Tooth Decay: How It Progresses

Tooth decay originates with plaque, the sticky bacteria-laden film that collects on your teeth between brushings. It's a common condition; tooth decay is second only to the common cold as the world's most prevalent ailment.

Are you at high risk for dental decay? People with these characteristics are more likely to develop dental decay:

- Three or more instances of decay in the past three years
- Poor oral hygiene
- Irregular dental checkups
- A diet high in refined sugar
- Deep pits and fissures on the crowns of the teeth
- Roots exposed by receding gums
- Reduced flow of saliva
- Use of orthodontic devices

Although many people believe that the terms "tooth decay" and "cavity" are synonymous, they are not. Tooth decay (also known as dental caries) originates when bacteria produce acid that destroys the surface of the teeth. The decay process is gradual. When decay advances to the point where a hole forms in the enamel, this is called a cavity. Initially this hole may be microscopic. If left untreated, however, the decay can penetrate through the enamel layer and into the softer tissue below. Here's a look at how tooth decay progresses.

Bacterial growth. Bacteria from the *Streptococcus* family are the main cause of decay. The most prevalent species in the plaque that forms on the teeth (supragingival plaque) is *Streptococcus mutans*. Other varieties of bacteria also are involved in the decay process, but to a lesser extent. *Lactobacilli* colonize the crevices on the crown, and *Actinomyces* are implicated in decay around exposed portions of the root.

Demineralization. Cavity-causing bacteria thrive on a steady supply of carbohydrates, especially sugars, coupled with poor oral hygiene that enables them to feed and grow without interference. When bacteria metabolize sugar, they produce acid. This acid dissolves the enamel surface of the teeth in a process called demineralization.

Ordinarily, this process takes place slowly, giving the body time to replenish the enamel or remineralize. But when enough bacteria accumulate, they produce sufficient acid to dissolve the enamel faster than the body can rebuild it. Tiny pits mar the surface of the

tooth, and cavities begin to take hold. It usually takes many months of alternating demineralization and remineralization for decay to develop.

First-stage decay. The earliest stage of decay appears as a white or brown area on a tooth. This “white spot” is discernible only to your dentist. Another clue that decay is occurring is a “shadow,” or area of lesser density, on an X-ray image. If decay is caught at this stage, there’s a good chance that it can be halted and reversed.

Cavity formation. Unchecked, the acid eventually penetrates the enamel, and a cavity forms. This process may take three or four years. Once this stage is reached, the tooth can no longer repair itself. Both the mineral crystals and living cells that constitute the dentin are vulnerable to cavities. The decay may also travel through the dentin and destroy parts of the tooth tissue still covered by intact enamel. At this point, your tooth may ache. It may also be sensitive to hot, cold, or sweet foods.

Pulpitis. Without intervention, the cavity grows, extending into the soft tissue of the pulp and causing an infection called pulpitis. The infected pulp tissue swells, but the harder dentin surrounding it prevents it from expanding. Ultimately the swollen tissue squeezes the blood vessels, the blood supply to the pulp is cut off, and the pulp dies. At this point, you’ll probably experience severe pain.

Abscess and systemic disease. The infection can continue to spread to the root of the tooth, creating an inflamed pocket called an abscess. From there, it can travel into the surrounding tissue. Finally, the infection can enter the bloodstream, causing a system-wide infection that’s potentially life-threatening.