MASTER**EFFECTS OF SODIUM FLUORIDE ON ULNAR RESONANT FREQUENCY IN ELDERLY WOMEN****John M. Jurist and C. Hugh Hickey**

The subjects were nuns from the Notre Dame convent in Elm Grove, Wisconsin. These women ranged in age from 58 to 99 years with a mean age of 78.4 years. The use of nuns simplified the study for several reasons. First, all subjects were nulliparous -- thus eliminating a potential source of variation. Second, they all received a uniform diet and had similar activity patterns. The subjects were all of similar heredity and cultural (North European) background. Finally, they were motivated and cooperative.

The 114 subjects who completed a 2 month baseline study (described later) were randomly separated into control and experimental groups. Fifty-five subjects served as controls. Fifty-nine subjects were selected to receive 50 mg of sodium fluoride, 500 units of Vitamin D₂, and 1 gm of calcium daily by means of enteric coated capsules.

Fifty-four of the 55 controls completed the experimental period of 8 months. Thirty-three of the 59 subjects in the experimental group discontinued their fluorides and were dropped. Thirteen discontinued because of nausea, 3 because of diarrhea, 1 was constipated, 1 developed a gastric ulcer, 2 developed cataracts, 5 declined to continue the experiment, 1 was discontinued because of senility (she was chewing her capsules), 5 discontinued for unknown reasons, and 2 died.

During the 2 month baseline period, a medical and therapeutic history with special emphasis on fractures, rheumatoid arthritis, and anti-inflammatory therapy was obtained from each subject. Serum calcium, phosphorus, and alkaline phosphatase determinations were performed. In addition, 24 hour urinary excretion of creatinine and hydroxyproline was measured. Hand-wrist, AP hip, and lateral thoracolumbar spine X-rays were taken for each subject. At the beginning and end of the baseline interval, the ulnar resonant frequencies were measured bilaterally as an index of relative rigidity of this bone.

Since we performed sequential measurements of our subjects,

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relative changes of resonant frequency with time independent of ulnar length were studied. During the 2 month baseline interval, the average resonant frequency was 229 Hz. In contrast, the mean ulnar resonant frequency for 20 clinically normal 70-79 year old women measured in our laboratory was 191 ± 10 (standard error) Hz. The overall resonant frequency reproducibility over 10 months was 36 Hz or approximately 16 percent of the mean value. The rate of change of resonant frequency during the 2 month baseline period was 1.21 ± 3.36 Hz/month.

After the 2 baseline measurements, all control and experimental subjects were remeasured 3 months after initiation of sodium fluoride therapy, and then 8 months after initiation of therapy.

During the first 3 months of sodium fluoride therapy, the women who were receiving fluorides experienced a rapid decline in resonant frequency in comparison to the controls. This difference cannot be regarded as definitive since the t test showed significance only at the 2-5% level. During the second treatment interval of approximately 5 months, the women receiving fluorides declined in resonant frequency at a somewhat lower rate than did the controls. This difference was not statistically significant. These data are summarized in the table attached to this report. As shown in the enclosed figure, there was no significant overall change in resonant frequency over the entire 8 month period of treatment. Since the study was controlled, we cannot attribute the lack of effect of sodium fluoride on compensatory changes or drift in calibration of our equipment with time.

In summary, a control group of 55 subjects and an experimental group of 59 subjects were evaluated for ulnar resonant frequency for a baseline period of 2 months. They were then followed for an experimental period of 8 months during which time the experimental subjects received 50 mg of sodium fluoride daily along with calcium and Vitamin D supplements. Twenty-six of the 59 subjects receiving the fluorides completed the study -- 33 discontinued their medication and were dropped. Eighteen of the 33 dropouts discontinued for reasons directly related to gastrointestinal upset.

Our experiment failed to show significant changes in the resonant frequencies of the bones of the experimental subjects when compared to their controls. This suggests that sodium fluoride therapy in our therapeutic regimen did not have a significant effect on skeletal status over the 8 month period of study.

TREATMENT INTERVAL	$\frac{d}{dt} \overline{F_d}$ (Hz/MONTH)		SIGNIFICANCE	
	FLUORIDES	CONTROLS	t	P _{null}
1 st 3 MONTHS	$-5.88 \pm 2.52^*$	$+1.01 \pm 1.68$	2.22	0.02-0.05
2 nd 5 MONTHS	-2.47 ± 1.86	-6.12 ± 1.02	1.88	0.05-0.10

* STANDARD ERROR