

Key points

- Dental fluorosis appears as markings of the enamel surface of teeth.
- In most cases fluorosis appears as barely visible pearly white flecks on the surface of the teeth, and is undetectable except by an expert.
- The more severe cosmetically unacceptable forms are uncommon in the UK.
- The risk of fluorosis can be reduced by simply following dentists' advice on the use of fluoride toothpastes and fluoride supplements by children.



Very mild dental fluorosis (TF1) giving teeth an attractive 'pearlised' appearance

What is dental fluorosis?

Dental fluorosis appears as markings of the enamel surface of teeth (enamel defects). It is caused by ingesting excessive fluoride during the period when the teeth are developing in the gums, before they erupt into the mouth. For the cosmetically important permanent front teeth, the key developmental period extends from birth to 6 years, though some suggest a more precise 'critical period' at 22 – 26 months of age [1].

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In the UK the likely overall prevalence of all types of enamel defects has been estimated at around 40% - about half of which will



Dental fluorosis (TF3) the lower end of the range of severity classified by York review as being 'of aesthetic concern'

be dental fluorosis – mainly the mildest forms [2]. The more severe forms, though uncommon in the UK, are generally more unsightly and cosmetically unacceptable.

Dental fluorosis is not a new condition, the relationship between dental fluorosis and fluoride intake has been recognised for over 70 years. However, it should be noted that:

- There are around 90 different causes of enamel defects, of which 3-4 causes – including fluorosis – are common;
- Few cases of dental fluorosis are unsightly; the mildest forms of fluorosis give teeth a 'pearlised' appearance. Indeed, one study has shown that adolescent children think that teeth with the mildest forms of fluorosis are more attractive than those without fluorosis [3];
- The diagnosis of dental fluorosis is not straightforward, and this has made it difficult to estimate the true prevalence of the condition in the UK.

It is important to keep the issue of dental fluorosis in perspective. An important point to keep in mind when considering dental fluorosis is that it is primarily a *cosmetic* issue, and not a health problem. Indeed, as noted above, research shows that in its milder forms dental fluorosis may not even be considered a cosmetic

issue by some, and that teeth exhibiting mild fluorosis can be considered to be more attractive than those without fluorosis. Furthermore, in the same study the children with fluorosis had, on average, significantly less tooth decay than those without fluorosis [3]. It is therefore important when considering fluoride to balance the risk of the *possible* cosmetic disadvantage of dental fluorosis against the known benefits to dental health, and that tooth decay is itself very unsightly, and poses a recognisable *health risk* to significant numbers of young children in less privileged parts of the UK.

Dental fluorosis occurs in both fluoridated and non-fluoridated areas. We need to make appropriate use of fluoride in order to protect against tooth decay and minimise the possibility of dental fluorosis.

The findings of recent reviews

The York review

The University of York systematic review considered 88 studies of the relationship between water fluoridation and dental fluorosis [4]. The studies were conducted in 30 countries, and included some studies of water fluoride levels of up to 5 parts per million (i.e. 5 times higher than the level recommended for water fluoridation). The review noted that there is a 'dose response' relationship between fluoride level in water and the amount of dental fluorosis in the population – that is, as the amount of fluoride in the water increases, the amount and severity of dental fluorosis in the population increases. This is nothing new; indeed, the beneficial effects of fluoride were first discovered because people tended to have 'mottled teeth' in areas where the natural fluoride levels were very high.

York estimated the prevalence of fluorosis (all levels of severity) to be 48% in fluoridated areas and 15% in non-fluoridated areas. However, their estimates of *cosmetically important* levels of severity were 12% in fluoridated areas and 6% in non-fluoridated areas.

Review by the Medical Research Council

The Medical Research Council noted the findings of the York review; however they also considered several studies relevant to the UK that were not included in the York review [5]. These studies suggest that in the UK the prevalence

of cosmetically important dental fluorosis is probably lower than that estimated by York.

In 2000 a study by Tabari *et al* estimated the prevalence of cosmetically important fluorosis in fluoridated Newcastle to be 3% and non-fluoridated Northumberland to be 0.5% [6]. Furthermore, a study looking at cosmetically significant fluorosis in several European cities, [7] estimated the prevalence to be between 0 and 4% (see table 1 below). Only Cork had a fluoridated water supply.

Table 1 Prevalence of cosmetically significant fluorosis

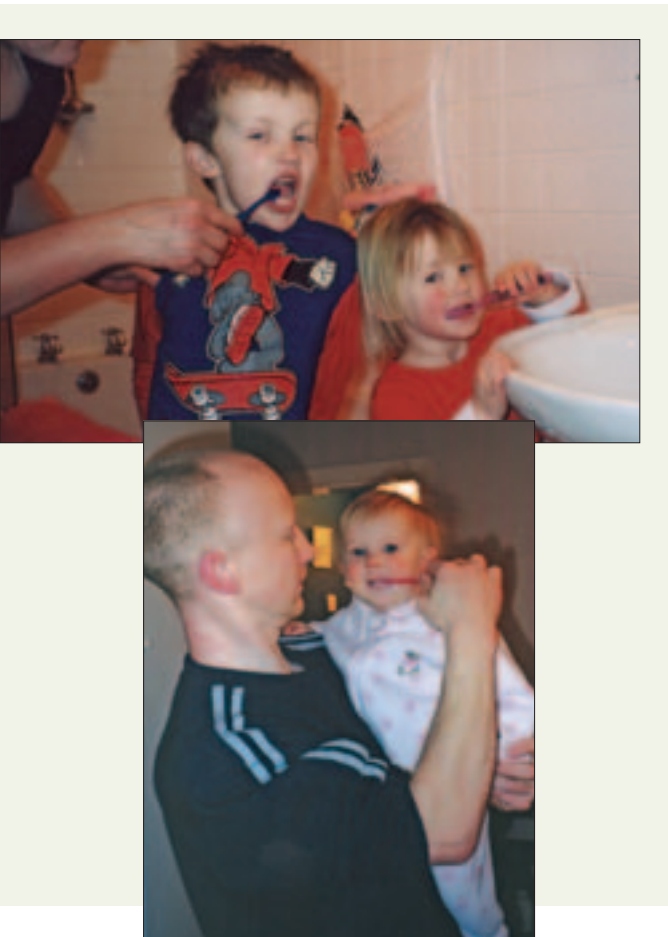
	Number of children photographed	Prevalence of cosmetically significant fluorosis
Cork, Ireland (Fluoridated)	325	4%
Knowsley, UK	314	1%
Haarlem, Netherlands	303	4%
Athens, Greece	283	0%
Almada, Portugal	210	1%
Reykjavik, Iceland	296	1%
Oulu, Finland	315	0%

Source Cochran *et al* [7]

Reducing the risk of dental fluorosis

Dental fluorosis develops as a result of excessive intake of fluoride by young children at the time of enamel formation. Therefore, after the age of seven the risk of cosmetically important fluorosis ceases to exist. The British Dental Association, and other specialist organisations believe that an important factor associated with the development of cosmetically significant dental fluorosis in the UK is young children routinely swallowing fluoride toothpaste.

To reduce the possibility of excessive fluoride intake by young children, parents are advised to supervise their children's tooth brushing, and use only a smear or small pea sized amount of paste on the brush. Children under seven years of age who are at low risk of tooth decay, living in a fluoridated area, or receiving fluoride supplements should use lower fluoride toothpaste [8]. (Children at low risk include those with little evidence of tooth decay, no history of tooth decay among siblings, and good oral hygiene suggesting regular use of fluoride toothpaste.)



Brushing should be done no more than twice a day and children should be encouraged to spit out afterwards. Toothpastes containing 1000 to 1500 ppm are more effective and should be used by all children over seven years of age and adults. Fluoride drops or tablets should be given to young children *only on the advice of a dentist or doctor*, and when they are used, they should be given at a different time of day to brushing [9].

References

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