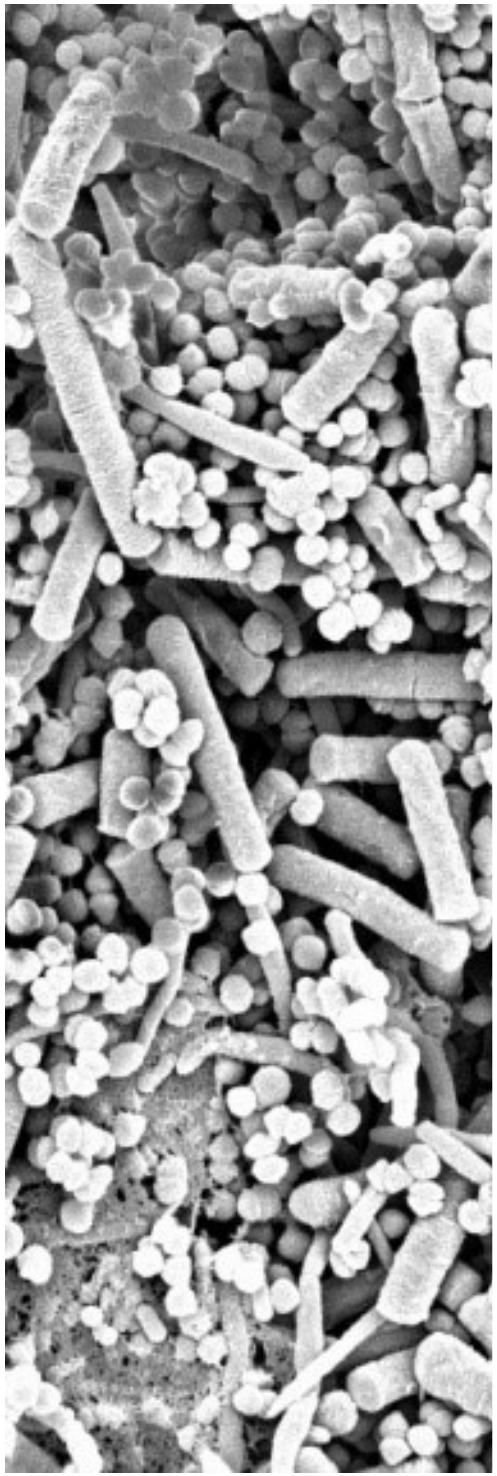
Essentials of Antimicrobial Mouthwashes

An educational course for dental and hygiene professionals

COURSE OUTCOMES

This course will provide the participant with an understanding of:

1. Dental plaque biofilm and its relationship to oral health
2. Safety and efficacy of antimicrobial mouthrinses in an oral health regimen
3. Methods for encouraging patients to include antimicrobial mouthrinses in their oral hygiene regimen



BIOFILM

- What is it?
- How does it form?
- What are the advantages of the biofilm community?
- Where does it form?
- How do oral biofilms form on teeth?
- How does it affect oral health?
- How does it affect general health?
- How can it be controlled?

BIOFILM
What is it?

- Biofilms are sticky, mat-like microbial communities found throughout nature
- Over 700 oral microbial species contribute to dental plaque biofilm
- Organisms that cooperate with each other to adapt to changes in their environment, such as
  - Shifts in pH
  - Mechanical stress of motion
- Teamwork ensures their mutual survival

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Subgingival plaque of a healthy subject grown 10 days anaerobically on saliva-coated hydroxyapatite discs.

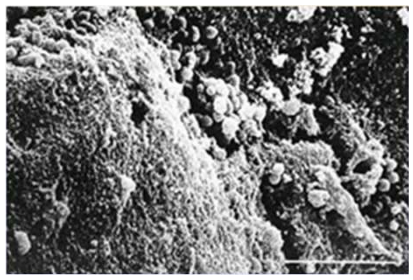
Grown by M. Sedlacek and Clay Walker, University of Florida; image, University of Florida Electron Microscopy Core Facility.

Thomas JG, Nakaishi LA. Managing the complexity of a dynamic biofilm. *JADA.* 2006;137(11 suppl):10S-15S.

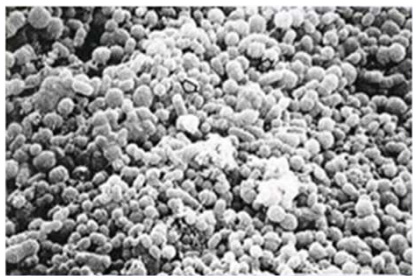
BIOFILM
How does it form?

2 hours

4 hours



8 hours



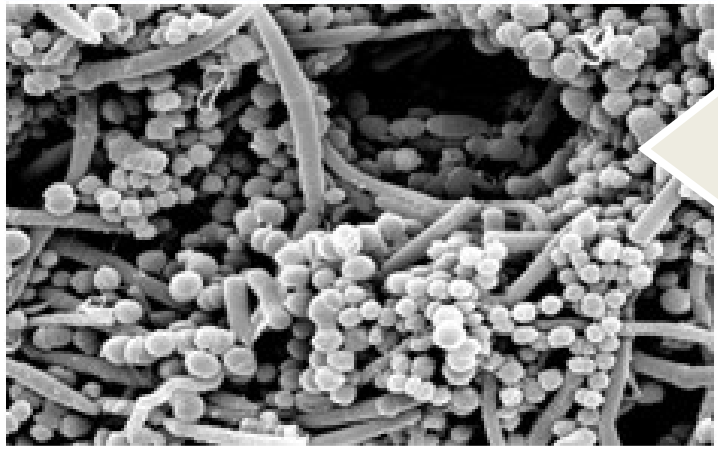
24 hours

Scanning electron micrographs of biofilms at different stages of development.
Grown by M. Sedlacek and Clay Walker, University of Florida; image, University of Florida Electron Microscopy Core Facility.

BIOFILM

What are the advantages of the biofilm community?

Strength in Numbers



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- Cooperating communities share resources
- Organisms within the biofilm communicate and share genetic information to ensure survival
- Bacteria in biofilms may benefit via increased resistance to antibiotics, antimicrobials, and host immune defenses

BIOFILM
Where does it form?

Biofilms can form on any surface exposed to bacteria and water.

Examples

In the world	In Medicine	In Dentistry
– Drinking water reservoirs – Ship hulls	– Medical implants – Stents	– Dental unit water lines – Form on the teeth and other surfaces and reservoirs in the mouth

BIOFILM
How do oral biofilms form on teeth?

Initial Adherence

- Tooth surface covered by pellicle
- Primary colonizing bacteria adhere to the pellicle (primarily Gram-positive cocci and rods)

Lag Phase

- Attachment to pellicle leads to shift in genetic expression that causes lag in bacterial growth

Rapid Growth

- Other types of bacteria adhere to primary colonizers to form mature dental plaque biofilm
  - **Primary colonizers**: include Gram-positive cocci (streptococcal species)
  - **Secondary colonizers:** include *Fusobacterium* species, which can act as cross-linkers
  - Final biofilm contains mostly pathogenic Gram-negative organisms

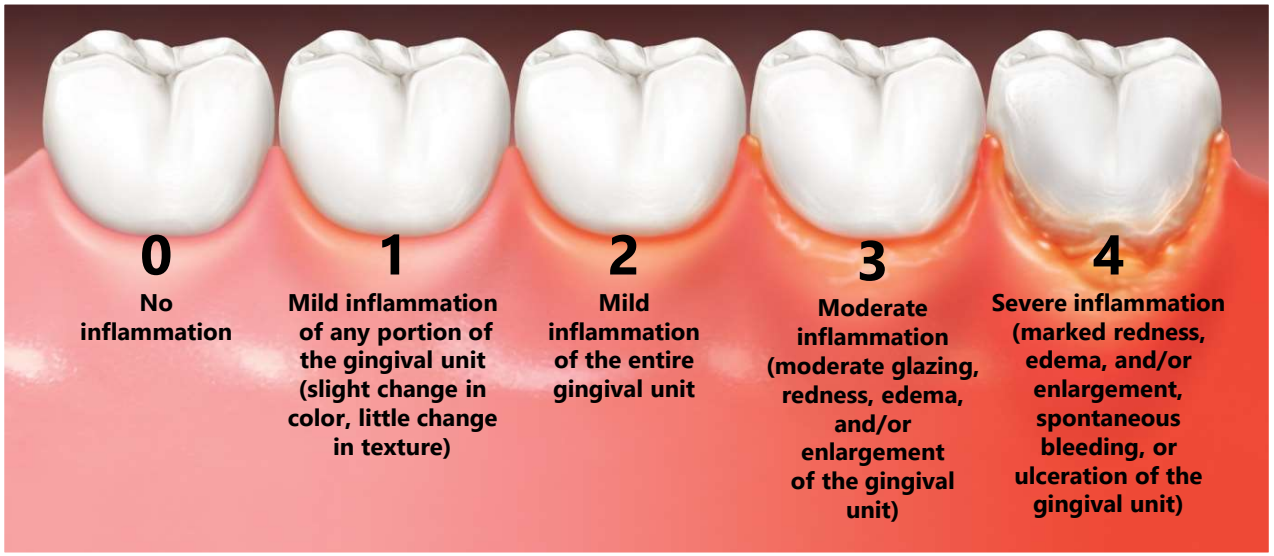
Steady State/ Detachment

- Some surface bacteria disperse to colonize other areas of the mouth

Thomas JG, Nakaishi LA. Managing the complexity of a dynamic biofilm. *JADA.* 2006;137(11 suppl):10S-15S.

BIOFILM
How do dental plaque biofilms affect oral health?

Modified Gingival Index



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Accumulation of dental plaque biofilm often leads to gingivitis

1. Plaque pathogenicity increases as biofilm matures
2. Induces inflammatory response in tissues

Chronic gingivitis may develop into periodontitis

BIOFILM
How do dental plaque biofilms affect general health?

Oral biofilms *may* play a role in diseases beyond that of oral health

Cardiovascular Disease[1-4]

Respiratory Disease[1, 5]

Diabetes[1,2,6]

REFERENCES

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2. American Dental Association. Oral-systemic health. Overview. http://www.ada.org/4081.aspx?currentTab=2. Accessed October 14, 2010.
3. Proceedings and consensus opinion from the Global Oral and Systemic Health Summit: present evidence and future directions. *Grand Rounds Oral Syst Med*.2007;2(1 suppl):5-21.
4. Demmer RT, Desvarieux M. Periodontal infections and cardiovascular disease: the heart of the matter. *JADA*. 2006;137(10 suppl):14S-20S.
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6. Mealey BL. Periodontal disease and diabetes: a two-way street. *JADA*. 2006;137(10 suppl):26S-31S.

BIOFILM
How can oral biofilms be controlled?

Plaque biofilm can be managed (pathogenicity lessened) through effective, ADA-recommended oral hygiene measures

- **Tooth brushing 2x per day with an ADA-accepted fluoride toothpaste[1]**
- **Clean between teeth with an ADA-accepted floss or interdental cleaner[1]**
- **Eat a balanced diet and limit between-meal snacks[1]**
- **Visit a dental professional regularly for professional cleanings and examination[1]**

"Antimicrobial mouth rinses and toothpastes reduce the bacterial count and stop bacterial activity in dental plaque, which can cause gingivitis, an early, reversible form of periodontal (gum) disease."[1]

1. ADA, Oral Health Topics A-Z: Cleaning Your Teeth and Gums (Oral Hygiene). http://www.ada.org/3072.aspx?currentTab=1. Accessed September 2010.

BIOFILM
Plaque biofilm can not be completely eliminated

1. Thorough mechanical plaque control can be difficult to achieve
   - Improper brushing and flossing technique is common[1,2]
   - Insufficient time allowed for oral hygiene compromises biofilm management[3]
   - Implants, crowns, braces, etc, may hamper mechanical efforts[2,4]
   - Postsurgical gingival sensitivity may interfere with patient compliance[5]
   - Patients may have limited dexterity[2,6]

2. Patients may not understand that they can develop gingivitis and that it may lead to greater oral health problems such as periodontitis

3. Brushing and flossing disrupt biofilm but do not kill biofilm bacteria, allowing it to recolonize on dental surfaces

1. Lang WP et al. The relation of preventive dental behaviors to periodontal health status. *J Clin Periodontol*. 1994;21(3):194-198.
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6. DePaola LG et al. Chemotherapeutic inhibition of supragingival dental plaque and gingivitis development. *J Clin Periodontol*. 1989;16(5):311-315.

BIOFILM
How can oral biofilms be controlled?

The American Dental Association has highlighted that "antimicrobial mouthrinses…reduce the bacterial count and stop bacterial activity in dental plaque, which can cause gingivitis…"[1]

Antimicrobial mouthrinses play an important role in managing biofilm for your patients.

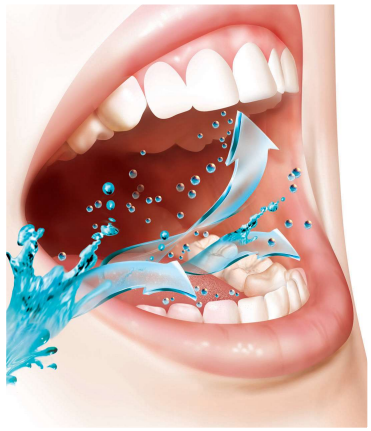
1. ADA, Oral Health Topics A-Z: Cleaning Your Teeth and Gums (Oral Hygiene). http://www.ada.org/3072.aspx?currentTab=1. Accessed March 2010.

Antimicrobial Mouthrinses

ANTIMICROBIAL MOUTHRINSES

- Why rinse?
- Who can benefit from rinsing?
- What are the active ingredients of antimicrobial rinses?
- How do they work?
- How do we know they are safe?
- What does the ADA advise about antimicrobial rinses?

ANTIMICROBIAL MOUTHRINSES
Why rinse?



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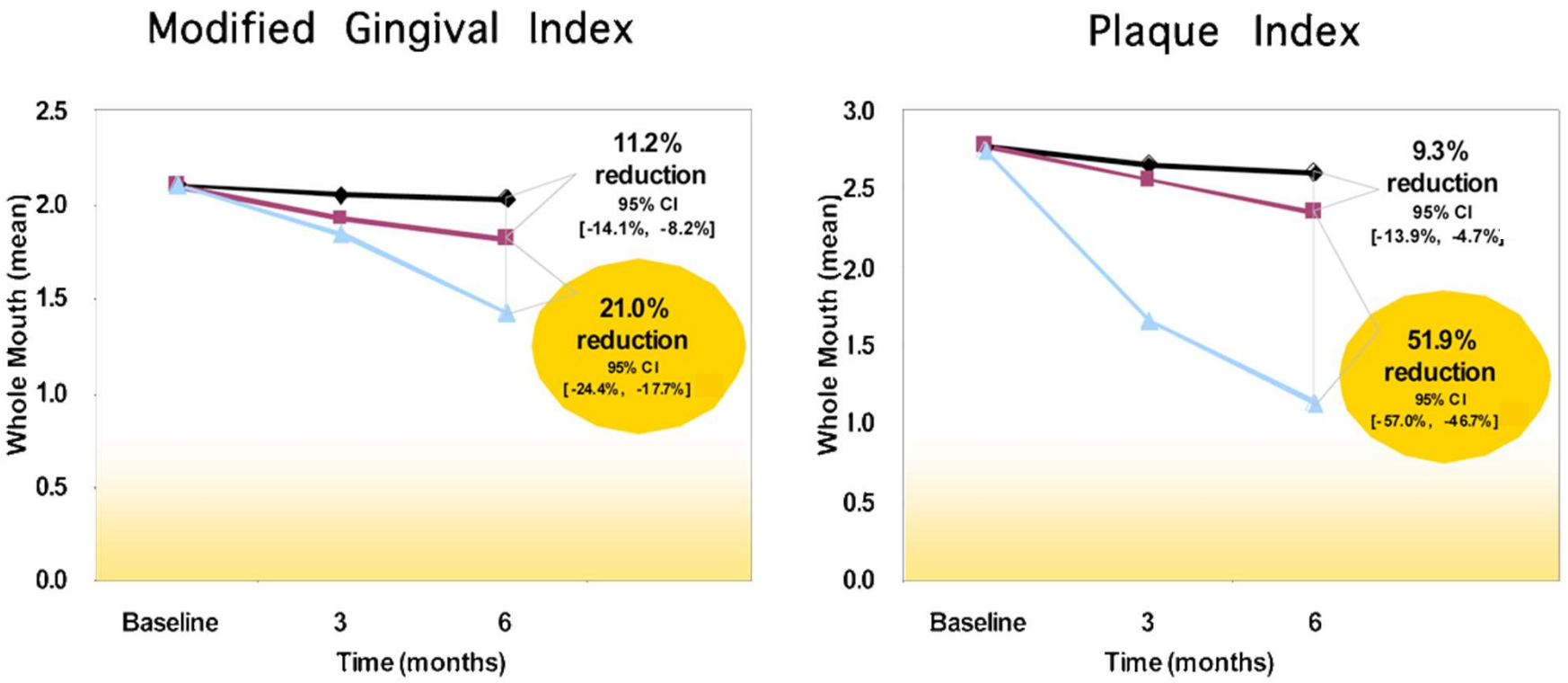
- Teeth make up only 25% of the oral cavity[1,2]
  - Biofilms cover the entire mouth, not just teeth
- As a liquid, mouthrinses carry antimicrobial agents to all areas of the mouth
- Plaque biofilm cannot be managed by tooth brushing and flossing alone!

Sharma et al. (2004) and Simmons et al. (2010) show the additive improvement over brushing and flossing alone[3,4]

1. Collins LMC, Dawes C. The surface area of the adult human mouth and thickness of the salivary film covering the teeth and oral mucosa. *J Dent Res*. 1987;66(8):1300-1302.
2. Kerr WSJ et al. The areas of various surfaces in the human mouth from nine years to adulthood. *J Dent Res.* 1991;70(12):1528-1530.
3. Sharma N et al. Adjunctive benefit of an essential oil–containing mouthrinse in reducing plaque and gingivitis in patients who brush and floss regularly: a six-month study. *JADA.* 2004;135(4):496-504
4. Simmons et al Efficacy of Brush, Floss, & Rinse Regimen vs. mechanical oral hygiene *J Dent Res* 89 Spec Issue A, #168 (2010)

Adjunctive benefit of an essential oil–containing mouthrinse in reducing plaque and gingivitis in patients who brush and floss regularly: a six-month study

Sharma N et al. (2004)



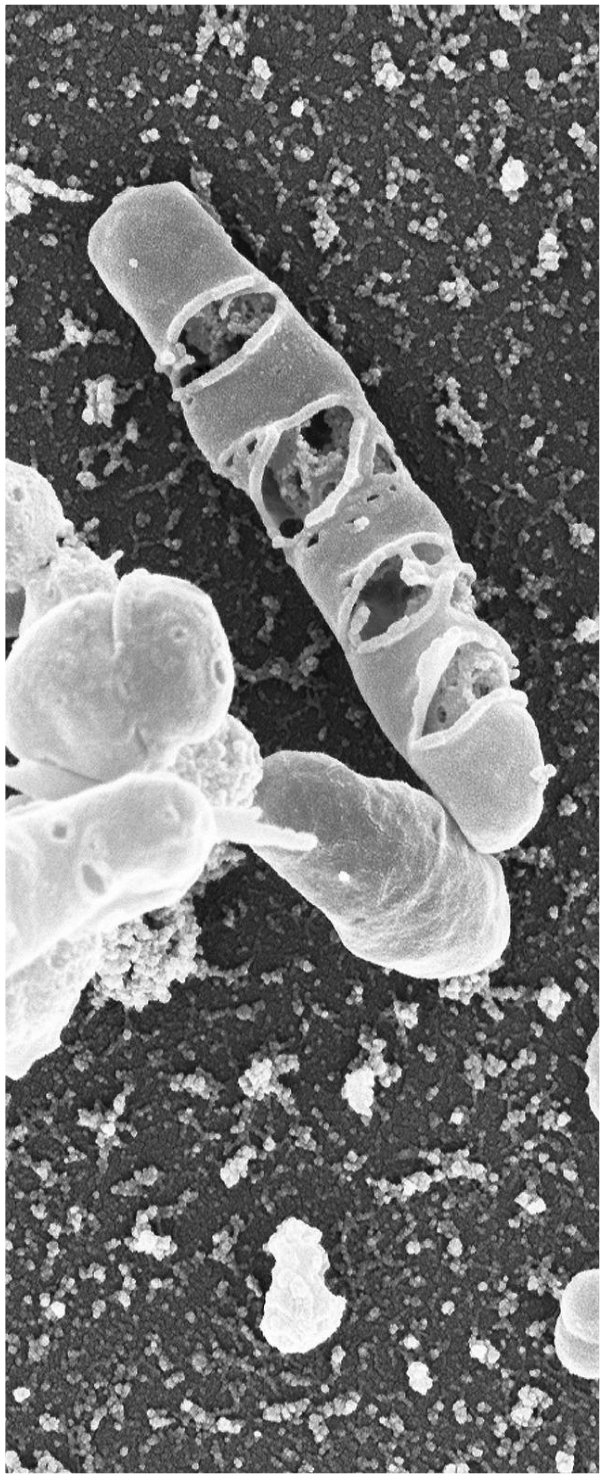
B/C	Brush twice daily, control mouth rinse twice daily
B/F/C	Brush twice daily, floss once daily, control mouth rinse twice daily
B/F/EO	Brush twice daily, floss once daily, essential oils mouth rinse twice daily

All of these results were statistically significant ($P < 0.001$), except for the comparison of BFC and BC groups at three months ($P < 0.05$).

Sharma N et al. Adjunctive benefit of an essential oil–containing mouthrinse in reducing plaque and gingivitis in patients who brush and floss regularly: a six-month study. *JADA*. 2004;135(4):496-504.

ANTIMICROBIAL MOUTHRINSES
What are the active ingredients of antimicrobial rinses?

Active Ingredient	Description	Marketed Product
EO (essential oils)	Fixed combination of: 1) Eucalyptol (0.092%) 2) Menthol (0.042%) 3) Methyl salicylate (0.060%) 4) Thymol (0.064%)	LISTERINE® Antiseptic (McNEIL-PPC, Inc)
CPC (cetylpyridinium chloride)	Quaternary ammonium compound	Crest® Pro-Health™ (Procter & Gamble)
0.12% CHX (chlorhexidine)	A bactericidal bisbiguanide antiseptic	Peridex® (3M ESPE) PerioGard® (Colgate-Palmolive)



ANTIMICROBIAL MOUTHRINSES
How do essential oils work?

- EO exhibits broad spectrum of activity against Gram-positive and Gram-negative bacteria
  - EO nonselectively and rapidly disrupts bacterial cell wall
  - Reduces plaque endotoxin levels and pathogenicity for gingivitis

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C. Schaudinn, USC

ANTIMICROBIAL MOUTHRINSES

How do essential oil-containing mouthrinses help control biofilm?

- Essential oils help control biofilm by[1,2,3]
  - Damaging the bacterial cell surface
  - Interfering with biofilm growth and vitality
  - Increasing bacteria regeneration time
  - Extracting bacterial endotoxins
- This mechanism of action ensures a deeper clean when using mouthrinses with essential oils.

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3. Pan PC et al. In vitro evidence for efficacy of antimicrobial mouthrinses. J. Dent 38 S1; S16-S20, 2010

ANTIMICROBIAL MOUTHRINSES
What do they kill?

Essential oils exhibit a broad spectrum of antimicrobial activity

EO antimicrobial kill vs. planktonic bacteria

Gram-positive bacteria	Gram-negative bacteria
Actinomyces naeslundii	*Actinobacillus actinomycetemcomitans*
Actinomyces viscosus	*Porphyromonas gingivalis*
Staphylococcus aureus	*Prevotella intermedia*
Streptococcus mutans	*Bacteroides loescheii*
Streptococcus sanguis	*Eikenella corrodens*
Lactobacillus acidophilus	*Wolinella recta*
Staphylococcus epidermidis	*Aerobacter aerogenes*
Streptococcus faecalis	*Escherichia coli*
Streptococcus pneumoniae	*Fusobacterium nucleatum*
Streptococcus pyogenes	*Klebsiella pneumoniae*
Streptococcus salivarius	*Leptotrichia buccalis*
Streptococcus gordonii	*Proteus vulgaris*
	Pseudomonas aeruginosa

Ross NM et al. Long-term effects of LISTERINE® Antiseptic on dental plaque and gingivitis. *J Clin Dent.* 1989;1(4):92-95.

ANTIMICROBIAL MOUTHRINSES

Studies demonstrate antiplaque/antigingivitis effectiveness of essential oil–containing mouthrinses

Summary of published 6-month plaque/gingivitis mouthrinse clinical trials

Active Ingredient	Marketed Product	Plaque Reduction (%)*	Gingivitis Reduction (%)*	References
Fixed combination of essential oils†	LISTERINE® Antiseptic (McNEIL-PPC, Inc.)‡	13.8-70.0	14.0-36.3	1-9

*Compared with negative control at 6 months.
† Thymol 0.064%, eucalyptol 0.092%, methyl salicylate 0.060%, menthol 0.042%.
‡ This product has received the ADA Seal of Acceptance.
Adapted from Barnett ML. The rationale for the daily use of an antimicrobial mouthrinse. *JADA.* 2006;137(11 suppl):16S-21S.

ANTIMICROBIAL MOUTHRINSES

Studies demonstrate antiplaque/antigingivitis effectiveness of essential oil–containing mouthrinses[1-9]

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2. Gordon JM et al. Efficacy of LISTERINE® Antiseptic in inhibiting the development of plaque and gingivitis. *J Clin Periodontol*. 1985;12(8):697-704.

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4. Overholser CD et al. Comparative effects of 2 chemotherapeutic mouthrinses on the development of supragingival dental plaque and gingivitis. *J Clin Periodontol*. 1990;17(8):575-579.

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6. Charles CH et al. Comparative antiplaque and antigingivitis effectiveness of a chlorhexidine and an essential oil mouthrinse:
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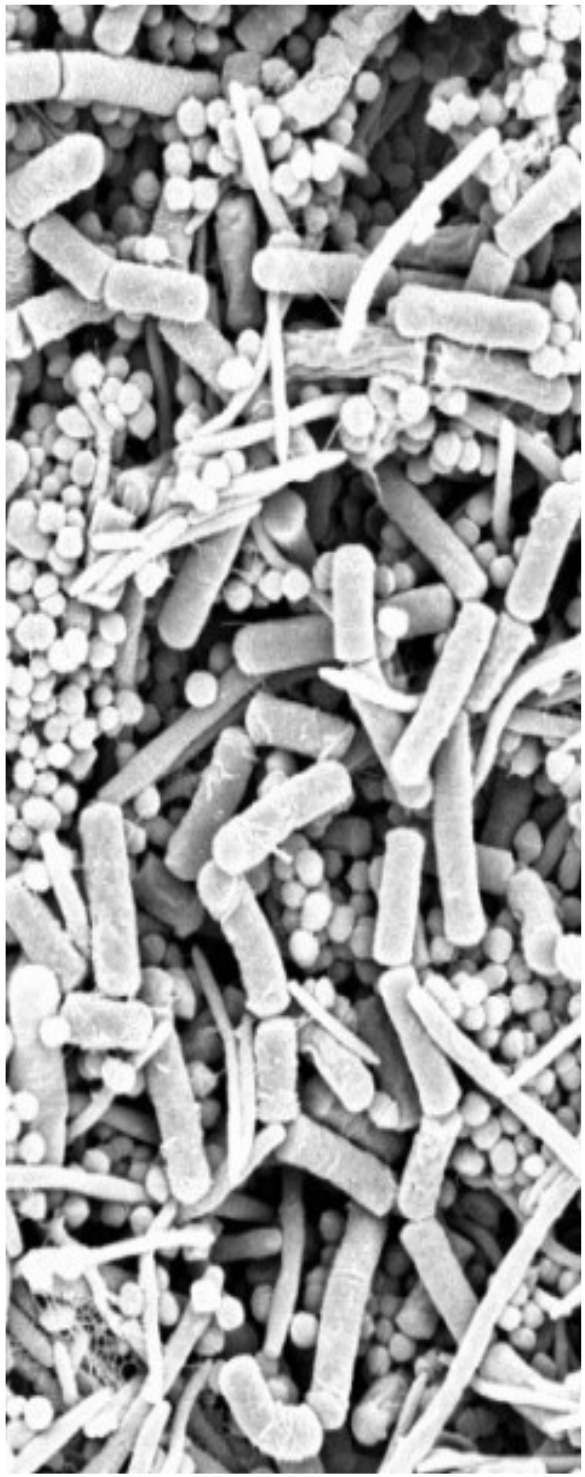
9. Simmons et al Efficacy of Brush, Floss, & Rinse Regimen vs. mechanical oral hygiene *J Dent Res* 89 Spec Issue A, #168 (2010)



ANTIMICROBIAL MOUTHRINSES
How does chlorhexidine work?

- Mechanism of action of chlorhexidine (CHX)
  - CHX ruptures bacterial cell membrane, leading to rapid leakage of cell contents and cell death
  - Binds salivary mucins, reducing pellicle formation, which in turn inhibits plaque bacteria colonization
  - Binds bacteria, inhibiting adsorption onto the teeth

DePaola LG, Spolarich AE. Safety and efficacy of antimicrobial mouthrinses in clinical practice. *J Dent Hyg*. 2007;81(15):13-25.

ANTIMICROBIAL MOUTHRINSES
What Do They Kill?

Chlorhexidine exhibits a broad spectrum of antimicrobial activity

Chlorhexidine antimicrobial kill vs. planktonic bacteria

Gram-positive bacteria	**Gram-negative bacteria**
Actinomyces naeslundii[1-3]	*Actinobacillus actinomycetemcomitans*[12]
Actinomyces viscosus[4]	*Porphyromonas gingivalis*[13,14]
Staphylococcus aureus[5]	*Prevotella intermedia*[13]
Streptococcus mutans[6]	*Eikenella corrodens*[15,16]
Streptococcus sanguis[7]	*Wolinella recta*[15]
Lactobacillus acidophilus[8]	*Aerobacter aerogenes*
Staphylococcus epidermidis[9]	*Escherichia coli* [4,5]
Streptococcus gordonii[10,11]	*Fusobacterium nucleatum*[16]
	Klebsiella pneumoniae[9,17]
	Leptotrichia buccalis[16]
	Pseudomonas aeruginosa[9]
	Fusobacterium fusiforme
	Fusobacterium polymorphum

ANTIMICROBIAL MOUTHRINSES
What Do They Kill?

Chlorhexidine exhibits a broad spectrum of antimicrobial activity

1. Takeuchi Y et al. Effect of chlorhexidine/thymol and fluoride varnishes on dental biofilm formation in vitro. Eur J Oral Sci. 2007;115(6):468-72.
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ANTIMICROBIAL MOUTHRINSES
What Do They Kill?

Chlorhexidine exhibits a broad spectrum of antimicrobial activity

16. Persson GR et al. The impact of a low-frequency chlorhexidine rinsing schedule on the subgingivial microbiota (the TEETH clinical trial). *J Periodontol.* 2001;79:1751-1758.
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ANTIMICROBIAL MOUTHRINSES

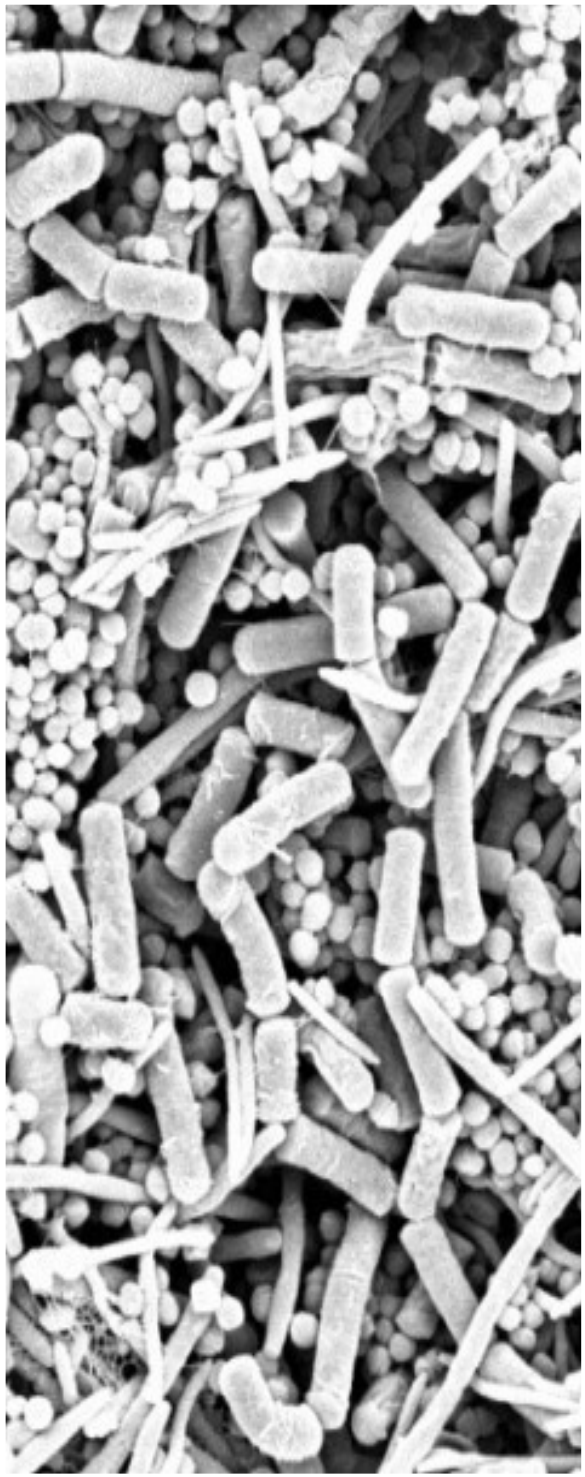
Studies demonstrate antiplaque/antigingivitis effectiveness of 0.12% chlorhexidine mouthrinse

Summary of published 6-month plaque/gingivitis mouthrinse clinical trials

Active Ingredient	Marketed Product	Plaque Reduction (%)*	Gingivitis Reduction (%)*	References
0.12% Chlorhexidine	Peridex™ (Zila Pharmaceuticals Inc.)†	21.6-60.9	18.2-42.5	1-3

*Compared with negative control at 6 months.
†This product has received the ADA Seal of Acceptance.
Adapted from Barnett ML. *JADA.* 2006;137(suppl):165-215.

1. Grossman E et al. Six-month study of the effects of a chlorhexidine mouthrinse on gingivitis in adults. *J Periodontal Res.* 1986;21(suppl):33-43.
2. Overholser CD et al. Comparative effects of 2 chemotherapeutic mouthrinses on the development of supragingival dental plaque and gingivitis. *J Clin Periodontol.* 1990;17(8):575-579.
3. Charles CH et al. Comparative antiplaque and antigingivitis effectiveness of a chlorhexidine and an essential oil mouthrinse: 6-month clinical trial. *J Clin Periodontol.* 2004;31(10):878-884.



ANTIMICROBIAL MOUTHRINSES
How does cetylpyridinium chloride work?

- Mechanism of action of CPC
  - Ruptures bacterial cell membrane, leading to rapid leakage of cell contents and cell death
  - May alter bacterial metabolism, inhibiting cell growth

DePaola LG, Spolarich AE. Safety and efficacy of antimicrobial mouthrinses in clinical practice. *J Dent Hyg*. 2007;81(5):13-25.

ANTIMICROBIAL MOUTHRINSES
What do they kill?

Cetylpyridinium chloride exhibits a broad spectrum of antimicrobial activity

CPC antimicrobial kill vs. planktonic bacteria

Gram-positive bacteria	**Gram-negative bacteria**
Actinomyces naeslundii[1]	*Prevotella intermedia*[6]
Staphylococcus aureus[2]	*Aerobacter aerogenes*
Streptococcus mutans[3]	*Escherichia coli* [2]
Streptococcus sanguis[4]	*Fusobacterium nucleatum*[7]
Staphylococcus epidermidis[5]	*Leptotrichia buccalis*[8]
	Pseudomonas aeruginosa[9]

ANTIMICROBIAL MOUTHRINSES
What do they kill?

Cetylpyridinium chloride exhibits a broad spectrum of antimicrobial activity

1. Imazato S et al. In vitro antibacterial effects of the dentin primer of Clearfil Protect Bond. *Dent Mater*. 2006;22(6):527-532.

2. Müller G, Kramer A. Biocompatibility index of antiseptic agents by parallel assessment of antimicrobial activity and cellular cytotoxicity. *J Antimicrob Chemother*. 2008;61(6):1287.

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ANTIMICROBIAL MOUTHRINSES

Studies demonstrate antiplaque/antigingivitis effectiveness of cetylpyridinium chloride mouthrinses

Summary of published 6-month plaque/gingivitis mouthrinse clinical trials

Active Ingredient	Marketed Product	Plaque Reduction (%)*	Gingivitis Reduction (%)*	References
Cetylpyridinium chloride				
0.05%	Viadent® (Colgate-Palmolive, New York, NY)	28.2	24.0	1
0.07%	Crest® Pro-Health™ Rinse (Procter & Gamble, Cincinnati, OH)	15.8	15.4	2

*Compared with negative control at 6 months.
Adapted from Barnett ML. *JADA.* 2006;137(suppl):165-215.

1. Allen DR et al. Efficacy of a mouthrinse containing 0.05% cetylpyridinium chloride for the control of plaque and gingivitis: a 6-month clinical study in adults. *Compend Contin Educ Dent.* 1998;19(2 suppl):20-26.
2. Mankodi S et al. A 6-month clinical trial to study the effects of a cetylpyridinium chloride mouthrinse on gingivitis and plaque. *Am J Dent.* 2005;18:9A-14A.

ANTIMICROBIAL MOUTHRINSES
How do we know they are safe?

The US Food and Drug Administration has different pathways for determining safety

Over-the-counter (OTC)

- Ingredients making therapeutic claims are evaluated and assigned to categories (I, II, III) based on level of safety and efficacy
- An advisory committee to the FDA has recommended that EO and CPC be classified as safe and effective
  - EO, CPC = Category I

Prescription and OTC products

- Evaluated for safety and efficacy via the New Drug Application (NDA) process
- CHX has been approved by the NDA process

DePaola LG, Spolarich AE. Safety and efficacy of antimicrobial mouthrinses in clinical practice. *J Dent Hyg*. 2007;81(5):13-25.

ANTIMICROBIAL MOUTHRINSES
Do not adversely affect oral microbial flora

- Studies show that **long-term daily use of CHX or EO does not adversely affect the natural balance of oral microbial flora**, including

  - No microbial overgrowth
  - No opportunistic infection
  - No development of microbial resistance

DePaola LG, Spolarich AE. Safety and efficacy of antimicrobial mouthrinses in clinical practice. *J Dent Hyg*. 2007;81(5):13-25.

ANTIMICROBIAL MOUTHRINSES
Role and safety of alcohol

- The majority of therapeutic mouthrinses contain pharmaceutical-grade denatured alcohol (ethanol) to solubilize ingredients
  - Unlike alcoholic beverages, the pharmaceutical-grade alcohol in commercial mouthrinses is free from contaminating carcinogens[1]
- Mouthrinses are expectorated and are not meant for ingestion
- Recommend the use of all products as directed by the manufacturer

1. Ciancio SG. Alcohol in mouthrinse: lack of association with cancer. *Biol Ther Dent*. 1993;9:1-2.

ANTIMICROBIAL MOUTHRINSES

Leading experts agree: Available evidence does not support a causal association between mouthrinse use and oral cancer risk

"Based on the studies reviewed, the Subcommittee concludes that the available data do not support a causal relationship between the use of alcohol-containing mouthrinses and oral cancer."[1]

"We conclude that a rigorous methodological review and analysis of the available evidence do not support a causal association between mouthwash use and risk of oral cancer. "[2]

"…the weight of the evidence strongly suggests that use of ACM does not increase the risk of OPC. Practicing dentists may recommend to their patients that they use the mouthwashes of their choice, including those that contain alcohol." [3]

"The pattern of risk is not different with reference to alcohol-containing mouthwashes, and other types of mixed use of mouthwashes. This, again, weighs against any relevant association between alcohol-containing mouthwashes and oral cancer risk." [4]

1. Food and Drug Administration Fed Regist. 2003;68(103): 32232-32287. Codified at 21 CFR Part 356.
2. Elmore, J et al, Otolaryngol Head Neck Surg Vol 113, Issue 3. September 1995. Pages 253-261.
3. Cole, P. et al, Alcohol-containing mouthwash and oropharyngeal cancer: a review of the epidemiology. JADA. 2003;134(8):1079-1087.
4. Vecchia CL, Mouthwash and oral cancer risk: An update, Oral Oncol (2008), doi:10.1016/j.oraloncology.2008.08.012

ANTIMICROBIAL MOUTHRINSES

Alcohol-containing mouthrinses are safe for patients with xerostomia

Fischman SL et al. (2004)

Use of essential oil–containing mouthrinses by xerostomic Individuals -

- Oral irritation potential of EO-containing mouthrinse was minimal
- Salivary flow rates were higher post-rinse vs. pre-rinse
- Salivary flow rates were 28.2% higher with EO-containing mouthrinse vs. control (not significant)
- At day 7, two subjects in the EO-containing mouthrinse group had mucosal abnormalities. In both cases, subjects had a whitish slough that wiped off readily, leaving behind a normal mucosa. In both subjects, mucosa were normal at day 14

Fischman SL et al. Use of essential oil–containing mouthrinses by xerostomic individuals: determination of potential for oral mucosal irritation. *Am J Dent.* 2004;17:23-26.

ANTIMICROBIAL MOUTHRINSES

The ADA advises use of ADA-accepted antimicrobial mouthrinses

ADA-Accepted Antimicrobial mouthrinses

1. Reduce the bacterial count and inhibit bacterial activity in dental plaque, which can cause gingivitis[1]
2. Have substantiated claims demonstrating significant reductions in plaque and gingivitis[1]

1. ADA, Oral Health Topics A-Z: Cleaning Your Teeth and Gums (Oral Hygiene). http://www.ada.org/2624.aspx?currentTab=2. Accessed October 2010.

ANTIMICROBIAL MOUTHRINSES

The American Dental Association (ADA) Seal of Acceptance Is Awarded Based on Strict Criteria

- Product claims that appear in conjunction with the ADA Seal must be supported by rigorous clinical studies and scientific data

- Among other requirements, the ADA requires that the mouthrinse achieve an average of 20% gingivitis reduction across two 6-month studies and a minimum 15% gingivitis reduction for any single study

- Products awarded the ADA Seal must present a true and accurate portrayal of intended use and efficacy on the label

Acceptance Program Guidelines: Chemotherapeutic Products for Control of Gingivitis. ADA Council on Scientific Affairs, July 2008.

ANTIMICROBIAL MOUTHRINSES

ADA Clinical Trial Guidelines For Chemotherapeutic Antiplaque & Antigingivitis Agents

Design

- Randomized, crossover, or parallel group, well controlled
- Active product must be used in normal regimen vs. placebo
- At least 2 studies conducted by independent investigators required

Population

- Must represent typical product users

Methods

- Study duration should be 6 months minimum
- Scoring and sampling must be performed at baseline, an intermediate point, and 6 months
- Qualitative microbiologic plaque sampling must be done
- Quantitative plaque measurements must be taken
- Safety must be demonstrated

Acceptance Program Guidelines: Chemotherapeutic Products for Control of Gingivitis. ADA Council on Scientific Affairs, July 2008.

ANTIMICROBIAL MOUTHRINSES

Antimicrobial rinses that have earned the ADA Seal

- Peridex™
- LISTERINE® Antiseptic
- Private-label EO rinses

- *No rinse containing CPC has earned the ADA Seal of Acceptance*

Note: Prescription products are no longer included in the ADA Seal program

Behavior Change

Strategies for encouraging patients to include an antimicrobial rinse in their daily oral hygiene regimen

BEHAVIOR CHANGE

- What are the patient's barriers to change?
- What are the dental professional's barriers to promoting change?
- Transtheoretical stages of change and suggested intervention
- Practical tips for behavior change
- Example

BEHAVIOR CHANGE
What are the patient's barriers to change?

- Patients do not view chronic gingivitis/periodontitis as threatening
- Patients feel oral health care instructions are time consuming and difficult to follow
- Patients may suffer from dental treatment anxiety
- Lack of economic resources may be a factor

As healthcare professionals we have an opportunity to help our patients improve their oral health with good oral hygiene habits.

Silverman S Jr, Wilder R. Antimicrobial mouthrinse as part of a comprehensive oral care regimen: safety and compliance factors. *JADA.* 2006;137(11 suppl):22S-26S.

BEHAVIOR CHANGE

What are the dental professional's barriers to encouraging change?

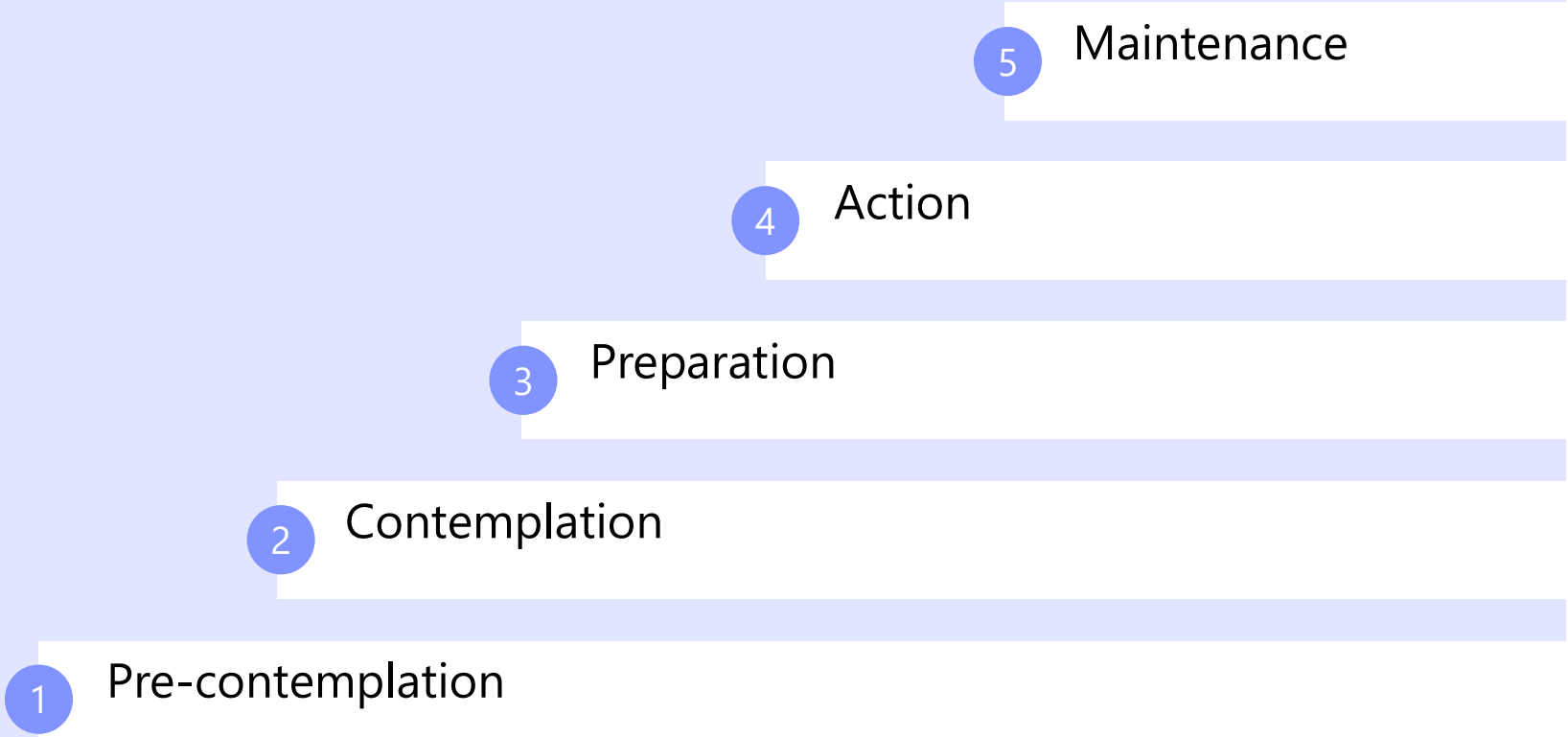
- Knowing the incremental benefits of adding an alternative oral hygiene measure (e.g. antimicrobial mouthrinse for biofilm control), professionals have the habit of only recommending traditional oral hygiene measures (brushing, flossing)
- Lack of confidence in using motivational techniques
- Lowered expectations that patients will listen to their advice and make a change
- Lack of time for oral hygiene instruction

Understanding behavior change can help dental professionals be more successful in encouraging patient compliance. The transtheoretical stages of change model is useful.

Asadoorian J. Strategies for incorporating antimicrobial mouthrinses into daily oral care. *J Dent Hyg*. 2007;81(5):118.

BEHAVIOR CHANGE

Transtheoretical stages of change



BEHAVIOR CHANGE

Transtheoretical stages of change and suggested intervention

1 Stage of change	Characteristics of patient	Oral health recommendation
Pre-contemplation (*I won't use a mouthrinse*)	• Lacks knowledge of periodontal disease • Does not believe he/she is at risk for developing periodontal disease	• Educate patient about periodontal disease

Adapted from Silverman S Jr, Wilder R. Antimicrobial mouthrinse as part of a comprehensive oral care regimen: safety and compliance factors. *JADA.* 2006;137(11 suppl):22S-26S.

BEHAVIOR CHANGE

Transtheoretical stages of change and suggested intervention

2 Stage of change	Characteristics of patient	Oral health recommendation
Contemplation (*I might use a mouthrinse)*	• Understands risks of developing periodontal disease • Not convinced about benefit of using antiseptic mouthrinse	• Inform patient of benefits of using antimicrobial rinse to reduce plaque and gingivitis • Discuss pros and cons of different rinses

Adapted from Silverman S Jr, Wilder R. Antimicrobial mouthrinse as part of a comprehensive oral care regimen: safety and compliance factors. *JADA.* 2006;137(11 suppl):22S-26S.

BEHAVIOR CHANGE

Transtheoretical stages of change and suggested intervention

3 Stage of change	Characteristics of patient	Oral health recommendation
Preparation (*I will use a mouthrinse)*	• Understands benefits of using mouthrinse • Wants to incorporate mouthrinse into home-care regimen	• Suggest a specific OTC brand or prescribe Rx mouthrinse • Note recommendation in patient's medical record

Adapted from Silverman S Jr, Wilder R. Antimicrobial mouthrinse as part of a comprehensive oral care regimen: safety and compliance factors. *JADA.* 2006;137(11 suppl):22S-26S.

BEHAVIOR CHANGE

Transtheoretical stages of change and suggested intervention

4 Stage of change	Characteristics of patient	Oral health recommendation
Action *(I am using a mouthrinse)*	• Using a mouthrinse as part of daily home-care regimen	• Provide positive feedback regarding the use of a mouthrinse

Adapted from Silverman S Jr, Wilder R. Antimicrobial mouthrinse as part of a comprehensive oral care regimen: safety and compliance factors. *JADA*. 2006;137(11 suppl):22S-26S.

BEHAVIOR CHANGE

Transtheoretical stages of change and suggested intervention

5 Stage of change	Characteristics of patient	Oral health recommendation
Maintenance *(I have incorporated a mouthrinse into my daily home-care regimen)*	• Has experienced the benefits of using a mouthrinse in addition to brushing and flossing	• Discuss any issues regarding regular use of mouthrinse • If relapse occurs, discuss why it did and how to get back on track

Adapted from Silverman S Jr, Wilder R. Antimicrobial mouthrinse as part of a comprehensive oral care regimen: safety and compliance factors. *JADA*. 2006;137(11 suppl):22S-26S.

BEHAVIOR CHANGE

Practical tips for behavior change

- Become comfortable asking questions and *listening*
  - Ask about current health practices
  - Determine the patient's motive for wanting to change and use that as the point of discussion
  - ***Example:*** *What do you do on a daily basis to take care of your mouth?*

Asadoorian J. Strategies for incorporating antimicrobial mouthrinses into daily oral care. *J Dent Hyg.* 2007;81(5):118.

BEHAVIOR CHANGE

Practical tips for behavior change

- Assess patient willingness to change
  - If not ready, provide interventions over multiple visits
  - If ready, supervise practice and provide a plan
    - Explain that lapses do happen
  - ***Example:*** *Would you be willing to try using an antimicrobial mouthrinse twice daily?*

Asadoorian J. Strategies for incorporating antimicrobial mouthrinses into daily oral care. *J Dent Hyg.* 2007;81(5):118.

BEHAVIOR CHANGE

Practical tips for behavior change

- Anticipate obstacles
  - Stressful life experiences can disrupt formation of positive habits
  - Encourage patient to incorporate external memory triggers to maintain or resume positive oral health habits during stressful periods

  - ***Example**: It can be hard sometimes to remember new healthy habits when we're busy, sick, traveling, or stressed out. What are some ways that help you remember to do things when life is stressful? What are some obstacles that may keep you from using an antimicrobial mouthrinse twice daily?*

Asadoorian J. Strategies for incorporating antimicrobial mouthrinses into daily oral care. *J Dent Hyg.* 2007;81(5):118.

BEHAVIOR CHANGE

Practical tips for behavior change

- Follow up with the patient
  - Specific follow-up demonstrates care for the patient and is appreciated
  - ***Example:*** *Were you able to find a product you really liked? Could you easily access the product? Was it hard to be consistent? What was your biggest challenge?*

  - Praise progress!
  - ***Example:*** *Even though you weren't able to use the rinse every day twice daily, I'm glad that you were able to use it before bed most nights. You have made a great start! Do you think you can use it more often?*

Asadoorian J. Strategies for incorporating antimicrobial mouthrinses into daily oral care. *J Dent Hyg.* 2007;81(5):118.

SUMMARY
Biofilm

- Dental plaque is a biofilm
- Accumulation of dental plaque biofilm can lead to gingivitis, which can progress to periodontitis
- Plaque biofilm can be managed through effective oral hygiene measures, including twice-daily antimicrobial rinsing

SUMMARY
Antimicrobial Mouthrinses

- Antimicrobial mouthrinses treat all accessible surfaces of the oral cavity and reduce the number of bacteria in accumulations on mucosal surfaces

- The leading OTC antimicrobial mouthrinses use active ingredients that have been found to be safe and effective by an FDA advisory committee. CHX mouthrinses have been approved by the FDA

- The ADA recognizes the value of rinsing with an ADA-accepted antimicrobial mouthrinse to help reduce and prevent plaque and gingivitis

SUMMARY
Behavior Change

- Dental professionals can encourage patients to adopt antimicrobial rinsing by targeting interventions to the individual patient's values, stage of readiness to change, and skill set

FORMULA FOR SUCCESS

- A thorough oral hygiene program—and your recommendation — can help your patients successfully manage biofilm to reduce and prevent plaque and gingivitis
  - Provide patient education
  - Promote patient compliance
  - Recommend use of an ADA-accepted antimicrobial mouthrinse in conjunction with tooth-brushing and daily flossing

EXAM

1. Thorough mechanical plaque control can be difficult to achieve due to
   a) patients using improper brushing and flossing technique
   b) insufficient time allowed for oral hygiene
   c) limited dexterity
   d) all of the above

2. Biofilms can form on any surface exposed to _____ and _____.
   a) bacteria and polysaccharides
   b) bacteria and slime
   c) bacteria and water
   d) bacteria and fungi

EXAM

3. Antimicrobial mouthrinses are particularly well suited for managing plaque biofilm because
   a) liquid carries antimicrobial agents to all areas of the mouth
   b) biofilms cover the entire mouth, not just teeth
   c) plaque biofilm cannot be completely removed by brushing and flossing alone
   d) all of the above

4. A common OTC antimicrobial agent used in mouthrinse formulations is
   a) a fixed combination of 4 essential oils
   b) cetylpyridinium chloride (CPC)
   c) chlorhexidine (CHX)
   d) a and b
   e) b and c

EXAM

5. According to an advisory committee to the FDA and other leading experts, the evidence does not support a causal relationship between alcohol-containing mouthrinses and oral cancer.
   a) True
   b) False

6. Which antimicrobial agents exhibit a broad spectrum of antimicrobial activity?
   a) essential oils
   b) CPC
   c) CHX
   d) CHX and CPC
   e) essential oils, CPC, and CHX

EXAM

7. Among other requirements, the ADA guidelines require a ___% reduction in gingivitis averaged over two 6-month clinical studies to be awarded the Seal of Acceptance for chemotherapeutic antiplaque and antigingivitis agents.

   a) 50%

   b) 20%

   c) 25%

   d) 30%

8. The fact that patients do not view chronic gingivitis/periodontitis to be a threatening condition is a common barrier to patient compliance with their dental professional's oral hygiene recommendations.

   a) True

   b) False

EXAM

9. A lack of time for oral hygiene instruction during an office visit is a common barrier to a dental professional's ability to promote change in their patients' oral care habits.

   a) True

   b) False

10. During the process of behavior change, lapses to old behaviors are not common.

    a) True

    b) False

ANSWERS

1. D
2. C
3. D
4. D
5. A
6. E
7. B
8. A
9. A
10. B