malignancies not grouped as smoking-related. The remaining 29.5% were relatives of patients with smoking-related malignancies. When the patients were asked whether smoking played a role in their disease, 60% of them answered yes. When asked whether your disease affected your smoking cessation, 45.7% answered yes. When the relationship between smoking cessation and age was analyzed, the median age of those who had reduced/quit smoking was 58 and 50, respectively, for those who still smoked. When the median age was compared, the difference was statistically significant ($p=0.029$). The tendency to reduce/stop smoking was significantly higher in older patients. When the smoking reduction/cessation rates of patients with metastatic disease and those with non-metastatic stage were compared, 81.8% of metastatic patients and 85.9% of non-metastatic patients reduced/quit smoking. The rate of smoking reduction/cessation was 57.1% in the relatives of metastatic patients and 42.9% in the non-metastatic group ($p=0.011$). Relatives of metastatic patients were significantly more likely to reduce/quit smoking than non-metastatic patients.

When patients and their relatives were asked whether their physicians recommended them to quit smoking, 41.9% of the patients stated that they were recommended. This rate was found to be 20% in relatives ($p=0.001$). It was understood that physicians made suggestions about smoking significantly more to patients than to their relatives. The rate of those who received support from smoking cessation outpatient clinics was 7.4% in the patient relatives group and 8.8% in the patients. When their opinions on legal regulations regarding the consumption of tobacco and tobacco products were taken, 38.3% of patients and 48.5% of relatives reported that they were affected by the ban on smoking in closed areas. Three months after the survey, patients and their relatives were called by telephone to re-interrogate smoking behavior. Some patients and relatives could not be reached for various reasons (exitus, wrong phone number, etc.). Of the patients and relatives who could be reached, 10% of those who still smoked had quit smoking after the survey. 7% had reduced the number of cigarettes per day after the survey.

The grouping in the Beck Depression Inventory, which was used in our study and validated in our country, is defined in Table 5.

Table 5

Beck Depression Inventory

Score	Evaluation
<10	Normal
11-16	Mild mood disturbance
17-24	Borderline clinical depression
>24	Depression

The mean Beck Depression Inventory score of patients was 12.79 ± 9.039 (minimum 0-maximum 49 points). The mean score of relatives was 9.20 ± 7.371 (minimum 0-maximum 38 points). While 10.2% of the patients had a depression score >24, this rate was 3.4% among the relatives. When the depression scores of relatives and patients were analyzed, it was found that the majority of those with borderline clinical depression or depression were patients. (66.1% and 75.0%). The majority of the group with mild mood disturbance or considered normal was composed of patients' relatives (53.1% and 55.7%) ($p=0.001$). Depression scores were significantly higher in patients than in their relatives.

When depression and smoking status were compared, 66.7% of the patients in the group with the highest depression score were

smokers who quit smoking. Similarly, 53.1% of those in the group with the lowest depression score were smokers who quit smoking. The majority of those who quit smoking (47.3%) were in the group with the lowest depression score. When the group with the highest depression score was analyzed, the highest percentage was composed of smokers who quit smoking (12.7%) ($p=0.564$). There was no significant relationship between smoking behavior and depression. When depression was compared with smoking status in relatives, 57.1% of those with the highest depression score were never smokers.

Similarly, 56.9% of those with the lowest depression score were never smokers. The majority of those who quit smoking (65.9%) were in the group with the lowest depression score. In the group with the highest depression score, the highest percentage was still smoking (6.0%) ($p=0.210$). Similarly, there was no significant relationship between smoking behavior and depression among the relatives of the patients. When the rate of depression was analyzed according to the marital status of the patients, single patients had significantly higher depression scores than married patients ($p=0.0447$). Similarly, the depression scores of single patients' relatives were higher than those of married patients ($p=0.042$). Depression scores were significantly higher in single patients compared to married patients.

4. Discussion

In this study, a cross-sectional evaluation of a limited number of patients and their relatives who are being followed up and treated in the Department of Medical Oncology, Ankara University Faculty of Medicine was made. Therefore, the study has some limitations related to the quantity and quality of participants.

In our study, it was found that patients' relatives were younger, and the female gender was predominant in the demographic data of patients and their relatives, which has also been found in other studies.²⁰ Pre-diagnosis smoking frequency was found to be significantly higher among patients than among their relatives. Smoking-related cancers were also less common in non-smokers among patients. In addition, the daily cigarette consumption of patients was significantly higher than that of their relatives. In addition, patients initiated smoking at a significantly earlier age than their relatives. As the age of initiating smoking decreased in patients and relatives, the amount of cigarettes smoked per day increased. A significant relationship was shown between these two parameters. This is an expected finding that was among the hypotheses of the study. In a study conducted in Turkey, it was shown that the earlier the age at initiation of smoking, the more likely it is to continue smoking in adulthood.²¹ The findings in the literature support these findings. Women are significantly less likely to smoke among patients and their relatives, but the rate tends to increase gradually.²² Among patients and their relatives, smoking was found to be significantly lower in those with primary and high school education. This finding may be explained by the high number of participants at the primary and high school levels when categorized according to education.

The rate of smoking cessation and reduction was significantly higher among patients than among their relatives. This difference was particularly pronounced in patients with smoking-related cancer. The tendency to reduce/quit smoking was significantly higher in older patients. Relatives of non-metastatic patients were significantly more likely to reduce/quit smoking than metastatic patients. A study in the literature made a partially similar assessment. In a study conducted in the USA, it was found that relatives of patients with lung cancer had higher smoking cessation

rates than relatives of patients with colorectal cancer.

Similarly, in our study, it was shown that patients with smoking-related malignancies quit smoking at a higher rate. As expected, the tendency to reduce/quit smoking is predominant in patients who face a life-threatening situation such as cancer diagnosis and treatment. After diagnosis, patients with cancer show more interest in healthy living recommendations than normal individuals. Physicians and the media are effective in this regard. The positive effect of a smoke-free life on the success and risks of treatment and prognosis is emphasized a lot. Interestingly, relatives of patients who are in close relationship with the patient with cancer and who participate in the process exhibit less smoking reduction/cessation behavior.²⁰

In a study conducted in Belgium, 70 NSCLC patients underwent quality of life questionnaire preop and postop at 1-3-6-12 months and were questioned about their smoking behavior and symptoms. Except for never-smokers, all patients who still smoked, those who quit after the disease and those who quit before the disease complained of fatigue. Dyspnea in the first six months was significantly less in the group that quit smoking. Those who continued to smoke could not reach their preop physical performance in the postop period, and persistent dyspnea and chest pain were more common. Symptomatic questioning was not performed in our study. In a study conducted on patients with head and neck squamous cell carcinoma, when the smoking cessation behaviors of patients who received surgical treatment, chemotherapy, radiotherapy and/or combined treatment were examined, smoking cessation rates were higher in patients who received surgical treatment alone or in combination with other treatments (p:0.004).²⁴

Physicians have important duties and serious responsibilities in the fight against smoking. In this study, approximately 42% of patients with cancer reported that their physicians made suggestions about smoking. The rate of patients quitting smoking with the recommendations of physicians is 5-10%. Considering the number of patients seen by these physicians, this rate exceeds the smoking cessation outpatient clinics in terms of impact power. In the study, the application to these outpatient clinics, which are active and well-publicized in our hospital, was low. Physicians who see cancer patients significantly make their recommendations on smoking to patients rather than their relatives. However, the physician bears the same responsibility for the relatives of the patients. Moreover, this measure is an effective preventive medicine approach when there is no smoking-related severe disease yet. It is very important to include attitude education effectively in medical education for the fight against smoking.^{9-11,23}

Depression scores were significantly higher in patients than in their relatives. In the PSYCOG study conducted by Derogatis et al., 47% of cancer patients were reported to have a diagnosable mental disorder. This rate is around 20-40% in cancer and non-cancer patients.¹⁹ Depression scores were found to be significantly higher in single patients compared to married patients. No significant difference was found between smoking behavior and depression scores in patients and their relatives. The reasons for this may be various. The Beck Depression Inventory is not an essential approach for the diagnosis of depression; it can only provide rough information. Since a few questions in the Beck Depression Inventory were related to the performance status of the patients, it was not an ideal questionnaire for the relatives of the patients. We chose to use the same scale for standardization in the study. In our study, the rate of smokers increased as the depression score increased, but the difference was not statistically significant. The small number of participants may have affected the statistical difference.

Statement of ethics

Ankara University Faculty of Medicine Ethics Committee approved the study with June 24, 2013, number 10-416-13.

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Conflict of interest statement

The authors declare that they have no conflict of interest.

Availability of data and materials

This Data and materials are available to the researchers Thesis number: 455789, <https://tez.yok.gov.tr/UlusalTezMerkezi/>

Author contributions

ZK, FCS: conceptualization, methodology, investigation, and writing – original draft. ZK, FCS: resources, formal analysis, and writing – review and editing. ZK, FCS: conceptualization, methodology, and writing – review and editing. All authors read and approved the final version of the manuscript.

References

- Centers for Disease Control and Prevention (CDC). Smoking-attributable mortality, years of potential life lost, and productivity losses--United States, 2000-2004. *MMWR Morb Mortal Wkly Rep.* 2008;57(45):1226-8.
- Brawley OW. Avoidable cancer deaths globally. *CA Cancer J Clin.* 2011;61(2):67-8. [[Crossref](#)]
- International Agency for Research on Cancer. Tobacco smoking. *IARC Monogr Eval Carcinog Risk Chem Hum.* 1986;38:1-397.
- U.S. Department of Health and Human Services. The health consequences of smoking: 25 years of progress. A report of the Surgeon General. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 1989. DHHS Publication No. (CDC) 89-8411.
- Erbaydar T, Lawrence S, Dağlı E, Hayran O, Collishaw NE. Influence of social environment in smoking among adolescents in Turkey. *Eur J Public Health.* 2005;15(4):404-10. [[Crossref](#)]
- McBride PE. The health consequences of smoking: cardiovascular diseases. *Med Clin North Am.* 1992;76(2):333-53. [[Crossref](#)]
- U.S. Department of Health and Human Services. The health benefits of smoking cessation: a report of the Surgeon General. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control; 1990. DHHS Publication No. (CDC) 90-8416.
- Erguder T, Cakir B, Aslan D, Warren CW, Jones NR, Asma S. Evaluation of the use of Global Youth Tobacco Survey (GYTS) data for developing evidence-based tobacco control policies in Turkey. *BMC Public Health.* 2008;8 Suppl 1:S4. [[Crossref](#)]
- Mimioğlu MM. Research on the systemic effects of smoking. *Turk J Hyg Exp Biol.* 1986;43(2):85-9.
- Hoffman D, Rathkamp G, Nesnow S, Wynder EL. Fluoranthenes: quantitative determination in cigarette smoke, formation by pyrolysis, and tumor-initiating activity. *J Natl Cancer Inst.* 1972;49(4):1165-75.
- Nandi M, Jick H, Slone D, Shapiro S, Lewis GP. Cadmium content of cigarettes. *Lancet.* 1969;2(7634):1329-30. [[Crossref](#)]
- Glassman AH, Covey LS, Stetner F, Rivelli S. Smoking cessation and the course of major depression: a follow-up study. *Lancet.* 2001;357(9272):1929-32. [[Crossref](#)]
- Bolam B, West R, Gunnell D. Does smoking cessation cause depression and anxiety? Findings from the ATTEMPT cohort. *Nicotine Tob Res.* 2011;13(3):209-14. [[Crossref](#)]
- Gilman AG, Goodman LS, Gilman A, editors. Goodman and Gilman's The pharmacological basis of therapeutics. 6th ed. New York: Macmillan Publishing Co.; 1980. p. 558.
- Tierney LM, McPhee SJ, Papadakis MA, editors. Current medical diagnosis & treatment 2010. 49th ed. New York: McGraw-Hill Medical; 2010. p. 6-8.

16. Rubins J, Unger M, Colice GL; American College of Chest Physicians. Follow-up and surveillance of the lung cancer patient following curative intent therapy: ACCP evidence-based clinical practice guideline (2nd edition). *Chest*. 2007;132(3 Suppl):355S-367S. [[Crossref](#)]
17. Centers for Disease Control and Prevention (CDC). State-specific estimates of smoking-attributable mortality and years of potential life lost - United States, 1985. *MMWR Morb Mortal Wkly Rep*. 1988;37(44):689-94.
18. Vineis P, Alavanja M, Buffler P, Fontham E, Franceschi S, Gao YT, et al. Tobacco and cancer: recent epidemiological evidence. *J Natl Cancer Inst*. 2004;96(2):99-106. [[Crossref](#)]
19. Derogatis LR, Morrow GR, Fetting J, Penman D, Piasetsky S, Schmale AM, et al. The prevalence of psychiatric disorders among cancer patients. *JAMA*. 1983;249(6):751-7. [[Crossref](#)]
20. Weaver KE, Rowland JH, Augustson E, Atienza AA. Smoking concordance in lung and colorectal cancer patient-caregiver dyads and quality of life. *Cancer Epidemiol Biomarkers Prev*. 2011;20(2):239-48. [[Crossref](#)]
21. Carmelli D, Swan GE, Robinette D, Fabsitz R. Genetic influence on smoking--a study of male twins. *N Engl J Med*. 1992;327(12):829-33. [[Crossref](#)]
22. National Committee on Smoking and Health [Internet]. [cited 2025 Jun 30].
23. Fontham ET, Correa P, Reynolds P, Wu-Williams A, Buffler PA, Greenberg RS, et al. Environmental tobacco smoke and lung cancer in nonsmoking women: a multicenter study. *JAMA*. 1994;271(22):1752-9. [[Crossref](#)]
24. Balduyck B, Sardari Nia P, Cogen A, Dockx Y, Lauwers P, Hendriks J, et al. The effect of smoking cessation on quality of life after lung cancer surgery. *Eur J Cardiothorac Surg*. 2011;40(6):1432-8. [[Crossref](#)]