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NEW RESEARCHES ON MONGOLISM RELATED TO THE DISEASE PRODUCING ROLE OF FLUORINE

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We have presented, in a previous communication (1), a statistical study on the geographical distribution of mongolism in some states in the central United States, showing a parallelism between the prevalence of this affliction and the concentration of fluorine in the drinking water.

The paradoxical rarity of dental caries, observed in mongoloids (2,3), constituted the point of departure of this study. The hypothesis of a simultaneous attack on these two structures derived from the primitive ectoderm, the brain and the enamel, by the same pathological process, has also been recently proposed by several authors (4,5). The high frequency of opacification of the crystalline lens (cataract) (3) and of licheniform hyperkeratosis (6), among mongoloids made us return this affliction (mongolism) into the group of neuroectodermoses of Touraine (7), and gave weight to the hypothesis indicated above.

It is important to mention, likewise, that the passage of fluorine across the placenta has been demonstrated by several recent works. (8,9,10).

Our communication on the pathogenic role of fluorine in mongolism has stirred up a certain number of recommendations and work, which we have taken into consideration in making some new statistics.

Following the advice of Dr. A.L. Russell, Chief of the Department of Epidemiology and Biometry of the National Institute of Dental Research in the United States, we have limited our investigation to a single state, Illinois. The Department of Public Health of this state had communicated to us the chemical analyses of the potable water of all the towns with 10,000 to 100,000 inhabitants.

We, on our part, proceeded to discover all cases of mongolism for which the diagnosis had been put on the birth or death certificates, or in the registries of the specialized medico-pedagogical institutions of the state. All cases of mongolism born from Jan. 1, 1950, to Dec. 31, 1956, for which the habitual residence of the mother before the delivery was in towns of 10,000 to 100,000 inhabitants, have been included in the study.

The frequency of mongolism has been calculated in relation to the number of cases per 100,000 births. The results of this investigation are presented in the following table.

FREQUENCY OF MONGOLISM (ILLINOIS)
Towns of 10,000 to 100,000 Inhabitants
(January 1, 1950 to December 31, 1956)

Births Total Number	Fluorine mg/liter	Cases of Mongolism	
		Number	per 100,000
196,186	0.0-0.2	67	34.15
70,111	0.3-0.7	33	47.07
67,053	1.0-2.6	48	71.59

Statistical significance: $X^2=16,29$ $P<001$

This investigation on the frequency of mongolism, from Jan. 1, 1950 to Dec. 31, 1956, formed a continuation of our previous study on the prevalence of cases of mongolism, born before 1950, in the same state. We found the same parallelism between the frequency of this affliction and the concentration of fluorine in the drinking water. The criticism formulated with respect to our former study, where we had grouped the cases according to the cities of birth of the mongoloids, has been taken into consideration. In the present study only the residence of the mother before delivery has been noted.

In any case, the increase in the frequency of mongolism seems associated with the presence of fluorine in the water at a concentration greater than 0.3 mg. per liter. Our previous statistics had shown, on the other hand, that beyond 1.0 mg. of fluorine per liter of water the curve of the frequency of mongolism reaches a plateau which is maintained until 2 mg per liter. This conduct of the curve is similar to that of the frequency of dental caries with regard to the concentration of fluorine in the water. Beyond 1 mg. of fluorine per liter, the frequency of caries is no longer, in effect, affected by the aqueous fluorine (11); there is another anomaly, mottled enamel, which makes its appearance.

It is important in such a study to take into account the contribution of the fluorine from the diet; most of the food contains 0.2 to 0.3 mg of fluorine per kilo (12). In the United States, the contribution of fluorine from the diet seems constant and depends on similar dietary habits. The evaluation of this contribution in three distant regions (Arizona, Cincinnati, and Minnesota) resulted in similar data: from 0.2 to 0.3 mg of fluorine per day (13).

The dietary habits can be variable from one country to another. In England, for example, where the water is low in fluorine, tea, traditional in that country, contributes from 0.4 to 0.6 mg of fluorine per day. Tea leaves contain a very high concentration of fluorine; from 161.5 to 197.5 mg. of fluorine per kilo (Fabre and deCampos 14). The consumption per capita is about 10 pounds in England compared to 7/10 pounds in the United States (15). The frequency of mongolism in England would be associated with this particular aspect of the diet more than with the consumption of water. These considerations would seem to us to render the recent statistics of Berry (16) debatable.

It is the same with the other pathological aspects associated with fluorine. Dental anomalies, known by the name of mottled enamel, are encountered in England in regions where the water contains no more than 0.3 mg of fluorine per liter (17), while the same anomaly is seen in the United States only where the amount of fluorine in the water exceeds 1 mg per liter.

It is important, therefore, to take into account, in a study of mongolism, the role of the age of the mother in the etiology of this affliction. The statistics of Penrose (18) in England, show that 40.7 per 100 of the mothers had reached or passed 40 years at the birth of the mongoloid. Our statistics on the frequency of mongolism in Illinois, show that 16.9 per 100 of the mothers had reached or passed 40 years. This difference depends without doubt, on geographical conditions variable from one country to the other, and can contribute equally to the frequency of mongolism in England. The role of the advanced age of the mothers in the pathogenesis of mongolism could be explained by a slow and progressive accumulation of fluorine in the mother's body. This process was shown by several recently reported studies (13). Deposited in the skeleton, fluorine is brought back into the circulation during pregnancy. This explains its presence in the foetus.

SUMMARY: A new statistical study on the distribution of mongolism in cities in Illinois, United States, from January 1, 1950 to December 31, 1956, permits us to verify an increasing frequency of this affliction associated with the concentration