

MINI-REVIEW

Cancer Prevention in the Asia Pacific Region

Keun-Young Yoo

Abstract

Cancer incidences as well as the most prevalent cancer types vary greatly across Asian countries since people have differing health behaviors as well as lifestyle factors related to cancer risk. Countries have varying systems of government organization, laws, resources, facilities, and management strategies for addressing the cancer burden. Examples such as Korea and Japan with existing national cancer control programs need to focus on early screening and detection and quality of screening methods. If screening and detection increase to cover more than 50% of the target population, survival rate increases and thus the number of cancer patients detected increases resulting in higher medical cost. Thus, expansion of cancer screening, in addition to smoking prevention, immunization increase, and diet control awareness, are needed for cancer prevention strategies. Countries such as Thailand, China, Malaysia, and Turkey need to begin organized efforts to reduce cancer deaths through state-wide cancer screening programs. Strategies focused on increasing survival among cancer patients are also needed. In addition, government organizations and law regulations need to be in place as the first step towards cancer prevention. For the countries such as Nepal, Pakistan, Mongolia, and Iraq which do not have any cancer-related organizations in place, the first step that is needed is to raise public awareness about cancer; a public awareness campaign is the number one priority and should begin immediately. The easiest and most feasible step at this point is dissemination of cancer education materials during school health education and physical health screening. This must be started immediately because we need to avoid the development of existing cancers where patients will need to seek specialized cancer treatment facilities that are non-existent in these regions. In addition, hospitals need to take a step further and start undergoing registration of cancer prevalence and incidence cases beginning at the regional level. Through the hospital census, countries will be able to determine the magnitude of the cancer burden. Moreover, countries with professionals and researchers with advanced cancer research, education, and training also need to contribute through international cooperation.

Keywords: Asian cancer control - cancer prevention - international collaboration - national cancer control planning

Asian Pacific J Cancer Prev, **11**, 839-844

Introduction

In this century, the major cause of death is cancer in many Asian countries. The burden of cancer continues to increase in this region, although some countries are beginning to develop cancer treatment and prevention strategies. There were more than 3 million new cancer cases and over 2 million cancer deaths in Asia; projections suggest the number of new cancer cases in Asia will increase to 7.1 million by the year 2020 if existing prevention and management strategies remain unchanged (Mackay et al., 2006).

Within Asian countries, however, there is wide variation in cancer frequencies and cancer types. Apparently stomach cancer is high in Far East countries, while very low in the South East Asian countries (Shin et al., 2010). Liver cancer is high in North East countries, i.e., Mongolia, Japan, China, and Korea, while relatively low in the Middle East. Particularly, incidence rates for both stomach and liver cancer, which was previously

a leading site of cancer in many Asian countries, had decreased considerably until the end of the 1990's. This is one of the very unique epidemiologic features that have been observed in Asia over the past few decades (Ngoan and Yoshimura, 2002).

Particularly noteworthy was a continuous increase in colon cancer incidence over the past few decades in both males and females in Asia. Colon cancer shows extremely wide variation. Japan shows similar incidence as the US. This variation appears dependent on westernized lifestyle. The incidence of colon cancer in Osaka, Japan, is similar to that of the US and Australia. Breast cancer also shows wide variation in Asian countries. Particularly, breast cancer incidence rates, which was previously very low in many Asian countries, increased considerably until the end of the 1990's in Asian women (Yoo et al., 2006). As has been described, per cent increase in breast cancer mortality for middle-aged women from the mid-80s to the mid-90s was the highest in Korea, followed by China, and Japan in the world (Bray et al., 2004).

*Seoul National University College of Medicine, Seoul, Korea. *For correspondence : kyyoo@snu.ac.kr*

General Strategies for Cancer Control in Asia

Many Asian countries are becoming an aging or aged society, with increasing westernized lifestyle related cancers, e.g., breast cancer and colon cancer. Protective Asian lifestyle may no longer exist in Asia, and better diagnosis accordingly increases the number of new cancer cases and ultimately increases the economic burden for diagnosis and treatment. On the other hand, there is a shortage in organized cancer screening programs in most of the countries, resulting in poor prognosis due to delayed diagnosis.

In terms of resource inequality, although only a third of the radiation therapy facilities are located in developing countries, about 70% of the world's cancer cases occur in developing countries. Today, more than half of cancer deaths live in developing countries (Cavalli, 2006). Cancer incidences as well as cancer types vary across the countries since peoples have differing health behaviors as well as lifestyle factors related to cancer risk. Countries have different systems of government organization, laws, resources, facilities, and management strategies for addressing the cancer burden. Therefore, cancer management and prevention strategies need to be tailored accordingly. The necessity for cancer control and capacity building in countries of limited resources is evident and urgent. We need to utilize the available opportunities and address the challenges to maximize benefit and outcome.

The overall objective of the health promotion of people is, therefore, to set up to enhance cancer control strategies in each country, and the four main topics for in Asian-Pacific Rim countries could be raised as follows: 1) a coordinated research on etiology, diagnosis, treatment and prevention; 2) knowledge transfer for health information; 3) capacity building for infrastructure; 4) sharing and exchanging cancer control activities through international collaborations by various organizations within the region.

Primary Prevention of Cancer in Asia

Preventive strategies for cancer control developed in Asia includes national cancer registries, cancer screening program, education program for public awareness, anti-smoking campaign, changes in dietary habit, eradication of *Helicobacter pylori*, and vaccination against HBV and HPV. However, it must be considered in the establishment of the efficient control strategy in each country that cancer control programs must be site-specific as well as country-specific (UICC-ARO/APOCP Asian Pacific Collaborative Group, 2010, Malcolm and Sobue, 2010).

Whatever is their socioeconomic status of a country, the chief recommendation for cancer prevention in each country that must be taken into account is the primary prevention. Primary prevention concerns measures aim at reducing carcinogen initiation, including public awareness of risk factors, tobacco control, vaccination and lifestyle changes to reduce cancer risk with dietary changes and reducing body weight, etc.

Among them, anti-smoking program is most important in cancer prevention. But compared to other developed countries, smoking rate is still high in many Asian

countries. The prevalence is over 50% in Korea, China, and India, and around 40% in Malaysia, Indonesia, Japan, Philippines, Bangladesh, etc. The lowest level is shown in Singapore (Yoo et al., 2006). Various types of tobacco smoking can be seen in Asia, not only cigarette smoking and cigar, but also chewing tobacco, betel nuts, bidis, and water pipe smoking, so called 'Shisha' (Park et al., 2008). To tackle these problems, Korea is enforcing several anti-smoking programs as follows; increase in tax on cigarettes, ban on smoking in public places, health education, etc., limit cigarette advertising, prohibit promoting the sale of tobacco, warning on cigarette packets, expand public anti-smoking campaign & education, and limit sales to the minors (Yoo, 2008).

Chronic hepatitis B virus infection, a well-known risk factor for Hepatocellular Carcinoma, is approximately 80-90% preventable with the HB vaccination. The global immunization strategy is carried out based on the generally accepted assumption that prevention of the HB-carrier state from a vaccine will prevent the disease. National vaccination against HB has been implemented in Taiwan, Thailand, Malaysia, Singapore, Korea and China. Mongolia began implementing HB vaccination programs in 1991 and Malaysia began expansion of the immunization program in 1989, which showed a dramatic impact on school children. In Taiwan, a nationwide HB vaccination program was launched in 1984, and has been shown to be very successful in preventing HCC. There was a significant decrease in both chronic HBV carrier rates and HCC incidence rates among birth cohorts born after the implementation of the vaccination program (Chang et al., 1997). The prevalence of hepatitis B surface antigen was about 8% in Korea in the 1980s. However it has dramatically declined during the last two decades reaching 0.2% in 2002 (Park et al., 2008).

In 2009, IARC reclassified liver flukes such as *Clonorchis sinensis* (CS) and *Opisthorchis viverrini* (OV), as Group I carcinogens based on evidence showing they caused cholangio-carcinoma (CCA). The incidence of CCA is relatively high in Thailand, an endemic area for OV, as well as in Korea, an endemic area for CS. Preventive strategies such as eating properly cooked fish, and increased hygiene should be implemented to reduce the risk of CCA in endemic areas of liver flukes (Park et al., 2008).

In 2001, the *Helicobacter* and Cancer Collaborative Group conducted a pooled analysis on the association between HP seropositivity and gastric cancer risk, and showed risks of less than 2.0 - 2.36 (Park et al., 2008; Shin et al., 2010). A Korean study looking at the association between HP and gastric cancer by virulence factors (CagA and VagA) suggested CagA seropositivity was associated with a significantly higher risk of gastric cancer among HP-infected subjects; the OR and corresponding 95% CI were 3.57 (Gwack et al., 2008). Although there are inconsistencies, epidemiological evidence suggests that HP eradication may reduce the risk of gastric cancer, especially among subjects without atrophic gastritis or intestinal metaplasia (Fukase et al., 2008).

There has been a continuous decrease in stomach cancer mortality rates during the last 25 years in Korea

(Sankaranarayanan et al., 2009). We believe this decline is due to improvement in early diagnosis, improvement in survival, and also increase in intake of vegetables and fruits through health education, as well as widespread use of refrigerators in each household. At the end of the 1970s, one out of two households had a refrigerator in their home.

Education to promote a healthy lifestyle is essential to illustrate changeable lifestyle cancer risk factors. Therefore, needless to say, public health policymakers should make an effort to promote smoking cessation, physical activity and healthy diets that include high consumption of fruits and vegetables, and lower consumption of salty foods, red meat, and alcohol. Safe sexual behaviors should be recommended as well.

Cancer Screening Program in Asia

As a secondary prevention of cancer, early detection for cancer cases through screening program is important [10]. Many studies in Asia have shown the effectiveness of cancer screening in reducing cancer mortality rates, i.e., a nation-wide screening program in the cancer of stomach, lung, colon, rectum, breast and cervix in Japan since 1982, and the national cancer screening program by the Korean government in 1999, which show substantial evidences on reducing cancer mortality rates.

In developing countries in Asia, the incidence of invasive cervical cancer has decreased in the last fifty years by providing routine Pap smear tests. Although decreasing in China, Japan, and Korea, cervical cancer incidence rates are high in Thailand, India and the Philippines, which are about 3 times the rates of the USA, Europe or Australia. In less developed countries, the cost-effectiveness of screening programs has been questioned and their implementation has been difficult because of the cost. Breast cancer is usually presented and diagnosed at a later stage of development in Asian women, except in Korea and Japan, because there is no population-based breast cancer screening program in the majority of Asian

countries (Sankaranarayanan et al., 2009).

The current status of cancer control program established and run in Asia shows that, of the total of 51 Asian countries listed, only 20 have some form of national center for cancer treatment, with research capacity only in a minority of these. Organized cancer screening program at national level has adopted in 3 countries only. Regarding the cancer registration in Asia, only 20% of Asian countries have population-based registries, and only 4 (8%) covering their entire populations, Korea, Japan, Taiwan, and Singapore. Shortage in resources in cancer control activities in Asian countries urged us to facilitate international cooperation in the global view against cancer for more effective prevention interventions (UICC-ARO/APOCP Asian Pacific Collaborative Group, 2010; Moore et al., 2010).

Preventive Strategy in Low-Resources Countries

Asian countries can be classified into three groups by per capita GNI income level. The third category countries would be countries with low per capita income, but the magnitude of cancer is growing and still the cancer survival is very poor due to extreme shortage of cancer diagnosis and treatment facilities (Figure 1).

Nepal, as an example of the first category, has a population size of over 25 millions. But have just 5 cancer-specialized hospitals and only one National Cancer Hospital in the entire country. Most of the patients are diagnosed with advanced stage cancer in this hospital, and prognosis is naturally very poor. Where do we begin to act in countries such as Nepal, Pakistan, Mongolia, and Iraq that do not have sufficient cancer-related resources in place?

The first step that is needed is to raise public awareness about cancer; a public awareness campaign is the number one priority and should begin immediately. The easiest and most feasible step at this point is dissemination of cancer

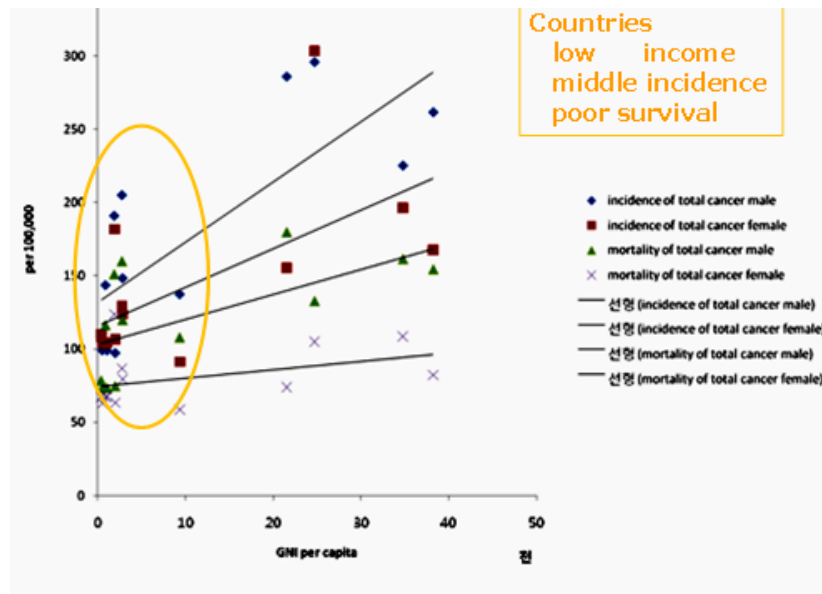


Figure 1. Cancer Burden According to Per Capita GNI Among Countries in the Asian-Pacific (Category I)

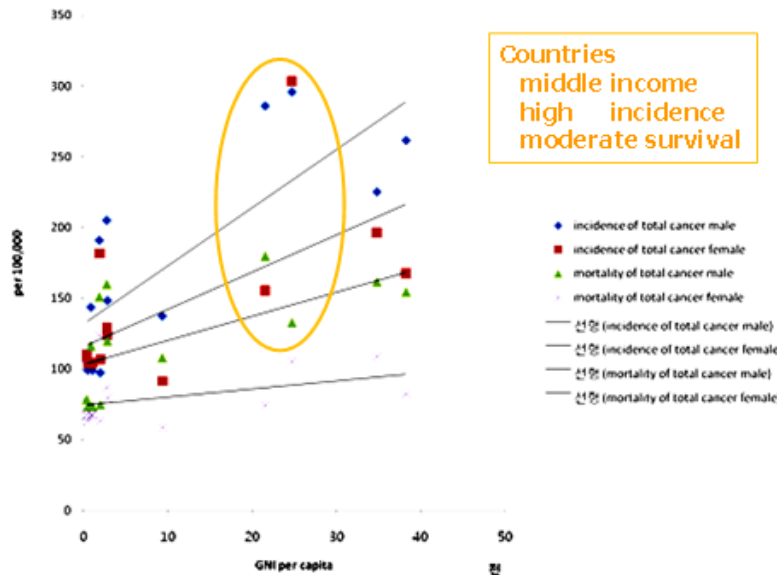


Figure 2. Cancer Burden According to Per Capita GNI among Countries in the Asian-Pacific (Category II)

education materials during school health education and physical health screening. This must start immediately in order to avoid the development of existing cancers where patients will need to seek specialized cancer treatment facilities that are non-existent in these regions.

In addition, hospitals need to take a step further and start registration of cancer prevalence and incidence cases at the regional level. Through the hospital census, countries will be able to determine the magnitude of the cancer burden. Moreover, countries with professionals and researchers with advanced cancer research, education, and training need also to contribute.

Preventive Strategy in Middle-Resources Countries

Countries with middle income in general show an increase in cancer incidence and survivorship is also moderate level. Countries like Turkey, China, Thailand, Malaysia, etc., belong to this category. They have a relatively short history of national cancer control activities. They have National Cancer Center for patient care and treatment, but not for cancer prevention activities (Figure 2).

Although cancer screening programs has begun in most of the countries, it does not cover the whole population, and thus expansion of the target population, governmental funding, and organized screening program is essentially needed. Survival rates for stomach cancer in countries of category III show around 50% in terms of 5 YSR, while other countries show around 25%. The 5 YSR of colon cancer shows similarly high rates of 60% in Korea and Turkey, Singapore, but about half level that at 25% in India and Thailand. As anticipated, there is a big difference in 5 YSR of breast cancer in Asia, highest in 84% in Japan and Korea, while around 50% in Manila and Indonesia.

Differences in age-specific curves of breast cancer in Asia are good example. Countries with higher incidence,

like Pakistan, Singapore, Philippines shows Western-type age-incidence curve of BC, while countries with moderate occurrence level shows a peak at around 50, namely, age at menopause. If data from Israel is include, the figure becomes more striking. This findings strongly suggest that there must be an upsurge of younger BC cases under age 50 among countries with moderate incidence level.

Countries in this category therefore need to expand the coverage of cancer screening for the secondary prevention of moderate risk group and to begin organized efforts to reduce cancer deaths through state-wide cancer screening programs. Strategies focused on increasing survival among cancer patients are needed. In addition, countries must expand or at least initiate primary prevention against cancer occurrence in the general population.

Preventive Strategy in High-Resources Countries

Countries with high income, in general, show high incidence of cancer, and survivorship is also relatively high. Countries like Japan, Korea, Taiwan, and Singapore belong to this category, and have relatively a long history of cancer control activities, well-established / well-organized cancer control programs supported by the government at the national level (Figure 3).

Japan has the longest history of cancer control activity in Asia. During the middle of the 20th century, cancer institutes were established, and the 1st cancer survey at the national level was initiated in 1958. In Japan, the national cancer control program was established in 1965, and the 1st cancer screening against stomach cancer was first introduced in 1966. Currently, there are 21 population-based cancer registries throughout the country.

Although belatedly initiated to address cancer at the national level, the Korean government developed a 10-year plan for cancer control in 1996. As part of the plan, the National Cancer Screening Program was introduced in 1999, National Cancer Center in 2001 as the national

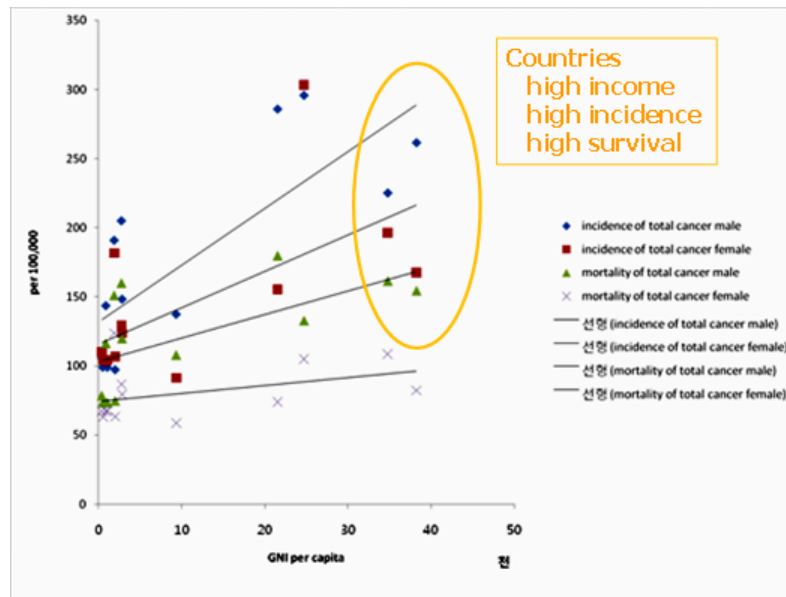


Figure 3. Cancer Burden according to per Capita GNI among Countries in the Asian-Pacific (Category III)

headquarters in the fight against cancer. The legal framework for controlling cancer was later established in 2003 when the National Cancer Control Law was legislated. Establishment 9 Regional Cancer Centers designated in 2004, and in 2006, the 2nd term 10-year plan for cancer control was initiated.

Another important event in the history of cancer control in Korea is the fact that National Cancer Act was enacted in 2003. Based on this act, many important programs were successfully in action. Examples are as follows; the central and regional government must establish the plan for cancer control every 5 years / to establish National Cancer Control Committee / to support cancer researches / to establish cancer registry system / and to activate the National Cancer Screening Program. National Hospice-Palliative Care Program was also started by this law. The second-term plan aims at reducing cancer burden significantly not only through primary prevention programs currently underway such as smoking cessation, HB vaccination, dissemination of cancer prevention guidelines, but also providing the target population with mass-screening services for 5 major cancers, which covers the whole population, strengthening financial support and improving quality of life through quality care for cancer patients. Particularly, the most noteworthy figure is the higher survival rate of stomach/liver cancer in Korea and Japan than that in the US, while survival rate for colorectal and breast cancer are similar (National Cancer Center, 2008).

Better diagnosis accordingly increases the number of new cancer cases and ultimately increases the economic burden for diagnosis and treatment. On the other hand, there is a shortage in organized cancer screening programs in most of the countries, resulting in poor prognosis due to delayed diagnosis.

This ultimately requires greater medical expenditure in terms of health economics. The estimated total cost caused by cancer in 2005 is supposed to reach 14 billion US\$, 1.7% of national GDP, and 0.7 billion USD for breast

cancer (0.1% of GDP). In this sense, reducing cancer burden by promoting national cancer control activities becomes one of the most urgent health issues in Korea.

For those countries in this category, in addition to their current activity with the full range of cancer screening activities for the secondary prevention of moderate risk groups, expansion of primary prevention against cancer occurrence in the general population, and the initiation of tertiary prevention for the improvement of patient's quality of life is highly recommended.

Acknowledgement

Author would like to express thanks to Dr. Lisa Cho and Dr. Enjoo Chung for their time and effort to prepare this manuscript.

References

- Bray F, McCarron P, Parkin DM (2004). The changing global patterns of female breast cancer incidence and mortality. *Breast Cancer Res*, **6**, 229-39.
- Cavalli F (2006). Cancer in the developing world: can we avoid the disaster? *Nat Clin Pract Oncol*, **11**, 582-3.
- Chang MH, Chen CJ, Lai MS, et al (1997). Universal hepatitis B vaccination in Taiwan and the incidence of hepatocellular carcinoma in children. Taiwan Childhood Hepatoma Study Group. *N Engl J Med*, **336**, 1855-9.
- Fukase K, Kato M, Kikuchi S, et al (2008). Effect of eradication of *Helicobacter pylori* on incidence of metachronous gastric carcinoma after endoscopic resection of early gastric cancer: an open-label, randomised controlled trial. *Lancet*, **372**, 392-7.
- Gwack J, Shin A, Kim CS, et al (2008). CagA-producing *Helicobacter pylori* and increased risk of gastric cancer: A nested case-control study in Korea. *Brit J Cancer*, **95**, 639-41.
- Moore MA, Sobue T (2010). Measures for cancer control on an organ-site basis. *Asian Pac J Cancer Prev*, **11**, 149-64.
- Moore MA, Yoo KY, Tuncer M, et al (2010). Overview of players and information in the cancer epidemiology world in Asia.

Keun-Young Yoo

Asian Pac J Cancer Prev, **11**, 1-10.

Mackay J, Jernal A, Lee NC, et al (2006). The cancer atlas. Atlanta, American Cancer Society, 44.

Ngoan LT, Yoshimura T (2002). Pattern and time trends of stomach cancer in Asia from 1950-99. *Asian Pac J Cancer Prev*, **3**, 47-54.

National cancer center, minister for Health, welfare and family affairs. Cancer Facts & Figures 2008 in Korea. Koyang-si, Korea, 2008.

Park SH, Bae JS, Nam BH, et al (2008). Aetiology of cancer in Asia. *Asian Pac J Cancer Prev*, **9**, 371-80.

Shin HR, Yoo KY (2010). Epidemiology of cancer in the Asia-Pacific region. (In) Tuncer AM, Moore M, Qiao YL, Yoo KY, Tajima K, Ozgul N, Gultekin M (eds.). Asian Pacific Organization for Cancer Prevention Cancer Report 2010. New Hope in Health Foundation 2010.

Shin HR, Masuyer E, Ferlay J, et al (2010). Cancer in Asia - incidence rates based on data in cancer incidence in five continents IX (1998-2002). *Asian Pac J Cancer Prev*, **11**, 11-6.

Sankaranarayanan R, Swaminathan R, Brenner H, et al (2009). Cancer survival in Africa, Asia, and Central America: a population-based study. *Lancet Oncol*, **11**, 165-73.

UICC-ARO/APOCP Asian Pacific Collaborative Group (2010). Cancer registration and epidemiology in Asian regions. *Asian Pac J Cancer Prev*, **11**, 1-18.

UICC-ARO/APOCP Asian Pacific Collaborative Group (2010). Strategies for organ-site-specific cancer control in Asia. *Asian Pac J Cancer Prev*, **11**, 19-34.

Yoo KY, Kim Y, Park SK, et al (2006). Lifestyle, genetic susceptibility and future trends of breast cancer in Korea. *Asian Pac J Cancer Prev*, **7**, 679-82.

Yoo KY (2008). Cancer control activities in the Republic of Korea. *Jpn J Clin Oncol*, **38**, 327-33.