

Should the Use of Smoking Cessation Products Be Promoted by Dental Offices?

An Evidence-Based Report

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A b s t r a c t

To address the issue of whether dentists should promote the use of smoking cessation products, an evidence-based methodology was applied to find answers to 3 questions: Does tobacco use affect periodontal health? Are dentists effective cessation counsellors? Do smoking cessation products improve the effectiveness of cessation interventions? MEDLINE and manual searches uncovered relevant evidence to use in developing evidence-based recommendations. There is fair evidence that tobacco use is a major factor in the progression and treatment outcome of adult periodontitis and that quitting tobacco use is beneficial to periodontal health. There is good evidence to recommend that oral health professionals provide cessation counselling. There is good evidence to recommend the use of smoking cessation adjuncts. In view of the strong supporting evidence, dental offices should incorporate systematic smoking cessation services into routine patient care and should promote the use of proven cessation products by patients who are attempting to quit.

MeSH Key Words: dentistry; periodontitis; smoking cessation, tobacco-use cessation

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Tobacco use (referred to in this paper as smoking) is generally recognized as the leading preventable cause of illness and death in the industrialized world.¹⁻³ Despite this knowledge and concerted public health efforts to reduce smoking by Canadians, nearly one in 3 Canadians routinely uses tobacco products.⁴ To reduce the impact of smoking on the health of Canadians, non-smokers must be convinced not to start and current smokers must be convinced to quit.

The provision of smoking cessation services by health professionals has received considerable recent attention. Research has clearly shown that physicians are effective in increasing the proportion of their patients who successfully quit smoking.⁵ As a result, public health organizations encourage physicians to provide smoking cessation services. Numerous prescription and over-the-counter products are now available to help medical practitioners and their patients to increase expected success rates.

With new awareness of the link between smoking and oral health, the dental profession has become more interested in cessation services for dental patients. The growing professional

support for cessation services is reflected by the addition of cessation information to the undergraduate dental curriculum at Canadian dental faculties and by the Canadian Dental Association's official policy on smoking cessation:

The Canadian Dental Association encourages the eradication of the use of tobacco products. Studies indicate that dental counselling is effective in influencing patients to quit using tobacco. The Canadian Dental Association urges dentists to inquire about their patient's tobacco use and provide advice and encouragement to those interested in quitting.⁶

If smoking cessation products are effective, information about them should be incorporated into dental school tobacco-use cessation curricula and their use should be recommended and promoted within the dental profession.

This paper uses an evidence-based approach to determine whether the use of smoking cessation products should be promoted by dental offices. The evidence-based methodology is applied to each of the following 3 questions:

1. Does tobacco use affect periodontal health?
2. Are dentists effective smoking cessation counsellors?
3. Can smoking cessation products improve the effectiveness of cessation interventions?

If tobacco use affects oral health, if dentists are effective counsellors and if the adjunctive use of cessation products improves cessation effectiveness, then the use of smoking cessation products should be promoted by dental practitioners.

Methods

Scientific evidence was gathered from searches of the 1980 to 2000 MEDLINE database. Relevant articles were identified by using MeSH headings such as "smoking cessation," "tobacco-use cessation," "dentistry" and "periodontitis," and by using key words such as "bupropion," "Zyban," "nicotine," "patch" and "gum." All searches were limited to the English language, human studies, local holdings, adults over age 19 years and meta-analyses or randomized controlled trials (RCT). Study titles and abstracts were used to select the most appropriate studies for inclusion. For question 1, only adult periodontitis studies were considered. Due to ethical restrictions on performing clinical trials to address the subject of smoking and periodontal health, searches on this issue were not limited to meta-analyses or RCTs.

In addition to the MEDLINE searches, articles were identified by manual searching and by perusing bibliographies from appropriate sources. Selected studies were evaluated to determine whether the interventions were effective.

The study's internal and external validity were also evaluated. All selected papers were assessed for the quality of the study as reported in the article (i.e., sample size, study length, controls, blinding, randomization and use of placebo).

Each article selected was rated for the level of evidence provided according to the criteria developed by the Canadian Task Force on the Periodic Health Examination (see **Table 1**).⁷ Recommendations for or against each issue were classified as being based on good, fair or poor scientific evidence. **Table 2** summarizes the resulting recommendations.

Results

Question 1 — Does Tobacco Use Affect Periodontal Health?

Direct Effect

An association between smoking and periodontitis has been shown in numerous cross-sectional studies.⁸⁻²⁵ This association remains after allowing for age and oral hygiene status.²³ Attributable risk calculations from prevalence data suggest that 32% to 51% of periodontitis in different age groups may be attributable to smoking.¹⁴

Case-control studies have reported that smokers have significantly greater prevalence and severity of periodontitis.^{26,27} Overall, an estimated 40% of periodontitis can be attributed to tobacco use.³⁰ In a recent cohort study, smokers were reported to experience greater periodontal attachment loss and

Table 1 Levels of evidence and classification of recommendations

Levels of evidence	
I:	Evidence obtained from at least one properly randomized controlled trial.
II-1:	Evidence obtained from well-designed controlled trials without randomization.
II-2:	Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one centre or research group.
II-3:	Evidence obtained from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of treatment with penicillin in the 1940s) could also be included in this category.
III:	Opinions of respected authorities, based on clinical experience, descriptive studies or reports of expert committees.
Recommendations	
A:	There is good evidence to support a recommendation for use of the manoeuvre in the management of adult periodontitis.
B:	There is fair evidence to support a recommendation for use of the manoeuvre in the management of adult periodontitis.
C:	There is poor evidence to support a recommendation for or against use of the manoeuvre in the management of adult periodontitis, but recommendations may be made on other grounds.
D:	There is fair evidence to support a recommendation against use of the manoeuvre in the management of adult periodontitis.
E:	There is good evidence to support a recommendation against use of the manoeuvre in the management of adult periodontitis.

** Adapted from Goldbloom and Battista⁷*

radiographic bone loss compared to non-smokers (odds ratio [OR] = 5.41; confidence interval [CI] = 1.5-19.5).³¹ Smokers' cotinine level showed direct correlation with periodontal breakdown, suggesting a dose-response relationship between smoking and periodontal disease exhibited in a longitudinal study. Odds ratios for former smokers having moderate or advanced periodontitis are reported to be intermediate to those of current smokers and never smokers, again suggesting a dose-response relationship.²⁷

Randomized clinical trials of the effect of smoking on periodontitis are not possible due to ethical restrictions; however, strong evidence of the deleterious effect of smoking comes from a cohort study of Swedish twins who differed in smoking exposure.³⁰ It was found that the degree of alveolar bone loss and the number of teeth lost were greater in twins with a high lifetime smoking exposure than in their twin partners with a low lifetime exposure.

The effect of smoking on alveolar bone loss has also been reported. A recent study reported that smokers had relative risks for attachment loss ranging from 2.05 for light smokers to 4.75 for heavy smokers when compared to non-smokers.⁸ Smokers also had greater odds for more severe bone loss compared to non-smokers, ranging from 3.25 to 7.28 for light and heavy smokers respectively.⁹ Approximately 56% of

Table 2 Summary of findings and recommendations

Practice	Effectiveness	Evidence	Recommendations
Tobacco use			
Direct effect	Tobacco use is associated with and shows a dose–response relationship with deteriorating periodontal health.	II-2 Cohort ^{29,30} Case-control ^{26,27} III Descriptive ⁸⁻²⁵	There is fair evidence that tobacco use is a major factor in the progression and treatment outcome of adult periodontitis.
Response to therapy	Smokers respond less favourably to periodontal therapy.	II-2 Cohort ³¹⁻³⁷	
Smoking cessation	Former smokers show periodontal health intermediate to that found in current smokers and individuals who have never smoked.	II-2 Cohort ³⁰ III Descriptive ^{14,15,18}	There is fair evidence that quitting tobacco use is beneficial to periodontal health.
Cessation counselling			
Oral health professionals as counsellors	Oral health professionals are effective at increasing the proportion of dental patients who successfully quit using tobacco.	I - Meta-analysis ⁵ I - RCT ³⁸⁻⁴³ III Case series ⁴⁴⁻⁴⁶	There is good evidence to recommend that oral health professionals provide cessation counselling for all patients who use tobacco. (A)
Cessation products			
Nicotine replacement	Use of transdermal nicotine (the patch) more than doubles the quit rates obtained in smoking cessation programs (ORs 2.1 to 2.6).	I – Meta-analysis ⁴⁷⁻⁵¹	There is good evidence to recommend the use of transdermal nicotine as a smoking cessation adjunct for most tobacco users. (A)
	Use of nicotine gum increases cessation rates by about 50% (ORs 1.4 to 1.6).	I – Meta-analysis ^{47,51,52}	There is good evidence to recommend the use of nicotine gum as a smoking cessation adjunct for most tobacco users. (A)
Bupropion	Use of bupropion nearly doubles smoking cessation success, with reported quit rates of 23.1 and 30.3% vs. 12.4 and 15.6% for placebo.	I – RCT ^{53,54}	There is good evidence to recommend the use of bupropion as a smoking cessation adjunct for most tobacco users. (A)

non-smokers were in the healthy group (< 2 mm bone loss) and 7.5% in the severe bone loss group, compared to 9.25% and 35.2% of smokers in these respective groups.

Response to Treatment

The effect of smoking on the response to periodontal therapy has been investigated in several recent studies. In the first, the effect of scaling and root planing was examined on 57 adult patients with periodontitis.³¹ The authors reported that pockets initially ≥ 4 mm showed significantly improved periodontal health after therapy. These improvements occurred only in non-smokers and former smokers and were not observed in current smokers. Two more studies looked at the effect of adjunctive locally delivered antimicrobials in cases of refractory³² and severe³³ periodontitis. The authors reported that, regardless of the type of treatment, the changes in probing depth and attachment gain were greater in non-smoker subjects than in smoker subjects. As well, there was a significant interaction between smoking status and baseline probing depth,³² suggesting that smoking plays an important role in the development of periodontitis as well as in the prognosis of periodontal treatment.

The clinical periodontal response to surgical and non-surgical therapy has been studied in 74 patients following

maintenance for 6 years.³⁴ The authors reported that smokers did not respond as favourably to therapy as non-smokers and were not maintained as well over the next 6 years. These results are also observed in another study of 60 smokers and 83 non-smokers.³⁵ Preber and Bergstrom have studied the effect of smoking on non-surgical and surgical periodontal therapy.^{36,37} They reported a significant effect of smoking on the outcome obtained by surgical periodontal therapy.

Benefit of Quitting

Evidence of the potential benefit to be gained by quitting smoking comes from cohort and cross-sectional studies that compare periodontal health in current smokers to that of former smokers and individuals who have never smoked. These studies have all reported that the periodontal health of former smokers is intermediate to that found in current smokers and never smokers.^{14,15,18,30} This relationship is suggestive of a dose–response relationship between smoking and periodontal health and indicates the potential benefit of quitting.

Conclusion

Cohort, case-control and descriptive studies have consistently shown that tobacco use is associated with periodontitis. Ethical restrictions preclude the use of randomized controlled

trials to assess this issue, leaving Level II research as the best possible evidence. Despite the lack of Level I evidence, the strong, consistent dose–response relationship seen between tobacco use and periodontitis suggests a cause–effect relationship. Overall, there is fair evidence that tobacco use is an important risk factor for periodontitis.

Question 2 — Are Dentists Effective Smoking Cessation Counsellors?

Randomized clinical trials consistently report that routine smoking cessation counselling by dental professionals increases the proportion of patients who successfully quit smoking.^{38–43} An early trial of private dental office-based interventions reported test group quit rates of 16.9% compared to 7.7% for the control group.³⁸ The efficacy of a brief dental office intervention has also been proven to be effective in helping patients quit using smokeless tobacco.^{39,40} A more recent trial of dental health advice as an aid to reducing cigarette smoking in a periodontal specialty clinic setting reported a quit rate of 13.3% in the intervention group compared to 5.3% in control subjects.⁴¹

Several case series studies have also demonstrated the effectiveness of dental quit smoking interventions.^{44–46} Quit rates of 23%, 40% to 47%, and 45.3% have been reported by studies of different cessation interventions. In a recent meta-analysis performed for the U.S. Department of Health and Human Services, dentists are reported to be as effective as other health professionals (physicians and nurses) in helping patients quit.⁵

There is good evidence that oral health professionals are effective smoking cessation counsellors. Dental offices should provide smoking cessation services as a routine patient service (A-level recommendation).

Question 3 — Can Smoking Cessation Products Improve the Effectiveness of Cessation Interventions?

Although there are many products available on the Canadian market to assist in the quitting process, the review in this area was limited to transdermal nicotine, nicotine gum and bupropion products.

Nicotine Replacement Products

The adjunctive use of nicotine replacement products has been extensively studied in numerous randomized clinical trials and subsequent meta-analyses. For the purposes of this paper, only transdermal nicotine and nicotine gum were reviewed.

Nicotine Patch

Five published meta-analyses consistently report that the use of transdermal nicotine (the patch) as an adjunct to counselling is significantly more effective than the use of a placebo.^{47,48} Transdermal nicotine more than doubled the one-year quit rates obtained in control groups with combined ORs of different meta-analyses ranging from 2.07 to 2.6. These meta-analyses give good evidence to recommend the use of the

transdermal nicotine patch as an adjunct to smoking cessation services (A-level recommendation).

Nicotine Gum

Three meta-analyses assessing the adjunctive use of nicotine chewing pieces report significantly increased cessation rates.^{48,51,52} These meta-analyses report that the use of nicotine gum increases one-year cessation success by approximately 50%, with combined ORs of different meta-analyses ranging from 1.4 to 1.6. These meta-analyses give good evidence to recommend the use of nicotine gum as an adjunct to smoking cessation services (A-level recommendation).

Bupropion

Bupropion is a relatively new anti-smoking product. The drug is also prescribed for its antidepressive properties. If fact, initial interest in the use of bupropion for smoking cessation arose from anecdotal reports of successful quit attempts by smokers taking the drug as an antidepressant. A sustained-release formulation was subsequently developed specifically for use in smoking cessation.

Two randomized clinical trials on the adjunctive use of bupropion for tobacco-use cessation reported that bupropion significantly increases the proportion of people who successfully quit smoking.^{53,54} The adjunctive use of bupropion approximately doubled the quit rate obtained with placebo (23.1% vs. 12.4% and 30.3% vs. 15.6%). Minimal side effects were reported by both studies, with the most common adverse events being insomnia and headache. One of these studies looked at combination therapy using both bupropion and transdermal nicotine. While higher abstinence rates were reported with combination therapy than with bupropion alone, the difference was not statistically significant.⁵⁴ These studies provide good evidence to recommend the use of bupropion as an adjunct to smoking cessation services (A-level recommendation).

Discussion

Canadians who are interested in quitting smoking often obtain cessation products to decrease the side effects of quitting and thereby increase their chance of success. Many cessation products are currently available on the Canadian market, some by prescription and others as over-the-counter products. If effective, these products should be promoted for use by health professionals.

This review clearly shows that smoking is an important risk factor in the progression and management of periodontitis. It is associated with and shows a dose–response relationship with deteriorating periodontal health and it interferes with the outcome of periodontal therapy. Individuals who quit smoking have better periodontal health than do patients who continue to smoke.

The review also shows that oral health professionals are effective at increasing the number of patients who successfully quit smoking. Quit rates are nearly doubled when cessation services are offered. It is therefore appropriate for oral health professionals to provide smoking cessation services in the

prevention and management of periodontal disease (A-level recommendation).

Finally, the review shows that transdermal nicotine and nicotine gum, both available as over-the-counter products in Canada, and bupropion are effective adjuncts to smoking cessation services (A-level recommendations). In view of the supporting evidence, the Canadian public would benefit from guidance in the selection of appropriate, effective smoking cessation methods. Dental offices should incorporate systematic smoking cessation services into routine patient care. ♦

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References

1. U.S. Department of Health and Human Services. The health consequences of smoking: cancer. A report of the Surgeon General. Rockville, Maryland: U.S. Department of Health and Human Services; 1982.
2. Chief Medical Officer of Health - Tobacco & your health, Ontario Ministry of Health, 1991.
3. Doll R, Peto R, Hall E, Wheatley K, Gray R, Sutherland I. Mortality in relation to smoking: 40 years' observations on male British doctors. *BMJ* 1994; 309(6959):901-11.
4. Statistics Canada, Ottawa, Ontario. Canada Health Reports: 7(2):1995.
5. Fiore MC, Bailey WC, Cohen SJ, Dorfman SF, Goldstein MG, Gritz ER, and others. Smoking cessation. Clinical practice guideline No 18. Rockville, MD: US Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research. AHCPH Publication no. 96-0692. April 1996.
6. Canadian Dental Association. CDA Policy on Tobacco Products and Health. Board of Governors. 1996.
7. Goldbloom R, Battista RN. The Periodic Health Examination: 1. Introduction. *CMAJ* 1986; 134(7):721-3.
8. Grossi SG, Zambon JL, Ho AW, Koch G, Dunford RG, Machtei EE, and others. Assessment of risk for periodontal disease. I. Risk indicators for attachment loss. *J Periodontol* 1994; 65(3):260-7.
9. Grossi SG, Genco RJ, Machtei EE, Ho AW, Koch G, Dunford R, and others. Assessment of risk for periodontal disease. II. Risk indicators for alveolar bone loss. *J Periodontol* 1995; 66(1):23-9.
10. Linden GJ, Mullally BH. Cigarette smoking and periodontal destruction in young adults. *J Periodontol* 1994; 65(7):718-23.
11. Stoltenberg JL, Osborn JE, Pihlstrom BL, Herzberg MC, Aeppli DM, Wolff LF, and other. Association between cigarette smoking, bacterial pathogens, and periodontal status. *J Periodontol* 1993; 64(12):1225-30.
12. Feldman RS, Bravacos JS, Rose CL. Association between smoking different tobacco products and periodontal disease indexes. *J Periodontol* 1983; 54(8):481-7.
13. Beck JD, Koch GG, Rozier RG, Tudor GE. Prevalence and risk indicators for periodontal attachment loss in a population of older community-dwelling blacks and whites. *J Periodontol* 1990; 61(8):521-8.
14. Haber J, Wattles J, Crowley M, Mandell R, Joshipura K, Kent RL. Evidence for cigarette smoking as a major risk factor for periodontitis. *J Periodontol* 1993; 64(1):16-23.
15. Locker D, Leake JL. Risk indicators and risk markers for periodontal disease experience in older adults living independently in Ontario, Canada. *J Dent Res* 1993; 72(1):9-17.
16. Goultschin J, Cohen HD, Donchin M, Brayer L, Soskolne WA. Association of smoking with periodontal treatment needs. *J Periodontol* 1990; 61(6):364-7.
17. Jette AM, Feldman HA, Tennstedt SL. Tobacco use: a modifiable risk factor for dental disease among the elderly. *Am J Public Health* 1993; 83(9):1271-6.
18. Locker D. Smoking and oral health in older adults. *Can J Public Health* 1992; 83(6):429-32.
19. Ismail AI, Burt BA, Eklund SA. Epidemiologic patterns of smoking and periodontal disease in the United States. *J Am Dent Assoc* 1983; 106(5):617-21.
20. Bergstrom J, Eliasson S, Preber H. Cigarette smoking and periodontal bone loss. *J Periodontol* 1991; 62(4):242-6.
21. Solomon HA, Priore RL, Bross ID. Cigarette smoking and periodontal disease. *J Am Dent Assoc* 1968; 77(5):1081-4.
22. Stoltenberg JL, Osborn JB, Hardie NA, Hertzberg MC, Pihlstrom BL. The association between periodontal status and cigarette smoking. *J Dent Res* 1991; 70(Spec Iss):556(Abstr 2321).
23. Bergstrom J, Eliasson S. Cigarette smoking and alveolar bone height in subjects with a high standard of oral hygiene. *J Clin Periodontol* 1987; 14(8):466-9.
24. Bergstrom J, Eliasson S. Noxious effect of cigarette smoking on periodontal health. *J Periodontol Res* 1987; 22(6):513-7.
25. Horning GM, Hatch CL, Cohen ME. Risk indicators for periodontitis in a military treatment population. *J Periodontol* 1992; 63(4):297-302.
26. Bergstrom J. Cigarette smoking as risk factor in chronic periodontal disease. *Community Dent Oral Epidemiol* 1989; 17(5):245-7.
27. Gelskey SC, Young TK, Singer DL. Factors associated with adult periodontitis in a dental teaching clinic population. *Community Dent Oral Epidemiol* 1998; 26(4):226-32.
28. The cost of substance abuse to America's health care system. Report 1: Medicaid Hospital Costs. Centre on Addiction and Substance Abuse at Columbia University. July 1993.
29. Machtei EE, Dunford R, Hausmann E, Grossi SG, Powell J, Cummins D, and others. Longitudinal study of prognostic factors in established periodontitis patients. *J Clin Periodontol* 1997; 24(2):102-9.
30. Bergstrom J, Floderus-Myrhed B. Co-twin control study of the relationship between smoking and some periodontal disease factors. *Community Dent Oral Epidemiol* 1983; 11(2):113-6.
31. Haffajee AD, Cugini MA, Dibart S, Smith C, Kent RL, Socranski SS. The effect of SRP on the clinical and microbiological parameters of periodontal diseases. *J Clin Periodontol* 1997; 24(5):324-34.
32. Kinane DF, Radvar M. The effect of smoking on mechanical and antimicrobial periodontal therapy. *J Periodontol* 1997; 68(5):467-72.
33. Mombelli A, Lehmann B, Tonetti M, Lang NP. Clinical response to local delivery of tetracycline in relation to overall and local periodontal conditions. *J Clin Periodontol* 1997; 24(7):470-7.
34. Ah MK, Johnson GK, Kaldahl WB, Patil KD, Kalkwarf KL. The effect of smoking on the response to periodontal therapy. *J Clin Periodontol* 1994; 21(2):91-7.
35. Grossi SG, Skrepcinski FB, DeCaro T, Zambon JJ, Cummins D, Genco RJ. Response to periodontal therapy in diabetics and smokers. *J Periodontol* 1996; 67(10 Suppl):1094-102.
36. Preber H, Bergstrom J. The effect of non-surgical treatment on periodontal pockets in smokers and non-smokers. *J Clin Periodontol* 1986; 13:319-23.
37. Preber H, Bergstrom J. Effect of cigarette smoking on periodontal healing following surgical therapy. *J Clin Periodontol* 1990; 17(5):324-8.
38. Cohen SJ, Stookey GK, Katz BP, Drook CA, Christen AG. Helping smokers quit: a randomized controlled trial with private practice dentists. *J Am Dent Assoc* 1989; 118(1):41-5.
39. Little SJ, Stevens VJ, Severson HH, Lichenstein E. An effective smokeless tobacco intervention for dental hygiene patients. *J Dent Hyg* 1992; 66(4):185-90.
40. Stevens VJ, Severson HH, Lichenstein E, Little SJ, Leben J. Making the most of a teachable moment: a smokeless-tobacco cessation intervention in the dental office. *Am J Public Health* 1995; 85(2):231-5.

41. Macgregor ID. Efficacy of dental health advice as an aid to reducing cigarette smoking. *Br Dent J* 1996; 180(8):292-6.
42. Christen AG, McDonald JL, Olsen BL, Drook CA, Stookey GK. Efficacy of nicotine chewing gum in facilitating smoking cessation. *J Am Dent Assoc* 1984; 108(4):594-7.
43. Transdermal Nicotine Study Group. Transdermal nicotine for smoking cessation. Six-month results from two multicenter controlled clinical trials. *JAMA* 1991; 266(22):3133-8.
44. Christen AG, Olson BL, Sampson VM, McDonald JL. Intensive quit smoking program in a dental setting using nicotine gum: one year results. *CDA J* 1986; 14(11):28-34.
45. Cooper TM, Clayton RR. Stop-smoking program using nicotine reduction therapy and behavior modification for heavy smokers. *J Am Dent Assoc* 1989; 118(1):47-51.
46. Cooper TM, Clayton RR. Nicotine reduction therapy and relapse prevention for heavy smokers: 3-year follow-up. *J Am Dent Assoc* 1990; Jan(Suppl):32S-36S.
47. Li Wan Po A. Transdermal nicotine in smoking cessation. A meta-analysis. *Eur J Clin Pharmacol* 1993; 45(6):519-28.
48. Tang JL, Law M, Wald N. How effective is nicotine replacement therapy in helping people to stop smoking? *BMJ* 1994; 308(6920):21-6.
49. Gourlay S. The pros and cons of transdermal nicotine therapy. *Med J Aust* 1994; 160(3):152-9.
50. Fiore MC, Smith SS, Jorenby DE, Baker TB. The effectiveness of the nicotine patch for smoking cessation. A meta-analysis. *JAMA* 1994; 271(24):1940-7.
51. Silagy C, Mant D, Fowler G, Lodge M. Meta-analysis on efficacy of nicotine replacement therapies in smoking cessation. *Lancet* 1994; 343(8890):139-42.
52. Cepeda-Benito A. A meta-analytic review of the efficacy of nicotine chewing gum in smoking treatment programs. *J Consult Clin Psychol* 1993; 61(5):822-30.
53. Hurt RD, Sachs DP, Glover ED, Offord KP, Johnston JA, Dale LC, and others. A comparison of sustained-release bupropion and placebo for smoking cessation. *N Engl J Med* 1997; 337(17):1195-202.
54. Jorenby DE, Leischow SJ, Nides MA, Rennard SI, Johnston JA, Hughes AR, and others. A controlled trial of sustained-release bupropion, a nicotine patch, or both for smoking cessation. *N Engl J Med* 1999; 340(9):685-91.