

## ABSTRACTS

### FLUORIDE AND ANAEMIA IN PREGNANCY

#### EFFECTIVE INTERVENTIONAL APPROACH TO CONTROL ANAEMIA IN PREGNANT WOMEN

Anaemia in pregnancy, which often leads to low birth weight babies, is a serious public health problem that troubles India and a number of other countries. This article reports the findings of an approach to address this problem. Women up to 20 weeks in pregnancy with haemoglobin (Hb) between 9.0 and 5.0 g/dL, urinary fluoride > 1.0 mg/L, and not suffering from any other ailments were chosen to participate in the study. The sample and control groups from 205 pregnant women attending antenatal clinics (ANCs) during their 1st and 2nd trimesters were selected through a computerized random sampling procedure. Ninety pregnant women formed the sample group and 115 formed the control group. The sample group was introduced to two interventions: (1) counselling to eliminate fluoride from ingestion through drinking water, food, and other sources; (2) counselling to ensure adequate intake of essential nutrients, viz., calcium, iron, folic acid, vitamins C and E, and other antioxidants through consuming dairy products, vegetables, and fruits. No intervention was introduced for the control group, but both groups took standard 100-mg iron and 500- $\mu$ g folic acid tablets/day. Sample and control groups were monitored for urinary fluoride and Hb during their visits to the ANCs until delivery. Birth weights of the babies were recorded from the labour room register.

Among the women in the sample group who attended ANCs during their 1st and 2nd trimester of pregnancy, the interventions revealed: (1) urinary fluoride levels decreased by 67% and 53%, respectively; (2) an increase in Hb occurred after elimination of fluoride and addition of nutritional intervention in 73% and 83%, respectively; (3) body mass index (BMI) showed a more favourable improvement in the sample group; (4) the rate of pre-term deliveries decreased in the sample group as compared to the control; (5) the percentage of healthy birth weight of babies (> 2.5 kg) was 80% and 77%, respectively, as opposed to 49% and 47% in the control group; (6) the percentage of low birth weight babies (< 2.5 kg) was reduced to 20% and 23%, respectively, in the sample group, compared to 51% and 53% in the control group.

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Keywords: Anaemia; Haemoglobin; Low birth weight; Pregnancy; Pre-term delivery; Urinary fluoride.  
Source: Current Science 2010 May 25; 98(10):1320-30.

### FLUORIDE AND HUMAN IMMUNE FUNCTION

#### EFFECT OF FLUORIDE EXPOSURE ON DIFFERENT IMMUNE PARAMETERS IN HUMANS

*Context:* T regulatory (Treg) cells play an important role in the modulation of the immune response, and are implicated in the pathogenesis of autoimmune diseases. Many people is exposed to fluoride (F), mainly through drinking water. *Objective:* The aim of this work was to assess the possible effect of F exposure on different immune parameters, mainly Treg cells. *Materials and methods:* We studied 61 subjects from a community of the state of Durango, Mexico, where the

population is exposed to F levels over 2.0 ppm in drinking water. Peripheral blood mononuclear cells (PBMC) were isolated and the level and function of Treg cells were analyzed by flow cytometry and cell proliferation assays. In addition, we detected the presence of apoptotic cells, the expression of TLR/CD14, and the *in vitro* synthesis of TNF-alpha by monocytes. *Results:* We found a negative correlation between urinary F and percentage of CD4(+)CD25(+) Treg cells ( $r = -0.55$ ,  $P < 0.001$ ). Accordingly, a defective function of these cells was detected in 30% of individuals exposed to F. In contrast, a positive association between levels of CD4(+)TGF-beta(+) or CD4(+)IL-10(+) Treg lymphocytes and F urine concentrations was detected. In addition, a negative correlation was detected between the F urinary levels and the proportion of apoptotic cells in the PBMC, the T cells, and the monocytes ( $P < 0.05$  in all cases). Finally, no apparent association between F exposure and TLR4/CD14 expression or the synthesis of TNF-alpha was detected. *Conclusion:* Our data suggest that F exposure exerts a complex and relevant effect on Treg cells in humans.

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Keywords: Autoimmune diseases; Immune parameters; Mononuclear cells; TNF-alpha; T regulatory (Treg) cells;

Source: Immunopharmacol Immunotoxicol. 2010 Jun 10. [Epub ahead of print]

## **FLUORIDE AND BODY LEAD LEVELS**

### **.FLUORIDE INCREASES LEAD CONCENTRATIONS IN WHOLE BLOOD AND IN CALCIFIED TISSUES FROM LEAD-EXPOSED RATS**

Higher blood lead (BPb) levels have been reported in children living in communities that receive fluoride-treated water. Here, we examined whether fluoride co-administered with lead increases BPb and lead concentrations in calcified tissues in Wistar rats exposed to this metal from the beginning of gestation. We exposed female rats and their offspring to control water (Control Group), 100 mg/L of fluoride (F Group), 30 mg/L of lead (Pb Group), or 100mg/L of fluoride and 30mg/L of lead (F+Pb Group) from 1 week prior to mating until offspring was 81 days old. Blood and calcified tissues (enamel, dentine, and bone) were harvested at day 81 for lead and fluoride analyses. Higher BPb concentrations were found in the F+Pb Group compared with the Pb Group ( $76.7 \pm 11.0 \mu\text{g/dL}$  vs.  $22.6 \pm 8.5 \mu\text{g/dL}$ , respectively;  $p < 0.001$ ). Two- to threefold higher lead concentrations were found in the calcified tissues in the F+Pb Group compared with the Pb Group (all  $p < 0.001$ ). Fluoride concentrations were similar in the F and in the F+Pb Groups. These findings show that fluoride consistently increases BPb and calcified tissues Pb concentrations in animals exposed to low levels of lead and suggest that a biological effect not yet recognized may underlie the epidemiological association between increased BPb lead levels in children living in water-fluoridated communities.

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Keywords: Blood lead; Calcified-tissue lead; Lead and water fluoridation; Lead in blood; Lead in calcified-tissues.

Source: Toxicology. 2010 Apr 30;271(1-2):21-6.

## DENTAL FLUOROSIS IN SWITZERLAND

### ASSESSMENT OF DENTAL FLUOROSIS PREVALENCE IN SWISS POPULATIONS.

In 1996 and 2006, recruits of the Swiss army participated in a dental survey. Similarly in 1995/96 and 2004/05, randomly selected schoolchildren from 16 rural communities of the Canton of Zurich participated in a dental survey. As part of these surveys, color slides were taken of the incisor teeth of all recruits, as well as of third and fourth grade schoolchildren. The slides (N = 2049) were examined for the presence of fluoride-associated enamel opacities (FOP), using the Thyl-strup-Fejerskov (TF) index. Two examiners (A and B) assessed all slides. The examiners were blind as to the year of survey. Examiner A recorded prevalences of FOP between 18% and 27% depending on population; examiner B recorded prevalences between 7% and 12%. The examiners' influence on the estimation of the prevalence was obvious. The prevalences reported should, therefore, be considered as rough estimates. FOP of TF score 2 were only observed in approximately 1% of the participants. One examiner recorded a TF score 3 in a single individual. FOP therefore are not a cosmetic problem and certainly not a public health concern. The prevalence of FOP decreased slightly during observation period I (recruits born 1975–77 vs 1985–87) and period II (school children born 1985–87 vs 1994–96). However, the decline was statistically supported in only one instance (Period I, Examiner B).

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Keywords: Dental surveys in 1996 and 2006; Enamel opacities; Examiner influence; Schoolchildren; Swiss army recruits.

Source: Schweiz Monatsschr Zahnmed 2010;120(1):12-20.

## HIGH FLUORINE EFFECTS ON CHICKEN RENAL CELLS

### EFFECT OF HIGH FLUORINE ON THE CELL CYCLE AND APOPTOSIS OF RENAL CELLS IN CHICKENS.

The experiment was conducted with the objective of evaluating the effect of dietary high fluorine (F) on cell cycle and apoptosis of kidney in chickens by the methods of flow cytometry. Three hundred one-day-old Avian broilers were divided into four groups and fed on control diet (F 23 mg/kg) and high F diets (400 mg/kg, high F group I; 800 mg/kg, high F group II; 1,200 mg/kg, high F group III) for 6 weeks. As tested by flow cytometry, the percentage of renal cell apoptosis was increased with increasing of dietary F, and it obviously rose in three high F groups when compared with that of control group. Renal cells in G(0)/G(1) phase were much higher, and renal cells in S phase, G(2)+M phase, and proliferation index value were much lower in high F groups I, II, and III than in control group. The results showed that excess dietary F in the range of 400–1,200 mg/kg caused G(0)/G(1) arrest and increased cellular apoptosis in the kidney, which might finally interfere with the excretion and retention of fluoride in chickens.

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Keywords: Cell cycle; Chickens; Flow cytometry; High fluoride; Kidney apoptosis.

Source: Biol Trace Elem Res 2010 Jan 20. [Epub ahead of print]

## CONTAMINATION BY FLUORIDE OF GROUNDWATER IN TAMIL NADU

### FLUORINE CONTAMINATION IN GROUNDWATER: A MAJOR CHALLENGE

Fluoride in high concentration in groundwater has been reported from many parts of India. However, a systematic study is required to understand the behavior of fluoride in natural water in terms of local hydrogeological setting, climatic conditions, and agricultural practices. The present study is an attempt to assess hydrogeochemistry of groundwater in parts of the Palar river basin pertaining to Kancheepuram district, Tamil Nadu to understand the fluoride abundance in groundwater and to deduce the chemical parameters responsible for the dissolution activity of fluoride. The study area is geologically occupied by partly sedimentary and partly crystalline formations. A total of 50 dug cum borewell-water samples, representing an area of 2,628.92 km<sup>2</sup>. (A dug cum bore is one in which the depth of a well which has been dug is extended by drilling a bore hole at its base). The results of the chemical analyses in September 2009 show fluoride abundance in the range of 1 to 3.24 mg/L with 86% of the samples in excess of the permissible limit of 1.5 mg/L. The presence of fluoride-bearing minerals in the host rock, chemical properties like decomposition, dissociation, and dissolution, and their interaction with water are considered to be the main causes for fluoride in groundwater. Chemical weathering with relatively high alkalinity favors the occurrence of a high concentration of fluoride in groundwater. Villagers who consume nonpotable high fluoride water may suffer from yellow, cracked teeth; joint pains; crippled limbs, and rapid aging.

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Keywords: Chemical weathering; Groundwater fluoride; Hydrogeochemistry; Palar River basin; Tamil Nadu, India.

Source: Environ Monit Assess 2010 Mar 30. [Epub ahead of print].

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### CORRECTION

Osteo-dental fluorosis in domestic horses and donkeys in Rajasthan, India by SL Choubisa in Fluoride 2010;43(1):5-12.

The second and third authors were inadvertently omitted from reference 21. The correct reference is: Choubisa SL, Choubisa L, Choubisa D. Osteo-dental fluorosis in relation to nutritional status, living habits, and occupation in rural tribal areas of Rajasthan, India. Fluoride 2009;42(3):210-5.