



**Scientific Committee Statement Regarding the
Safety of Fluoride Exposure for the Developing
Foetus in Ireland**

January 2018

This statement has been adopted in response to a query to the Food Safety Authority of Ireland (FSAI) regarding the safety of fluoride exposure for the developing foetus in Ireland. It should be read in conjunction with earlier advice from the FSAI Scientific Committee on Infant Feeding and Fluoridated Tap Water which is included in the *Report of the Forum on Fluoridation (2002)*.

The foetus may obtain fluoride from maternal intake since fluoride passes through the placenta (SCHER, 2011). At levels of fluoride intake observed in women in Ireland (FSAI, 2018) the only potential adverse effect of fluoride during development in early life relates to dental fluorosis (Forum on Fluoridation, 2002; Health Canada, 2010; McDonagh *et al.*, 2000; NHMRC, 2006; NRC, 2006; Sutton *et al.*, 2015; Jack *et al.*, 2016).

Dental fluorosis is a condition of reduced mineral content of enamel arising from exposure of enamel to fluoride during tooth development, specifically during pre-eruptive development of enamel. Exposure of the foetus to fluoride *in utero* could potentially contribute to fluorosis of teeth in which pre-eruptive development of enamel occurs during this period (SCHER, 2011). Such is not the case for permanent teeth in which enamel formation does not begin until after birth. However, enamel formation of primary teeth (e.g. incisors, canines) begins from about 4–5 months gestation and is complete by about 10–11 months of age (EFSA, 2006). Thus, maternal exposure to fluoride during the latter half of pregnancy could potentially contribute to fluorosis in primary teeth, as could exposure to fluoride during the first year of life.

Dental fluorosis is graded into questionable, very mild, mild, moderate or severe on the basis of tooth appearance ranging from fine white lines (which are difficult to see) to pitting or staining of enamel (which are readily apparent and aesthetically objectionable) (Forum on Fluoridation, 2002). It is generally accepted among experts that enamel fluorosis does not have an adverse effect on tooth appearance unless it is at the moderate or severe grade (Forum on Fluoridation, 2002; EFSA, 2006; Institute of Medicine, 1997), particularly in front teeth (incisors and canines). In its milder forms, dental fluorosis is not readily apparent, has no effect on tooth function and may render the enamel more resistant to caries (Forum on Fluoridation, 2002; Institute of Medicine, 1997). Thus, the potential adverse effect related to foetal exposure to fluoride in Ireland is moderate or severe dental fluorosis of primary teeth which affects tooth appearance.

Fluorosis of primary teeth can be prevalent and severe in countries with regions of very high natural levels of fluoride in water, e.g. Africa, Israel and China (Forum on Fluoridation, 2002; Ruan *et al.*, 2015). However, studies in Europe and the USA, where fluoride concentrations in water are generally below 2 mg/l, and where fluoride intakes are similar to Ireland, show that although mild fluorosis occurs with varying prevalence in primary teeth, anterior primary teeth are rarely affected and the prevalence of moderate fluorosis in primary teeth is very low (Forum on Fluoridation, 2002). The observed pattern of primary tooth fluorosis indicates that it is predominantly associated with post-natal rather than pre-natal exposure to fluoride (Levy *et al.*, 2002), i.e. it occurs mainly in molars which develop post-natally rather than in central incisors and canines which develop mainly pre-natally.

In Ireland, where the fluoride concentration maximum limit value in water, prior to 2007, was 1.0 mg/l, a study by Harding *et al.* (2005) concluded that the prevalence of moderate fluorosis in primary teeth in children living in fluoridated communities was also very low. Of 208 five-year-old children examined who lived in regions having fluoridated water, 68% (n=141) had no fluorosis in primary teeth while all but 1 of the 67 children that had evidence of fluorosis had a score of very mild to mild. Most of the fluorosis found was confined to primary molars, mainly the second molars, indicating that it may have resulted from post-natal rather than pre-natal exposure. Such low prevalence of moderate dental fluorosis of primary teeth indicates that exposure of primary teeth to fluoride during enamel development, either pre-natally during gestation or post-natally during early infancy, was not excessive. The reduction in the maximum limit value of fluoride in public water supplies in Ireland from 0.8–1.0mg/l to 0.6–0.8mg/l in 2007 serves to further reduce fluoride exposure to the foetus during development.

With regard to the safety of fluoride exposure for the developing foetus, at current levels of fluoride intake observed in women in Ireland, the only potential adverse effect of fluoride during foetal development is moderate or severe dental fluorosis of primary teeth.

The available evidence indicates that exposure to fluoride during foetal development in Ireland is not excessive and does not give rise to moderate or severe fluorosis of primary teeth. Therefore, there is currently no scientific basis for concerns about the safety of the developing foetus arising from exposure to fluoride in Ireland.

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