



Gum Disease – The Basics Explained

The nature of gum disease....

Firstly it is essential to understand that gum disease is an inflammatory condition. The plaque bacteria present in the mouth consume nutrients from your food and metabolise these chemicals producing highly toxic waste products. These toxic waste products then irritate and damage the adjacent soft gum tissue. As a result, the gum (known as gingiva), becomes inflamed and may bleed at times when brushed or food abrasion occurs. This is a condition we call “Gingivitis”.

Gingivitis....

Gingivitis is not really a disease, but rather a protective process that is working in your defence. This is not the same as Periodontitis that is a destructive condition that attacks the bone supporting your teeth.

Gingivitis is simply an expression of inflammation in the gum tissues. At this stage the inflammation is a protective response directed against the toxic waste products produced by the bacteria that make up the plaque (biofilm) and hence it simply demonstrates that bacterial plaque is present and your immune system is doing its job correctly in trying to remove the toxic material to re-establish a healthy gum tissue.

Around 80% of humans can tolerate this protective inflammation (Gingivitis) without any destructive changes taking place in the periodontal ligament and bone supporting the teeth. We call that a *Stable Gingivitis*. It represents inflammation in the tissues that remains active and protective and maintains a balance between bacterial toxic products and the gum tissue preventing a change to a destructive process.

Progression from Gingivitis....

Sadly, around 20% of humans can only tolerate this stable inflammation (*Stable Gingivitis*) for a few years before there is a change in the types of inflammatory cells present in the inflamed tissues.

Understanding inflammatory progression....

To understand this progression, imagine a small cut on your hand obtained while gardening. The following day around the cut, the skin has a pronounced red margin. This is a *protective inflammation* that is present to protect you from becoming infected.

Now imagine a patient with Rheumatoid Arthritis, another inflammatory condition known as an Autoimmune condition. This condition is simply inflammation in the joints that attacks the bone and cartilage and is therefore NOT protective but instead is an entirely destructive process. If we take a small piece of the inflammatory tissue from the joint (*destructive inflammation*) and another from the cut on the hand (*protective inflammation*) and look at the inflammatory cells present under a microscope we see that the cells present in the two tissues are different. This demonstrates that while we talk about inflammation, it is in fact one word that describes a massive number of different cellular, chemical and immune reactions in a complex system designed to protect and repair our bodies.

Apply this knowledge of inflammation to the gums....

If we now compare this inflammatory story to the mouth, the Gingivitis represents a *protective inflammation* and this can remain stable in around 80% of people. However in the other 20% of people, the Gingivitis lesion eventually changes so that the protective inflammatory cells present are replaced with the types of inflammatory cell we see in *destructive inflammation* present in Rheumatoid Arthritis. Now the inflammation can begin to attack the adjacent bone under the gum around the teeth. It is the destruction of this tooth-supporting bone that we call *Periodontitis*. This is the condition that we describe as Gum Disease.

Influencing factors in gum disease....



It is a patient's genetic make-up, inherited from parents, that determines how the immune system functions, and therefore whether a patient is one of the 80% or the 20%. So part of the reason a patient suffers from gum disease rests with their *genetic susceptibility* inherited from their parents.

Another important factor in a person's susceptibility to gum disease includes the *types of bacteria* that are present, and the *quantity of bacterial plaque* that is present, in the mouth.

Smoking is an important risk factor in many diseases, and in gum disease it increases the risk for any individual suffering destructive effects of gum disease.

Stress too may have a role in influencing the outcome of gum disease by modifying the person's immune system, reducing its ability to protect the individual from disease.

Diabetes influences the body's ability to respond to infection and heal. With raised blood sugar levels, poorer healing capability and greater susceptibility to infection, diabetics tend to suffer from more severe gum disease and may respond to treatment less effectively.

Medications can influence the body's ability to respond to infection. Any drug that influences immune function will influence the course and progression of periodontal disease.

What is plaque?

To understand the influence of bacteria, it is important to understand plaque itself. Plaque is a biofilm (*a film of living material*) that grows in the mouth from two sources; firstly *protein* that is derived from the saliva and secondly *bacteria* that are present in the mouth of all humans. Indeed there are over 700 different species of bacteria found in the human mouth, many of which can be actively engaged in the cause of gum disease.

Protein is characteristically sticky; this can be appreciated when you crack an egg and the egg becomes sticky on your finger if you don't wash it off. This is because the egg protein, Albumen, is present. It is important to understand that the protein that is laid down on the surfaces of the teeth, gums, cheeks and lips derived from your saliva, is sticky and therefore it attracts and retains millions of bacteria in the mouth forming a bacterial layer known as plaque or a biofilm. Within no time at all, more saliva flows over this bacterial layer and once again deposits protein and once again a bacterial layer adheres. This process continues constantly forming many layers and explains partly how plaque builds up volume over time.

The second way in which the bulk of plaque increases is by bacterial cell division. Each bacterium divides into two bacteria every 20 to 30 minutes. Hence the plaque increases its volume from the multiplication of bacteria within the plaque. During those hours when we sleep there is nothing rubbing the plaque off teeth, which normally occurs during eating, and so it is during sleep that plaque builds up most quickly.

Plaque is not uniform. In other words different types of bacteria live in the plaque at different depths and at different sites around the mouth. This results from the different availability of oxygen and nutrients at the different depths. In the deepest plaque, the bacteria known as *Anaerobes* that like to live in the absence of oxygen, thrive. These are most commonly associated with the production of toxic waste products that induce inflammation and hence initiate gum disease. In other words, the thicker the plaque, the more likely it is that there will be gum disease-associated bacteria and destruction of the bone around the teeth will be more likely in those people with a degree of genetic susceptibility.

The importance of reducing plaque....

The treatment of patients with destructive gum disease depends on the reduction of the quantity of plaque found both in the mouth generally, and in the spaces underneath the gum margins called *pockets*. It is in these pockets that bacteria remain untouched by normal tooth brushing and remain protected from abrasion of food. The pockets fill with plaque and very little oxygen can gain access into the pockets resulting in a



very anaerobic plaque (*thrives without oxygen*) and consequently the production of highly toxic waste chemicals leading to severe inflammation in the pocket walls of the gum that extends down to destroy bone.

The deeper the pockets, the more plaque can accumulate, the thicker the plaque, the less oxygen contained in the plaque and the more destructive the gum disease process. This process becomes a vicious circle.

Treatment aims....

Treatment of gum disease is very simple. All one has to do is remove all the bacteria in the mouth generally and in the pockets in particular. Obviously that sounds easier than it is to achieve.

We cannot change the patient's immune system or their genetics so there are primarily two ways to fight gum disease. Firstly any patient who suffers from gum disease must quit smoking if they were a smoker as the smoking habit starves the gums of adequate blood supply reducing their ability to heal and recover. Once not smoking, the next stage is to provide a patient with an achievable method of detailed plaque disruption and removal. And for those patients who are diabetics, it is crucial to maintain excellent blood sugar control to improve the body's ability to combat gum disease and improve the ability to heal.

How to remove plaque biofilm....

Nowadays, the use of high frequency vibration tooth brushes, sometimes referred to as sonic brushes, appear to offer the most efficient technique for the disruption of plaque, but only if the brush filaments can be pushed into the pockets. This requires a specific technique angling the filaments at 45 degrees towards the gum margins. The brush should be held fairly still so the vibration of the filaments disrupts the highly sticky plaque film.

Other plaque control techniques work but are often very difficult and more time consuming to do well, and other electric brushes like the contra-rotating or rotating brushes clean only the tooth surface visible in the mouth but fail to gain adequate access to pockets during cleaning to disrupt that part of the plaque located within the pockets underneath the gum margins.

Does mouthwash help?

Patients often ask if mouthwash will help in controlling plaque. Generally the answer is No. However, at NQ Surgical Dentistry *sometimes* we use both a mouthwash and a toothpaste called Curasept that contains Chlorhexidine. This is a very effective antibacterial agent that helps control the plaque, but it is not generally necessary for patients suffering the most common form of gum disease.

It is best to keep the use of antimicrobial drugs like Chlorhexidine and antibiotics for those cases of severe and aggressive form of gum disease that are not adequately managed by simple hygiene techniques. There are rare forms of gum disease that are best treated with the additional support of a combination of two antibiotics but this applies only to specific conditions.

If you have been advised to use the Curasept mouthwash for your severe or progressive disease, we suggest you dip the sonic brush head in the mouthwash and then use the brush in the mouth for cleaning. Mouthwash does not contain a foaming agent and therefore you will be able to see the brush and hence see that you are angling the brush correctly. If you were to use a toothpaste containing a foaming agent, you would only be able to see the bubbles in the mouth and would be unable to see if the brush is being used correctly.

Detailed instruction in the cleaning technique is provided by Sharon Everett our dental hygienist. She has taught countless patients the techniques necessary to control plaque (biofilm) adequately to eliminate the inflammation and hence control gum disease. But it remains the patient who must perform the daily cleaning to the necessary standard for sufficient time, if treatment is to succeed in the long term.



Once the plaque control technique has been explained and the patient has demonstrated an ability to carry out this cleaning, treatment may begin.

The aim of treatment....

In the past, patients will have left plaque undisturbed in the pockets and between teeth sometimes for many years. These soft plaque deposits can become calcified, forming hard deposits on the roots of the teeth inside the pockets. These hard deposits are called calculus, also known as tartar by many people. Only when these deposits grown to a thickness of 1-2mm can they be seen on Xrays. It is imperative that all deposits of calculus are removed from the roots of all the teeth and the root surfaces are left clean and smooth. Such smooth surfaces are less likely to attract a protein film and allow plaque formation to occur, particularly if pockets are cleaned well.

The dental hygienist will clean all the root surfaces and tooth surfaces using local anaesthetic to ensure the entire procedure is completely comfortable. It is a time consuming procedure and requires great attention to detail working in difficult areas of the mouth. However, Sharon will complete this work for you allowing resolution of the inflammation to begin, as long as you continue to maintain the high standard of plaque control she taught you.

Gum disease is preventable....

Gum disease is preventable even in the 20% of susceptible, or high risk patients. However, to successfully prevent the disease, immaculate plaque control is necessary otherwise the plaque-produced toxic waste products will set off the inflammatory process and bone destruction will continue.

It is therefore essential that patients who have been identified as high risk patients with an increased susceptibility to gum disease are treated correctly and taught about the disease and exactly what they must achieve to control the disease. Knowledge of gum disease and its prevention is very important to enable patients to understand exactly what they have to do and how they can achieve their goals.

Average cleaning will not have any effect on gum disease.

Plaque control in those people who are genetically susceptible must be near perfect but if these patients take the time to get it right, then the benefit is elimination of the destructive inflammation and preservation of the teeth.

Failure to achieve the necessary level of plaque control will leave the destructive inflammation active and continued bone loss will take place and tooth loss will be inevitable.