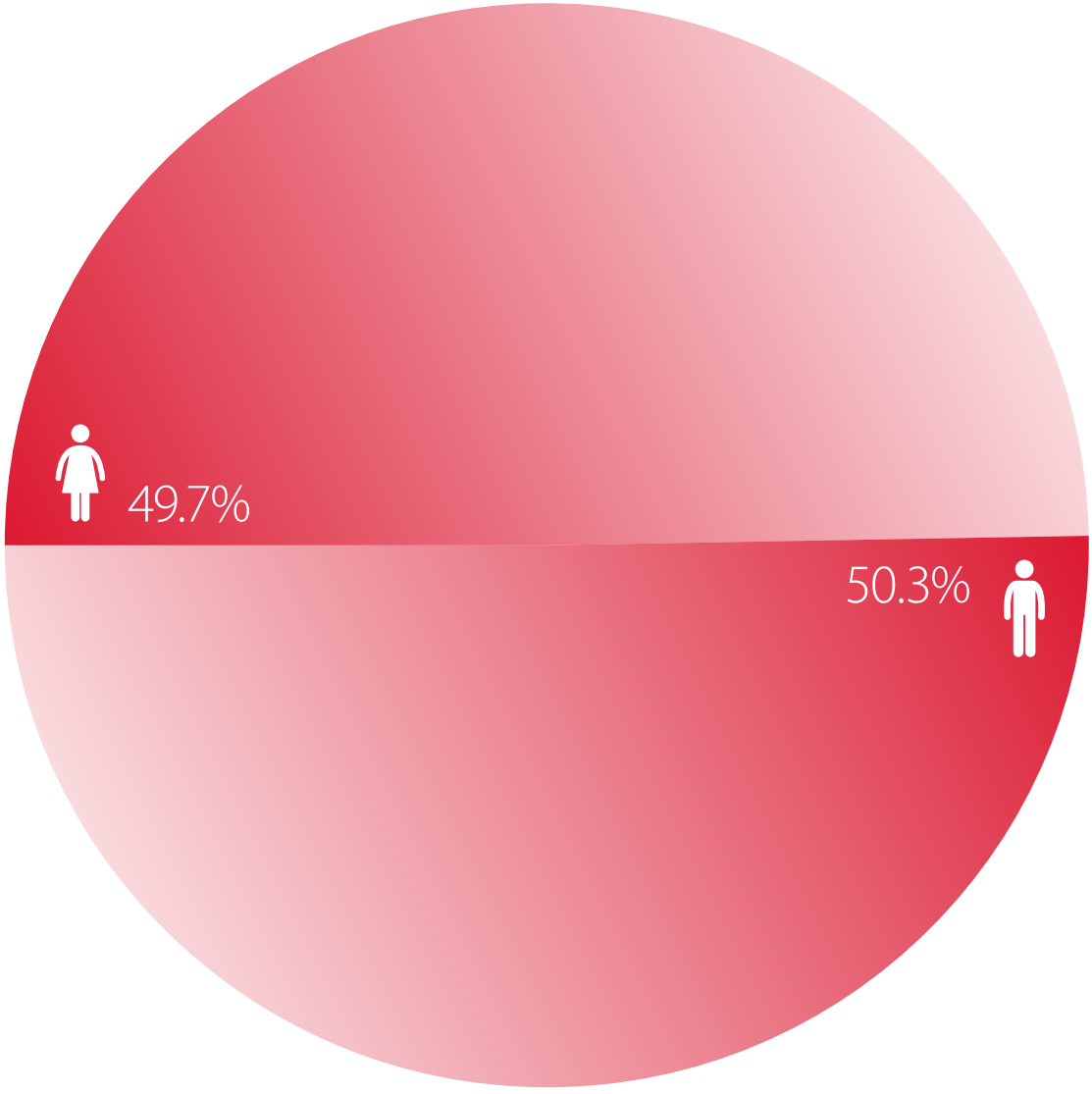
Chapter 1

Estimated current cancer incidence

Incidence measures the number of new cases of cancer diagnosed within a specific time period. This chapter presents projected statistics on cancer incidence in Ontario for the current year.

Expected new cases of cancer

"In 2018, 90,483 new cases of cancer are expected to be diagnosed in Ontario, 45,518 in males and 44,965 in females."



The number of new cancer cases diagnosed each year in Ontario (the incidence) and the incidence rate have increased since at least 1983. In general, the incidence of cancer is influenced by:

- socio-demographic factors;
- the availability of early detection and screening for cancer; and
- the prevalence of risk and protective factors.

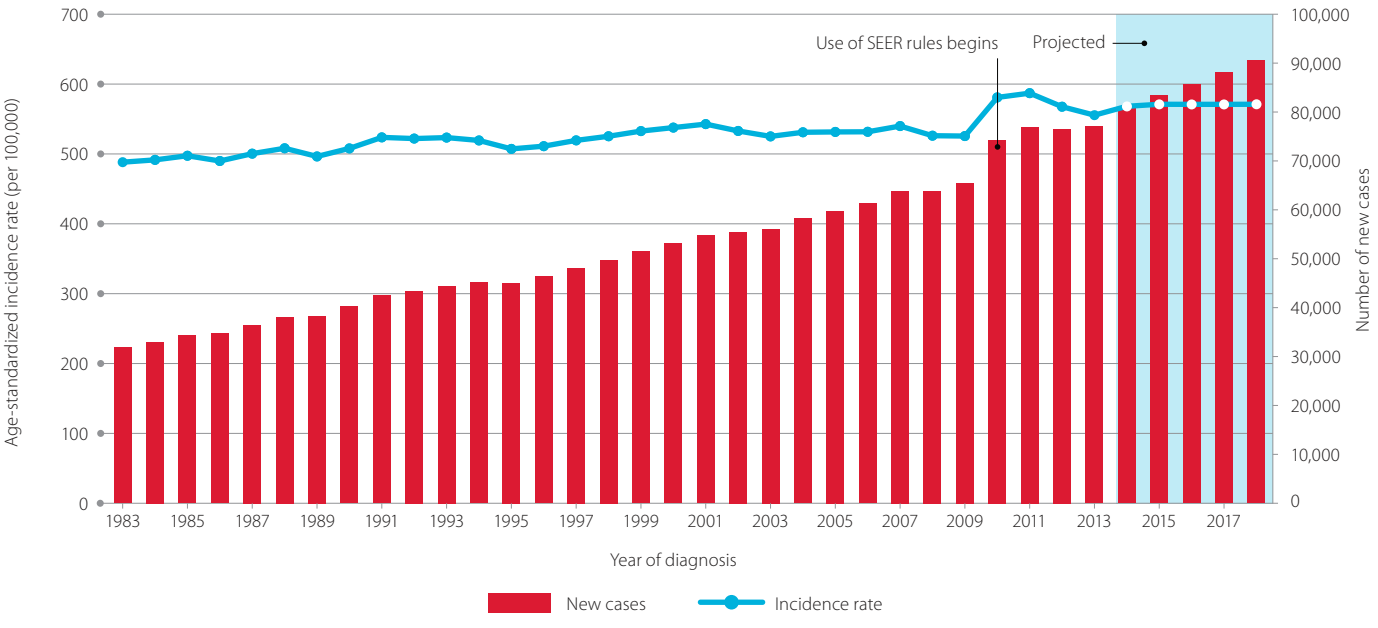
Risk factors can include unhealthy behaviours (e.g., smoking, poor diet, alcohol consumption, physical inactivity), non-modifiable factors (e.g., age at menarche and menopause), lifestyle factors (e.g., oral contraceptive use, hormone-replacement therapy use), exposure to certain environmental and occupational carcinogens (e.g., radon, PM2.5 [fine particulate matter], UV exposure, asbestos, diesel engine exhaust) and genetic predispositions (e.g., BRCA1 and BRCA2 genes).

The statistics reported in this chapter are projections for the years 2014 to 2018.

In 2018 an estimated 90,483 new cases of malignant cancer (excluding non-melanoma skin cancer) are expected to be diagnosed in Ontario, resulting in an age-standardized incidence rate (ASIR) of 571.1 cases per 100,000 people (Figure 1.1).

The abrupt increase in the count and incidence rate seen in 2010 is a result of the Ontario Cancer Registry's adoption of the National Cancer Institute (NCI) Surveillance, Epidemiology and End Results (SEER) Program's rules for counting multiple primaries. Those rules were applied starting in diagnosis year 2010, which means the higher numbers observed that year do not reflect a true increase in the incidence of cancer (see the *Technical appendix* for more information).[1]

Figure 1.1 **Projected incidence counts and age-standardized rates for all cancers combined, Ontario, 1983–2018**



Notes: 1. Rates are per 100,000 and standardized to the age distribution of the 2011 Canadian population.
2. Observed incidence rates are based on the NCI SEER standards for counting multiple primary cancers, which were adopted by the Ontario Cancer Registry for cases diagnosed in 2010 and beyond. Direct comparisons with rates for 2009 and prior years are shown here to highlight the impact of this change in counting standards for multiple primary cancers but should generally not be made.
Analysis by: Surveillance, Analytics and Informatics, CCO
Data source: Ontario Cancer Registry (November 2016), CCO

Incidence by sex

Among males, 45,518 cases of cancer are expected to be diagnosed in 2018 for an ASIR of 613.2 per 100,000 (Figure 1.2). The temporary decrease in the count and rate after 2011 can be attributed to the declining rate of prostate cancer, resulting from recommendations from the U.S. Preventive Services Task Force against using prostate-specific antigen (PSA) testing for the routine screening of healthy males.[2]

The numbers are expected to be lower for females, with 44,965 cases diagnosed for an ASIR of 542.7 per 100,000 (Figure 1.2). The incidence rate has been higher for males than females for every year since 1983. This sex difference has been observed in many different jurisdictions and is not unique to Ontario.[3,4] Higher rates of cancer among males have been attributed to behavioural, immunity and hormonal differences between the sexes; however, for some cancer types the mechanism underlying the difference is still unknown.[5]

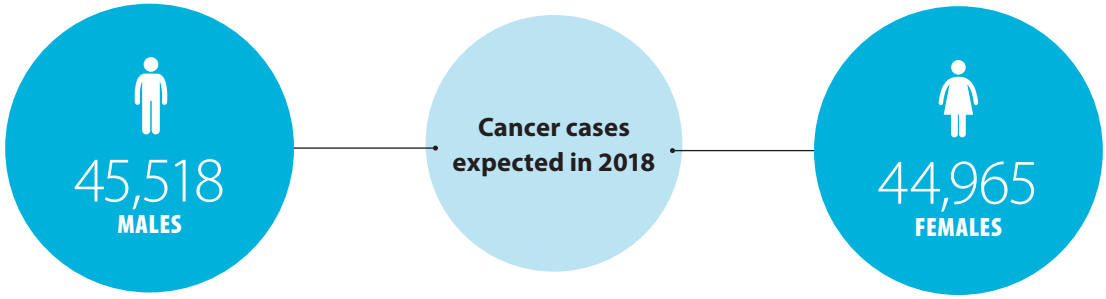
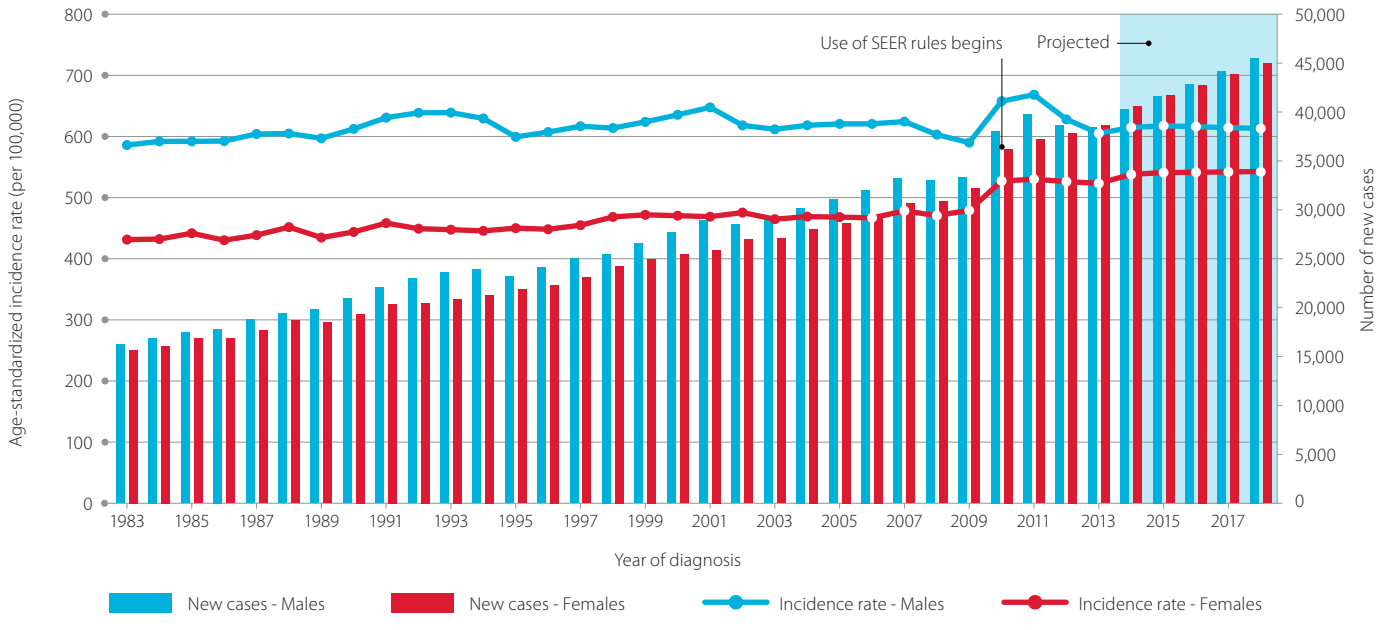


Figure 1.2 **Projected incidence counts and age-standardized rates by sex for all cancers combined, Ontario, 1983–2018**



Notes: 1. Rates are per 100,000 and standardized to the age distribution of the 2011 Canadian population.
2. Observed incidence rates are based on the NCI SEER standards for counting multiple primary cancers, which were adopted by the Ontario Cancer Registry for cases diagnosed in 2010 and beyond. Direct comparisons with rates for 2009 and prior years are shown here to highlight the impact of this change in counting standards for multiple primary cancers but should generally not be made.
Analysis by: Surveillance, Analytics and Informatics, CCO
Data source: Ontario Cancer Registry (November 2016), CCO

Incidence by cancer type

In 2018, the most commonly diagnosed cancer is expected to be female breast cancer (11,762 cases or 13.0% of all new cases), followed closely by colorectal (11,595 cases or 12.8%) and lung (11,396 cases or 12.6%) cancers (Table 1.1). These three cancers alone are projected to account for almost 40% of all new cancers diagnosed in 2018. Among males, the most commonly diagnosed cancer is expected to be prostate cancer, accounting for an estimated 8,828 new cases for an ASIR of 115.6 per 100,000. Breast cancer (with an ASIR of 146.4 per 100,000) is projected to be the most commonly diagnosed cancer among females.

With the exception of thyroid cancer, the ASIR is expected to be higher in males than females for all the cancers listed in Table 1.1. For thyroid cancer, female incidence will outpace male by more than 3:1. A number of possible reasons for the higher incidence of thyroid cancer in females have been proposed. For example, females are more likely to have thyroid disease and therefore have an increased likelihood of diagnostic investigation,[6] females have a greater tendency to seek medical attention and participate more actively in medical visits,[7–9] males and females have biological differences in their hormone levels, including thyroid stimulated hormone and sex steroids.[10–12] While the incidence of less aggressive types, such as papillary thyroid cancer, has been higher in females than males in a number of jurisdictions, the rate of more aggressive types such as anaplastic and medullary thyroid cancers are generally similar between the sexes.[6, 13] As a result thyroid mortality rates have been fairly equal between males and females (see *Chapter 5: Cancer mortality rates and trends*).

Table 1.1 **Projected incidence counts and age-standardized rates by cancer type and sex for selected cancers, Ontario, 2018**

Cancer type	Both sexes		Males		Females	
	New cases	ASIR	New cases	ASIR	New cases	ASIR
All cancers	**90,483**	**571.1**	**45,518**	**613.2**	**44,965**	**542.7**
Bladder	5,176	31.5	3,959	53.4	1,217	13.7
Breast (female)	—	—	—	—	11,762	146.4
Cervix	—	—	—	—	748	10.1
Colorectal	11,595	72.3	6,376	86.2	5,219	60.4
Kidney	2,814	18	1,800	24.5	1,014	12.1
Liver	1,495	9.3	1,064	14.2	431	4.9
Lung	11,396	69.6	5,698	76.2	5,698	64.9
Melanoma	4,129	26.4	2,372	32.5	1,757	21.6
Pancreas	2,281	14	1,116	15	1,165	13.1
Prostate	—	—	8,828	115.6	—	—
Thyroid	3,341	23	746	10.4	2,595	35.1
Uterus	—	—	—	—	3,544	43.6

ASIR=Age-standardized incidence rate
Note: Rates are per 100,000 and standardized to the age distribution of the 2011 Canadian population.
Analysis by: Surveillance, Analytics and Informatics, CCO
Data source: Ontario Cancer Registry (November 2016), CCO

Other than thyroid cancer, the greatest disparities between the sexes in cancer incidence are expected to occur in bladder and liver cancer. Specifically:

- For bladder cancer, the male rate will be almost four times the female rate. One of the risk factors for bladder cancer is a history of smoking, with smokers being two to three times as likely to develop bladder cancer as non-smokers.[14, 15] A history of tobacco use is more common in males, which may be one of the reasons bladder cancer incidence is much higher in males.[16]
- For liver cancer, the male rate is expected to be almost three times the female rate. While higher male prevalence of risk factors such as alcohol use and smoking may account for some of the discrepancy,[17–19] recent research indicates the possibility that there are genetic differences in the way males and females respond to the chronic inflammation caused by infectious agents such as hepatitis B or hepatitis C viruses, which are the most common liver cancer risk factors.[20–22]

The greatest number of new cancer cases are expected to be diagnosed in those ages 60 to 79 with an estimated 53.1% of all cases in 2018 projected to occur in this age group.

Incidence by age group

The greatest number of new cancer cases are expected to be diagnosed in those ages 60 to 79 with an estimated 53.1% of all cases in 2018 projected to occur in this age group (Table 1.2). The next most common age group for new cancer cases will be 40 to 59 year olds (22.9%) followed by those 80 and older (19.4%). Only 4.7% of cases are expected to be diagnosed in those under the age of 40.

Cancer incidence increases with age. The incidence rate in 2018 is projected to range from 61.1 per 100,000 in those ages 39 and under to 2,716.8 per 100,000 in people age 80 and older. Further:

- The incidence rates for bladder and colorectal cancers and melanoma are expected to increase significantly with age.
- The incidence rates for breast, kidney, liver, lung and pancreas cancers are expected to increase non-significantly with age.
- The incidence rates of both cervical and thyroid cancer are expected to peak in those ages 40 to 59.
- The incidence rates of prostate and uterine cancer are expected to peak in the 60 to 79 age group, although for prostate cancer the rate is expected to be very similar to that of the 80 and over group.

The incidence of the 12 cancers reported in Table 1.2 are projected to be very low in those under the age of 40. The exceptions are breast cancer, for which the rate is expected to be 15.4 per 100,000; thyroid cancer, for which the rate is expected to be 9.0 per 100,000; and cervical cancer, for which the rate is expected to be 5.3 per 100,000. Bladder, liver, lung and pancreas cancers are very rare in people under the age of 40; prostate cancer is non-existent.

Female breast cancer will account for 20.0% of all cases diagnosed in those ages 40 to 59. Among the oldest Ontarians—those 80 years and older—prostate will be the most commonly diagnosed cancer (463.1 per 100,000) followed by colorectal (439.9 per 100,000) and lung (432.1 per 100,000) cancers.

Table 1.2 Projected incidence counts and age-specific rates by cancer type and age group for selected cancers, Ontario, 2018

Cancer type	Age-group (years)							
	0–39		40–59		60–79		80+	
	New cases	Age-specific rate	New cases	Age-specific rate	New cases	Age-specific rate	New cases	Age-specific rate
All cancers*	**4,256**	**61.1**	**20,681**	**524.3**	**48,038**	**1748.1**	**17,509**	**2716.8**
Bladder*	52	0.7	588	14.9	2,996	109.0	1,540	239.0
Breast (female)	531	15.4	4,155	207.9	5,561	386.6	1,515	391.3
Cervix	184	5.3	325	16.2	202	14.0	37	9.6
Colorectal*	223	3.2	2,339	59.3	6,198	225.5	2,835	439.9
Kidney	98	1.4	809	20.5	1,473	53.6	434	67.3
Liver	22	0.3	290	7.3	893	32.5	290	45.0
Lung	59	0.8	1,530	38.8	7,022	255.5	2,785	432.1
Melanoma*	345	5.0	1,012	25.7	1,924	70.0	848	131.5
Pancreas	20	0.3	377	9.5	1,284	46.7	601	93.2
Prostate	0	0.0	1,485	76.3	6,152	469.8	1,192	463.1
Thyroid	627	9.0	1,544	39.1	1,064	38.7	106	16.5
Uterus	72	2.1	1,188	59.5	1,941	135.0	342	88.3

*Significant increasing trend in age-specific rate with increasing age
Analysis by: Surveillance, Analytics and Informatics, CCO
Data source: Ontario Cancer Registry (November 2016), CCO

This chapter presented an overview of projected incidence frequencies and rates for 2018 for selected cancer types. For more information on cancer incidence in Ontario, including data on more cancer types and trends over time, see *Chapter 4: Cancer incidence rates and trends*.

References

1. Ontario Cancer Registry [Internet]. Toronto: Cancer Care Ontario [updated 2015 May 19; cited 2018 June 1]. Available from: https://www.cancercare.on.ca/ocs/csurv/ocr/
2. Moyer VA. Screening for prostate cancer: U.S. Preventive Services Task Force recommendation statement. Ann Intern Med. 2012;157(2):120-34.
3. Cook MB, Dawsey SM, Freedman ND, Inskip PD, Wichner SM, Quraishi SM, et al. Sex disparities in cancer incidence by period and age. Cancer Epidemiol Biomarkers Prev. 2009;18(4):1174-82.
4. Edgren G, Liang L, Adami HO, Chang ET. Enigmatic sex disparities in cancer incidence. Eur J Epidemiol. 2012;27(3):187-96.
5. Dorak MT, Karpuzoglu E. Gender differences in cancer susceptibility: an inadequately addressed issue. Front Genet. 2012;3:268.
6. Rahbari R, Zhang L, Kebebew E. Thyroid cancer gender disparity. Future Oncol. 2010;6(11):1771-9.
7. Bertakis KD. The influence of gender on the doctor-patient interaction. Patient Educ Couns. 2009;76(3):356-60.
8. Verbrugge LM. Sex differentials in health. Public Health Rep. 1982;97(5):417-37.
9. Bertakis KD, Azari R, Helms LJ, Callahan EJ, Robbins JA. Gender differences in the utilization of health care services. J Fam Pract. 2000;49(2):147-52.
10. Rasmussen NG, Hornnes PJ, Hegedus L, Feldt-Rasmussen U. Serum thyroglobulin during the menstrual cycle, during pregnancy, and post partum. Acta Endocrinol (Copenh). 1989;121(2):168-73.
11. Pacchiarotti A, Martino E, Bartalena L, Buratti L, Mammoli C, Strigini F, et al. Serum thyrotropin by ultrasensitive immunoradiometric assay and serum free thyroid hormones in pregnancy. J Endocrinol Invest. 1986;9(2):185-9.
12. Knudsen N, Bulow I, Laurberg P, Perrild H, Ovesen L, Jorgensen T. Low goitre prevalence among users of oral contraceptives in a population sample of 3712 women. Clin Endocrinol (Oxf). 2002;57(1):71-6.
13. Grubbs EG, Rich TA, Li G, Sturgis EM, Younes MN, Myers JN, et al. Recent advances in thyroid cancer. Curr Probl Surg. 2008;45(3):156-250.
14. Freedman ND, Silverman DT, Hollenbeck AR, Schatzkin A, Abnet CC. Association between smoking and risk of bladder cancer among men and women. JAMA. 2011;306(7):737-45.
15. Hemelt M, Yamamoto H, Cheng KK, Zeegers MP. The effect of smoking on the male excess of bladder cancer: a meta-analysis and geographical analyses. Int J Cancer. 2009;124(2):412-9.
16. Ferrence RG. Sex differences in cigarette smoking in Canada, 1900-1978: a reconstructed cohort study. Can J Public Health. 1988;79(3):160-5.
17. Bosch FX, Ribes J, Borras J. Epidemiology of primary liver cancer. Semin Liver Dis. 1999;19(3):271-85.
18. Turati F, Galeone C, Rota M, Pelucchi C, Negri E, Bagnardi V, et al. Alcohol and liver cancer: a systematic review and meta-analysis of prospective studies. Ann Oncol. 2014;25(8):1526-35.
19. Chuang SC, La Vecchia C, Boffetta P. Liver cancer: descriptive epidemiology and risk factors other than HBV and HCV infection. Cancer Lett. 2009;286(1):9-14.
20. Naugler WE, Sakurai T, Kim S, Maeda S, Kim K, Elsharkawy AM, et al. Gender disparity in liver cancer due to sex differences in MyD88-dependent IL-6 production. Science. 2007;317(5834):121-4.
21. Prieto J. Inflammation, HCC and sex: IL-6 in the centre of the triangle. J Hepatol. 2008;48(2):380-1.
22. Sander LE, Trautwein C, Liedtke C. Is interleukin-6 a gender-specific risk factor for liver cancer? Hepatology. 2007;46(4):1304-5.