

HEALTH/BIOLOGICAL EFFECTS**EXTENDED FOLLOW-UP OF CANCER INCIDENCE IN FLUORIDE-EXPOSED WORKERS**

In two previous studies, the authors and their colleagues reported cancer morbidity rates for the years 1943-1987 among 422 male workers exposed to high levels of fluoride dust. All of these workers were employed for at least six months at a cryolite mill in Copenhagen, Denmark, during the years 1924-1961. This new analysis incorporates additional cancer morbidity data among the cohort by extending the period of observation by 12 years from 1987 to 1999, at the end of which over 90% of the workers had died. The new data again revealed a statistically significant elevation in cancer of the bladder among the workers, in agreement with and augmenting earlier findings. The earlier observation of an increased incidence of lung cancer was also confirmed, but the significance of this increase is uncertain because of the unknown, but potentially high rate of smoking among the workers. Still, from the new data now reported, the authors conclude that “fluoride should be considered a possible cause of bladder cancer and a contributory cause of primary lung cancer.”

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Keywords: Bladder tumors; Cryolite workers; Fluoride dust; Fluoride-exposed workers; Primary lung cancers.

Source: J Natl Cancer Inst 2004;96(10):802-3 [letter].

COMMENT

Editor's note: In response to the communication from Drs Grandjean and Olsen abstracted above, the letter below from one of our readers was submitted on June 10, 2004 to the *Journal of the National Cancer Institute* but was declined for publication.

This journal [*J Nat Cancer Inst*] recently reported increased cancer incidence among cryolite industry workers.¹ These findings merit comment on the implications for workers in other industries, particularly the aluminum industry. The study reported elevated bladder cancer rates among workers in the cryolite plant. Bladder cancer is also the main cancer reported in the aluminum industry.² In the case of the aluminum industry, the increased cancer incidence is believed to be caused by exposure to Polycyclic Aromatic Hydrocarbons (PAH). However, in the cryolite plant, the workers were *not* exposed to PAH; “All cryolite plant processes were at room temperature, and there was no source of PAH other than some machinery and trucks entering and leaving the plant. We therefore concluded that there was no increased exposure to PAH among these workers.” [personal communication, Grandjean P; Oct 2, 2002].

The absence of PAH exposure among the cryolite workers suggests that airborne fluorides may be an important contributing factor to the increased incidence of bladder cancer in both the cryolite and aluminum industry. Unlike PAH, fluoride is present in both the cryolite and aluminum industries and is the major common exposure between the two industries.

The possibility that fluoride may be a carcinogen is strengthened by recent findings of genotoxicity (increased sister-chromatid exchange) in fluoride-exposed workers³ as well as genotoxicity (increased sister-chromatid exchange) in humans consuming elevated levels of fluoride in drinking water,⁴ although contradictory findings have also been reported.⁵ Also interesting is a recent *in-vitro* report that cells taken from apes and humans were more susceptible to fluoride's genotoxic effects than cells taken from rodents.⁶

Thus, contradictory findings notwithstanding, there is now both *in-vitro* and *in-vivo* evidence of fluoride genotoxicity, and evidence that fluoride may increase the incidence of bladder cancer in workers not exposed to PAH. This has potential implications for populations, particularly susceptible subsets such as those with chronic renal failure, exposed to daily doses of fluoride through fluoridated drinking water, dental products, and certain processed foods.

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REFERENCES

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- 3 Meng Z, Meng H, Cao X. Sister-chromatid exchanges in lymphocytes of workers at a phosphate fertilizer factory. *Mutat Res* 1995;334:243-6.
- 4 Joseph S, Gadhia PK. Sister chromatid exchange frequency and chromosome aberrations in residents of fluoride endemic regions of South Gujarat. *Fluoride* 2000;33:154-8.
- 5 Jackson RD, Kelly SA, Noblitt TW, Zhang W, Wilson ME, Dunipace AJ, et al. Lack of effect of long-term fluoride ingestion on blood chemistry and frequency of sister chromatid exchange in human lymphocytes. *Environ Mol Mutagen* 1997;29:265-71.
- 6 Kishi K, Ishida T. Clastogenic activity of sodium fluoride in great ape cells. *Mutat Res* 1993;301:183-8.

BONE MINERAL DENSITY OF THE SPINE AND FEMUR IN EARLY POSTMENOPAUSAL TURKISH WOMEN WITH ENDEMIC SKELETAL FLUOROSIS

The aim of this prospective, comparative study was to investigate the bone mineral density (BMD) changes in a group of early postmenopausal Turkish women with endemic skeletal fluorosis and to study effects of endemic fluorosis on BMD. Bone mineral density of L2-L4 vertebrae, femoral neck, femoral trochanter, and Ward's triangle were measured in 45 female patients with endemic skeletal fluorosis and 41 age-matched controls by dual X-ray absorptiometry (DXA). The BMD of L2-L4 vertebrae and Ward's triangle were higher in the endemic fluorosis group than in the control group ($p < 0.001$). Patients with endemic fluorosis had higher femoral neck and femoral trochanter BMDs than did controls ($p < 0.01$ and $p < 0.05$, respectively). There was a positive correlation between serum fluoride content and BMD at the spine ($r = 0.345$, $p = 0.001$), femoral neck ($r = 0.274$, $p = 0.011$), Ward's triangle ($r = 0.295$, $p = 0.006$), and trochanter ($r = 0.217$, $p = 0.045$). In conclusion, higher bone mineral density levels were seen in early postmenopausal women with endemic skeletal fluorosis. BMD measurement is a tool in the diagnosis and management of this preventable crippling disease.

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Keywords: Bone mineral density; Femur; Postmenopausal women; Serum fluoride; Skeletal fluorosis; Turkey; Vertebrae;

Source: *Calcif Tissue Int* 2003 Jun;72(6):689-93.

HEALTH/TOXIC EFFECTS IN HUMANS**A STUDY OF THE GENETIC BASIS OF SUSCEPTIBILITY TO OCCUPATIONAL FLUOROSIS IN ALUMINUM INDUSTRY WORKERS OF SIBERIA**

The phenotype frequency distributions of several classical blood genetic markers and dermatoglyphic characters were analyzed in workers of Siberian aluminum plants who had occupational fluorosis. Comparison with healthy workers revealed significant differences in frequencies of several markers. Phenotypes B (ABO), D (Rh), MN (MN), P1 (P), Le a (Lewis), Gc 2-1, Cx (on both hands), Th/I+ (on the left hand), C3, and C4 (HLA) were associated with higher risk of occupational fluorosis.

Authors: Lavriashina MB, Ul'ianova MV, Druzhinin VG, Tolochko TA.

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Keywords: Aluminum industry; Dermatoglyphics; Genetic markers; Occupational fluorosis; Phenotypes; Siberian workers;

Source: Genetika 2003 Jul;39(7):982-7. [in Russian].

MORTALITY OF EMPLOYEES OF A PERFLUOROOCETANESULPHONYL FLUORIDE MANUFACTURING FACILITY

AIM: To evaluate the mortality experience of a cohort of employees of a perfluorooctanesulphonyl fluoride (POSF) based fluorochemical production facility. METHODS: A retrospective cohort mortality study followed all workers with at least one year of cumulative employment at the facility. The jobs held by cohort members were assigned to one of three exposure subgroups; high exposed, low exposed, and non-exposed, based on biological monitoring data for perfluorooctane sulphonate (PFOS). RESULTS: A total of 145 deaths were identified in the 2083 cohort members. Sixty five deaths occurred among workers ever employed in high exposed jobs. The overall mortality rates for the cohort and the exposure subcohorts were lower than expected in the general population. Two deaths from liver cancer were observed in the workers with at least one year of high or low exposure (standardised mortality ratio (SMR) 3.08, 95% CI 0.37 to 11.10). The risk of death from bladder cancer was increased for the entire cohort (three observed, SMR 4.81, 95% CI 0.99 to 14.06). All three bladder cancers occurred among workers who held a high exposure job (SMR 12.77, 95% CI 2.63 to 37.35). The bladder cancer cases primarily worked in non-production jobs, including maintenance and incinerator and wastewater treatment plant operations. CONCLUSION: Workers employed in high exposure jobs had an increased number of deaths from bladder cancer; however it is not clear whether these three cases can be attributed to fluorochemical exposure, an unknown bladder carcinogen encountered during the course of maintenance work, and/or non-occupational exposures. With only three observed cases the possibility of a chance finding cannot be ruled out.

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Keywords: Bladder cancer; Perfluorooctanesulphonyl fluoride manufacturing.

Source: Occup Environ Med 2003 Oct;60(10):722-9.

FLUORIDE POISONING TREATMENT**A SIMPLE, SAFE, AND EFFICIENT WAY TO TREAT SEVERE FLUORIDE POISONING—ORAL CALCIUM OR MAGNESIUM**

PURPOSE: To examine the efficacy and safety of administration of calcium and magnesium orally and intraperitoneally to treat severe sodium fluoride intoxication. MATERIALS AND METHODS: Mice were initially gavaged a lethal dose of sodium fluoride (NaF) or water. Then, mice were treated with water or varying concentrations of calcium chloride (CaCl₂) or magnesium sulfate (MgSO₄) via intraperitoneal (IP) route or via oral route. Mice were monitored for 24 hr, and the time of death was recorded. RESULTS: IP injections of

large amounts of CaCl_2 or MgSO_4 were dangerous. All mice gavaged with water and then treated with oral CaCl_2 or MgSO_4 survived and displayed normal activity during the experiment. The survival rate of mice gavaged with a lethal dose of NaF and then treated with a high dose of oral CaCl_2 or MgSO_4 was significantly higher than those of using low dose. CONCLUSION: Oral administration of a high dose of CaCl_2 or MgSO_4 is a simple, safe, and effective adjunctive method for treating severe oral fluoride poisoning.

Authors: Kao WF, Deng JF, Chiang SC, Heard K, Yen DH, Lu MC, et al.

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Keywords: Calcium chloride; Magnesium sulfate; Mice; Oral and intraperitoneal administration; Sodium fluoride intoxication.

Source: J Toxicol Clin Toxicol 2004;42(1):33-40.

HEALTH/TOXIC EFFECTS IN ANIMALS

INGESTION OF SOIL FLUORINE: ITS IMPACT ON THE FLUORINE METABOLISM AND STATUS OF GRAZING YOUNG SHEEP

When young sheep ingested soil fluorine (F) at moderate to high rates (69-184 mg F/day for 63 days) the apparent absorption of F ranged from 44 to 53%, while apparent retention of F ranged from 28 to 42%. The respective values for ingestion of sodium fluoride (NaF) at 69 mg F/day were 69% and 39-45%. Increasing F intakes had little effect on kidney and liver F concentrations, but markedly increased the bone F concentrations in sheep fed NaF in the ration or from soil with high levels of F. Further, serum F concentration and the rate of F accumulation in bone were related to soil F intake. The rate of F accumulation in bone was curvilinearly related to serum F concentration, and serum F concentration had to be > 0.25 mg/L before a significant accumulation of F occurred in bone. Serum F concentration could be a useful index to assess the soil F intakes and F status of grazing sheep. An examination of the sheep during and at the end of the study showed no clinical signs of fluorosis, such as mottled teeth or bone abnormalities.

Authors: Grace, ND, Loganathan P, Hedley, MJ, Wallace GC.

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Keywords: Bone fluoride concentration; Grazing sheep; Kidney and liver fluoride concentration; Serum fluoride concentration; Soil fluoride;

Source: NZ J Agric Res 2003; 46(4):279-286.

FLUORIDE ANALYSIS

A BIDENTATE BORANE AS COLORIMETRIC FLUORIDE ION SENSOR

A bright yellow 1,8-diboranaphthalene, formed by reaction of 10-bromo-9-thia-10-boraanthracene with lithium dimesityl-1,8-naphthalenediborate, has been found to be a highly selective colorimetric bidentate fluoride ion sensor (λ_{max} 363 nm, ϵ 17,400/mol·cm) with an association constant exceeding $5 \times 10^9/\text{M}$ in tetrahydrofuran. The short distance between the two boron centers allows a single fluoride anion but no other halide anion to be complexed, which occurs with loss of the yellow color. Unlike monofunctional boranes, addition of water does not lead to decomplexation of the fluoride, and therefore this sensor shows promise for development as a highly selective and very sensitive colorimetric reagent for fluoride ion determination. For recovery of the reagent, fluoride is liberated from the complex by treatment with tris-pentafluorophenylborane.

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Keywords: Bidentate borane; Colorimetric fluoride ion sensor.

Source: Chem Commun 2004;1284-5.

DENTAL EFFECTS**PREVALENCE OF FLUOROSIS IN CHILDREN AGED 6-9 YEARS-OLD WHO PARTICIPATED IN A MILK FLUORIDATION PROGRAMME IN CODEGUA, CHILE**

OBJECTIVE: To determine the prevalence and severity of enamel fluorosis in the permanent dentition of children aged 6-9 years old exposed to fluoride through a milk fluoridation programme in Codegua, Chile. **BASIC RESEARCH DESIGN:** A survey was conducted in 2002 of a sample of school children living in Codegua (n = 215) and La Punta, the control community (n = 206) to compare enamel fluorosis data with those obtained in 1994. Dean's criteria were followed to assess enamel fluorosis. **RESULTS:** It was found that 16.4% of the children aged 6-9 years from Codegua had questionable fluorosis in 2002, while in 1994 10.3% were classified in this category. In addition, 7.9% and 1.3% of the children in 2002 and 1994, respectively, had at least very mild fluorosis. These increments were not observed in the control community. Comparison of mean community fluorosis indices (CFI) between the children in 2002 (CFI = 0.18) and those in 1994 (CFI = 0.06) was found to be significant ($p < 0.001$). For La Punta, no statistically significant differences were observed (CFI 0.16 vs. 0.15). **CONCLUSIONS:** Present results indicate that, although there was an expected increase in the prevalence and severity of enamel fluorosis after four years of fluoride exposure, the CFI for Codegua in 2002 is well below the upper limit of the CFI range associated with a public health concern. Therefore, if the average daily fluoride ingestion was adjusted to more appropriate doses at the time of mineralisation of anterior permanent teeth, this would minimise the increase in the prevalence of enamel fluorosis without losing the dental caries preventive effect of F.

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Keywords: Chile; Enamel fluorosis; Milk fluoridation.

Source: Community Dent Health 2004 Jun;21(2):143-8.

A REVIEW OF FLUOROSIS IN THE EUROPEAN UNION: PREVALENCE, RISK FACTORS AND AESTHETIC ISSUES

Fluoride has played a key role in caries prevention for the past 50 years but excessive ingestion of fluoride during tooth development may lead to dental fluorosis. Throughout Europe many vehicles have been, and are currently, employed for optimal fluoride delivery including drinking water, toothpaste, fluoride supplements, salt and milk. Several indices, both descriptive and aetiological, have been developed and used for measuring fluorosis. This factor, combined with the lack of use of a standardized method for measurement of fluorosis, has made comparison between studies difficult and assessment of trends in fluorosis prevalence unreliable. Overall the evidence would appear to indicate, however, that diffuse enamel opacities are more prevalent in fluoridated than in nonfluoridated communities and that their prevalence at the very mild level may be increasing. In addition to fluoridated drinking water, risk factors for fluorosis include inadvertent ingestion of fluoride toothpaste and the inappropriate use of fluoride supplements. The risk is of aesthetic concern primarily during the period of enamel development of the permanent central incisors, although this largely appears to be a cosmetic rather than a public-health issue. It is concluded that there is a need to co-ordinate studies measuring fluorosis throughout Europe and that development of a standardized photographic method would be useful. Furthermore, the aesthetic importance of fluorosis needs to be determined in more detail in each country in the light of each country's respective risk factors and dental health policies.

Authors: Whelton HP, Ketley CE, McSweeney F, O'Mullane DM.

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Keywords: Caries prevention; Dental fluorosis; European Union; Fluoridated milk; Fluoridated salt; Fluoridated water; Fluoride supplements; Fluoride toothpaste.

Source: Community Dent Oral Epidemiol 2004;32 (Suppl. 1):9-18.

**PREVALENCE AND DETERMINANTS OF ENAMEL FLUOROSIS
IN FLEMISH SCHOOLCHILDREN**

As part of an epidemiological study on the oral health of Flemish schoolchildren, fluoride use was studied together with risk factors (medical history, tap water fluoride concentration, use of fluoride supplements, toothpaste and brushing habits). Fluorosis was scored according to the Thylstrup-Fejerskov index (TFI) in children aged 11 years (4,128 children examined). Explanatory variables were recorded yearly, starting at the age of 7. Earliest toothpaste use was reported at the age of 1. By age 7, 99.7% of the children reported the use of toothpaste (90% fluoride-containing), but only 13.9% reported using a pea-sized amount. At age 7, 66% of the children had received systemic fluoride supplements during at least part of their childhood. At 11 years, 92% of the children used a fluoride-containing toothpaste and 6% still received systemic fluoride supplements. Fluorosis was present in about 10% of all the children examined, mainly TFI score 1 (7.3% in upper central incisors). Logistic regression established tooth brushing frequency and fluoride supplement use, in addition to tap water fluoride concentrations above 0.7 mg/L, as significant risk factors when the presence of fluorosis on at least one tooth was used as outcome variable. Children having fluorosis had a lower risk of caries, both in the primary (median dmft 1, range 0-10 vs. 2, range 0-12) and permanent dentition (median DMFT 0, range 0-5 vs. 0, range 0-11).

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Keywords: Brushing habits; Dental caries; Dental fluorosis; Flemish schoolchildren; Fluoridated toothpaste; Fluoride supplements; Medical history; Risk factors; Thylstrup-Fejerskov index; Water fluoride concentration.

Source: Caries Res 2004 Jan-Feb;38(1):20-8.

**THE RELATIONSHIP BETWEEN HEALTHFUL EATING PRACTICES AND DENTAL CARIES IN
CHILDREN AGED 2-5 YEARS IN THE UNITED STATES, 1988-1994**

BACKGROUND: As a result of the introduction of multiple fluoride vehicles and other preventive agents, caries prevalence rates in young children have been declining over the past two decades in the United States. However, changing dietary patterns in young children may offset some of the oral health benefits of fluoridation. The objective of this study was to examine the relationship between caries in primary teeth and healthful eating practices in young children. **METHODS:** The authors used data from the third National Health and Nutrition Examination Survey to investigate the relationship between healthful eating practices (such as breast-feeding, eating breakfast and consuming five servings of fruits and vegetables a day) and dental caries (untreated tooth decay and overall caries experience) in the primary dentition among children aged 2 through 5 years. **RESULTS:** The odds of experiencing caries in primary teeth were significantly greater in non-poor children who did not eat breakfast daily or ate fewer than five servings of fruit and vegetables per day (OR = 3.77; 95% CI, 1.80–7.89 and OR = 3.21; 95% CI, 1.74–5.95, respectively). No association was found between breast-feeding and caries in primary teeth. **CONCLUSION:** Young children with poor eating habits are more likely to experience caries. Overall, the findings support the notion that dental health education should encourage parents, primary caregivers and policy-makers to promote healthful eating practices, such as eating breakfast daily, for young children. **PRACTICE IMPLICATIONS:** Dental professionals are well-positioned to inform parents and caregivers regarding age-appropriate healthful eating practices for young children entrusted in their care.

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Keywords: Caries prevalence rates; Children's dietary patterns.

Source: J Am Dent Assoc 2004 Jan; 135(1):55-66.

**GROUNDWATER QUALITY IN SOME VILLAGES OF HARYANA, INDIA:
FOCUS ON FLUORIDE AND FLUOROSIS**

The fluoride concentration in underground water was determined in four villages of the Jind district of Haryana state, India, where it is the only source of drinking water. Various other water quality parameters such as pH, electrical conductivity, total dissolved salts, total hardness, total alkalinity as well as sodium, potassium, calcium, magnesium, carbonate, bicarbonate, chloride, and sulfate concentrations were also measured. A systematic calculation of correlation coefficients among different physico-chemical parameters was performed. The analytical results indicated considerable variations among the analyzed samples with respect to their chemical composition. The majority of the samples do not comply with Indian as well as WHO standards for most of the water quality parameters measured. The fluoride concentration in the underground water of these villages varied from 0.3 to 6.9 mg/L, causing dental fluorosis among people, especially children, of these villages. Overall water quality was found unsatisfactory for drinking purposes without any prior treatment except at eight locations out of 60.

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Keywords: Children; Dental caries; Haryana state, India; Water quality parameters; Underground water.

Source: J Hazard Mater 2004 Jan 2;106(1):55-60.

BIOCHEMICAL EFFECTS

DECREASED NICOTINIC RECEPTORS IN PC12 CELLS AND RAT BRAINS INFLUENCED BY FLUORIDE TOXICITY – A MECHANISM RELATING TO A DAMAGE AT THE LEVEL IN POST-TRANSCRIPTION OF THE RECEPTOR GENES

In order to reveal mechanisms of the decreased nicotinic acetylcholine receptors (nAChRs) resulting from fluoride toxicity, we treated PC12 cells with different concentrations of fluoride (0.1–100 ppm) for 48 hr, and exposed rats to high doses of fluoride (30 and 100 ppm) in their drinking water for 7 months. The expression of nAChRs at mRNA and protein levels, neurotoxicity, and oxidative stress were analyzed in the study. The results indicated that there were no significant changes at mRNA level of the nAChR alpha3, alpha7, beta2 subunits in PC12 cells, and alpha4, alpha7, beta2 subunits in rat brains between the groups with fluorosis and controls. A significant decline in 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) reduction, and increased levels of protein oxidation and lipid peroxidation were observed in PC12 cells treated with high doses of fluoride or rat brains with chronic fluorosis. Decreases of nAChR alpha3 and alpha7 subunit proteins in PC12 cells resulted from fluoride toxicity were mostly prevented by a pretreatment with anti-oxidant. The results suggest that the deficit of nAChRs induced by fluoride toxicity occurs at the level of post-transcription of the receptor gene, in which a mechanism might be involved in the damage by oxidative stress.

Authors: Shan KR, Qi XL, Long YG, Nordberg A, Guan ZZ.

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Keywords: 3-(4,5-dimethylthiazol-2-yl)-diphenyltetrazolium bromide (MTT); Fluoride; Lipid peroxidation; Neurotoxicity; Nicotinic acetylcholine receptors; Oxidative stress; PC12 cells; Protein oxidation; Rats; Receptor genes.

Source: Toxicology 2004 Aug 5;200(2-3):169-77.

THE EFFECT OF FLUORIDES AND CARIES IN PRIMARY TEETH ON PERMANENT TOOTH EMERGENCE

This study addressed two questions: (i) is there an effect of exposure to fluorides on the timing of emergence of permanent teeth? and (ii) can a difference in timing of tooth emergence be explained by the impact of fluorides on the caries experience of the predecessors?

Data were obtained from a long-term follow-up study of the oral health condition in a sample of 4468 Flemish children. Survival analyses with log-logistic distribution were performed to calculate median emergence ages and 95% confidence intervals; four fluoride exposure parameters (fluorosis, use of systemic fluoride supplements, age at which tooth brushing started and frequency of tooth brushing) and caries experience were taken as covariates in the model. The present study indicates that the impact of any of the four fluoride exposure parameters on permanent tooth emergence was relatively minimal. Caries experience in the primary molars had a more pronounced impact on the timing of emergence of the successors than exposure to any of the four fluoride parameters.

Authors: Roos L, Bogaerts K, Lesaffre E, Declerck D.

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Keywords: Flemish children; Fluoride exposure; Fluoride supplements; Fluorosis; Permanent tooth emergence; Primary molars caries.

Source: Community Dent Oral Epidemiol 2003 Dec; 31(6):463-70.

CLARIFICATION

In the summary of the paper by Ş Kalaycı and G Somer, "Factors affecting the extraction of fluoride from tea: application to three tea samples" (*Fluoride* 2003;36:267-70), the water-soluble fluoride contents of the three brands of tea were reported as 98, 53, and 83 ppm (= mg F/kg tea). These concentrations were calculated from molar fluoride concentrations (unstated) in 20-mL samples prepared from 16-mL aliquots of 20-min infusions of 2.0 g of tea in 50 mL of soft water diluted to 100 mL. For the three tea values, these molar concentrations in the 20-mL volumes used in each analysis were 8.3×10^{-5} , 4.5×10^{-5} , and 7.0×10^{-5} M, respectively. The amount of tea in the 16-mL aliquots corresponds to $(16 \text{ mL}/100 \text{ mL}) \times 2.0 \text{ g tea} = 0.32 \text{ g tea} = 0.00032 \text{ kg tea}$. The concentration of fluoride in the Çaykur-Kamelya tea is therefore: $8.3 \times 10^{-5} \text{ mol F/L} \times 0.020 \text{ L} \times (18,998 \text{ mg F/mol F})/0.00032 \text{ kg tea} = 98\text{--}99 \text{ mg F/kg tea}$, and similarly for the other two tea brands.

SECOND ANNOUNCEMENT: XXVITH CONFERENCE OF THE INTERNATIONAL SOCIETY FOR FLUORIDE RESEARCH

The XXVIth Conference of the International Society for Fluoride Research will be held at the Dorint Sofitel Pallas Wiesbaden hotel in Wiesbaden, Germany, September 26–29, 2005. The meeting will be hosted by Professor Jörg Spitz, Department of Nuclear Medicine, Wiesbaden, Germany.

Wiesbaden is described further at <http://english.wiesbaden.de/index.php>.

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