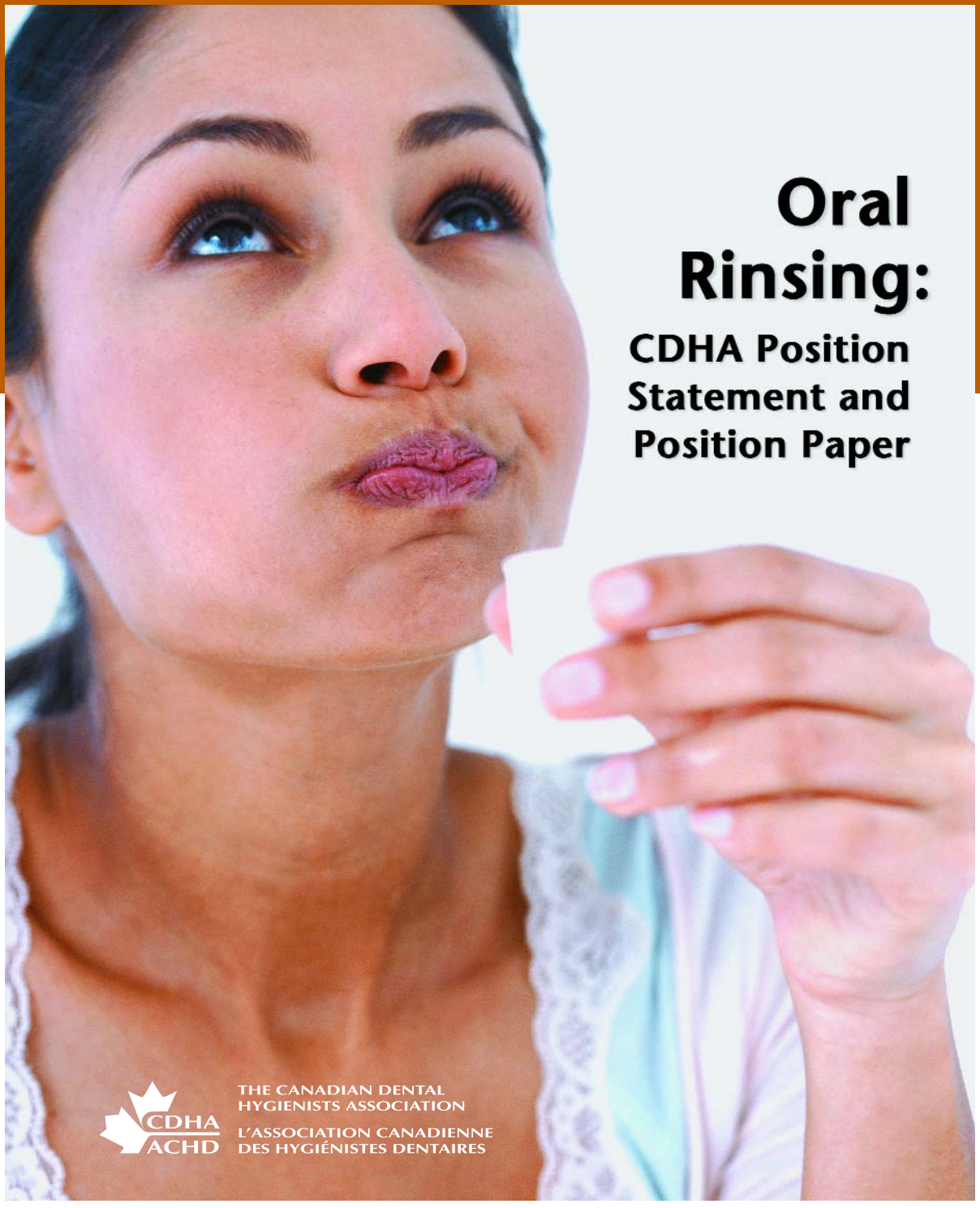
CANADIAN JOURNAL OF DENTAL HYGIENE · JOURNAL CANADIEN DE L'HYGIÈNE DENTAIRE

CJDH JCHD

JULY – AUGUST 2006, VOL. 40, NO. 4



THE OFFICIAL JOURNAL OF THE CANADIAN DENTAL HYGIENISTS ASSOCIATION

Mentorship

by Diane Thériault, RDH

While I usually channel surf whenever a television commercial comes on, a recent commercial by Rona that related to the 2010 Vancouver Olympics struck a cord with me. The philosophy of this company, a sponsor of Olympic athletes, is "Winning Values. Let's pass them on." This message reminded me of the need to create a spirit of mentorship within our organization so we can develop a new generation of volunteers and leaders to help our organization and profession prosper.

It is well known that all organizations, whether social, professional, or commercial, need the energy and fresh ideas of new participants to help the organizations navigate obstacles and reach new goals. The profession of dental hygiene in this country has benefited from the efforts and dedication of countless volunteers who wanted to improve the public's access to oral health care and also fashion a better career for themselves and their colleagues.

All organizations, whether social, professional, or commercial, need the energy and fresh ideas of new participants.

We are indebted to these trailblazers and owe them our commitment to further their efforts. The road toward a better future for all dental hygienists still stretches ahead of us and we need your vision and participation to reach that future. **Remember, only through your direct participation will you be able to help create the dental hygiene profession that you envision.**

I can speak from personal experience that the thought of volunteering on a local, provincial, or national organization can seem overwhelming. However, it must be noted that no one ever joins an organization fully understanding all the issues confronting it. We all go through a learning process with the help of mentors along the way. I was fortunate in having wonderful mentors who shared their experiences and knowledge with me and thus motivated me to get directly involved at the provincial and national level. I sincerely thank these individuals—they know who they are—for urging me to make a difference.

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Mentorat

par Diane Thériault, RDH

Alors qu'habituellement je zappe lors des messages publicitaires, un récent message publicitaire de Rona portant sur les Jeux Olympiques de Vancouver en 2010 a fait vibrer une corde sensible chez moi. La philosophie de cette entreprise, un commanditaire des athlètes olympiques, est « *Winning Values. Let's pass them on* ». Ce message m'a rappelé le besoin de créer un esprit de mentorat au sein de notre organisation afin que nous puissions former une nouvelle génération de bénévoles et de leaders pour aider notre organisation et notre profession à prospérer.

Il est bien connu que toutes les organisations, qu'elles soient sociales, professionnelles ou commerciales, ont besoin de l'énergie et des idées neuves des nouveaux participants pour aider ces organisations à franchir les obstacles et atteindre de nouveaux buts. La profession d'hygiéniste dentaire, dans ce pays, a bénéficié des efforts et du dévouement d'innombrables bénévoles qui voulaient améliorer l'accès aux soins de santé buccodentaire pour le public et, également, façonner une meilleure carrière pour eux et pour leurs collègues. Nous sommes redevables à ces pionniers et pionnières et nous devons nous engager envers eux à poursuivre leurs efforts.

Toutes les organisations, qu'elles soient sociales, professionnelles ou commerciales, ont besoin de l'énergie et des idées neuves des nouveaux participants.

La route pour un avenir meilleur pour tous et toutes les hygiénistes dentaires s'étend toujours devant nous et nous avons besoin de votre vision et de votre participation pour atteindre cet avenir. **Rappelez-vous que c'est seulement par votre participation directe que vous serez capables d'aider à créer la profession d'hygiéniste dentaire telle que vous l'imaginez.**

Je peux dire, par expérience personnelle, que l'idée de bénévolat au sein d'une organisation locale, provinciale ou nationale peut sembler écrasante. Cependant, il faut noter que personne, jamais, ne se joint à une organisation en comprenant entièrement tous les problèmes auxquels elle doit faire face. Nous passons tous et toutes par un

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Published six times a year, January/February, March/April, May/June, July/August, September/October, November/December, by the Canadian Dental Hygienists Association, 96 Centrepointe Drive, Ottawa, ON K2G 6B1. Tel: (613) 224-5515

Canada Post #40063062.

CANADIAN POSTMASTER
Notice of change of address and undeliverables should be sent to:
Canadian Dental Hygienists Association
96 Centrepointe Drive, Ottawa, ON K2G 6B1

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$90 plus GST for libraries and educational institutions in Canada; $135 plus GST otherwise in Canada; C$145 elsewhere. One dollar per issue is allocated from membership fees for journal productions. All statements are those of the authors and do not necessarily represent the CDHA, its board, or its staff.

CDHA 2006
6176 CN ISSN 1712-171X *(Print)*
ISSN 1712-1728 *(Online)*
GST Registration No. R106845233

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DEPARTMENTS

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Flowers, Dental Hygiene Issues, and CDHA

by Susan Ziebarth, BSc, MHA, CHE

All association must be a compromise, and, what is worst, the very flower and aroma of the flower of each of the beautiful natures disappears as they approach each other.

– Ralph Waldo Emerson, essay on "Friendship" (1841)

A CDHA MEMBER AND I WERE TALKING THE OTHER day about third-party reimbursement for dental hygiene services performed by an independent dental hygienist. Although we have been able to celebrate some significant successes in this area over the past year, entrepreneurial dental hygienists are still experiencing much frustration. Why do some things that seem so simple and obvious take so long to come to fruition? We discussed some of the political, geographical, competition, and legislative issues that form eddies and currents around this issue.

CDHA watches eight "flowerbeds" of activity in the dental hygiene environment.

I was also corresponding via e-mail with an educator who was concerned about learning outcomes for dental hygiene and the consistency in educational practices and standards for the country. She wanted to talk about what is being done to ensure that dental hygienists graduating from dental hygiene schools have the knowledge required to perform as professionals. We discussed the roles of accreditation, certification exams, and the role of Dental Hygiene Educators Canada and of CDHA. Technology, geography, legislation—all these factors influence the subject.

How to get more dental hygienists involved in dental hygiene research was another topic at the top of my mind in the past week. Linking a member with a research mentor to assist him or her in developing a plan was exciting as the future holds much potential with this combination of talent. Building unique dental hygiene knowledge is a key factor in the future health of the profession. Social factors, economics, and technology are significant factors in the development of research knowledge.

Flowers, Dental Hygiene Issues, and CDHA
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Fleurs, questions d'hygiène dentaire et l'ACHD

par Susan Ziebarth, B.Sc., M.H.A., C.H.E.

Toute association doit être un compromis et, ce qui est pire, c'est que l'essence et le parfum de la fleur de chacune des natures magnifiques disparaissent alors qu'elles se rapprochent l'une de l'autre. [Traduction]

– Ralph Waldo Emerson, essai on "Friendship" (1841)

L'AUTRE JOUR, UNE MEMBRE DE L'ACHD ET MOI discutions des remboursements effectués par une tierce partie pour des services d'hygiène dentaire rendus par une hygiéniste dentaire indépendante. Bien que nous ayons des raisons de nous réjouir de certains résultats significatifs dans ce domaine, au cours de la dernière année, les hygiénistes dentaires entrepreneures doivent supporter encore beaucoup de frustrations. Pourquoi certaines choses qui semblent pourtant si simples et si évidentes prennent-elles tant de temps à se régler ? Nous avons discuté de certaines des questions politiques, géographiques, concurrentielles et législatives qui forment les courants et contre-courants de cette question.

L'ACHD surveille huit « plates-bandes » d'activités dans le milieu de l'hygiène dentaire.

J'ai également correspondu par courriel avec une éducatrice qui était préoccupé par les résultats d'apprentissage en hygiène dentaire et la constance des normes et méthodes pédagogiques au niveau national. Elle voulait parler de ce qui se fait pour s'assurer que les hygiénistes dentaires qui obtiennent leur diplôme d'un programme en hygiène dentaire ont les connaissances nécessaires pour exercer en tant que professionnelles. Nous avons discuté des rôles de l'agrément et des examens de certification, ainsi que du rôle de l'association des Éducateurs en hygiène dentaire du Canada et de l'ACHD. Technologie, géographie, législation – ce sont tous des facteurs qui ont une influence sur la question.

Fleurs, questions d'hygiène dentaire et l'ACHD
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ORAL RINSING

Canadian Dental Hygienists Association Position Statement

Based on current research, dental hygienists are encouraged to recommend oral rinsing with commercially available over-the-counter rinses (mouthwashes) as an adjunct to their clients' usual mechanical plaque control measures, particularly for clients who are unable to control plaque accumulations and/or show signs of gingivitis. Based on well-conducted long-term clinical studies (six months and longer), mouth rinses with a fixed combination of three essential oils—thymol 0.063%, eucalyptol 0.091%, and menthol 0.042% along with other ingredient(s) (i.e., methyl salicylate 0.0660%)—have shown reductions in plaque and gingival inflammation beyond that accomplished with mechanical means alone. Other oral rinses, such as those with the active ingredients cetylpyridinium chloride, triclosan, and amine/stannous fluoride, demonstrate some reductions in plaque and gingivitis, but the research surrounding these formulations is less conclusive. Where rinses with alcohol may be poorly tolerated by or contraindicated for clients, an alternative alcohol-free oral rinse formulation may be warranted but it is recognized there will be a marked reduction in product efficacy. Recommendations surrounding the use of oral chemotherapeutics should be based on current evidence and client-specific conditions.

Keywords: biguanides, cetylpyridinium, chlorhexidine, dental plaque, gingivitis, mouthwashes, triclosan

CDHA Position Paper on Commercially Available Over-the-Counter Oral Rinsing Products

by Joanna Asadoorian, AAS(DH), MSc

INTRODUCTION

THE PREVALENCE OF GINGIVITIS IN ADULTS IN THE United States exceeds 50% and approaches 100% in some population groups.[1,2] Similar proportions are believed to exist in Canada, although data are lacking. Although the prevalence of periodontitis is decreasing in some populations, it increases with age and may effect as many as 80% of seniors.[3] While gingivitis is not a good predictor for the development of periodontitis, gingivitis does typically precede periodontitis[4] and therefore the control of gingivitis is well warranted.

Gingivitis does typically precede periodontitis and therefore the control of gingivitis is well warranted.

In developed nations, it is estimated that approximately one-third of the population removes plaque adequately; the proportion is much less in underdeveloped nations.[5] Inadequate control of bacterial plaque is considered one of the primary causative factors in periodontal disease progression.[6,7] While mechanical methods of plaque removal are considered the standard for individually applied oral disease preventive practices, the high prevalence of gingival disease has prompted research into and development of adjunctive methods for controlling oral biofilms.[8] In 2002, data presented at the International Association for Dental Research (IADR) meeting supported the benefit of oral rinsing with chemotherapeutics as an adjunct for controlling plaque and maintaining gingival health.[9] The adjunctive benefit of oral rinsing may also increase with age if dexterity and income decline.[3]

Mouth rinsing is reported to be favoured by the public because of its ease of use and breath freshening effect.[9] As dental hygienists are well positioned to make patient-specific recommendations to their clients that ultimately have the potential to influence individual behaviours for promoting oral health, [9] it is essential that dental hygienists possess and utilize the most current and evidence-based literature.

This paper reports on the current state of the science on oral rinsing with commercially available, over-the-counter (OTC) chemotherapeutic formulations for the control of periodontal diseases. The outcome of the investigation is the current position paper and subsequent position statements that will provide dental hygienists with current knowledge of the topic so they can provide evidence-based client education.

BACKGROUND

Standard mechanical oral hygiene methods, specifically toothbrushing and interdental cleansing along with regu-

lar professional care, have traditionally been relied on to prevent and treat periodontal diseases.[9] Indeed, the American Dental Association (ADA) has made this a consistent recommendation for almost a century.[7] Despite ubiquitous use of toothbrushing with fluoridated toothpaste in developed nations and flossing being the most widely recommended home care procedure for interproximal plaque control,[10,11] epidemiological data have indicated that these methods do not achieve their theoretical potential for controlling bacterial plaque accumulation and gingival disease.[1,2,11]

There are several difficulties with mechanical oral hygiene strategies for controlling bacterial biofilms. These include the time required to complete the task, continuing motivation to maintain these behaviours, and the manual dexterity required to prevent accumulations from occurring.[9,12-14] These difficulties are believed to be more pronounced in difficult-to-access areas of the mouth,[15] such as interproximal and posterior regions, which are even more technically demanding for plaque removal.[16] It is believed that the ability to overcome these difficulties is often lacking, and some plaque inevitably remains even under the best conditions.[13,17]

Mouth rinsing is reported to be favoured by the public because of its ease of use and breath freshening effect.

Plaque is considered the key factor contributing to gingival inflammation that, if left untreated, may progress to periodontitis.[16-18] Optimal plaque removal has been shown to control periodontal disease progression.[19] It is thus imperative that home care strategies address clients' non-compliance with traditional methods. It is essential that dental hygienists develop and maintain a keen understanding of the antimicrobial benefits of commercial OTC

Déclaration de l'ACHD concernant le rinçage buccal

En se fondant sur les recherches actuelles, les hygiénistes dentaires sont encouragées à recommander le rinçage buccal avec des rince-bouche commerciaux offerts en vente libre à leurs clients, comme complément à leurs méthodes mécaniques habituelles pour contrôler l'accumulation de plaque, particulièrement dans le cas des clients qui sont incapables de contrôler les accumulations de plaque et/ou qui montrent des signes de gingivite. Des études cliniques sérieuses à long terme (six mois et plus) ont démontré que l'utilisation de rince-bouche ayant une combinaison fixe de trois huiles essentielles – le thymol à 0,063 %, l'eucalyptol à 0,091 % et le menthol à 0,042 % – et d'autres ingrédients (p. ex., le salicylate de méthyle à 0,0660 %) permet de réduire davantage la plaque et l'inflammation gingivale que ne le font les méthodes mécaniques seules. L'utilisation d'autres rince-bouche, tels que ceux contenant des ingrédients actifs comme le chlorure de cétylpyridinium, le triclosan et le fluorure d'amine/étain amène certaines diminutions de la plaque et de la gingivite, mais la recherche englobant ces préparations est moins concluante. Lorsque les rince-bouche contenant de l'alcool peuvent être difficilement tolérés par les clients ou contre-indiqués pour les clients, l'utilisation d'un rince-bouche dont la préparation ne contient pas d'alcool peut être justifiée, bien qu'il soit reconnu qu'il y aura une réduction marquée de l'efficacité du produit. Les recommandations touchant les agents chimiothérapeutiques oraux devraient être fondées sur des données probantes actuelles et sur les affections spécifiques des clients.

RECOMMANDATIONS

1. Les rince-bouche chimiothérapeutiques commerciaux, offerts en vente libre, devraient être vus comme des compléments aux méthodes mécaniques d'enlèvement de la plaque.
2. Les rince-bouche offerts en vente libre sont particulièrement indiqués pour les clients qui ont une accumulation de plaque non contrôlée, des saignements, de l'inflammation et/ou de la gingivite ; toutes les recommandations d'hygiène buccale devraient être spécifiques au client.
3. Pour les rince-bouche offerts en vente libre, une combinaison fixe de trois huiles essentielles – le thymol à 0,063 %, l'eucalyptol à 0,091 % et le menthol à 0,042 % - avec d'autres ingrédients, comme le salicylate de méthyle à 0.0660% (Listerine®), s'est avérée plus efficace, plus sûre et a des effets secondaires acceptables, selon des études à long terme rigoureuses.
4. Plusieurs autres rince-bouche, offerts en vente libre, ont montré une efficacité supérieure aux placébos – incluant le AmF/SnF_2, certains produits contenant du chlorure de cétylpyridinium chloride et le triclosan – mais il n'y avait pas de protocoles rigoureux d'étude, ce qui, par conséquent, justifie une investigation plus poussée.
5. Les hygiénistes dentaires peuvent recommander des rince-bouche contenant de l'alcool puisqu'il n'a pas été démontré qu'ils pouvaient avoir des effets secondaires, l'exception étant pour les clients qui ne peuvent tolérer l'alcool pour des raisons médicales variées.
6. Les hygiénistes dentaires devront surveiller de près ce domaine d'étude puisque la recherche et le développement vigoureux dans ce domaine se poursuivront probablement. Les hygiénistes dentaires doivent reconnaître les limites des protocoles d'études à court terme et moins rigoureux lorsqu'elles évaluent l'efficacité et la sûreté des préparations de rince-bouche.

oral rinses and be aware in particular of these rinses' clinical efficacy and the manifestations of the products.[20]

Brief history of oral rinses

The earliest recorded reference to oral rinsing as a formal practice to treat diseases of the gums is attributed to Chinese medicine in approximately 2700 B.C.[5] The early practice of mouth rinsing was recommended with the urine of a child, and this practice spread across many countries and persisted until the early 1700s.[5]

In the mid-1800s, Joseph Lister, a surgeon and researcher, emerged as one of the major proponents of chemotherapeutics.[5] In the latter half of that century, Miller, a researcher in bacteriology, furthered the knowledge on oral rinsing by distinguishing between bacteriostatic effects (inhibiting the metabolism or reproduction of a bacteria) and bactericidal effects (killing the microbes).[21] He also recognized the need to rinse after mechanical methods of debris removal.[5] In the post-Miller era of the mid-1900s, oral antiseptic and germicidal claims were abundant. However, few claims had supporting clinical data, and those that did were in the form of *in vitro* testing.[5] While the early emphasis of these rinses was on caries prevention, there was a shift in the 1960s from preventive and therapeutic studies of antimicrobials to gingivitis and periodontitis.[5]

More recently, it was recognized that the levels of mechanical oral hygiene practice were inadequate despite technological innovations. This provided the impetus for the use of antimicrobial mouth rinses with the aim of controlling plaque and gingivitis.[6,16,22,23] As a result, both OTC and prescription formulations of oral rinses have increased sales and acquired a share of the home oral health care products market.[24] Oral rinses are typically viewed as being adjunctive to mechanical measures. Non-adjunctive methods—using chemotherapeutic rinses *instead* of mechanical means—are typically used in short-term preliminary studies for screening potential active ingredients and also in clinical settings such as post-surgery when mechanical plaque control is not possible.[4]

ORAL RINSES IN GENERAL

It is becoming increasingly accepted that chemotherapeutics in the form of oral rinses have a key role as adjuncts to the prevention and treatment of periodontal diseases.[6,7,12,15,18,19,23,25] However, a relatively small proportion of formulations and proprietary products have shown convincing evidence of efficacy.[26] It should be noted that long-term compliance with oral rinses is also yet to be established.[12] Current statistics indicate that less than 50% of the population use mouth rinses and half of these rinses are not therapeutic preparations.[27] Furthermore, most patients do not use mouth rinse products according to the manufacturers' directions; this could limit product efficacy.[27]

Although mouth rinses have the ability to reach less accessible areas, they penetrate sub-gingival areas only minimally. Within minutes, gingival crevicular fluid outflow will dilute sub-gingivally applied antiseptics.[12,28,29] In addition, the proteins present in saliva may reduce the activity of some substances.[29] It should also be noted that the oral biofilm produces an encased and highly protective community of cells that acts as a barrier and as a result is much less influenced by its environment, including the introduction of chemical agents.[29] Compared with bacteria in free water (planktonic forms), the gel-matrix of the plaque biofilm inhibits the diffusion of materials, albeit less than previously believed.[29]

Ideal properties of oral rinses include the following:

- safety
- access to bacteria even in difficult areas
- palatability
- low-cost
- high solubility within the formulation
- effective antibacterial impact
- broad spectrum preferably
- selectivity
- adequate bioavailability (plaque penetration and reactivity)
- specificity with regard to oral bacteria
- minimal side effects
- ability to reach and provide adequate retention in sites of disease initiation
- stability in storage[12,27,30-32]

CATEGORIZATION AND DISCUSSION OF ACTIVE INGREDIENTS

Extensive literature is available on chemotherapeutics for plaque and periodontal disease control. This falls into five distinct categories: antiseptic agents, antibiotics, enzymes, modifying agents, and anti-adhesives[5,33] (see table 1). Oral antiseptic agents exhibit little or no oral or systemic toxicity, or microbial resistance, and most have a broad antimicrobial spectrum.[5] Generally, the efficacy of

Antiseptic agents	Antibiotics	Enzymes	Modifying agents	Anti-adhesives
Broad spectrum; aimed at killing or preventing proliferation of all plaque organisms	Capable of inhibiting or killing specific groups of bacteria	Single or combinations; break up gel-like matrix holding plaque together; or modify plaque activity	Non-enzymatic, dispersing, denaturing agents that can alter the structure or metabolic activity of bacterial plaque	Agents that can interfere with the attachment of all or some of the bacteria to the pellicle surface

Table 1. Definitions of major antimicrobial categories[5]

oral antiseptics is attributed to their bactericidal activity; however, some also have been shown to interfere with bacterial colonization.[28] Several antiseptic agents have been investigated including phenols, quaternary ammonium compounds (QAC), oxygenating agents, herbal extracts, bis-biguanides, bis-pyridines, pyrimidines, halogens, and heavy metal salts.[5] Most of these are considered "first generation antimicrobials" in that they are able to kill bacteria readily on contact, but their effect on the microflora subsequent to expectoration is limited.[34] "Second generation" products, such as those incorporating some bis-biguanides, not only possess the immediate anti-bacterial effect but also have the important characteristic of a prolonged intra-oral effect, referred to as substantivity.[34] Substantivity is defined as the ability of a substance to bind to tissue surfaces and be released over time, thus providing sustained anti-bacterial activity.[31] In some products, it is considered to elicit effective plaque reductions.[19]

Antibiotics, enzymes, plaque-modifying agents, and anti-adherence products have varying roles in controlling plaque accumulations and periodontal diseases (table 1), and some agents are beginning to show promise. However, this review will cover only antiseptics, as this is where most of the research in commercial products has been conducted.[5,18]

Phenolic compounds. Of the antiseptic agents (see table 2), phenols have been in clinical use the longest and have been available worldwide for over a century with minimal adverse effects reported.[5,12] Listerine is a commercially available OTC phenolic compound.[5,12] The original Listerine formulation was tested in 1884. Miller, in his book *Micro-organisms of the Human Mouth* (1890), states that "Listerine has proved to be a very useful and active antiseptic."[5,22] An independently published assessment in 1929 showed Listerine to have significant bactericidal activity against a variety of micro-organisms.[22] Listerine was the first non-prescription oral rinse to be accepted by the Council of Dental Therapeutics for controlling plaque and gingivitis and by the Consumer Products Recognition Committee of the CDA for reducing and preventing the progression of gingivitis.[22,35]

Phenols have been in clinical use the longest and have been available worldwide for over a century with minimal adverse effects reported.

Essential oils (EOs) are the fragrant component of plants and contain phenolic compounds. These essential oils kill micro-organisms by disrupting their cell membrane and inhibiting enzyme activity.[28,36] The active ingredients in Listerine are a fixed combination of three EOs, thymol 0.063%, eucalyptol 0.091%, and menthol 0.042% along with other ingredients (i.e., methyl salicylate 0.0660%).[12,22] Together, these EOs prevent bacteria from aggregating with gram positive pioneer species, slow bacterial multiplication, and extract endotoxins from gram negative pathogens, thus reducing bacterial load.[28,30] They also slow plaque maturation and decrease plaque mass and pathogenicity.[28,30] The "sharp" taste reported of Listerine has been attributed to the ethanol and the essential oils, but other formulations—Cool Mint and Cool Citrus Listerine—are reportedly less "intense" tasting while maintaining the same effectiveness.[35,37] These compounds are also anti-inflammatory and scavenge oxygen free radicals; both these characteristics may contribute to their therapeutic effect.[5] While possessing high specificity and efficiency, EOs are considered to have low substantivi-

Active ingredient	Examples	Trade names
Phenolic compounds	Thymol, eucalyptol, menthol	Listerine®
Bis-biguanides	Chlorhexidine	Peridex® (0.12%)
Quaternary ammonium compounds	Cetylpyridinium chloride (CPC) Domiphen bromide (DB) Benzethonium chloride (BC)	Cepacol® (0.05% CPC); Scope® (CPC & DB); Colgate® 0100* (0.05% BC); Crest Pro-Health Rinse®* (0.07% CPC)
Herbal extracts	Sanguinarine	Viadent® (0.03%)
Germicide	Triclosan	Colgate Total Plax® (0.3% triclosan/ 2.0% copolymer) [USA]*
Halogens	Fluorides; iodine	Meridol®
Oxygenating agents	Peroxides	Amosan®

Table 2. Summary of antiseptic agents[5]

* Not available in Canada

ty.[30] Use of EOs results in no change in bacterial composition of supra-gingival plaque.[12] Although EOs decrease the total micro flora, there is no evidence of increased and/or opportunistic oral pathogens or antimicrobial resistance.[12]

Numerous short-term trials that include Listerine have been conducted and most have shown Listerine to have a positive influence on retarding plaque re-growth and other indices.[8,38-40] Long-term trials have shown the efficacy of Listerine in plaque and gingivitis reductions in the area of 56% and 35%, respectively, as compared with negative controls.[12,41] While most studies have shown that Listerine is significantly more effective than negative controls, CHX (discussed below) is generally shown to be more effective than Listerine in plaque reductions while demonstrating comparable anti-gingivitis properties.[22] The side effect profile of Listerine, however, is more favourable than CHX, with the former demonstrating minimal staining, no calculus promotion, and no interaction with toothpaste ingredients.[5,12,22]

Chlorhexidine gluconate (CHX)… is now one of the most widely investigated and used oral products.

In early 2005, it was reported that a U.S. federal court issued an order barring Listerine advertising claims (applying to promotional material and advertising in the United States), purporting that the mouth rinse was as effective as floss in reducing plaque and gingivitis interproximally.[42] The judge in the case asserted that the Listerine claims are false and misleading, pose a public health risk, and may undermine the efforts of dental professionals.[42] The complaint filed by McNeil-PPC Inc., a subsidiary of Johnson & Johnson (the maker of Listerine), involved two considerations: first, the claim that Listerine is as effective as flossing against plaque and gingivitis; and second, the implicit claim that Listerine is a replacement for flossing and all benefits of the latter may be replaced by rinsing.[42]

According to the report, the claims made by Listerine were based on two well-designed six-month trials performed by independent laboratories under contract with Pfizer following America Dental Association (ADA) guidelines. These trials were reviewed and accepted by the ADA's Council on Scientific affairs.[42] In May 2004, the Council approved Pfizer Inc.'s request to use the "as effective as flossing" claim in advertising Listerine.[42] For the therapeutic effect of a product to be "at least as good as" another, it must demonstrate a level of benefit no less than what would have been required for the two agents to be considered equivalent.[41] However, the study was conducted under "real world conditions," meaning that neither the flossing nor the oral rinsing was supervised by researchers. Therefore there was no assurance of compliance or that the correct technique was followed with each respective intervention. The judge concluded that the flossing arm of the study was not done correctly.[42] Assuming that flossing is more technically demanding than rinsing, compliance within this test group may be less stringent than the rinsing group and may have an impact on the study outcomes. It has been asserted in subsequent publications of Listerine that it was never the intention to imply that mechanical interproximal plaque removal is not necessary, and more recent studies have been conducted in an attempt to demonstrate an incremental adjunctive benefit of rinsing with Listerine in addition to flossing.[7,18,41]

Bis-biguanides. Introduced in the mid-1950s, bis-biguanides have a very broad antimicrobial spectrum effective with both gram positive and gram negative bacteria.[5,30] Chlorhexidine gluconate (CHX) is a cationic bis-biguanide and was initially presented to the market as a 0.2% mouth rinse.[6] It is now one of the most widely investigated and used oral products.[30] The mechanism of action is to bind strongly to bacterial cell membranes, increasing the cell permeability, thus initiating leakage and/or precipitating intracellular components.[28] Furthermore, it binds to salivary mucins, reducing the pellicle formation, thereby inhibiting subsequent colonization. It also hinders the adsorption of bacteria onto the tooth structure.[28]

While the 0.2% CHX rinse was previously popular in Europe, less concentrated formulations (0.12%–0.1%) were later made available in an attempt to reduce notable side effects such as tooth staining while still maintaining the positive plaque and gingivitis outcomes.[26] The proprietary formula, Peridex, was one of these and is now typically marketed as a 0.12% prescription formulation.[22] It was accepted by the U.S. Food and Drug Administration's (FDA) Council on Dental Therapeutics on a prescription basis.[12] The typical regimen for this product is 18–20 mg for 60 seconds twice a day at 0.12% or 0.2% formulations.[26] The dose-response of CHX is evident in that a concentration of 0.1% is the threshold level, above which no further benefits will be expected.[26,43]

The advantage of CHX over other cationic agents is that it can bind strongly to many sites in the oral cavity and is released slowly over 7 to 12 hours after rinsing, thus providing considerable substantivity and a sustained antimicrobial effect restricting bacterial proliferation.[19,28,30] CHX binds strongly with anionic glycoproteins and phosphoproteins on the mucosa and tooth pellicle, but it can also bind to cell surfaces of bacteria affecting the cells' ability to adhere.[5,12,30] CHX is considered the most potent chemotherapeutic agent currently available.[44] Short-term trials predominantly demonstrate the superior efficacy of CHX on plaque re-growth and numerous other outcome measures.[38,40,45-48] Plaque reductions of 16%–45% and gingivitis reductions from 27%–80% have been demonstrated in six-month trials.[12] Because of the accumulation of positive clinical research findings, CHX rinses are often used as a benchmark control, meaning a product already in use and/or evaluated thus providing information regarding another agent's relative activity. CHX rinses are used similarly as a positive control, meaning they are accepted as effective, the most effective, or the "gold standard."[4,22,23,26,36]

As CHX has no activity on specific bacterial enzymes or receptors, there is minimal opportunity for bacterial resistance to develop, and no shift in the oral flora has been demonstrated that would allow opportunistic species to flourish.[5,12,28] Unfortunately, CHX has several clinically significant disadvantages including brown staining of the teeth, tongue, and restorations, particularly on composites, requiring professional removal; alteration of taste perceptions for up to four hours after rinsing; and potentially increased supra-gingival calculus build-up.[12,30,33] Hypersensitivity of mucosa and hairy tongue are less common side effects.[30] Furthermore, the efficacy of CHX can be impaired when it is incorporated into complex rinse formulas and also by ingredients in toothpastes, specifically, sodium lauryl sulfate.[12,23,33] Although the long-term use of CHX has been shown to be safe, its side effects prevent its acceptance except under short time frames.[12,23,44]

Halogens/fluoride. The use of fluoride as a caries preventive agent is well documented, but its use in the prevention and control of plaque and periodontal diseases is less recognized. While stannous fluoride (SnF_2) has been shown to be effective, stability problems have prevented its widespread use.[49] A recent systematic review concluded that there is insufficient research surrounding the efficacy of SnF_2 mouth rinses on plaque and gingivitis.[50] In the early 1990s, a stable amine/stannous fluoride (AmF/SnF_2) solution was marketed by GABA International (Swiss) under the proprietary name Meridol[47] and Oraflur® (Swiss).[29] Unlike SnF_2, AmF has only caries preventive properties. However, in Meridol, the antimicrobial affect of SnF_2 (inorganic) is stabilized as it is combined with AmF (organic).[49,51] The stannic ions in the AmF/SnF_2 compound are absorbed on the bacterial surface, inhibiting metabolic efficiency and thereby reducing the accumulations of plaque deposits.[49]

Some short-term trials with Meridol have shown improvements in plaque outcome scores over placebo rinses,[38,45,48,52] while others have shown equivocal results in comparison to CHX.[45] Studies, again short-term, have demonstrated efficacy on bacteria in planktonic forms but not in biofilms, thus demonstrating the importance of *in vivo* trials under real-life conditions.[48] One long-term study examining the efficacy of Meridol demonstrated significant reductions in approximal plaque, bleeding, and gingival indices over untreated controls.[51] However, no positive control group was included so it is not known how Meridol compares with benchmark formulations such as CHX.[51] In more recent short- and long-term studies, definitive reductions in pathogenic micro-organisms that have translated into reductions in signs of inflammation have also been demonstrated.[29,49] To date, no side effects of Meridol have been reported.[33,51]

Quaternary ammonium compounds. Quaternary ammonium compounds (QAC), which are generally cationic agents, interact with the cell membrane of bacteria affecting their permeability and subsequently resulting in the loss of cell contents.[5] QAC are bactericidal to both gram positive and gram negative bacteria but to a greater degree with the former.[5] QAC are also considered to have low substantivity while possessing high specificity and efficiency.[30] These compounds have the ability to bind strongly to oral tissues, but they are released at a more rapid rate than CHX.[33]

One example: cetylpyridinium chloride (CPC*)* usually at 0.05% (Cepacol) without or with domiphen bromide (Scope) or benzethonium chloride also at 0.05% (Colgate 100 [USA]) have been used in mouthwash for many years.[5,33] CPC controls supra-gingival plaque and calculus.[6,15,31] Crest Pro-Health Rinse (USA) is a recently introduced commercially available OTC formulation that delivers 0.07% CPC in a high bioavailability base not requiring alcohol for solubilization.[6,15,27,31] It has met FDA guidelines for safety and effectiveness against plaque formation and gingivitis, but its effectiveness can decrease in the presence of product emulsifiers.[6,15,27,31]

CPC commercial rinses have shown plaque reductions at 25%–35% with equivocal results for gingivitis measures and therefore have mainly been accepted only for cosmetic use.

CPC commercial rinses have shown plaque reductions at 25%–35% with equivocal results for gingivitis measures[5,33] and therefore have mainly been accepted only for cosmetic use.[12] Short-term trials, including some with experimental formulations of CPC, have shown improvements in plaque indices over controls,[53] but they have been significantly less effective than CHX, reporting less than half the plaque reductions.[46] CPC shares some of the adverse effects of CHX including tooth staining, burning, and increased calculus formation.[5,33] So, while having a moderate degree of efficacy, its potential is limited because of rapid desorption from oral tissues.[5,33] New combinations of CPC with other active ingredients have been proposed, are being tested, and have shown promise *in vivo*.[54]

Germicides. Triclosan, a bis-phenyl, is a broad-spectrum antibacterial agent with a favourable safety profile.[23,33] Short-term trials of triclosan/copolymer (Colgate Total Plax) have shown significant effectiveness in plaque outcomes when measured against controls, but this formulation is significantly less effective than CHX.[39] Another short-term trial showed that Colgate Total Plax with triclosan significantly reduced planktonic forms of bacteria over controls, but this was not demonstrated for bacteria in biofilm forms.[52] Experimental triclosan formulations have been compared with sanguinarine and CHX; triclosan was significantly more effective than sanguinarine but less than CHX.[47] While triclosan is mostly used in dentifrices,[15] the oral rinse containing 0.3% triclosan/2.0% copolymer (Colgate Total Plax [USA]) has beneficial effects on plaque formation and gingivitis reduction.[23,55] However, triclosan-containing formulations are not as effective as CHX, likely due to triclosan's limited ability to

bind intra-orally.[23,33] To combat its limited substantivity, triclosan has been placed into combination products to increase its retention.[33]

Caution must be taken when making recommendations as other Plax formulations do not contain triclosan but have an antimicrobial detergent, sodium benzoate, and are no more effective than placebo and have limited clinical significance.[33,56] A new formulation marketed under the trade name Advanced Formula Plax® in the United States contains increased amounts of sodium lauryl sulfate and tetrasodium pyrophosphate along with the usual detergent mixture, but no triclosan.[8] In short-term trials, this combination was no more effective than the negative controls in plaque outcome scores.[8]

Oxygenating agents. Oxidizing agents, such as hydrogen peroxide, have been used for many years to "disinfect" or cleanse oral tissues, but interest in their use against plaque and gingivitis has been limited.[57] Hydrogen peroxide in concentrations acceptable for human use (<3%) is unstable and difficult to store, but some commercial products containing sodium peroxyborate or sodium peroxycarbonate are available.[57]

Herbal extracts. The herbal extract sanguinarine is currently employed as an anti-plaque and anti-gingivitis agent in mouth rinses and toothpastes. It is an alkaloid extract from the bloodroot plant, *Sanguinaria canadensis,* and is used at 0.03% concentrations.[5,33] There are conflicting reports on its effectiveness.[33] A long-term trial compared the effect of a sanguinarine rinse (Viadent) with EO (Listerine), CHX (Peridex), and a placebo on plaque, inflammation, and bleeding.[34] All three test groups reduced plaque scores significantly compared with the placebo, with the CHX being significantly better than the EO that in turn had significant improvements over the sanguinarine.[34] Only the CHX showed significant reduction in the gingival indices, and the EO demonstrated reductions in the area of 9%.[34] In contrast, subsequent short-term trials have demonstrated that an experimental sanguinarine formulation was no more effective than placebo.[47] Therefore, long-term trials are still required to establish its efficacy.[5]

Other naturally sourced products, for example Herbal Mouth and Gum Therapy®, have shown antimicrobial activity, but not in long-term studies nor with positive controls.[24] According to the manufacturer, echinacea (analgesic, anti-inflammatory, and antibiotic) and goldenseal (antiseptic and antibiotic) are the main active ingredients, but the percentage of each within the formulation is retained as proprietary information.[24]

There are several studies on a variety of other miscellaneous compounds. The salts of heavy metals are effective as antibacterial agents, and while zinc has persisted in use, interest has shifted commercially to toothpastes.[5] Povidone-iodine, which contains 1% iodine, is an antiseptic that has received little attention in the literature, but preliminary data shows some efficacy against gingivitis.[58] Short-term trials examining Xylitol rinse, with or without fluoride, demonstrated no superiority over controls on plaque and gingival indices.[59] Recently, antimicrobial host proteins, lysozyme, lactoferrin, and lactoperoxidase (LLL), have been used in oral health care products, particularly for clients with xerostomia.[48] One such product, Biotène®, an antimicrobial containing LLL, was investigated in a short-term trial. Even though it reduced salivary bacteria, it had no more efficacy on plaque indices than the control and was inferior to both CHX and AmF/SnF_2.[48]

Triclosan-containing formulations are not as effective as CHX, likely due to triclosan's limited ability to bind intra-orally.

The role of alcohol in oral rinses

Alcohol, particularly ethanol, is a common chemical agent in oral rinse solutions to emulsify antimicrobial ingredients in bioavailable forms.[24,25,27] The ethanol itself has only a slight antibacterial efficacy both *in vitro* and *in vivo,* but this does not contribute to the oral rinse's efficacy.[17,25,60] Most mouth rinses contain less than 10% by volume but some contain up to 30% by volume.[25] Most AmF/SnF_2, CHX, CPC, triclosan, and EO rinses contain alcohol,[25] but interest has increased for oral rinse formulations that are alcohol free.

Concern has been raised surrounding alcoholic beverages and oral cancer, but it is recognized such risk is linked to carcinogens, such as urethane, found in beverages (not oral rinses) rather than to the alcohol itself.[17] While this paper does not attempt to review the literature surrounding an association between alcohol and cancer-related health risks, the authors of one review paper stated: "The ethanol [found in oral rinses] has never been demonstrated to be carcinogenic" in laboratory or human studies.[17] The paper looked at studies and reviews of oral rinses and epidemiological data examining a potential association. It concluded there is no reason for clients to refrain from using mouth rinses with alcohol except for medically related client-specific contraindications.[17]

Alcohol-containing oral rinses may be contraindicated for certain patient groups including recovering alcoholics, those taking certain antibiotics, and diabetics.[17,27] Similarly, products containing alcohol may be poorly tolerated by patients who are immunocompromised, undergoing head and neck radiation therapy, and/or have mucositis.[17,27] Some researchers have concluded that higher alcohol content may induce more pain on rinsing in some subjects.[27] While a recent review investigating the epidemiology of dry mouth in geriatric populations stated that alcohol use has been implicated in xerostomia, the authors state the exact nature of the relationship is unclear and needs to be systematically examined.[61] In two recent short-term studies, perceived mouth dryness and reduced salivary flow were not shown to be significantly different between study subjects using oral rinses either with or without alcohol.[62,63]

MATERIALS AND METHODS

This position paper, commissioned by the Canadian Dental Hygienists Association (CDHA), represents a comprehensive review of the literature on oral rinsing with commercially available, over-the-counter (OTC) chemotherapeutic agents in order to develop position statements surrounding the use of the practice of home mouth rinsing as a preventive oral health behaviour. The first step in the investigation was to develop a PICO question, which subsequently guided the literature search and this report. The PICO question:

> Do adults who have plaque and/or gingivitis and/or early periodontitis (**P**opulation) who mouth-rinse according to manufacturer's directions with a commercially available, non-prescription oral rinse as an adjunct to mechanical measures including toothbrushing alone or toothbrushing and flossing (**I**ntervention) compared to using no oral rinse (**C**omparison) have improved plaque, bleeding, and/or gingivitis scores (**O**utcome)?

The literature search was conducted in stages from January 2006 to March 17, 2006. The search included the following databases: MedLine, CINAHL (Cumulative Index of Nursing and Allied Health Literature), and the Cochrane controlled trials register. The literature search focused on papers reporting on long-term, *in vivo* randomized controlled trials (RCTs) but also included other relevant papers (both *in vivo* and *in vitro* short-term studies) including meta-analysis/systematic reviews, reviews, and various other sources including media reports and websites.

The first stage of the review involved the three databases and included combinations of the following keywords: oral rinse, mouth rinse, home rinse, oral chemotherapeutics, fluoride rinse, (anti) gingivitis, (anti) plaque, and essential oils. The search was limited to the English language from 1995 to 2006. This search resulted in 534 articles from the Medline and CINAHL databases. The search of the Cochrane database did not produce any literature (existing systematic reviews or study protocols) pertaining to oral rinsing for the purpose of controlling plaque or periodontal diseases. Papers were selected for retrieval if they measured the impact of oral rinsing with the use of a commercially available, non-prescription mouth rinse (experimental group) compared with oral rinsing with alternative products and/or the use of mechanical plaque removal interventions (control group) in adult populations who had either plaque and/or healthy gingiva, and/or gingivitis and/or early periodontitis and an outcome variable was measured. Other relevant literature was identified at this point if it was deemed to provide background information. The search was conducted using titles, abstracts, and the full text when necessary. A total of 70 papers were identified and subsequently retrieved in full text.

The second stage of the search involved manually checking for additional materials in the bibliographies and references in all papers identified by the initial search. At this stage, the retrieval criteria were more purposeful and less restricted to the original keywords and PICO question, as the literature may have been necessary for understanding or background information. This resulted in an additional 29 papers being retrieved. Several websites were also subsequently examined including those of the Canadian Dental Association (CDA) and the American Dental Hygiene Association (ADHA).

A unique element of a position paper is the solicited input from recognized experts and researchers. For this paper, input was sought from experts in three fields: oral biology, pharmacology, and periodontology. The rationale for this combination was to provide expertise in each scientific theme of inquiry pertaining to this topic.

RESULTS

Most studies conducted on oral rinsing are either short-term (24 hours to a month in length) or long-term (six months or longer). The short-term trials were either *in vitro* or *in vivo*, with the latter typically conducted in the absence of any oral hygiene measures.[64] *In vitro* studies are more affordable and practical to conduct. However, they do not reflect the true intra-oral conditions such as saliva turnover; the ability of the active ingredient to adhere to oral tissues and its resulting substantivity (or lack thereof); and the interference of rinse's cationic active ingredients by external some components, such as those in toothpaste.[4,64,65]

A four-day *in vivo* model that has been used extensively in research and has produced consistent results involves study subjects rinsing with either an experimental or control rinse formulation in the absence of any other oral hygiene measures with a subsequent assessment of the chemotherapeutic plaque inhibitory activity.[64] As bacterial phenotypes can change when organisms go from a planktonic state to part of a biofilm—referred to as a sessile state—altered susceptibilities to antimicrobial agents may result.[28] Therefore the efficacy of antiseptics depends on *in vivo* as well as *in vitro* microbicidal properties.[28] It can be stated generally that, with few exceptions, an agent with limited activity *in vitro* will have poor activity *in vivo*.[4] However, *in vitro* study results have poor correlations with *in vivo* findings. *In vitro* models cannot measure and do not allow for the dynamic nature of the mouth and other factors such as the substantivity of an agent that affect the effectiveness of antimicrobials.[4]

To address the deficiencies of short-term trials, the ADA established the Council on Dental Therapeutics (CDT) acceptance program for chemotherapeutic mouth rinses. This resulted in guidelines in the late 1980s for conducting clinical trials aimed at demonstrating efficacy of these products.[65] These guidelines stipulate that clinical trials must be controlled, be at least six months in length, and demonstrate statistical significance of efficacy against supra-gingival plaque and gingivitis under "normal" situations with a typical population group.[65] In Canada, as of 2003, only Listerine and Peridex were approved by the Council as effective under these guidelines.[12,65] The author is unaware of any change in this status.

LONG-TERM CLINICAL TRIALS

Essential oils studies

Of the long-term trials conducted since 1995, nine studies of OTC, commercially available oral chemotherapeutics were identified within the published literature, although earlier long-term studies have been conducted (see previous review). Five of these more recent studies directly examined essential oil formulations (table 3).[7,13,22,41,66]

In comparisons of EO and CHX, CHX usually demonstrates superior results, albeit coupled with significant side effects. Of the most recent studies, Listerine (EO) and Peridex (CHX), along with a negative control, were directly compared with the aim of assessing their anti-plaque and anti-gingivitis effectiveness and their associated side effects.[22] In this study, which was in accordance with ADA guidelines for acceptance of chemotherapeutic products, both experimental groups produced significant improvements in plaque, bleeding, and gingivitis scores over the control.[22] Most striking was observation that at the six-month point, there was no statistically significant difference between CHX and EO rinses.[22] For the calculus index, CHX showed significant increases over the control and EO, whereas the stain indices showed that both test groups had significant increases over the control group.[22]

As CHX is not currently indicated for long-term use, EO rinsing has been compared to various other interventions including flossing. Rinsing with EO, specifically Listerine, was more effective than flossing or controls on plaque scores in recent long-term trials.[13,41] Both Listerine rinsing and flossing are more effective than controls on gingival indices with one later study showing that EO rinsing significantly outperforms flossing.[13,41] These two comparable studies have demonstrated Listerine mouth rinse to be "as

Study	Design	Groups	Results (statistically significant findings)
2004[7] (Sharma et al.)	RCT, observer blind, parallel group, 6 month, n=241	Three: 1. Brush + control rinse vs. 2. Brush + floss + control rinse vs. 3. Brush + floss + EO rinse	**GI**: Brush +F (11.2%) and Brush+F+EO (29.9%) reductions compared to control; and Brush+F+EO (21%) reduction compared to Brush+F **PI:** Brush+F (9.3%) & Brush+F+EO (56.3%) reductions compared to control; and Brush+F+EO (51.9%) better than Brush+F **IP MGI**: Brush+F+EO (15.8%) reduction compared to Brush +F **IP PI**: Brush+F+EO (47.7%) reduction compared to Brush +F
2004[22] (Charles et al.)	RCT, observer blind, parallel group, 6 month, n=107	Three: 1. Test CHX 2. Test EO 3. Control	**GI** (BI was similar): EO 14% and CHX 18.2% reductions over control; no difference between EO and CHX **PI:** EO 18.8% and CHX 21.6% reductions over control, no difference between CHX and EO **Calc.I:** CHX had increases over both EO and control; no difference between EO and control **Stain I**: both test groups had increases over control and CHX increased over EO
2003[13] (Bauroth et al.)	RCT, observer blind, parallel group, 6 month, n=324	Three: 1. Brush+EO 2. Brush+F 3. Brush + control rinse	**Ip MGI**: Brush+EO and Brush+F reduced over control; Brush+EO reduced over Brush+F **Ip PI**: Brush+EO reduced over both Brush+F and control **Ip BI**: Brush+EO and Brush+F reduced over control
2002[41] (Sharma et al.)	RCT, observer blind, parallel group, 6 month, n=301	Three: 1. EO rinse 2. Floss 3. Negative control rinse	**Ip MGI**: EO (7.9%) & F (8.3%) reductions over control **Ip PI:** EO more effective than control and F **IpBI:** EO and F more effective than control **Whole mouth MGI, PI, & BI**: EO and F better than control except PI (F only at 3 months); EO was better than F for BI
2001[66] (Charles et al.)	RCT, double blind, parallel group, 6 month, n=316	Three: 1. EO+control toothpaste 2. Total toothpaste + control rinse 3. Control (placebo)	**MGI:** EO and Total TP reductions compared to placebo; no difference between test groups

Table 3. Summary of long-term essential oil oral rinse studies

effective as" dental floss when both were used under "real-life" conditions, meaning unsupervised home use.[13,41] The authors concluded that the results indicated that Listerine rinsing satisfied the "at least as good as" criterion as interproximal gingivitis reductions were comparable to the flossing groups.[13,41] In both studies, however, it was noted that the flossing group produced lower-than-expected values based on previous findings.[13,41] The studies did not examine the compliance with any of the interventions; therefore the frequency and technique of flossing during the study is unknown. The authors recommended that EO mouth rinse be used as an adjunct to, rather than a replacement for, mechanical means and that further studies were warranted to examine the incremental effect of using EO rinse with flossing compared with using each on its own.[13,41]

In comparisons of EO and CHX, CHX usually demonstrates superior results, albeit coupled with significant side effects.

The incremental effect of the adjunctive use of EO (Listerine) oral rinse with brushing and flossing was evaluated in a study carried out in accordance with the ADA Guidelines.[7] As expected, both the toothbrushing-with-flossing group and the toothbrushing-with-flossing-and-EO-rinsing group outperformed the toothbrushing-only group.[7] However, the incremental benefit of adding Listerine rinsing to flossing regimens was demonstrated as this group showed statistically significant reductions in plaque (51.9%) and gingival (21.0%) scores over the toothbrushing-and-flossing group.[7] The authors concluded that clinically significant and meaningful benefits were obtained with the adjunctive use of the EO oral rinse in addition to flossing and that this reflects a mechanical/chemotherapeutic synergistic effect rather than a simply additive effect.[7]

In a study comparing three groups, Listerine rinsing and a control toothpaste; Colgate Total toothpaste, a triclosan copolymer, with a control rinse; and a control toothpaste and a placebo rinse.[66] Both of the experimental groups showed significantly reduced gingival, bleeding, and plaque indices compared with the placebo group.[66] The reductions were greater for the Listerine group compared with the toothpaste group for all outcomes measured, but the differences were found to be significant only for reducing bleeding and plaque.[66]

Other long-term studies

One long-term random controlled trial (RCT) examined the efficacy of a triclosan/copolymer pre-brush rinse without fluoride (0.03% triclosan, and 0.13% polyvinylmethyl ether/maleic acid; Colgate Plax) formulation on pre-existing plaque and gingivitis in comparison with a placebo.[55] While no positive control group was included in the study, the results indicated that the rinse had significant reductions in plaque (29.1%) and gingival indices (16.9%) over the placebo.[55] These findings are consistent with an earlier short-term study where a 0.06% triclosan formulation was more effective than placebo in controlling plaque accumulations when oral hygiene practices were suspended over an 18-day period.[67] In the latter study, 0.12% CHX (Peridex) that was included as a positive control outperformed the triclosan.[67]

While earlier research had clearly shown superiority of CHX and EO (Listerine) over AmF/SnF_2 formulations,[26,64] recent short-term studies have shown equivocal results. For example, a 24-hour RCT examined the *in vivo* efficacy of AmF/SnF_2 mouth rinse (Meridol) and 0.2% CHX solution (Chlorheximed®) in comparison with a placebo control on the thickness and vitality of developing biofilms using an *in situ* splint system.[29] Although both rinses reduced the biofilm thickness and vitality compared with the placebo, there were no significant differences between the two test groups.[29] A 24-hour plaque re-growth study showed that, while all of the test groups were superior to the negative control, the differing CHX concentrations were not more effective than the AmF/SnF_2 rinse (Meridol).[26] In another recent four-day plaque re-growth model, five experimental alcohol-free rinses were compared with a placebo.[25] The test groups included AmF/SnF_2 vs. triclosan (0.02%) vs. triclosan (0.15%) vs. negative control (placebo) vs. CHX.[25] All of the test formulations showed significant reductions in plaque indices and plaque flora vitality.[25] Interestingly, the AmF/SnF_2 formulation was superior to the CHX, which was inconsistent with previous findings.[25] The CHX concentration was slightly lower than typically employed, but this was unlikely to account for its decreased efficacy. [25] It is likely that the differences in CHX activity were due to the differences between *in vitro* and *in vivo* actions.[25]

One long-term (nine-month) RCT examined the effects of an AmF/SnF_2 oral rinse on adults with chronic gingivitis or signs of early periodontitis.[49] The study was complicated by including a comparison of the efficacy of AmF/SnF_2 toothpaste/AmF/SnF_2 rinse (test/test), with an AmF/SnF_2 toothpaste/NaF rinse (test/control), with a NaF toothpaste/NaF rinse (control/control).[49] While the microbiological assessments showed that the test/test group had a superior impact on microflora than the other two groups, the plaque, bleeding, and gingival indices and pocket depth measurements were all significantly and positively influenced over baseline scores by all groups, and there were no significant differences among the three groups.[49]

The anti-gingivitis, anti-plaque, and anti-stain efficacies of a fluoridated hydrogen peroxide rinse (0.05% sodium fluoride and 1.5% hydrogen peroxide) manufactured by Rembrandt were examined in a two-stage design where oral hygiene practices were suspended for the first 28 days of the study.[44] The study, which did not include a positive control group, showed no differences in plaque scores compared with the baseline or placebo controls.[44] However, the test group did have reductions from baseline in bleeding, gingival, and stain indices, whereas the placebo had reductions in bleeding only.[44]

The long-term effect of an alcohol-free 0.07% CPC oral rinse (Crest Pro-Health Rinse [USA]) was compared with that of an alcohol-free negative control on plaque and gingivitis.[15] Results showed that at six months, there were 15.8%, 33.3%, and 15.4% reductions in plaque, bleeding, and gingival indices respectively by the test groups over the placebo; each of these reductions was found to be statistically significant.[15] While the authors concluded that the results support the use of the CPC mouth rinse, it should be noted that a benchmark control was not included in the study.[15] While recent studies have compared CPC oral rinse to Listerine and shown no significant differences between the two test groups, these have been short-term experimental models.[6,68] Therefore conclusions cannot be firmly drawn about the relative effectiveness of CPC compared with other more established formulations.

CONCLUSIONS

Evidence has accumulated that suggests some chemotherapeutic oral rinses are effective as an adjunct to home care routines. Using the defined guidelines from the ADA's Council on Dental Therapeutics acceptance program for chemotherapeutic mouth rinses, only two products—Listerine and Peridex—have been shown to be efficacious. For daily use of an OTC product by clients with inadequate plaque control and/or gingivitis or early periodontitis, Listerine stands as the most substantiated product for efficacy, safety, and an acceptable side effect profile. An exception to this would be for clients unable to tolerate, or unwilling to use, products containing alcohol. For these individuals, non-alcohol containing formulations may be indicated with the understanding that the efficacy is markedly less, although likely greater than placebo. Their use should be evaluated on an individual client basis. The concerns that products with alcohol contribute to cancers of the oropharynx are unsubstantiated and do not constitute sound evidence.

Using the defined guidelines from the ADA's Council on Dental Therapeutics acceptance program for chemotherapeutic mouth rinses, only two products—Listerine and Peridex—have been shown to be efficacious.

Many products are being developed and studied showing efficacy superior to placebo controls. Some of these products are approaching the level of efficacy of Listerine. These products include Meridol, some CPCs, and triclosan-containing products. Consequently, it is important to continuously re-visit this literature. However, dental hygienists among other oral health care providers must recognize the limits of short-term trials and of long-term trials that are not appropriately controlled. This is necessary for the accurate "placing" of product efficacy within stringent study protocols.

ACKNOWLEDGEMENTS

This paper has been made possible by an unrestricted educational grant from Pfizer Consumer Healthcare.

RECOMMENDATIONS

1. Over-the-counter (OTC) commercially available chemotherapeutic oral rinses should be viewed as adjunctive to mechanical plaque removal methods.
2. OTC rinses are particularly indicated for clients with uncontrolled plaque, bleeding, inflammation and/or gingivitis; all oral hygiene recommendations should be client-specific.
3. For OTC rinses, a fixed combination of three essential oils, thymol 0.063%, eucalyptol 0.091%, and menthol 0.042%, and additional ingredients such as methyl salicylate 0.0660% (Listerine) has been demonstrated in stringent long-term studies to be most effective, safe, with acceptable side effects.
4. Several additional OTC rinse products—including AmF/SnF_2, some products containing cetylpyridinium chloride and triclosan—have shown efficacy superior to placebos but not within stringent study protocols. They therefore warrant further investigation.
5. Dental hygienists can recommend alcohol-containing products as these have not been demonstrated to have adverse effects; the exception remains for clients who are unable to tolerate alcohol for various medically related reasons.
6. Dental hygienists will need to monitor this field of inquiry closely as vigorous research and development in the area will likely continue. Dental hygienists need to recognize the limitations of short-term and less-stringent long-term study protocols when determining the efficacy and safety of rinse formulations.

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Mentorat *(suite de la page 163)*

processus d'apprentissage avec l'aide de mentors qui nous soutiennent tout au long de la route. J'ai été choyée en ayant de fantastiques mentors qui ont partagé leurs expériences et leurs connaissances avec moi et qui m'ont également motivée à participer au niveau provincial et au niveau national. Je remercie sincèrement ces personnes – elles se reconnaîtront – pour m'avoir incitée à faire une différence.

Et maintenant, je demande aux leaders passés et présents de devenir des mentors. Nous avons besoin de vous pour transmettre votre sagesse et votre entrain à une nouvelle génération d'hygiénistes dentaire qui nous conduirons vers l'avenir. « La connaissance, c'est le pouvoir ». Je me rappelle de toutes les batailles qui ont entouré la question de l'autorégulation et à quel point les organismes provinciaux et les hygiénistes dentaires ont pu apprendre les uns des autres pour faire de cet objectif une réalité. Nous devons partager nos connaissances avec les autres afin qu'ils puissent prendre la relève et poursuivre la progression vers un avenir meilleur pour tous et toutes les hygiénistes dentaires.

Nous devons créer un milieu stimulant qui motivera nos collègues à participer et à donner leurs suggestions. Je profite de ce moment pour inviter tous et toutes les hygiénistes dentaires qui n'ont jamais participé directement à leur association professionnelle à le faire. Investissez dans votre profession. Après tout, vous et tous vos collègues ne pouvez que bénéficier de vos suggestions et de votre contribution. Pourquoi ne pas façonner l'avenir de notre profession plutôt que d'espérer que les prochains leaders partageront la même vision que vous ?

Je crois que les prochaines années offriront plus d'occasions d'entreprenariat et que nous verrons une augmentation considérable des types de milieux professionnels où les hygiénistes dentaires pourront offrir des services de soins de santé buccodentaire au public. Au fur et à mesure que vous aiderez à faire progresser votre profession, vous éprouverez une satisfaction professionnelle que vous n'êtes peut-être pas en mesure de ressentir dans votre milieu de travail actuel.

C'est mon vœu le plus sincère que tous les bénévoles présents et futurs mentorent au moins un ou une hygiéniste dentaire et l'aident à se préparer à prendre la barre de nos organismes professionnels et de notre profession.

On peut communiquer avec Diane Thériault à l'adresse <president@cdha.ca>.

Research Fundamentals

by Sandra Cobban, RDH, MDE, PhD Student, and Joanne Clovis, PhD***

ABSTRACT

As dental hygiene continues to emerge as a profession, and dental hygienists increasingly incorporate findings from recent research into their clinical decisions, the need for understanding and appreciating the process and rigour of scientific research also increases. Theory is fundamental to research; it informs and shapes research. When theory is well developed, deductive research is implemented. When theory is sketchy and unclear, inductive designs are selected. Beyond theory, the formulation of research questions and the determination of appropriate design and methodology follow coherent and cohesive strategies.

The philosophical underpinnings determine the direction and sequence of action in research. In qualitative designs using inductive reasoning, research may seek to describe and interpret individual or group experiences by focusing on the perspectives of those involved, or it may attempt to reveal theoretical principles about individuals or group phenomena. In quantitative designs using deductive reasoning, research may seek to describe one or more phenomena, relate two or more phenomena, or determine cause and effect. The scientific method has many expressions and each expression must be rigorous if it is to be regarded as credible research.

Regardless of the research question or design, all studies involving humans must have ethical approval from boards and committees that review research proposals according to a set of ethical principles and guidelines. Dental hygiene research demonstrates examples of a wide range of research questions and designs. In building the dental hygiene research base, diversity is necessary and expected in order to describe, demonstrate relationships, and predict phenomena. Ultimately syntheses of theories and methods will advance dental hygiene as an evidence-based profession.

Keywords: dental hygienists, qualitative research, research, research design, research support

INTRODUCTION

AS DENTAL HYGIENE CONTINUES TO EMERGE AS A PROfession and gain credibility, and dental hygienists increasingly incorporate findings from recent research into their clinical decisions, the need for understanding and appreciating the process and rigour of scientific research also increases.[1-3] Theory is fundamental to research; it informs and shapes the research approach. When theory is sketchy and unclear, inductive designs are selected. When theory is well developed, deductive research is implemented. Beyond theory, the formulation of research questions and the determination of appropriate design and methodology follow coherent and systematic strategies. The purpose of this paper is to provide basic information about the fundamentals of research to assist those who read research, and to those who are contemplating research projects.

The basic process of disciplined inquiry consists of "experiencing the world and then drawing general conclusions (called facts) from observations."[4 (p.2)] A major characteristic of science is its reliance on information that can be verified through observation or experience. That is, it must be possible for different individuals in different places and at different times using a similar method to produce the same results.[4 (p.7)] In contrast to casual human inquiry, scientific observation is a very conscious, very deliberate activity. The scientific method makes all of the steps used in observation more explicit and provides techniques for dealing with them more rigorously than would casual human inquiry. It is these qualities that most distinguish science from casual inquiry because making observation more deliberate helps to reduce the potential for error.[5] There are numerous design approaches and we include both qualitative and quantitative approaches in our consideration of scientific method, as both follow disciplined approaches to inquiry as they attempt to answer the research question(s).

In contrast to casual human inquiry, scientific observation is a very conscious, very deliberate activity.

Scientific theory professes to describe logical and persistent patterns of regularity that occur. A scientific theory describes the relationship that might logically be expected to occur among certain variables, time after time. This expectation can involve the notion of cause-and-effect relationships. Consequently, a theory could suggest that a person's attributes on one variable are expected to "cause,

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RÉSUMÉ

Alors que la profession d'hygiéniste dentaire poursuit son émergence et que les hygiénistes dentaires incorporent de plus en plus les résultats des recherches récentes dans leurs décisions cliniques, la nécessité de comprendre et d'évaluer le processus et la rigueur de la recherche scientifique augmente également. La théorie est la base de recherche ; elle influence et oriente la recherche. Lorsque la théorie est bien conçue, la recherche déductive est mise en œuvre. Lorsque la théorie est sommaire et nébuleuse, des modèles inductifs sont sélectionnés. Au-delà de la théorie, la formulation des questions de recherche et la détermination du modèle et de la méthodologie appropriés suivent des stratégies cohérentes et cohésives.

Les bases philosophiques déterminent l'orientation et la séquence de l'action en recherche. Dans les modèles qualitatifs utilisant un raisonnement inductif, la recherche peut chercher à décrire et à interpréter des expériences individuelles ou de groupe en se concentrant sur les perspectives des personnes concernées, ou elle peut tenter de révéler des principes théoriques concernant des phénomènes individuels ou de groupe. Dans les modèles quantitatifs utilisant un raisonnement déductif, la recherche peut chercher à décrire un ou plusieurs phénomènes, relier deux ou plusieurs phénomènes, ou établir la cause et l'effet. La méthode scientifique a plusieurs expressions et chaque expression doit être rigoureuse pour que la recherche soit considérée crédible.

Peu importe la question ou le modèle de la recherche, toutes les études ayant un rapport avec des humains doivent avoir une approbation éthique des commissions et comités qui analysent les projets de recherche en tenant compte d'un ensemble de principes de déontologie et de lignes directrices. La recherche en hygiène dentaire présente des exemples d'une grande variété de questions et de modèles de recherche. En établissant la base de la recherche en hygiène dentaire, la diversité est nécessaire et souhaitée afin de décrire, démontrer les relations et prédire les phénomènes. Ultimement, les synthèses des théories et méthodes feront connaître la profession d'hygiéniste dentaire comme une profession basée sur des données probantes.

predispose, or encourage a particular attribute on another variable."[5] (p.35) As a gross generalization, scientific theory deals with the logical aspects of science; research methods or designs provide a process for structuring the observational aspect; and statistics offer a means for comparing what is logically expected with what is actually observed.[5] (p.27)

There are considered to be two main approaches to reasoning from science—inductive reasoning and deductive reasoning. (See Babbie[5] for extended explanations and examples of inductive and deductive reasoning.) Inductive reasoning occurs when multiple sets of observations lead to identification of these patterns of regularity, that is, moving from the observations or facts to theories. In this case, one would start from the observed data and develop a generalization that explains or attempts to explain any relationships observed among the objects. Deductive reasoning occurs when an existing theory is applied to a particular case in an attempt to explain the relationships that are observed, that is, moving from the general to the particular instance or observations, applying a theory to a particular case.[5] These are the important links between theory and research. In the deductive model, research is used to test theories; in the inductive model, theories are developed from the analysis of research data.[5]

This difference between testing theory and constructing theory is the chief distinction between quantitative and qualitative research approaches.[6] While the theoretical framework of a research study is an important consideration, unfortunately many published dental hygiene research studies do not indicate that a specific theory has been used to frame the study design. Identification of theory is particularly relevant for hypothesis-testing designs, as theory should guide expectations of results.

There are considered to be two main approaches to reasoning from science—inductive reasoning and deductive reasoning.

There are three main elements in the traditional scientific method in a quantitative design, which can be considered as you would expect them to occur chronologically. They are theory, operationalization, and observation.[5] *Theory* refers to the patterns within the observations that have occurred repeatedly under the same conditions and that can form the basis for predictions of patterns that could be expected to occur. *Operationalization* refers simply to a specification of the steps, procedures, or operations that the researcher will go through in actually measuring and identifying the variables to be observed. This stage of the research process results in what are often referred to as the "Operational Definitions" within a research study. The scientific method is based on the need to have a clear, systematic plan for how to look for the answer to the research questions, and how to recognize and interpret the answers once found. The final step in the traditional model of science involves actual *observation*, looking at the world and making measurements of what is seen. Having developed theoretical clarity and expectations and having created a strategy for looking, all that remains is to look at the way things are.[5] This process of relying on sensory experience, or the use of the senses, to verify ideas about reality is referred to as empiricism.[4] Sometimes the observations are structured around the testing of hypotheses; sometimes the inquiry is less structured.[5]

When there is no clear theory regarding the phenomena or the population in question, disciplined inquiry takes a different approach—the qualitative design—and draws on observations to develop theory. Research designs in such situations make use of a reverse sequence: collection of observations, determination of themes, and development of theory. Methods of collecting observations and the design of the study are guided by the research question. This process is readily apparent in qualitative methods.

When the observations, or data, will be collected from human subjects, approval of the proposed study by a Research Ethics Board is required.

Designing and implementing a research study follows a systematic sequence of general steps. There are some basic questions at each of 12 essential steps that will assist in the design of such a study.*

1. What is the purpose of the study? What do you want to know?
2. What is already known about this topic?
3. Is there a theory or conceptual framework that will form the basis of this study?
4. What is an appropriate design for this study (e.g., observational, experimental, etc.)?
5. Will your study have a hypothesis? What data will be necessary to answer the research question?
6. What data collection method is most appropriate to gather data in a format to answer your research question?
7. Is an appropriate data collection instrument available or do you need to design one?
8. What sample or population will you use?
9. How will you collect your data?
10. What format will you use for data entry or processing?
11. How will you analyze your data in order to answer your research question?
12. How will you disseminate the findings of your study?

The first three questions on this list have been discussed in the introduction and in a previous article.[9] Identifying what is known about a topic typically involves a literature search and analysis of the findings of previous research. The balance of this paper will provide an overview of considerations for addressing the remaining questions. Support for designing a comprehensive research project is beyond the scope of a single paper, so readers and potential researchers are urged to consult a good-quality research text for further information. A list of suggested readings is included at the end of this paper. Before proceeding to discuss research designs, the implications of ethics in research must be clarified.

* This list was adapted from Babbie,[5] Ray and Ravizza,[4] DePoy and Gitlin,[7] and McColl et al.[8]

ETHICAL CONSIDERATIONS

When the observations, or data, will be collected from human subjects, approval of the proposed study by a Research Ethics Board (REB) is required. In Canada, this is a requirement of the Tri-Council Policy Statement on Ethical Conduct for Research involving Humans.[10] These REBs will consider whether any humans can be harmed either by their participation in the proposed study or by the publication of its results. The REB will ensure that every attempt is made to protect the identity of participants, all responses remain confidential, all records related to the study are stored in a secure location for a pre-determined length of time following the study, and dissemination and use of the results is made explicit to all participants.

All universities, and many colleges and post-secondary institutions, have REBs that review research proposals regularly in order to grant ethics approval. In some cases, regional health authorities or provincial health agencies have ethics review boards to consider research proposals from groups outside of educational institutions. An example of this is the Community Research Ethics Board in Alberta, which "fills a gap in the Province by providing review of health research being conducting in any region, organization or authority that does not have a duly constituted health research ethics board and process."[11] In some cases, all health care provider organizations involved in a research project may require individual as well as collective approval. Most granting agencies require proof of ethics approval before any research funds will be released. Published reports of research should always indicate that a Research Ethics Board approved the conduct of the study.

In many studies, it is possible for respondents to remain anonymous, but in others, such as face-to-face interviews, the participants cannot help but be known to the researchers or their designates. In all cases, measures must be in place to maintain confidentiality of the identity and responses of the participants unless the participants request that they be identified.

An important issue for REBs is that of voluntariness in participation. This issue becomes especially important for captive audiences, such as those in classrooms or some community collectives such as ethnic or religious groups. Assurances must be made regarding the recruitment of study participants in a non-coercive manner. Implementation of federal and provincial privacy legislation at a local level drives policies that will continue to evolve over time and affect the information that may be made accessible to researchers.

THE RESEARCH DESIGN

The research question, and how much is already known about the phenomenon of interest, will guide the design for the study. If little is currently known about the topic, the question will be exploratory in nature and will lend itself to qualitative designs.[12] Observations may collect unstructured data that would be examined to determine any patterns that may exist. If more is known about the topic, but much remains to be known and the question seeks to know more, a descriptive design may be most suit-

able to answer the research question. In this case, data collected may be more structured, or both structured and unstructured data would be collected to arrive at a description. These inductive designs would lead to theory rather than being driven by theory.

As more becomes known about the phenomenon, the researcher may seek to describe relationships among variables so may select a correlational design.[12] Depending on how much is known about the topic, the research question may seek to determine whether any relationships exist, or existing theory may drive the search for relationships with a hypothesis. Data collected in these instances would be structured or quantitative to facilitate analysis and answer this type of research question.

As more theory becomes known in a particular topic area, this stronger theoretical base provides support to begin to use one or more theories to make predictions about expected outcomes as variables are manipulated. These hypothesis-driven designs are experimental or quasi-experimental. The strongest designs would have a control group and two or more experimental groups, with random allocation into each of the groups.[12] Two or more experimental groups help to identify differences in outcomes that result from more than just a difference between application of the intervention or no intervention. Increasing the sophistication of the design increases the likelihood the statistical analyses of the findings would be more accurate. Quasi-experimental designs still manipulate the independent variable but lack at least one of the features of the experimental design. This might be lack of randomization or lack of a control group.[12] These designs would be used when it is not possible to achieve a true experimental design, for example, within a particular practice setting or a school where it is not possible to randomly allocate individual students but perhaps to randomly allocate classrooms.

Other considerations when selecting a research design and choosing a data collection method include the time, cost, and expertise needed to collect and analyze your data. Would the chosen data collection method take longer than the available time for the project? How much funding is available? Will the funding cover the cost of the project? A challenge faced by dental hygienists when contemplating research is limited access to resources to implement data collection. Choosing the data collection method can unfortunately be constrained by the available funding, and a decision may be made based on funds available rather than on the best method for collecting the type of data needed to answer the research question. Another challenge, given the limits of dental hygiene education in Canada, is whether the researcher has access to the expertise needed to analyze the data to be collected.

DATA COLLECTION

How the data will be collected will be guided by a number of considerations, including the research question, the type of data needed to answer the question, and how much is known about the variable(s). Mason has prepared a table of numerous data collection methods and the strengths, costs, time, and expertise associated with each (see table 1).[13] Whatever data collection method is chosen, it is important to ensure that the data is consistent with the research question. In other words, will the data gathered be able to answer the research question?

Other considerations…include the time, cost, and expertise needed to collect and analyze your data.

When little is known, an exploratory or unstructured design will lead to data being collected broadly and taking a flexible approach.[12] Unstructured or semi-structured interviews, observations, and/or document retrieval may be the data collection methods chosen. Where little is known, the interviews would be unstructured and may evolve throughout the data collection period. In all cases, expertise is needed both to conduct the interviews and to analyze the data. These methods can also be costly if interviewers and transcribers need to be hired. Analysis can also be time consuming, especially if a lot of material results from the interviews. However, the in-depth detailed information that results from interviews cannot generally be obtained through other data collection methods. If this is the type of information necessary to answer the research question, unstructured interviews would be included in

Methods	Pros	Cons
Self-administered surveys (pen and pencil)	Anonymous; inexpensive; easy to analyze; standardized; easy to compare to other data	Results are easily biased; misses information; attrition is a problem for analysis
Telephone surveys	Same as self-administered; increased ability to clarify responses	Same as self-administered; requires more staff time; misses those with no phone (low income)
Face-to-face structured surveys	Same as self-administered; ability to clarify responses	Same as self-administered; requires more staff time
Archival trend data	Fast; inexpensive; extensive data available	Comparison can be difficult; may not show changes
Observation (i.e., dental indexes)	Can see a program in operation	Requires much training; can influence participants
Record review	Objective; quick; does not require program staff of participants; pre-existing	Can be difficult to interpret; data often incomplete
Focus groups	Can quickly get information about needs, community attitudes and norms; information can be used to generate survey questions	Can be difficult to analyze data; need a good facilitator
Unstructured interview/narratives	Gather in depth, detailed information; information can be used to generate survey questions	Takes much time and expertise to conduct and analyze; potential interview bias possible
Open-ended questions on a written survey	Can add more in depth detailed information to a structure survey	People often do not answer them; may be difficult to interpret meaning of written statements
Participant observation	Can provide detailed information and an "insider" view	Observer bias common; can be a lengthy process
Archival research	Can provide detailed information about a program	May be difficult to organize data

Table 1. Data collection methods Reprinted with permission from: Mason J, editor. Concepts in dental public health.

the research design. Focus groups are another face-to-face method to collect in-depth information on a topic, using a group to stimulate discussion and provide multiple perspectives. Information uncovered through focus groups and interviews may form the basis of further investigation on the topic.

If more is known about the topic, and the purpose is to identify relationships among the variables, accurate techniques or tools for measuring the variables will be needed. Structured observations or interviews, questionnaires, behaviours, physiological measures, or standardized instruments are examples of mechanisms of data collection that may be used in this situation. Correlational study designs require quantifiable data, and data collection instruments must measure the variables accurately across multiple research participants and settings.[12] Steps must be implemented to reduce the potential for measurement error. Self-administered survey questionnaires, commonly sent through the mail, are a relatively inexpensive way to collect standardized data. This data collection method can be designed to preserve anonymity, and the questionnaire can be designed to facilitate analysis. The potential for non-response bias and measurement bias are limitations. Mail surveys can be conducted in a fairly short time frame and a moderate amount of expertise is needed for analysis. Telephone surveys cost more than mail surveys but also provide the opportunity to clarify responses and typically provide a higher response rate than mail surveys. Training is needed for interviewers. An advantage of telephone interviewing is the ability to enter the data directly into a computer database while it is being collected. Measures can be implemented to preserve anonymity in the data set. A disadvantage for research designs that require responses from a broad spectrum of the population is that telephone interviewing will miss those with lowest incomes who do not have a telephone, and those with private incomes whose numbers are de-listed or screened. An interesting phenomenon currently is the increasing use of cellular

Costs	Time to complete	Response rate	Expertise needed
Moderate	Moderate, depending on system (mail, in-person delivery)	Moderate, depending on system (mail is lowest)	Little to gather; moderate for analysis and use
More than self-administered	Moderate to high	More than self-administered	Some to gather; moderate for analysis and use
Moderate to high	More than self-administered; same as phone	Moderate to high	Some to gather; moderate for analysis and use
Inexpensive	Quick	Usually good, depending on the original collection method	None needed to gather; some needed to analyze and use
Depends on staff time and costs	Quick; depends on the number of observations	Not an issue	Some needed to devise coding scheme and calibrate examiners
Inexpensive	Can be time-consuming	Not an issue	Little needed; coding scheme may need to be developed
Inexpensive, depending on location; can be expensive to hire facilitator	Groups themselves last about 1.5 hours	Good; people usually agree to participate, depending on schedule	Good interview / conversation skills; technical aspects can be easily learned
Inexpensive if using current staff; can be expensive to hire interviewers and / or transcribers	Varies by length of interview; analysis can be lengthy, depending on method	People usually agree to participate if it fits their schedule	Good interview / conversation skills; formal analysis methods are difficult to learn
Inexpensive	Adds a few more minutes to a written survey	Moderate to low	Content analysis
Expense based on time	Time-consuming	Participants may not want to be observed	Data analysis
Expense based on time	Time-consuming	Documents may not be able to be reviewed	Data analysis skills

Philadelphia (PA): Lippincott, Williams, & Wilkins; 2004. p. 108-109.

telephones by youth and young adults who are moving away from land lines that are listed in directories. Changes to random digit dialing technology will be needed to reach this population in the future.

Face-to-face interviews can also be used to collect data using structured survey questionnaires, although this method is more expensive than the previous two survey methods. Training is required for interviewers and, due to the face-to-face interactions, anonymity is not possible so measures to keep identities confidential must be implemented. As with all data collection, expertise in analysis is necessary. Data storage practices must preclude identification of individuals, and data sets should be made anonymous at the point of entry and prior to analysis.

The use of web-based data collection software is becoming more accepted, particularly for populations whose use of the Internet is likely to be high. While the hardware can be expensive, an advantage is that the data is collected in an electronic format that typically facilitates analysis.

A review of records or chart audit can be a relatively inexpensive way for a dental hygienist to collect data. A certain amount of expertise is necessary to develop a coding scheme and perform analysis. Two main limitations include charts that may be incomplete or difficult to interpret[13] and ethical considerations regarding consent for accessing patient charts for research purposes that need to be addressed. Again, preserving confidentiality and client anonymity during data collection and storage are important. Other kinds of documents that may be analyzed are legislation, institutional records, and historical documents.

In experimental research, it is important to control the situation and the setting. This includes the need to collect structured, quantifiable data using the most precise measures possible.[12] An important consideration is whether an instrument exists to aid in data collection, and whether the concept measured is consistent with the operational definitions for the variables under study. The operational definition should both define the term or variable and

describe how it is going to be measured. A review of the literature may identify an existing instrument that has already been tested and that can measure your variable. An existing instrument may also be able to be modified (with permission of the original author) to better measure the variable of interest.

Probability sampling uses random sampling to eliminate subjectivity or bias in selecting the sample.

Developing an original instrument can be very complex, depending on the phenomenon to be measured. Basic facts, demographics, level of knowledge, or similar phenomena can be readily captured through a simple questionnaire or similar instrument. Abstract concepts that include multiple aspects of thought and behaviour, such as critical thinking or self-directedness, are much more complex and difficult to capture. They require the development of sophisticated measurement instruments.[12] Development of instruments to measure phenomena such as these is a highly specialized science and requires advanced research skills. Any newly developed instruments must be tested extensively to establish their reliability and validity prior to use.[12] For this reason, if a suitable instrument cannot be found in the literature, a researcher without these specialized skills may wish to consider modifying their research question and study design.

Measures of validity determine if the construct being measured is consistent with the operational definition that is intended to be measured. A reliable instrument is stable, consistent, and will obtain the same or substantially similar results after repeated administrations with the same person over time.[12] The concepts of reliability and validity are equally important in qualitative research but are approached in a somewhat different manner. They may be described as trustworthiness criteria—credibility, transferability, dependability, and confirmability[9]—or as verification strategies that occur throughout the research process. These strategies include "investigator responsiveness, methodological coherence, theoretical sampling and sampling adequacy, an active analytic stance, and saturation."[14 (p.9)] (See also Morse[15] and Morse and Field[6] for additional information on this topic.)

THE SAMPLE

The total population includes everyone who has the characteristic you are interested in studying. The target population includes those to whom you would like to generalize your results.[12] The Operational Definitions of your variable(s) of interest will help to identify the population of interest.[12] It is from this group that the sample will be drawn. A sample will be representative of the population if important characteristics are distributed similarly in both the sample and the population.[16]

There are two main types of samples—probability and non-probability. Qualitative designs will use a form of non-probability sampling known as purposive sampling. To study the phenomenon of interest, the researcher must identify individuals or situations that include that characteristic. Examples of non-probability samples include convenience sampling, snowball sampling, quota sampling, and focus groups. (See Sandelowski[17] for further information on sampling.) Quantitative designs, on the other hand, will be strengthened with the use of probability sampling methods. Probability sampling uses random sampling to eliminate subjectivity or bias in selecting the sample. In probability sampling, each member of the target population has an equal and known chance of being selected to the sample. Probability samples include simple random sampling, stratified random sampling, systematic sampling, and cluster sampling. Many on-line sample size calculators are available to assist with the task of determining the appropriate sample size for a given population (see www.raosoft.com/samplesize.html or www.surveysystem.com/sscalc.htm for calculating quantitative sample sizes.)

DATA ANALYSIS

The research question, study design, method of data collection, and type of data collected will all lead to the format for data entry and analysis. The data analysis should lead to an answer to the research question. There are basic differences in approaches to analysis between quantitative and qualitative data. In quantitative research designs, the data and analysis are descriptive or inferential. Descriptive analysis describes the data from the sample. Inferential analysis provides statistical support for the data to answer the research question, drawing inferences about the larger population based on the findings from the sample.[12] Qualitative data requires the determination of recurring themes and categories that may give rise to new theory or further research questions.[7,9]

Descriptive analysis can include content analysis of unstructured data. It can use tables or graphs to describe the sample, descriptive statistics to describe individual variables, and statistical analysis to describe relationships between variables.[12] Inferential analysis uses statistical tests to identify statistical relationships among variables or to offer statistical support for the research hypothesis. Inferential analysis draws inferences from a probability sample to generalize to the population from which the sample was drawn. A good research textbook is an invaluable tool to help determine which analysis methods and which statistical tests are most appropriate with a given research question and specific types of data. (See Wood and Ross-Kerr[12] for excellent basic information on this topic.)

Many computer software programs are available to manage data entry and to assist with the task of analysis of various types of data. Qualitative analysis can be supported with programs such as NVivo 7 (the latest version of NUD*IST),[18] and ATLAS.ti.[19] Quantitative analysis can be made easier with programs such as SPSS[20] and SAS.[21] High-quality data analysis software programs that are in the

public domain, such as Epi Info,[22] can be accessed free of charge through the World Wide Web and downloaded to an individual's computer for his or her use. Type of data, cost of software, and access to technical support, as well as ease of use, will influence choices of data analysis methods.

Having a plan for the dissemination of results is important to any research endeavour. Communication of research results to potential users moves the research findings into an arena where they can do the most good—where they can be accessed by practitioners. One potential area for dissemination is through professional or membership publications. These venues also enhance the development of dental hygiene as a profession by providing a forum for research results that is accessible to practitioners. Preparation of manuscripts and publication of research is well described in the *Publication Manual of the American Psychological Association*[23] and on the website of the International Council of Medical Journal Editors.[24]

CONCLUSION

As dental hygiene evolves as a profession and there is greater emphasis on evidence-based practice, dental hygiene educational programs need to adequately prepare for developing practitioners skilled in this approach. This includes the ability to locate and critically appraise research findings, whether in the form of systematic reviews, practice guidelines, or individual research studies. The purpose of this paper was to provide practical information regarding research fundamentals and to provide readers with a frame of reference for greater understanding when approaching the task of appraising individual research studies and understanding some of the choices the researcher made.

The research design is the plan or blueprint for how the study will be conducted. Decisions made at each step of the plan influence subsequent steps, so clearly addressing each of the 12 essential steps can increase the likelihood of a successful project. Publication of well-conducted research studies contributes to the body of knowledge that forms the basis upon which decisions are made for the practice of dental hygiene. A thorough understanding of research fundamentals helps both the producer and the consumer of dental hygiene research.

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CORRECTION In a book review on page 96 of the March-April 2006 issue of *CJDH,* the biography of the author of *Promoting Oral Health: The Use of Salt Fluoridation to Prevent Dental Caries* contained some errors. The second and third sentences should have read. "After a fellowship at UCLA Neuropsychiatry Institute in 1983, she received her Master in Public Health (MPH) degree from UCLA in 1988 where she was Adjunct Professor until 1989. She joined PAHO in 1993 and is the Regional Advisor for Oral Health for the Pan American Health Organization/World Health Organization." We apologize for this and for any inconvenience it may have caused.

GINGIVITIS: CALL TO ACTION

WHAT IS GINGIVITIS ANYWAY? Gingivitis is inflammation of the gums caused by a plaque build-up in the mouth. Signs of gingivitis include red, swollen, tender gums that may bleed when you brush. Left untreated, it may lead to serious periodontal disease and eventually, tooth loss.

WHO IS LIKELY TO GET GINGIVITIS? Anyone can get gingivitis. In fact, research has shown that 50% of Canadian adults may have gingivitis and many of these people do not know it. Gingivitis often goes undetected because it is difficult to measure so this incidence level may, in reality, be higher.

WHY SHOULD I CARE? Oral health and oral inflammation are linked to overall health. Specific associations have been made with some chronic systemic diseases and conditions such as poor blood sugar control in diabetes, a variety of heart diseases, pre-term low birth weight babies, and certain lung diseases.

SOME NEW FACTS ON THE LINKS BETWEEN ORAL HEALTH AND OVERALL HEALTH:

Diabetes: If you have diabetes, you may have a greater risk of developing periodontal disease. Dental hygiene and mouthrinse/antibiotic treatment for periodontal disease may help reduce blood sugar levels in diabetics by up to 11%.

Heart disease: Periodontal disease—including gingivitis—is associated with a 19% increased risk of developing cardiovascular disease.

Pre-term low birth weight (PTLBW): PTLBW accounts for about 80% of all infant deaths that occur around the time of birth and may cause long-term disabilities. Dental hygiene services for individuals with periodontal disease (which includes gingivitis) may reduce the risk of PTLBW by 50%.

Respiratory disease: Patients in long-term care facilities or hospital intensive care units who receive oral hygiene care may reduce their risk of developing pneumonia by 40 to 58%.

SO WHAT CAN I DO? Happily, researchers have also found that good oral hygiene care reduces and prevents the progression of gingivitis. The Canadian Dental Hygienists Association recommends the following steps to help you maintain good oral health as an integral part of overall health:

BRUSH: Use a power toothbrush with rotation-oscillation action if possible. It is better at removing plaque and reducing gum inflammation than manual toothbrushes.

Use fluoride toothpaste to help prevent tooth decay.

FLOSS: Flossing reaches the areas between your teeth to remove plaque. To make flossing easier, try using tools such as floss holder, automatic flossers, interdental brushes, picks, and irrigators.

RINSE: Use an essential oil antiseptic mouthrinse to reduce and prevent plaque and gingivitis more than brushing and flossing can alone.

And finally, make regular visits to your dental hygienist for specialized oral health care.

CDHA ACHD
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LA GINGIVITE : APPEL À L'ACTION

QU'EST-CE QUE LA GINGIVITE ? La gingivite, c'est une inflammation des gencives causée par une accumulation de plaque dentaire dans la bouche. Les signes de la gingivite comprennent des gencives sensibles, gonflées et rouges qui peuvent saigner lorsque vous brossez vos dents. Si elle n'est pas traitée, la gingivite peut entraîner une maladie parodontale plus sérieuse et, éventuellement, la perte des dents.

QUI RISQUE LE PLUS D'AVOIR UNE GINGIVITE ? Tout le monde peut avoir une gingivite. En fait, la recherche a montré que 50 % des adultes canadiens pourraient avoir une gingivite et que beaucoup de ces personnes ne le savent même pas. Souvent, la gingivite n'est pas détectée parce qu'il est difficile de l'évaluer ; alors, en réalité, ce taux d'incidence peut être plus élevé.

POURQUOI DEVRAIS-JE M'EN PRÉOCCUPER ? La santé buccale et l'inflammation buccale sont liées à l'état de santé global. Des associations spécifiques ont été faites avec certaines maladies et affections systémiques chroniques comme un mauvais contrôle de la glycémie dans les cas de diabète, une variété de cardiopathies, les bébés prématurés de faible poids à la naissance et certaines maladies pulmonaires.

CERTAINS FAITS NOUVEAUX SUR LES LIENS EXISTANT ENTRE LA SANTÉ BUCCODENTAIRE ET L'ÉTAT DE SANTÉ GLOBAL :

Diabète : Si vous êtes atteint ou atteinte de diabète, vous pourriez courir un risque plus élevé de développer une maladie parodontale. L'hygiène buccodentaire et un traitement antibiotique/rince-bouche pour les maladies parodontales peuvent aider à réduire les taux de glycémie jusqu'à 11 % chez les personnes diabétiques.

Cardiopathie : Les maladies parodontales – incluant la gingivite – sont associées à un risque accru de 19 % de développer une maladie cardiovasculaire.

Bébés prématurés de faible poids à la naissance (BPFPN) : Les BPFPN représentent environ 80 % de tous les enfants en bas âge morts peu après leur naissance ou atteints d'invalidités de longue durée. Les soins d'hygiène buccodentaire pour les personnes atteintes de maladies parodontales (lesquelles incluent la gingivite) peuvent réduire de 50 % le risque d'avoir un BPFPN.

Maladie respiratoire : Les personnes résidant dans un établissement de soins de longue durée ou hospitalisées dans une unité de soins intensifs qui reçoivent des soins d'hygiène buccodentaire peuvent réduire leur risque de développer une pneumonie de 40 à 58 %.

ALORS, QU'EST-CE QUE JE DOIS FAIRE ? Heureusement, les chercheurs ont également découvert que de bons soins d'hygiène buccodentaire réduisent et préviennent la progression de la gingivite. L'Association canadienne des hygiénistes dentaires recommande la démarche suivante pour vous aider à maintenir une bonne santé buccodentaire comme partie intégrante de votre état de santé global :

LE BROSSAGE : Utilisez, si possible, une brosse à dents électrique oscillo-rotative. C'est mieux qu'une brosse à dents manuelle pour enlever la plaque et réduire l'inflammation des gencives.

Utilisez un dentifrice fluoré pour aider à prévenir la carie dentaire.

L'UTILISATION DE LA SOIE DENTAIRE : L'utilisation de la soie dentaire vous permet d'atteindre les surfaces entres vos dents afin d'y enlever la plaque dentaire. Pour faciliter l'utilisation de la soie dentaire, essayez des aides tels que : les porte-soie dentaires, les porte-soie électriques, les brosses interdentaires, les cure-dents et les irrigateurs.

LE RINÇAGE : L'ajout d'un rince-bouche antiseptique aux huiles essentielles peut réduire et prévenir davantage la plaque dentaire et la gingivite que le brossage et l'utilisation de la soie dentaire seulement.

Et, finalement, visitez régulièrement votre hygiéniste dentaire pour des soins spécialisés de santé buccodentaire.

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Évaluation des dentifrices et des variables associées au choix d'un produit

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RÉSUMÉ

Problème. Le marché canadien compte environ 200 dentifrices, dont l'abrasivité est en grande partie inconnue. Puisque la dernière échelle québécoise sur l'abrasivité n'évaluait que 60 produits et remonte à 1994, elle est aussi périmée qu'incomplète. De plus, la multiplicité des méthodes de fabrication complique la comparaison des produits, par exemple quant à l'abrasivité, au pH et aux matières insolubles. **Méthode.** En 2004 et 2005, une équipe interdisciplinaire (hygiène dentaire, physique, chimie et biologie) a établi deux nouveaux protocoles d'analyse des dentifrices. Une machine simulait le brossage sur des blocs de polyméthylméthacrylate, matière semblable à la dentine humaine. L'équipement incluait un système de vacuum, un vortex, un agitateur magnétique, un dessiccateur, une balance, un pH-mètre et un chronomètre. Une solution de 25 g de dentifrice et de 25 g d'eau distillée était appliquée selon l'équation F = 150 g × 120 mvts/4 heures. **Résultats.** Selon les indications des manufacturiers, la plupart des dentifrices réduisent certains problèmes : la carie (76 %), les taches (42 %), le tartre (26 %), la gingivite (21 %) et l'hypersensibilité (12 %); 1 % des dentifrices sont multisoins et 55 produits portent le sceau de l'ADC. Il existe d'importantes différences entre les dentifrices : l'abrasivité varie de 0 à 6, le pH de 3 à 10 et l'écoulement de 0,1 à 10 ml en 10 secondes; la mousse peut tripler d'une marque à l'autre. **Conclusion.** Le choix d'un dentifrice influence de façon importante la réduction de certains problèmes buccodentaires et le maintien de la santé dentaire.

Mots clés : dentifrice, pH, abrasivité

1. INTRODUCTION

En 2005, le vide théorique entourant l'abrasivité des dentifrices est énorme. Les connaissances des professionnels de la santé dentaire présentent des lacunes puisqu'elles n'ont pas été mises à jour depuis 1994, soit depuis la dernière étude effectuée par Désautels et Labrèche de l'Université de Montréal[1]. Certains manufacturiers fournissent leur échelle d'abrasivité, mais le matériel et la méthodologie peuvent varier, ce qui rend toute comparaison inadéquate.

Quelques variables se sont ajoutées à la démarche, car elles permettent de vérifier des aspects pratiques durant le brossage. L'acidité peut favoriser une déminéralisation, phénomène déjà étudié en ce qui a trait aux dentifrices vendus en Europe[2]. On sait par exemple que les liquides acides augmentent la perméabilité de la dentine[3]. En 2004, Josiak et coll.[4] ont publié un article sur l'écoulement en comparant des dentifrices en pâte et en liquide. L'article concluait qu'un dentifrice liquide libère une plus grande quantité de fluorure sur l'émail durant différentes périodes de temps, ce qui accroît la résistance de la dent à la carie. D'autre part, les dentifrices sont composés de nombreux ingrédients solubles ou non solubles dans l'eau[5]. Or la solubilité dans l'eau est importante à considérer, car le brossage quotidien s'effectue avec de l'eau, et non de l'huile (dans leur étude, Désautels et Labrèche[1] utilisaient en effet un mélange d'huile pour éviter que le bicarbonate ne se dissolve dans l'eau). Puisqu'il est actuellement impossible de séparer les dentifrices selon leur teneur en bicarbonate, il y a risque de biais méthodologique. L'équipe interdisciplinaire a réglé ce problème en incluant un nouveau test : celui sur les matières insolubles contenues dans les dentifrices. Enfin, le pouvoir moussant est intéressant à considérer chez les utilisateurs de brosse électrique et les gens souffrant de xérostomie, entre autres. Une trousse d'évaluation des dentifrices[6] permet de vérifier cette variable.

2. RECENSION DES ÉCRITS

Le travail interdisciplinaire exige une précision terminologique minimale. Il est à souligner que les travaux de Wilkins[7,8] ont été privilégiés parce qu'ils font figure de référence depuis des décennies dans le domaine de l'hygiène dentaire. Ils ont de plus été traduits de l'anglais au français dès 1991. La neuvième édition, sortie en 2005,

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ABSTRACT

Background. Some 200 toothpastes are available on the Canadian market, and the abrasiveness of most of them is unknown. Since the most recent Quebec abrasiveness scale dates back to 1994 and evaluates only 60 products, it is both incomplete and out of date. Moreover, the large number of manufacturing methods makes it more complicated to compare products, for example in terms of abrasiveness, pH and water-insoluble material. **Method.** In 2004 and 2005, an interdisciplinary team (dental hygiene, physics, chemistry and biology) developed two new protocols for analyzing toothpastes. A machine simulated brushing on blocks of polymethylmethacrylate, which has similar properties to human dentine. The equipment included a vacuum system, a vortex, a magnetic stirrer, a desiccator, a scale, a pH meter and a stopwatch. A solution of 25 g of toothpaste and 25 g of distilled water was applied according to the equation F = 150 g × 120 mvts/4 hours. **Results.** According to the manufacturers' indications, most toothpastes reduce certain problems: caries (76%), staining (42%), tartar (26%), gingivitis (21%) and hypersensitivity (12%); 1% are multicare toothpastes and 55 products bear the CDA seal. There are significant differences between toothpastes: abrasiveness ranges from 0 to 6, pH from 3 to 10, and flow from 0.1 to 10 ml in 10 seconds; foaming may differ by a factor of 3 from one brand to another. **Conclusion.** The choice of toothpaste has a major impact on the reduction of certain dental problems and the maintenance of oral hygiene.

Keywords: toothpaste, pH, abrasivity

reprend les mêmes données. Ainsi, le dentifrice y est défini comme une substance utilisée avec une brosse à dents ou tout autre applicateur pour enlever, à des fins esthétiques ou hygiéniques, la plaque bactérienne, la matéria alba et les débris accumulés sur les gencives et les dents, ainsi que pour étendre sur les dents des agents préventifs ou thérapeutiques particuliers[7,8]. Quant à l'abrasion, elle correspond à l'action d'un produit abrasif[9] ou à l'usure pathologique des composantes de la surface de la dent au moyen d'un processus mécanique anormal[1]. L'abrasion peut être causée par une combinaison de plusieurs facteurs, par exemple la fréquence du brossage, la dureté des soies, la pression appliquée, le pH, la dureté et l'abrasivité du dentifrice[10].

En ce qui concerne le cadre de référence, les dentifrices pourraient faire partie de l'environnement, selon le modèle de pratique de l'ACHD[11]. Celui-ci est inspiré des normes de Santé et Bien-être social Canada[12]. De plus, le modèle de Forrest[13,14] est tout à fait adapté puisqu'il comprend quatre facteurs importants à considérer : l'évidence scientifique, le client, le professionnel et le milieu. Ces quatre facteurs sont pris en compte dans cette étude.

2.1 Composition générale des dentifrices (voir tableau 1)

La composition générale des dentifrices change selon les époques et les pays. Ainsi, des produits d'hygiène buccale existaient déjà il y a 6000 ans[15], et les Égyptiens utilisaient un dentifrice dont la recette comprenait des fleurs d'iris, entre autres. Au XVIII^{e} siècle, on trouvait en Angleterre un dentifrice importé d'Orient pour les dents et les gencives[10]. En 1991, Wilkins[7,8] a étudié la composition générale des dentifrices.

Selon *La chimie des produits cosmétiques*[16], la formulation d'un dentifrice varie d'un manufacturier à l'autre. Wilkins arrive donc à des pourcentages d'ingrédients légèrement différents[7,8]. L'intérêt de cette étude réside dans l'image générale qu'elle fournit, même si elle n'en fait pas l'analyse détaillée.

2.2 Facteurs reliés à l'abrasivité

Cette section présente un survol des notions mécaniques liées à la perte de substance dentaire. Elle débute avec l'équation de Newton, qui explique la force[17], puis elle aborde l'acidité des dentifrices, l'échelle de dureté des particules de Mohs[18] et le choix des dentifrices en fonction des clients, des manufacturiers et des professionnels de la santé buccodentaire[19]. Ainsi, le modèle de Forrest[13,14] trouve toute sa pertinence dans l'étude des dentifrices.

2.2.1 Équation de Newton

L'équation de Newton[18] conjugue la force, la masse, la vitesse et le temps, des variables qui sont toutes pertinentes au domaine dentaire. L'application d'une force excessive durant le brossage et la durée du brossage sont en effet des facteurs importants : une force excessive peut être néfaste. Elle peut par exemple entraîner l'abrasion de l'émail ou de la racine, l'exposition dentinaire, l'abrasion gingivale et la récession de la gencive marginale[3].

F = ma, soit Force = Masse × Accélération ou vitesse et temps.

2.2.2 Acidité des dentifrices

La notion selon laquelle le pH est relié à l'abrasivité des dentifrices peut sembler surprenante au Canada, mais en Europe, le pH est indiqué pour plusieurs dentifrices[2]. Par exemple, Elmex l'inclut dans sa publicité, qui paraît dans la revue suisse des hygiénistes dentaires[19]. En 1983, Lehne et Winston[10] faisaient ressortir cette variable, qui influence l'abrasion. Traditionnellement, dans le domaine dentaire, l'usure chimique correspond plutôt à l'érosion[3]. L'acidité est pertinente à la présente étude, car le fluor agit différemment selon que le milieu est neutre ou acide[20]. De plus, la déminéralisation de la dent peut commencer à 6,5 sur la racine et à 5,5 sur l'émail[9]. Selon les résultats d'études effectuées sur des dentifrices européens[2], certains dentifrices se situent en dessous du seuil critique du pH

Pourcentage	Action	Ingrédients
20 à 60 %	**Agents de nettoyage et de polissage** Composé abrasif pour nettoyer les dents et agent de polissage pour obtenir une surface lisse et luisante	Carbonate de calcium, pyrophosphate de calcium, phosphate dicalcique déshydraté, phosphate dicalcique anhydre, métaphosphate de calcium insoluble(IMP), oxyde d'aluminium hydraté, silice, silicates et gelées de silicates déshydratées, silicates synthétiques amorphes sous forme de gel, sel complexe de silicate d'aluminium synthétique amorphe
20 à 40 %	**Humectant** Substance utilisée pour retenir l'eau et pour éviter que le produit ne sèche à l'air	Glycérine, sorbitol, propylène glycol
15 à 50 %	**Eau**	Aucune précision apportée par Wilkins
2 à 3 %	**Agent de conservation, édulcorant et colorant** Substances pour empêcher la prolifération des bactéries, pour donner un goût agréable et pour rendre le produit attrayant	Agents de conservation : alcools, benzoates, formaldhéides, phénol dichloré. Édulcorants : édulcorant artificiel non cariogénique, sorbitol et glycérine (ces deux derniers contribuent aussi comme humectant et édulcorant). Colorants : teintures végétales.
1 à 2 %	**Agent thérapeutique** Médicament ou agent chimique ajouté à des fins particulières de prévention ou de traitement	Les dentifrices fluorés constituent pour le moment le meilleur agent préventif. Ajout d'antibiotiques : pénicilline, tyrothricine. Dentifrices ammoniacaux et inhibiteurs enzymatiques pour la recherche sur la carie : N-Lauryl sarcosinate de sodium et déshydroacétate de sodium.
1 à 2 %	**Liant** Substances empêchant la séparation des ingrédients solides et liquides	Colloïdes organiques hydrophiles tels que les alginates, dérivés synthétiques de la cellulose
1 à 2 %	**Détergent** Agents moussants ou tensioactifs	Laurylsulfate de sodium, N-Lauryl sarcosinate de sodium, cocomonoglycéride sulfonate de sodium
1 à 1,5 %	**Parfum** Composé visant à rendre le dentifrice attrayant et à en masquer le goût	Huiles essentielles, menthol, édulcorant artificiel non cariogénique

Tableau 1 : Composition générale des dentifrices

(5,5). De plus, l'acidité influence le contrôle de la plaque, la réduction du tartre et le traitement de l'hypersensibilité[21]. Les dentifrices de blanchiment composés de peroxyde ont généralement une valeur acide[22]. Pour sa part, le bicarbonate de soude est considéré comme un antiacide depuis des siècles[9]. Les tests mesurant l'acidité des dentifrices s'avèrent donc novateurs.

2.2.3 Dureté des particules

En 1812, Mohs a établi la dureté de dix minéraux en créant une échelle de dureté qu'on utilise encore aujourd'hui. Cette échelle de 1 à 10 classe les matériaux du plus mou (1) au plus dur (10) :

1 = talc, 2 = gypsum, 3 = calcite, 4 = fluorite, 5 = apatite, 6 = moonstone, 7 = quartz, 8 = topaze, 9 = corundum, 10 = diamant[18] [sic]

Les parties de la dent et certains abrasifs contenus dans des dentifrices ont également été comparés par Lehne et coll. dans *Clinical Preventive Dentistry* en 1983[10] :

- dentine : 2 à 2,5
- bicarbonate de sodium : 2,5
- dihydrate de sodium : 2,5
- carbonate de calcium : 3
- phosphate dicalcique anhydrique : 3,5
- émail dentaire : 4 à 5
- pyrophosphate tétracyclique : 5
- alumine : 9,25

Les aspects pratiques de ces échelles sont importants pour améliorer la compréhension des échelles d'abrasivité. Par exemple, Désautels[1] a établi quatre niveaux dans son échelle d'abrasivité graduée de 0 à 2 ou plus, où 0 correspond à peu abrasif et 2 ou plus à très abrasif. Ce seuil de 2 ou plus de Désautels semble logique puisqu'il est égal ou supérieur à la dureté de la dentine. Cette partie de la dent est souvent exposée chez les adultes. Avec un indice de dureté de 4 à 5, l'émail est plus dur que la dentine, ce qui permettrait l'utilisation d'un dentifrice plus abrasif si la dentine n'est pas exposée, surtout si l'on considère que la durée moyenne de brossage est d'environ une minute[5]. Le fluor, qui se situe à 4 sur l'échelle de Mohs, est semblable à l'émail. De plus, son action varie selon sa concentration : il peut être abrasif[17], antibactérien[20] et anti-carie[7,8]. Un dentifrice qui contient de l'alumine est efficace pour enlever les taches, mais il risque fort

d'endommager la surface des dents, puisqu'il est trop dur. L'alumine atteint en effet 9,25 sur l'échelle de Mohs.

La prochaine section présente brièvement les diverses raisons qui motivent, pour le grand public, le choix d'un dentifrice.

2.2.4 Facteurs reliés au choix d'un dentifrice

En général, les facteurs reliés au choix d'un dentifrice varient d'un groupe à l'autre, en fonction des intérêts de chacun. Ainsi, la population, les manufacturiers et les professionnels de la santé buccodentaire peuvent choisir un dentifrice en fonction du coût, des agents actifs ou de la commercialisation; ces aspects doivent donc être pris en considération[15,23].

A. La population accorde une importance particulière au coût du dentifrice, à son apparence et à sa qualité esthétique, à sa saveur, à la mousse qu'il produit, à l'haleine et à la sensation de fraîcheur et de propreté qu'il laisse après le brossage et à divers aspects liés à la santé, par exemple sa capacité à prévenir la carie et le saignement des gencives. Les gens veulent des produits faciles et rapides à utiliser et de qualité supérieure[15,23].

B. Les manufacturiers proposent à la population des produits attrayants. Par exemple, une de leurs stratégies consiste à offrir des produits recommandés par les professionnels pour prévenir, dans la mesure du possible, les problèmes buccodentaires[23].

- Le marketing en réaction à la concurrence : Pour plaire aux consommateurs, on multiplie le nombre de produits offerts[1]. On lance par exemple des dentifrices conçus pour les prothèses ou la langue, d'autres sont compatibles avec les produits homéopathiques, sans mousse pour les brosses électriques, sans agents de conservation, sans fluor, sans colorant, sans peroxyde, sans saveur artificielle, etc. Récemment, on trouve des nouveautés adaptées à divers problèmes de santé, comme le diabète (édulcorants sans effet sur la glycémie), la xérostomie (ajout d'enzymes salivaires ou diminution d'agents moussants) ou encore l'hypertension artérielle (sans bicarbonate de soude et sans sel).
- L'ajout d'agents thérapeutiques : L'action spécifique de certains agents permet de réduire des problèmes buccodentaires. Par exemple, on note l'ajout d'enzymes pour prédigérer le lait ou pour augmenter le flot salivaire, des vitamines B ou C pour favoriser la santé des gencives et des fluorures d'amines ou du calcium pour renforcer les dents et les os du parodonte.

C. Les professionnels insistent particulièrement sur la prévention et sur la promotion de la santé. Ils cherchent à réduire les facteurs de risque, comme l'utilisation d'un dentifrice au pH très acide sur une dent cariée, ou ils insistent sur des facteurs de protection, comme l'utilisation de dentifrices contenant des fluorures[23].

- Il existe deux grandes catégories de dentifrices : ceux dont l'objectif est cosmétique, qui visent l'apparence, et ceux dont l'objectif est thérapeutique, qui contiennent des agents qui favorisent la santé buccodentaire. L'application de la loi est particulière lorsqu'il s'agit d'un produit thérapeutique portant un code ISBN.
- Les dentifrices thérapeutiques existent depuis 20 ans environ. Le marché offre des produits anti-tartre, anti-carie, antibactériens, désensibilisants, et d'autres conçus pour combattre la xérostomie, la mauvaise haleine, les taches, etc[9]. Moyennant certains frais, l'Association dentaire canadienne (ADC)[27] peut accorder son sceau à un produit thérapeutique s'il est conforme à certaines normes et s'il est soumis à une démarche rigoureuse comprenant des études scientifiques.

Les données actuelles, bien qu'elles ne soient pas exhaustives, permettent de formuler la question principale et l'objectif de la présente étude. Celle-ci cherche à évaluer l'abrasivité des dentifrices offerts en 2005. L'objectif général de la recherche consiste à effectuer une mise à jour des données sur l'abrasivité des dentifrices et sur certaines variables associées aux dentifrices : le taux de matières insolubles, le pouvoir moussant, la viscosité et le pH. Il serait possible d'approfondir la recension des écrits.

3. MÉTHODOLOGIE

3.1 Pré-tests

Plusieurs pré-tests ont permis de vérifier la préparation des blocs de polyméthylmétacrylate (PMMA), les variables de force, de vitesse, de durée, le choix des matériaux utilisés pour l'étude in vitro, la dilution des solutions pour les tests sur l'abrasivité, le pH, la viscosité et le pouvoir moussant. Le montage sous vide et le choix des filtres, et la dilution avec eau et dentifrice pour le test sur les matières insolubles ont fait l'objet de démarches supplémentaires.

La conception et la fabrication de la machine de brossage a exigé plusieurs mois. L'ancien modèle de Désautels[1] utilisait cinq dentifrices dans cinq compartiments, alors que le nouveau modèle comporte sept compartiments, qui permettent de vérifier simultanément deux échantillons de trois dentifrices; le dernier espace sert de témoin. Les sept têtes de brosses à dents sont fixées dans de petits compartiments conçus à cet effet. La brosse Oral-B 40 a été choisie pour deux raisons : les poils en sont souples et la tête, rectangulaire. En effet, on recommande les brosse à poils souples pour le brossage quotidien, et la forme rectangulaire a été privilégiée parce qu'elle a l'avantage d'user les blocs de PMMA uniformément au centre et sur les rebords, tout en présentant une surface plane. Puisque le manche de la brosse à dents Oral-B 40 est flexible, il a été remplacé par une tige métallique rigide. D'autre part, les blocs de PMMA ont été placés dans un bac divisé en sept compartiments. L'équipement est relativement facile à nettoyer entre les tests. De plus, un couvercle a été ajouté pour réduire entre autres l'évaporation et les éclaboussures de dentifrices très liquides. Un puissant moteur permet de maintenir la constance des paramètres tout au long de l'expérimentation, ce qui n'aurait pas été le cas avec des piles, par exemple. Le montage est fixé sur une grande plaque d'acier pour éviter les vibrations et

protéger la précision des ajustements. Étant donné la robustesse de l'équipement, il sera possible de le réutiliser afin de répéter l'étude.

L'équation F = ma[17] ou F = mv/t permet de comparer la méthodologie de quelques études sur les dentifrices. Par exemple, Désautels[1] effectue ses tests durant 48 heures à une très faible force tandis que Pickles[24] effectue le brossage en quelques secondes, mais en appliquant une force élevée (supérieure à 200 g), déconseillée par Bowen[5], qu'il s'agisse de brosses manuelles ou électriques. Le Comité dentifrice a opté pour une force de 150 g, adaptée au brossage, et une durée de quatre heures, car certains dentifrices s'évaporaient en cinq heures malgré le couvercle.

- Équation de Désautels[1] : F = 55 g × 52 mvts durant 18 heures, solution composée à 2/3 de dentifrice et 1/3 d'eau
- Équation de Pickles[24] : F = 375 g × 400 mvts durant quelques secondes, solution composée à 38,5 % de dentifrice et 61,8 % d'eau
- Équation de l'ADA[25,26] : 150 g × 1500 mvts durant quelques secondes, solution comprenant des isotopes radioactifs dans 10 g de dentifrice et 50 ml de carboxyméthylcellulose à 5 %, ce qui fournit la RDA (radioactive dentine abrasion) ou la REA (radioactive enamel abrasion).
- Équation de FXG : F = 150 g × 120 mvts durant 4 heures, solution composée de 25 g de dentifrice et de 25 g d'eau.

3.2 Protocole

La méthode est inspirée principalement de l'étude de Désautels[1], qui utilise la pesée pour déterminer le degré d'abrasion des dentifrices en mesurant l'usure des blocs de PMMA. L'étude de Désautels suit les étapes suivantes : les blocs PMMA sont nettoyés au toluol; ils sont asséchés et placés au dessiccateur durant 48 heures. Ensuite, ils sont pesés avec précision sur la balance Mettler. Leur poids ne doit pas excéder 160 g, à 0,01g près. La préparation de la solution aqueuse est de 2/3 de pâte et 1/3 d'eau distillée, sauf dans le cas du dentifrice en poudre et le bicarbonate de soude. La solution de cinq dentifrices est placée dans cinq compartiments brossés simultanément. La force appliquée est de 55 g à une vitesse de 52 mvts/min. Les blocs sont ensuite lavés, asséchés et mis au dessiccateur pour une durée de 48 heures. Les brosses sont changées après chaque expérience. On calcule l'abrasion relative en établissant le rapport entre la perte de poids du spécimen et son poids initial × 100. Les résultats de 60 dentifrices sont classés en 4 niveaux d'abrasion : très abrasifs (2 et plus), abrasifs (1,37 à 1,99), moyennement abrasifs (0,88 à 1,36) et peu abrasifs (0 à 0,87). Une section spéciale présente les dentifrices « naturistes » (selon la terminologie de Désautels).

L'association dentaire américaine[25,26] propose les valeurs RDA (radioactive dentine abrasion) et REA (radioactive enamel abrasion) pour vérifier l'abrasivité des dentifrices. La méthodologie prescrit l'utilisation d'une solution radioactive composée de 10 g de pyrophosphate de calcium et de 50 ml de carboxyméthylcellulose à 5 %. Le nombre de mouvements est de 1500 brossages sur l'émail ou la dentine humaine. Les blocs de PMMA sont également utilisés dans les études in vitro. Plusieurs manufacturiers s'inspirent de l'ADA, et cette information est inscrite sur plusieurs tubes européens[2,22]. Le coût de ces équipements est très élevé.

Le protocole suivi par le Comité dentifrice et résumé ci-dessous était dirigé par la titulaire d'un doctorat en chimie. Le tube de dentifrice utilisé était neuf, et la première section du tube était utilisée aux fins des tests. Dans certains cas, la pâte variait en ce qui a trait à la couleur et à la séparation de l'huile et de l'ensemble de la pâte dentifrice. Nous avons vérifié quelques dentifrices dans deux tubes identiques ainsi qu'un échantillon prélevé au centre du tube. Dans chaque cas, nous avons noté un écart dans les résultats. Les dentifrices ne semblent donc pas homogènes, ni d'un tube à l'autre ni à l'intérieur d'un même tube. Il serait intéressant de connaître le procédé de fabrication des dentifrices, mais là n'était pas le but de la présente étude. Quoi qu'il en soit, le protocole a été appliqué rigoureusement, et seule la première partie des tubes a été utilisée. De plus, les sept brosses étaient changées avant chaque utilisation.

Le protocole d'étude de l'abrasivité des dentifrices et de leurs caractéristiques est le suivant :

1. Laver les blocs et les placer au dessiccateur pour une durée minimale de 48 heures. Peser les blocs.
2. Préparer la solution de 50 % dentifrice et 50 % d'eau (25 000 g ± 0,001 g chacun). Mesurer la hauteur du mélange à deux reprises. Agiter sur la plaque magnétique durant cinq minutes. Mesurer la hauteur de la mousse et comparer. Note : La mesure qualitative est effectuée à la règle étant donné l'absence d'un becher de 250 ml gradué très précisément. Prendre deux mesures.
3. Effectuer le test sur la viscosité à deux reprises en pompant 10 ml dans une pipette sérologique et en mesurant la quantité écoulée en 10 secondes.
4. Effectuer le test de pH à deux reprises en standardisant le pH-mètre et en plongeant l'électrode dans 3 ml de la solution.
5. Vérifier la forme des particules. Prendre deux photographies au microscope (facultatif).
6. Effectuer les tests sur l'abrasivité en préparant les sept blocs de PMMA. Verser 20 ml de solution dans deux compartiments et remplir un compartiment d'eau (témoin). Ainsi, deux échantillons de trois dentifrices sont testés simultanément. Placer les brosses neuves, ajuster l'appareil et le chronomètre afin de poursuivre le test pour une durée de quatre heures.
7. Démarrer et cesser le brossage selon des paramètres uniformes de vitesse, de poids et de durée.
8. Prélever un échantillon du dentifrice utilisé. Observer la forme des particules après les tests. Prendre deux photographies au microscope (facultatif).

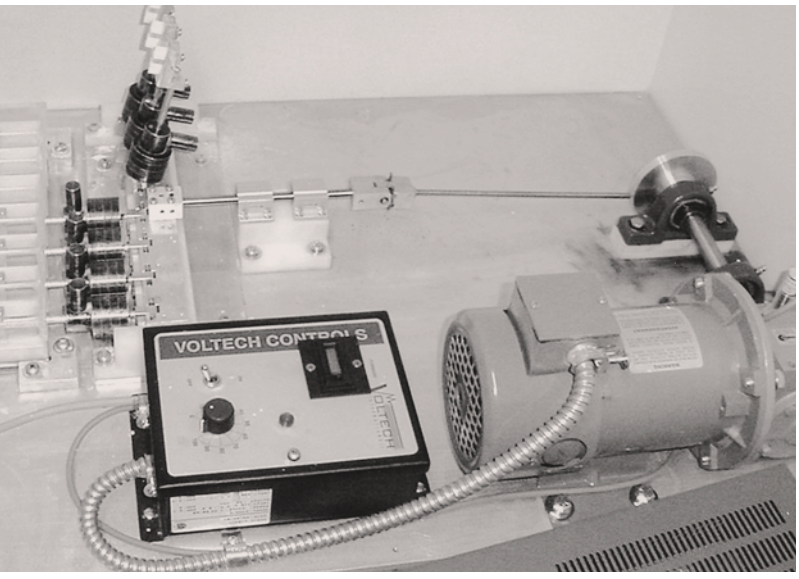


Illustration 1 : Machine de brossage pour le test d'abrasivité

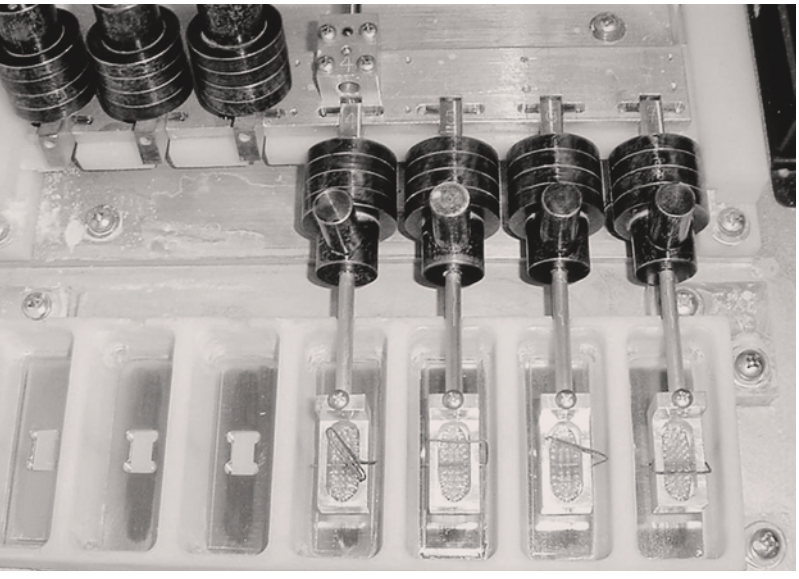


Illustration 2 : Bac de brossage

9. Laver et placer les blocs de PMMA au dessiccateur pour une durée minimale de 48 heures. Peser les blocs de résine.
10. Retirer les brosses et nettoyer le matériel.

Le protocole du test sur les matières insolubles se compose des étapes suivantes : placer le filtre au dessiccateur pour une durée minimale de 48 heures, préparer le montage sous vide, mélanger 2 g ± 0,001 de dentifrice et 10 g ± 0,001 et agiter au vortex pendant 3 minutes (même durée que le brossage), transférer sur le filtre placé dans l'entonnoir Buchner. Ensuite, ajouter 5 g ± 0,001 d'eau et répéter à trois reprises en agitant également au vortex. Effectuer la filtration, qui varie de quelques secondes à 12 heures, la moyenne étant de 30 minutes environ, pour permettre au mélange de s'écouler complètement. Finalement, remettre le filtre au dessiccateur et peser après 48 heures.

Les protocoles ont été appliqués en utilisant le matériel énuméré ci-dessous.

3.3 Matériel *(voir illustrations 1 et 2.)*

La machine de brossage et les brosses à dents sans manche ont été conçues et produites au Collège FXG, et les blocs de PMMA y ont été taillés. La plupart des équipements ont été prêtés par divers départements du Collège FXG. Le tableau suivant présente le matériel et en indique le fournisseur et les particularités.

En terminant, le traitement statistique a été réalisé avec le logiciel Microsoft Excel, version 2003. La méthode suivie pour établir l'abrasivité est la même que celle utilisée par Désautels[1], soit le rapport entre la perte de poids final du bloc de PMMA et son poids initial × 100. Par exemple, pour un bloc de 0,842 g qui, une fois soumis à un test sur l'abrasivité d'un dentifrice pèserait 0,815 g, le calcul s'effectuerait ainsi :

$$\frac{\text{Masse initiale du bloc de PMMA} - \text{Masse finale du bloc de PMMA}}{\text{Masse initiale du bloc PMMA}} \times 100\ \%$$

Dans notre exemple :

$$\frac{0{,}842 - 0{,}815}{0{,}842} \times 100 = \frac{0{,}027}{0{,}842} \times 100 = 3{,}2$$

Le taux d'abrasivité est exprimé en pourcentage, mais en pratique, on a tendance à utiliser la valeur numérique de 3,2 pour ce dentifrice. Le test est effectué deux fois simultanément, sur deux blocs différents. La moyenne des deux tests par bloc est multipliée par 100 et elle constitue le résultat final.

Le taux de matières insolubles provient de la multiplication par 100 de la différence entre la masse finale du filtre et sa masse initiale. Le test est réalisé une seule fois, car il exige beaucoup de temps durant la phase de filtration. En effet, s'il se limite généralement à 30 minutes, il peut atteindre plus de 12 heures dans le cas de certains mélanges.

Le pouvoir moussant est une mesure qualitative. Lors des manipulations, le becher de 250 ml contient 25 g de dentifrice et 25 g d'eau distillée, soit le mélange initial. Le malaxage est effectué sur la plaque magnétique pendant cinq minutes. Le mélange final est homogène, mais son volume est généralement supérieur. La première mesure est la hauteur minimale, et la seconde est la hauteur maximale. Par exemple, des dentifrices peuvent produire une énorme bulle de 20 mm. On calcule la moyenne des deux tests. L'écart entre le mélange initial et le mélange final fournit la mesure du pouvoir moussant. Le becher n'étant pas gradué à petite échelle, il a fallu prendre une règle millimétrée et répéter les mesures à deux reprises. La moyenne des deux tests constitue le résultat final.

Le calcul du taux d'écoulement du dentifrice s'effectue de la façon suivante : Moyenne entre le volume initial de 10 ml de solution au temps 0 et le volume écoulé après 10 secondes. Plus la mesure est élevée, plus le mélange s'écoule rapidement. Par exemple, la moyenne entre un volume initial de 10 ml et un volume final de 8 ml est de 9 ml. Le résultat final provient de la moyenne des deux tests.

Nom, nº produit	Fournisseur *	Particularités
Brosse douce Oral-B 40 nº 663904	Oral B	Forme rectangulaire et surface plane, manche taillé au centre de sciences physiques
Chronomètre Fisher n º 92241896	Fisher Scientific	Précision 0,1 seconde
Pipette sérologique 10 ml	Mohr	Graduation 0,1 jusqu'à l'extrémité
Bécher 250 ml nº 1003	Pyrex	Forme plate et large
Tube de centrifugation 15 ml nº 3103 0015	Nalgène	Graduation 0,1
Savon liquide Fisher nº 04342	Fisher	Concentré qui ne laisse aucun résidu
Agitateur Vortex nº K-500-2	Sc. Industries	3 agitateurs utilisés simultanément
Plaque chauffante agitatrice nº PC 351	Corning	Réglée à la puissance maximale
Agitateur octogonal *stir bar* nº 11451170	Fisher Scientific	Longueur de 51 mm
Balance électronique nº 10108379	Dewer	Max. : 200 g, précision : 0,001 g
PH-mètre Fisher nº 00934	Fisher Scientific	3 calibrations, ajustement à 7
Solution tampon de pH = 7 nº SB108B	Fisher Scientific	Électrode conservée dans la solution neutre
Mouchoirs de papier Scott Light Work nº 02930	Fisher Scientific	Fibres fines qui n'endommagent pas les surfaces
Dessiccateur nº 08-644	Fisher Scientific	Séchage à la température ambiante
Chlorure de calcium anhydre nº CP-0108	Lab Mat	Produit asséchant dans le dessiccateur
Erlenmeyer 250 ml nº 10-040F	Pyrex	Montage sous vide
Bouchon étanche noir nº 273836B8	Fisher Scientific	Adaptation entre l'erlenmeyer et l'entonnoir
Tube Fisher nº 14-150-2K	Fisher Scientific	Installation entre le bouchon et le robinet
Support à 2 pinces pour Erlenmeyer nº 05-769-3	Fisher Scientific	Fixation du montage sur le robinet
Entonnoir Buchner Coors nº 60240	Fisher Scientific	Fond plat perforé pour recevoir filtre, solution
Filtre quantitatif Whatman Glass microfibre nº 1827 055	Fisher Scientific	Filtre avec fibre de verre très performant pour retenir des matières de toutes sortes
Lame en verre finest Premium nº 12-544-2	Fisher Scientific	Observation au microscope de phase
Lamelle finest Premium Coverglass nº 12-548-B	Fisher Scientific	Observation au microscope de phase
Microscope à contraste de phase Carl Zeiss West Germany, standard 14	Opti-Ressources	Grosseur maximum 400×
Moniteur JVC nº TM-1400U	Opti-Ressources	Écran de 40 cm environ
Appareil photo numérique Nikon CoolPix 5400	Opti-Ressources	Ajustement en noir et blanc
Parafilm Pechiney plastic packaging nº 992	Pechiney	Protecteur sur les contenants
Eau distillée	-	Machine à eau distillée en biologie
Flacon laveur nº 0340922C	Fisher Scientific	Plastique flexible et pipette fine
Machine de brossage	FXG	Conception, usinage au centre de démonstration de sciences physiques
Blocs 18 X 9 X 5 mm en PMMA (poly-méthacrylate de méthyl, polymérisée à chaud)	Johnnston Industrial Industries	Taille au centre de sciences physiques
Accessoires : cylindres, support à cylindres, spatules, bac, assiette à papier filtre et pince, papier collant à éprouvette, brosse fine pour cylindre, brosse pour nettoyer le bac de brossage, rallonge électrique, crayons, règles, etc.	Fisher Scientific pour les articles de laboratoire quincaillerie Rona et Bureau en Gros	Complément utile, sans influence directe sur les tests
Ordinateur, logiciels et grilles de compilation maison	IBM et Microsoft 2003	Aucun

* Contacter les auteurs pour obtenir plus de détails sur le matériel, par exemple, les coordonnées des fournisseurs.

Tableau 2 : Liste du matériel, des fournisseurs et de certaines particularités

Le calcul du pH provient d'une lecture directe du pH-mètre, par exemple 7,14 et 7,15. La mesure est effectuée à deux reprises, et la moyenne constitue le résultat final.

Afin de connaître les agents actifs, entre autres, nous avons noté les ingrédients des dentifrices. Soulignons qu'il existe des différences importantes entre les ingrédients observés et ceux énumérés sur l'emballage. En effet, les manufacturiers ne sont pas tenus par la loi de fournir la liste complète des ingrédients. Ainsi, la liste est tirée de l'emballage ou provient des observations effectuées, par exemple, en ce qui a trait à la couleur. Dans un projet futur, la liste des ingrédients devrait être analysée davantage.

En général, les données devaient être saisies dans une grille Excel à la fin de chaque série de tests. Pour assurer l'exactitude des résultats, une double saisie de données était effectuée par une tierce personne membre du comité.

Les données descriptives provenant d'une compilation des tests et incluant des fréquences, des moyennes et des pourcentages sont fournies dans les résultats. De plus, des données générales sont obtenues par la lecture des informations fournies sur les emballages par les manufacturiers, par exemple leur action anti-carie ou anti-tartre. D'autre part, l'observation directe des produits a été effectuée, par exemple quant à la couleur et à la saveur, puisque la population peut choisir un dentifrice selon ces critères. Toutefois, des renseignements sur les tendances du marché n'étaient pas disponibles.

La prochaine partie présente des résultats partiels sur les dentifrices. Il est à souligner que comme les résultats complets s'avèrent très volumineux, ils feront l'objet d'un second volet qui inclura entre autres de nouveaux outils didactiques et un tableau-synthèse.

4. RÉSULTATS

Les résultats d'environ 200 produits sont présentés partiellement en 2 grandes sections : les données générales et les données spécifiques. En général, la première section indique les manufacturiers et les caractéristiques fournies principalement par eux, comme la couleur, la saveur, la texture, le format et l'action spécifique des dentifrices. Quant à la deuxième section, sur les données spécifiques, elle présente quelques résultats sur l'abrasivité, le pH, les matières insolubles, le pouvoir moussant et l'écoulement, et établit une comparaison entre certains produits dentaires. Parmi les 196 produits évalués, 98 % sont commercialisés, 2 % proviennent de recettes maison, comme le mélange de bicarbonate et de peroxyde, qui est utilisé régulièrement en parodontie douce. À des fins de comparaison, une pâte à prophylaxie douce, un produit de blanchiment et un produit conçu pour l'entretien des prothèses, des gels nettoyants pour la langue ainsi que la « brosse à doigt » BrushUps ont été vérifiés. Quelques dentifrices américains et européens ont été testés, car ils sont faciles à trouver sur le marché canadien.

4.1 Généralités

4.1.1 Manufacturiers des dentifrices (voir tableau 3)

Regroupés sous le terme « autres », 51 % des manufacturiers offrent quelques dentifrices. Les principales parts de marché appartiennent à trois grandes multinationales, soit Colgate-Palmolive (13 %), Proctor & Gamble (13 %) et Glaxo-Smith-Kline (10 %).

Manufacturiers	Nombre	Pourcentage
Colgate-Palmolive Canada	26	13 %
Proctor & Gamble Inc.	26	13 %
Glaxo-Smith-Kline	19	10 %
Church & Dwight Co. Inc.	11	6 %
Oral-B	7	4 %
Omni Oral Pharmaceuticals	5	3 %
Zooth	3	2 %
Autres	99	51 %

Tableau 3 : Manufacturiers des dentifrices

4.1.2 Caractéristiques générales des dentifrices (voir tableau 4)

En général le dentifrice est une pâte blanche, à saveur de menthe, offerte dans un tube et qui protège contre la carie ou qui blanchit les dents. L'émergence de nouvelles tendances se fait sentir, comme l'arrivée de la couleur orange, de saveurs de cannelle et d'agrumes, d'une texture liquide et d'une pompe, qui se démarque en étant verticale, ou l'arrivée de dentifrices conçus pour les diabétiques.

Coloration	Saveur	Texture	Format	Action spécifique
Blanc : 39 %	Menthe : 63 %	Pâte : 51 %	Tube : 82 %	Anti-carie : 76 %
Bleu : 21 %	Autre : 22 %	Gel : 29 %	Bouteille : 12 %	Blanchissant : 42 %
Vert : 15 %	Fruits : 6 %	Gel liquide : 9 %	Autre : 6 %	Anti-tartre : 26 %
2-3 couleurs : 12 %	Gomme : 5 %	Gel et pâte : 6 %		Anti-gingivite : 21 %
Clair : 7 %	Cannelle : 4 %	Autre : 5 %		Sensibilité : 12 %
Rouge : 7 %	Agrumes : 1 %	Liquide : 1 %		Multi : 1 %
Rose : 6 %				
Orange : 3 %				

Tableau 4 : Répartition des dentifrices selon la coloration, la saveur, la texture, le format et l'action spécifique

Il est à noter que les manufacturiers précisent l'action spécifique de chaque produit. Parmi les produits offerts, 55 dentifrices portent le sceau de l'Association dentaire canadienne (ADC)[27], soit 45 approuvés pour la carie, 7 pour la sensibilité dentinaire et 3 pour la gingivite. Une consultation d'Internet aurait fourni plus d'information, mais la présente étude s'est limitée aux renseignements inscrits sur l'emballage ou sur le tube.

4.2 Résultats détaillés selon les tests

Les résultats complets étant très volumineux, nous avons choisi de fournir quelques exemples de produits et d'inclure des tableaux exhaustifs dans des outils éducatifs qui seront diffusés ultérieurement.

4.2.1 Abrasivité (voir tableau 5)*

Plus du tiers des dentifrices, soit 35,7 %, s'avèrent peu abrasifs. Environ 75 % se situent sous le seuil de 2, qui correspond à la dureté de la dentine. Cependant, près de 25 % sont au-dessus de ce seuil. Quelques dentifrices se situent au-dessus de 4, ce qui risque d'être néfaste pour l'émail.

4.2.2 Mesure du pH (voir tableau 6)

La plupart des dentifrices, soit plus de 80 %, se trouvent dans l'échelle neutre et basique. Les produits acides et très acides, soit 15 % des produits testés ou 30 produits, se situent sous le seuil critique de la déminéralisation (6).

4.2.3 Matières insolubles (voir tableau 7)

Les matières insolubles sont obtenues par le montage sous vide. La plupart des dentifrices se situent entre 30 et 40 % ou ils sont inférieurs à 10 %. Le pH des dentifrices comportant peu de matières insolubles et une faible abrasivité est généralement neutre ou acide. Par exemple, le Gel Kam aux fruits des champs comporte 0 % de matières insolubles, 0 % d'abrasivité et un pH de 3,6.

* Désautels[1] et le Comité dentifrice utilisent les mêmes catégories, même si la méthodologie du Comité a été adaptée afin de tenir compte des nombreux dentifrices sur le marché en 2005.

	Très : 2 ou plus	**Abrasif : de 1,37 à 1,99**	**Moyen : de 0,88 à 1,36**	**Peu : de 0 à 0,87**
Fréquence et % (n = 196)	48 et 24,5 %	38 et 19,4 %	40 et 20,4 %	70 et 35,7 %
Exemple	Healthy mouth Tea Tree à 5,17	Arm & Hammer rafraîchissement de 3 heures à 2,38	Crest expression blancheur, menthe à 2,17	Sensodyne F revitalisant à 0,61

Tableau 5 : Échelle d'abrasivité

	Basique ou alcalin : 8 et plus	**Neutre : 7 (7 ± 1 est considéré neutre)**	**Acide : de 4 à 5,9**	**Très acide : moins de 4**
Fréquence et % (n = 194)*	56 et 28,9 %	108 et 55,7 %	20 et 10,3 %	10 et 5,1 %
Exemple	Tom's of Maine avec propolis à 9,86	Colgate Total, fraîcheur active à 7,02	Biotène en gel à 5,60	Omnii Gel Natural à 3,17

Tableau 6 : Mesure du pH

* Les produits BrushUps et le bicarbonate sont exclus de ce test.

	Élevé : 40 ou plus	**Moyen : de 20 à 39,99**	**Peu : de 0 à 19,99**
Fréquence et % (n = 194)*	27 et 13,8 %	85 et 43,8 %	82 et 42,3 %
Exemple	Nutrismile C pure with Citrus and Spice à 56,45 %	Weleda, dentifrice au calendula à 27,95 %	Prim'age 2-6 ans, fluor 500 ppm, calcium et provitamine B5, goût de fraise à 16,65 %

Tableau 7 : Matières insolubles

* Les produits BrushUps et le bicarbonate sont exclus de test.

4.2.4 Pouvoir moussant (voir tableau 8)

Environ 50 % des dentifrices, soit 97 produits, produisent peu de mousse. Les dentifrices sans mousse sont particulièrement appréciés en cas de sécheresse buccale ou lorsqu'on utilise une brosse électrique.

4.2.5 Écoulement (voir tableau 9)

En général, l'écoulement des dentifrices se situe dans la moyenne, soit environ cinq gouttes par seconde. Plus un dentifrice contient de matières insolubles, plus il s'écoule lentement. Par exemple, Sea Fresh, qui contient 55,35 % de matières insolubles, s'écoule à raison de 0,5 ml en 10 secondes. Dans ce test, l'eau, qui s'écoule à raison de 10 ml en 10 secondes, est la substance de référence.

À titre indicatif seulement, le graphique (voir graphique 1) suivant montre la répartition des matières insolubles en fonction des quatre niveaux de l'échelle d'abrasivité. Des analyses statistiques supplémentaires fourniraient un portrait plus exhaustif. En général, plus un dentifrice contient de matières insolubles, plus forte est la probabilité qu'il se situe dans la catégorie « très abrasif ». Par exemple, Healthy Mouth, Tea Tree (abrasivité de 5,17 %) est élevé avec 55,90 % de matières insolubles. Les dentifrices pour enfants ne sont pas très abrasifs et contiennent un taux de matières insolubles situé entre 10 et 30 %. Ils sont généralement doux et neutres, comme Kids Pre Step, avec 8,90 % de matières insolubles, une abrasivité de 0,24 % et un pH de 6,78.

	Élevé : 2 ou plus Valeurs représentant le double ou plus du volume initial	**Moyen : de 1 à 1,99 Valeurs moyennement supérieures au volume initial**	**Peu : de 0 à 0,99 Valeurs équivalentes ou légèrement supérieures au volume initial**
Fréquence et % (n = 194)*	18 et 9,2 %	79 et 40,3 %	97 et 49,5 %
Exemple	Aim au fluorure à 2,50	GUM, Whitening Plus à 1,85	Emoform-F à 0,6

Tableau 8 : Pouvoir moussant

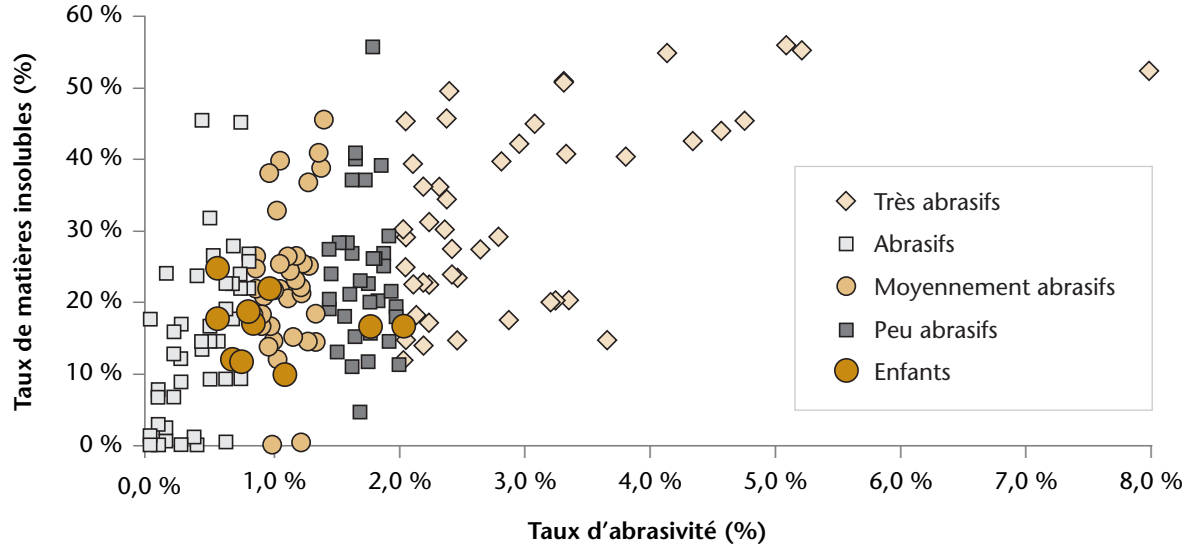
* Les produits BrushUps et le bicarbonate sont exclus de test.

	Rapide : 7 ou plus	**Moyen : 5 ± 2 Valeurs entre 3 et 6,9**	**Lent : de 0 à 2,9**
Fréquence et % (n = 194)*	32 et 16,5 %	88 et 45,4 %	74 et 38,1 %
Exemple	Thera Breath, pâte dentifrice oxygénante avec aloès oxyd-8 à 7,8	Colgate glace polaire, 2 en 1, dentifrice et rince-bouche à 6,65	Crest Vraiment Blanc à 0,25

Tableau 9 : Écoulement

* Les produits BrushUps et le bicarbonate sont exclus de test.

Graphique 1 : Corrélation entre taux de matières insolubles et taux d'abrasivité



4.2.6 Comparaison entre des produits dentaires (voir tableau 10)

Certains produits sont comparés à titre indicatif : la pâte à prophylaxie, un produit de blanchiment, des produits pour prothèses, des nettoyants pour la langue et la brosse à doigts BrushUps. Des comparaisons sont effectuées également entre deux tubes identiques ou deux tubes dont les échantillons ont été prélevés au début et au milieu du tube. De plus, cette dernière section présente les résultats des tests effectués sur des recettes maison très populaires et des produits purs.

La comparaison entre les dentifrices commerciaux, certains dentifrices maison et quelques produits dentaires permet d'évaluer ces produits les uns par rapport aux autres. Selon cette comparaison, aucun dentifrice n'est plus abrasif que la pâte à prophylaxie fine Nupro, qui se situe à 7,94 dans l'échelle d'abrasivité et qui est très alcaline. Le dentifrice à prothèses, dont l'écoulement est faible, se démarque en étant très doux : abrasivité de 0,42 et pH basique (7,6). Le nettoyant à prothèses Ban-A-Stain est très acide (pH de 1,8). Le gel de blanchiment en cinq minutes est plutôt acide et s'écoule lentement. Les produits pour nettoyer la langue se ressemblent en général, mais n'ont pas le même écoulement. De plus, ils sont légèrement acides. BrushUps nettoie faiblement, avec une abrasivité de 0, équivalente à celle de l'eau. Précisons toutefois qu'il n'est pas possible d'effectuer tous les tests à cause des particularités du produit. Les recettes maison se ressemblent à divers points de vue, entre autres une abrasivité faible et un pH alcalin, plus élevé avec la glycérine qu'avec le peroxyde. Les produits purs, comme l'eau, le peroxyde et la glycérine, n'ont aucune abrasivité, aucune matière insoluble, aucune mousse et un écoule-

Produits	Abrasivité (%)	Matières insolubles (%)	Pouvoir moussant (mm)	Écoulement (ml)	pH
Pâte à prophylaxie Nupro, fine	7,94	52,85	0	8,1	9,36
Pâte à prothèses Polident	0,42	45,68	1,7	2,85	7,69
Nettoyant à prothèses Ban-A-Stain	0	0,15	0,55	2,6	1,8
Gel javellisant, blanchiment 5 min. Plus+White	0	0	1,2	2,25	6,325
Brosse à doigt Brush Ups menthe	0	-	0	-	-
Nettoyant pour la langue Breath-So-Fresh	0,42	13,45	0,1	1,65	5,29
Nettoyant pour la langue GUM, Fresh-R	0,73	9,4	0,15	7,9	6,46
Rince Gel Kam fruits des champs	0	0	0	8,25	3,6
Rince Gel-Kam menthe	0,24	0	0,55	7,55	3,2
Sensodyne-F revitalisant, tube 1	0,85	21,95	0,25	4,25	8,3
Sensodyne-F revitalisant, tube 2	0,61	22,7	0	4,35	8,315
Mentadent, début du tube	2	12,05	1	5,6	8,08
Mentadent, milieu du tube	1,97	11,4	1,5	2,75	8,05
Eau	0	0	0	10	6,9
Peroxyde d'hydrogène USP 3 %/10 vol.	0	0	0	10	4,92
Glycérine USP	0,06	0	0	0,6	7,87
Glycérine et peroxyde 3 %	0,06	0	0,2	9,15	6,19
Bicarbonate de soude Arm & Hammer, Cow Brand, sec	0,98	0	-	0	-
Bicarbonate et eau 1:1	0,06	0	0	9,45	8,4
Bicarbonate et eau et peroxyde 1:1:1	0,36	1	0	10	8,24
Bicarbonate et peroxyde 1:1	0	0	0	10	8,34
Bicarbonate et glycérine 1:1	0,12	24,05	0	10	8,32
Bicarbonate et glycérine (Désautels) 0,8:1	0,36	0	0	10	7,76

Tableau 10 : Comparaison entre des produits dentaires

Très abrasifs : 2 % ou plus
Abrasifs : de 1,35 % à 1,99 %
Moyennement abrasifs : de 0,88 % à 1,36 %
Peu abrasifs : de 0,0 % à 0,87 %
Dentifrice pour enfant

AmF : fluorure d'amine
MFP : monofluorophosphate de sodium
NAF : fluorure de sodium
SF : sans fluor
SNF2 : fluorure stanneux ou d'étain
E : enzymes antibactériens
FHN : hydrofluorure de nicométhanol
NP : nitrate de potassium
CS : chlorure de strontium
P : pyrophosphate
T : triclosan

No	Nom du dentifrice	Fluorure	PH	Taux d'abrasivité
185	Nupro fine, pâte à prophylaxie	NAF	9,4	7,94 %
124	Jasön, Healthy mouth, pure, natural & organic, à l'huile d'arbre à thé, clou de girofle et cannelle	SF	7,5	5,17 %
125	Jasön, Nutrismile C, pure, natural & organic, citrus & spice	SF	7,3	5,06 %
136	Nature's Gate, dentifrice naturel, bicarbonate de soude, Crème de menthe anglaise aux plantes	SF	8,5	4,72 %
137	Nature's Gate, dentifrice naturel, bicarbonate de soude, Crème de menthe aux plantes	SF	8,4	4,54 %
155	Pearl Drops, dentifrice blanchissant, menthe	MFP	6,6	4,30 %
126	Jasön, Sea Fresh, deepsea, pure, natural et organic, menthe	SF	6,8	4,11 %
113	Pomme verte, dentifrice naturel avec calcium et vitamine C	SF	8,5	3,78 %
170	Cleanicdent, dur pour les taches	NAF	7,3	3,64 %
41	Colgate MaxFrais avec mini Pellicules Fraîches Blanchissant, menthe pure	NAF	7,2	3,33 %
112	Orange fruitée, dentifrice naturel avec calcium et vitamine C	SF	8,1	3,30 %
119	Tom's of Maine, dentifrice naturel avec propolis et myrrhe, fenouil	SF	9,6	3,29 %
117	Tom's of Maine, dentifrice naturel avec propolis et myrrhe, menthe verte	SF	9,9	3,27 %
40	Colgate MaxFrais, avec mini Pellicules Fraîches Blanchissant, menthe fraîche	NAF	7,2	3,22 %
116	Homéodent 2, plantes et chlorophylle	MFP+NAF	6,7	3,18 %
134	Auromère, pâte dentifrice aux herbes. Original Licorice	SF	8,6	3,05 %
111	Menthe givrée, dentifrice naturel avec calcium et vitamine C	SF	8,2	2,93 %
74	Close-Up, gel à la menthe	MFP	6,4	2,85 %
45	Colgate Herbal Blancheur, menthe fraîche, extraits de citron	MFP	10	2,77 %
109	Aquafresh avancé, triple protection, extra-frais	MFP	8,4	2,76 %
49	Aquafresh, triple protection, Enfants, Gomme à la menthe	MFP	8,4	2,61 %

Tableau 11 : Tableau de synthèse sur les dentifrices très abrasifs

Abrasivité des dentifrices 2004-2006

ment rapide (de 9 à 10). Leurs différences se situent dans le pH : neutre pour l'eau, alcalin pour la glycérine (7,87) et acide pour le peroxyde (4,92).

Un dernier tableau (no 11) résume les résultats de quelques tests sur les dentifrices.

Il est à remarquer que plusieurs dentifrices dits naturels sont groupés dans cette catégorie. En général, ils contiennent des extraits de plantes et des abrasifs peu solubles dans l'eau, comme la craie, ce qui influence l'abrasivité. D'autre part, puisqu'ils contiennent plusieurs dérivés du fluor, ils préviennent la carie et la formation de tartre. Finalement, leur pH est généralement neutre ou basique.

En résumé, les résultats de la présente étude effectuée en 2005 sur les dentifrices fournissent de nouvelles données, entre autres sur l'abrasivité, le pH, les matières insolubles, l'écoulement et le pouvoir moussant, autant de données pertinentes, analysées ci-dessous.

5. ANALYSE

L'analyse suivante permet de décortiquer les résultats et d'inclure des recommandations. Idéalement, les dentifrices doivent protéger les dents, et non présenter un risque. Certains dentifrices, dont le pH est acide (5,5 ou moins), favorisent la déminéralisation et ont une faible abrasivité. Il est à remarquer que si certaines bactéries sont vulnérables à ces variations, d'autres sont très résistantes, comme les streptocoques, et sont actives en milieu acide[5]. Ces dentifrices acides doivent donc être suggérés avec précaution lorsque les racines sont exposées ou en cas de déminéralisation. Les dentifrices alcalins ou basiques peuvent être influencés par le bicarbonate de soude puisque celui-ci est reconnu depuis des siècles pour son effet alcalin[8]. Lors des tests, les solutions d'eau et de bicarbonate (1:1) atteignent un pH de 8,4. Selon Lehne[9], d'autres facteurs que la dureté influencent l'abrasivité globale d'un produit, comme sa composition ainsi que la taille et la forme des particules qu'il contient. En fait, la solubilité relativement élevée du bicarbonate pourrait contribuer à sa faible abrasivité[9]. Sec, il pourrait user la dentine ou l'émail. En effet, il a égratigné le bloc de PMMA, ce qui lui confère une abrasivité moyenne de 0,98. Sur l'échelle de Mohs, le bicarbonate de soude et la dentine ont une dureté semblable (2), mais les particules sont très irrégulières. C'est pour cette raison, judicieuse, que certains dentifrices contiennent des particules micro pulvérisées.

En 1994, Désautels[1] soulignait l'arrivée d'agents blanchissants, qui occupent maintenant une part de marché de 42 %. Il serait souhaitable que le vocabulaire relié au blanchiment soit uniformisé dans le domaine de la santé. Par exemple, les pharmaciennes Than et Laviolette[28] suggèrent deux catégories de produits de blanchiment des dents : les agents blanchissants tels que les bandelettes WhiteStrips, qui contiennent du peroxyde d'hydrogène, et les dentifrices à propriétés blanchissantes, qui contiennent des agents abrasifs. Les auteures incluent des abrasifs récents comme le trihydrate d'aluminium. Le procédé de blanchiment au moyen du peroxyde semble viser la déminéralisation de la dent afin de remplacer les ions de calcium et de phosphate par ceux du fluor, sinon de la salive[22]. Les dentifrices naturels et les dentifrices blanchissants semblent plus abrasifs que les autres, en général. Les dentifrices naturels contiennent souvent des plantes[29], qui ne sont pas dissoutes dans l'eau. Dans les dentifrices blanchissants, on peut trouver des particules très abrasives, comme l'alumine[9], qui peuvent avoir un effet direct sur l'usure de la surface. Sur l'échelle de Mohs[18], ce dérivé métallique est très dur et non soluble. La prudence est donc de mise par rapport aux agents blanchissants.

En ce qui a trait aux manufacturiers, il est dommage qu'ils n'indiquent pas le pH sur leurs emballages en Amérique, information qui s'y trouve pourtant fréquemment en Europe[19]. Le RDA[25,26] est noté sur plusieurs dentifrices européens[2] et il serait intéressant de l'inclure aussi sur les produits destinés aux autres marchés. Les manufacturiers ne sont pas tenus de fournir la liste des ingrédients. Pourtant, une telle liste apporterait une information précieuse étant donné la multiplicité des produits chimiques. Plusieurs dentifrices naturels affichent une tendance opposée en précisant le rôle protecteur de leurs ingrédients, par exemple la vitamine C, qui favorise la guérison des gencives.

En ce qui concerne les dentifrices commerciaux, des prélèvements effectués dans deux tubes différents ou recueillis au début et au milieu d'un même tube fournissent des données légèrement différentes. On trouve parfois des bulles d'air et des changements de couleur. S'il est possible que l'équipement utilisé pour mélanger les solutions ait influencé les résultats, la variable humaine risque peu d'avoir contribué à ces variations puisqu'une seule personne a effectué tous les tests. Ainsi, la probabilité que le dentifrice soit homogène partout dans le tube est faible. Il est à noter que deux blocs de PMMA par mélange n'ont pas toujours donné les mêmes résultats même si le mélange provenait de la même solution. Microscopiquement, les blocs n'étaient pas usés de façon identique. Cette comparaison indique clairement que le produit n'est pas uniforme. Il faut donc relativiser les résultats, qui sont seulement valables pour les quantités analysées. Cette constatation s'applique à toutes les études sur le sujet. En outre, il est à souligner que deux tests sont insuffisants pour généraliser les résultats. Toutefois, puisque Désautels[1] n'avait effectué qu'un seul test par produit, la présente étude offre des résultats plus exhaustifs, malgré ses limites.

Plusieurs recherches tentent actuellement de mesurer l'efficacité d'agents thérapeutiques comportant du fluorure-xylitol[30], du triclosan[31], de la chlorexydine[32] ou des fluorures d'amines et du fluorure stanneux[34] censés prévenir la plaque et la gingivite[33], ou de dentifrice aux herbes censés eux aussi prévenir ces problèmes[29]. L'huile d'olive pourrait même inhiber la plaque dentaire lorsqu'elle est incluse dans un dentifrice[35]. Le brossage avec ou sans dentifrice n'aurait aucun effet sur la récession gingivale selon une étude très récente de Verste et coll., mais il faut remarquer que le nombre de dentifrices étudiés était très limité[36]. Cependant, le choix d'une brosse manuelle ou électrique peut influencer l'abrasion[5,37]. D'autre part, en Europe, on étudie depuis quelques années les caractéristiques des dentifrices (par exemple l'acidité), le pouvoir nettoyant et l'analyse d'abrasifs (par exemple la silice hydratée, le carbonate de calcium et le tryhydrate d'aluminium)[2]. La salive joue également un rôle prépondérant dans l'accumulation de la plaque et la déminéralisation de l'émail[38]. De plus, d'autres résultats de recherche révèlent de nouveaux agents antimicrobiens qui s'avèrent plus ou moins efficaces selon les micro-organismes[39]. Plus de 500 types de microorganismes, incluant des bactéries, des champignons et parfois des amibes, forment une communauté dynamique et complexe dans le biofilm[40]. Ainsi, l'étude du biofilm révèlera d'autres aspects qui seront sûrement pris en considération en recherche fondamentale et en recherche clinique[41]. Ces études sont encore plus détaillées qu'auparavant et elles ouvrent de nouvelles perspectives dans le domaine de la santé dentaire. Les nouveaux produits en regard de l'état de santé générale, comme les

produits conçus pour les diabétiques et les dentifrices visant certains types de problèmes buccodentaires, devraient se multiplier, car ils répondent à des besoins particuliers au sein de la population vieillissante.

La méthodologie et le protocole ont exigé beaucoup de temps, mais ils répondent aux principales observations des membres de l'équipe interdisciplinaire. La participation de professionnels de formations différentes était importante dans la conception et la réalisation de l'étude et constituait un atout. L'analyse pourrait être encore plus exhaustive, mais ce tour d'horizon permet de mieux connaître les dentifrices selon les besoins éventuels de chaque client.

6. RECOMMANDATIONS ET RETOMBÉES

Les retombées de cette étude sont nombreuses pour les enseignants et les départements du Collège FXG qui travaillent en interdisciplinarité. Avant l'étude, les enseignants du département d'hygiène dentaire déploraient l'état de la connaissance sur les dentifrices, et tout le département est fier d'avoir contribué à l'avancement de la profession. Soulignons que le projet est modeste, simple et relativement facile à mettre en place. La mise à jour ultérieure est possible au Collège puisque plusieurs équipements sont durables et à la disposition des enseignants. Ce précieux partenariat s'avère nécessaire pour donner un élan qui augmente la synergie de l'ensemble du département.

La diffusion des résultats au moyen d'une brochure, de matériel didactique ou de conférences est à prévoir, tant en français qu'en anglais. Ainsi, la mise en œuvre d'un deuxième volet, qui consisterait à chercher des partenaires pour diffuser les résultats de l'étude, par exemple, serait souhaitable. Cette diffusion serait pertinente pour les enseignants, les étudiants et les professionnels. En outre, avec le temps, les consommateurs seraient de mieux en mieux informés sur les produits offerts sur le marché et ils profiteraient donc des retombées d'une telle étude. Soulignons que cette démarche de diffusion de tous les résultats doit être approuvée par le département des Techniques d'hygiène dentaire du Collège FXG.

Quant aux limites de l'étude, mentionnons que la méthodologie et la fabrication de la machine de brossage ont été très laborieuses. Il est possible d'obtenir l'information nécessaire à la reproduction de la machine de brossage en s'adressant aux concepteurs des plans. D'autre part, l'utilisation du même protocole pourrait se prêter à l'inclusion de nouveaux dentifrices. Les résultats sont présentés en pourcentage, mais l'idéal serait d'établir une équivalence entre le taux d'abrasivité et les mesures RDA ou REA. Ces dernières sont utilisées par les manufacturiers et présentées sur l'emballage de plusieurs dentifrices en Europe. Certains renseignements devraient être obligatoires, par exemple la liste des ingrédients, l'abrasivité, le pH et les matières insolubles. Ces variables méritent d'être considérées lorsque les professionnels conseillent leurs clients. D'autre part, il serait intéressant de comparer d'autres matériaux au PMMA puisque des centaines de produits ont été mis en marché depuis 1964, soit l'époque de la principale étude sur les matériaux semblables à l'émail ou à la dentine humaine. La dureté de l'émail n'a pas été vérifiée chez les enfants, à notre connaissance. Cet élément serait pertinent pour établir l'abrasivité minimale pour nettoyer les dents. L'abrasivité maximale devrait prendre en considération toutes les parties de la dent exposée, soit l'émail (la partie la plus dure) et la dentine (la partie la plus molle). Toute autre variable soumise à la loi de Newton durant le brossage devrait aussi être approfondie, comme la force déployée durant le brossage, le choix d'une brosse à dents manuelle ou électrique ou même ultrasonique qui agit à distance sur le biofilm.

La présente étude permet d'établir certains liens entre les notions générales et les notions spécifiques tout en permettant la formulation de recommandations concrètes.

7. CONCLUSION

Cette étude a rempli son mandat et atteint l'objectif général, soit la mise à jour des données disponibles sur les dentifrices. Le modèle de Forrest[13,14] s'est avéré utile pour concilier les données scientifiques, le point de vue des professionnels, les besoins du client et les contraintes du milieu, comme la confection de la machine de brossage à Québec. De plus, l'ajout de nouvelles variables a permis d'approfondir certains aspects. La conception de la méthodologie a été longue, mais cruciale. Quant au traitement statistique, il a fourni des résultats descriptifs, grâce à l'utilisation des moyennes, par exemple. L'étude a déterminé que l'abrasivité de 75 % des produits se situe entre les seuils de 0 et 1,99, qui sont équivalents à la dureté de la dentine. Le pourcentage de matières insolubles se situe en moyenne entre 30 % et 40 % ou est inférieur à 10 %. Quant au pouvoir moussant, il est faible dans la plupart des produits. Environ la moitié des produits s'écoule moyennement vite, soit à un rythme de cinq gouttes par seconde. En ce qui concerne le pH, la grande majorité des produits est neutre, environ 25 % sont très basiques et 15 % sont acides (sous le seuil de 6). Une évaluation de la composition des dentifrices cosmétiques et thérapeutiques et plus particulièrement des agents actifs a été effectuée. La plupart ne sont pas approuvés par l'ADC, tout en ayant la même concentration de produits. Par exemple, la majorité des dentifrices pour enfants contiennent du NaF à 0,243 %, mais une minorité sont approuvés par l'ADC.

En terminant, les dentifrices pour enfants sont peu abrasifs ou ne le sont pas du tout, et ils contiennent peu de matières insolubles, en général. D'autres études statistiques sont nécessaires pour connaître les liens entre les différentes caractéristiques des dentifrices. Un deuxième volet visant la diffusion des résultats et de matériel éducatif en français et en anglais est grandement souhaité.

Cette étude novatrice d'environ 200 produits répond à plusieurs besoins. Elle répond aux besoins des professionnels de la santé dentaire pour des informations plus précises sur la prévention. De plus, elle permet aux manufacturiers de déceler les nouvelles tendances — et elles sont nombreuses — en analysant les saveurs, en

modifiant des ingrédients comme les humectants, ou en ajoutant des ingrédients adaptés pour les diabétiques, des vitamines et des minéraux, comme la vitamine C, le calcium ou le cuivre, qui ont un effet sur les gencives, les os du parodonte ou le biofilm. Pour sa part, la population désire connaître les propriétés des dentifrices pour acheter le dentifrice adéquat, par exemple à saveur de fruits. D'autre part, l'abrasivité devient un facteur de risque lorsque le produit est trop abrasif ou trop acide, par exemple. Le dentifrice devrait constituer un facteur de protection qui réduit les problèmes buccodentaires tels que la carie, le tartre, la gingivite et l'hypersensibilité. Cette vision élargie des produits dentaires ouvre des perspectives intéressantes au chapitre de la recherche ainsi qu'en matière de retombées cliniques à court, moyen ou long terme.

REMERCIEMENTS

Nous souhaitons remercier chaleureusement les membres de l'équipe interdisciplinaire. Nos sincères remerciements s'adressent également au comité de formation continue du département d'hygiène dentaire du Collège FXG. La collaboration des coordonnateurs et des départements dans ce projet a été grandement appréciée. Le projet a également profité de l'appui de l'administration du collège, et nous lui en sommes reconnaissants. Nous souhaitons enfin exprimer notre profonde gratitude aux collaborateurs occasionnels : Louise Robichaud et Maurice Robichaud pour la traduction en anglais d'un résumé de communication à la FDI, aux enseignants en hygiène dentaire, aux services informatiques et au secrétariat pédagogique du Collège FXG.

La deuxième équipe prendra maintenant la relève pour le deuxième volet, qui s'annonce tout aussi intéressant et pertinent. **Demande de tirés à part** : s'adresser à Nadia Dubreuil, Collège FXG. Tél. : 418 688-8310 Courriel : ndubreuil2@cegep-fxg.qc.ca

Lien entre le projet et les commandites :

Le financement de la présente étude a été assuré par le Comité d'éducation continue du département d'hygiène dentaire du Collège FXG. Aucun lien n'existe entre les commanditaires et l'étude sur les dentifrices. Dans le premier volet, la neutralité a été privilégiée afin d'assurer l'indépendance de l'étude. Le second volet respectera les mêmes critères en ce qui a trait aux documents produits tout en s'appuyant sur de nouvelles collaborations pour ce qui est, par exemple, de la traduction, de la production et de la diffusion des tirés à part et du matériel éducatif.

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Mentorship *(continued from page 163)*

And now I am calling on present and past leaders to become mentors. We need you to impart your wisdom and zest to a new generation of dental hygienists who will lead us into the future. "Knowledge is power." I am reminded of all the struggles surrounding the issue of self-governance and how provincial organizations and individual dental hygienists were able to learn from each other to make this goal a reality. We need to share our knowledge with others so they can pick up where we leave off and continue the progression toward a better future for all dental hygienists.

We need to create a nurturing environment that will motivate our colleagues to get involved and provide input. At the same time, I ask all dental hygienists who have never participated directly in your professional association to get involved. Invest in your profession. After all, you and all your colleagues can only benefit from your input and contribution. Why not fashion the future of our profession rather than hope the next leaders share the same vision that you have?

I believe that the next few years will offer more opportunities for entrepreneurship and will see a great increase in the types of professional settings where dental hygienists can provide oral health care services to the public. As you help your profession progress, you will feel a level of professional gratification that you may not be able to achieve in your present working environment.

It is my sincere wish that all present and past volunteers will mentor at least one dental hygienist and help prepare him or her to take the helm of our professional organizations and profession.

You can contact the president at <president@cdha.ca>.

Flowers, Dental Hygiene Issues, and CDHA *(continued from page 167)*

Three separate conversations—what do they have in common? They are some of the many voices of our dental hygiene community. Each of these issues is so important yet they blend together, sometimes only once their relationship is recognized, and sometimes by conscious decision. Although Emerson laments the loss of the beauty of the individual flowers, as an association, we create a colourful and fragrant bouquet that celebrates the richness of much beauty.

As your professional association, CDHA watches eight "flowerbeds" of activity in the dental hygiene environment to understand your issues within the environment of the Canadian health system. We engage in efforts to promote dental hygienists across eight sectors of influence that parallel Dr. Karl Albrecht's Strategic Radar Model.* We attempt to create a unified bouquet by understanding and benefiting from lessons learned while studying and interacting with all these factors: customer, competitor, economic, technological, social, political, legal, and geographical. At times, one issue or another may receive more attention just as flowers have their seasons. Yet all of these areas remain important to the association as they directly affect how you work today and how you will work in the future. As we enjoy our summer gardens, remember that membership in CDHA means that you are part of a community that is committed to ensuring a vital profession that can actively contribute to the oral health of Canadians.

* Albrecht, Karl. The strategic radar model. In: American Society of Association Executives, the Center for Association Leadership. Mapping the future of your association. Washington (DC): ASAE and the Center; 2005.

We'll keep you connected

With a professional membership in the Canadian Dental Hygienists Association, everything you need to help you give your clients the care they deserve is right at your fingertips.

Need to learn about new products, find another CDHA member or get the very latest in research findings or practice standards? You can do it all by simply visiting the *members-only* section of our Web site.

Visit us online at **www.cdha.ca/members** today to find out more about the benefits of membership in your professional association—and how you can stay in touch.

CDHA ACHD

THE CANADIAN DENTAL HYGIENISTS ASSOCIATION

L'ASSOCIATION CANADIENNE DES HYGIÉNISTES DENTAIRES

Membership Renewal Notice

Summer means that CDHA's 2005–2006 membership drive will be starting soon.

Renewing your membership lets you continue receiving all the benefits CDHA has to offer. Included at no extra cost in your membership fee are liability (malpractice) insurance with coverage of up to $3 million damages with additional funds to cover legal expenses; disciplinary/sexual abuse defence-cost insurance to cover civil litigation costs; the *Canadian Journal of Dental Hygiene;* and the on-line CDHA Professional Development Manager Tool to track your continuing education activity.

Other benefits include the on-line continuing education courses; the *DVD Journal of Dental Hygiene*; RRSP programs designed for CDHA members; group discounts on hotel rates, cell phone packages, Curves memberships, Hewlett-Packard purchases; car rentals; uniforms; and access to group rates for home and auto insurance as well as disability, life, accidental death, critical illness and extended health care insurance.

Be on the lookout at the end of August for information on how to renew your membership. To ensure this goes smoothly and with the least possible delay, please make sure CDHA has your current e-mail address as well as your postal address. You can check your contact information by logging onto the *Members Only* section of our web site at **www.cdha.ca.** There you can check your personal file and make changes if necessary. If you go not have Internet access, we would be pleased to help you. Just call us toll free at 1-800-267-5235, Monday to Friday, 8:30 a.m. to 5 p.m. Eastern Time.

Please note that in Alberta and Saskatchewan, membership renewals are handled through the regulatory bodies. Please contact Saskatchewan Dental Hygienists Association at 306-931-7342 or the Alberta Dental Hygienists' Association at 780-465-1756 for more information on membership renewal in your province.

Fleurs, questions d'hygiène dentaire et l'ACHD *(suite de la page 167)*

La semaine dernière, un autre sujet d'importance dans mes pensées était de trouver ce qu'il fallait faire pour avoir plus d'hygiénistes dentaires qui s'engagent dans la recherche en hygiène dentaire. Le jumelage d'un ou d'une membre à un mentor en recherche pour l'aider à élaborer un plan était une idée intéressante puisque l'avenir renferme plus de possibilités avec cette combinaison de talents. Le développement de connaissances uniques en hygiène dentaire est un facteur important pour la santé future de la profession. Les facteurs sociaux, économiques et technologiques sont des facteurs significatifs dans le développement des connaissances et de la recherche.

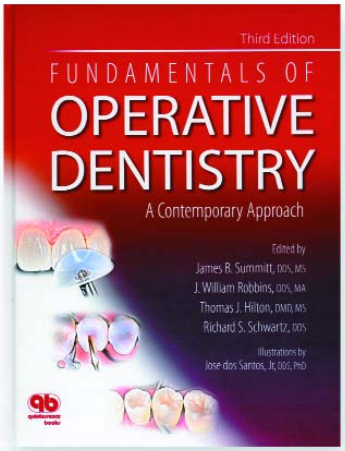
Trois conversations distinctes – qu'ont-elles en commun ? Elles représentent quelques-unes de nombreuses voix de notre communauté en hygiène dentaire. Chacune de ces questions est si importante et pourtant elles se confondent ; parfois, leur relation est définie une seule fois, parfois elle est définie par décision délibérée. Bien que Emerson se lamente sur la perte de la beauté des fleurs individuelles, comme association, nous formons un bouquet coloré et parfumé qui célèbre la richesse de tant de beauté.

Étant votre association professionnelle, l'ACHD surveille huit « plates-bandes » d'activités dans le milieu de l'hygiène dentaire pour comprendre vos préoccupations dans l'environnement du système de santé canadien. Nous déployons des efforts pour promouvoir les hygiénistes dentaires dans les huit secteurs d'influence qui correspondent au *Strategic Radar Model* du Dr Karl Albrecht.* Nous essayons de former un bouquet unique en comprenant et en tirant avantage des leçons apprises en étudiant et en interagissant avec tous ces facteurs : clientèle, concurrence, facteurs économiques, technologiques, sociaux, politiques, légaux et géographiques. De temps en temps, un point ou un autre peut recevoir plus d'attention tout comme les fleurs ont leurs saisons. Toutefois, tous ces domaines demeurent importants pour l'association puisqu'ils ont un effet direct sur la façon dont vous travaillez aujourd'hui et sur la façon dont vous travaillerez dans le futur. Alors que nous profitons de nos jardins d'été, rappelez-vous qu'être membre de l'ACHD signifie que vous faites partie d'une communauté qui s'est engagée à protéger une profession vitale qui peut contribuer activement à la santé buccodentaire des Canadiens et des Canadiennes.

* ALBRECHT, Karl. The strategic radar model. In: American Society of Association Executives, the Center for Association Leadership. Mapping the future of your association, Washington (DC), ASAE et le Centre, 2005

Fundamentals of Operative Dentistry. A Contemporary Approach

3rd ed. Edited by J.B. Summitt et al. Chicago: Quintessence; 2006.
599 pages. ISBN 0-86715-452-7.
US$95



THIS IS A COMPREHENSIVE BOOK, WELL organized, and the information is easy to find. There are a large number of colour and black and white figures, diagrams, photographs, radiographs, boxed texts, tables, and graphs. Attention to detail prevails in this book. The editors and authors of this book are clinically active, with many of them engaged in clinical and laboratory research in areas such as cariology, restorative dentistry, and dental materials. Some of the illustrations are created by a dentist. This third edition includes updated and new information on the latest scientific evidence-based dentistry.

The book endorses preventive dental care as a first line for treatment, caries risk assessments, strategies and regimens for caries control, and supports fluoride use. It also promotes conservative dentistry with a variety of treatment modalities.

The following topics (themes, issues, or subjects) are addressed:

- Biological considerations of dental materials, their interactions with the tooth tissues and the periodontium
- Defective restorations and periodontal health, relevant for dental hygienists
- Patient evaluation using a problem-oriented approach
- Esthetic considerations in diagnosis and treatment planning
- Caries management, as well as diagnosis and treatment options
- Pulpal considerations and the effects of cavity preparation, caries, and restorative materials on pulp tissue
- Updated information about the properties of several dental materials and antibacterial efficacy
- Nomenclature and instrumentation (plus a section on how to sharpen those instruments)
- Air abrasion
- Field isolation, rubber dam and other means to achieve moisture control and retraction
- A comprehensive review of bonding to enamel and dentin and dental materials
- Material properties of compomers, amalgam, ceramics, and glass-ionomer cement
- Direct anterior restorations, materials and clinical procedures, direct posterior esthetic restorations, their longevity, indications and placement techniques
- Amalgam restoration and controversial issues (mercury)
- Diagnosis and treatment of root caries, strategies to address predictability in the aging population, preventive measures, restorative treatment, and materials
- Fluoride-releasing materials, fluoride recharge capabilities of some dental materials, their clinical effectiveness, and selection of dental materials in high-caries-risk patients
- Natural bleaching, stains, discolorations, current bleaching modalities and techniques, safety concerns, effects of bleaching on restorations, alternatives to bleaching
- Porcelain veneers, indications and limitations, comprehensive assessment, computer imaging, failures, removal, and maintenance
- Anterior ceramic crowns, selection of ceramic systems
- Tooth-coloured inlays and onlays fabricated in resin composite and ceramic materials, including fabrication with computer-aided design technology
- Cast gold restorations
- Restorations of endodontically treated teeth

Even though this is a very comprehensive book, there were areas where the book was found to be incomplete, and where there are differences in opinion:

- No hygiene practices for the storing and disposal of mercury-containing wastes are covered, nor any recommendations about safer ways to remove older amalgam restorations.
- Information on the detrimental effects of different types of topical fluoride on certain dental materials would be beneficial.
- Infection control is not addressed on this book.
- The removal of the floss ligature from the rubber dam clamp discussed in the book is not precautionary as keeping the floss ligature is reassuring when unexpected emergencies arise.
- This book recommends lubricating the lips with petroleum-based lubricant prior to placement of rubber dam. This is not consistent with current thought as current practices indicate that glove integrity could be compromised, as could bonding procedures. There is also an issue with this substance reaching the alveoli of the lungs, even in minute quantities.

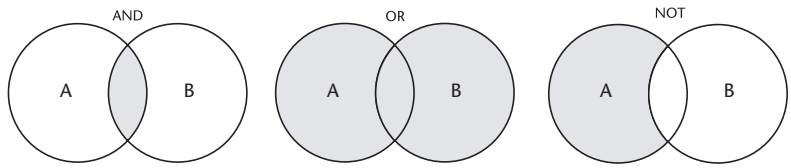
Book Review *…continued on page 222*

Summing Up Searching

by CDHA staff

INDIVIDUALS ARE INCREASINGLY TURNING TO THE Internet as a source of information, whether for consumer advice on new products or for professional resources. People often assume that search directories and engines will do all the work for them. "Searching is easy, isn't it? All you have to do is type a few words into a search tool and it finds all the information you want." However, a successful search for research material is not usually that simple. So, over the past five issues, this column has looked at how to hone in on the information you want, efficiently and with as little frustration as possible. Spending a little time preparing a strategy or a plan for your web-based research saves a great deal of fruitless effort, minimizes the number of missed sources and references, and generally produces much better results.

1. **What do you want to find?** Clarifying exactly what it is you are looking for (your research question) is the first step. Look at the clear explanation of the PICO process in the September-October 2004 issue of the *CJDH* (pp. 212, 215). An example: "I want to know about the risks associated with tongue piercing so I can inform my teenage clients."
2. **Search terms.** Last November-December (2005), we looked at choosing search terms. As different databases may use different terms for the same concept, alternate ways of expressing an idea are needed to gather all the information. One good way of checking synonyms is to look at controlled vocabularies. Controlled vocabularies select just one term (of the various synonyms for a disease or situation) to be used in indexing a database, crucial to managing extensive databases. But these controlled vocabularies also list the various terms *not* chosen along with the selected terms. Inputting these terms in a search tool can make your search more comprehensive. The National Library of Medicine's MeSH (www.nlm.nih.gov/mesh/MBrowser.html) might be the database with which you are most familiar.
3. **Boolean logic, truncation.** These commands, (AND, OR, NOT) are used to broaden or narrow your search and were discussed extensively in the January-February 2006 issue.
4. **Website credibility, databases, and search engines.** Using reputable sites is key when gathering information. The March-April 2006 issue of *CJDH* discussed the criteria that should be used when assessing a website's authority.
5. **Grey literature.** The problem with this type of literature is to find it in the first place. Last issue's overview of this topic provided some valuable sites to use when trying to winkle out those elusive reports, working papers, etc.
6. **Too many or too few results?** It is discouraging when there are only a few hits but rather daunting when there are thousands.
   – Check your search terms again (and their spelling!). If they are too general, you will retrieve too much extraneous information. Check for narrower or more specific terms and use these. However, if the terms are too specific, you may get too few results. Then broaden your search terms and perhaps move up one level in, say, the MeSH hierarchy of terms. MeSH is arranged in a "tree" format, starting with broad terms and narrowing down to more specific terms:
   Stomatognathic Diseases
   Mouth Diseases
   Salivary Gland Diseases
   Xerostomia
   Sjogren's Syndrome
   – Use truncation sparingly. Truncation—searching on the root of a word with "*" to stand in for the various endings—produces a wider set of results. If you have too many results, try searching again with the specific terms you want, e.g., "periodontitis" instead of "periodont*". When possible, use nouns and objects as keywords in your search and put the most important terms first.
   – Search on phrases rather than single words. Enclose the phrase in quotation marks, e.g., "periodontal disease".
   – Use Boolean operators to expand or narrow search results. The **OR** command means "any of the words" entered and widens the search results. The **AND** command translates as "all of the words entered" and narrows the search results. The **NOT** command excludes unwanted terms. This, however, should be used cautiously as it can block retrieval in ways you may not expect.



   – Use the advanced search options and limit your search by years, by type of document, by what is searched (title, abstract, body of article, etc.).

Refining search skills takes a bit of time and practice but there are a number of interactive tutorials to help. The Pandia Goalgetter is a short and easy guide/tutorial found at www.pandia.com/goalgetter/index.html that takes about 30 minutes to complete.

Information databases are designed to allow you to search for published literature so explore and use the features they offer to save time and to find the material you need.

Older Clients and Oral Hygiene

by CDHA Staff

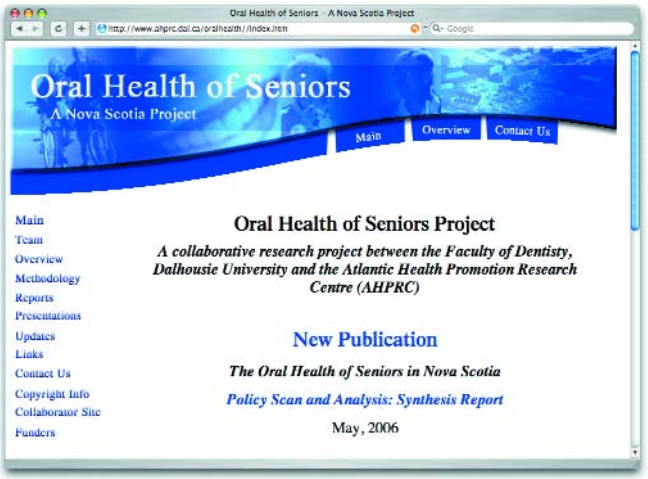
WE ARE CONSTANTLY REMINDED IN ARTICLES, newspapers, and on television of the aging of the population. Client demographics will surely change for the dental hygienist and below are listed some sites that focus on oral health care for seniors. One site offers an insight into a large-scale project in Nova Scotia that is planning for seniors' oral health; the rest can be good resources for the clients, their caregivers, or their oral health care providers.

Seniors' Health (Public Health Agency of Canada)
www.phac-aspc.gc.ca/sh-sa_e.html
This site is a portal site to a wide variety of ailments that appear more commonly in the older population. It has links categorized under a variety of headings: "Age-related and Chronic Diseases," "Health Promotion," "Injury Prevention," "Policy and Framework," and "Seniors in Canada." One drawback is that the "Oral Health" links merely sends the reader to the National Advisory Council on Aging website and a relevant publication (noted below). However, this remains a good site to recommend to older clients.

Oral Health of Seniors. A Nova Scotia Project
www.ahprc.dal.ca/oralhealth/
The purpose of this project is "to determine the strategies needed to develop an Oral Health Action Plan that will assure continuity of oral health care for seniors living in Nova Scotia, and elsewhere." The project is a collaborative research project between the Faculty of Dentistry, Dalhousie University and the Atlantic Health Promotion Research Centre (AHPRC). The site is a good example of how to report on such a project and the overview and recently released report, *The Oral Health of Seniors in Nova Scotia. Policy Scan and Analysis: Synthesis Report,* give a good literature review and rationale for the push to provide oral care to seniors.

National Advisory Council on Aging (NACA)
www.naca-ccnta.ca/expression/18-2/exp18-2_toc_e.htm
The National Advisory Council on Aging was founded in 1980 to provide the Minister of Health with advice on all matters relating to aging of the Canadian population. The NACA publishes a quarterly newsletter, *Expression,* and the Spring 2005 issue (Vol. 18, No. 2) deals with "The Importance of Oral Health." Topics addressed in this issue include "Oral health matters," "Teeth change with age," "Oral health care tips," "Barriers to oral health," and "Who pays?" The publication can be downloaded as a PDF. The site does acknowledge that there may be vision problems among its readers but instead of giving an option regarding size of print, the "Need larger text?" button just leads to instructions on how to adjust browser settings.

Chew on This! Seniors' Oral Health
www.canadian-health-network.ca
Once on the Canadian Health Network site, type "chew on this" (together with the quotation marks) into the search box at the top right. You will be sent to the article that debunks myths about "aging teeth and gums" – about cavities, dentures, and care of the teeth. There is a print-friendly version if you wish to print it off for clients or yourself. If the client would like to read it on-line, there is a convenient "Increase font size" button for greater ease in reading.



Dental Health (Medline Plus)
www.nlm.nih.gov/medlineplus/dentalhealth.html
An excellent portal site from the U.S. National Library of Medicine and the National Institutes of Health, the information is divided into such section as "Overviews," "Treatment," "Prevention and Screening," "Nutrition," among others. The links are mostly relevant to all age groups with information on general care, debridement, preventive antibiotics, gum-chewing, fluoride, diabetes, sealants, methamphetamine use, toothbrush care, and so forth. One interesting link for caregivers of patients of any age is the "Dental Care Every Day: A Caregiver's Guide" (under "Related Issues"). This has clear advice with excellent illustrations.

Dental Care for Seniors (Canadian Dental Association)
www.cda-adc.ca/en/oral_health/cfyt/dental_care_seniors/index.asp
This is a well-illustrated and clear four-page section for seniors, dealing with "Flossing and Brushing," "Denture Care," "Tips for Caregivers," and "The Check Up." The denture care section discusses the different types of dentures and also implants: what they look like, when they are recommended, and how to care for them. The pages—in printer-friendly versions—can be printed out by the dental hygienist or the client.

CLASSIFIED ADVERTISING

CDHA and *CJDH* take no responsibility for ads or their compliance with any federal or provincial/territorial legislation.

BRITISH COLUMBIA

DUNCAN DENTAL HYGIENISTS WANTED! Wonderful patients, staff and office would like a second dental hygienist to work with our team. Hours and days are flexible. Full time is available. Alderlea Dental Health Centre is located in Duncan on beautiful Vancouver Island, midway between Victoria and Nanaimo. We think this is a marvelous area in which to work and live. Please contact us at **raedae@shaw.ca** or fax your résumé to **250-748-9868**. Office telephone: **250-748-1842**; evenings: **250-748-2086** or **250-715-1837**.

INVERMERE Are you fun, energetic, and love working with people? Enjoy being part of a great team in an easy-going, stress-free setting? This dental office in Invermere may be for you. No weekends! Flexible time off and best of all, live an active outdoors lifestyle. New grads welcome. To inquire, e-mail us at: **rskanan@telus.net** or call Dalphine at **250-342-3811**.

SECHELT We are located on the beautiful Sunshine Coast, just a short ferry ride from downtown Vancouver. Full-time position available starting June 20, 2006. 3-4 days per week. Seeking an experienced dental hygienist with great people skills and friendly demeanor. Must be a reliable, experienced, friendly, hardworking team player with a positive attitude. Please contact Lori Ann or Cheryl, Cowrie Street Dental Clinic, 5662 Cowrie Street, P.O. Box 2201, Sechelt, BC V0N 3A0. Tel: **604-885-4669**; e-mail: **cowrie_dental@dccnet.com**.

VANCOUVER A modern, clean, and well-organized downtown office is looking for a part-time dental hygienist for two days a week, Tuesdays and Wednesdays. If you have computer knowledge, excellent communication skills, and digital radiography, please fax your résumé to our office, attention Corina Paris. Fax number: **604-669-7825**.

ALBERTA

GIBBONS Dental hygienist needed for established and growing family practice. Gibbons is a promising town just 15 minutes north of Edmonton in a beautiful rural area, 5 minutes from the new bitumen upgrader projects in Sturgeon County. Competitive wage. No weekends or evenings required. Loyal patients and staff. High-quality soft tissue laser and ambidextrous chair unit available. We strive to please our patients and staff through excellent service, flexibility, and allowing sufficient time for quality care. Contact: Brigitte Mueller, Gibbons Dental Clinic, Dr. M. E. Mueller Prof. Corp., Box 360, 5032–49 Street, Gibbons AB, T0A 1N0. Tel: **780-992-0160**; fax: **780-923-2008**; e-mail: **bmueller@albertacom.com**.

STETTLER Career opportunity for a Registered Dental Hygienist to join our well-established family practice one to four days per week. We are seeking a friendly, enthusiastic individual to work with our dedicated dental team. Office hours are Monday thru Thursday 8-5. Contact name: Julie Sribney, Brian Sribney Prof. Corp., Box 640, AB T0C 2L0. Tel: **403-742-6741**; fax: **403-742-2391**; e-mail: **jsribney@electrotel.ca**.

NOVA SCOTIA

TRURO Registered dental hygienist F/T or P/T required immediately. Excellent salary. Apply: Dominion Family Dentistry, Truro, Nova Scotia B2N 3P3. Call: **902-895-6307** (days) or **902-895-5028** (evenings); e-mail: **domdent@eastlink.ca**; Web site: **drjohncook.com**.

INTERNATIONAL

GERMANY AND SWITZERLAND WORK ABROAD – Dental hygienist in Germany and Switzerland. Full-time position available in state-of-the-art dental offices (immediately or at a future date). German language (basic) important. Respond to Elke Mehrfeld, Neue Straße 54, 70186 Stuttgart. Mobile: **(49) 172-8 06 77 77**; e-mail: **info@emcdent.de**.

HONG KONG Very progressive U.S. group practice in Hong Kong seeking serious applications for an available 2-year-term hygienist's position ASAP. US$4,000.00 minimum monthly or 30% commission, whichever is higher. Chinese language skill is not necessary. Suites 513-516 Prince's Building, Central, Hong Kong, SAR. Tel: **852 2526 2288**; fax: **852 2521 8632**; e-mail: **dental@adgl.com.hk**.

SWITZERLAND Dental hygienists wanted in Switzerland. Wonderful opportunities for travelling, languages, culture, and more! Very interesting salary and working conditions, including 4 wks minimum paid vacation and 13th salary. Don't pass this up! Visit our website at WWW.KANADENT.CH / **011-4132-322-0943**.

CDHA CLASSIFIED ADS

Classified job ads appear primarily on the CDHA's website (www.cdha.ca) in the Career Centre (*Members' Only* section). On-line advertisers may also have their ad (maximum of 70 words) listed in the journal *CJDH* for an additional $50. If an advertiser wishes to advertise only in the print journal, the cost will be the same as an on-line ad. These classified ads reach over 11,000 CDHA members across Canada, ensuring that your message gets to the target audience promptly. Contact CDHA at **info@cdha.ca** or **613-224-5515** for more information.

Advertisers' Index

Book Review *(continued from page 217)*

- Information about retraction cord, hemostasis, and anesthesia is very limited or non existent.

The target audience for this book is dental clinicians and auxiliaries, dental educators, lab technicians, and any other dental-related personnel who wish to understand the aspects of operative and restorative dentistry. Dental hygienists will find this book interesting and informative. It will help them understand the interactions of hard and soft tissues with a variety of dental materials, and the importance of assessment, cavity preparation, and placement of restorative materials. It provides examples that can serve as benchmarks for high standards of restorations. For the restorative dental hygienist, it is without doubt an excellent resource book; it covers the aspects of operative and restorative dentistry systematically and with clarity.

– Maria Elena Tigner, DDS (National University of Mexico), RRDH, Dental Hygiene Program, Algonquin College