

Tooth sensitivity can be a real pain!

Do you have Sensitive teeth? Do you suffer from sharp pain with cold drinks or even pain with cold air? These are symptoms of highly sensitive dentine or tooth surfaces. So why and how does it happen, and what can be done about it?

To understand the problem first I will explain the anatomy of the tooth and then you will better understand the nature of the problem and how it can be treated.

Enamel and dentine

Teeth are largely made up of two substances, **dentine** and **enamel**. The *crown* of the tooth is that part of the tooth seen in the mouth and the *root* of the tooth is that part not seen but anchored into the bone and covered by gum.

The crown of the tooth has a protective covering of hard and fairly white enamel that is a mineralised crystalline hard structure called hydroxy-apatite and is not in any way a live tissue. It therefore has no nerve supply and is not capable of feeling or causing pain.

The dentine that forms the central part of the crown of the tooth and the entire body of the root of the tooth is a mixed organic and inorganic material. That is to say it is made up of live tissue (organic) and non-live mineralised tissue (inorganic).

Finally in the very middle of the tooth and root (in the centre of the dentine) there is a chamber that has live nerve tissue and blood vessels (called the pulp of the tooth) providing the tooth with fluid, mineral salts and nutrients for the cells of the pulp of the tooth. This pulp is very highly innervated by nerves of sensation and can detect such stimulus as hot and cold sending pain signals to the brain.

Normal, healthy teeth are not sensitive

When the tooth and surrounding gums are healthy, the only part of the tooth structure that comes into contact with the oral environment is the crown of the tooth covered in very hard mineralised enamel (not a live tissue) so normal temperature variation and sweet or sour stimuli or biting on food or hard substances do not cause any pain or sensitivity.

Exposed dentine can be extremely sensitive

However when you suffer from **gum disease** that is often accompanied by gum recession the gum moves back from the crown of the tooth exposing the start of the root, which is made up of dentine. This is a live tissue capable of feeling pain. So for gum disease sufferers who lose bone around their teeth and suffer gum recession as a result, tooth sensitivity can be a very painful problem.

Another group of patients who can suffer from sensitive teeth are those who have **worn away enamel from the crowns** of their teeth and exposed the underlying dentine. This can happen for several reasons, the most common being due to either fracture of teeth or heavy tooth wear that may result from grinding teeth

together. This grinding may be a habit often associated with stress, physical exertion, depression or mental health disorders. The most common reason is simply a stress coping mechanism. This grinding habit is called either parafunction or bruxism.

When the enamel of the crown of any tooth is either fractured or worn away, the live and sensitive dentine within, is exposed to the oral cavity. This means that all the stimuli including hot, cold, sweet, sour and mechanical rubbing may stimulate the dentine and this live tissue conducts the stimuli to the pulp tissue in the centre of the tooth and the nerves in the pulp are activated to send pain messages to the brain.

So now you understand that dentine is the site where the pain message begins. How can we treat this problem?

Treatment options

There are many products available from supermarkets, chemists and your dentist that you can purchase that are designed to reduce tooth sensitivity, some work better than others, most help some people some of the time, but realistically there are only a few products that your dentist will use that are scientifically proven to help with sensitivity regularly. It is always best to discuss your particular problem areas with your own dentist and see if there are other factors that may be causing your pain such as cracks in teeth, decay or old fillings that are leaking with decay beneath the old filling.

First we must identify what areas of your teeth have exposed dentine that may be the site of the problem. Then confirm which of the exposed dentine areas are causing pain as not all dentine does this. Once the sensitive dentine is identified, we can treat it in different ways to reduce the sensitivity of that dentine.

Mechanism of pain sensation in dentine

The dentine passes the stimulus message to the live pulp consisting of nerve tissue, by the movement of fluid within microscopic tunnels in the dentine called dentinal tubules. Therefore if we can block the tubules, we can block the movement of the fluid within the tubules and prevent the passing of the stimulus back to the live nerve endings in the pulp.

Blocking pain transmission in dentine

This may be achieved using a number of different materials including minerals, fluoride, potassium nitrate, and other recipes containing proteins, calcium, phospho-peptides, and amorphous calcium phosphate. If the dentinal tubules are blocked, the pain production is blocked and the problem is eliminated.

Covering sensitive dentine

Sometimes we are not able to block up the dentinal tubules and block the pain transmission and so the next option is to simply cover the exposed dentine with a filling material and this too can be most successful in some circumstances, as long as you can identify the site accurately. However, if the sensitive area is inaccessible between the teeth, this application of filling may not be possible. Then we can try and place fluoride varnish on the tooth or root surface by painting it onto the dried surface and flossing it between the teeth in the hope that the fluoride helps block tubules after being held in contact with the dentine of the root surface by a varnish preparation called *Durophat*.

Like any treatment, Durophat does not work for everyone all the time. It is not a permanent treatment and often needs to be repeated periodically. For some patients it can work for only a short period of time.

There are other products that may help reduce sensitivity by blocking the tubules one of which is **Tooth Mousse**. This product is Casein Phosphopeptide with Amorphous Calcium Phosphate known as CPP-ACP. It has several benefits and the reduction of tooth sensitivity is only one. It is also useful in reversing the early effects of dental decay particularly in young children's teeth by initiating re-mineralisation of the early demineralised caries lesion.

Colgate Pro Relief is a toothpaste formulation that incorporates "*Pro Argin technology*" containing calcium carbonate and arginine, that helps to reduce sensitivity by blocking the dentinal tubules and stopping the stimuli reaching the pulp nerve endings that conduct pain messages to the brain. In some cases, its effect can be instant and long lasting. However, its effects generally last a few weeks and the regular use of the Pro Relief is advised to maintain the beneficial effects.

Another professional treatment option that can be provided by your dentist is the use of a flowable filling material called a glass ionomer cement, capable of bonding to the mineralised tooth substance. This material is then set hard using a visible blue light to cover the root surface. Once again this may be successful but may not be practical in the tiny spaces between teeth. It is very useful and effective for repairing damage to dentine at the gum margins covering up the sensitive dentine and protecting the worn dentine surface.

Finally, for some patients, and only when a tooth is otherwise healthy, it is possible to remove the nerve from the sensitive tooth and fill the pulp chamber and root canal with a root canal filling material. The tooth is then no longer supplied with sensation and the pain is eliminated. This is always the last option called elective de-nerivation of the tooth. If this were to be considered you should discuss the problems that can arise with the tooth in the future.