

Open wide. What do you see? Teeth, gums, tongue, saliva, the inside of your mouth. Anything else in there? Yes, lots of **bacteria** (even though you can't see them). Yuk! What are they doing? Feasting on your food.

**Plaque** is a film of leftover food, bacteria, and acid that settles on the surface of teeth. Plaque is produced as bacteria process your food. Gently scrape a fingernail across your teeth. The white stuff you collect is plaque. You can get rid of plaque with proper brushing and flossing. If you don't, the acid that forms with plaque will eventually eat through **tooth enamel**, causing **decay**. If you have braces, pay special attention to the hiding places for plaque and bits of food.

When plaque is not removed, it hardens and turns into a yellowish crust called **tartar** or **calculus**. Once this forms, only professional dental cleaning can remove it. Red, swollen, or bleeding gums from plaque and tartar build-up are a problem for more than half of the 15-year-olds in the U.S.

Why do we care about gum problems? Well, they can cause bad breath. Also, breakdown of the gums makes it easier for bacteria and **viruses** to enter the rest of your body. **Gum**

**disease** is a serious health problem for many people.

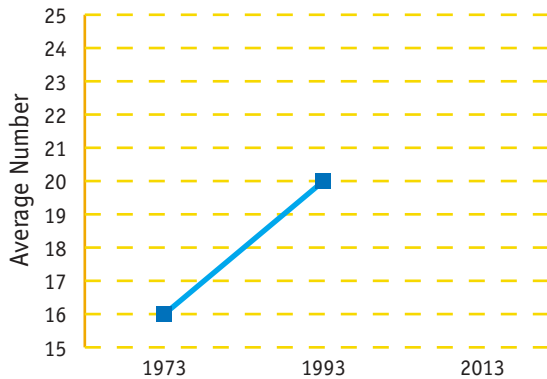
Today's children have fewer **cavities** than their parents did. In 1945, communities began to add **fluoride** to water supplies. Since that time, decay has dropped by 60 percent in the U.S. How does fluoride work? It strengthens teeth and fights off bacteria. Fluoride attracts **minerals** like calcium and phosphate in your saliva to build tooth enamel and **dentin** that are more resistant to acid attack.

People your age eat often - about nine times a day (including snacks). Remember to rinse your mouth with water after eating. Brush and floss at least twice a day, especially before bedtime. Your teeth will thank you!

## You and Your **BIG** Mouth

# Check It Out

## Average Number of Permanent Teeth (without decay or fillings) among 18-34 year olds



Source: Adapted from Figure 4.6 of Surgeon General's Oral Health report

By 12 years of age, most people have a set of 28 permanent teeth.

Take care of your teeth now, and you will have fewer problems when you get older. Over the past 25 years, we have learned that better brushing techniques, flossing, fluoride, and plastic sealants help reduce tooth decay. Use this graph to answer the questions.

1. In 1973, how many teeth without decay or fillings (average) did young adults have? \_\_\_\_\_
2. By 1993, how many teeth without decay or fillings (average) did young adults have? \_\_\_\_\_
3. How old will you be in 2013? \_\_\_\_\_
4. **Estimate** the average number of teeth without decay or fillings that young adults (like you) may have in the year 2013. \_\_\_\_\_

Visit these sites. Answer the questions and learn more about oral health.

- Should you brush your tongue?  
How much floss do you need for flossing?  
<http://www.ada.org/public/faq/cleaning.html>  
<http://www.adha.org/oralhealth/index.html>
- How much of your tooth surface does not get clean if you do not floss?  
[www.healthyteeth.org](http://www.healthyteeth.org)
- Most cavities occur on the chewing surfaces of teeth. What are plastic sealants? Could decay spread if trapped under a sealant?  
[www.nidcr.nih.gov/news/pubs/sealants/main.htm](http://www.nidcr.nih.gov/news/pubs/sealants/main.htm)
- What is gingivitis?  
Could periodontal disease be genetic?  
[www.perio.org/consumer](http://www.perio.org/consumer)
- What tools and equipment do dental hygienists use?  
[www.adha.org/kidstuff/](http://www.adha.org/kidstuff/)

## Untangle the WEB



# Get REAL

Lots of toothpastes are for sale. Many claim to whiten teeth and freshen breath. The bottom line is: buy one that contains fluoride because it fights decay. \* Scientists want to know how effective a toothpaste is, but they also test to

\* Look for the American Dental Association's Council on Dental Therapeutics Accepted Seal on the label (effectiveness is based on fluoride content).

find out which toothpastes have other qualities that appeal to consumers.



Dentists develop new **formulas** all the time. Toothpastes contain different foaming agents, detergents, colors, and flavors. Here's a chance to make your own toothpaste. Compare its qualities with commercial toothpastes.

**Hypothesis:** Decide what formulas to use for a good toothpaste.

One part \_\_\_\_\_ + \_\_\_\_\_ drops of \_\_\_\_\_ + flavorings, coloring  
(calcium carbonate or baking soda) (how many?) (water or glycerin)

One part \_\_\_\_\_ + \_\_\_\_\_ drops of \_\_\_\_\_ + flavorings, coloring  
(calcium carbonate or baking soda) (how many?) (water or glycerin)

**Predictions:** Which formula will taste better? Look better? What about texture?

**Materials:**

- Toothpaste (2 or more brands)
- Small paper plates
- Flat toothpicks
- Medicine cups
- Pipettes, straws, or medicine droppers
- Plastic spoons
- Calcium carbonate
- Sodium bicarbonate (baking soda)
- Water and Glycerin
- Flavorings
- Vinegar or lemon juice
- Coloring

**Procedure:** Work with a group.

**Step 1:** With your group, rate the commercial toothpastes for taste, smell, appearance, texture, and foaming. Make a chart and use this rating scale:

1 = poor \_\_\_\_\_ 5 = excellent

BRAND NAME	TASTE	SMELL	APPEARANCE	TEXTURE	FOAMING
XX					
YY					

**Step 2:** Now, mix your own formulas. Label and rate each one. Record data in the chart.

**Step 3:** Set your own formulas aside. Observe after 15 and 30 minutes (or overnight). Record any changes.

**Step 4:** Summarize your data to report it to the class.

**Results:** What changes and reactions did you notice? Can you explain your observations? What did you learn about your chemical mixtures?

**Conclusions:** Based on your results, which commercial toothpaste gets the highest ratings? Which formula? If you wanted to sell your "new, improved toothpaste," how would you promote it?

## What is Oral Health?

Oral means mouth. Oral health is more than strong teeth. It also means taking care of the tongue, gums, and surrounding tissues in your mouth.



## Flaska's Facts

Acids from bacteria attack your teeth for 20 minutes after you eat sugary or starchy foods.

Your body makes enough saliva each day to fill two cans of soda.

Brushing and flossing can reduce tooth decay by 40 percent.

Replace your toothbrush when bristles no longer stand up straight.

Periodontal diseases are serious bacterial infections. Periodontal means "around the tooth."

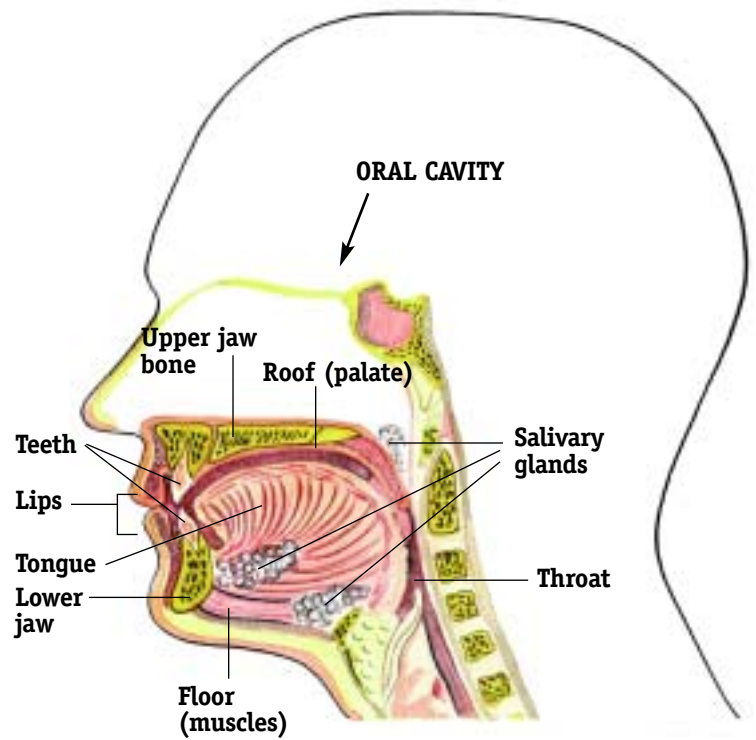
# Inside Story

Our mouth helps keep us alive as we eat and drink. It keeps us in touch with others as we talk and smile. Did you know your mouth protects you, too?

The lining of the mouth (**oral mucosa**) might seem soft and delicate, but it can tolerate extremes of temperature. It has two layers, the **epithelium** and **connective tissues**. Epithelial cells provide a **barrier** to bacteria. With a microscope you can see why. The cells are square-shaped. They give off sticky **molecules** that keep them close together. Under the epithelium is a sturdier layer of connective tissue. Blood vessels and nerves run through this tissue. The connective tissue and epithelium are damaged when you have really bad gum disease.

With damaged mucosa, it's easier for bacteria to get into your bloodstream. Luckily, you have saliva to help you recover from problems like a pizza burn on the roof of your mouth. Saliva helps heal wounds as your body repairs and builds cells. Saliva can also **neutralize acids** from foods that may cause cavities. It even kills many **microorganisms**.

Epithelial cells can be damaged by smoking and the use of smokeless tobacco, leading to **oral cancer**. In fact, oral health is



more than keeping teeth and gums clean. A healthy mouth is directly related to your general health. Remember to visit your **dental professional** twice a year.

## Research RAP



Dr. Xinbin Gu and Dr. Joel Schwartz in their research lab

Over 30,000 Americans will get oral cancer this year. Half of them will die within five years. Oral cancer is a deadly disease, but early detection can save lives.

How can we find out if cancer is developing? Dr. Joel Schwartz and Dr. Xinbin Gu, researchers at the Howard University College of Dentistry, are seeking ways to detect oral cancer in its early stages. Let's find out about their research.

Chemicals and viruses can cause cancer. Scientists may study a substance to find out if it causes cancer. Drs. Schwartz and Gu are investigating a chemical called **DMBA**.

Epithelial cells grown in a lab dish with DMBA turn cancerous. These cells multiply out of control. Observing cells grown *in vitro* gives us better understanding. But that environment is not the same as a complex, living organism. Researchers need a model with a mouth, bloodstream, and an **immune system**. Hamsters make a good model because their **oral structures** are similar to ours.

Researchers painted DMBA on the inside of young hamsters' mouths to find out what would happen. They repeated this three times a week for 16 weeks. The

animals developed oral cancer. Drs. Schwartz and Gu are now looking for **biochemical markers**. These markers indicate when during the testing period the hamsters first developed lesions and when these lesions became cancerous.

How will this help humans? Once researchers can identify the **stages** of cancer growth, they can screen humans for similar markers. *In vitro* and animal models may lead to better understanding and early treatment of this disease. Dr. Schwartz is also studying the use of vitamin E to fight oral cancer.

These Howard University researchers are working with scientists at the University of Wisconsin on new **imaging technology**. Cancer cells divide faster than surrounding cells, and they give off different amounts of energy. This energy can be detected by a **fluorescent glow**. Cancerous growths smaller than one mm in size can be seen with these hand-held cameras. That will make early detection of cancer much easier!

Today's discoveries in the lab may save lives in tomorrow's world.

# Helping Humans, Helping Animals



Did you know that some people brush their dog's teeth or their cat's teeth? Maybe you like mint toothpaste, but your dog would probably prefer chicken flavor. Yes, pet toothpaste really comes in flavors like that! Remember, animals need their own toothpaste because yours may upset their stomach.

Ideally, pets don't get **cavities**. Animal diets do not include much sugar. Dry food and chew toys like **rawhide** can also help your pet's teeth stay healthy by reducing plaque build-up.

Even though they don't get many cavities, **gum disease** is present in many dogs and cats by three years of age. Teeth become stained. A yellow-brown crust of tartar builds up around the gumline. Gum disease causes tooth loss in older pets.

This makes it difficult for them to eat. Some die of infections that start in the gums and spread through the bloodstream, usually to the heart or kidneys.

In the past 20 years, **veterinary dentistry** has become more common. Vets can remove plaque from your dog or cat's teeth, but it's hard to get animals to cooperate. However, if pets are given **anesthesia**, they are **unconscious** during the cleaning process. The rest of the procedure is similar to your treatment. Hygienists and dentists use a **scaler** to scrape off tartar, or they may also use **ultrasonic vibrations** to remove it. Then, teeth are polished with a small **spinning rubber buffer cup**.

Keep your pet smiling with healthy gums and teeth!



## DELVING DEEPER

*Judith Neely, RDH, works with students at Howard University, where she received her own education in dental health.*

How do you become a **dental hygienist**? Most students go to college for one year to study science, English, and psychology before starting the formal 2-year program. After that, students continue with science classes. Hands-on learning is also important. Students learn about infection control and practice on models with large instruments. Then they move on to a **dental clinic**, where they work with **patients**. After completing their coursework, students must pass a national exam to become registered dental hygienists (RDH).

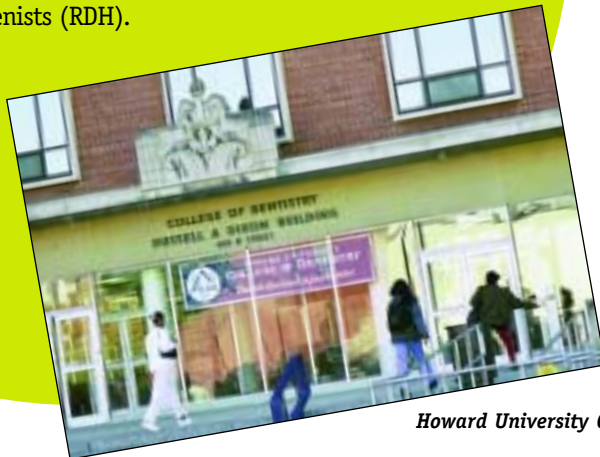


## Express Yourself

Dental professionals like dentists, dental hygienists, and people who make dental appliances (braces or retainers) work with their hands. Try your hand at making a model of a set of teeth. Use modeling clay or other materials.

Label your model accurately. Then, describe how you would do the following:

- Proper brushing and flossing
- Straightening teeth
- Protecting teeth during sports



Howard University College of Dentistry

# Cool Careers

Childhood experiences interested Ms. Frazier-Kelley and Dr. Grant-Mills in **dentistry**. Today they are leaders who train dental hygienists at Howard University in Washington, D.C.

As a young girl, Marie Frazier-Kelley did not know how to take care of her teeth. When she started school, she was ashamed of the appearance of her teeth. Luckily, there was a dental hygienist in her school. After her first dental cleaning, Marie felt like a whole new person. From then on, she took good care of her teeth. After high school, Ms. Frazier-Kelley wanted to follow in the footsteps of her friend, the dental hygienist. She knew that was just the right the job for her.



When Donna Grant-Mills was young, many people in her community could not afford to go to a dentist for regular check-ups. Dr. Grant-Mills grew up thinking that it was normal for people to lose all their teeth as they got older. As a teen, she got a job at a new dental clinic in her community. She was surprised to learn that teeth could last a lifetime. Donna decided to become a registered dental hygienist and went back to help the people in her community. Later she took on a new challenge. She went to dental school and became Dr. Grant-Mills. Now she



continues to help others through her teaching at the College of Dentistry.

The next time you get your teeth cleaned, ask your dental professionals to tell you their own stories about starting a **career in oral health**.

*Above: Howard University faculty: Judith Neely, RDH, Donna Grant-Mills, RDH, MEd, DDS, and Marie Frazier-Kelley, RDH Left: Ms. Frazier-Kelley, Chair of the Dental Hygiene Dept. at Howard University*

## Ask a Scientist

Get connected! Ask a question about oral health and get an answer online. Visit: [www.agd.org](http://www.agd.org) and go to "Ask a dental question."

Also try: [kidstuff@adha.net](mailto:kidstuff@adha.net)



*Ms. Neely with student and patient at Howard University's dental clinic*

## ★ BENDER

# MIND

New technologies will change dental visits in the future. Create your own dental invention (or adapt one of these ideas). Share it with others.

Here's a sampling of new ideas coming soon to your dentist's office:

- Removing decayed areas without a metal drill.

- Using lasers to cut away diseased gum tissue.
- Looking inside the mouth with a pen-sized camera and projecting the image on a computer screen.
- Replacing a knocked out tooth with one grown in a lab.

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