

---

## RESEARCH COMMUNICATION

---

# What is Important for the Introduction of Cancer Screening in the Workplace?

Chisato Hamashima<sup>\*1\*2</sup>, Katsumi Yoshida<sup>\*2</sup>

### Abstract

Although cancer screening has been introduced into physical checkup programs in the workplace, it has not been regulated by the Occupational Health and Safety Law in Japan. In addition, the target age groups and strategy for cancer screening have not been defined. To aid in development of better screening programs, we investigated primary factors considered for introducing cancer screening in workplaces. A mail survey targeted 441 facilities of the Kanto Occupational Health Management Association in June 2002. We received ninety-one responses (20.6%), including 59 facilities of manufacturing companies. The implementations of gastric and colorectal cancer screening were higher than other cancer screenings, exceeding 90% in the responding facilities. Thirty years old or over was the target age in most facilities. The facilities were divided into two groups, A and B, except for two examples whose strategies for cancer screening were not well-documented in their response. There were 35 facilities in group A and 54 in group B. In group A, cancer screening was conducted using strategies for all of which effectiveness has been established. On the other hand, in group B, cancer screening was conducted using strategies whose effectiveness were at least partially unestablished. We chose five items to evaluate important factors for introducing a cancer screening program into the workplace: prevalence, screening strategy, effectiveness, efficacy and needs of workers. The most important was the same in both groups, effectiveness. However, there was a tendency for neglect of this aspect in actual conducted plans. Appropriate cancer screening should be carefully coordinated in accordance with the guidelines of the Task Force for Cancer Screening in Japan in the workplace.

**Key Words:** cancer - screening - effectiveness - workplace - guidelines

*Asian Pacific J Cancer Prev*, 4, 39-43

### Introduction

To prevent premature death in the workplace, cancer screening has been introduced into the physical checkup program, but has not been regulated by the Occupational Health and Safety Law in Japan. In addition, the target age groups and strategy for cancer screening have not been defined. It has been demonstrated that several cancer screening approaches are indeed effective to lower mortality rates from cancers. The efficacy is conventionally evaluated using randomized controlled, cohort and case-control studies. The Task Force for Cancer Screening in Japan

(Hisamichi et al., 2001) has recommended 6 cancer screenings as follows: gastric cancer screening using photofluorography; colorectal cancer screening using the fecal occult blood test; lung cancer screening using chest radiography and the sputum cytomorphicologic examination; cervical cancer screening using the pap smear test; breast cancer screening using clinical breast examination and mammography; and hepatocellular carcinoma screening using hepatitis virus markers. Some workplaces are enthusiastic to introduce relatively new screening methods including the serum pepsinogen test for gastric cancer and hepatocellular carcinoma screening using ultrasound (Miki

*\*1 Cancer Information and Epidemiology Division, National Cancer Center Research Institute, \*2 Department of Preventive Medicine St. Marianna University School of Medicine*

*Corresponding Author: Chisato Hamashima, Cancer Information and Epidemiology Division, National Cancer Center Research Institute, 5-1-1 Tsukiji Chuo-ku Tokyo, 104-0045 Japan TEL: +81-3-3542-2511 ex.4252 FAX: +81-3-3546-0630 E-mail: chamashi@gan2.res.ncc.go.jp*

**Table 1. Implementation Rates of Cancer Screening in Workplaces**

Cancer screening	Implementation (%)		
	+	-	NA
Gastric cancer	94.5 (86/91)	3.3 (3/91)	2.2 (2/91)
Colorectal cancer	93.4 (85/91)	2.2 (2/91)	4.4 (4/91)
Lung cancer	68.1 (62/91)	20.9 (19/91)	11.0 (10/91)
Breast cancer	52.7 (48/91)	30.8 (28/91)	15.4 (14/91)
Cervical cancer	60.4 (55/91)	24.2 (22/91)	24.2 (22/91)
Prostate cancer	20.9 (19/91)	54.9 (50/91)	24.2 (22/91)
Hepatocellular carcinoma	34.1 (31/91)	44.0 (40/91)	22.0 (20/91)

Ninety - one facilities responded to the questionnaire. Answers were divided into + (positive), - (negative) and NA (no answer given).

et al., 1993; Mihara 1995; Morita, 2002; Yura et al., 2002; Yahagi et al., 2002). These approaches, however, have yet to be reliably evaluated. The target age group for cancer screening in the workplace tends to be younger than that of the general population in municipalities. In addition, facilities tend to employ healthy workers, especially, large-scale companies. The introduction of cancer screening in the workplace requires consideration of the effectiveness of cancer screening and the characteristics of the target population. In the present study, the primary factors for the introduction of cancer screening in the workplace were investigated.

**Methods**

The mail survey targeted 441 facilities of the Kanto Occupational Health Management Association in June 2002. The survey investigated the following items: the current state

of cancer screening (implementation of cancer screening, target age group), the degree of information awareness regarding workup exams for cancer screening, cancer patients information grasp, the primary factor for the introduction of cancer screening and future plans. The answer for the primary factor for the introduction or non-introduction of cancer screening could be selected from the following three patterns: a, cancer screening is not effective, and its introduction is not required in the workplace; b, cancer screening is effective, but its introduction is not required in the workplace; and c, cancer screening is effective, and should be introduced into the workplace. The question of what is an important factor of the introduction for cancer screening was answered by selecting answer 'yes' or 'no' for every item: prevalence, screening strategy, effectiveness, efficacy and needs of workers. Statistical analysis used the chi-square test, with a p-value of 0.05 or less regarded as significant.

**Table 2. Strategies for Cancer screening**

Cancer screening	Strategy 1	(%)	Strategy 2	(%)	Strategy 3	(%)	Strategy 4	(%)	Strategy 5	(%)
Gastric cancer	<i>Photofluorography</i>	64.0 (55/86)	<i>Full X-ray</i>	52.3 (45/86)	Endoscopy	31.4 (27/86)	PG	9.3 (8/86)	-	-
Colorectal cancer	<i>FOBT 2days</i>	61.2 (52/85)	<i>FOBT 1day</i>	38.8 (33/85)	Barium enema	17.6 (15/85)	Endoscopy	15.3 (13/85)	DRE	7.1 (6/85)
Lung cancer	<i>Minimum X-ray</i>	51.6 (32/62)	<i>Full X-ray</i>	61.3 (38/62)	<i>SCE</i>	25.8 (16/62)	CT	14.5 (9/62)	-	-
Breast cancer	CE	87.5 (42/48)	US	41.7 (20/48)	<i>Mammography</i>	22.9 (11/48)	-	-	-	-
Cervical cancer	<i>Pap smear</i>	90.9 (50/55)	CE	58.2 (32/55)	US	16.4 (9/55)	-	-	-	-
Prostate cancer	PSA	84.2 (16/19)	DRE	26.3 (5/19)	US	15.8 (3/19)	-	-	-	-
Hepatocellular carcinoma	US	100.0 (31/31)	CT	6.5 (2/31)	-	-	-	-	-	-

The italics show the strategies recommended by the Task Force for Cancer Screening in Japan (Hisamichi et al.,2001)  
 PG, serum pepsinogen test; FOBT, fecal occult blood test; DRE, digital rectum examination; SCE, sputum cytomorphologic examination  
 CE:clinical examination US:ultrasound CT:computed tomography PSA:prostate specific antigen

**Table 3. The Primary Factor for Introduction of Cancer Screening**

Group	Answer type (%)	
	b	c
A	40.7 (11/27)	59.3 (16/27)
B	20.8 (10/48)	79.2 (38/48)

chi-square test chi-square=3.317 (P=0.069)

**Results**

The response rate was 20.6% (91 facilities), with 59 of the facilities being manufacturing companies. Fifty-three of the 91 facilities (58.2%) were companies with over 1000 workers, whereas 16 facilities (17.6%) were companies with less than 300 workers. The percentage of workers over 60 years was only 2.0%. Table 1 summarizes results for the implementation of cancer screening in the responding workplaces. The implementation of gastric and colorectal cancer screening was higher than other cancer screenings, exceeding 90%. Gastric cancer screening was most common. The strategies for cancer screening are seen in Table 2. The italics show the strategies recommended by the Task Force of Cancer Screening in Japan (Hisamichi et al., 2001). Although the recommended strategies by the Task Force were the most commonly conducted for gastric, colorectal, lung and cervical cancer screening, clinical breast examination was the most conducted strategy for breast cancer screening. Thirty years of age or over was the target age in most facilities. In the workup exams of the cancer screening, 61% of the responding facilities appeared aware of the necessary information, whereas 3% were not at all. In addition, in 74% of the facilities information regarding cancer patients detected by cancer screening was grasped, but this was not the case in 22%.

The responding facilities were divided into two groups except for two facilities with strategies of cancer screening which were unclear. There were 35 facilities in group A, and 54 in group B. In group A, cancer screenings were conducted using the strategies whose effectiveness was established, whereas in group B, cancer screenings were

conducted with strategies whose effectiveness was both established and unestablished. Comparing group A with B, the scale of the company as defined by the number of companies with over 1000 workers was equal. The percentage of employees over 60 years of age was not significantly different between the two groups. Table 3 shows the primary factor for the introduction of cancer screening in the workplace. Neither group selected answer a that was ‘cancer screening is not effective, and its introduction is not required in the workplace’. However, 8 facilities of group A and 6 facilities of group B did not provide a clear answer to this question. The selection rates for answers b and c were equal in the two groups.

The next question was ‘Which of following factors are important in the introduction of cancer screening?’(Table 4) The question was answered by selecting ‘yes’ or ‘no’ for each individual item: prevalence, screening strategy, effectiveness, efficacy and needs of workers. The most important factor was ‘effectiveness’, independent of the method of cancer screening conducted at the present time. Other factors, ‘efficacy’ or ‘screening strategy’ were less important than ‘effectiveness’ in both groups. Only ‘needs of workers’ was a more important factor in group A than that in group B.

The last question was the future plan for the introduction of cancer screening (Figure 1). Five strategies for the future plan for cancer screening were selected among 24 strategies by responding workplaces. Twenty-four strategies have conducted in several workplaces, which were same items of cancer screening at Table2. The selected strategies were gastric cancer screening using the serum pepsinogen test, lung cancer screening using computed tomography (CT), breast cancer screening using mammography, prostate cancer screening using prostate specific antigen (PSA), and hepatocellular carcinoma screening using ultrasound (US). The PSA was the most attractive strategy for both groups A and B. In addition, group B intended to conduct cancer screening with the new strategies, whether or not their effectiveness had been established.

**Discussion**

Cancer screening is a common strategy to prevent

**Table 4. What is Important for the Introduction of Cancer Screening ?**

Group	Important factor				
	Prevalence	Strategy	Effectiveness	Efficacy	Needs
A	5.7 (2/35)	11.4 (4/35)	48.6 (17/35)	14.3 (5/35)	20.0 (7/35)
B	13.0 (7/54)	14.8 (8/54)	64.8 (35/54)	14.8 (8/54)	3.7 (2/54)
P-value	0.260	0.648	0.129	0.945	<0.001

The question of important factors for the introduction for cancer screening was answered by selecting answer ‘yes’ or ‘no’ for every item: prevalence, screening strategy, effectiveness, efficacy and needs of workers.

The chi-value test was conducted for every factor to compare answer rate of answer type yes or no between groups A and B.

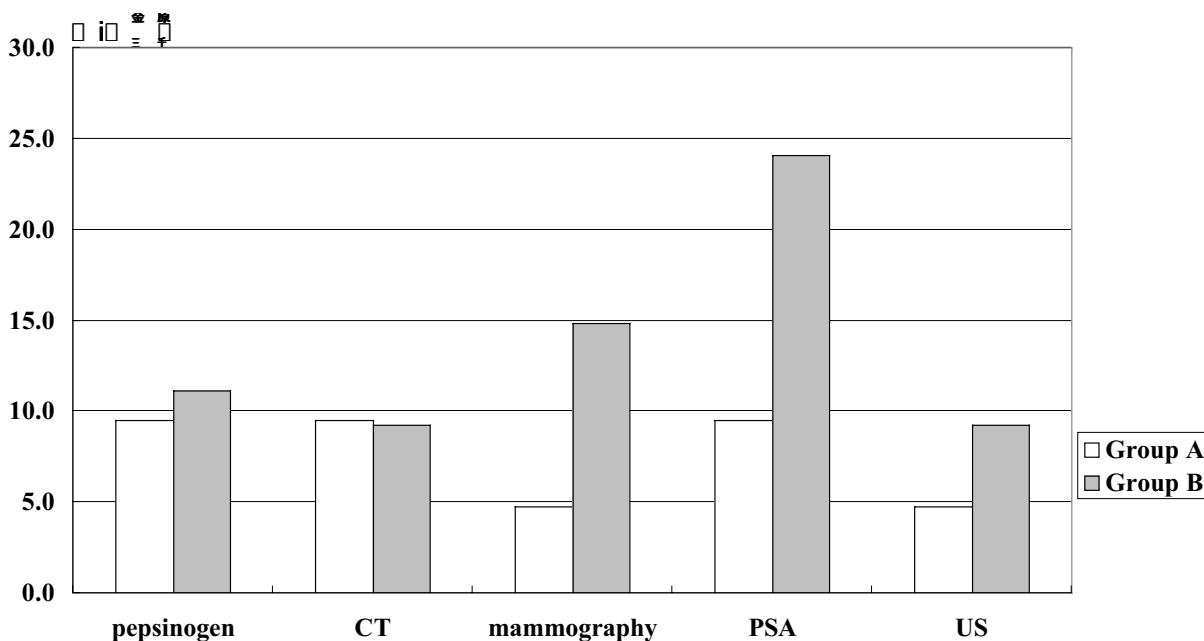
Statistical analysis was with the chi-square test, with a p-value of 0.05 or less considered significant.

premature death from cancer in Japan. Gastric cancer screening using photofluorography was started in Japan around 1960 and has become available nationwide (Oshima, 1994). In 1983, enhanced government legislation (The Health Service Law for the Aged) recommended annual screening of all residents over the age of 40. On the other hand, cancer screening has not been regulated at the workplace by the Occupational Health and Safety Law. In the present time, the strategy of cancer screening could be selected on a case-by-case basis, depending on the purpose, target group and screening cost in the workplace. The present survey suggested effectiveness as the most important factor for the introduction of cancer screening in the workplace. The methods of cancer screening whose effectiveness not been established, have been conducted in some facilities, who were enthusiastic to introduce new cancer screening program. On the other hand, the prevalence of cancer was not considered as an important factor.

The conclusion of the present study is limited as to its universal application in all workplace, because response rate was low and the majority of responded facilities were comparatively large companies which were enthusiastically conducting cancer screening. The Kanto Occupational Health Management Association has conducted the survey of cancer prevalence at workplaces every year. In the last few years, we received the response rate of the survey around 20%. Cancer screening is not a mandatory item for physical checkup program by the Occupational Health and Safety Law. Most facilities tend to be unwilling to introduce cancer screening because of the additional costs of the program.

The present study revealed that the effectiveness of cancer screening was not understood in many workplaces.

In the future plan for introduction of cancer screening, prostate cancer screening using PSA was considered as the most attractive strategy. However, the incidence of prostate cancer is low, given that employees 60 years of age or older are few in the target group of the workplace. In addition, conclusive evidence for prostate cancer screening derived from randomized controlled trials is not yet available (Gohagan et al, 1994; Scoroder et al., 1997; Standaert et al., 1997). Based on the present situation, the introduction of prostate cancer screening should be seriously evaluated with consideration given to both the benefits and the risks for the target groups. The target group of the workplace is different from the general population in the municipality. The incidence of cancer in the 30-40 years age group is lower than that of 60 years of age or older (Ajiki et al., 2000). In the workplaces, the target age of cancer screening is almost 30 years of age or older, and the age of participants is up to 60 years of age. Considering the relatively low incidence of cancer in this age group, those at high risk for cancer should be selected and intensively recruited to participate in cancer screening. For example, the high risk group for gastric cancer could be selected by serum anti-Helicobacter pylori antibody or the serum pepsinogen test (Asaka M et al., 1992; Kikuchi et al., 1994; Yahagi et al., 2002). Long-term follow-up of the high risk group selected by these tests is required, and cancer screening should be continued after retirement. Therefore, education regarding the continuation of lifetime cancer screening might be expected in the workplace.



**Figure 1. Introduction of new strategy for cancer screening**

The question concerned the future plans for cancer screening. Five future strategies were selected among a total of 24 : gastric cancer screening using the serum pepsinogen test, lung cancer screening using computed tomography (CT), breast cancer screening using mammography, prostate cancer screening using prostate specific antigen (PSA), and hepatocellular carcinoma screening using ultrasound (US).

The effectiveness for reduction of death from cancer has been established in several cancer screenings methods. Based on these studies, the Task Force for Cancer Screening in Japan (Hisamichi et al., 2001) recommended six cancer screenings. Although effectiveness was considered as the most important factor for the introduction of cancer screening in the workplace, there was a tendency that was neglected in their actual plan conducted. In order to prevent premature death from cancer, the effectiveness is the most important factor for the introduction of cancer screening. Proper cancer screening should be carefully coordinated in accordance with the guideline of the Task Force for Cancer Screening in Japan in the workplace.

## Acknowledgments

The authors would like to thank those facilities of the Kanto Occupational Health Management Association who responded to the questionnaire and participated in the present survey, and Dr. Mari H. Masuda for critical reading of this manuscript.

## References

- Ajiki W, Kinoshita N, Tsukuma H, et al (2000). Estimation of cancer incidence (1995). In 'Report of Research of Utilization of Cancer Registry' Eds Oshima A, pp35-45.
- Asaka M, Kimura T, Kudo M, et al (1992). Relationships of *Helicobacter pylori* to serum pepsinogen in an asymptomatic Japanese population. *Gastroenterology*, **102**, 760-6.
- Gohagan JK, Prorok PC, Kramer BS, et al (1994). Prostate cancer screening in the prostate, lung, colorectal and ovarian cancer screening trial of the National Cancer Institute. *J Uro*, **152**, 1905-9.
- Hisamichi S, Tsuji I, Tsubono Y, et al (2000). The Effectiveness of cancer screening in Japan. In 'Task Force for Cancer Screening in Japan' Eds Hisamichi S. Tohoku Univ Press, Sendai, pp1-16.
- Kikuchi S, Wada O, Miki K, et al (1994). Serum pepsinogen as a new marker for gastric carcinoma among young adults. *Cancer*, **73**, 2695-701.
- Miki K, Ichinose M, Ishikawa KB, et al (1993). Clinical application of serum pepsinogen \_ and \_ levels for mass screening to detect gastric cancer. *Jpn J Cancer Res*, **84**, 1086-90.
- Mihara S, Sado M, Kiba H, et al (1995). Efficacy and diagnostic accuracy of ultrasonic mass survey for hepatocellular carcinoma. *J Gastroent Mass Survey*, **33**, 486-92.
- Morita M (2002). A comparative study on serum pepsinogen test and X-ray examination used as a gastric cancer screening for company employees. *J Gastroent Mass Survey*, **40**, 11-9.
- Oshima A (1994). A critical review of cancer screening programs in Japan. *Intl J Technol Assess Health Care*, **10**, 348-58
- Schroder FH, Bangma CH (1997). The European randomized study of screening for prostate cancer (ERSPC). *Br J Uro*, **79** (Suppl.1), 68-71.
- Standaert B, Denis L (1997). The European randomized study of screening for prostate cancer; an update. *Cancer*, **80**, 1830-4.
- Yahagi N, Shimizu Y, Ichinose M, et al (2002). Corroborative evidence on mass screening method using serum pepsinogen test for long term follow up of gastric cancer patients. *Clin Gastroenterol*, **17**, 1577-83.
- Yura A, Takahashi K, Ando Y (2002). Gastric cancer detected by a combined method of indirect barium X-ray scan and serum pepsinogen test. *J Gastroent Mass Survey*, **40**, 533-41.