

Basic Anatomy of the Mouth and Teeth

The entrance to the digestive tract, the mouth is lined with mucous membranes. The membrane-covered roof of the mouth is called the **palate**. The front part consists of a bony portion called the hard palate, with a fleshy rear part called the soft palate. The hard palate divides the mouth and the nasal passages above. The soft palate forms a curtain between the mouth and the throat, or **pharynx**, to the rear. The soft palate contains the **uvula**, the dangling flesh at the back of the mouth. The **tonsils** are located on either side of the uvula and look like twin pillars holding up the opening to the pharynx.

A bundle of muscles extends from the floor of the mouth to form the **tongue**. The upper surface of the tongue is covered with tiny bumps called papillae. These contain tiny pores that are our taste buds. Four kinds of taste buds are grouped together on certain areas of the tongue - those that sense sweet, salty, sour, and bitter tastes. Three pairs of **salivary glands** secrete saliva, which contains a digestive enzyme called amylase that starts the breakdown of carbohydrates even before food enters the stomach.

The **lips** are covered with skin on the outside and with slippery mucous membranes on the inside of the mouth. The major lip muscle, called the orbicularis oris, allows for the lips' mobility. The reddish tint of the lips comes from underlying blood vessels. The inside portion of both lips is connected to the **gums**.

There are several types of teeth. **Incisors** are the squarish, sharp-edged teeth in the front of the mouth. There are four on the bottom and four on the top. On either side of the incisors are the sharp **canines**. The upper canines are sometimes called eyeteeth. Behind the canines are the **premolars**, or bicuspid. There are two sets, or four premolars, in each jaw.

The **molars**, situated behind the premolars, have points and grooves. There are 12 molars - three sets in each jaw called the first, second, and third molars. The third molars are the **wisdom teeth**, thought by some to have evolved thousands of years ago when human diets consisted of mostly raw foods that required extra chewing power. But because they can crowd out the other teeth, sometimes a dentist will need to remove them.

Human teeth are made up of four different types of tissue: pulp, dentin, enamel, and cementum. The **pulp** is the innermost portion of the tooth and consists of connective tissue, nerves, and blood vessels, which nourish the tooth. The pulp has two parts - the pulp chamber, which lies in the crown, and the root canal, which is in the root of the tooth. Blood vessels and nerves enter the root through a small hole in its tip and extend through the canal into the pulp chamber.

Dentin surrounds the pulp. A hard yellow substance consisting mostly of mineral salts and water, it makes up most of the tooth and is as hard as bone. It's the dentin that gives teeth their yellowish tint. **Enamel**, the hardest tissue in the body, covers the dentin and forms the outermost

layer of the crown. It enables the tooth to withstand the pressure of chewing and protects it from harmful bacteria and changes in temperature from hot and cold foods. Both the dentin and pulp extend into the root. A bony layer of **cementum** covers the outside of the root, under the gum line, and holds the tooth in place within the jawbone. Cementum is also as hard as bone.

Normal Development of the Mouth and Teeth

Humans are diphyodont, meaning that they develop two sets of teeth. The first set of 20 **deciduous teeth** are also called the milk, primary, temporary, falling-off, or baby teeth. They begin to develop before birth and begin to fall out when a child is around 6 years old. They're replaced by a set of 32 **permanent teeth**, which are also called secondary or adult teeth.

Around the 8th week after conception, oval-shaped tooth buds consisting of cells form in the embryo. These buds begin to harden about the 16th week. Although teeth aren't visible at birth, both the primary and permanent teeth are forming below the gums. The **crown**, or the hard enamel-covered part that's visible in the mouth, develops first. When the crown is fully grown, the root begins to develop.

Between the ages of 6 months and 1 year, the deciduous teeth begin to push through the gums. This process is called eruption or teething. At this point, the crown is complete and the root is almost fully formed. By the time a child is 3 years old, he or she has a set of 20 deciduous teeth, 10 in the lower and 10 in the upper jaw. Each jaw has four incisors, two canines, and four molars. The molars' purpose is to grind food, and the incisors and canine teeth are used to bite into and tear food.

The primary teeth help the permanent teeth erupt in their normal positions; most of the permanent teeth form close to the roots of the primary teeth. When a primary tooth is preparing to fall out, its root begins to dissolve. This root has completely dissolved by the time the permanent tooth below it is ready to erupt.

Children start to lose their primary teeth, or baby teeth, at about 6 years old. This begins a phase of permanent tooth development that lasts over the next 15 years, as the jaw steadily grows into its adult form. From ages 6 to 9, the incisors and first molars start to come in. Between ages 10 and 12, the first and second premolars, as well as the canines, erupt. From 12 to 13, the second molars come in. The wisdom teeth (third molars) erupt between the ages of 17 and 21. Sometimes there isn't room in a person's mouth for all the permanent teeth. If this happens, the wisdom teeth may not come through at all. Overcrowding of the teeth is one of the reasons people get braces during their teenage years.

What Do the Mouth and Teeth Do?

The first step of digestion involves the mouth and teeth. Food enters the mouth and is immediately broken down into smaller pieces by our teeth. Each type of tooth serves a different function in the

chewing process. Incisors cut foods when you bite into them. The sharper and longer canines tear food. The premolars, which are flatter than the canines, grind and mash food. Molars, with their points and grooves, are responsible for the most vigorous chewing. All the while, the tongue helps to push the food up against our teeth.

As we chew, salivary glands in the walls and floor of the mouth secrete saliva, which moistens the food and helps break it down even more. Saliva makes it easier to chew and swallow foods (especially dry foods), and it contains enzymes that aid in the digestion of carbohydrates.

Once food has been converted into a soft, moist mass, it's pushed into the throat (or pharynx) at the back of the mouth and is swallowed. When we swallow, the soft palate closes off the nasal passages from the throat to prevent food from entering the nose.

Things That Can Go Wrong With the Mouth and Teeth

Proper dental care - including a good diet, frequent cleaning of the teeth after eating, and regular dental checkups - is essential to maintaining healthy teeth and avoiding tooth decay and gum disease. Some common mouth and dental diseases and conditions - some of which can be prevented, some of which cannot - are listed below.

Disorders of the Mouth:

- **Aphthous stomatitis (canker sores).** A common form of mouth ulcer, canker sores occur in women more often than in men. Although their cause isn't completely understood, mouth injuries, stress, dietary deficiencies, hormonal changes (such as the menstrual cycle), or food allergies can trigger them. They usually appear on the inner surface of the cheeks, lips, tongue, soft palate, or the base of the gums, and begin with a tingling or burning sensation followed by a painful sore called an ulcer. Pain subsides in 7 to 10 days, with complete healing in 1 to 3 weeks.
- **Cleft lip and cleft palate** are birth defects in which the tissues of the mouth and/or lip don't form properly during fetal development. Children born with these disorders may have trouble feeding immediately after birth. Reconstructive surgery in infancy and sometimes later can repair the anatomical defects, and can prevent or lessen the severity of speech problems later on.
- **Enteroviral stomatitis** is a common childhood infection caused by a family of viruses called the enteroviruses. An important member of this family is coxsackie virus, which causes hand, foot, and mouth disease. Enteroviral stomatitis is marked by small, painful ulcers in the mouth that may decrease a child's desire to eat and drink and put him or her at risk for dehydration.

- **Herpetic stomatitis (oral herpes).** Children can get a mouth infection with the herpes simplex virus from an adult or another child who has it. The resulting painful, clustered vesicles, or blisters, can make it difficult to drink or eat, which can lead to dehydration, especially in a young child.
- **Periodontal disease.** The gums and bones supporting the teeth are subject to disease. A common periodontal disease is **gingivitis** - inflammation of the gums characterized by redness, swelling, and sometimes bleeding. The accumulation of tartar (a hardened film of food particles and bacteria that builds up on teeth) usually causes this condition, and it's almost always the result of inadequate brushing and flossing. When gingivitis isn't treated, it can lead to **periodontitis**, in which the gums loosen around the teeth and pockets of bacteria and pus form, sometimes damaging the supporting bone and causing tooth loss.

Disorders of the Teeth:

- **Cavities and tooth decay.** When bacteria and food particles stick to saliva on the teeth, plaque forms. The bacteria digest the carbohydrates in the food and produce acid, which dissolves the tooth's enamel and causes a cavity. If the cavity isn't treated, the decay process progresses to involve the dentin. The most common ways to treat cavities and more serious tooth decay problems are: filling the cavity with silver amalgam; performing root canal therapy, involving the removal of the pulp of a tooth; crowning a tooth with a cap that looks like a tooth made of metal, porcelain, or plastic; or removing or replacing the tooth. A common cause of tooth decay in toddlers is "milk bottle mouth," which occurs when a child goes to sleep with a milk or juice bottle in the mouth and the teeth are bathed in sugary liquid for an extended period of time. To avoid tooth decay and cavities, teach your child good dental habits - including proper tooth-brushing techniques - at an early age.
- **Impacted wisdom teeth.** In many people, the wisdom teeth are unable to erupt normally so they either remain below the jawline or don't grow in properly. Dentists call these teeth impacted. Wisdom teeth usually become impacted because the jaw isn't large enough to accommodate all the teeth that are growing in and the mouth becomes overcrowded. Impacted teeth can damage other teeth or become painful and infected. Dentists can check if a person has impacted wisdom teeth by taking X-rays of the teeth. If, after looking at the X-rays, a dentist thinks there's a chance that impacted teeth may cause problems, he or she will usually recommend that the tooth or teeth be removed (extracted).
- **Malocclusion** is the failure of the teeth in the upper and lower jaws to meet properly. Types of malocclusion include overbite, underbite, and crowding. Most conditions can be corrected with braces, which are metal or clear ceramic brackets bonded to the front of each tooth. The wires connecting braces are tightened periodically to force the teeth to move into the correct position.