Why are white spots on teeth more common?

Over the last decade, it has become more common to observe patients with white spots on the anterior teeth (Kühnisch et al, 2016). The curious dentist will want to know why this phenomenon is occurring, and its implications for the aesthetic treatments that we provide for our patients on a minimally invasive basis. Therefore, it is important to attempt to understand the increasing prevalence of white spots.

A recent systematic review reported a wide variation in defect prevalence of white spots, ranging from 2.4% to 40.2% of patients (mean 18%) (Jälevik, 2010).

Furthermore, a Greek study (Lygidakis, 2008) assessed the prevalence of molar incisor hypoplasia in children, and noted that in the central incisor group, maxillary teeth were more frequently affected (50-55%) than mandibular (24.4-25%), while laterals were the least affected.

In all, 37.9% of molars showed moderate to severe defects.

As the prevalence seems to be increasing, a symposium was called to understand the aetiology and to classify types of white spot, which will help with treatment planning.

Causes of increase

So, what are the controversies surrounding the occurrence of white spots?

Although there are now many documented reasons why white spots occur on teeth and thus have an increasing prevalence, a simple answer would be the increasing incidence of the administration of antibiotics in the developing dentition – which is a well-documented cause of tooth discolouration – over the last decade.

During the ages of two to five months, the tooth is most vulnerable to calcium deficiencies, and also has the greatest need for calcium. Therefore, during this period children are vulnerable to white spots.

To go one step further, the increasing incidence of white spots in children can also be traced to the maternal intake of antibiotics and problems occurring around the birth of the child or postnatal illness of the baby, when antibiotics or medication administration may have occurred (Johnston, 2013).

Bisphenol A

Another controversy is related to the administration of bisphenol A, a common ingredient in composite resins and plastics (Edginton et al, 2009). It is known as an endocrine disrupter, and is also found in blue plastic such as plastic water bottles and pacifiers. However, it has now been eliminated as a plastic ingredient in the newest pacifiers available for babies.

'The increasing incidence of white spots in children can also be traced to the maternal intake of antibiotics'

A recent study showed that administering bisphenol A to male rats caused white spots on rat incisors in similar patterns to human teeth (Jedeon et al, 2013).

Additionally, a recently published study (Jedoen et al, 2016a) looked at two other endocrine disruptors and assessed the difference between male and female rats.

They found that male rats were more susceptible to the white opaque hypomineralisation than female rats. It seems that exposure to bisphenol A weakens enamel, making it more prone to generate frequent mineralisation defects of molar incisor hypoplasia and dental fluorosis (Jedeon et al, 2016b).

The latter study identified hypomineralisation genes that may enable the use of dental enamel as an early marker of exposure to environmental toxicants, because of its unique ability to retrospectively record ameloblast pathophysiology.

The genes associated with enamel formation have been detected in amelogenesis. These are the list of genes that are affected by environmental disturbance of enamel formation. They are listed as amelx, enam, Klk4, Mmp12, Slc26a4 and Slc5a8, and can be regrouped as forming the 'hypomineralisation enameloma'.

Environmental impact

There are also environmental factors and these are related to the ingestion of fluoride in the water or in toothpaste, or the administration of topical fluoride in tablets or gel forms (Aoba et al, 2002).

It is interesting to note that effects of fluoride on enamel formation causing dental fluorosis in humans are cumulative, rather than requiring a specific threshold dose, depending on the total fluoride intake from all sources and the duration of fluoride exposure (Aoba et al, 2002). This would explain the increasing incidence in fluorosis that is being detected.

For further discussion on this subject please see my latest textbook, **Tooth whitening techniques 2nd edition**, which will be released in early 2017. We will also be publishing excerpts in the 10th anniversary issue of **Aesthetic Dentistry Today**, which will be published in February.

Linda Greenwall BDS MSc MGDS RCS MRD RCS FFGDP(UK)
Editor-in-chief – Aesthetic Dentistry Today

References

Aoba T, Fejerskov O (2002) Dental fluorosis: chemistry and biology. **Crit Rev Oral Biol Med** 13(2): 155-170

Edginton AN, Ritter L (2009) Predicting plasma concentrations of bisphenol A in children younger than 2 years of age after typical feeding schedules, using a physiologically base toxicokinetic model. **Environ Health Perspect** 117(4): 645-652

Jälevik B (2010) Prevalence and diagnosis of molar-incisor hypomineralisation (MIH): a systematic review. **Eur Arch Paediatr Dent** 11(2): 59-64

Jedeon K, Berdal A, Babajko A (2016a) Impact of three endocrine disruptors, Bisphenol A, Genistein and Vinclozolin on female rat enamel. **Bull Group Int Rech Sci Stomatol Odontol** 28;53(1): e28

Jedeon K, De la Dure-Molla M, Brookes SJ, Loiodice S (2013) Enamel defects reflect perinatal exposure to bisphenol A. **Am J Pathol** 183(1): 108-18

Jedeon K, Houari S Loiodice S Thuy T, Le Normand M, Berdal A, Babajko S (2016b) Chronic Exposure to Bisphenol A Exacerbates Dental Fluorosis in Growing Rats. **J Bone Miner Res** doi: 10.1002/jbmr.2879

Johnston S (2013) Feeling blue? Minocycline-induced staining of the teeth, oral mucosa, sclerae and ears – a case report. **Br Dent J** 215(2):71-73

Kühnisch J, Lauenstein A, Pitchika V, McGlynn G, Staskiewicz A, Hickel R, Grupe G (2016). Was molar incisor hypomineralisation (MIH) present in archaeological case series? **Clin Oral Investig** 2016 Jan 18 [Epub ahead of print]

Lygidakis NA1, Dimou G, Briseniou E (2008) Molar-incisor-hypomineralisation (MIH). Retrospective clinical study in Greek children. I. Prevalence and defect characteristics. **Eur Arch Paediatr Dent** 9(4): 200-206