

# **High-fluoride Toothpaste (5000 ppm) in Caries Prevention**

## **Akademisk avhandling**

som för avläggande av odontologie doktorexamen vid Sahlgrenska akademien, Göteborgs universitet kommer att offentligens försvaras i hörsal Arvid Carlsson, Academicum, Medicinargatan 3, Göteborg, fredagen den 6 maj 2011, kl. 9.00

av

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Avhandlingen är av sammanläggningstyp och baseras på följande fyra delarbeten:

- I. Nordström A, Birkhed D. Fluoride retention in proximal plaque and saliva using two NaF dentifrices containing 5,000 and 1,450 ppm F with and without water rinsing. *Caries Res* 2009;43:64-69.
- II. Nordström A, Mystikos C, Ramberg P, Birkhed D. Effect on de novo plaque formation of rinsing with toothpaste slurries and water solutions with a high fluoride concentration (5,000 ppm). *Eur J Oral Sci* 2009;117:563-567.
- III. Nordström A, Birkhed D. Preventive effect of a high-fluoride dentifrice (5,000 ppm) in caries-active adolescents – a 2-year clinical trial. *Caries Res* 2010;44:323-333.
- IV. Nordström A, Birkhed D. Effect of a third application of toothpaste (1,450 and 5,000 ppm F), including a “massage” method, on fluoride retention and pH drop in plaque. *Acta Odontol Scand* (under revision).

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## Abstract

### High-fluoride Toothpaste (5000 ppm) in Caries Prevention

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Dental caries is a common disease in a large number of individuals. Fluoride (F) toothpaste plays an essential role in any programme designed to prevent caries. **Objective:** This thesis focuses on the effect of high-fluoride toothpaste (5,000 ppm) compared with a standard dentifrice (1,450 ppm) in caries prevention. The aims were to investigate: 1) the F retention in proximal plaque and saliva, 2) the effect of post-brushing water rinsing on F retention, 3) the effect on de novo plaque formation, 4) the effect on caries incidence and progression in caries-active adolescents and 5) the effect of a third application of toothpaste on F retention and the pH drop in plaque. **Design:** Papers I, II and IV were randomised, cross-over studies with 12-26 individuals. Paper III was a 2-year, single-blind, longitudinal study of 279 caries-active adolescents. **Results:** High content of F in toothpaste increased the F retention in both plaque and saliva. High-fluoride toothpaste without post-brushing water rinsing increased the fluoride concentration in proximal saliva more than two times, compared with standard toothpaste also without rinsing. Water rinsing immediately after brushing with high-fluoride toothpaste reduced the F concentration in proximal saliva more than two times, which supports the recommendation to refrain from post-brushing water rinsing. Toothpaste slurry with 5,000 ppm F reduced the formation of new dental plaque on tooth surfaces. Caries-active adolescents (14-16-year-olds) using high-fluoride toothpaste during two years had 40% lower progression of caries compared with those using standard toothpaste. Twenty-eight per cent of the adolescents had "poor compliance" and brushed irregularly. Brushing with high-fluoride toothpaste resulted in 42% less new caries lesions among caries-active adolescents with "poor compliance" compared with those with "excellent compliance". Thus, high-fluoride toothpaste is an excellent home care treatment for individuals with high caries risk. Brushing with high-fluoride toothpaste three times a day resulted in almost four times higher F concentration in saliva compared with standard toothpaste twice a day. The retention of fluoride in plaque increased significantly as well. Brushing with 5,000 and 1,450 ppm toothpastes, twice a day plus the "massage" once a day, resulted in the same F concentration in saliva and plaque as brushing 3 times a day with the same paste. Using toothpaste as a "lotion" to massage the buccal surfaces with the fingertip may be a simple and inexpensive way of delivering F a third time during the day, tentatively at lunch time. **Main Conclusions:** High-fluoride toothpaste has a clear role in prevention of dental caries; targeting those at the greatest risk, reducing and arresting caries lesions and thereby reducing the need for operative treatment in caries-active adolescents.

**Key words:** Caries-active adolescents, Dental caries, Dental plaque, Dentifrice, de novo plaque formation, Fluoride retention, Frequency of brushing, High-fluoride toothpaste, Tooth-brushing, Toothpaste, Water rinsing

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