Effectiveness of smoking cessation self-help materials in a lung cancer screening population

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Summary Randomized controlled trials of smoking interventions have not been well-documented for lung cancer screening populations. In this study, we randomly assigned 171 current smokers who were undergoing low-dose fast spiral chest CT (SCTS) for lung cancer screening to receive either standard written self-help materials or a written list of Internet resources for smoking cessation. At the 1-year follow-up, more of the subjects receiving Internet-based resources reported making a stop attempt (68% versus 48%, $P = 0.011$). However, there were no statistically significant differences in 7-day point prevalence quit rates (5% versus 10%) or advancement in motivational readiness to stop smoking (27% versus 30%), respectively, between the groups. Clearly, more investigation is warranted into how to tailor smoking interventions for cancer screening participants.
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1. Introduction

It has been proposed that cancer screening presents a unique opportunity for providing nicotine dependence counseling [1]. Cancer screening may provide a ''teachable moment'' in which the motivation to change health behaviors can be enhanced when assistance for stopping smoking is provided [2]. However, there has been limited investigation of the effectiveness of providing nicotine dependence counseling to individuals undergoing cancer screening [3]. One study found that 86% of smokers undergoing low-dose chest CT screening for early detection of lung cancer reported they would have liked to have received smoking cessation treatment as part of the lung cancer screening program [4], indicating a high level of interest. In terms of characteristics, 55 women undergoing lung cancer early detection screening reported high levels of nicotine addiction, low confidence in their ability to

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quit smoking, and having a high perceived risk for developing lung cancer [5]. In this non-randomized, single arm study, after receiving physician advice to quit smoking, 9 (16%) of these 55 women reported quitting smoking at a 1-month follow-up.

While clinic-based treatment of nicotine dependence produces the highest abstinence rates, less than 5% of smokers in the general population take advantage of clinical programs [6]. Interventions that can be widely accessible and easily distributed are necessary for reaching a larger proportion of smokers. For smokers who may interact briefly with health care providers on a periodic basis (e.g. annual exam or at a screening), it is important to have stop smoking treatments that can be easily distributed, and used by the smoker at his or her convenience. Many brief, self-help manuals have been developed to provide written information to assist individuals in stopping smoking. Information that assists a smoker in advancing their readiness to stop smoking or making a stop attempt may help improve the likelihood of future successful abstinence [7]. Although not evaluated in a cancer screening population, the provision of written self-help materials to general samples of smokers slightly increases the smoking abstinence rate (13%) [8] beyond the rate of spontaneous smoking cessation over a 1-year period (7%) [9,10]. However, not all studies utilizing self-help materials report a benefit. For example in a large randomized field trial ($N = 843$), only 3.5% of subjects who received a standardized self-help guide reported 7-day abstinence at the 6 months follow-up. Multiple-tailored materials yielded a similar abstinence rate (3.2%) and this was not different from the 5.5% of control subjects reporting 7-day abstinence [11]. Thus, more efficacious, self-help methods need to be created.

An alternative means of disseminating information is to utilize the potential provided by the Internet. The results of a nationally-representative survey indicated that approximately 40% of individuals with Internet access reported use of the Internet to seek health-related information. Further, nearly one-third of those using the Internet for health information reported that this use affected a decision about health or health care [12]. Various web sites are available that contain vast and diverse information on smoking-related health issues, and on specific strategies for stopping smoking. Use of Internet-based information allows a smoker to access multiple sources of information, and to direct their learning tools based on their own needs, interests, and circumstances. A qualitative study of individuals using Internet resources for smoking cessation suggested that convenience, timeliness, anonymity, and unmet informational needs were primary reasons for seeking online smoking cessation resources [13]. Evaluation of the use of written self-help materials which direct smokers to web sites on smoking cessation versus standard condition information on smoking abstinence may provide guidance for the development of more effective modes of intervening with high risk individuals undergoing cancer screening.

In 1999, we initiated a low-dose fast spiral chest CT study (SCTS) [14] to determine whether use of such screening for non-small cell lung cancer has a reasonable likelihood of decreasing mortality by increasing diagnosis of early stage tumors. SCTC participants had at least a 20-pack-year smoking history, and therefore were at high risk for smoking-related morbidity, and they were motivated to engage in lung cancer screening. However, it is not known to what degree participation in a low-dose fast spiral chest CT screening may influence change in smoking behavior in the context of receiving self-help materials for smoking cessation. For example it is possible that undergoing screening (i.e. acknowledging increased cancer risk, interacting with health care providers, and obtaining screening results) might promote smoking abstinence. Since studies have shown that receiving feedback on the health consequences of smoking enhances motivation to stop [15], it is plausible that receiving a positive screening result may have a particularly strong influence on increasing smoking abstinence. Alternately, there may be a potential for current or former smokers who receive a negative screening result to continue or restart smoking, possibly resulting from a perceived reduction in their cancer risk. Interestingly, in a survey of 172 current or former smokers, respondents expressed a high interest in receiving chest CT screening (62%), and most (54%) smokers said they would quit smoking if they received a positive scan (52%) [16]. While few (19%) said they would quit if they received a negative scan, the authors note that the above study was a measure of intention not action. We recently reported in a sample of 1475 chest CT screening participants that low-dose fast spiral chest CT screening recommendations were not associated with smoking abstinence at a 1-year follow-up [17]. We did note that the 14% abstinence rate was higher than what would be expected for spontaneous rates of stopping smoking. Perhaps, chest CT screening results can enhance intent to quit, but without the delivery of tailored and timed interventions, quit rates will not improve.

The primary goal of this study was to examine the effectiveness of standard written self-help

materials for nicotine dependence compared to written materials consisting of Internet-based resources on smoking abstinence rates in a lung cancer screening population. We hypothesized that Internet-based resources, that provide a range of resources, would be more beneficial in improving smoking abstinence.

2. Methods

2.1. Participants

From 20 January to 15 December 1999, 1520 participants were enrolled in the SCTS, then underwent a baseline prevalence low-dose fast spiral chest CT scan. The participants included 785 men and 735 women; 1508 (99%) were white, and 12 were African American, Native American, or Hispanic. All were at least 50 years of age (mean age, 59 years; range: 50—85 years). Sixty-one percent were current smokers and 39% were former smokers. The median number of pack-years of smoking was 45 (range: 20—230 pack-years). Of the 1520 participants enrolled in SCTS, there were 738 participants that returned for their first annual follow-up visit during the time period that subjects were being recruited for the current investigation. As reported above, baseline CT screening recommendations were not associated with smoking abstinence at the 1-year follow-up [17]. Of these, 25 declined to be screened for tobacco use, 315 self-reported abstinence from cigarettes, and 398 reported currently smoking cigarettes. Of the 398 current smokers, 162 (42%) were not eligible for the study because they did not have access to the Internet. In addition, 65 eligible smokers (i.e. smokers with Internet access) declined to participate in the randomized smoking cessation intervention. Thus, the current study includes a total of 171 current smokers who were randomized to receive written self-help materials consisting of Internet-based resources ($N = 85$) or standard smoking cessation information ($N = 86$).

The community was informed about the low-dose fast spiral chest CT screening study by local and regional television and newspaper coverage that carried information regarding the general outline of the study and eligibility requirements as well as funding by the National Cancer Institute. For the larger SCTS trial, participants were enrolled after providing written informed consent and included asymptomatic men and women 50 years of age or older who were current or former (quit less than 10 years ago) cigarette smokers with at least a 20 pack-year history of smoking. Ineligible were those with a history of any cancer within five years, other than non-melanomatous skin cancer, cervical cancer in situ, or localized prostate cancer. Participants were required to be mentally competent and considered healthy enough to potentially undergo pulmonary resection (i.e. no congestive heart failure or disabling dyspnea at the time of enrollment). Individuals with a serious illness that decreased life expectancy to less than 5 years were excluded. Sixty-three individuals were ineligible due to serious illness. For the current investigation, participants were recruited at the first annual follow-up visit. Additional inclusion criteria for the current study were current cigarette smoker, access to a computer with Internet service, and written informed consent to participate.

3. Measures

3.1. Smoking status-stage of readiness to stop smoking

Evaluation of stage of readiness to change [18] assessed interest in changing smoking behavior. Based on a five-item assessment, individuals were classified according to one of the transtheoretical model [19] stages of change: precontemplation (not currently thinking of stopping smoking), contemplation (considering stopping smoking in the next 6 months), preparation (planning to stop smoking within the next month), action (stopped smoking within the past 6 months), or maintenance (abstinent from smoking for more than 6 months).

3.2. Smoking history

We assessed cigarettes smoked per day, stop attempts in past year, and other smokers in the household. The six-item Fagerström Test for Nicotine Dependence (FTND) [20] was used to measure degree or severity of nicotine dependence. At the annual follow-up visits, participants were asked, ''Do you now smoke cigarettes?''; if ''yes,'' then they were asked, ''How many cigarettes do you smoke per day?''; and, if ''no,'' then they were asked, ''When was your quit date?''. We collected expired air carbon monoxide (CO) levels to biochemically confirm point prevalence smoking abstinence, and 98% were biochemically confirmed abstinent.

4. Procedure

All scans were performed on a multislice, spiral computed tomography scanner. All computed tomography images were viewed in cine-mode

formats at a computer workstation by one of four investigator radiologists.

4.1. Smoking cessation interventions

Subjects were randomized to receive written self-help materials consisting of standard smoking cessation information ($N = 86$) or a list of Internet resources for smoking cessation ($N = 85$). While current smokers without Internet access were not randomized, they were provided with the standard written self-help materials.

4.2. Standard materials

Participants in this condition received a copy of ''Clearing the Air: How to Quit Smoking and Quit for Keeps,'' a publication of the National Cancer Institute [21]. ''Clearing the Air'' is a 24-page self-help manual describing multiple behavioral strategies for stopping smoking. Topics include preparing to quit smoking, getting social support, reducing temptation, practicing new habits, avoiding weight gain, and rewarding success. Also included are addresses and telephone numbers of additional resources including the American Heart Association, American Cancer Society, and American Lung Association. In addition, participants in this condition were given the American Lung Association booklet, ''Quit Smoking Action Plan,'' which provides up to date information on available pharmacotherapies for nicotine dependence.

4.3. Internet-based resources

Participants in this condition received a handout with a list of 10 Internet sites related to stopping smoking and a brief description of each site. Web sites included the American Heart Association, American Cancer Society, National Cancer Institute, Cancer Information Service, Center of Disease Control's (CDC) Tips, Tobacco Information/Prevention Source, Mayo Clinic Nicotine Dependence Center, Quit Now! (the National Tobacco Campaign), the No Smoke Café, Massachusetts Quitline, Nicotine Anonymous, and the American Lung Association. These sites include information on health risks related to tobacco use, benefits of stopping smoking, specific behavioral strategies, support for stopping, review of stop smoking medications, and references to local resources.

5. Follow-up

One month following enrollment in the smoking intervention, participants were mailed a brief questionnaire to assess current smoking status, other tobacco use, current stage of readiness to stop smoking [18], and the extent to which they utilized the information provided by the study. They were asked to return the questionnaire via postage-paid mail. At the annual visit, which corresponds to 1-year follow-up in this study, all participants were asked about their current tobacco use status, and expired air CO was measured. In addition, the participants were asked to complete a brief series of questions assessing stage of readiness to stop smoking, number of tobacco stop attempts in the past year, and other tobacco use.

6. Statistical analysis

Data are presented using mean $\pm$ S.D. for continuous variables and percentages for categorical variables. Responses from the 1-month follow-up survey, and tobacco use variables collected at 1-year follow-up, were compared between treatment groups using the chi-square test. For the 1-year smoking abstinence outcome, subjects that missed the visit or failed to provide tobacco use information, were classified as smoking. All other analyses were performed using available data with no imputation of missing values. For biochemically confirmed 7-day smoking abstinence, exact binary confidence intervals were calculated for each treatment group and a logistic regression analysis was performed using smoking abstinence as the dependent variable and treatment group as the independent variable. In addition, logistic regression was used to assess whether screening recommendations were associated with 1-year tobacco use outcomes. Separate analyses were performed with the dependent variable being biochemically confirmed 7-day smoking abstinence, attempted to stop smoking in the last year, and advancement in stage of change from baseline to 1 year. Screening recommendations were analyzed using a binary indicator variable (no additional follow-up versus any additional follow-up) and treatment group was included as a covariate in the analysis. In all cases two-sided tests were performed with P-values ≤ 0.05 used to indicate statistical significance.

7. Results

Baseline subject characteristics, at the time of enrollment in the current investigation, were similar between treatment groups (see Table 1). Overall, the mean $\pm$ S.D. age at enrollment was 57.4 ± 5.3 years (range: 51–74 years) and the majority of

Table 1 Baseline subject characteristics by treatment condition

	Internet resources (N = 85[a])			Standard materials (N = 86[a])		
	#	%	Mean ± S.D.	#	%	Mean ± S.D.
Age (years)			57.8 ± 5.2			57.0 ± 5.3
50—54	27	32		35	41	
55—59	33	39		30	35	
60—64	16	19		13	15	
>65	9	11		8	9	
Female gender	39	46		45	52	
Stage of change						
Precontemplation	14	16		22	26	
Contemplation	51	60		50	58	
Preparation	20	24		14	16	
Cigarettes per day[b]						
10 or less	13	15		10	12	
11—20	41	48		38	44	
21—30	23	27		25	29	
31 or more	8	9		13	15	
Attempted to stop smoking in last year	53	70		47	60	
Other smokers in household	31	37		32	38	
Fagerstrom Test for Nicotine Dependence score						
≤5	56	66		51	59	
≥6	29	34		35	41	
Recommendation from chest CT screening						
No additional follow-up	68	80		70	81	
Follow-up in 6-months	6	7		8	9	
Follow-up in 3 months	8	9		6	7	
Follow-up as soon as possible	2	2		2	2	
Other	1	1		0	0	

[a] Data regarding stop attempts in the last year were missing for nine subjects in the Internet group and eight subjects in the written material group. Data regarding other smokers in the household were missing for one subject in the written group.

[b] In addition to cigarettes, use of other tobacco products was reported by four subjects in the Internet group (three cigar, one pipe) and two subjects in the written material group (one cigar, one chewing tobacco).

subjects (60%) were smoking ≤20 cigarettes per day. Although a large proportion of subjects (65%) reported that they had attempted to stop smoking in the last year, most did not plan to initiate a serious stop attempt in the next 30 days (20, 59, and 21% of subjects were in preparation, contemplation, and precontemplation stages of change, respectively).

The 1-month follow-up survey was returned by 61 (72%) subjects in the Internet-based information group and 59 (69%) in the standard condition (see Table 2). Of those that responded to the survey, the self-reported 7-day point prevalence abstinence from smoking did not differ significantly between groups (13% versus 7% for Internet versus standard materials respectively; $P = 0.248$). The groups were also similar with respect to the percentage of subjects that were found to have advanced from baseline in their stage of change at the 1-month follow-up (29% versus 14% for Internet versus standard materials; $P = 0.632$). The only significant difference ($P = 0.001$) between groups was the percent of the amount of provided written information that subjects reviewed. For respondents receiving Internet-based resources, 26% did not look at any of the material, 51% looked at some, and 23% looked at all of it. For the standard group, the corresponding percentages were 17, 27 and 56%. Thus, subjects receiving the standard information were more likely to report reviewing all of the material, while subjects receiving Internet-based resources were more likely to report looking at only some of the material. Clearly, the amount of the Internet material was much greater than the content of the written materials. For both groups, the majority (>80%) of subjects reported that they

Table 2 Utilization of intervention materials at 30-day follow-up

	Internet resources			Standard materials			
	N^a	#	%	N^a	#	%	P^b
Did you look at the information provided to you about ways to stopping smoking?	61			59			0.001
No, I haven't had a chance to look at it		16	26		10	17	
Yes, I looked at part of it		31	51		16	27	
Yes, I looked at all of it		14	23		33	56	
How helpful was the information you looked at?	45			49			NS
It was very helpful		5	11		4	8	
It was somewhat helpful		35	78		38	78	
It was not helpful		5	11		7	14	
Did you share this information with a friend or relative?	54			56			NS
No		36	67		46	82	
Yes		18	33		10	18	
Have you tried to stop smoking since your last study visit?	61			59			NS
No		38	62		39	66	
Yes		23	38		20	34	
Have you smoked at all (even a puff) in the last 7 days?	61			59			NS
No		8	13		4	7	
Yes		53	87		55	93	
Stage of change	58			58			NS
Precontemplation		10	17		8	14	
Contemplation		28	48		38	66	
Preparation		11	19		8	14	
Action		9	16		4	7	
Since your last CT visit, how much time did you spend on the Internet looking at websites (Internet group) or looking at pamphlets (written material group) related to stopping smoking?	61			59			NS
<1 h		39	64		29	49	
1—2 h		12	20		25	42	
2—5 h		8	13		5	8	
>5 h		2	3		0	0	
How many web sites related to health or stopping smoking did you look at? (Internet group only)	49						
None		16	33				
One		3	6				
Two		6	12				
Three		8	16				
Four		6	12				
Five		6	12				
Six or more		4	8				

[a] The 30-day follow-up survey was returned by 61 (72%) subjects in the Internet group and 59 (69%) in the written group. The numbers provided correspond to the number of subjects responding to each item.
[b] Chi-square test.

had spent less than 2 hr looking at information related to stopping smoking.

At 1-year follow-up, a statistically, significantly higher percentage of subjects receiving Internet-based resources, compared to the standard condition group, reported that they had made an attempt to stop smoking in the last year (68% versus 48%, $P = 0.011$) (see Table 3). The percentage of subjects biochemically confirmed abstinent from smoking at 1-year follow-up was only 5% (95% CI 1−12%) for the Internet group versus 10% (95% CI 5−19%) for the standard condition group ($P = 0.166$, OR = 0.4, 95% CI 0.1−1.4) The groups were also similar with respect to the proportion of subjects who advanced from baseline in their stage of change (27% versus 30% for Internet versus written materials; $P = 0.704$). From multiple logistic regression analysis, adjusting for treatment group, the recommendation of additional follow-up from the chest CT screening exam was not found to be associated with abstinence (OR = 0.5, $P = 0.267$), making a quit attempt (OR = 0.8, $P = 0.412$), or advancement in stage of change from baseline to 1-year (OR = 0.6, $P = 0.222$).

8. Discussion

This study reports the results of a randomized controlled trial of a nicotine dependence intervention for a lung cancer screening population. We found that for high-risk individuals undergoing lung cancer screening there was no significant difference in smoking abstinence rates at 1-year for those receiving standard written self-help materials for smoking cessation or from providing a list of 10 Internet sites consisting of information and strategies for smoking cessation ($P = 0.166$, OR = 0.4, 95% CI 0.1−1.4 for Internet versus standard material). Similar percentages of these subjects advanced in their readiness to stop smoking at the 1-month follow-up. There also was similar advancement in their readiness to stop smoking at the 1-year follow-up. The biochemically-confirmed smoking abstinence rates (5% for Internet and 10% for standard materials) at the 1-year follow-up are similar to the rate of spontaneous cessation over a 1-year period in the general population (∼7%) [9]. Given that participants are interacting with physicians and receiving direct information on specific health factors related to their cigarette usage, perhaps future researchers can design more efficacious interventions.

Although the sample-size of this investigation provides limited statistical power to detect a difference in abstinence rates between groups, the upper limit of the 95% confidence interval for the odds ratio (upper limit of 1.4 for the odds ratio of Internet versus standard material) suggests that at best a modest benefit using Internet-based material with an approach similar to that used in this investigation. One plausible explanation for the lack of efficacy is that we did not tailor the web-based materials. Web-based materials can be educational materials, can be focused on self-management education, can be interactive, or can be a combined program [22,23]. We did not discuss the different formats of web-based materials with our participants, so they were not able to make an informed decision on which web site to use, nor did we assess their learning preferences. Thus, consideration of tailoring of web site recommendations may be helpful, as one-third of our subjects did not even look at any web sites. Investigators in other health behaviors, such as weight management, have identified the importance of including an interactive counseling segment of web-based interventions to assist participants with health behavior change [24], and there are some initial suggestions that e-mail communications may be helpful to smokers [25]. Attention, therefore, should be placed on the interactive and counseling aspects of web-based interventions. Perhaps if future studies include web-based health resources criteria for evaluating the quality of Internet health programs [26], the efficacy of these interventions can be improved.

Another limitation is that participants were randomized to receive either print or web-based informational resources, which was not matched to their perceived learning needs and preferred learning styles. Prior research has demonstrated that individuals vary in terms of favored learning modalities and preferences for accessing health-related information [27−29]. In order to meet individual informational and learning needs, it has been recommended that health education and information be delivered using a variety of learning modalities and technologies [30]. Consequently, matching the smoking cessation information modality (print versus web-based material) to an individual's preferences and styles may impact smoking cessation rates.

We limited the sample to those with Internet access. Of potential current smokers, 58% had Internet access, which is much higher than in the general population (42%). Nonetheless, this characteristic of the subjects limits generalization of the study findings. The results of this study are also limited by the lack of ethnic diversity of the sample and therefore should not be generalized. Furthermore, while it has been proposed that undergoing cancer screening may present a ''teachable moment,''

Table 3 One-year smoking status outcomes

Outcome	Internet resources			Standard material			
	N	#	%	N	#	%	P[a]
Biochemically confirmed smoking abstinence	85	4	5	86	9	10	NS
Cigarettes per day	80			78			NS
0		4	5		9	12	
1—10		15	19		9	12	
11—20		43	54		41	53	
21—30		13	16		10	13	
31 or more		5	6		9	12	
Attempted to stop smoking during the last year	73	50	68	79	38	48	0.011
Methods tried in past year to quit smoking[b]	50			38			
On my own		28	56		24	63	
Formal program		0	0		1	3	
Nicotine replacement		17	34		10	26	
Non-nicotine medication		17	34		10	26	
Other		3	6		1	2	
Stage of change	74			79			NS
Precontemplation		15	20		19	24	
Contemplation		37	50		35	44	
Preparation		18	24		15	19	
Action		3	4		9	11	
Maintenance		1	1		1	1	

[a] Chi-square test.
[b] Subjects may have indicated more than one method.

neither of our interventions were integrated into the screening results, and our intervention was provided at the second, not the first (or baseline), chest CT screening. Perhaps educational material, either written or Internet-based, directed towards integrating screening results, perceived risk of cancer, and smoking cessation strategies would be more efficacious in increasing long-term smoking abstinence in high-risk individuals undergoing lung cancer screening.

Acknowledgements

References

[1] Cox L, Africano N, Tercyak K, Taylor K. Nicotine dependence treatment for patients with cancer: review and recommendations. Cancer 2003;98(3):632—44.

[2] McBride C, Emmons K, Lipkus I. Understanding the potential of teachable moments for motivating smoking cessation. Health Educ Res 2003;18:156—70.

[3] McBride C, Scholes D, Grothaus L, Curry S, Ludman E, Albright J. Evaluation of a minimal self-help smoking cessation intervention following cervical cancer screening. Prev Med 1999;29:133—8.

[4] Ostroff J, Buckshee N, Mancuso C, Yankelevitz D, Henschke C. Smoking cessation following CT screening for early detection of lung cancer. Prev Med 2001;33:613—21.

[5] Schnoll R, Miller S, Unger M, McAleer C, Halbherr T, Bradley P. Characteristics of female smokers attending a lung cancer screening program: a pilot study with implications for program development. Lung Cancer 2002;37:257—65.

[6] Lichtenstein E, Hollis J. Patient referral to smoking cessation programs: who follows through? J Fam Pract 1992;34:739—44.

[7] Rohren C, Croghan I, Hurt R, Offord K, Marusic Z, McClain F. Predicting smoking cessation outcome in a medical center from stage of readiness: contemplation versus action. Prev Med 1994;23:335—44.

[8] Dijkstra A, de Vries H, Roijackers J. Targeting smokers with low readiness to change with tailored and nontailored self-help materials. Prev Med 1999;28:203—11.

[9] Baker L, Wagner T, Singer S, Bundorf M. Use of the internet and e-mail for health care information. JAMA 2003;289:2400—6.

[10] Frisby G, Bessell T, Borland R, Anderson J. Smoking cessation and the internet: a qualitative method examining online consumer behavior. J Med Internet Res 2002;4(2):E8.

[11] Curry S. Self-help interventions for smoking cessation. J Consult Clin Psychol 1993;59:318—24.

[12] Centers for Disease Control & Prevention. Smoking cessation during previous year among adults—United States, 1990 and 1991. Mor Mortal Wkly Rep 1993;42(26):504—7.

[13] Hatziandreu E, Pierce J, Lefkopoulou M, Fiore M, Mills S, Novotny T, et al. Quitting smoking in the United States in 1986. J Natl Cancer Inst 1990;82(17):1402—6.

[14] Swensen S, Jett J, Sloan J, Midthun D, Hartman T, Sykes A, et al. Screening for lung cancer with low-dose spiral computed tomography. Am J Respir Critic Care Med 2002;165(4):508—13.

[15] Copeland A, Brandon T. Testing the causal role of expectancies in smoking motivation and behavior. Addict Behav 2000;25(3):445—9.

[16] Schnoll R, Bradley P, Miller S, Unger M, Babb J, Cornfeld M. Psychological issues related to the use of spiral CT for lung cancer early detection. Lung Cancer 2003;39:315—25.

[17] Cox L, Clark M, Jett J, Patten C, Schroeder D, Nirelli L, et al. Change in smoking status following spiral chest CT screening. Cancer, in press.

[18] Prochaska J, DiClemente C. Stages and processes of self-change of smoking: toward an integrative model of change. J Consult Clin Psychol 1983;51:390—5.

[19] DiClemente C, Prochaska J, Fairhurst S, Velicer W, Velasquez M, Rossi J. The process of smoking cessation: an analysis of precontemplation, contemplation, and preparation stages of change. J Consult Clin Psychol 1991;59:295—304.

[20] Heatherton T, Kozlowski L, Frecker R, Fagerström K. The Fagerström Test for Nicotine Dependence: a revision of the Fagerström Tolerance Questionnaire. Br J Addic 1991;86:1119—27.

[21] National Cancer Institute. Clearing the Air. Washington, DC: National Institutes of Health; 1995 September.

[22] Bodenheimer T, Lorig K, Holman H, Grumbach K. Patient self-management of chronic disease in primary care. JAMA 2002;288(19):2469—75.

[23] Lenert L, Munoz R, Stoddard J, Delucchi K, Bansod A, Skoczen S, et al. Design and pilot evaluation of an Internet smoking cessation program. J Am Med Inform Assoc 2003;10:16—20.

[24] Tate D, Jackvony E, Wing R. Effects of internet behavioral counseling on weight loss in adults at risk for type 2 diabetes. JAMA 2003;289(14):1833—6.

[25] Etter J, le Houezec J, Landfeldt B. Impact of messages on concomitant use of nicotine replacement therapy and cigarettes: a randomized trial on the internet. Addiction 2003;98:941—50.

[26] Cummins C, Prochaska J, Driskell M, Evers K, Wright J, Prochaska J, et al. Development of review criteria to evaluate health behavior change websites. J Health Psychol 2003;8(1):55—62.

[27] Harris M, Bayer A, Tadd W. Addressing the information needs of older patients. Rev Clin Gerontol 2002;12(1):5—11.

[28] Dye D, Haley-Zitlin V, Willoughby D. Insights from older adults with type 2 diabetes: making dietary and exercise changes. Diabetes Educ 2003;29:116—27.

[29] James C, James N, Davies D, Harvey P, Tweddle S. Preferences for sources of information about cancer. Patient Educ Counsel 1999;37:273—82.

[30] Lock K, Willson B. Information needs of cancer patients receiving chemotherapy in an ambulatory-care setting. Can J Nursing Res 2002;34:83—93.