

MINUTES OF THE SENATE PUBLIC HEALTH AND WELFARE COMMITTEE

The meeting was called to order by Chairperson Susan Wagle at 1:30 p.m. on March 4, 2004 in Room 231-N of the Capitol.

All members were present except:

Ms. Emalene Correll, Legislative Research - excused

Committee staff present:

Ms. Terry Munchmore, Legislative Research

Mr. Norm Furse, Revisor of Statutes

Mrs. Diana Lee, Revisor of Statutes

Ms. Margaret Cianciarulo, Committee Secretary

Conferees appearing before the committee:

Ms. Kim Kimminau, Senior Vice President for Research and Analysis, Kansas Health Institute

Dr. Robert Hetrick, Psychologist, Wichita

Others attending:

Please See Attached List.

**Continue hearing on SB530 - an act concerning public water supply; requiring fluoridation in certain public water supply systems**

Upon calling the meeting to order, the Chair announced the Committee would be hearing a presentation regarding "alternatives to Standard Community Water Fluoridation: A Study Conducted for the Wichita/Sedgwick County Board of Health" and called upon Ms. Kim Kimminau, Senior Vice President for Research and Analysis, Kansas Health Institute who offered the purpose of the study, literature findings, alternatives to water-delivered fluoride, cost comparisons, the KHI Dental Field Study and its results and final remarks stating that conservative estimated savings from cavities that could be prevented by public water fluoridation is approximately \$3 million for Wichita/Sedgwick County following five years of water fluoridation. A copy of her testimony is (Attachment 1) attached hereto and incorporated into the Minutes as referenced. A copy of the Research brief entitled "Findings from the Alternatives to Standard Community Water Fluoridation Study" and a binder entitled "Wichita/Sedgwick County, Kansas Alternatives to Standard Community Water Fluoridation" have been filed in Chairperson Wagle's office.

The next to testify was Dr. Bob Hetrick, a psychologist at Wichita, who offered a detailed commentary on the Kansas Health Institute report statements, the Natick Study conclusions, a curriculum vitae of Natick investigators, a recent study (Community Dentistry and Oral Epidemiology August, 2000 Aug; 28:281-8, and with a suggestion that an independent analysis of the KHI report is strongly recommended. A copy of his handout, "A Critical Analysis of the Wichita/Sedgwick County, Kansas Alternatives to Standard Community Water Fluoridation" is (Attachment 2) attached hereto and incorporated into the Minutes as referenced.

The Chair then directed the Committee to the remaining handouts, including:

1) A response letter from Mr. Meryl Dye, Special Assistant to the City Manager at Hutchinson Kansas, to Senator Phil Journey, concerning the cost of fluoridation. Included with the response is:

A) A cover memo prepared by their Utilities Director, Mr. Reg Jones, that was presented when the fluoridation issue was considered by their City Council in 1999;

B) An excerpt from the March 30, 1999, City Council minutes on this agenda item; and

C) Email correspondence between Mr. Jones and David Waldo of KDHE regarding clarification of the cost figures used in 1999.

CONTINUATION SHEET

MINUTES OF THE SENATE PUBLIC HEALTH AND WELFARE COMMITTEE at 1:30 p.m. on March 4, 2004 in Room 231-N of the Capitol.

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2) A letter from Stanley Elementary School, stating they were in their fourth year of demonstrating the positive benefits of using xylitol, twice a day, every day through their Xylitol Dental Health Project. The letter went on to say that xylitol is a natural sweetener and approved by the FDA in 1963 and it discourages both tooth decay and ear infections;

3) An email from Dr. Burgstahler to Chairperson Wagle's secretary, who offered a response to questions asked of him in the opponent portion of the hearing yesterday including:

A) Erroneous endorsements of fluoridation;

B) A detailed review of the circumstances prompting the June 1950 USPHS endorsement;

C) A response to the question regarding H. Trendley Dean, his work on fluoride & dental caries;

D) The manufacturing source of silicofluorides used for water fluoridation; and

E) In connection with the U.S. Food & Drug Administration's position on "fluoride" supplements.

4) Information distributed to the Ways and Means Committee Meeting including:

A) Dental information requested in yesterday's hearing entitled "Revised Fluoride Schedule as Accepted by the American Dental Association Council on Scientific Affairs;

B) Two papers, one on economic factors associated with fluoridation entitled "The Economics of Water Fluoridation" and the other entitled "Alternatives to Water Fluoridation" both prepared by the Fluoride Awareness Team of Kansas;

C) A report entitled "Fluoridation: the Rest of the Story" which includes: physicians comments on fluoridation, the law and fluoridation, is it a medicine, responses from a dentist advocate, professionally written books, and brief responses to fluoridation proponents information provided to the Ways & Means Subcommittee, submitted by Dr. Robert Hetrick, PhD.

A copy of the handouts one through four are (Attachment 3) attached hereto and incorporated into the Minutes as referenced, with the exception of 4) C) which has been filed in Chairperson Wagle's office.

The Chair then asked for questions or comments from the Committee. Senators Barnett, Salmans, Wagle, Haley, and Journey offered a range of questions for both Ms. Kimminau and Dr. Hetrick including: what is the ongoing cost for Wichita, the difference between topical and systemic, is topical fluoridation toothpaste adequate, materials used, how does xylitol compare to fluoride, how compelling is this issue regarding local control, if cumulative, what happens if you drink large amounts (for example during the summer) and small amounts (as in winter), why not put in salt or milk as opposed to water, do commercial bottlers offer with or without fluoride, compare the Louisiana study to the California study, are there other comparisons used and available to us, any additional information regarding the social and economic conditions, parish-to-parish community, and community specific studies.

### Adjournment

As there was no further discussion, the Chair closed the hearing. The meeting was adjourned at 2:30 p.m.

The next meeting is scheduled for Monday, March 8, 2004

# SENATE PUBLIC HEALTH AND WELFARE COMMITTEE

## GUEST LIST

DATE: Thursday, March 4, 2004

NAME	REPRESENTING
<i>[Signature]</i>	<i>HEIN LAW FIRM</i>
Kim Kimmman	Kansas Health Institute
Laurea Weyaceno	Kansas Health Institute
Giuseppe Perzino	Kansas Health Institute
<i>[Signature]</i>	Ko. Public Health Assoc.
Teresa Schuyler	Oral Health Kansas
<i>[Signature]</i>	<i>ORAL Care</i>
Susan Kang	Kdhe
Jim Byrnes	Sen. Salmons Off.
Austin Lowry	Self
Jeri Garland	Self
Deanna Havens	B.O.D. Editor FLUORIDE ACTION NETWORK FLUORIDE AWARENESS TEAM
MELODY SCHEEL	FLUORIDE AWARENESS TEAM OF KANSAS
BOB HETTRICK PH.D	

19 min  
att



# Alternatives to Standard Community Water Fluoridation: A Study Conducted for the Wichita/Sedgwick County Board of Health

## Purpose of the Study

- Examine alternatives to water in delivering fluoride
- Present cost and effectiveness of alternatives, where available
- Assess current dental health status of school aged children in Wichita/Sedgwick County
- Conduct a limited fluoride use and opinion survey among dentists in Wichita/Sedgwick County

## Literature Findings

1. Fluoridated water has been shown to have a substantial impact on decreasing the rate of dental disease in over 100 studies conducted worldwide during the past 50 years.
2. The use of fluoride and preventive dentistry has contributed to the decline in dental disease in the last 50 years.
3. While there are credible studies demonstrating both the risks and benefits of fluoride and fluoridated water, the preponderance of the evidence supports its safety and effectiveness.

## Alternatives to Water-Delivered Fluoride

- Systemic Alternatives (fluoride delivered through ingestion)
  - Salt (not available in U.S.)      Sugar (not produced)
  - Milk (not available in U.S.)      Fluoride Drops/Tablets
- Topical Alternatives (fluoride delivered by direct contact)
  - Gels      Dental floss      Fluoride-release sealants
  - Mouth rinses      Toothpicks      Varnish
- Issues = availability, over-exposure, cost, compliance or undemonstrated effect

## Fluoride Cost Comparisons

Fluoridated Water	Sealants (per tooth)	Fluoride Tooth-paste	Fluoride Treatment by Dentist	Fluoride Drops	Fluoride Tablets	Vitamin with Fluoride	Fluoride Mouth Rinse	Fluoride Gel
\$0.50	\$5.00–\$37.00*	\$10.00–\$73.00†	\$15.00–\$25.00 ▲	\$73.00	\$85.17	\$85.17	\$109.50	\$146.00

Note: Figures show the estimated average cost per person per year of various fluoride-delivery options. Information on costs was provided by Wichita area pharmacies and drugstores and by dentists participating in the KHI dental health status project.

\* Expected duration or life of sealant varies among individuals; least expensive option includes costs underwritten at a number of health clinics in Sedgwick County.

† Least expensive generic to most expensive prescription (.15% to 1.1% fluoride)

▲ Assumes one fluoride treatment received in a dental office setting

*Senate Public Health & Welfare Committee  
Attachment 1  
Note: March 4, 2004*

### **KHI Dental Field Study**

- 480 dental charts were reviewed from 16 private dentists' offices (random sample represents 12% of Wichita dentists).
  - Children between age 5 and 18 were included
  - Only one child per family
  - No children living on military base
  - No public health clinics

### **KHI Dental Field Study Results**

- Approximately one in four children in the Sedgwick County study were free of decay or fillings.
- Approximately three in four children in the Sedgwick County study had a least one tooth with decay or fillings.
- The children with decay or fillings averaged between four and five teeth with problems.
- The entire Sedgwick County sample had an average of 3.14 decayed or filled teeth, compared to a U.S. average of 1.9.
- Three in four children in the Sedgwick County sample had dental health insurance.
- About half (48%) of the children in the Sedgwick County sample had a sealant on one or more teeth; this is twice the national average.
- Not all children received fluoride treatments during their dental office visits.
- There was no statistical difference in decay / filled rates by zip code (income), insurance status or presence of sealants.

### **KHI Dentist Survey Results**

- Dentists consider fluoride important to dental health.
- Patterns of fluoride supplements and recommendation varied among dentists.
- Dentists consider compliance but not cost in recommendations to parents.
- Dentists view the community as "uneducated about fluoride" and "influenced by vocal minority."

### **Final Remarks**

- Conservative estimated savings from cavities that could be *prevented* by public water fluoridation is approximately \$3 million for Wichita/Sedgwick County following five years of water fluoridation.
- The cost of fluoridating Wichita's public water (start-up costs estimated to be approximately \$1.58 million) is less than the cost savings that would result in a 20% reduction in dental cavities among school aged children (estimated to be approximately \$2.98 million).
- Risks associated with fluoride are more likely from topical alternatives than from low-dose, controlled systemic exposure, as is the case with water.
- While there are alternatives to water fluoridation, none are safer or as cost effective as standard community water fluoridation.

**Full report available at: [www.khi.org](http://www.khi.org)**

A Critical Analysis of the  
**Wichita/Sedgwick County, Kansas**  
**Alternatives to Standard Community**  
**Water Fluoridation**  
**September 2000**  
For the Board of Health  
Kansas Health Institute, Topeka, Ks.

Analysis completed by  
**Fluoride Awareness Team of Kansas**  
Wichita subcommittee

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This critique will begin with a brief summary followed by the Team's conclusions. This format is intended to offer a relatively brief overview of the extensive and substantive sequential comments in the body of this critique.

SUMMARY: Highlights of Analysis

KHI's claim of "independence" is not credible.  
Misleading statements are made.  
Issues are minimized.  
The significance of fluoride's topical action is not appreciated.  
Solutions to problems are not mentioned or under-treated.  
There is a relative paucity of information, analysis in general, and of alternatives.  
Key issues are completely ignored.  
Too little supporting documentation.  
Unsupported assumptions.  
Relevant critical input is ignored.  
Pertinent questions are left unanswered.  
Dental study flawed.  
The cost/benefit analysis is superficial.  
Serious dose control problems associated with water fluoridation are ignored.  
An independent analysis of this KHI report is strongly recommended.

*Senate Public Health & Welfare Committee*  
*Attachment 2.1*  
*Note: March 4, 2004*

## CONCLUSIONS

In reading these conclusions, it is worthy to note that KHI was provided with a 54 page, detailed critique of the previous (review) copy of their work. It offered 118 references. In spite of this input, the KHI *final* report is almost identical to the review copy. This suggests that they did not welcome critical input. They ignored an opportunity to use verifiable information to enhance the report. Such input could have made their work more comprehensive, accurate, and representative of the nature of fluoridation alternatives. The poor quality of the KHI report and the apparent lack of independence of the KHI revealed in and beyond it, suggest that the analysis of alternatives is insufficient and misleads the uninformed reader.

The categories of problems listed below describe some important failings of the KHI report. The detail provided in the body of this critique may assist the reader in determining the level of confidence of which their work is worthy. In-depth comments supporting the Team's (FAT-K) conclusions can be found below in the section labeled *Detailed Responses to selected statements from the KHI report*. (page 12)

The seriousness of these conclusions prompt the inclusion of the following lengthy discussion (about 8 pages). Following this discussion, recommendations are made. The detailed analysis of the report follows that.

### Categories of Problems:

Lack of independence and scientific objectivity.

This category describes what may be the most important finding of this critique, its failure to present a balanced and objective report. This issue addresses the level of confidence the reader can have in the KHI report. The Fluoride Awareness Team (FAT-Ks.) evaluators found a clear and strong lack of impartiality in the document.

The following five facts show the existence of a serious conflict-of-interest between KHI and organizations that promote fluoridation:

1. One author of this study enters it with a bias. About fluoridation, he wrote:

*"It has long been recognized that community water fluoridation is a beneficial public health action due to its ability to inexpensively prevent dental problems, particularly for those who do not have access to regular dental care. ..."* *Community Water Fluoridation and Cancer Mortality in Kansas: Is There a Relationship?* (1999) Matthew D. Shepherd, Margaret M. Grubiak

Shepherd's statement in this study demonstrates a preconceived attitude toward fluoridation. It undermines any claim of independence. In fact, it implies that alternatives could not match fluoridation even *before* they were asked to review them. Further, his statement *is not supported* by recent studies.

2. The KHI has a close working relationship with the Kansas Dental Association. The KDA *actively promotes fluoridation* in Kansas. The KHI says:

"Also, we wish to acknowledge Greg Hill of the Kansas Dental Association **for his time and resources.**" Community Water Fluoridation and Cancer Mortality in Kansas: *Is There a Relationship?* (1999) Mr. Hill is the **Director of Fluoridation Development**, KDA.

3. The KHI report authors included with their report an additional two documents (164 pages of information) that *advocates fluoridation*. This shameless inclusion with their alleged stance of "independence" shows a lack of professional distance among these researchers. It appears they are attempting to *influence* more than inform the Board and City Council. Specifically, the material included was from the ADA and Kansas Public Health Assn., both of which strongly promote community fluoridation. Alternatives are NOT their focus.

Even more evidence of lack of Independence is the fact that a KHI investigator worked on a KPHA project that promotes fluoridation. As a body, the KPHA actively advocated for fluoridation. This close association adds to the incredulity of KHI's claim of "independence". (*A reproduction of the easily available ADA website in hard copy; and "Improving The Oral Health of Kansans Through Community Water Fluoridation", KPHA and KHI*)

To remain objective, the authors of the report might have included two reports that have contrary conclusions. Without them, the documents amount to a blatant attempt to persuade under the guise of providing information. Reviews of the literature by two credible sources that oppose fluoridation would have been included if non-partiality existed (namely, one study by a Public Health Director, and a second by a team of disinterested investigators). Including such studies would suggest that an intent to inform existed instead of an intent to persuade. In the spirit of balance, at least one review that does not favor fluoridation is summarized in Appendix 1. Its 12 conclusions are listed.

4. The KDA's Director of Fluoridation Development, published a report about this KHI study *before* the final copy was approved by the contracting agency, the Board of Health (see Kansas Public Health Association's *Fluoridation News*, Fall 2000). This publication promotes fluoridation. In it, the Director cites information that does not appear in KHI's reports. Was he privy to private information? Having special access to the Board's August review copy along with private data, further suggests a lack of independence between KHI and another organization dedicate to promoting fluoridation.

5. This KHI investigation *was funded by* the same organization that offers financial inducements to Kansas communities to initiate fluoridation (namely, the United Methodist Health Ministries Fund). Indeed, the UMHMF has a vested interest in the report's outcome. Perhaps, the KHI would want to please its benefactors. KHI and UMHMF are supported by the same pool of funds from the Kansas Health Foundation in spite of their alleged separation. (In 1995, the KHF established the *Kansas Health Institute* (KHI) a multi-year grant).



Given the strong local and international conflict that exists about water fluoridation, the Wichita/Sedgwick County Board of Health should have gone to extra lengths to hire a research agency having absolutely no association with water fluoridation. The independence of KHI with regard to fluoridation is highly suspect.

#### Intra-report indications of bias

In some cases, evidence of bias can be a matter of interpretation and judgment. On balance, this report does not seem to reflect the true nature of both sides of the scientific literature described as the great fluoridation debate. The examples below will help the reader judge the credibility of the KHI report.

#### Examples:

1. While intolerance to one alternative is mentioned, (fluoridated milk and lactos intolerance) intolerance to fluoride (hypersensitivity) is largely ignored.
2. The naming of organizations endorsing fluoride (R12, pg. 11) is a blatant statement of persuasion disguised as a statement of fact. Endorsements are not scientific data. Lack of balance, is further indicated by failure to name the number of organizations having *withdrawn* their endorsements. This action is reflects a one-sided, non-objective attitude. A reader not familiar with the full fluoridation story could easily miss the inherent bias of this tactic.
3. **One of the strongest arguments against the ingestion of fluoride is omitted.** Studies show that the alleged "optimal" dose is currently ingested daily by most citizens when all fluoride sources are considered. This fact is not treated seriously. Perhaps it is minimized because knowledge about the current dose ingested by Wichitans would seriously undermine or defeat the movement to add more fluoride. Studies supporting this dose problem are not cited, not even to discredit them as a comprehensive summary of the literature would dictate.

#### Misleading statements:

The quest for viable *alternatives* to fluoridated water is ill-served by this statement: *No alternative examined is as cost effective, safe or efficacious as public water fluoridation in providing fluoride to a population irrespective of age, income, education, or other socioeconomic factors.*" Without analysis, this statement is misleading. It contains the hidden assumption that universal dosing is desirable. The City Council's implied request that each alternative be evaluated on its on merits, *not* on delivery peculiarities. Each alternative should be evaluated separately based on its safety and effectiveness.

Universal dosing can and *should be* fully and separately explored. The authors inappropriately link alternatives to the concept of mass-medication. Prior to just such worthy discussion, the merits *and problems* with water fluoridation must be fully discussed. Only in this way, can each alternative be properly

compared to it point-for-point. To compound the problem, the report fails to discuss water fluoridation in an analytic way, certainly not with reference to its problems.

More examples:

1. *Re: the effects of fluoridated water.* The statement ignores the fact that several national and international studies show almost no effect on caries. R78, pg. 45

2. *Re: fluoride (is a) ...naturally occurring elements.* R14, pg. 12 . The reader may not know that man-compounded fluoride most used in water fluoridation. It is 85 times more toxic natural calcium fluoride. In addition, this chemical, flurosilicic acid, is contaminated with a long list of toxic chemicals.

3. ...costs associated with the fluoridation of public water (R44, page 21) The reader cannot judge the validity of this figure without more information, therefore, it misleads when considered in the context of fluoride's side-effects. There is good evidence that these are gross under-estimations. Even a tentative economic analysis requires dozens of pages to discuss the available economic information. **(See the 19 page economics report prepared by the FAT-Ks. )**

Minimization:

1. Good news for Wichita is minimized. One can only guess that the authors did not want to dilute any impact of their survey about the dental status in 347 children in Wichita.

A. Minimized is the finding that family income and insurance status aren't linked children's decay status (in Wichita). (R63, page 38, R66, page 39). Interestingly, these results are contrary to the statements in the Surgeon General's suggestion of a "silent epidemic" of caries among some these very groups of children.

B. Another bit of good news is that Wichita's "sealant use is more than twice the rate reported nationally." (R61, pg.35)

C. Finally, our kids might have lower dental fluorosis than the national average because it was not mentioned on any dental charts. Taken together, these four findings are positive elements to consider in Wichita children's dental status. This information is not balanced against caries information.

2. Fluorosis is the first obvious sign of fluoride overdose. It deserves more than a brief half-page discussion. From the child's viewpoint, it is more than "esthetic" or "cosmetic" (the latter is the dismissive term most often used by fluoridation advocates.) R16, page 12 Consider this pithy statement: "To suggest we should ignore such a sign [white spots on the tooth] is as irrational as saying the blue-black line which appears on the gums due to chronic lead poisoning is of no significance because it doesn't cause any pain or discomfort." (Geoffrey Smith. "Fluoridation--are the dangers resolved?" New Scientist. May 5, 1983. pg. 286-287.)

3. The reality of fluoride's topical action is minimized.

4. The case for ingesting any form of fluoride rests on its effect. Many studies and the CDC state the actual action of fluoride is on the *surface* of the teeth. However, these authors avoid this impressive finding. They changed their original stance in just

four weeks. They ignore the implications of the very references *they cite* (e.g., Featherstone, 1999, and July, 2000 in the JADA). For example, in the original version, "This is a very important finding..." a few weeks later they say, "This finding is important...". More minimization is evident in the alternation from the finding..." would support the hypothesis that fluoride's *primary action* (in italics) is topical not systemic." The phrase "primary action" is deleted in the latest report. It would appear the authors resist acknowledging the strength of new findings that do not support their obvious preference of water fluoridation. They do not explain this shift.

### Solutions not discussed

Several viable solutions to questions about alternatives are not discussed in any meaningful fashion or they are completely ignored.

1. A good solution to the problem of children complying with the use of a preventive strategy, is the use of sweet dental mints or chewing gum that have caries fighting action.

2. Certainly, an inexpensive alternative to swallowing fluoridated water is to *rinse* the mouth with it. (R34, page 19)

3. A partial solution to cost concerns about dental programs is the possibility of a clinic or school system's ability to purchase any active agent at quantity discount. No such estimates are obvious in this report for any alternative. Indeed, the kind and cost of the fluoride used in water delivery is not even mentioned. The differences in cost between the various forms of fluoride are significant.

4. In spite of saying "...toothpastes have been subject to the most rigorous clinical testing." (R35, pg.20), these benefits of this alternative is not emphasized. The kind of fluoride in toothpaste used is a higher grade (purity) than that used in water delivery. For this and other reasons, this inexpensive option should have been strongly recommended (given the incomplete information provided about other alternatives).

Candidly speaking, it appears that the solutions to the *alternatives* question are not explored in order to avoid strengthening them vis-à-vis water fluoridation. This observation adds to the evidence of attitudinal bias in favor of fluoridation.

Diffusion of staff's attention: Non-essential issues were explored relative to the given task.

The stated purpose of the study (p. 1) "to examine alternatives to standard public water fluoridation". However, the resources used to discuss several aspects of fluoride seem to have been squandered. The Wichita City Council did not question fluoride's nature, only its delivery methods. In point of fact, the Council has been exposed to considerable (even overloaded with) general information about these issues. They rejected water fluoridation. Information about alternatives was sought by the Council.

The time and energy used in developing several chapters (Chapters 2, 3, 4,

6, 7 and 8) could be applied to going into more depth about alternatives. As used here, "depth" is defined as failure to include and discuss data and significant relevant aspects of the issues, and to do so with sufficient detail as to support statements made.

Depth of the report:

Out of about 45 pages of text, *only seven pages* and two charts are directly devoted to discussion of alternatives to fluoridated water. Two more pages discuss "new technologies". One "technology" is actually not new. It is a potent anti-caries agent that is given only one sentence in this report. This means that only 11 of 45 pages (references excluded) address the City Council's direct interest in alternatives. This deficiency short-changes decision-takers.

The investigators cite a paucity of scientific studies that support their declarative statements and conclusions. They ignore a considerable body of contradictory evidence. Much is not even acknowledged. Further, many statements lack sufficient explanation to be clear and useful.

A lack of depth is further illustrated by the report's failure to articulate the many significant factors that make up a comprehensive *cost/benefit analysis* calculation. Beyond costs of equipment and the chemical are a host of factors never mentioned. A ten-page discussion of fluoridation's economics was presented to the authors *before* their final report. In spite of their awareness of significant additional cost factor, none were taken into consideration in their making their final estimate.

More examples:

Incomplete *FDA information*, R41, pg.21, The status of each fluoride alternative with each

major regulatory agency should be discussed.

*Missing documentation*, R76, pg. 44 re: *safety of water fluoridation and other alternatives*

Missing discussion, R54, pg. 31, No informed speculation as to key finding

Statistic missing, R49, page 27, The number of people who "opt-out" is not estimated to allow

for a full cost analysis.

Statistic missing: the numbers of children not receiving fluoride treatments R53, pg. 31

Standard for comparison missing: R55, pg. 31 How was this measured ?

Standard missing, R77 Item 4, pg 44, What is "high", in compared to what?

More on depth: ignoring information:

1. The authors apparently do not welcome outside information germane to their task. When provided with extensive criticism of their review copy, they ignored an opportunity to complement their work . They did not even comment on reviews of relevant literature done by other qualified researchers. They

accepted other reviews but not one that disagrees with their bias. (The following is in reaction to Dr. Kimminau's statements in the cover letter of the report)

Dr. Kimminau, criticizes the independent group researchers hired by a Massachusetts town that was referenced in FAT-W's critique of her review copy. Of the Natick study, she says the researchers of this study *frequently use the same literature in their arguments*. Even if it was true, any repetition of a citation is irrelevant: it is the quality and relevance of the study and arguments that is of importance.

Kimminau goes on to indirectly insult independent investigators who disagree with her. To her discredit, she generalizes. She fails to cite any errors or violation of scientific rules of procedure relevant to key studies. Let the reader judge if it is likely that an entire unaffiliated group with excellent research experience would produce a questionable evaluation. (see Appendix 2 for their vitae) We submit that they are as qualified, if not more qualified, than Kimminau and her team for the task given them.

The Board of Health and Wichita City Council deserve a researcher that would adopt a scientific attitude toward the Natick review and to all the other pertinent data the KHI group chose to ignore.

2. To their credit, the KHI researchers discuss some non-fluoride options (R50, pg. 29). However, two dental chewing gums are only *very briefly mentioned*. This treatment ignores important information useful in safeguarding dental health. Because these alternatives are *powerful agents*, both should be given longer treatment. A top alternative, xylitol, deserves more than one sentence.

3. Ignoring fluoridation's lack of dose control is serious. Only the merits of water delivery are stated or implied. The serious problem of overdose is *deliberately* excluded from the choices offered available to the Board of Health and City Council: to wit, "*The risk of under-consumption or over-consumption of fluoride is a common factor when considering any alternative to standard water fluoridation*". (R42, pg. 22) (emphasis added) Note: fluoridation is *not* included in spite of *having the same risk*. Such information was given to them and yet it had no effect on the final report.

4. Another serious flaw is ignored: the need for a prescription to buy fluoride in a equal dose to that proposed for all Wichitans without seeing a physician. It is not medically sound to give a prescription-strength dose of any medicine to any citizen without a previous examination. At this dose, an overdose of fluoride is almost guaranteed with water delivery.

5. Excluded, too, from the report, is cost information for three viable fluoride options (salt, sugar, and milk). Needless to say, the absence of key information inhibits the decision-takers of power of differentiation between choices.

6. Finally, this KHI report cost/benefit discussion suggests that significant factors were omitted from a formula that would permit an accurate economic assessment.

Regarding the lack of depth in one segment, the authors say: *Do not attribute the relative length of this section of the report to indicate that a majority of research suggests that fluoride has more risk than benefit. It only indicates the level of attention the element has received in health research. R15, page 13* This caveat or disclaimer is curious. Discerning readers will rely on the nature of the studies and their quality, not their quantity.

Certainly, more attention should be given to risk studies in order to safeguard our children.

#### Ignored studies:

- 1) R17, page 13, Skeletal System: Minimization of fluoride harm to bone.
- 2) Neurological Function, R21, page 14, ONLY 2 studies cited in this report in the 14 line text section; this misrepresents and minimizes the state of the literature.
- 3) Misleading findings re dietary intake R11, pg. 9. Only 2 of several cited.
- 4) Cancer R18, page 13, While no absolute proof links fluoride and cancer sufficient many studies strongly suggest it. This important risk is given only two paragraphs. The authors use feeble support, they cite a 9 year old review, a non-peer-reviewed citation, and a simple "brief report". This is not current or strong science. They were **provided with 22** relevant studies-all were apparently ignored.
- 5) Reproductive Health, R20, page 14; Only 1 of the 3 citations refers to humans.

#### Ignored facts:

- 1) Biochemical: fluoride is a toxic, cumulative "protoplasmic poison"
- 2) "people with renal insufficiency..." R19, page 10. This important health and economic factor is not discussed as to its implications for Wichita.
- 3) That the EPA, CDC, FDA, & AWWA, admit having no safety studies on fluorosilic acid (fluoridation agent). R76, pg. 44
- 4) Ignored effects: *Fluoride accumulation in skeletal tissues*(R12, p 9); They omit soft tissue effects. Note: New research (brief report) found how fluoride is able to kill *human cells*: 1) by stimulating by activating an enzyme called caspase-3, factor; and 2) by inducing a local injury in the cell.

#### Assumptions, Unsupported comments

Several of the authors' comments and practices suggest they assumed that the delivery of fluoride by community water systems is unequivocally scientifically and professionally supported. One hint of this attitude is the use of the quote of the Surgeon General's support of water fluoridation. Citing authorities is not scientific; nor is the mention of supporting organizations.

They appear to assume that the City Council would desire any alternative to be distributed "on a population-wide basis". R30, page 17. Indeed, this distribution method has serious consequences. To deliver a specific dose to a specific person is the ideal standard; water fluoridation does not do this.

There is no clear support for the assumption that: *The lack of water*

*fluoridation in Wichita has contributed substantially to dental disease... R72, page 41:Table 11-7*

*Invalid conclusion:*

It is not logical that *most* professional researchers reporting negative effects of fluoride or fluoridation would “*not meet scientific standards of replicability or statistical significance.*” This simplistic overgeneralization dismisses a large body of research and implies that only superior researchers produce studies supporting fluoridation.

No support exists for this generalization: *The scientific standards required to consider fluoride a health risk when used at the optimal dose have not been achieved.* R23, pg. 14 To the contrary, a great deal of research at levels less than the arbitrary “optimal” dose is dismissed. The Wichita / Sedgwick County Board of Health has a 49 page paper that examines just such evidence, “**Effects of fluoride at concentrations of one part per million or less**” (it contains hundreds of references)

It is well known that fluoride makes bone and teeth more brittle, but the authors mislead by stating only part of its effects: “... fluoride yields bone with greater density...” The final part of the statement is not true, bone “... that is more resistant to fracture...” R10

To their discredit, this statement is simply based on an *advisory board* citation, no specific studies are cited. It is protocol to cite studies read and analyzed.

The “Biological Action of Fluoride on Hard Tissues.” was discussed. They ignored fluoride’s significant action on soft tissues: they are negative. This significant omission casts another shadow of doubt on the utility of this report. There is no acknowledgment that fluorine and fluorides act as direct cellular poisons by interfering with calcium metabolism and enzyme mechanisms.

Dental project design flaws:

The “KHI Dental Health Status Project” is full of design and execution flaws that raise the question of the accuracy and utility of the results. Examples follow:

1. Measures are not equivalent: The choice of measuring DFT or DFMT should have been based on finding the measure that will permit comparisons between local data and those data about other communities. (R62 page 36)

2. The criterion of randomness: ... 75% of the dental offices the charts had been selected by office staff prior to the arrival of the researchers....(R57, page 33)  
All charts must be selected randomly by “blind” investigators. This failure unnecessarily weakens the study. Office staffs are likely to have a bias because the fluoridation issue is highly conflicted in this community.

3. Sample selection: It would appear a more uniform population to study would

have been the students living in USD 259 (N=395, instead of the full group of 463). R58, page 34). These children were more likely to be exposed to the same dental hygiene education and programs that is used in the single school district.

4. Usefulness of data: *One goal of the project was to be able to compare data collected to the annual school-based dental inspection data. ....the two data sets are not compatible.*" (R68 page 40)

Available baseline statistics should have influenced the design of the study before it was executed. It seems that the researchers did not account for differences in data-collection categories.

A) National lack of comparability: *National Comparisons: The discrepancies make it impossible to correctly compare summary dental disease estimates.* (page 40)

B) Other: *The results of the tests were inconclusive at a **broad level of analysis**...* R67,

page 40 It is regrettable that the researchers failed design a more narrow level of analysis in order to ensure collection of information about an alternative. Incredibly, the lack of data didn't inhibit the authors from concluding that fluoride treatments gave no advantage over children not receiving them. This stance, once again, minimizes the role of topical applications; it implies that systemic fluoride is superior.

5. Critical measures not made: The authors recognize that, " *...an assessment of both current fluoride exposure and current dental caries experience **would be basic to developing an informed position on the use of supplements fluoride at both a community and individual level***". R51, page 30

We still do not know the amount of fluoride ingested by Wichita's children. Therefore, we have no guide as to the amount of fluoride to give or avoid no matter what the means of delivery is selected. Over-dosing of our children is likely. The researcher's time would have been better spend determining our children's current exposure to fluoride than to be concerned about their caries level. This level was not debated by decision-takers. That is, the need for preventive dental assistance was already assumed by both sides of the fluoride debate.

SURVEY OF DENTISTS: Opinion data

Ideally, an equal number of dentists for and against fluoridation could have been interviewed. Such procedure would highlight the issues with regard to fluoridation and the other options which are desired. What is the local experience of a dentist with positive and with negative attitudes toward the use of fluoride and the use of water delivery? As important, and again, ideally, opinions of physicians might have been solicited. They, have greater competence to discuss systemic effects fluoride.

RECOMMENDATIONS

Status of dental caries in Wichita

If the study's findings are accurate, they suggest that our community needs to find the most effective and safe caries preventive methods. Because the action of fluoride is now said to be *topical*, not systemic, ingesting fluoride



**is not recommended.** Toothpaste is one of the most economical ways to apply fluoride topically. Toothpaste with xylitol would be a superior option because it has no-known risk factors as does fluoride, and yet it inhibits the same bacteria. In addition, children's risk of *otitis media* is reduced with *xylitol*.

Overall recommendations:

A. Professional Evaluators: If any committee, Board, or Council is to give significant weight to this report, we recommend that it be evaluated by a truly independent professional group with no association to dentistry or fluoridation. Ideally, members of the group would not be affiliated with each other in a working relationship before undertaking their assessment. This expensive suggestion is not made lightly. It comes after a minimum of 95 hours spent to review the material. An evaluation of this report is also suggested because of the seriousness of the considerations that could affect the life of 350,000 citizens served by the Wichita Water Department. Only the most reliable and valid information must be presented to those who attempt to resolve the 50 year debate of our community.

This recommendation for an independent analysis of this report has president. For example:

1. Fluoridation advocates in California often cited a study, "California Oral Health Needs Assessment" (Pollick et al 1994) as proving the effectiveness of fluoridation. This so-called scientific study was never subjected to peer review as every credible scientific paper is. It was finally discredited because the city of Escondito, Calif. paid \$5000 to have it analyzed by an independent center in Tennessee (SENES). The Senes group is also called a "Center For Risk Analysis". (SENES means *Specialists in Energy-Nuclear and Environmental Science* ). They produced a 25 page report saying the study did not support its conclusions. Unfortunately, it is that study which the State used to guide their decision to promote fluoridation (before reading the critique). Our citizens deserve to be guided by a fully objective and scientifically based set of conclusions.

B. Consider reviewing the oft cited Natick, Mass. study. It has a more general scope and its findings are relevant to any city considering water fluoridation. It also discusses economic issues in more detail than the KHI report. Natick also hired truly independent scientists to study the issues.

C. Seek information to update and complete the analysis of economics considerations. Our literature reviews suggests that the cost of side-effects will greatly offset any predicted savings. (See the 19 page economics report by the FAT-Ks.)

D. Thoroughly investigate continued reports from dentists that fluoride's action is topical. This means ingestion (fluoridation) of fluoride is **not** effective in dental hygiene. This KHI report fails to fully explore this issue and does not give it the significance and credibility it deserves.

The significance of this recommendation cannot be over-estimated because it can eliminate several fluoride delivery methods from consideration. That step alone would reduce the number of alternatives needed to be studied.

The KHI fails to mention that the Center's for Disease Control states that any dental action of fluoride is indeed topical, not systemic. Indeed, they seem to appeal to authority only when it supports fluoridation.

E. If all alternatives are rejected, consider a specific analysis of two of the strongest arguments against the ingestion of fluoride regardless of delivery; 1) lack of dose control, and 2) the amount of daily intake Wichita children currently ingest from all sources.

## **DETAILED RESPONSES TO SELECTED STATEMENTS FROM THE KHI REPORT**

*Format note:* Selected sentences were reproduced in order to facilitate commentary by the Fluoride Awareness Team of Kansas, Wichita Group (FATK-W). Statements chosen from the KHI report are designated by "R" (report), are numbered, and appear in *italics*. The Team's comments are labeled with the letter "C" (comment) followed by sequential numbering.

### **Ch 1. EXECUTIVE SUMMARY (page 1)**

*R1 Pg 1 Fluoride is widely accepted as having substantial and positive influence on preventing dental cavities. ...the majority of the research community agrees that the benefits well outweigh the risk.*

C1 This statement is misleading given the 50 year debate. The use of the term "the majority" is a quantitative analysis. Comments on the *quality* of the literature would offer a more complete and objective view. Too often, in the history of science, a majority of experts agree only to find a single study in disagreement and that becomes the turning point and breakthrough to new understanding. The cover letter to this document says that 500 studies were consulted. Specific studies should be cited to support each statement (R1). We would expect at least 250 to be cited. Of course, any 500 studies represent only a small fraction of the body of literature; and the problem of selection bias. (For example: at least 1000 studies are listed on Medline regarding the single and minute issue of the inhibition of hydrolysis by fluorides.) In this report, the researchers mislead by not mentioning the weight of contradictory evidence. A balanced report will examine both sides. (Refer to the discussion and documentation in Chapters 6 and 7 and contrast that information with relevant comments made by the Team.)

*(See Appendix 3 for a new study, Aug, 2000)*

*R2 Pg.1 No alternative examined is as cost effective, safe or efficacious as public water fluoridation in providing fluoride to a population irrespective of age, income, education, or other socioeconomic factors.*

C2 (See comment below under Chapter 12, "Concluding Remarks") A more precise statement would allow the first part of the above sentence to stand on its own. The qualifier: "... in providing fluoride to a population irrespective of age,

*income, education, or other socioeconomic factors.*” ...confuses the meaning of this statement. It raises an issue that can and should be treated irrespective of safety or efficacy issues. Universal delivery has separate advantages and disadvantages apart from the quality of the product delivered. Thus, it is difficult to discern which aspect of fluoridation the authors are emphasizing. It will be important to discuss the serious problems of universal delivery before this comment can be used to guide action.

*R3 Pg. 2 (All alternatives when compared to water fluoridation have the following characteristics...)*

*C3 Comments about each of the following 5 items:*

*1. Lower or unproven effectiveness*

This issue is not settled, it continues to be debated. Therefore, the authors are *offering an opinion*. The reader must judge the quality and weight of evidence beyond references listed in this report.

*2. Less suitable for community public health approach.*

What are the criteria of such approach? If “suitability” refers to universal dosing, it is important to discuss the reasons why it was abandoned in the early 1900’s when tried for goiter treatment.

*3. Patient compliance issues that put individuals at risk of over- or under-exposure.*

“Patient compliance” is also a factor in water delivery. Individual citizens vary enough in water consumption that over and under dosing remains a problem with fluoridation of drinking water. There is no doctor control over the dose received. Without individual diagnosis, a dentist or physician can only guess as to the amount of fluoride intake from all other sources. To dispense a drug without knowing the “patient’s” current intake is malpractice.

Citizens are inappropriately (and possibly unethically) treated as “patients”. These patients do not have the full benefits of patient-hood, nor its full protections. They are not individually examined for hypersensitivity, not individually diagnosed as to a need for fluoride, not prescribed for in light of the diagnosis, and not followed by their physician after the drug is “prescribed”. This is a serious problem with mass delivery of a drug.

Mass-dosing has the unspoken problem of removing the personal choice as to whether to “comply” with mandated drugs or not. This is a civil liberties issue.

Of course universal dosing increases the likelihood that a dose will be delivered. The KHI report touts the fact that delivery does not discriminate according to social and economic factors. However, they completely ignore the

inherent risk in indiscriminant dosing. Universally administered doses includes those citizens most likely to suffer physical harm from fluoride ingestion. These persons are put at risk in hopes of serving another group. Such dosing is divisive. It forces use to value one group over another. Further, the KHI report does not discuss the risks of overdose because children in the target group, and the rest of the population, vary widely in water intake.

4. *Dental practice issues can influence efficacy.*

The word "efficacy" refers to the power to have an effect. Fluoride has certain fixed and toxic actions. Dose size and other factors determine the degree to which the drug can deliver its effects. A dentist can control fluoride's ultimate effects only when he has control over all dosing issues. With water delivery, he has no direct control.

5. *Per person cost is higher.*

Using the standard simple formula this statement *appears* to be valid. A realistic formula is very complex. Cost per person depends on many factors. Reasonable estimates based on treatment of fluoride's side effects and other factors will show fluoridation to be *more* costly than delivery methods that target the specific individuals of concern.

*R4 New data on the dental health of children and youth who have seen a dentist in Wichita/Sedgwick County are presented in the report.*

C4 The study should be specific to the target group. Of major concern of proponents are the poor children of Wichita. Only an *indirect method* of analysis of that group is included in this report.

*R5, pg.2 All of them (dentists) recommended the use of fluoride products, but not all chose to use the same alternatives.*

C5 Missing is a discussion of the frequency of use of fluoride and each alternative by dentists is expected given the aim (page 4) of this investigation.

*R6 Pg. 2 ...we estimate savings from cavities that could be prevented by public water fluoridation is more than \$2.9 million for Wichita/Sedgwick County after five years of water fluoridation.*

C6 This is pure speculation *based on a simplistic formula.* See C3, response to R3, number 5. The formula used in their calculation excludes major costs. This is discussed further below.

**Ch. 2 BACKGROUND AND HISTORY** (page 4)

This Chapter is non-essential and uses resources that might have examined critical issues more deeply.

R7 (early studies cited) ...the results indicated that dental caries fell 50-70% among school children.

C7 This information is highly *misleading*. No specific study is cited, only a 1999 book, which not helpful to the critical reader wanting to examine the evidence. The results of the original Newburgh/Kingston, NY study were published in 1945 and are out of date. The first study to discover the long term effects of fluoridation was *invalidated* after 6.5 years into it when the control city was dropped (viz., the study comparing Grand Rapids and Muskegon, Michigan). Independent statisticians cite *many violations of scientific protocol*. However, this study is repeatedly cited by proponents. The Public Health Service had cities begin fluoridation long before this initial test (trial) was completed.

These old studies do not reflect the long term effect of water fluoridation. For example, a 1999 New York State Department of Health study shows that **children in fluoridated Newburgh**, have no less tooth decay but significantly more dental fluorosis than children from never-fluoridated Kingston, New York. **This new research shows the experiment has failed.** (Published in *Community Dentistry and Oral Epidemiology*, June 1999, New York State Department of Health dentist, Dr. J. V. Kumar, and associates). Studies reflecting fluoridation's effects over significantly longer time periods are available and not cited in this context.

Dr. Dean's work is cited in association with caries decrease as linked with fluoride. Glaring by its omission is the following: Two Illinois towns surveyed by Dean were compared *showed different results* than the KHI history would lead the reader to believe (Galesburg with more fluorine than Quincy was associated with *less* caries in children.) *About Fluoridation: The Case Against Mass Medication* by Harvey Day, Thorsons Pub. Ltd, London, 1966, p. 6

Generally speaking, the early studies that associated naturally occurring calcium fluoride in drinking water with less decay also noticed a superabundance of calcium and phosphorus in foods grown in the region. The importance of these two chemicals is see today in dental chewing gum and toothpastes. They are promoted because they contain these chemicals that re-mineralize the teeth and thus repair would-be cavities. The point is that fluoride was inappropriately singled out as the active chemical responsible for better teeth and heavily promoted since. No controls for calcium and phosphorus were made. This bad science is not discussed in KHI's all too brief history.

R8, p5: *Rapid adoption of public water fluoridation in the 1960's and 1970's was associated with a decline in the average decayed, missing, filled teeth (DMFT) scores.*

C8 Not so: Data exists showing that caries began and continued to decline *before* the advent of fluoridation. Further, it continued to decrease in BOTH fluoridated and unfluoridated areas. Credit cannot be attributed only to fluoride as the reader is lead to believe here. The following quotes offer a more accurate picture.

*“The major reasons for the general decline of tooth decay worldwide, both in non-fluoridated and fluoridated areas, is the widespread use of fluoridated toothpaste, improved diets, and overall improved general and dental health (antibiotics, preservatives, hygiene etc).”* Dr. Hardy Limeback BSc PhD (Biochemistry) DDS, Head, Preventive Dentistry .

Dr. M. Diesendorf, PhD, Prof., Enviro. Sc., Univ. of Tech. (Sydney), Director, Inst. for Sustainable Futures: Studies showed teeth improved from 1930s to present in both fluoridated & non-fluoridated communities. *Mystery of Declining Tooth Decay*. 1986. *Nature*, 322, 125-129.

#### **Ch. 4 BIOLOGIC ACTION OF FLUORIDE (page 8)**

R9 “History”: ,p8

The “history” section of this chapter fails to go far enough. In fact, it ignores key information about fluoride’s action and minimizes the importance of dietary fluoride:

...it is necessary to emphasize the fact that the mere addition of fluoride to drinking water does not have the same effect as a sensible diet. Fluorides in foods are ingested in microscopic quantities the natural way; mineral fluorides are not, and may indeed, have extremely dangerous side effects. (p 13).

“In theory sodium fluoride added to water will ionize, and the result would be the same as if calcium fluoride were present; in practice it is not.” Stanley Rundle (*Fluoridation-the Arrogance of Scientists*, BA, Phd, D.Sc.) did many experiments in this regard and concluded that the ionization of calcium fluoride and that of sodium fluoride in the presence of other calcium salts differed widely. (*About Fluoridation: The Case Against Mass Medication* by Harvey Day, Thorsons Pub. Ltd, London, 1966, p. 13)

The KHI authors say “*Current research indicates that fluoride not only has a systemic influence on hard tissues, but it is also has a primary cariostatic effect when with those tissues*”.

The topical effects of fluoride are mentioned, but its importance is ignored. Although they cite Featherstone’s findings, the fact that his findings are backed up by twenty years of reports by experts is lost on the KHI reporters. Even when fluoride’s action is minimized an given co-equal status with systemic action, it is clear that *fluoride does not have to be ingested to exert it significant influence*. This is important to those wanting to avoid the debated risks of ingesting fluoride. When the same action, actually the primary action of fluoride can be obtained topically and with less risk, prudence would suggest that it be recommended.

Of great significance is the omission of a comment on the nature of hard tissue (viz., bone) effect. Fluoride is known to make bones more *brittle*.

It is worthy to mention that, the natural and non-toxic chemical *xylitol* also has a cariostatic effect. It inhibits streptococcus mutans just as is claimed for fluoride. It is delivered topically and has clinical research to support its effects. The toxic nature of fluoride is undisputed. Also, the *non-toxic* nature of xylitol is also undisputed. Such an option avoids any risk associate with fluoride. Xylitol is available in toothpaste, tasty chewing gums, and mints. Compliance problems in children, and adults for that matter, should be minimal because it has a

pleasant sweet taste. Diabetics can use it safely.

*R10 Research in skeletal biology, for example, continues to suggest that systemic uptake of fluoride yields bone with greater density that is more resistant to fracture among those at risk for osteoporosis.*

C10 This statement is based on an advisory board citation. Missing are the alleged specific references that would be expected among the alleged 500 studies claimed by the KHI authors. Rather than "more resistance", fluoride actually increases in brittleness. It was observed as far back as... **Feb.10, 1951 in the JAMA. Reports the following symptoms of chronic fluoride poisoning: dental fluorosis; accumulation bones, leading to hypercalcification and brittleness. Ligaments and tendons also become calcified. Serious symptoms may ensue, such as loss of mobility of joints, easy fractures and pressure on the spinal chord.**

This lengthy comment is necessary to show the significance of the gross misstatement R10...or, at the very least, *a surface look at the literature*. They seem to take a single reference on faith.

Knowing the hot debate over the alleged negative effects of fluoride which is part of the reason for the task to be given KHI, one would expect each claim to be more carefully investigated than is apparent. These authors were given specific feedback and references in response to their first draft, and yet they continue to avoid an in depth analysis of contrary findings.

That studies exist, is shown in this brief listing:

Since 1990, there have been 18 studies investigating the relationship between fluoride exposure via the water supply (both natural and artificial) and the incidence of hip fracture in the elderly.

Of the 18, 10 studies show an association between fluoride exposure and increased hip fracture, but 8 do not. Some studies show an association for both women and men, some for women only and some for only certain age ranges. Some studies show an increased risk for increased time of exposure, some do not. One (Li (1999, unpublished) shows a linear increase in risk with level of fluoride concentration in the water from 1 ppm up to over 4 ppm.

The evidence from these human epidemiological studies is mixed. This finding must be examined in the context of the Precautionary Principle. This is especially true because fluoride build-ups in bones over a lifetime.

Jacobsen et al examined over 200,000 hip fractures in men and women over 65 in the US and compared the number of fractures in fluoridated counties compared to non-fluoridated counties. They found relative risk ratios for women and for men which were statistically significant. A RR of 1.08 for women means an 8% increase in hip fractures. Assuming that half the 200,000 hip fractures in the US for people of 65 and older, are for women (it is actually a larger fraction, as women are more prone to hip fractures after menopause) then an 8% increase represents an extra 8,000 hip fractures. (see reference below: Jacobsen, S., J. Goldberg, et al. (1992).

Additional studies:

1. Cauley, J., P. Murphy, et al. (1995). "Effects of fluoridated drinking water on bone mass and fractures: the study of osteoporotic fractures." J Bone Min Res 10(7): 1076-86.
2. a) Cooper, C., C. Wickham, et al. (1991). "Water fluoridation and hip fracture." JAMA 266: 513-

- 514 (letter, a re-analysis of data presented in 1990 paper).
2. b) Cooper, C., C. Wickham, et al. (1990). "Water fluoride concentration and fracture of the proximal femur." *J Epidemiol Community Health* 44: 17-19.
  3. Danielson, C., J. L. Lyon, et al. (1992). "Hip fractures and fluoridation in Utah's elderly population." *Jama* 268(6): 746-748.
  4. Hegmann, K.T. et al (2000) the Effects of Fluoridation on Degenerative Joint Disease (DJD) and Hip Fractures. Abstract #71, of the 33<sup>rd</sup> Annual Meeting of the Society For Epidemiological research, June 15-17, 2000. Published in a Supplement of *Am. J. Epid.*
  5. Hillier, S., C. Copper, et al. (2000). "Fluoride in drinking water and risk of hip fracture in the UK: a case control study." *The Lancet* 335: 265-269.
  6. Jacobsen, S., J. Goldberg, et al. (1992). "The association between water fluoridation and hip fracture among white women and men aged 65 years and older; a national ecologic study." *Annals of Epidemiology* 2: 617-626.
  7. Jacobsen, S., J. Goldberg, et al. (1990). "Regional variation in the incidence of hip fracture: US white women aged 65 years and older." *J Am Med Assoc* 264(4): 500-2.
  8. Jacobsen, S.J. et al (1993). Hip Fracture Incidence Before and After the Fluoridation of the Public Water Supply, Rochester, Minnesota. *American Journal of Public Health*, 83, 743-745.
  9. a) Jacqmin-Gadda, H. (1995). "Fluorine concentration in drinking water and fractures in the elderly." *JAMA* 273: 775-776 (letter).
  - 9 b) Jacqmin-Gadda, H., A. Fourrier, et al. (1998). "Risk factors for fractures in the elderly." *Epidemiology* 9(4): 417-423. (An elaboration of the 1995 study referred to in the JAMA letter).
  10. Karagas, M.R. et al (1996). "Patterns of Fracture among the United States Elderly: Geographic and Fluoride Effects". *Ann. Epidemiol.* 6 (3), 209-216.
  11. Keller, C. (1991) Fluorides in drinking water. Unpublished results. Discussed in Gordon, S.L. and Corbin, S.B. (1992) Summary of Workshop on Drinking Water Fluoride Influence on Hip Fracture on Bone Health. *Osteoporosis Int.* 2, 109-117.
  12. Kurttio, P., N. Gustavsson, et al. (1999). "Exposure to natural fluoride in well water and hip fracture: A cohort analysis in Finland." *American Journal of Epidemiology* 150(8): 817-824.
  13. Lehmann R. et al (1998). Drinking Water Fluoridation: Bone Mineral Density and Hip Fracture Incidence. *Bone*, 22, 273-278.
  14. Li, Y., C. Liang, et al. (1999). "Effect of Long-Term Exposure to Fluoride in Drinking Water on Risks of Bone Fractures." Submitted for publication. Contact details: Dr. Yiming Li, Loma Linda School of Dentistry, Loma Linda, California, Phone 1-909-558-8069, Fax 1-909-558-0328 and e-mail, [Yli@sd.llu.edu](mailto:Yli@sd.llu.edu)
  15. May, D.S. and Wilson, M.G. Hip fractures in relation to water fluoridation: an ecologic analysis. Unpublished data, discussed in Gordon, S.L. and Corbin S.B., (1992), Summary of Workshop on Drinking Water Fluoride Influence on Hip Fracture on Bone Health. *Osteoporosis Int.* 2, 109-117.
  16. Phipps, K. R. (1999). Community water fluoridation, bone mineral density and fractures. R01DE10814-02. HSR/96101800. USA, Oregon Health Sciences University, 611 SW Campus Dr, Portland, OR 97201, IR: (503) 494-8895. 199309: National Institute of Dental Research (NIDR) - Grant: Non-competing Continuation (5). To be published in the *British Medical Journal*.



17. Sowers, M., M. Clark, et al. (1991). "A prospective study of bone mineral content and fracture in communities with differential fluoride exposure." American Journal of Epidemiology 133: 649-660.

18. Suarez-Almazor, M., G. Flowerdew, et al. (1993). "The fluoridation of drinking water and hip fracture hospitalization rates in two Canadian communities." Am J Public Health 83: 689-693.

*Please note that dental fluorosis includes increasing the brittleness of teeth.*

Absent from this section and the entire KHI study is the "Biological Action of Fluoride on **SOFT** tissues." It is a fact that water delivery of fluoride includes soft tissue exposure, some brief comments from scientific studies are offered.

1. "Fluorine and fluorides act as **direct cellular poisons** by interfering with calcium metabolism and enzyme mechanisms." ...it is "corrosive to tissues." pg. 216- 218, "Chronic poisoning (from inhalation or ingestion): Intake of more than 6 mg. of fluoride per day results in fluorosis." [poisoning] "Symptoms are weight loss, brittle bones, anemia, weakness, general ill health, stiffness of joints, and discoloration of the teeth when exposure occurs during tooth formation." Handbook of Poisoning: prevention, diagnosis & treatment, 12<sup>th</sup> Edition, Robert H. Dreisbach, M.D., Ph.D. and William C. Robertson, M.D.

Appleton & Lange, Norwalk, Conn., 1983,

2. Dr. Allan S. Gray, a British Columbia health officer, studied all schoolchildren's teeth in that province, which is only about 15% fluoridated. He found that the teeth of those children in British Columbia where there was no fluoridation were in much better condition than in the fluoridated areas. (J. of the Canadian Dental Assn, entitled, "Time for a New Baseline?" )

3. Since 1994 six publications link fluoride exposure to direct adverse effects on the brain.

A. Impairment of I.Q. in children Effect of high fluoride water supply on children's intelligence. Zhao, L.B., Liang, G.H., Zhang, D.N., and Wu, X.R. Fluoride 29 190-192 (1996); and Effect of fluoride exposure on intelligence in children. Li, X.S.,

Zhi, J.L., and Gao, R.O. Fluoride 28 (1995)

B. Prenatal exposure of animals to fluoride and subsequent birth of off- spring which

are hyperactive throughout life. "The fluoride pattern of behavioral problems matches up with the same results of administering radiation and chemotherapy to cancer patients. Neurotoxicity

of sodium fluoride in rats. Mullenix, P.J., Denbesten, P.K., Schunior, A. and Kernan, W.J.

Neurotoxicol. Teratol. 17 169-177 (1995)

C. Brain and kidney damage in animals given the "optimal" dosage of

fluoride, viz. one part per million . Chronic administration of aluminum- fluoride or sodium-fluoride to rats in drinking water: alterations in neuronal and cerebrovascular integrity. Varner, J.A., Jensen, K.F., Horvath, W. And Isaacson, R.L. Brain Research 784 284-298 (1998).

D. Decreased levels of a key substance in the brain that may explain the results in the other paper from that journal. Influence of chronic fluorosis on membrane lipids in rat brain. Z.Z. Guan, Y.N. Wang, K.Q. Xiao, D.Y. Dai, Y.H. Chen, J.L. Liu, P. Sindelar and G. Dallner, Neurotoxicology and Teratology 20 537-542 (1998).

E. Fluoride dosing is linked to adverse effects on the brain's pineal gland and pre-mature onset of sexual maturity in animals. Earlier onset of menstruation of girls in fluoridated Newburg, New York has also been reported. Newburgh- Kingstoncaries-fluorine study XIII. Pediatric findings after ten years. Schlesinger, E.R., Overton, D.E. Chase, H.C., and Cantwell, K.T. JADA 52 296-306 (1956).

4. Dr. Robert L. Isaacson: "Probably the most startling observation from our first experiment was the high mortality rate in the group of animals that received the lowest dose of AIF 3 [aluminum fluoride]. Different groups of rats had been given one of three levels of AIF3 in double distilled drinking water: 0.5 ppm, 5 ppm, and 50 ppm starting at about four months of age. A fourth group received only the distilled water." The experiment lasted only 45 weeks but, Isaacson stated, "*Eighty per cent of the rats in the [lowest concentration group] died before the end of the experiment*" which was the highest mortality rate of all." Follow-up studies, "*showed the same high level of mortality.*" In subsequent research, low levels of the same kind of fluoride that is that is added to city drinking water "also allows the enhancement of brain levels of Al." A significant reduction was found on the cells of the hippocampus, that part of the brain that acts like a central processing unit in a computer, telling other parts what to do and how to function. The hippocampus is the primary decision making part of the brain, damage to which causes the victim to become more submissive and less challenging to his environment. Annals of the New York Academy of Sciences, Vol. 825 "Neuroprotective Agents, Third International Conference." Title: "Toxin-Induced Blood Vessel Inclusion caused by the Chronic Administration of Aluminum and Sodium Fluoride and their Implication for Dementia." Robert. L. Isaacson, et al, p. 152-166.

5. Fluoride exposure disrupts the synthesis of collagen and leads to the breakdown of collagen in bone, tendon, muscle, skin, cartilage, lungs, kidney and trachea. A.K. Susheela and Mohan Jha, "Effects of Fluoride on Cortical and Cancellous Bone Composition," IRCS Medical Sciences: Library Compendium, Vol. 9, No.11, pp. 1021-1022 (1981); Y. D. Sharma, "Effect of Sodium Fluoride on Collagen Cross-Link Precursors," Toxicological Letters, Vol. 10, pp. 97-100 (1982);

A. K. Susheela and D. Mukerjee, "Fluoride poisoning and the Effect of Collagen Biosynthesis of Osseous and Nonosseous Tissue," Toxicological European Research, Vol. 3, No.2, pp. 99-104 (1981);  
 Y.D. Sharma, "Variations in the Metabolism and Maturation of Collagen after Fluoride Ingestion," Biochemica et Biophysica Acta, Vol. 715, pp. 137-141 (1982);  
 Marian Drozd et al., "Studies on the Influence of Fluoride Compounds upon Connective Tissue Metabolism in Growing Rats" and "Effect of Sodium Fluoride With and Without Simultaneous Exposure to Hydrogen Fluoride on Collagen Metabolism," Journal of Toxicological Medicine, Vol. 4, pp. 151-157 (1984).

6. Fluoride stimulates granule formation and oxygen consumption in white blood cells, but inhibits these processes when the white blood cell is challenged by a foreign agent in the blood. Robert A. Clark, "Neutrophil Iodination Reaction Induced by Fluoride: Implications for Degranulation and Metabolic Activation," Blood, Vol. 57, pp. 913-921 (1981).

7. Fluoride depresses thyroid activity.

Viktor Gorlitzer Von Mundy, "Influence of Fluorine and Iodine on the Metabolism, Particularly on the Thyroid Gland," Muenchener Medicische Wochenschrift, Vol. 105, pp. 182-186 (1963);  
 A. Benagiano, "The Effect of Sodium Fluoride on Thyroid Enzymes and Basal Metabolism in the Rat," Annali Di Stomatologia, Vol. 14, pp. 601-619 (1965);  
 Donald Hillman, et al., "Hypothyroidism and Anemia Related to Fluoride in Dairy Cattle," Journal of Dairy Science, Vol. 62, No.3, pp. 416-423 (1979);  
 V. Stole and J. Podoba, "Effect of Fluoride on the Biogenesis of Thyroid Hormones," Nature, Vol. 188, No. 4753, pp. 855-856 (1960);  
 Pierre Galleti and Gustave Joyet, "Effect of Fluorine on Thyroid Iodine Metabolism and Hyperthyroidism," Journal of Clinical Endocrinology and Metabolism, Vol. 18, pp. 1102-1110 (1958)

8. Fluorides have a disruptive effect on various tissues in the body.

T. Takamorim "The Heart Changes in Growing Albino Rats Fed on Varied Contents of Fluorine," The Toxicology of Fluorine Symposium, Bern, Switzerland, Oct 1962, pp. 125-129;  
 Vilber A. O. Bello and Hillel J. Gitelman, "High Fluoride Exposure in Hemodialysis Patients," American Journal of Kidney Diseases, Vol. 15, pp. 320-324 (1990);  
 Y. Yoshisa, "Experimental Studies on Chronic Fluorine Poisoning," Japanese Journal of Industrial Health, Vol. 1, pp. 683-690 (1959)

9. Fluorides cause premature aging of the human body.

Nicholas Leone, et al., "Medical Aspects of Excessive Fluoride in a Water Supply," Public Health Reports, Vol. 69, pp. 925-936 (1954); J. David Erikson, "Mortality of Selected Cities with Fluoridated and Non-Fluoridated Water Supplies," New England Journal of Medicine, Vol. 298, pp. 1112-1116 (1978); "The Village Where People Are Old Before Their Time," Stern Magazine, Vol. 30, pp. 107-108, 111-112 (1978)

*R11, pg. 9 The average intake of fluoride from food is estimated to be 1.76 mg/day or between 1.4 and 3.4 mg/day.*

C11 Only two of several studies are cited. Studies exist the show the total

intake from all sources can reach 5 and 6 mg/day, for example, "In U.S. cities having one part per million fluoride in their water supply, the range in total daily fluoride intake exceeds 6.5 milligrams daily." *Rev. of Fluoride Benefits and Risks, Dept. Health Hum. Serv. Feb.1991 p.17*

Obviously, this exceeds the goal of fluoridation suggesting that no fluoride need to be added to drinking water. The omission of such information suggests shoddiness or perhaps the effect of non-objectivity.

*R12, p 9 Fluoride is not easily excreted and is more likely to accumulate in the body in skeletal tissues over time.*

### **C12 Fluoride also accumulates in soft body tissues**

#### **Ch 5. FLUORIDE'S BENEFITS (page 10)**

C13 This section is a curious addition given the purpose of the study to compare delivery methods, not fluoride's nature. However, an initial statement touts water fluoridation by a weekly report. This opinion is hardly useful to a critical reader who wants to examine specific studies. Such an introduction hardly seems to offer an objective look at the literature. In fact, its use reminds one of propagandas, not science. This view is strengthened when one considers that the same agency claims the actual action of fluoride is topical, not systemic (fluoridation then is undercut, not supported).

The entire "benefits" section is superficially rooted in science. Any alleged benefit must be considered in the context of hundreds of studies suggest that fluoride fulfills its claim as a "protoplasmic poison". These research findings are not mentioned here for reasons of space. See "EFFECTS OF FLUORIDE AT CONCENTRATIONS OF ONE PART PER MILLION OR LESS", A report to the Board of Health, August 13, 2000, Requested by George Potts, Ph.D., Compiled by Robert Hetrick, Ph.D with the Fluoride Awareness Team..

Studies contrary to this report's comments on osteoporosis have been offered **above**.

*R12, pg. 11 At least 98 professional organizations endorse the use of fluoride in preventing dental decay.*

C14 The number of endorsements and/or a simple list of organizational names fails to offer meaningful information without deeper investigation. This number has, at best, an emotional appeal to the suggestible. It has little place in a serious scientific report unless it is critically analyzed and put into its proper context. Consider two relevant facts which help define the import statement R12.

1. In measuring just one year, following organizations have withdrawn their endorsements of fluoride (August 1995 to August 1996 ).

American Cancer Society  
American Heart Association  
National Kidney Foundation  
American Academy of Allergy and Immunology  
American Diabetes Association  
Society of Toxicology  
Chronic Fatigue Syndrome Activation Network  
American Psychiatric Association  
American Chiropractic Association

American Civil Liberties Union  
National Institute of Law Municipal Officers

The reasons for withdrawal are unclear, however considerable new research may contribute to the trend.

In addition, the following do not endorse fluoridation: the KHI authors do not mention this fact:

**Federal Drug Administration (FDA)**  
National Institute of Law Municipal Officers  
**U. S Drug Administration (USDA)**  
**U.S. Environmental Protection Agency (EPA)**  
(Fluoridation violates Safe Drinking Water Act)

2. Endorsements must be evaluated, listings reflect a low level of criticality:

Joseph C. Sweeney analyzed the endorsements of ADA against 3 criteria of a quality: 1) is an endorser a qualified authority; 2) is it credible with an untarnished record of integrity; 3) it must receive no remuneration . No endorser on the ADA list meet all of the three criteria. Interestingly, those scientific organizations which meet DO the 3 criteria are missing. FLUORIDATION OF PUBLIC WATER SUPPLIES (The Motives That Drive The Two Sides Of The Issue) by Louis J.Ronsivalli (MK Mermakk Publications, 5 West Bedford St.,Methuen, MA 01844

3. Sweeney's point about the quality of endorsements is most dramatically made by the AMA.

The AMA, in 1965, was willing to endorse fluoridation while admitting that it was not prepared to state that "no harm will be done to any person by fluoridation". They endorsed it also while admitting that "The AMA has not carried out any research work, either long-term or short-term, regarding the possibility of side effects." 5/13/1965, J. E. Flannagan, Jr., Assistant Director, Dept. of Environmental Health issued a letter of the AMA policy statement) (p.41, *About Fluoridation*, H. Day, 1966)

This bit of information suggests that the researchers for this report failed to be critical of any endorsements; this is hardly what is expected from an analytical report. This list, without contrasting comment, reflects a shameless appeal to authority. This behavior is consistent with this report's paucity of focus on the analysis of literature on both sides of the scientific debate.

## **Ch. 6 FLUORIDE'S RISKS, page 12**

Before responding to specific comments, note that on page 4 ,the authors mention the famous Grand Rapids Mich. study. Relevant to the safety of fluoride is the following quote, "But no mention was made of the fact that in Grand Rapids there were 100 percent more deaths from heart disease and 50 percent more from nephritis (kidney disease) in 1948 than in 1944.

*About Fluoridation*: H Day, 1966, p. 15.

It is just such omission of a complete picture that suggests researcher bias.

An important perspective on risks and safety is offered by an expert with a long experience with fluoridation: Dr. Douw G. Steyn; professor of pharmacology, U. of Pretoria, collected literature from the world along with **his own studies on fluorosis for 28 years**. He said: "In the course of my studies of the available literature in favor of fluoridation, especially that available in official American publications, ***I failed to find satisfactory proof that no risk whatever is attached to artificial fluoridation of water supplies.*** Whatever tests, clinical examinations, studies and observations have been made, have not yielded irrefutable and conclusive proof of the safety of this measure of combating tooth decay." "The experiments were too short, because the harmful effects of the ingestion of fluorides may not sometimes be apparent for two or three decades. Moreover, many of the factors considered in such studies and investigations were not fully considered." *About Fluoridation*, H. Day, Thorsons, 1966, p. 39

*R13 Fluoride's risks are generally attributed to ingesting too much of the element. At relatively low doses, fluoride has observed beneficial effects.*

C15 This research paper has failed to cite a substantial body of literature that demonstrates such effects. The Board's taskforce has a copy of the Team's extensive paper addressing the low dose effects of fluoride (See "*Effects of fluoride at concentrations of one part per million or less*", Data accumulated by the FAT-W and compiled by R. Hetrick, Ph.D. at the request of Board Member, George Potts, Ph.D., )

*R14, pg. 12 Like many other naturally occurring elements consumed by humans, fluoride in excessive amounts can be toxic.*

C16 The word "natural" suggests the notion of "benign". In this context the cumulative nature of any poison is significant to mention in a "risk" discussion. Statement R14 reflects a superficial truism that is unworthy of a scientific paper. The fact is that different compounds of fluorine have varying toxicity levels. The "naturally occurring" compound, *calcium fluoride* is said to be about 85 times less toxic than fluoride's other forms. Failure to mention this in the context of the introduction to "risks" is grossly misleading. Calcium fluoride is NOT used in water fluoridation. The most common fluoride compound added to drinking water is fluorsilicic acid. It is far from the being a pure grade of fluoride that is used in most studies on which proponents base their claims.

This statement omits scientists' statements (toxicological handbooks, etc.) that fluoride is a *protoplasmic poison*. Fluoride is rated as slightly less toxic than arsenic and *more toxic than lead*. The margin of safety of fluoride is very narrow compared to other toxins. Thus, an overdose is much, much more likely with it than other poisons. Fluoride's action below at and below 1 ppm (the so called "optimal dose") is to interfere with significant cellular processes. This action may account for the many human ills that are associated with fluoride ingestion.

*R15, page 13 Do not attribute the relative length of this section of the report to indicate that a majority of research suggests that fluoride has more risk than benefit. It only indicates the level of attention the element has received in health research.*

C17 This statement is curious. Why explain a reflection of the state of the literature? The studies are their or not, and need to be reported sufficiently to

reflect the state of current knowledge as accurately as possible. If more attention is given to risk studies, is this because they exist in greater abundance? Let the studies speak for themselves.

*R16, page 12 Fluorosis*

C18 The brief half-page discussion of fluorosis minimizes its effects as "esthetics". The increase in fluorosis is positively correlated with dose. Fluoridation adds to the amount ingested from diet. This unfortunate occurrence has increased the incidence of this growing problem as the following references show. *Note: in spite of having shared these references with the authors before their final report, they changed nothing in their brief treatment of this first sign of fluoride poisoning.*

A. In nonfluoridated areas, there is clear evidence that the total prevalence of dental fluorosis has increased over the last 40 years. Review of Fluoride Benefits and Risks, Department of Health and Human Services, February 1991 p 86.

B. New York cities of **Kingston and Newburg**, after a fifty-year fluoridation experiment has shown no difference in dental cavity rates between the fluoridated and unfluoridated cities. The only difference between the 2 cities of any statistical significance is that the **fluoridated city Newburg, NY has about twice the rate of dental fluorosis that Kingston**, the unfluoridated city has. It's about 11 percent in Kingston and 19 percent in Newburg. "Recommendations for Fluoride Use in Children," by JV Kumar and E.L. Green, (pages 40-47, N.Y. State Dental Journal, 1998.

C. The National Research Council admitted that **8% to 51%** and sometimes up to 80% of the **children** living in fluoridated areas have dental fluorosis. 1993

D. An NIDR study of 40,000 children in the US found that dental fluorosis increased in a dose-related fashion with the level of the fluoride in the drinking water: <0.3 ppm had 13.5%; 0.3- 0.7 ppm had 21.7%; 0.7- 1.2 ppm had 29.9%. Heller, K.E. et. al. J. Pub Health Dentistry, 57, 239-249, 1987.

E. Fluorosis: ... a prevalence of 80.9% was reported in children 1214 years old in Augusta, Georgia, the highest prevalence yet reported in an optimally fluoridated community in the United States ... moderatetosevere fluorosis was found in 14% of the children. Health Effects of Ingested Fluoride, Subcommittee on Health Effects of Ingested Fluoride, Committee on Toxicology, Board on Environmental Studies and Toxicology, Commission on Life Sciences, National Research Council, August 1993 p 37.

F. Fluorosis has increased in both fluoridated and non-fluoridated communities at an alarming rate. Data (p.1630) shows that babies 9 months and younger are over-exposed to fluoride. Risk of Fluorosis in a Fluoridated Population and Infant Fluoride Ingestion from Water, Supplementation and Dentifrice (JADA, Dec. 1995)

*R17, page 13 Skeletal System*

C19 Some of the literature cited above was relevant to these authors' skimpy treatment of a major side-effect of fluoride. This section minimizes the

2-26

harm to bone from fluoride. At the very least, suggestions of harm should be treated as a red flag, that is, a meaningful risk factor from long term exposure to fluoride that is the consequence of fluoridation.

R18, page 13, Cancer

C20 Just two paragraphs and two references are written. The report clearly ignores significant direct and indirect evidence pointing to increased cancer risk with fluoride. The authors rely on a review *published 10 years ago*. The final study cited was not peer-reviewed, an important process that helps determine the quality of the investigation.

Below you will see more recent studies cited. Their second citation to a brief report, was not published in a peer-reviewed journal and is 8 years old. For these reasons the conclusions of the authors cannot be relied upon with confidence.

The following brief listings will present a more adequate picture of the literature with respect to fluoride and cancer:

1. In persons under 20, the rates for bone and joint cancers in both sexes rose 47% from 1973-80, and 1981-87 in fluoridated areas of Seattle and Iowa, and declined 34% in the non-fluoridated areas. Osteosarcomas in males increased 79% in fluoridated areas, and decreased 4% in the non-fluoridated areas. Time trends....end results program National Cancer Institute, Fluoride, Vol. 26, No.1, 1993.

2. Thyroid Cancer: Patients with constitutively active adenylyl cyclase have hyperactive tumors. It has been established that mere cAMP elevation is enough to stimulate thyroid growth as well as thyroid cancer growth (Shaver et al, 1993; Orgiazzi et al, 1976; Ledent et al, 1991; Zielke et al, 1999). Such tumours are found elevated in fluoridated areas, and can be clearly seen in the actual data of the NTP carcinogenesis study on sodium fluoride.

The nature of the fluoride compound accumulating in the thyroid gland has never been investigated.) AIF4- has been used to activate ras mutants and p21 ras in the laboratory (Coleman et al, 1994; Kleuss et al, 1994; Xu et al, 1997). Fluorides act directly like TSH in stimulating the growth of cold nodules.

3. Fluoride promotes development of bone cancer.

J.K. Mauer, et al., "Two-Year Cacinogenicity Study Of Sodium Fluoride In Rats," Journal of the National Cancer Institute, Vol. 82, pp. 1118-1126 (1990);  
Proctor and Gamble "Carcinogenicity Studies with Sodium Fluoride in Rats" National Institute of Environmental Health Sciences Presentation, July 27, 1985;  
S. E. Hrudley et al., "Drinking Water Fluoridation and Osteosarcoma," Canadian Journal of Public Health, Vol. 81, pp. 415-416 (1990);  
P. D. Cohn, "A Brief Report on the Association of Drinking Water Fluoridation and Incidence of Osteosarcoma in Young Males," New Jersey Department of Health, Trenton, New Jersey, Nov. 1992;  
M. C. Mahoney et al., "Bone Cancer Incidence Rates in New York," American Journal of Public Health, Vol. 81, pp. 81, 475 (1991);  
Irwin Herskowitz and Isabel Norton, "Increased Incidence of Melanotic Tumors Following



- Treatment with Sodium Fluoride," Genetics Vol. 48, pp. 307-310 (1963);  
 J. A. Disney, et al., "A Case Study in Testing the Conventional Wisdom: School Based Fluoride Mouth Rinse Programs in the USA," Community Dentistry and Oral Epidemiology, Vol. 18, pp. 46-56 (1990);  
 D. J. Newell, "Fluoridation of Water Supplies and Cancer - An Association?," Applied Statistics, Vol. 26, No. 2, pp. 125-135 (1977)
4. Fluoride confuses the immune system and causes it to attack the body's own tissues, and increases the tumor growth rate in cancer prone individuals.  
 Alfred Taylor and Nell C. Taylor, "Effect of Sodium Fluoride on Tumor Growth," Proceedings of the Society for Experimental Biology and Medicine, Vol. 119, p. 252 (1965);  
 Shiela Gibson, "Effects of Fluoride on Immune System Function," Complementary Medical Research, Vol. 6, pp. 111-113 (1992);  
 Peter Wilkinson, "Inhibition of the Immune System With Low Levels of Fluorides," Testimony before the Scottish High Court in Edinburgh in the Case of McColl vs. Strathclyde Regional Council, pp. 17723-18150, 19328-19492, and Exhibit 636, (1982);  
 D. W. Allman and M. Benac, "Effect of Inorganic Fluoride Salts on Urine and Cyclic AMP Concentration in Vivo," Journal of Dental Research, Vol. 55 (Supplement B), p. 523 (1976);  
 S. Jaouni and D. W. Allman, "Effect of Sodium Fluoride and Aluminum on Adenylate Cyclase and Phosphodiesterase Activity," Journal of Dental Research, Vol. 64, p. 201 (1985)
5. Fluoride inhibits antibody formation in the blood.  
 S. K. Jain and A. K. Susheela, "Effect of Sodium Fluoride on Antibody Formation in Rabbits," Environmental Research, Vol. 44, pp. 117-125 (1987)

*R19, page 13, ...people with renal insufficiency may be at risk of toxic effects of the element if introduced at higher than optimal levels.*

C21 This acknowledgement of a long cited risk factor raises questions not discussed, e.g. How many Wichitans with renal problems will be affected if water fluoridation is recommended? What plans will be made for them if tap water is elevated in fluoride levels? The literature is replete with "overfeeds" which, simply stated, refers to accidental releases of fluoride many times above the intended dose. How many citizens with renal problems must exist in Wichita for the author's of this report to warn readers of this danger and suggest other alternatives to fluoridation? Citizens in the nation already ingest more than the intended goal of fluoridation. Even without adding more to the diet, the average citizen ingests more than upper limits of allowable by the EPA.

*R20, page 14 Reproductive Health*

C22 One of the 3 cited, referred only to "secondary data in humans". The impression given is that no significant human studies and effects exist, which is false. (see below)

Fluoride's effects in humans is of prime importance. Also, its effects on other living systems are significant. Animal studies are heavily relied upon in determining human consequences. The KHI study omitted comments about a pattern of effects that

deserve mention: Freni (a 1994 review) demonstrated decreased fertility in most animals studied. This phenomenon was first noted in 1933 and confirmed in 1984. His paper presents multiple examples that lead him to state, without equivocation, that fluoride easily crosses the placenta.

(A study focusing on humans) Because high doses are emphasized in this report, it is worth mentioning that Freni compared the total fertility rate (TFR) in counties whose water supplies had at least 3 ppm fluoride. He found a negative TFR/fluoride association that fitted in with the toxicity data on animals. Most Americans consume this amount of fluoride, ergo, this suggests some degree of risk which should be mentioned. Freni, S.C., Exposure to High Fluoride Concentrations in Drinking Water is Associated With Decreased Birth Rates, *J. Toxicol and Environ. Health*; 42; 109 -121; 1994.

The following unmentioned studies exemplify the research interest and activity relevant to reproduction. These suggest that reproduction should be taken more seriously than the authors' report indicates with their two paragraph treatment of this area.

1. Cox, W.R., The Olsen Publishing Co., Milwaukee, Wisc., 1951. Multiple problems in Chinchillas that were attributed to high fluoride content of commercial animal feed. After changing to a diet low in fluoride there were increases in the number of Offspring born; the number of litters; and, the numbers born alive. The adult mortality rate decreased from 14.6% in 1951 to 3.3% in 1952. A number of abnormalities associated with the fluoride - contaminated feed were passed on through multiple generations.

Cox found more than 1,400 studies that demonstrated adverse effects of fluoride in animals, both wild and domestic.

2. Narayana and Chinoy referred in a 1994 paper to "the wide prevalence of infertility in the fluorosis-afflicted human population in India and other parts of the globe." In their study, mature rats were treated with sodium fluoride (10mg/kg daily for 50 days). They found that fluoride interferes with androgenesis and adversely impaired the target organ structures. They suggested that the effect of fluoride may be on receptor sites. That is, fluoride may alter the concentration or configuration of the receptor, thereby inhibiting the action of testosterone. The similarity of this action to that of the hormone-disrupting chemicals, described in *Our Stolen Future* is obvious. (*Our Stolen Future: Are We Threatening Our Fertility, Intelligence, and Survival?* by Theo Colborn, et al. See review Feb/March 1997, *TLfDP*, # 163/164 pg. 122.) Narayana, M.V., Chinoy, N.J., Effect of fluoride on Rat Testicular Steroidogenesis, *Fluoride*, 27; 1; 7-12, 1994.

3. Some human studies:

A. Chinoy NJ, Narayana MV, In Vitro Fluoride Toxicity In Human Spermatozoa, *Fluoride*, 1994 October, 27:4, 231-232, from *Reproductive Toxicology*, 1994, 8(2), 155-159. Effects of sodium fluoride (NaF) on washed, ejaculated human spermatozoa at doses of 25, 50, and 250 mM were investigated in vitro at intervals of 5, 10, and 20 min. Sodium fluoride (NaF) did not affect the extracellular pH of sperm, except that a slight acidification was caused by the 250 mM dose only. The treatment caused a significant enhancement in acid phosphatase (ACPase) and hyaluronidase activities after 5 and 10 min. Silver nitrate staining of sperm revealed elongated heads, deflagellation, and loss of the acrosome together with coiling of the tail. Sperm glutathione levels also showed a time-dependent decrease with complete depletion after 20 min, indicating rapid glutathione oxidation in detoxification of the NaF. The altered lysosomal enzyme activity and glutathione levels together with morphologic anomalies resulted in a significant decline in sperm motility with an effective

dose of 250 mM.

B. Susheela AK, Jethanandani P, Circulating testosterone levels in skeletal fluorosis patients, *J Toxicol Clin Toxicol*, 34: 2, 1996, 183-9 **OBJECTIVE:** The present study focuses on serum testosterone concentrations in patients with skeletal fluorosis, in order to assess the hormonal status in fluoride toxicity. **RESULTS:** Circulating serum testosterone levels in skeletal fluorosis patients were significantly lower than those of Control 1 at  $p < 0.01$ . Testosterone concentrations of Control 2 were also lower than those of Control 1 at  $p < 0.05$  but were higher than those of the patient group. **CONCLUSIONS:** Decreased testosterone concentrations in skeletal fluorosis patients and in males drinking the same water as the patients but with no clinical manifestations of the disease compared with those of normal, healthy males living in areas nonendemic for fluorosis suggest that fluoride toxicity may cause adverse effects in the reproductive system of males living in fluorosis endemic areas.

Zhang ZY, Zhang GZ, Liu XJ, Effects of Organic Fluorine Exposure on the Reproductive Function of Female Workers and the Development of their Offspring, *Fluoride*, 1993, 26:3

#### 4. Other studies:

- Chinoy NJ, Sukla S, Walimbe AS, Bhattacharya S, Fluoride Toxicity on Rat Testis and Cauda Epididymal Tissue Components and its Reversal, *Fluoride*, 1997,30:1
- Chinoy NJ, Narayana MV, Dalal V, et al, Amelioration of Fluoride Toxicity in Some Accessory Reproductive Glands, and Spermatozoa of Rat, *Fluoride*, 1995, 28:2
- Chinoy NJ, Reddy VVPC, Michael M, Beneficial Effects of Ascorbic Acid and Calcium on Reproductive Functions of Sodium Fluoride-Treated Prepubertal Male Rats, *Fluoride*, 1994, 27:2
- Chinoy NJ, Sequeira E, Narayana MV, Effects of Vitamin C and Calcium on the Reversibility of Fluoride-Induced Alterations in Spermatozoa of Rabbits, *Fluoride*, 1991, 24:1
- Chinoy NJ, Sequeira E, Reversible Fluoride Induced Fertility Impairment In Male Mice, *Fluoride*, 1992, 25:2, 71-76
- Chinoy NJ, Manisha S, Mathews M, Beneficial Effects of Ascorbic Acid and Calcium on Reversal of Fluoride Toxicity in Male Rats, *Fluoride*, 1993, 26:1
- Eckerlin RH, et al., Ameliorative effects of reduced food-borne fluoride on reproduction in silver foxes. *Cornell Vet* 1988 Oct;78(4):385-91
- Hoffman DJ, Pattee OH, Wiemeyer SN, Effects of fluoride on screech owl reproduction: teratological evaluation, growth, and blood chemistry in hatchlings. *Toxicol Lett* 1985 Jul;26(1):19-24
- Kumar A, Susheela AK, Effects of Chronic Fluoride Toxicity on the Morphology of Ductus Epididymis and the Maturation of Spermatozoa of Rabbit, *Fluoride*, 1995, 28:3
- Kumar A, Susheela AK, Ultrastructural Studies of Spermiogenesis in Rabbit Exposed to Chronic Fluoride Toxicity, *Fluoride*, 1995, 28:1
- Narayana MV, Chinoy NJ, Reversible Effects of Sodium Fluoride Ingestion on Spermatozoa of the Rat, *Fluoride*, 1995, 28:3
- Shashi A, Preliminary Observations on Alterations in Rabbit Ovary DNA and RNA Content in Experimental Fluorosis, *Fluoride*, 1994, 27:2
- Shashi A, Biochemical Effects of Fluoride on Lipid Metabolism of the Reproductive Organs of Male Rabbits, *Fluoride*, 1992, 25:3
- Susheela, Kumar A, A Study of the Effect of High Concentrations of Fluoride on the Reproductive Organs of Male Rabbits, Using Light and Scanning Electron Microscopy, *Fluoride*, 1993, 26:2
- Zhao ZL, Wu NP, Influence of Fluoride on Contents of Testosterone and Cholesterol in Rat,

R21, page 14 *Neurological Function*

C23 Just two studies are cited in this tiny 14 line section. This sparse treatment of this significant topic is serious. It misrepresents and minimizes the state of the literature. This is ironic given this reports focuses on school children when intellectual function is especially critical. Some of the topics omitted can be seen in the studies listed below: *mongolism, downs syndrome, psychiatric disturbances, and lassitude, sluggishness, and sedation*. That fluoride effects cellular action and crosses the blood-brain barrier, are important and need to be mentioned. They are consistent with brain abnormalities discovered.

An April 29, 1944 Manhattan Project memo, released in 1997, states "Clinical evidence suggests that **uranium hexafluoride may have a rather marked central nervous system effect**, with mental confusion, drowsiness and lassitude as the conspicuous features. Ref: **Previously classified SECRET** Manhattan Project Memo, 29 April 1944, declassified and released from the National Archives.

1956 Ionel Rapaport, French endocrinologist at the Psychiatric Institute of the University of Wisconsin, ascertains the **birthplace of all mongoloid** children in Wisconsin, North Dakota, South Dakota and Illinois, N = 687 urban cases, he finds a two-fold statistically significant greater prevalence or risk of mongoloid births in communities with **1 ppm** or more in the water. (2<sup>nd</sup> ref. Is *Complete Bk. Of Mineral for Health*, J. I. Rodale, 1972, 369)

8/22/ 1971 British claims the new drug fenfluramine (Fen-Phen) burns up fat and is appropriate for obese people. [In **1997, 26 years later**, it is revealed that fenfluramine damages the heart and **brain**, which might indicate that the original "safety" studies were faked]. The article stated that the fenfluramine pill **contains fluoride**, and is an amphetamine type of drug--**fluoride acts like a sedative**, "it is also likely that it causes lack of appetite."

Kay, A.R., et al, J. Neuroscience, Vol 6, p2915,1986, intracellular fluorides can alter the kinetic properties of calcium currents in **hippocampal neurons**, which can affect behavior.

In 1992, Chinese research at the Deptof Pathology, Guiyang Medical Coll, found cellular abnormalities in **fetal brain tissue** exposed to fluorides.

Two studies found exposure to high fluoride (F) lowers intelligence as measured by IQ test scores. (1) Two suburban villages in Shanxi Province, China, are very much alike but for the level of CaF<sub>2</sub> (calcium fluoride, which is known in crystal form as fluorspar) in the water supplied from underground sources. Occupations, living standards and social customs are similar.

*Xinghua's* water contains 0.9l parts per million (ppm, the same as milligrams per litre) of F. ; the rate of dental fluorosis is 14 percent. That is mottling, softening, increased porosity and brittleness of tooth enamel. The bone fluorosis rate is 0 percent. *Sima* has 4.12 ppm in its drinking water; 86 percent of the population have clearly evident dental fluorosis, and 9 percent have clinically diagnosed skeletal fluorosis. The study does not reveal caries rates.

In each village, 160 randomly selected children took a standard IQ test lasting 40 minutes; each child's mother had lived in the study village during pregnancy. Children whose intelligence had been affected by congenital or acquired diseases not related to F were excluded.

Mean IQ in *Sima* (*high F*) was 97.7; mean IQ in *Xinghua* (*lower F*), was 105.2-(7.5 points, or 7.7 percent higher). The difference in mean IQ's was statistically significant (p<.01). The entire range of IQs was lower in high-F *Sima*, and that village's typical bell shaped IQ curve was

distinctly flattened. Among the selected 160 in Sima the number of children with IQ of 69 or below was six times that in lower-F Xinghua. And 26 percent fewer in Sima had IQ scores of 120 or above.

(2) A separate Chinese study of 907 children ages 8-13 years in four areas of Guizhou Province confirmed those findings.

*The maximum IQ of low fluorosis students was 140; maximum IQ of moderate to severe fluorosis students: 110. The very large difference of 19 points in mean IQ scores between high and low fluorosis areas appears to have been caused in part by exposure to lead as well as F. A separate Chinese study in a coal-burning area found that excessive fluoride lowered mental work capacity and zinc content of the serum.*

Dr. Bruce Spittle cited examples of fluoride affecting adult mental function. (Permission to quote has been kindly granted by the author; *International Clinical Psychopharmacology* is \$389 a year.) "The late George L. Waldbott, MD, in 1979 studied 23 persons living within three miles of an enamel factory that emitted hydrogen fluoride into the air. Symptoms included a distinct decline in mental acuity, poorer memory, inability to coordinate thoughts and reduced ability to write. Those living further away from the factory were less affected and had lower urinary F." He found after an F overdose in 1981 in Annapolis, MD, "Six [among 112 who suffered ill effects] reported deterioration of their mental acuity, lethargy, loss of memory" (see Argument 4).

*"As founder and chief of allergy clinics in four Detroit hospitals, Dr. Waldbott used double-blind tests to determine whether F caused symptoms. These always disappeared when F was taken away without the patient's knowledge and reappeared when it was given again, but not with other possible agents. Hans Moolenburgh, G.W. Grimbergen and others, also using double-blind experiments, confirmed the discovery. Czerwinski and Lankosz studied 60 aluminum smelter workers: 97% had skeletal fluorosis, and 23% had psychiatric disturbances including depression, mental sluggishness and forgetfulness.*

Waldbott and Lee and Waldbott *et al* described 11 cases. Psychiatric symptoms such as lethargy, memory impairment and difficulties with concentration and thinking began after F exposure. This usually occurred with fluoridated drinking water but three cases involved industrial exposure. The temporal relationship was supported by double blind testing in two individuals, single blind testing in four, and high environmental F levels in three cases. Two also had high individual levels.

Dr. Spittle concludes, "there is suggestive rather than definitive evidence that chronic toxicity affecting cerebral functioning can follow exposure to F." But in light of the cited findings in China, the conclusion now appears to me to be definitive.

**Down's syndrome:** Down's Syndrome is a disease closely associated with thyroid pathology. This association has become well recognized, and many studies have explored various aspects of that association. *Mattheis P "Thyroid Disease in Down syndrome: Clinical perspectives, and directions of research" Presented at 2nd Internl. Symposium on Biomedical and Psychoeducational Aspects on Down Syndrome, Mexico City, April 24, 1997. <http://fas.sfu.ca/fas-info/kin/ds/thyroid.htm>*

Already in the 1950s, Ionel Rapaport published studies showing links between Down's Syndrome and natural fluoridation. Later Rapaport also showed that the age of women bearing mongoloid children decreased, directly related to increasing fluoride intake. These studies have never been refuted.

[Rapaport, 2<sup>nd</sup> study (1959) on fluoridation and birth defects in Illinois spanned six years (1950 to 1956). Results showed a highly significant association between the frequency of Down's Syndrome and the fluoride content of the mother's drinking water. ]

Burgstahler (1975, 1977) later **confirmed Rapaport's findings** and noted that many of the clinical and bio-chemical peculiarities (which could be found in Down's Syndrome) were similar to the characteristics of chronic fluoride poisoning. As of 1978, all properly conducted large scale-studies conducted had shown higher incidence of Down's Syndrome births in communities with elevated levels of fluoride in the drinking water. (*Waldbott et al, 1978*)

Ian Packington, a toxicologist on the advisory panel of the National Pure Water Association (NPWA) also reported results from an analysis done on Department of Health statistics in the UK, concluding that in the period 1983-86 cases of Down's Syndrome were 30 per cent higher in fluoridated than non-fluoridated areas.

The number of excess DS births due to water fluoridation is estimated to be several thousand cases annually throughout the world. Takahashi K - "Fluoride-Linked Down Syndrome Births and Their Estimated Occurrence Due to Water Fluoridation" *Fluoride*, 31(2):61-73 (1998) <http://www.fluoride-journal.com/98-31-2/31261-73.htm>; APA/The Monitor - "Down's Syndrome shares symptoms with Alzheimer's" <http://www.apa.org/monitor/oct95/old.html>

*R22, page 14. Summary: Except for fluorosis, little of this research has been able to show a clear association between fluoride and the diseases just described, and most do not meet scientific standards of replicability or statistical significance.*

C24 This statement is untrue. The reader can judge the credibility of this summary statement using the samples of studies offered by the Team for each condition. The protocol for reviews of scientific studies (such as a KHI review) requires that all studies that are evaluated will be listed. Under each section of the "Risks" chapter (conditions discussed) there is a pattern showing a paucity of references and comments. Of course, these do not accurately reflect the weight of the available literature. To the uninitiated, this pattern would incorrectly suggest that no significant effects of fluoride exists and, by extension, that risks are absent or minimal, at best.

The reader must assume that the paucity of studies cited reflects an incomplete assessment of current scientific findings. The confidence one can place in the summary statements and conclusions are related to the breadth and depth of the analysis. This critical topic, risks to human health, deserves much more consideration than the brief treatment given in this report.

Some conditions for which research exists are completely ignored. For example, oversensitivity to fluoride is not mentioned. It has been estimated that at least one percent of the population is oversensitive to fluoride. If this figure is reduced by a conservative 50%, then those who would be exposed to Wichita fluoridated water would be 1750 citizens having adverse health consequences. How serious is this risk taken vis a vis alleged benefits?

*R23, pg. 14. The scientific standards required to consider fluoride a health risk when used at the optimal dose have not been achieved.*

C 25 This conclusion is not supported by the literature cited. (Again see the 49 page paper cited above: "**Effects of fluoride at concentrations of one part per million or less**" it contains hundreds of references )

*Ch. 7, page 16. ALTERNATIVES TO WATER-DELIVERED FLUORIDE*

*R24, page 16 Salt: The negative aspects of salt fluoridation include the following: ...individuals vary in their salt intake which poses both risk of under- and over-exposure to fluoride; and underdose.*

C 26 This is the SAME RISK that water borne fluoride carries. The benefit of salt is that only targeted individuals are dosed which reduces dose problems

for the majority of the city population.

*R25, page 16 Fluoridated salt currently is not available in the United States.*

C 27 Of course, if desired it could be obtained. Why is its cost not stated. Such data would permit an economic comparison with other alternatives. (Perhaps, as in the first version of this report, its unavailable in the U.S. " *so a meaningful cost assessment is impossible.*" This omission is significant. Our cursory investigation found that the cost is for a 2-g per day consumption, about 55 cents per annum. (see comments below) This yearly figure is almost exactly what water delivery is said to be per citizen. But has the advantage of safeguarding civil rights and permitting the oversensitive to avoid fluoride.

Important comments from the literature which are **not** cited in this report:

*(NOTE: What does it mean that the KHI was provided with all this information before their final revised edition? Why do they not check out scientific references, especially when an analysis of alternatives was the prime concern and request? )*

Using salt as a vehicle for other trace elements is not a new concept, since it is the major route of iodine supplementation in many countries, successfully eradicating goiter due to iodine deficiency. In China, it has also been used successfully as a vehicle for selenium to overcome Keshan disease, a necrotizing cardiomyopathy where selenium deficiency is the major causative factor (Levander, 1986). Fluoridated salt was introduced in Switzerland more than two decades ago, and has since found great acceptance in many countries (Marthaler, 1981; Marthaler and Steiner, 1981; Marthaler et al., 1978).

(1) Advantages

- a. Salt is itself a supplement.
- b. Compared with drinking water fluoridation, salt allows the consumer free choice.
- c. Unlike daily intake of fluoride tablets or drops, no attention has to be paid to lifelong daily compliance.
- d. The supplement is not taken as a single bolus dose once every day with its peak concentrations of fluoride in plasma, but rather in small amounts throughout the day.
- e. The cost is very low; In Germany, the addition of fluoride does not increase the price over iodized salt. However, iodized salt may cost up to 1,20 DM ( or about 75 cents) per kg and therefore is more expensive than salt without any supplements. This means, for a 2-g per day consumption, about 55 cents per annum.

(2) Disadvantages

There is a general agreement that a high consumption of sodium is a risk factor for hypertension. Recent studies, including the Intersalt Study (1988), confirm an independent role of sodium for the age-related increase of blood pressure and for the development of hypertension. It is assumed that about 20 to 40 % of the general population are sensitive to sodium. However, no reliable screening method is available to identify persons at risk. Therefore, national and international bodies recommend a decreased salt consumption in the general population (National Research Council 1989; Deutsche Gesellschaft für Ernährung, 1991).

Conclusions:

1. We consider salt fluoridation to be a good means to increase the fluoride intake of the population.
2. Enrichment of salt with trace elements known to be deficient in a population at large is compatible with the objective of decreasing salt consumption.
3. The fluoride levels in salt recommended at present appear to be below optimum. They could be increased as soon as more experience in its acceptance and consumption as well as its effects on dental caries are available.
4. Salt fluoridated at 250 mg/kg does not present a risk for excessive fluoride intake.
5. However, *only one form of systemic fluoride supplementation should be recommended to the public and the individual*. That means that, if fluoride table salt is used, no other supplements - e.g., fluoride tablets or mineral water high in fluoride - should be consumed, except for the first two years of life, with their low consumption of table salt. Careful public information needs to accompany the introduction of salt fluoridation.

References:

Intersalt Cooperative Research Group (1988). Intersalt: an international study of electrolyte excretion and blood pressure. Results for 24 hour urinary and potassium excretion. *Br Med J* 297:319-328.

Marthaler TM, Mejia R, Toth K, Vines JJ (1978). Cariespreventive salt fluoridation. *Caries Res* 12 (Suppl 1):15-21.

R27 page 16, *Milk*

C28 The literature is not well represented in this short comment. Only one study (1984) was cited. More recent studies were ignored. Why?

Another study, published this year, confirms fluoride's action in milk.

Microcosmic dental plaques were grown in artificial saliva and supplemented with either milk or fluoridated milk. The presence of fluoride in the milk increased the pH of the biofilms and reduced the proportions of streptococci, demonstrating that in this model, fluoridation of milk produces biofilms with reduced cariogenic potential. An in vitro study of the effect of fluoridated milk on oral bacterial biofilms. Pratten J, Bedi R, Wilson M, *Appl Environ Microbiol* 2000 Apr;66(4):1720-3; Dept. Microbiology, Eastman Dental Institute for Oral Health Care Sciences, Univer. College London, London WC1X 8LD, United Kingdom. jpratten@eastman.ucl.ac.uk

Again, for this option, individual differences in consumption and tolerance are cited as problematic. Both of these problems are also limitations associated with fluoridation BUT NOT EMPHASIZED IN THIS REPORT. Some citizens are *intolerant* to fluoride. The reason for this inconsistency in discussing intolerance warrants consideration because *it speaks to either the lack depth during the survey of the literature or of bias*.

Again, the authors avoid discussion of costs, for the same reason as was cited for salt. In spite of receiving criticism on this point, cost statements are not to be found. The task given to compare alternatives is incompletely fulfilled.

R28, page 17, *Sugar*

C29 What are the details of international use of sugar?

R29, page 17 *The potential advantage of fluoridated sugar (or sugar substitutes)*



would be particularly appealing to the children's food industry from a marketing perspective.

C30 Indeed, the compliance problem of great concern to dentists and parents could be significantly reduced using a sweet product. This option also avoids the problems of mass medication. Again, KHI researchers were informed of a sweet option that is effective in fighting cavities, this version of the report treats it superficially. Xylitol has been distributed in schools effectively for years in Europe. It should be considered because of its advantages and ability to kill the same bacteria as fluoride!! There is a book and a great deal of research on xylitol. It is an active ingredient in dental chewing gum made by several U.S. companies.

R30, page 17, *Supplements (Tablets/Drops): This would add substantial costs in addition to being impractical on a population-wide basis.*

C31 The costs mentioned may vary considerably if needy children are given supplements at school so that a local government would receive a quantity discount.

That fluorosis increases with increases in dose is properly recognized. However, the cost of fluorosis repair is ignored. While discussing assessment of the dietary intake of the child (World Health Org.) these authors say it is too expensive. Of course, diagnosing a patient's level of a drug is costly, but without it any prescription of the drug is made blindly; it is gambling. The significance of this risk of overdosing is not mentioned here: is this not a key issue when discussing the use of fluoride?

One citation mentions revising recommendations, "What was the outcome of the dose recommendations?" What are the changes since 1958 and the 1970's mentioned?

Consider this, a physician following the revised recommendations of the ADA and the American Association of Pediatrics, can not prescribe to a 6 month to 3 year old child any more fluoride than is found in one cup of fluoridated water. How do we keep these kids from ingesting fluoride when if it is put into the water used for preparing food and for drinking.

Then too, in 1996, fluoride supplements guidelines were revised by the Canadian Dental Association and the Ontario Dental Association and supported by the Regional Niagara Public Health Department: *specifically they recommended **no supplements for children less than three years of age.** This regimen was based on recent trends in dental fluorosis, which displayed a marked increase.*

These authors do not mention that in 1993 FDA admitted that no studies exist showing fluoride tablets or drops are safe . This was *also ignored* under the chapter on "risk".

Systemic fluoride has been said to have its major cariostatic benefit (if any) during early developmental years. It is, therefore, impractical to ask the entire city population to drink it. (of course, systemic benefits are currently challenged *by dentists* in favor of topical exposures.)

R31, page 18, *Topical Alternatives*

C32 Compliance concerns are reduced with a gum/mint because of the good taste. As indicated Xylitol gum/mints have no risk of over-dosing. An additional non-toxic alternative increased compliance to almost and amazing 100% . It occurred in a school-community dental hygiene incentive program (JADA, 1929).

R32, p 19 *Costs of dentist-applied gels were unavailable from the participating dentists surveyed.*

C33 However, on Table 7-1, page 23 gel is listed. There seems to be is a contradiction between the statements on page 19 and 23.

R33, page 19 *Rinses ....sodium fluoride...*

C34 This form of fluoride is probably safer than the contaminated fluorosilic acid used in 90% of drinking water systems because the latter is a diluted scrubber liquor.

R34, page 19 *Rinses ...the risk of swallowing....*

C35 This risk currently obtains when children use toothpaste. This revised edition of the KHI report deleted the word "poison" which is literally correct according to government instructions on how to treat fluoride overdoses. *Why water down this risk factor?* A suggested answer is that it points to the fact that any fluoride in any dose is still a poison according to biochemists and toxicologists. (Again, it minimizes the risk of water fluoridation that this report seems to favor throughout.)

To avoid the risk of swallowing rinses of doses in a clearly dangerous range, a leading dentist suggests bathing the teeth in fluoridated water. Children can then spit it out. (Dr. Featherstone (July 2000). His recent lead article in the JADA, tell us that fluoride's primary effect is topical, not systemic.

What is the quantity-discounted cost of a fluoride rinse used in a school sponsored program? Using fluoridate water as a rinse would be greatly less expensive.

R35, pg.20 *"...toothpastes have been subject to the most rigorous clinical testing.."*

C36 Various forms of high grade fluoride used in toothpaste are mentioned, and touted as safe as implied by the phrase *"most rigorous clinical testing."* Because this fluoride uses a higher grade of fluoride compound (pure) and because the essential action of fluoride is from topical applications, and because it is inexpensive, **toothpaste should be strongly recommended over**

**drinking fluoridated water by the FAT-W team.**

R36, pg 20 ...warnings....

C37 Indeed the warnings on toothpaste demonstrate that fluoride is dangerous...the authors finally acknowledge the advice to call a physician or the poison control center if a child swallows fluoridated toothpaste. The point is, fluoride is harmful to the body, especially at high doses. However, small doses over a long time build up in the system and permeate most cells of the body, including the brain.

Consider all the options that top dentists recommend: "Baking soda and salt or a mixture of both with hydrogen peroxide are among the most effective disinfective (germ killers) available even today..." they are "...the most reliable approach is to use the common, time-tested agents..." Dr. David Kennedy, DDS

*R37, pg. 20 Many researchers agree that it is toothpaste...and not optimally fluoridated water, that is principally responsible for current fluorosis levels observed among children.*

C38 This pro-water delivery statement is unsupported in this document and in the literature. The New York studies cited above in which toothpaste use can be expected to be equal in both towns with and without fluoridated water, show a significant increase in fluorosis in children of the fluoridated community. The attempt of this KHI report to sanitize fluoridation is noted again. Such a gratuitous statement is inappropriate for alleged scientific, and objective researchers.

*R38, pg.20 Those choosing not to expose children to any topical alternative could still provide a dentifrice for oral hygiene use.*

C39 This statement makes no sense unless one inserts the word "fluoride" in topical alternative and "non-fluoride" before "dentifrice". Most commonly used dentifrices are indeed topical, fluoridated or not. At least, the implied non-fluoridate alternatives are recognized.

*R39, page, 20 Omitted from this report version: "With a prescription, toothpaste with fluoride at a 1.1% concentration can be purchased."*

C40 Water delivery does not require a prescription but fluoride at equivalent doses does. This important fact is avoided in this report. Why? Prescription drugs are controlled for significant health risk reasons. Again, fluoride risks are minimized in this report by not mentioning that fluoridation involves the same dose that otherwise requires a prescription. This should be discussed and explained if fluoridation is recommended.

R40, pg 21 Fluoridated chewing gum

C41 This option is said to no longer be available. If it is desired, a world

wide search should be pursued.

The acceptability of gum is correctly mentioned. It fosters compliance, a major problem about which dentists complain. As mentioned earlier and omitted from this gum section, is existence of a non-fluoridated product, chewing gum and mints containing cavity-fighting Xylitol. The authors mentioned non-fluoride toothpaste as an option for parents, why exclude this immediately available decay-fighting choice

R41, pg.21 FDA clearance (for varnishes)

C42 This statement shows the authors are aware of the importance of FDA clearance. But, they do not mention its lack with regard to water delivered fluoride or with other options. Why? **A critical analysis of all possible uses of fluoride should check each and every one for FDA approval.**

Again, local dentists surveyed did not have cost figures, perhaps the ADA might.

Before leaving the section called "Topical Alternatives" it is important for the reader to be aware of the scientific information available that refutes the notion that ingested fluoride is necessary or even desirable.

**THIS IS A CRITICAL ISSUE WHEN DESIDING BETWEEN TO USE AN ALTERNATIVE OR TO ADVOCATE FOR THE FLUORIDATION OF DRINKING WATER.**

If the primary action of fluoride is on the surface of the teeth, then there is no compelling reason to expose children and adults to the risk factors attendant to drinking it for a lifetime. This point is strongly emphasized in this critique because of the recommendation of these reviewers to fluoridate. Consider the following citations in helping to form your decision.

1. The Center For Disease Control (1999) says: *Fluoride's caries-preventive properties initially were attributed to changes in enamel during tooth development because of the association between fluoride and cosmetic changes in enamel and a belief that fluoride incorporated into enamel during tooth development would result in a more acid-resistant mineral.* However, laboratory and epidemiologic research suggests that fluoride prevents dental caries predominately after eruption of the tooth into the mouth, and its actions **primarily are topical for both adults and children** (1). *These mechanisms include 1) inhibition of demineralization, 2) enhancement of remineralization, and 3) inhibition of bacterial activity in dental plaque (1).*

2. ...any (small) benefit from fluoridation comes from the action of fluoride at the **surface of the teeth** before fluoridated water is swallowed." Diessendorf, M. et al, Australian & New Zealand J of Pub Hlth, 1997, 21,2

3. Dr. H. Limeback, professor of preventive dentistry at the University of Toronto, fluoride's decay preventing effects are mostly topical are also quite relevant. "A Re-examination of the Pre-eruptive and Post-eruptive Mechanism of the Anti-Caries Effects of Fluoride: Is there Any Anti-Caries Benefit From Swallowing Fluoride?" Community Dental-Oral Epidemiology, V. 27, pgs. 62-71,1999.

4. JADA, July 2000 peer-reviewed cover story **there is no physiological method for ingested fluoride to reduce tooth decay**; any reduction of tooth decay from fluoride is due to **topical application. "Fluoride ...works primarily via topical mechanisms."**  
Featherstone, J.D.B. The Science and Practice of Caries Prevention. JADA, 131, 887-899, 2000

5. These (topical products) are "superior to fluoridated water" (Pediatric Nursing, 1997).

6. "...protection against dental decay was primarily due to the reaction of fluoride **in the mouth** rather than by systemic routes...reduction in dental decay in adults and in children has now been attributed primarily to the almost universal use of fluoridated tooth pastes. (p. 10; refs. 1 & 2.). .... fluoride "has an antibacterial action... when fluoride enters the bacteria, it interferes with the enzymes inside the bacteria, inhibiting acid production. " In other words, when the bacteria eat the sugar on your teeth their digestive enzymes create acid which causes tooth decay. Fluoride interferes so the bacteria starve to death and, if you use fluoridated toothpaste, you have no plaque or decay. The Mechanism of Dental Decay, Dr. John Featherstone, [chairman of the Oral Biology Dept., Eastman Dental Center, Rochester, N.Y Nutrition Today, May/June, 10, 1987.

#### 7. Other references:

- Burt, B.A. (1994). Letter. Fluoride, 27, 180-181.  
Carlos, J.P. (1983). Comments on Fluoride. J.Pedodontics. Winter, 135-136.  
Fejerskov, O. et al (1981) Rational use of fluorides in caries prevention. Acta Odontol. Scand., 241-249.  
Levine, R.S., (1976). The action of fluoride in caries prevention: a Review of current concepts. Brit. Dent. J. 140, 9-14.  
Limeback, H. (1999). A re-examination of the pre-eruptive and post-eruptive mechanism of the anti-caries effects of fluoride: is there any caries benefit from swallowing fluoride? Community. Dent. Oral Epidemiol. 27, 62-71.  
Limeback, H. (2000) Videotaped Interview. available from GGVideo, 82 Judson Street, Canton, NY 13617. Tel: 315-379-9544. Fax: 315-379-0448. E-mail: ggvideo@northnet.org and www.FluorideAlert.Org  
Margolis, H.C. and Moreno, E.C. (1990). Physicochemical Perspectives on the Cariostatic Mechanisms of Systemic and Topical Fluorides. J. Dent. Res 69 (Special Issue) 606-613.  
Shellis, R.P and Duckworth, R.M.(1994). Studies on the cariostatic mechanisms of fluoride. Int. dent. J. 44, 263-273.

**The KHI review omits these references (above).** They are offered for the discerning reader to check, especially if he/she is predisposed to favor water delivery of fluoride.

R42, pg. 22 **Alternatives: Summary:** *The risk of under-consumption or over-consumption of fluoride is a common factor when considering any alternative to standard water fluoridation.*

C43 This sentence misleads. It omits water fluoridation itself. Why? Delivery of fluoride by drinking water gives us an uncontrolled dose, just like some alternatives. It has been long recognized that citizens vary greatly in water consumption so over-under dosing is guaranteed with fluoridation. This common

fact is so obvious its omission needs explanation. Without clarification, this is another hint that alternatives to fluoridation are discounted. *This omission seriously undermines the credibility of the authors, deliberate or not.*

*R43, pg. 22 If the most important impact of fluoride is on the oral environment when present in consistent, low dosage, no other alternative provides the benefit as well as drinking water.*

C44 This statement under appreciates at least one alternative; it reflects the superficiality of the consideration of alternatives. **Salt is also said to deliver a consistent, low dosage application** (see above). Also, swishing and spitting out fluoridated water will bathe the teeth. In school rest rooms, a dispenser of fluoridated water could be designated for that purpose and be used several times a day. *Drinking* the water is not necessary to achieve any benefits (JADA, July, 2000) and exposes the child to several suspected risks. Chewing xylitol gum or using xylitol mints after snacks and meals would offer almost equal frequency of intake to both water and salt and produce a cariostatic effect several times a day.

*R44, page 21 ....costs associated with the fluoridation of public water is approximately \$0.50 per person per year with a range of \$0.12 and \$5.41 per person per year, depending on the size of the community.*

C45 This report fails to list the specific factors included in calculating water fluoridation costs. It would appear that the stated person/year figures reflect only the product cost. *This figure is highly misleading.* If the decision as to whether to use an alternative vs. drinking water delivery is based on cost, a careful study of the comprehensive costs is strongly suggested. The formula for the proper calculation is so very complex that it is not appropriate to insert one study into this document. Please see the Economics document prepared by the Fluoride Awareness Team. It is lengthy and detailed.

As noted above a significant and obvious omission from this report is the significant cost of treating the increase in dental fluorosis attendant to instituting water delivery of fluoride.

To illustrate the complexity of estimating actual costs, see the following list of the factors that significantly influence the costs and savings calculations of fluoridation.

- Amortization costs
- Chemical (depends on the particular compound)
- Corrosion control chemicals
- Repairs and replacement of privately owned and publicly owned equipment due to corrosion
- Training of personnel
- Avoiding fluoridated water: purchase of unfluoridated water or removal equipment
- Environmental impact costs (almost impossible to estimate) 99% of the chemical put in the water never reaches the target group, but instead "seeds" the river and environment.
- Defending against lawsuits

**Treatment of "side" effects**

- Fluorosis : it increases by 10 to 60 % ; repair is as high as c. \$700 per tooth.
- Cardiovascular
- Elderly (are more vulnerable)
- Kidney problems. or undergoing dialysis treatments
- Lead effects: children in fluoridated cities have higher blood levels of lead, a toxin.
- Osteoporetic fractures of the forearm, spine and hip, osteoporosis, arthritis and ligament damage.
- Undernourished persons: those deficient in calcium, magnesium, and/or vitamin C, (poor kids are likely to lack these protective minerals)

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**A different cost comparison** involves including the costs or savings based on comparisons of **dental care costs** for populations with and without fluoride. Studies: California, Louisiana, Texas  
Also, costs should be compared with other countries both fluoridated and not.

**Calculating cost per person:** The yearly cost of fluoridation can be divided in two ways: 1) by the number of citizens in a community (the usual method reported) or 2) by the number in the specific target group, viz., children in need.

- a. in considering cost efficiency, note that decay has declined over the last 25 years (in cites with and without fluoridated water); also, now 50% of children are caries free in adult teeth . 80% of caries occurs in only 15% of the population. Thus, there are fewer cavities in the population and that *any percentage reduction in the incidence of cavities involves many fewer incidences* than was previously the case.
- b. 55% of the children in communities having un-fluoridated water are cavity free.
- c. Because only 1% of all water processed by the Water Department is drunk.
  - 1. In 1967, Dr. F.B. Exner: for each thousand dollars spent for fluoridating water, less than 50 cents goes for the intended purpose of supplying each child with one quart of fluoridated water per day.

**SAVINGS EXPECTED:** These are based on beliefs that ingested fluoride prevents decay and the costs of treating it. How do any actual savings differ from programs using each of the fluoride delivery alternatives, and the non-fluoride alternatives? What are the costs of each alternative?

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Cost-delivery-efficiency: Although the delivery of a drug by water is reliable, it is not necessarily economically efficient compared to delivery by other means to a specific target group. In Wichita, the target group comprises about 7% of the total population (a stated 24, 000 poor children of about 350,000 served by our water department). In short, the cost/person in the target group is the true divisor into the estimated full cost of fluoridation. It is misleading to cite a cost per every citizen when the drug program is initiated for a few (7%). *The same divisor must be used when estimating all alternatives.* Only the target group will receive non-mass dosing alternatives. For example, toothpaste or bottles of rinse would only be dispensed to less than 7% of the 350,000 citizens.

**Experts estimate that there are no savings from water fluoridation.**

2-42

C46 Fluoridated Salt, Milk, and Sugar costs are not listed. They cannot be considered economically. If attractive, these data might be obtainable.

*R46, pg. 24 Table 7-2 Some alternative methods of fluoride delivery have not been approved by appropriate United States regulatory agencies (i.e. Food and Drug Administration)*

C47 The authors permit their dollar values to rank order their data. Perhaps this task is best left to the reader whom this report is alleged to serve. This critical comment is made to highlight the presumption made by the authors from the beginning of this document. For a host of reason, that will be summarized elsewhere, it appears that a bias in favor of water fluoridation operated herein. Although the authors claim any bias is simply a reflection in the state of the "available evidence". This disclaimer can be evaluated in light of the additional information references provided by the Team.

## **Ch. 8, page 25 METHODS TO REMOVE FLUORIDE FROM WATER**

*R47, page 25 One final alternative...would provide non-fluoridated drinking water to citizens in a community with a fluoridated water supply.*

C48 The degree of necessity and desire among citizens is not discussed; it wasn't estimated. What are the characteristics of the population wanting or requiring water without artificial fluoridated water?

*R48, page 26, Specifically, activated carbon filter removes 81% of fluoride, reverse osmosis can remove approximately 84% and distillation unites remove 99% of fluoride from tap water.*

C49 The single citation appears to offer erroneous information [retained in this final version in spite of feedback to the contrary]. Other sources say carbon filtration is not effective with fluoride. Those sensitive to fluoride could be misled by relying on such filtration. Therefore, this information must be checked for accuracy.

1. Carbon is excellent at trapping the larger molecules, chemicals, and larger microorganisms; it is **not good** at removing inorganic minerals **including fluoride** bound strongly to sodium or calcium, the way it is added to municipal waters. However, if nitrate levels are high or if we want fluoride removed, **reverse osmosis is necessary**. *Staying Healthy With Nutrition, Elson M. Haas, M.D.*

2. Charcoal filters remove chlorine but not fluoride. Reverse osmosis will remove **93 - 95 %** of the fluoride. *The Great Water Company (A division of Porta Via Water Company, LLC), 700 Centre City Plaza, 151 N. Main, Wichita, KS 67202-1408, Central Time, Toll Free 877-262-5191, International 316-262-5191*

3. A reverse Osmosis filter does not totally take away all Fluoride and according to some texts on the Web there is no safe level of Fluoride what so ever. A reverse Osmosis filter takes away perhaps **95 - 99 % of all Fluoride**. If we want to be completely sure we have to get a **Water distiller**. <http://www.ummah.net.pk/dajjal/fluor1.html>



*R49, page 27 As these options indicate, the economic impact of providing non-fluoridated water to some individuals in a publicly fluoridated community depends on the number of people who participate in a "opt-out" program.*

C50 No attempt is made to estimate the number of citizens "opting out" either by choice or medical necessity. This figure is extremely important in estimating the full and true costs of community water fluoridation. This omission is serious.

In some areas, citizens have filed lawsuits to have the local government provide home units for reverse osmosis filtration. These can be filed inexpensively so the number filed could be significant. This report would be more complete if it would calculate the economic impact of such suits, and of general litigation regarding fluoridation.

#### *Ch. 9, page 26 NEW TECHNOLOGIES*

*R50, pg. 29 Chewing Gums*

C51 This final report included this important option and even mentions Xylitol. It fails to attempt comparison of the efficacy of Xylitol relative to fluoride. This analysis is important since both claim to inhibit the same bacteria that cause dental decay. Only one xylitol reference can hardly reflect the nature of this promising non-toxic alternative. As mentioned, xylitol decreases recurrent otitis media, a very important problem for children. That this option is given ONE SENTENCE in an "alternatives" report, seems to ignore the spirit of the City Commissions mandate to the Board of Health.

In the spirit of safeguarding dental health, both gum options mentioned should be given longer treatment.

#### *Ch. 10, page 30 KHI DENTAL HEALTH STATUS PROJECT*

*R51, page 30 ...an assessment of both current fluoride exposure and current dental caries experience would be basic to developing an informed position on the use of supplements fluoride at both a community and individual level.*

C52 This excellent statement recognizes the debate over fluoride and seeks to attain important information. However, *it appears that critical measurements were not taken*. The only exposure to fluoride approximated in this study is derived from interviewing dentists and looking at dental charts. An analytic view of fluoride exposure must include all major sources of the chemical: diet and fluoridated dentifrices. This figure is medically, dentally, and scientifically necessary in order to prescribe any amount of fluoride to a child. Dentists make this point, especially with respect to youngsters from aged 0 to 3.

Reliable data exist to suggest that diet and dentifrice sources provide MORE THAN the optimal dose exists. It points to the need to diagnose before

treating all citizens with a medicine. There is ethical medical president for this health process.

The second measure is also important, *current dental caries experience*. Such data can be used as the base line used as a basis of comparison for future measurements after some program is implemented. Only pre-measures of significant variables can permit an accurate assessment of new interventions. The significance of scientific controls cannot be over stated. As noted earlier, the fluoridation flagship study was compromised when the control city was nullified before the trial was complete. The tragedy is that *Public Health officials did not wait for valid results* to be obtained. They convinced cities to fluoridate without a single proper scientific trail. It is regrettable that this KHI study did not seek information that would help the City Council distinguish between various alternatives to the use of fluoridated water. Our population is ideal because the variable of artificially fluoridated water is absent.

*R52, pg. 30 ...purpose of the...project...dental health status of school age children, age 5-18 years in Wichita/Sedgwick County.*

C53 The stated aim of fluoridation is to reach children of poverty. This study did not directly assess this group in Wichita. Therefore, we cannot estimate the level of dental health compared to other cities in the US. This study only incidentally and indirectly included poor children by a general and imprecise method (see classification by zip code). The project's goal is stated as : "estimate of the level of dental disease and treatment for Wichita and Sedgwick County youth." Because, water fluoridation is heavily relied upon as a benchmark in this report, a matched control group would include a group that has been exposed to fluoridation for at least 10 years. These data is available for the US and international cities. Statistics relevant to Wichita are of interest to our City Government and Department of Health. It is absent.

*R53, pg. 31 Not all children are receiving fluoride treatments regularly from their dentists...*

C54 How many received none? How was this subgroup different from others? Were there any statistical differences? What was their exposure from other sources?

What does it mean that fluorosis was not mentioned on any charts? It would appear that this finding suggests that our children are below the national average and certainly below that for fluoridated communities. **Is this not good news?** (See R67 below)

*R54, pg. 31 Differences in the average number of decayed and filled teeth could not be attributed to receiving dentist-office-visit fluoride treatment, the insurance status of the patient, or whether the child received at least one sealant.*

C55 What could they be attributed to? Did the experimental design prohibit this analysis? Do you mean there were NO statistically significant

differences related to fluoride use or non use? Such data would be useful in demonstrating the efficacy of fluoride alternatives; the prime information desired by the City Council.

*R55, pg. 31 The results indicate that receiving less than optimal fluoride levels is the "equalizer: among groupings of children.*

C56 What does this mean? What is the standard for "optimal fluoride level" in a dentist's office? How many children achieved it and how did they differ (or not) from other children? What does "equalizer" mean-that most kids were equal in the amount of fluoride? How was it measured?

*R56, pg.31 The results indicate that receiving less than optimal fluoride levels is the "equalizer" among these groupings of children.*

C57 Does this statement refer to "dentist administered" fluoride treatments, by any method (prescription, sealants, gels, etc.)? If not, then, it is possible that increases in dietary fluoride and home use of fluoride toothpaste might approach or exceed optimal levels? What are the "optimal levels" of dentist-administered treatments? ...of home achieved doses of fluoride (diet, fluoride dentifrices)?

*R57, page 33 ... 75% of the dental offices the charts had been selected by office staff prior to the arrival of the researchers....*

C58 Researchers should have observed staff chart-pulling **to assure random selection.** The staff's foreknowledge about the purpose of the study could contaminate the procedures. "Blind" participation is an ideal protocol for many studies. The conflicted and emotional aspect of public reaction to fluoridation dictates great caution in doing research with implications for or against its implementation locally.

*R58, page 34: Each sub-sample was analyzed separately, but only the County based sample results are described below. The reason is that the USD 259 sub-sample cannot currently be compared to the available data from the school inspection data.*

C59. The county sub-sample was comprised of 463 charts. The results described are based on these. Students living in USD 259 boundaries numbered 395. To describe this sub-sample may offer a more uniform group to study, namely, those educated in the Wichita school district and exposed to its unique dental education programs. From this perspective, the ***inclusion of 68 charts living outside the district contaminates the findings.***

What was the reason that the school inspection data made the USD sub-sample unfit for description in this report?

*R59, page 35 Sedgwick County boundary... Their residence zip codes span the entire county, with the largest zip codes represented being 67212, 67217, 67226.*

C60 These zip codes are not the largest in territory. Perhaps, the reference

is to the number of children studied? What proportion of the total population represented children of poverty? Are Wichita's poor a part of the "crisis" reported in the Surgeon General's report? The data appear to be minimal, however, it seems this goal was not articulated as part of the research task.

*R60, pg.35 Fluoride treatments were provided as a routine part of a prophylactic examination Over 1800 fluoride treatments... [of 5004 total visits].*

C61 What does "routine" mean? How often were they given and how many dentists gave them. How many visits were prophylactic? Answers would help evaluate the amount of fluoride exposure and its ubiquity. This is important to know, in addition to the amount of exposure from other non-dentist sources if the assumption is to be supported that Wichita children are not sufficiently exposed to fluoride according to proponents goals.

*R61, pg.35 The rate of sealant use is more than twice the rate reported nationally.*

C62 This statistic shows above average care for local children using this method.

*R62 page 36: Dental health findings: missing teeth*

C63 Although the rationale is explained for omitting missing teeth from this study, can we assume that other studies using DFMT (a standard measure) had the same problem but include missing teeth? Such practice would be based on the assumption that non-orthodontic and other reasons for missing teeth would average across populations when comparing fluoridated populations with those un-fluoridated. To deliberately omit missing teeth (M) when designing the study automatically reduced its meaningfulness. The report admits the omission of M reduced some comparability. Was a consulting dentist involved in designing this study?

*R63, page 38: ...the socioeconomic factor of the average family income does not predict a child's dental decay status in this study. (no statistically significant differences)*

C64 This finding suggests that Wichita's poor children are not among the "silent epidemic". This finding seems quite significant from two points of view: 1) The chapter dedicated to the Surgeon General's report (page 2) cites a "silent epidemic" among vulnerable populations such as children, the uninsured and the poor. The researchers thought it important to mention this plight three times. Given their emphasis and the findings contradiction of the Government report, some discussion is expected. 2) It weakens the sense of need and urgency for additional dental interventions.

*R64, pg 38, (a note that is added to the final report) Note: A comparison of the children in the Sedgwick County, subsample by income as determined by zip code are showed a higher ratio of dental defects for children in the lowest incomes, compared to*

children in families with the highest incomes.

C65 Where are the data to illustrate this? If correct, what does it mean compared to the main sample's low income children? How are the differences reconciled? (e.g. R63 and R64)

*R65, pg 38 Children from the lowest socioeconomic areas of Wichita/Sedgwick County who are more likely to visit public health clinics might have significantly higher DFT scores, but they were not included in this study.*

C66 Do statistics exist that could help the reader interpret the meaning of "might" in this statement? A detailed appraisal of the status quo is needed to guide health and governmental authorities in sound decision-taking. Its omission weakens the utility of this effort.

*R66 page 39: "not statistically significant differences" [among insured and uninsured]*

C67 There was **no support** in this study for the Surgeon General's comments about the importance of insurance in the incident of caries. This suggests, again, that Wichita children are better off than the nation's children. That is, their lack of insurance does not deprive them of dental care.

*R67, page 40 The results of the tests were inconclusive at a broad level of analysis...*

C68 Questions were raised above (See R53/C54 above) about fluoride treatments and that might distinguish decay differences. It is regrettable that the researchers failed to perform a more narrow level of analysis. In spite of any data, the researchers feel free to conclude that fluoride treatments give no advantage over children not receiving them. In short, they down-play topical applications. This "suggestion" is not surprising in the light of the repeated downplaying of the significance of topical fluoride over systemic.

*R68 page 40: One goal of the project was to be able to compare data collected to the annual school-based dental inspection data. ....the two data sets are not compatible.*

C69 The study design included a specific goal but *apparently* failed to match its measurement technique to that of the database known to exist. This failure guaranteed that the goal could not be reached through standard scientific methodology. This apparent situation, judged by reading page 40, is curious indeed.

*R69, page 40: DFT SCORES COMPARED NATIONALLY. This makes it impossible to correctly compare summary dental disease estimates.*

C70 This paragraph attempts to explain the lack of comparability of the data collected. Prior to designing a study, a thorough literature review alerts researchers to the kinds of problems these authors discuss. Then, the new study can be designed so that findings can be as comparable as possible; at least

during comparison studies. Their paragraph suggests that literature search was incomplete prior to beginning a project. As the stated goal was to make comparisons, steps should have been taken to insure that possibility. Specifically, DFT scores, without a context, provide little guidance for the Board.

*Ch. 11, pg 41* **DENTIST FLUORIDE PRACTICES AND OPINION**

*R70, pg 41* Fifteen respondents estimated ... 5.7 DMFT ...our chart review was 3.14

C71 Given the literature on the differences in DMFT scores when fluoridated populations are compared with those absent fluoridation (about 1.2 teeth), this 2.5 tooth error of estimation seems significant. Proponents of fluoridation suggest a significant difference is made in DMFT scores. *Estimates* by experienced dentists are obviously not accurate enough to support testimony regarding status of need. The over-estimation of dental health by 2.5 teeth is considerable in this context.

*R71, page 41* Table 11-7

C72 An overwhelming majority of dentists used 5 different kinds of fluoride application. *Unanswered Questions*: What is the significance of this finding in when compared with the optimal level of exposure dentists desire for children? What percent of children in Wichita receive this level of fluoride exposure? How much more exposure/ or less is recommended? This comment is relevant because professional organizations have warned against adding fluoride to children in certain age ranges when living in a fluoridated community. How does this exposure level in dental practice compare to the level of fluoride received daily by Wichita children? What is that figure? How many dentists only recommend fluoride use but don't apply it in their practice?

*R72, page 41: Table 11-7: The lack of water fluoridation in Wichita has contributed substantially to dental disease in children and adolescents.*

C73 What does "substantially" mean? What number of DMFT could be expected if youth ingested and additional 1 ppm? How soon would the results be measurable?

Because 81% of dentists have never practiced in a water fluoridated community (page 38), on what basis is this opinion founded? Do the researchers acknowledge that dental fluorosis a dental disease? What percent of increase in patients wanting or needing treatment for fluorosis would you expect with a daily ingestion of 1 ppm? How does this level of dental problem effect your answer to the question about the significance Wichita's current level of fluoride? That is, how do you balance risk/benefit? What is the savings per tooth against the cost per tooth treated for decay or for fluorosis?

Answers to these questions help determine a reader's confidence in and subsequent use of the in opinions given. Note: Opinion polls are the weakest (invalid, unreliable) form of measurement.

R73, pg 43 ... and a vocal minority of community members who oppose public fluoridation...

C74 The tone of this paragraph assumes water fluoridation is the standard to be universally accepted. Actually, fluoridation continues to be hotly debated in the US, but settled for 13 other countries whom reject fluoridation. Statements in this paragraph assume that a "majority-driven consensus" is a "should" and, by implication the desire of the majority. Some dentists imply that a minority, especially if it is *vocal* is a negative aspect of societal function. This comment is made to clarify that the MAJORITY of Wichita citizens twice rejected fluoridation in the past 25 years, and the City Council is rejecting it and seeking **alternatives to it.**

Proponents have no data, to demonstrate a shift in local attitudes. National data shows that when citizens vote on fluoridation, it is rejected more often than accepted.

This qualitative section reflects *opinions of a few*. It also reflects the editing of researchers. That 12.7% of a group "represents relatively common views" of the full group seems to set an inaccurate statistical standard (mean, median, mode). Such a statement by researchers is simply a judgment and a surprising one at that.

## **Ch. 12, CONCLUDING REMARKS, page 44**

R74, page 44 Re item 1, the impact of oral health

C75 These statements would be especially useful if the report allowed the reader to contrast the local status quo with national statistics. Of course, *this lack is an important failing of this study.*

R75 Item 2: Appropriate use of professional dental services, dental health education, use of proven interventions such as sealants, and effective use of fluoride are considered to be the most important factors influencing dental health.

C76 It is regrettable that this comment is not supported by the opinions gathered in this study, nor others. Prominent dentists will state that **oral hygiene and diet** are the *most* important factors. It can be argued that education is equally important in the context of the population in question, children. Parental, school, and dental education is most important in determining the level of knowledge, importance, and compliance. The above comment (R75) fails to recognize "*proven interventions*" (*even those discussed in this report!*).

The importance of diet, even in the presence of fluoride and quality dental care is illustrated in the following concerns of dentists this September:

The *Ohio Dental Association* wants school districts to stop entering contracts with soft drink companies because of a *disturbing rise in child tooth decay*. The group plans to spend up to \$10,000 on an educational campaign to remind schools and parent groups about the effects of soft drinks and snacks on children's oral health.

"We are seeing an increase in decay in children who are taken care of to the nth degree -

they have **fluoride, tooth sealants, routine care appointments,**" said Dr. Hans Guter, a dentist in Circleville, Ohio, and chairman of the ODA committee planning the education campaign. The dentists point to soft drinks, which contain sugar and carbonic acid, as the culprit for cases of decay between the teeth, rather than on the chewing surface. "Make soda the exception to the rule, rather than the rule." *Soft drinks are rotting kids' teeth*, Laurel Campbell, staff reporter, Cincinnati Post, 9/28/00

*R76, pg. 44 Item 3: re: Alternatives: the safety of water fluoridation and other alternatives*

C77 (See the limitation of this statement above, R2,C2. ) Safety studies are not documented for fluoridation or other fluoride alternatives. (See Ch. 6 "Risks") Therefore, the stated conclusion, an unfounded opinion, has insufficient substantiation in this report. Indeed, in the entire report, safety appears to be a "given" (an assumption). An in-depth survey of the literature fails to support this sentence. In science, assumptions (hypotheses) are tested and documented. Recall, that the form of fluoride put in drinking water has few, if any, safety studies; agencies admit having none: EPA, CDC, FDA etc.

Insufficient data are offered to make any economic comparisons between alternatives and water delivery of fluoride. This is a major omission and failure of this investigation for the Board and City Council.

*R77 Item 4, pg 44 ...the number of teeth with dental decay and fillings....is high.*

C78 By what standard is "high" measured? What is the average number of DFT in other non-fluoridated towns in Kansas and in the U.S.? Most, if not all, studies use a different measure (including "M" for missing). The authors will have to produce citations of studies they use for comparison using the DFT measure in order for "high" to have meaning and support. This answer is fundamental to the question of the level of "need" and "crisis" in Wichita, if any exists. These data are important in appraising the effect of less exposure to fluoride.

*R78, pg. 45 If fluoridated water were to have the same effect as has been observed internationally....*

C79 The effect cited is based on one report, a meta-analysis. The findings are dependent on which studies are selected from the literature. Several national and international studies show almost no effect. Are any of these included? Please include in your appendix, a reprint of Murray's study. This request would permit verification of one of the critical variables in the formula that calculates benefits. It must be reported in such a way that the Board can review and verify these claims. Given the fluoride debate, specific supportive data should be included in this report. Remember, researchers with contrary findings based their conclusions on a group of studies of over a half-million subjects. These data cannot be ignored in any objective analysis and yet, contrary studies are not cited nor discussed. This report is unbalanced and not representative of the literature.



The 5 year savings with fluoridated water is estimated to be \$2.9 million. Omitted from the analysis is the cost of treating fluorosis (which this report acknowledges increases with the introduction of fluoride).

Adjustment of the calculation for only one fluoride side-effect: The cost of repair can reach up to \$700 per tooth. Using the population figures given, 8874 children would need a conservative \$200 per tooth for repair. Assuming one tooth, the five year cost is \$1.8 million. These costs are not often covered by dental health insurance and represent an out-of-pocket burden on the citizens.

Given these figures, the yearly savings, if fluoride was 20% effective, would be reduced to \$390,000. However, a complete analysis is not accomplished yet.

The KHI report ignores the full costs of fluoridation. A crude estimate for Wichita is about \$400,000 per year. [NOTE: on page 45 the final report estimates Wichita will have to spend from \$800,000 to 900,000 per year!] If this figure can be verified, the savings wash out.

However, the conservative estimate made by the Team of \$400,000, does not include many hidden costs. See *Economic Costs of Fluoridation* which accompanies this critique.

For example, sketchy data from Bremerton Washington when applied to the Wichita population would result in a cost of fluoridation of \$2.5 million. When Calgary, Alberta, Canada amortized its equipment and maintenance costs, the initial estimates skyrocketed. Applying their data to Wichita that serves half the population, the yearly cost of fluoridation here would be \$787,000. Obviously, much work needs to be done to gather specific information about costs and savings for the local community.

The cost of dental and medical treatment for all side-effects is probably the largest economic factor in calculating the final burden to the community of water fluoridation.

Another significant cost factor is the burden on citizens to provide themselves with fluoride free water, because of preference or by medical necessity (kidney disease etc). Consider the cost per year if only 1% of the 350,000 served purchased bottled water at 50 cents a gallon. It is \$637,000. Half that could be considered conservative, equaling \$318,000.

#### APPENDIX 1: The Natick Study, a summary

(See the full study at [www.cadvision.com/fluoride/index.htm#natick](http://www.cadvision.com/fluoride/index.htm#natick) )

[This summary is included in order to provide some counter balance to KHI's inclusion of two extensive documents that supports fluoridation. ]

This report to the Board of Selectmen, Natick, Ma. was prepared in recognition of the existence of an incredibly large database of conflicting opinion and that both proponents and opponents on the fluoridation issue were

entrenched and unlikely to reach a consensus. On April 28, 1997, the Board of Selectmen voted to appoint a special committee of unbiased and qualified people to study the fluoridation. Report delivered: October 23, 1997

The primary question for the Independent Scientists on the Reviewing Committee: *On the basis of the documentation provided to you by the proponents and opponents: Do you believe that the potential side effects associated with fluoridating Natick's public water supply outweigh the potential benefits?*

Findings:

1. Recent studies of the incidence of cavities in children show little to no difference between fluoridated and non-fluoridated communities.
2. Ten to thirty percent (10-30%) of Natick's children will have very mild to mild dental fluorosis if Natick fluoridates its water (up from probably 6% now).
3. Approximately 1% of Natick's children will have moderate or severe dental fluorosis. Dental fluorosis can cause great concern for the affected family and may result in additional dental bills. It should not be dismissed as a "cosmetic" effect.
4. Fluoride adversely effects the central nervous system, causing behavioral changes and cognitive deficits. These effects are observed at fluoride doses that some people in the US actually receive.
5. There is good evidence that fluoride is a developmental neurotoxicant, meaning that fluoride effects the nervous system of the developing fetus at doses that are not toxic to the mother. The developmental neurotoxicity would be manifest as lower IQ and behavioral changes.
6. Water fluoridation shows a positive correlation with increased hip fracture rates in persons 65 years of age and older, based on two recent epidemiology studies.
7. Some adults are hypersensitive to even small quantities of fluoride, including that contained in fluoridated water.

8. The impact of fluoride on human reproduction at the levels received from environmental exposures is a serious concern; e.g. a correlation between decreasing annual fertility rate in humans and increasing levels of fluoride in drinking water.

9. Animal bioassays suggest that fluoride is a carcinogen, especially for tissues such as bone (osteosarcoma) and liver. The potential for carcinogenicity is supported by fluoride's genotoxicity and pharmacokinetic properties.

10. Fluoride inhibits or otherwise alters the actions of a long list of enzymes important to metabolism, growth, and cell regulation.

11. Sodium fluorosilicate and fluorosilicic acid, the two chemicals Natick intends to use to fluoridate the water supply, have been associated with increased concentrations of lead in tap water and increased blood lead levels in children.

12. If Natick fluoridates its water supply at the proposed level, most children under the age of three will daily receive more fluoride than is recommended for them.

The scientific literature supporting these findings is summarized in the full report which also discusses a variety of non-health related concerns that have been raised about water fluoridation.

Conclusion: The Committee reached the firm conclusion that the risks of overexposure to fluoride far outweigh any current benefit of water fluoridation.

Recommendations: The Natick Fluoridation Study Committee unanimously and emphatically recommends that the town of Natick NOT fluoridate the town water supply.

#### APPENDIX 2: Curriculum Vitae of Natick Investigators:

1. **B. J. Gallo, Ph.D.** Botany; Chemistry; M.S., Biology; M.S., Geology; Zoology, Research Microbiologist;
2. **Jason Kupperschmidt; B. S.**, Chemical Engineering; **M. S.** Student, Environmental Engineering
3. **Norman R. Mancuso, Ph.D.**, Chemistry, **M.S.**, Chemistry, **B.S.** Chemistry & Mathematics; Postdoctoral Fellow, MIT; Author or co-author of over 100 Chemical, Scientific and Engineering publications

4. **Alfred J. Murray** 1960. **M.S.T.**, Chemistry; **B.S.** Mathematics & Chemistry  
Published re Segmentation of Neutrophilic Leucocytes;

5. **Harlee S. Strauss, Ph.D.** molecular biology; **A.B.** chemistry; Postdoctoral fellow in

biology at MIT; Pres. of a consulting firm she founded, Works doing on-site specific

human health risk assessments, in-depth evaluations of the toxicity of individual

chemicals, to the development of risk assessment methodology.

APPENDIX 3: A recent study

Community Dentistry and Oral Epidemiology August 2000 Aug; 28: 281-8.

*No Increase in Cavities After Ending Water Fluoridation: A recent study seems to*

*refute the fact that fluoridated water reduces the rate of cavities.*

- The city of Kuopio in central Finland had fluoridated piped water for 33 years, beginning in 1959.
- Due to strong opposition by various civic groups, water fluoridation was stopped at the end of 1992.
- Changes in the average cavity rates between 1992 and 1995 in fluoridated Kuopio were compared to those in Jyvaskyla, a nearby non-fluoridated community.
- In 1992 and 1995, independent random samples of all children aged 3, 6 and 9 years were drawn in both cities.

The authors note that despite the discontinuation of water fluoridation, no increase in the incidence of cavities in children's primary teeth was observed.

MAR-03-2004 09:22 CITY OF HUTCHINSON 620 694 2675 P.02

# City of Hutchinson

*Pursuing Excellence In Public Service*

P.O. Box 1567 / Hutchinson, KS 675 67

Telephone: (620) 694-2608

Office Of: City Manager

March 3, 2004

The Honorable Senator Phillip Journey  
State Capitol Building - Rm 513-A  
Topeka KS 66612

**RE: SB 530 - Fluoridation**

Dear Senator Journey:

We were advised yesterday that you need information from the City of Hutchinson concerning the cost of fluoridation. Attached you will find a cover memo prepared by our Utilities Director, Reg Jones, that was presented when the fluoridation issue was considered by our City Council in 1999. Also attached is an excerpt from the March 30, 1999, City Council minutes on this agenda item, and email correspondence between Mr. Jones and David Waldo of KDHE regarding clarification of the cost figures used in 1999.

In 1999, the estimated cost is an initial \$151,872 in equipment costs, and an on-going annual cost estimate of \$74,000. The cost is expected to be greater for Hutchinson because we do not have a water treatment plant that would provide for a single source of injection into the system. Rather, we have 16 water wells. Furthermore, with inflation over the past five years, we can expect the cost to be greater today than in 1999.

As you can see from the City Council minutes, there were a number of proponents and opponents on this issue. It appears the City Council voted against fluoridation based on the arguments they heard from both sides and based on the costs estimates presented. Concerning SB 530 before you at this time, the City of Hutchinson's stance today is that we see this primarily as a local issue related to our ability to govern ourselves under Home Rule authority.

If we can provide you with additional information, please don't hesitate to ask.

Sincerely,

Meryl Dye  
Special Assistant to the City Manager  
(Registered Lobbyist)  
meryld@hutchgov.com

cc: Senate President Dave Kerr  
Joe J. Palacioz, City Manager  
League of KS Municipalities  
Dennis Clennan, Director of Public Works  
Reg Jones, Director of Utilities



recycled and recyclable

City Hall Fax 620-694-2673  
Central Purchasing Fax 620-694-1971  
Fire Fax 620-694-2875

Flood / Refuse Fax 620-694-2650  
Inspection Fax 620-694-2691  
Municipal Court Fax 620-694-2858

Police Fax 620-694-2859  
Public Works Fax 620-694-1980  
Waste Water Plant Fax 620-694-2604

Senate Public Health & Welfare Committee  
Attachment 3  
Date: March 4, 2004

COUNCIL COMMUNICATION	
FOR MEETING OF	3-30
AGENDA ITEM	6
FOR ACTION	✓
INFORMATION ONLY	

## INTER-OFFICE COMMUNICATION

**DATE:** March 15, 1999

**TO:** Dennis M. Clennan, P.E.  
Director of Public Works and Engineering

**FROM:** Reg Jones *B*  
Director of Utilities

**SUBJECT:** 3-30-99 City Council Meeting – Fluoridation of Hutchinson's Water System

### BACKGROUND

In 1998 the United Methodist Health Ministry Fund (UNHMF) started a Water Fluoridation Initiative, with the goals to educate Kansans about the benefits of community water system fluoridation and to support implementation of fluoridation in communities where governing bodies permit. A grant program is also available to assist communities in designing and constructing facilities to fluoridate the water system. The UNHMF has identified in the grant structure, \$69,000 of grant funds available for the City of Hutchinson.

On January 19, 1999, the City Council discussed water fluoridation for Hutchinson in a study session. At this meeting the UNMHF indicated they would support a grant request for \$100,000 for the City of Hutchinson to fluoridate it's water. The Council set February 9, 1999, as a date for a public hearing on the issue. The following cost information was presented and discussed at this meeting:

• Equipment costs (\$9,492 per well for 16 active wells)	\$151,872
• Annual chemical costs (76,103 lbs. of hydrofluosilicic acid at \$0.60/lb)	\$ 45,662
• Annual labor costs (1000 manhours at \$15/hr.)	\$ 15,000
• Cost to fluoridate 1000 gallons of water	\$0.034
• Cost to fluoridate 1 hcf (750 gallons) of water	\$0.026

The equipment costs could be reduced by approximately 2/3's with a \$100,000 grant. The cost to fluoridate 1000 gallons of water is based on annual costs of \$73,903 which includes a \$13,241 annualized cost for the \$151,872 initial equipment costs. With the grant, that figure would be reduced, but annual allocations for future equipment replacements needs to be considered also. That cost would offset the grant savings in these figures. The \$0.034 cost to fluoridate 1000 gallons of water is equal to \$0.026 cost per hcf (hundred cubic feet = 750 gallons, which is the unit we use for water rates). Our current water rate unit charge is \$0.95 per hcf for the average customer. Cost of fluoridation would equal about a 3 percent increase in the current 1999 hcf unit charge.

On February 9, 1999, the public hearing was held. The Council tabled any decision until staff could contact State and Federal agencies concerning water fluoridation and potential health effects that were concerns of the opposition.

Responses have been received from the agencies and the issue is now ready for Council discussion. A brief summary of each agency's response is listed in the following issues section. The agency responses are also attached.

## ISSUES

**Response from Dave Waldo, PE, Chief of the Public Water Supply Section, Bureau of Water, Kansas Department of Health (KDHE):** Mr. Waldo provided information concerning fluoridation and the KDHE Minimum Standards of Design for Public Water Supply Systems plus some CDC reports on design and operation of fluoridation systems and ADA facts. Some noteworthy items related to KDHE design standards are: A City Ordinance authorizing fluoridation must be passed and a copy submitted to KDHE. Safety precautions and chemical handling must be thoroughly documented to KDHE along with plans and specifications for their approval. Laboratory controls and monitoring must carefully and thoroughly be established and followed.

**Response from Joyce Donohue, United States Environmental Protection Agency (USEPA) – Office of Science and Technology:** Basically all that the EPA can provide is the attached Fluoride: Regulatory Fact Sheet which describes studies used to determine the drinking water standards. Highlights from that fact sheet are: On April 2, 1986, EPA set a Maximum Contaminant Level (MCL, and enforceable Federal Primary Standard) at 4 mg/L to protect against crippling skeletal fluorosis, an adverse health effect. In addition, EPA set a nonenforceable Secondary Maximum Contaminant Level of 2 mg/L to protect against objectionable dental fluorosis. Studies to date concerning health effects of ingested fluoride conclude that the current 4 mg/L standard is appropriate as an interim standard to protect public health. The process of fluoridation is the intentional addition of fluoride to drinking water to a level of about 1 mg/L, with the purpose to reduce the incidence of tooth decay. No regulation under the EPA SDWA ( safe drinking water act) requires the addition of fluoride to drinking water. As long as the 4 mg/L standard is not exceeded, State and local authorities determine whether or not to fluoridate.

**Response from Dr. Corrine Miller, Assistant State Epidemiologist, Division of Health, Bureau of Epidemiology and Disease Prevention, Kansas Department of Health and Environment (KDHE):** The following are excerpts from that response: The answers to the questions about adverse health effects including osteoporosis, cancer, fluoride accumulation in the body, genetic concerns and the effect of children's health related to water fluoridation depend on the results of many, many scientific studies, not just a few. Nearly 4,000 studies have been done since 1970 on fluoride, with many more before that. The bulk of the research on water fluoridation continues to support its safety and efficacy at recommended levels. Since the 1940's, when water community water fluoridation was first introduced, every Surgeon General of the United States has supported it, as have many national and international organizations such as the American Medical Association. Public health practitioners at all levels continue to support community water fluoridation as a safe, effective, and cost-effective method of promoting good dental health.

**Response from Tom Reeves, PE, National Fluoridation Engineer, Department of Health and Human Services, Centers for Disease Control and Prevention (CDC):** The following are excerpts from that response: The issues that were raised about the dangers of water fluoridation are not new. They have been looked into many times. Two relative recent reports investigated all aspects of the health effects of water fluoridation and concluded that water fluoridation should continue (the specific report references are included in the response). CDC endorses the fluoridation of public water supplies in the same manner it endorses other public health measures such as vaccination against polio, pasteurization of milk, and immunization against diphtheria. We believe that water fluoridation is both safe and effective. Attached with the response are the Public Health Service's statement of community water fluoridation and the Surgeon General's statement on community water fluoridation.

### ACTION

To (approve, not approve) water fluoridation for the City of Hutchinson and (authorize, not authorize) staff to apply for the United Methodist Health Ministry Fund grant.

F:flur2ioc.doc



## FLUORIDATION OF HUTCHINSON'S DRINKING WATER

**ISSUE:** The Hutchinson City Council needs to decide whether to add additional fluoride to the City's drinking water, to the optimum level for effective dental protection and tooth decay prevention.

**STAFF'S RECOMMENDATION:** To provide a support role in providing information to the council as requested and needed to make a decision. Let the public and professionals voice their positions both for and against to the City Council.

### USEFUL DECISION MAKING INFORMATION:

- The United Methodist Health Ministry Fund has offered a \$100,000 grant to the City to help pay the expenses to fluoridate the water.
- City staff estimates the cost to install fluoridation equipment will be around \$152,000 and will cost about \$73,000 per year to operate.
- This will cost the average water customer an additional \$0.25 per month or \$3.00 per year on their water bill.
- The City does not have a water treatment plant so equipment must be installed at 16 different water wells and fluoride injected at these 16 locations into the water.
- Most Cities that fluoridate add fluoride chemicals at one location such as a treatment plant.
- The chemical used for fluoridation is a strong acid and requires extreme safety considerations for operator safety and handling, and monitoring of proper dosage injections.
- Only Cities in Kansas over 35,000 population without water fluoridation are Wichita, Leavenworth and Hutchinson.
- City of Hutchinson water naturally has .45 mg/l of fluoride.
- Optimum level of fluoride needed for effective decay prevention is 1 mg/l.
- Opponents to water fluoridation claim studies support potential health effects related to osteoporosis, cancer, fluoride accumulation in the body, genetic concerns. Proponents disagree that these are good studies.
- Proponents to water fluoridation claim good studies don't support the health effects concerns and do continue to support that fluoridation is safe and effective and the most cost effective method to provide supplemental fluoride protection to all.
- Since the 1940's when water fluoridation was started, every Surgeon General of the United States has supported it, as have many national and international organizations such as the American Medical Association and the American Dental Association.
- Fluoride can be toxic to humans if ingested in high enough concentrations.
- The EPA (Environmental Protection Agency) has set an enforceable MCL (maximum contaminant level) for fluoride in water at 4 mg/l to protect against crippling skeletal fluorosis, and a nonenforceable secondary MCL of 2 mg/l to protect against objectionable dental fluorosis (browning of teeth).
- Fluoride toothpaste is effective in preventing tooth decay without effects if used properly.
- Fluoride supplements and dental sealants are also effective means of prevention.
- Water fluoridation alone cannot guarantee no dental health problems but history indicates it will help prevent tooth decay.
- Less than 5% of City water used is consumed through drinking and cooking. Therefore, if City water was fluoridated, about 95% would not provide any dental benefit.
- No regulation under the EPA SDAW (safe drinking water act) requires the addition of fluoride to drinking water. As long as the 4 mg/l standard is not exceeded, State and local (Hutchinson City Council) authorities determine whether or not to fluoridate. F:phmsfluo.doc

MINUTES COUNCIL MEETING 3/30/99 - 2 3/30/99

Motion by Stuckey, seconded by Leslie, to table this item until after the April 13 hearing, passed unanimously.

5. Consent Agenda:

- a. Approval of Minutes of the previous meeting;
- b. Change Order No. 1 for Street Improvement Project No. 98-13 and 16 (23<sup>rd</sup> Avenue from Apple Lane to Lucille Drive, and Avenue F from Adams to Woody Seat Freeway) for an increase of \$23,258.05;
- c. First partial payment to Kayton Electric, Inc. for Municipal Airport Improvement Project No. 98-03 (for medium intensity lights, slurry seal and marking Taxiway "A") in the amount of \$97,775;
- d. Consideration of Cereal Malt Beverage License Applications for the Kwik Shop No. 774 at 1401 East 17<sup>th</sup> (Lic. No. 1315), and Zip Trip Fuel & Food at 200 East Avenue A (Lic. No. 1316);
- e. Consideration of awarding a contract to Shears Construction, L.P. for the 1999 Drainage Improvement Project No. 99-13 (30<sup>th</sup> Terrace - Severance to Garden Grove; Dogwood-Garden Grove to 37<sup>th</sup>, Nutmeg at Pershing; 13<sup>th</sup> - Elm to Plum; 12<sup>th</sup> at Maple NW corner and 12<sup>th</sup> at Walnut, SE Corner) in the amount of \$57,983.30;
- f. ORDINANCE NO. 1353, being the Weekly Appropriation Ordinance, in the amount of \$202,085.05.

Motion by Deming, seconded by Leslie, to approve the Consent Agenda and authorize the Mayor to sign, passed unanimously.

6c. Discussion was held on the possible fluoridation for Hutchinson's Public Water System. Mayor Roberts announced that the City Council will allow 30 minutes for individuals to state the pros and 30 minutes for the cons on the subject. Each individual speaker will be allowed 5 minutes. He asked that no derogatory remarks be made toward the City Council or staff and to limit repetitive statements.

Vince Stevenson, 1423 North Main, appeared and stated he had no problem with fluoridation. He showed a visual demonstration of chemical already in Hutchinson's water supply. He stated he did not see the need to add more chemicals to benefit a small segment of the community.

The following individuals appeared in opposition to fluoridation citing possible side effects such as cancer, brittle bones and other health problems. Most felt that good dental hygiene will alleviate most of the dental problems and encouraged programs teaching good dental hygiene. Several individuals suggested that the question be put to the public for a vote.

3/30/99 - 3

Bernard Jarvis	209 West 23 <sup>rd</sup>
Wesley Oakley	
Floyd Neuenschwander	603 West 10 <sup>th</sup>
Mr. Moore	807 Hoagland
D. Pierson	6 East 29 <sup>th</sup> Court
Dr. Burkholder	Lawrence, Kansas
Wayne Logbeck	1009 East 6 <sup>th</sup>
Jean McComb	Kansas City, Missouri

The following individuals appeared in favor of fluoridation outlining the benefits to dental health in the community. They refuted allegations that fluoridation caused undue health problems.

April Osborn, Coordinator	Reno County Health Council
Dr, James Casey	Medical Center
Ray Cross	Dental Center
Tom Reeves	Center for Disease Control, Atlanta, GA.
Carolyn Thompson	Reno County Health Department
Sally Finney, Executive Director	Kansas Health Association

Councilmember Deming stated he did not think the City Council should vote on this issue since there are such strong feelings on both sides of the issue. He suggested that the question be placed on the August Primary ballot in 2000 for the public to make the decision. Councilmember McCreary stated he had no problem with letting the public decide this issue, however, he is of the opinion that the issue will be decided on emotions instead of factual information. Councilmember Stuckey thanked United Methodist Health Ministries for offering grant money to the City to assist in this project, however, the total cost to the City has not been determined. Staff will have to be able to monitor all wells and the cost is unknown.

Motion by Deming, seconded by Leslie, to recommend to the new City Council that they consider placing this issue on the August 2000 ballot for voters to decide. The motion failed by the following vote: No – McCreary, Stuckey and Roberts; Yes – Deming and Leslie.

Councilmembers called on Dr. Burkholder and Mr. Reeves for clarifications. The City Council also further discussed with Carolyn Thompson and Dr. Casey alternate ways of providing fluoride for those in need. Both indicated that adding fluoride to the water is the best method. They discussed a sealant program and the availability of vitamins with fluoride. Both felt other methods are very expensive and fluoride in the water would be the least costly.

Mayor Roberts stated that he felt the American Dental Association and the American Medical Association would not recommend water fluoridation if it was not effective.

3/30/99 - 4

Motion by McCreary, seconded by Stuckey, to accept United Methodist Health Ministries educational and topical applications and not authorize fluoride be added to the water supply. After discussion on the meaning of the motion, the motion and second was withdrawn.

Councilmember Leslie stated that he feels the best way to focus on this problem is for United Methodist Ministries to target children and adults in need of dental hygiene. Mr. Moore of United Health Ministries appeared and stated they have two applications for funding: 1) Fluoridation of City water supply and 2) Sealant program.

Motion by McCreary to authorize staff to apply to United Methodist Health Ministries for funding for a sealant program with the understanding that the City of Hutchinson will not be required to add any funding. The motion died for lack of a second.

Mr. Moore advised that the Sealant program is available to any organization to develop a program with a maximum of 300 children. The program earmarks \$60 per child and will require some cooperation from the dental community.

Motion by Leslie, seconded by McCreary, that the City Council not authorize fluoridation of the public water supply, passed by the following vote: Yes - Leslie, McCreary and Stuckey; No - Deming and Roberts.

Motion by McCreary, to authorize staff to apply to United Methodist Health Ministries fund to provide a sealant in the maximum amount with no funds from the City, motion died for lack of a second.

6a. The report of the Housing Task Force Recommendations, was considered. The City Council indicated they were willing to discuss the recommendations at a study session. John Irving asked that the study session be held prior to Councilmember Deming leaving the City Council. Motion by Roberts, seconded by Deming, to accept the Mayor's Task Force on Housing Report and schedule a luncheon Study Session to discuss the full report on April 20, 1999, with the understanding that Councilmembers Deming and Leslie will be invited to attend the Study Session, passed unanimously.

6b. The 1999 Swim Pool Management Contract with the Hutchinson Recreation Commission was considered by the City Council. Motion by Deming, seconded by McCreary, to approve the 1999 Swim Pool Management Contract with HRC for \$25,000, passed unanimously.

6d. The Second Amendment to Agreement No. 3298 with the City of South Hutchinson and the Chamber of Commerce relating to the CVB Advisory Board, was considered by the City Council. Motion by Deming, seconded by Stuckey, to approve the Second Amendment to Agreement No. 3298, passed unanimously.

6e. Railroad Crossing Agreements with KDOT and the Union Pacific RR for crossings at Cleveland and Monroe (right-of-way permission), was considered by the

Reg Jones

**From:** Reg Jones  
**Sent:** Wednesday, February 18, 2004 2:18 PM  
**To:** 'DWaldo@kdhe.state.ks.us'  
**Subject:** RE: Fluoride Info

These are the estimated costs by PEC for equipment including installation per well. PEC used a 1.25 multiplier of the equipment cost for installed cost. I am sure they are conservative with the contingency and project cost. The estimate was prepared in November of 1998.

EQUIPMENT COSTS

Chemical Feed Pump	\$3,125	
Drum Scale	\$2,250	
Instrumentation/Electrical	\$1,250	
Exhaust Fan	\$ 125	
Exhaust Ductwork	\$ 313	
Subtotal		\$7,063

CONTRACTOR COSTS

Bond & Insurance (1.5%)	\$ 106	
Mobilization (1.5%)	\$ 106	
Project Supervision (2.0%)	\$ 141	
Project Management (2.0%)	\$ 141	
Overhead & Profit (5.0%)	\$ 353	
Subtotal		\$ 848

CONSTRUCTION TOTAL		\$7,910
Contingency (10%)		\$ 791
Project Costs (10%)		\$ 791
OPINION OF TOTAL PROJECT COST PER WELL		\$9,492

Reg Jones, Director of Utilities  
 City of Hutchinson  
 email: regj@hutchgov.com  
 620 694-1900  
 620 694-1980 (fax)

-----Original Message-----

**From:** DWaldo@kdhe.state.ks.us [mailto:DWaldo@kdhe.state.ks.us]  
**Sent:** Wednesday, February 18, 2004 2:01 PM  
**To:** Reg Jones  
**Cc:** KMuelden@kdhe.state.ks.us  
**Subject:** Fluoride Info

Reg-thanks for the information on fluoridation at Hutchinson. I'm curious, do you have a breakdown of the estimated \$9492 equipment cost per well? We've been using a considerably smaller number. I believe you mentioned the city's estimate included some building modification, partitioning/venting, which our estimate did not include.

If you haven't seen the bill yet, it's attached as a pdf file, Senate Bill 530.

Thanks for the help.

(See attached file: 530.pdf)

L. F. Waldo, PE  
Bureau of Water-Public Water Supply  
Kansas Department of Health & Environment  
1000 SW Jackson, Suite 420  
Topeka KS 66612-1367  
Phone 785 296 5503  
Fax 785 296 5509

**CITY OF HUTCHINSON TRANSMITTAL**

**CITY OF HUTCHINSON PUBLIC WORKS**

**P.O. BOX 1567**

**HUTCHINSON, KANSAS 67504-1567**

**(620) 694-1900 FAX (620) 694-1980**

**TO:** Dave Waldo, P.E., Section Chief

**COMPANY:** Kansas Department of Health & Environment  
Bureau of Water, Public Water Supply Section

**ADDRESS:** 1000 Jackson, Suite 420

**CITY and STATE:** Topeka, Kansas 66612-1367

**FAX:** \_\_\_\_\_

**TOTAL NUMBER of PAGES:** \_\_\_\_\_ (including cover page)

**DATE:** February 17, 2004

**FROM:** Reg Jones, Director of Utilities *Reg Jones*

**Email:** regj@hutchgov.com

**COMMENTS:**

**SUBJECT: Potential Legislative Action on Mandatory Fluoridation for Public Water Supply Systems (PWS's) with over 10,000 Service Connections**

Thanks for the call and notification of the rumblings at the state legislature related to fluoridation of PWS's. As we discussed, the City considered fluoridation back in 1999. At your request, I have attached information related to that discussion and potential costs to the City. The issue of fluoridation was not pursued any further as per City Council action on March 30, 1999. Feel free to use this information as needed. My personal position would be that of not supporting a mandatory fluoridation requirement for public water supply systems in Kansas.

Please contact me if you have questions or need additional information.

**Cc:** Dennis Clennan, City Director of Public Works and Engineering  
Jim Brummer, City Superintendent of Water and Sewer  
Joe Palacios, City Manager

f:transform



(316) 973-1300  
FAX 973-1310

March 1, 2004

TO: Kansas Legislators  
FM: Anita Allard, Principal  
Stanley Elementary School  
Wichita, Kansas  
RE: Children's Oral Health & Xylitol

Stanley Elementary School students are now in their fourth enthusiastic year of demonstrating the positive benefits of using xylitol every day through their Xylitol Dental Health Project.

Xylitol is a natural sweetener, approved by the FDA in 1963. It discourages both tooth decay and ear infections (and even appears to improve school attendance!!!)

Our students receive 100% xylitol mints twice daily after they rinse their mouths with water ("swish & swallow") to clear any food particles. They speak of healthier teeth and fewer earaches, while their teachers tell of growing hygiene knowledge.

Xylitol has been used successfully by school children in Finland for many years, and its effectiveness against strep bacteria (the cause of decay) is also reported in American medical and dental journals. In fact, Dr. Catherine Hayes of the Harvard School of Dental Medicine calls it "unethical for people to be deprived of the strong protective effect of xylitol", and she further indicates that "the evidence is there, and we should be looking at this [xylitol] as part of a preventive program."

Stanley Elementary is proud to be a pioneer in, and with xylitol's use against cavities and ear infections in Wichita children (I even use it regularly as an adult!!!)

Your leadership would be very valuable in acquainting more Kansans with xylitol's remarkable health benefits; I have attached several fact sheets about this amazing discovery, and would gladly provide you with testimonials from our students and teachers (and free samples) upon request!!!

Thank you for your professional consideration; I hope that you will include xylitol in your discussions regarding children's oral health in Kansas.

Attachments

Cc: Members of the Board of Education, USD 259


3-12



3

Ma y

**Burgstahler, Albert W**

 This message was sent with High importance

**From:** Burgstahler, Albert W  
**To:** margaretc@senate.state.ks.us

**Sent:** Wed 3/3/2004 10:21 AM

**Cc:**

**Subject:** Information requested re. SB 530

**Attachments:**  1\_multipart\_xF8FF\_2\_DSCF0048\_JPG.htm(578B)

Dear Ms. Cianciarulo,

1. With respect to erroneous endorsements of fluoridation: In the chapter on "Endorsements" in the 1978 book Fluoridation: The Great Dilemma that I left with you and the senate committee yesterday, there is a table on page 278 (with accompanying comments on pages 277-279) concerning dubious and incorrect endorsements of water fluoridation. More recently, some of the organizations claimed by the USPHS to approve of fluoridation (see page 284 in FGD), such as the American Nurses Association, should not be listed as endorsing fluoridation.

2. For a detailed review of the circumstances prompting the June 1950 USPHS endorsement of fluoridation and its aftermath band-wagon endorsements, see the article by Michael Wollan, "Controlling the potential hazards of government-sponsored technology" The George Washington Law Review, Vol. 36, No. 5, July 1963, pp. 1105-1137 (esp. pp. 1127-1134).

3. With regard to the question about H. Trendley Dean and his work on fluoride and dental caries, it should be noted that on October 20, 1955, he admitted under oath to the California Public Utilities Commission during cross-examination that the tooth-decay reduction data he had presented lacked the requirements that he himself had set out for quantitative evaluation--that, in effect, he had presented data that were not reliable.

4. With respect to the manufacturing source of silicofluorides used for water fluoridation, today it is mainly the Cargill Fertilizer Co. A picture of a bag of sodium silicofluoride (Na<sub>2</sub>SiF<sub>6</sub>) sold by several years ago by KC Industries LLC, Mulberry, Florida, 33860, is attached to this email.

5. Finally, in connection with the US Food and Drug Administration's position on "fluoride" (usually meaning pharmaceutical grade sodium fluoride, NaF) supplements for use as a preventive for tooth decay, that agency has not actually given its approval for such use. What is on the market (e.g., fluoridated vitamins) were "grandfathered" in after that requirement that drugs be proved "safe and effective" became law.

Thank you for your kind courtesy.

Sincerely,

Albert W. Burgstahler, Ph.D.

*with*  
3-13

**Revised Fluoride Supplementation Schedule As Accepted by the American Dental Association  
Council on Scientific Affairs**

<b>Fluoride Ion Concentration In Drinking Water</b>			
<b>Child's Age</b>	<b>&lt;0.3 ppm</b>	<b>0.3-0.6 ppm</b>	<b>&gt;0.6 ppm</b>
<b>Birth to 6 months</b>	<b>None</b>	<b>None</b>	<b>None</b>
<b>6 months to 3 yrs</b>	<b>0.25 mg/day</b>	<b>None</b>	<b>None</b>
<b>3-6 years</b>	<b>0.50 mg/day</b>	<b>0.25 mg/day</b>	<b>None</b>
<b>6-16 years</b>	<b>1 mg/day</b>	<b>0.50 mg/day</b>	<b>None</b>
<b>Source: Journal of the American Dental Association, Volume 126, December 1995, page 1622</b>			

Subject: CDA on Fluoride Supplements for Children

Stop Fluoride Supplements for Children Under Age 7 Says Canadian Dental Association

ABSTR

HICKSVILLE, N.Y., May 24, 2000 /PRNewswire/ -- To avoid permanent tooth discoloration, the Canadian Dental Association advises against fluoride supplement use for children before their permanent teeth have erupted, at about 6 or 7 years old.

At a Canadian Consensus Conference on the Appropriate Use of Fluoride Supplements, there is "...weak scientific evidence supporting the effectiveness of fluoride supplements."

"The use of fluoride supplements before the eruption of the first permanent tooth is generally not recommended," says recently released CDA fluoride supplement guidelines and announced world-wide on the internet-based dental-public-health listserv, a forum for government and academic public health dentists and other fluoride policy makers.

Children have become over-saturated with fluoride from food and beverages made in fluoridated cities, from the overuse or misuse of a growing number of fluoridated dental products, from fluoride containing pesticide residues in food, from industrial fluoride air emissions and from some fluoride-containing medicines, anesthetics and other products. Fluoride is also inhaled via ocean mist (ocean water and fish contain 1.4 ppm fluoride) and through showers and humidifiers using fluoridated water. Fluoride is found naturally in some foods like tea.

The American Dental Association (ADA) still recommends fluoride supplements for

children from **6 months to 16 years** old in non or low-fluoridated community

\*\*\*\*\*

Canadian Dental Association  
Considerations re: Fluoride Supplementation

The Canadian Dental Association supports the appropriate use of fluorides in the prevention of dental caries as one of the most successful preventive health measures in the history of health care. The availability of fluorides from a variety of sources, however, is a current reality which the practising dentist needs to take into account in dealing with patients. This is particularly true of children under the age of six, where exposure to more fluoride than is required simply to prevent dental caries can cause dental fluorosis. There is no evidence of any health problems being created by such exposure, but it is prudent to attempt to limit exposure to the optimal levels required for continuing dental caries protection. Current levels of fluoride intake from all sources are difficult to establish for any given area, but the dentist should consider general intake to the extent possible in recommending fluoride supplementation.

The following suggestions are consistent with these principles:

1. Fluoride supplements are only required for high dental caries risk patients and may be unnecessary if the patient is receiving adequate fluoride from other sources.

**2. Before prescribing fluoride supplements, a thorough clinical examination, dental caries risk assessment and informed consent with patients/caregivers are required.**

3. The Canadian Consensus Conference on the Appropriate Use of Fluoride Supplements for the Prevention of Dental Caries in Children, held in November 1997 suggested that high caries risk individuals or groups may include those who do not brush their teeth (or have them brushed) with a fluoridated dentifrice twice a day or those who are assessed as susceptible to high caries activity because of community or family history, etc.

4. The estimation of fluoride exposure from all sources should include use of fluoridated dentifrice and all home and child care water sources. Dentists should be aware of the average fluoride exposure in their area. The possible impact of fluoride reducing factors within the home such as the use of unfluoridated bottled water of some reverse osmosis devices should be taken into account.

5. Lozenges or chewable tablets are the preferred forms of fluoride supplementation. Drops may be required for individual patients with special needs.

**6. The use of fluoride supplements before the eruption of the first permanent tooth is generally not recommended.** When, on an individual basis, the benefit of supplemental fluoride outweighs the risk of dental fluorosis, practitioners may elect to use these supplements at appropriate dosages on younger children. **In doing so, the total daily fluoride intake from all sources should not exceed 0.05-0.07 mg F / kg body weight in order to minimize the risk of dental fluorosis.**

*[BH: So a 30 lb child, say 2 or 3 years old, should not have more than  $(30 \times .454 = 13.62 \text{ kg})$ ; thus,  $13.62 \times \text{average of } .06 \text{ mg F per kg} = .82 \text{ mg of fluoride}$ . Therefore, if a kid gets a supplement by pill, vitamin, or water (at 1.0 mg), it will be overdosed. ]*

7. Following the eruption of the first permanent tooth and the associated decrease in the risk of dental fluorosis at this stage of development, fluoride supplements in the form of lozenges or chewable tablets may be used to deliver an intra-oral fluoride dose. A lozenge or chewable tablet containing 1 mg fluoride delivers the same amount of fluoride intra-orally as brushing with an average load (1 gm) of a 1000 ppm fluoride dentifrice.

Approved by Resolution 2000.06  
Canadian Dental Association Board of Governors  
March, 2000

**ALTERNATIVES TO WATER FLUORIDATION**  
**BY**  
**FLUORIDE AWARENESS TEAM OF KANSAS**  
 (Melody Scheel and Deanna Havens, Co-Founders)  
 Wichita Branch Research Sub-committee

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  - G. *RECOMMENATIONS:*
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INTRODUCTION:

On October 26, 1999, the Wichita City Council asked the City-County Board of Health to find alternatives to water system delivery of fluoride to all citizens. This report seeks to assist the Council by itemizing many dental health options. It begins with a concise overview of these options in order to conserve the reader's time. Each option is accompanied by a notation number directing the reader to additional information and references. The notes appear at the end of the document.

This report is intended to complement the Health Board's mandated report. The Team is concerned that the Health Board failed to select an independent organization to search for alternatives to water fluoridation. They chose the Kansas Health Institute (KHI) . It is an indirect creation of and is funded by the Kansas Health Foundation. This foundation advocates water fluoridation. The KHI report was paid for United Methodist Health Ministries (UMHM) which also actively promotes fluoridation by offering a monetary incentives to Wichita and other Kansas cities. For these and other reasons, the findings and recommendations of the KHI Report are not considered to be objective. Please refer to the extensive critique of the KHI Report by the FAT-Ks. It offers over 50 pages of documentation of the weaknesses of the KHI effort.

A major advantage of most options to fluoridation is their target-specificity. They directly serve the needy. The original goal of fluoridation advocates can be attained. Non-universal delivery of any preventive agent spares citizens who are medically at risk and respects those choosing not to ingest it.

The target group in Wichita represents seven percent of all Wichitans and others served by water system (24,000 of 350,000). When considering cost effectiveness delivery to this small group of citizens, of every \$100 dollars spent on fluoride, only \$14.30 is apportioned to the needy children. This figure is drastically reduced because citizens uses only 20% of processed water for drinking and food preparation. When reduced by 20%, the \$100 dollars spent to reach the children shrinks to \$2.86. Indeed, 97 dollars worth of fluoride is wasted and effectively discarded. Some say that only one percent is used for drinking. Therefore, 99% ends up into river.

Given the weight of evidence, the Team strongly recommends that non-fluoride agents be used to serve the dental needs of children. However, for those parents preferring fluoride for their children, toothpaste is strongly recommended because its topical application is represents the *primary action* and effect on teeth.

## METHODS OF PROMOTING DENTAL HEALTH AND PREVENTING CAVITIES

### A. THE BASICS OF PREVENTION OF CAVITIES (Dental caries):

Personal behavior is the most effective and efficient way to prevent tooth decay. Good oral hygiene and diet control is within the power of a properly instructed and supervised child.

*“It is not the quantity but the frequency of sugar intake causes decay. Acid production causes loss of calcium. Eating food with sugar produces acid for 20 minutes.”* (Note 1)

Chemicals are aides to, not replacements for, individual self-care. A deficiency of fluoride is not the cause of caries. Therefore, dental education is should be the first and strongest program instituted to prevent caries. Even children of poverty in the U.S. can receive adequate instruction in the public schools. In addition, routine practice of some oral hygiene methods can be taught and supervised there. (Note 2)

#### 1. Educational and behavioral Options:

A. Parents must educate their children: Specific changes in parental and early childhood behaviors could prevent most of the clinically noticeable dental fluorosis in children. (Note 15)

#### B. In-school dental hygiene:

- 1) Dry tooth brushing beginning each school day. It requires no sink and no tooth paste to knock the scum off the teeth. David C. Kennedy, DDS
- 2) “swish and swallow” practice after lunch.
- 3) Distribute chewing gum or mints containing Xylitol which kill decay causing bacteria. These can be chewed after lunch and/ or at recess. (used in prevention programs in European schools) (Note 3)

B. FLUORIDE OPTIONS: Ingested and topically applied

1. **Ingested fluoride:** *These alternatives carry many of the same systemic risks of as drinking fluoridated water. Recent scientific reports suggest that topical application, not systemic, are responsible for the primary effect on teeth. (Note 10)*

**A. Tablets:** In 1993 FDA admitted that no studies exist showing fluoride tablets or drops are safe. (Note 4)

**B. Table Salt** with fluoride is used in France, Switzerland, Colombia, Jamaica, Costa Rica, Mexico, Spain and Germany, says the ADA. (Note 5)

**C. Fluoridated bottled water** can be provided for the target group of children when in school; parents retain permission-granting power.  
1). It can also be used as a rinse.

**D. Milk with fluoride:** This delivery method also spares the entire population. (Note 6)

**E. Sugar with fluoride:** An advantage of fluoridated sugar (or sugar substitutes) would be its appeal to children and enhance compliance, an important problem with most dental hygiene processes. However, sugar promotes caries-causing bacteria so this option is not recommended. (it is only included to be complete as possible)

2. **Topical fluoride:**

A. Researchers suggest the main action of fluoride on teeth is topical, not Internal. (Note 10) See JADA, July 2000

B. Fluoride Lozenge: easy and convenient fluoride prescribed by a dentist. It has topical benefits and provides the same type of systemic benefits derived from drinking fluoridated water. (Note 7)

C. Sealants containing fluoride. The 6 and 12 year molars are the critical ones. (Dr. D. Kennedy, pg..77)

D. Toothpaste containing fluoride: Many are commonly available. The brand "Enamlon" claims its formula also strengthens tooth enamel with "liquid calcium". It allegedly remineralizes tooth enamel and mineralizes tubules in dentin. (Note 8, 9)

E. Toothbrushes. The bristles contain sodium fluoride. *Intradent Toothbrushes* <http://www.mn-gmbh.de/en/produkte/zahnbuersten.html>

F. Floss: *Intradent BrushFloss* contains sodium fluoride. <http://www.mn-gmbh.de/en/produkte/zahnseide.html>

G. Dental Picks *Intradent dental Picks* to fit perfectly between two teeth. They are soft-structured with a blue plastic area, which contains a sodium fluoride depot. <http://www.mn-gmbh.de/en/produkte/dentalpicks.html>

H. Fluoride varnish: Fluoride varnish has a long history of use by dentists throughout Europe as an anti-cavity treatment in adults and children. However, only 32 % of dentists use this option. (Note 15)

I. Vitamins: Dispensing vitamins at school or to the parents of needy

children also address possible nutritional deficiencies. "Other sources of fluoride are now available and the dose can be controlled in tablet and vitamin preparations which were more than twice as effective as fluoridated water in preventing cavities. G L. Waldbott, M.D., Fluoridation: the Great Dilemma, 307 (1978).

- J. Home-water-fluoridation: This is an inexpensive option. Tablets are available. (Note 21)
- K. Rinses: Using sodium fluoride in a rinse is probably safer than the contaminated fluorosilic acid used in 90% of drinking water systems because the latter is a diluted scrubber liquor. (see Note 22 for additional comments).

C. NON-FLUORIDE ALTERNATIVES:

1. Baking soda tooth paste: Baking soda and salt "are among the most effective disinfective (germ killers) available even today..." (pg. 22); "...the most reliable approach is to use the common, time-tested agents: baking soda and salt or a mixture of both with hydrogen peroxide." David Kennedy, DDS, pg. 24
2. Chewing Gums and Mints with Xylitol (z - eye - lit - all ) is a plaque fighting, natural sweetener. It inhibits streptococcus mutans. Xylitol helps remineralize tooth enamel, the principle cause of tooth decay. (Note 3)
3. Identify youth eligible for the current "**Kan Be Healthy**" program. It provides free dental screening, care, and fluoride treatment to medicaid-eligible children. (Note 16)
4. Changing mouth pH: Fizz & Clean or Fizz & Clean Free (without aspartame.). When chewed after meals it is said to stop plaque from forming. Chew (two tablets), swish for 15 seconds, expel (or swallow). Safe for children. Use 3 or 4 times per day. (Note 13)
5. Full spectrum lighting (simulates the spectrum of sun light) A five-year Canadian study that found that dental cavities were reduced, with savings in dental costs averaging \$100.00 a child per year. (Note 11)
6. Remineralization: is the newest frontier in dental marketing. New products replenish the minerals found in teeth, making them stronger and reverse early decay. (Note 9)
7. Toothpaste with bacteria inhibitor. As an ingredient, it can be added to toothpaste which may or may not contain fluoride. (Note 3)

D. FUNDING:

In addition to the usual funding sources for health programs, private industry might be approached. In California, a health provider and a dental products



manufacture are sponsoring dental educational programs for children and adults. (Note 12). Also, dental insurance providers and other groups have funded fluoridation programs. Locally, Delta Dental supports dental health efforts and might be approached. In California, Delta Dental Insurance has provided funds to the effort. (Note 12a). Locally, the United Methodist Health Ministry Fund with its interest in dental health can be asked to fund a study of the effectiveness and possible implementation of the selected alternative(s).

#### E. PROMISING FUTURE ALTERNATIVES:

1. Calcium glycerophosphate is a non-toxic compound, It presents none of the problems encountered with fluoride.. Dr. Y A Federov that it is twice as effective as fluoride for the reduction of dental caries. His original report came out in 1961.

#### F. SUMMARY AND CONCLUSIONS

Because the primary action of fluoride occurs on the surface of the teeth, only topical alternatives should be considered. The choice or choices from among topical options can quiet the community conflict that reflects the divisive nature of the 50 year fluoridation controversy. These options permit persons to use or avoid fluoride. The wisdom of the Council's decision to reject universal distribution of fluoride is supported by the long list of facts listed in this document (Note 20).

A dispassionate analysis of the problem of dental caries suggests that the ultimate power over dental health rests with each person. Education and training is an essential and potent intervention that can improve a child's oral hygiene behavior. Diet, especially the sugar products such as soda, is under individual control. Children must be taught how to handle sugar ingestion. Simple oral hygiene using a mixture of inexpensive baking soda and salt after eating is a viable health practice available to rich and poor alike. Clearly, parents and teachers are the major influences in habit development.

Two of the latest innovations in dental care assist the natural tooth health cycle. Chemicals that kill decay-causing bacteria and change the acidity of the oral cavity are available in toothpastes, chewing gums and mints. Some chemicals help replace the minerals which rebuild damaged tooth enamel (remineralization). None of these chemicals have the side effects associated with fluoride. They also avoid the need for rigorous attention controlling the dose delivered to avoid both dental and skeletal fluorosis. Some products combine all these oral hygiene agents. They can be elected by those professionals and parents desiring them.

Citizens and the City Council will want to weigh the benefits of any oral health program against its fiscal and human costs (health risks, effort needed to implement, etc.). The calculations are more complex than first sight suggest.

Because of fluoride's inherent toxicity and accumulation in body tissues, only topical fluoride avoids most health risks. Non-fluoride topical agents (xylitol) has long been used to inhibit bacterial causing decay. It is readily available and is non-toxic.

G. RECOMMENATIONS:

1. A cardinal question emanating from Council's decision to seek alternatives to water fluoridation is "Which program(s) will promote dental health most efficiently and effectively with the least side-effects?" An answer to this question can only come when many investigative questions are addressed. A list of important questions is offered in order to assist the Council conserve its time and energy by focusing on the fundamental issues that will facilitate a sound decision. The following list is not all inclusive, however, it can be used as a guide:

- A. What are the findings of peer-reviewed studies regarding these issues:
  - 1) the effectiveness of each method on prevention of dental caries.
  - 2) number and significance of side-effects, e.g. rate of dental fluorosis.  
(of course, the listed non-fluoride options avoid this public health problem)
  - 3) the dollar cost of each method.
    - a) This is a complex calculation (Note 18). It includes the cost of program personnel, materials, and remedies for side-effects. For example, fluoride accumulates in the body and children. What is the cost of treating moderate and severe fluorosis relative to the estimated number of cavities which occur with other methods? [Fluorosis treatment can cost \$100 to 700; a cavity costs about \$50]
    - 1. If water fluoridation is used as a basis of comparison in the search for options to it, the medical costs to treat its systemic effects must be computed. Many studies link fluoride to illnesses that are very expensive to treat.
      - a. Fluoride causes increased costs for the water delivery system because of its highly corrosive nature. Note: a paper on the economics of water fluoridation can be provided on request.
      - b. The cost of delivery of 1ppm to a child relative to fixing one cavity is simplistic and deceptive
  - 4) ability to control the dose of active ingredients and/or follow up on teachings
  - 5) the acceptability of a program by the target group and the wider community
  - 6) level of respect for parental choice and control over child's behavior
  - 7) an option's attractiveness to potential funding groups and implementation staff
  - 8) the degree to individuals gain control over oral hygiene and cultivate effective life-long dental care habits.

2. Any renewed petition by the Board of Health to fluoridate, which, in effect, ignores alternatives, should be rejected for a long list of reasons. If the water fluoridation issue is re-opened, a public debate is recommended in order to discover the latest issues regarding the risks and benefits of any dental program under consideration. This will expand the search for a viable solution to any dental health issues in Wichita. Further, it

will educate the public and solicit its support for a program that will fit its perceived needs and financial situation. Nationally known experts would be asked to present their best data and arguments about the cost/benefit ratio regarding adding fluoride to drinking water.

A. In the event that a reconsideration of water fluoridation is desired by the Council, the following information is offered (the "Natick" study). Note 19 offers a summary the chief conclusions from a major fluoridation contracted by the city of Natick, Mass. The scientific group interviewed experts and reviewed the scientific literature. The strength of this study lies in its recent completion, and in the fact that scientists were selected for their independence and objectivity regarding water fluoridation. This information is offered as a summary of some of the salient contemporary issues and findings with respect the highly controversial idea of adding any chemical to drinking water to treat humans. (Note 19)

3. Non-fluoride topical dental agents (e.g. toothpaste, rinses) are very strongly recommended by the authors of this document. They avoid many of the controversial and highly contested of ingested fluoride and concerns with topical fluoride applications.

H. NOTES AND REFERENCES:

N1. Things To Do To Avoid Decay:

A. Avoid sugar between meals: In tea, coffee, sodas; Snacks - many contain sugar e.g. chips, cookies, ice cream, fruit juices - look at labeling. Sugar with meals is okay. You do not need sugar to get energy. Not the quantity but the frequency of sugar intake causes decay. Use sugar substitutes (sugar free sweeteners). Clean teeth at least twice a day with fluoride toothpaste. Use brush, floss or wood points (dental toothpicks - not ordinary toothpicks). Chew sugar-free gum (sugar-free sweeteners, Xylitol) 3-5 times a day, which helps to remineralize decay.

B. Things To Control Decay: Avoid sugar between meals; Clean teeth twice a Day. Rinse at night with fluoride rinse (about \$3.00 - \$4.00 a bottle, which lasts about 2 weeks). You are responsible for keeping healthy by your lifestyle. Doctors can advise you how to stay healthy but you must do the work

C. It is not the quantity but the frequency of sugar intake causes decay. Acid production causes loss of calcium. Eating food with sugar produces acid for 20 minutes. Sugar with meals is okay but you do not need sugar to get energy.

Reduce the frequency of sugar intake, voiding it between meals. Clean plaque off teeth. Rinse with fluoride. Chew sugar-free gum (sugar-free sweeteners, Xylitol) 3-5 times a day, which helps to remineralize decay. Your dentist may recommend Chlorhexidine nightly rinses for 2 weeks to kill

off the bacteria which cause decay. Dr. Douglas K. Benn, U. Florida College of Dentistry, [benn@dental.ufl.edu](mailto:benn@dental.ufl.edu)

<http://www.sciencedaily.com/releases/2000/03/000316153755.htm> ;

<http://www.health.ufl.edu/hssc>

N2. Oral hygiene instruction. "An effective program of preventive dental health requires a holistic approach that combines a healthy lifestyle, good nutrition, minimizing exposure to pollutants, effective dental hygiene, and the professional care of a dental team..." Kennedy, D. DDS *How to save your teeth, toxic-free preventive dentistry*, Health Action Press, Delaware, Ohio, 1993, pg. 25)

"Prevention requires a team approach that simply entails education, daily home care, and routine professional cleaning." (Kennedy, pg.48)

“Three steps to prevent decay”: (Kennedy, pg.76)

1. Diet: the amount of decay is proportional to the length of time the teeth are in contact with **sugar**; even sugar in dried fruit, such as raisins.
2. Antibacterial: baking soda washes away germs which eat teeth. Cleanliness (eg., brushing) stops decay.
3. For children, sealants are important.

N3. Xylitol, is a sweet non-toxic decay fighting natural substance. It **has** been distributed in schools effectively for years in Europe. It would tackle the compliance problem because of its sweetness. It is readily available in mints and dental chewing gums made by several U.S. companies. It avoids the risks of toxicity of fluoride.

Dental Chewing gums and Mints containing Xylitol (z - eye - lit - all ) It is a plaque fighting, natural sweetener that inhibits streptococcus mutans. Xylitol helps remineralize tooth enamel, the principle cause of tooth decay. It can be used by diabetics. It helps reduce otitis media in children. Encorsed by dental associations in Finland, Norway and Sweden. Is delivered to children as mints or chewing gum.

- A. D. Kandelman and G. Gagnon of the Department of Oral Health, University of Montreal, studied the effect of xylitol in chewing gum on the incidence and the progression of dental caries.
- B. Kandelman und G. Gagnon (1): Clinical Results after 12 Months from a Study of the Incidence and Progression of Dental Caries in Relation to Consumption of Chewing Gum Containing Xylitol in School Preventive Programs [Abstract from J Dent Res 66 (8): 1407-1411, August, 1987] <http://www.saveyoursmile.com/info/xylitol.html>
- C. Svanberg, D. Birkhed studied the effect of dentifrices which contained one of three chemicals either Xylitol and Glycerol or Sorbitol on mutans streptococci in Saliva.
- D. Abstract from Caries Res. 1991, 25, S. 449-453 : M. Svanberg Department of Public Dental Health, Kronoberg County Council, Växjö; D. Birkhed, Department of Cariology, Faculty of Odontology, University of Göteborg, Sweden; [http://www.mn-gmbh.de/en/studie/xyl\\_zp\\_en.html](http://www.mn-gmbh.de/en/studie/xyl_zp_en.html)
- E. In Finland, the impact of xylitol and sucrose chewing-gum on caries was compared by Scheinin et. al.,
- F. Several other clinical studies suggest that xylitol can contribute to the prevention of caries (Scheinin et al.,1985; Kandelman and Gagnon, 1987; Isokangas et al., 1988), and various mechanisms have been proposed for ist cariostatic effect (for a review see Mäkinen, 1985). Most oral microorganisms are incapable of using xylitol (Knuuttila and Mäkinen, 1975; Edwardsson et al., 1977), and it has been found to inhibit acid production and growth of various strains of *Streptococcus mutans* and *Streptococcus sobrinus* (Vadebancœur et al., 1983; Assev und Rölla, 1986; Söderling und Pihlanto -Leppälä, 1989). Sorbitol, on the other hand, can serve as a substrate for mutans streptococci (Edwardsson et al., 1977; Kalfas and Edwardsson, 1990).
- G. Matti Uhari, MD; Tero Kontiokari, MD; Marjo Niemelä, MD: A Novel Use of Xylitol Sugar in Preventing Acute Otitis Media, PEDIATRICS: Vol. 102, P. 879-884, October, 1998; [http://www.mn-gmbh.de/en/studie/otitis\\_en.html](http://www.mn-gmbh.de/en/studie/otitis_en.html); Uhari, Mattim M.D. ; Kontiokari, Tero, M.D.; Koskela, Marjo Niemelä, M.D.: Xylitol chewing gum in prevention of acute otitis media. *British Medical Journal* 1996, Vol. 313, P. 1180-1183

N4 Tablets: In 1988, the City of Calgary spent less than \$30,000 to provide fluoride tablets and drops to those parents who chose to give their children fluoride supplements.

1) Wilmington, Mass.: study by the Director of Pub. Health:

With sodium fluoride tablets, a prescription is required, yet to fluoridate an entire community no prescription is necessary. Sodium fluoride tablets cost about \$6.99 per hundred (1 tablet per day for 100 days which equals \$26/year). A dentist can prescribe tablets at a regular visit at no, additional

cost to the parents.

2) In 1992 the wholesale cost for 5000 1 milligram fluoride tablet was \$10.50. With a schedule of ½ tablet for the first three years, and one tablet daily until age 10, the cost per child would be \$6.55. (Dr. Richard G. foulkes)

N5. Fluoridated Salt:

A. "We consider salt fluoridation to be a good means to increase the fluoride intake of the population to a level preventing tooth decay.

B. Only one form of systemic fluoride supplementation should be recommended to the public and the individual. That means that, if fluoride table salt is used, no other supplements - e.g., fluoride tablets or mineral water high in fluoride - should be consumed, except for the first two years of life, with their low consumption of table salt. Careful public information needs to accompany the introduction of salt fluoridation.

C. "By and large, in areas of low drinking water fluoride, fluoridated table salt has the potential to become a means of systemic supplementation comparable with drinking water fluoridation." *K.E. Bergmann, R.L. Bergmann, Adv Dent Res 9(2): 138-143, July, 1995*

D. Like drinking fluoridated water, individuals vary in their salt intake. This poses both risk of under- and over-exposure to fluoride.

E. Using salt as a vehicle for other trace elements is not a new concept, since it is the major route of iodine supplementation in many countries, successfully eradicating goiter due to iodine deficiency. In China, it has also been used successfully as a vehicle for selenium to overcome Keshan disease, a necrotizing cardiomyopathy where selenium deficiency is the major causative factor (Levander, 1986). Fluoridated salt was introduced in Switzerland more than two decades ago, and has since found great acceptance in many countries (Marthaler, 1981; Marthaler and Steiner, 1981; Marthaler et al., 1978).

(1) Advantages

- a. Salt is itself a supplement.
- b. Compared with drinking water fluoridation, salt allows the consumer free choice.
- c. Unlike daily intake of fluoride tablets or drops, no attention has to be paid to lifelong daily compliance.
- d. The supplement is not taken as a single bolus dose once every day with its peak concentrations of fluoride in plasma, but rather in small amounts throughout the day.
- e. **The cost is very low;** In Germany, the addition of fluoride does not increase the price over iodized salt. However, iodized salt may cost up to 1,20 DM ( or about 75 cents) per kg and therefore is more expensive than salt without any supplements. This means, for a 2-g per day consumption, **about 55 cents per annum.**

(2) Disadvantages

There is a general agreement that a high consumption of sodium is a risk factor for hypertension. Recent studies, including the Intersalt Study (1988), confirm an independent role of sodium for the age-related increase of blood pressure and for the development of hypertension. It is assumed that about 20 to 40 % of the general population are sensitive to sodium. However, no reliable screening method is available to identify persons at risk. Therefore, national and international bodies recommend a decreased salt consumption in the general population (National Research Council 1989; Deutsche Gesellschaft für Ernährung, 1991).

Conclusions:

1. Enrichment of salt with trace elements known to be deficient in a population at large is compatible with the objective of decreasing salt consumption.
2. The fluoride levels in salt recommended at present appear to be below optimum. They could be increased as soon as more experience in its acceptance and consumption as well as its effects on dental caries are available.
3. Salt fluoridated at 250 mg/kg does not present a risk for excessive fluoride intake.
4. However, *only one form of systemic fluoride supplementation should be recommended to the public and the individual*. That means that, if fluoride table salt is used, no other supplements - e.g., fluoride tablets or mineral water high in fluoride - should be consumed, except for the first two years of life, with their low consumption of table salt. Careful public information needs to accompany the introduction of salt fluoridation.

References:

Intersalt Cooperative Research Group (1988). Intersalt: an international study of electrolyte excretion and blood pressure. Results for 24 hour urinary and potassium excretion. *Br Med J* 297:319-328.

Marthaler TM, Mejia R, Toth K, Vines JJ (1978). Cariespreventive salt fluoridation. *Caries Res* 12 (Suppl 1):15-21.

N6. Fluoridated Milk

**A.** Microcosmic dental plaques were grown in artificial saliva and supplemented with either milk or fluoridated milk. The presence of fluoride in the milk increased the pH of the biofilms and reduced the proportions of streptococci, demonstrating that in this model, fluoridation of milk produces biofilms with reduced cariogenic potential. An in vitro study of the effect of fluoridated milk on oral bacterial biofilms. *Pratten J, Bedi R, Wilson M, Appl Environ Microbiol* 2000 Apr;66(4):1720-3; Dept. Microbiology, Eastman Dental Institute for Oral Health Care Sciences, Univer. College London, London WC1X 8LD, United Kingdom. [jpratten@eastman.ucl.ac.uk](mailto:jpratten@eastman.ucl.ac.uk)

**B.** Those intolerant to milk will have to find other means. Perhaps soy milk can be made available, although it is unknown to these investigators.

N7. Fluoride Lozenges: Use once a day. One lozenge is equivalent to 1.0 mg of fluoride ion; or 2.21 mg dose of NaF. It contains no sugar or Saccharin. Active ingredient: sodium fluoride (NaF). 2.21mg; other ingredients: Sorbitol, Stearic Acid, Flavor, Magnesium Stearate. USE where drinking water contains less than 0.3 PPM. Children 6 to 16 years of age, 1 lozenge daily (equivalent to 1.0 mg of fluoride ion daily) . Not indicated for children under 6 years of age. Adults: 1 lozenge daily or as recommended, regardless of drinking water fluoride levels. WARNING: No more than 264 mg of sodium fluoride should be dispensed at one time. [LOZI-FLUR, Dreir harmaceuticals, Inc. 8479 E. San Daniel Drive, Scottsdale AZ 85258

N8. Enamelon Incorporated, a New York company holds a U.S. Patent which describes a compound made **of water soluble calcium salt(s), water soluble phosphate salt(s), a hydrophilic, non-aqueous vehicle and fluoride salt(s)**. When applied to cavities, this compound reportedly causes remineralization of the tooth enamel and mineralization of tubules in dentin, thus counteracting dental caries and hypersensitivity. Calcium phosphate has long been known to help strengthen teeth. Kimberly A. Loos, D.D.S. and Brad J. Loos; <http://www.smiledoc.com/dentist/candy.html>

N9. Remineralization: Fred Eichmiller, head of the ADA Health Foundation's Paffenbarger Research Center, Gaithersburg, Md., thinks the issue of remineralization soon will be as important to the discussion of dental health as it is now to talk about improving bone density to fight osteoporosis. "Every major manufacturer is either looking at or developing remineralization technologies at this point," he says. "This looks to be the next phase of prevention in over-the-counter products."

A. Recaldent™, Trident Chewing gum: is said to remineralize the enamel subsurface demineralized areas. is a trade mark for a complex of casein phosphopeptides (CPP) and amorphous calcium phosphate (ACP). They are derived from casein, a protein naturally found in milk. It promotes remineralization of enamel subsurface demineralized areas.

Univ. of Melbourne researchers developed recaldent, the ingredient in Trident Advantage, after studying the natural remineralizing properties of dairy foods like milk and cheese. One study, published in 1999 in the Journal of Clinical Dentistry, 10 people wore special dental appliances with demineralized enamel similar to the demineralization that occurs in teeth. The testers chewed various gums for 20 minutes a day for 14 days. The results showed the recaldent gum replenished about 20% of the enamel, twice as much as a normal sugarless gum, which spurs remineralization by stimulating saliva flow.

- A. Reynolds EC. Remineralization of enamel subsurface lesions by casein phosphopeptide-stabilized calcium phosphate solutions. J. Dent Res. **1997**;76:1587-1595.
- B. Reynolds EC, Cain CJ, Webber FL, Black CL, Riley PF, et al. Anticariogenicity of tryptic casein- and synthetic-phosphopeptides in the rat. J Dent Res. **1995**;74:1272-1279.
- C. Reynolds EC. Anticariogenic complexes of amorphous calcium phosphate stabilized by casein phosphopeptides: a review. Spec Care Dentist. **1998**;18:8-16.
- D. In a 2 year double blind clinical trial in the USA, CaSP incorporated into chewing gum was shown to reduce DMFS by 39% relative to a control gum (Craig GG. The use of a calcium sucrose phosphates-calcium orthophosphate complex as a cariostatic agent. Brit Dent J 7:25-8, 1975.)

N10. "These (topical products) are "superior to fluoridated water" (Pediatric Nursing, 1997).

A. Any Fluoride Protection is topical and limited to the oral cavity:

"...protection against dental decay was primarily due to the reaction of fluoride **in the mouth** rather than by systemic routes...reduction in dental decay in adults and in children has now been attributed primarily to the almost universal use of fluoridated tooth pastes. (p. 10; refs. 1 & 2.).

.... fluoride "has an antibacterial action... when fluoride enters the bacteria, it interferes with the enzymes inside the bacteria, inhibiting acid production." In other words, when the bacteria eat the sugar on your teeth their digestive enzymes create acid which causes tooth decay.

Fluoride interferes so the bacteria starve to death and, if you use fluoridated toothpaste, you have no plaque or decay. *The Mechanism of*

*Dental Decay*, Dr. John Featherstone, [chairman of the Oral Biology Dept., Eastman Dental Center, Rochester, N.Y.] NutritionToday, May/June, 10, 1987.

Burt, B.A. (1994). Letter. Fluoride, 27, 180-181.

Carlos, J.P. (1983). Comments on Fluoride. J.Pedodontics. Winter, 135-136.

Fejerskov, O. et al (1981) Rational use of fluorides in caries prevention. Acta. Odontol. Scand., 241-249.

Levine, R.S., (1976). The action of fluoride in caries prevention: a Review of current concepts. Brit. Dent. J. 140, 9-14.

Limeback, H. (1999). A re-examination of the pre-eruptive and post-eruptive mechanism of the anti-caries effects of fluoride: is there any caries benefit from swallowing fluoride? Community. Dent. Oral Epidemiol. 27, 62-71.

- Limeback, H. (2000) Videotaped Interview. available from GGVideo, 82 Judson Street, Canton, NY 13617. Tel: 315-379-9544. Fax: 315-379-0448. E-mail: ggvideo@northnet.org and www.FluorideAlert.Org
- Margolis, H.C. and Moreno, E.C. (1990). Physicochemical Perspectives on the Cariostatic Mechanisms of Systemic and Topical Fluorides. J. Dent. Res 69 (Special Issue) 606-613.
- Shellis, R.P and Duckworth, R.M.(1994). Studies on the cariostatic mechanisms of fluoride. Int. dent. J. 44, 263-273.

B. Fluoride Action: In our bodies "fluorides act as direct cellular poisons by interfering with calcium metabolism and enzyme mechanisms." (p. 216)  
The Handbook on Poisoning by Robert Dreisbach, MD, Ph.D. chemist and a physician; the 13<sup>th</sup> edition of this medical textbook; published in 5 languages.] An irony: the characteristic that makes fluoride beneficial when applied to teeth (TOPICAL) is the same one that makes it dangerous to the body when ingested (systemic). This is why the FDA requires the warning label on toothpaste.

N11 Light: full spectrum— Study by Warren Hathaway of the Alberta Education Department. There were 9% less cavities. Light influences calcium absorption. This light has additional health benefits in the class room for school children. Sun light plays a role in triggering hormones. "Light is definitely a nutrient. It is essential to life and the whole endocrine system." Phillip Hughes Ph.D., a scientist at Duro-Test Corp., North Bergen, N.H, is a specialist in neurological sciences, physiology and psychology. Hughes says that vitamin D is synthesized by ultraviolet in the skin. Vitamin D receptors help proper bone development and prevent development of rickets. Vitamin D facilitates the **absorption of calcium**.

A. Dr. John Ott's studies: "Let There Be Light" ;"Health & Light"  
 "Color & Light: Their Effects on Plants, Animals & People"; "Light, Radiation & You"; "The Principles of Light and Color", Edwin D. Babbit (1878)

[http://www.maxpages.com/durotest/Full Spectrum Benefit Dentists](http://www.maxpages.com/durotest/Full_Spectrum_Benefit_Dentists)

N12. Private industry supports dental health: Western Dental Co. partners with Crest Oral Care Products (Procter & Gamble) to begin a major program in oral hygiene. (reported Jun 5, 2000) The goal: provide a greater number and variety of informational materials to parents and children; and to give them the tools for practicing good oral hygiene (toothpaste, tooth brushes and dental floss). They plan to develop special oral health presentations for use by schools, youth organizations and other interested groups. The company will be providing free dental screenings at schools, health fairs and other venues throughout the year. (The Phelps Group, Bill Krenn, 310/752-4400, ext. 116; [bkrenn@phelpsgroup.com](mailto:bkrenn@phelpsgroup.com); URL: <http://www.businesswire.com> )

A. Delta Dental joined the California Dental Association (CDA) to help state's water districts fund fluoridation. They announced pledges totaling \$130,000 in seed money for the implementation of the Statewide Fluoridation Act. They will hire a professional fundraiser for two years to solicit private sector support and possibly federal grants to pay the capital costs of fluoridation statewide. William Ward, CEO, Delta Dental Plan of California, Corp. Headquarters, P.O Box 7736, San Francisco, CA 94120, [ddpca@delta.org](mailto:ddpca@delta.org)

N13. Oral PH changer: It absorbs plaque. Orahealth Labs, 18662 MacArthur



Bldv, Suite 456 Irvine, CA 92612800 toll-free # 800-969-5227. Ingredients: sodium bicarbonate, silicon dioxide, citric acid, mannitol, aspartame, sunflower oil, parsley seed oil, natural and artificial flavoring.

{Without aspartame: sodium bicarbonate, silicon dioxide, citric acid, mannitol, sucrolose, sunflower oil, parsley seed oil, natural flavoring, food glaze}  
<http://www.orahealth.com/nnindex.html>

N14. Triclosan, is a common ingredient antibacterial soap. However, the FDA stressed that nobody yet knows just how triclosan works inside the mouth. Colgate's new Total is the only toothpaste the U.S. Food & Drug Admin. has approved as a fighter of gum disease. (Note: Total is a fluoridated toothpastes)

N15. Fluoride varnish: Dentists paint this easy, safe and cost-effective coating. The sodium fluoride varnish has a higher concentration of fluoride than current gels, foams, rinses and pastes, but is less toxic to children because less of the product is swallowed during application. In one study it had reversed (remineralized) in more than 80 percent of the test group and 37 percent in the control group. The cost is comparable to current fluoride gels and foams.

Studies have indicated that a minority of dentists regularly use fluoride varnish to control caries; about 32 percent) Louis Fiset, D.D.S.; David Grembowski, Ph.D.; Michael del Aguila, Ph.D. July 2000, JADA, page 961

Dr. Jaana Autio, a Univ. Florida, College of Dentistry assistant professor of pediatric dentistry, who studied the effectiveness of one varnish in a group of Head Start children aged 3 to 5. Autio said. "The varnish was clearly more beneficial to the children than the gel and reduced the need for expensive fillings." Duraphat is available only to dental professionals. For parents and the dental profession the two main benefits are its effectiveness in preventing the need for fillings and crowns, as well as the decreased risk of fluoride toxicity and fluorosis. "Toxicity and its effects such as nausea are always a concern with children under 6. Previous studies have shown that fluoride in patients' blood plasma is lowest among fluoride varnish users than users of other topical treatments. Less is swallowed," Autio said.

Autio, at UF since 1997, used the product routinely in her practice in Finland. Along with other American dentists and organizations such as the American Dental Association, she thinks that all children can benefit from use of the varnish, especially children from low-income families. Autio and co-researcher Dr. Frank Courts, advocate providing dental care to low-income children, believe the easy application and positive results of varnish use makes it ideal to be administered routinely in the school system. Gainsville, Fla. (ScienceDaily, Apr.4 2000)

N16. *KAN Be Healthy* (KBH) is a medicaid program to keep children and young adults healthy with regular check-ups. It is for everyone who is 20 or under and has a medical ID card. It is a federal program to provide good health by finding and treating, medical, **dental**, developmental and emotional problems. KAN Be Healthy services are important because they:

- A. **Prevent illness and find problems early** - Check-ups help find problems so they can be treated before they become serious.
- B. **Get screens every year**. When KBH dental screens

are up-to-date, you or your child can get services like: Teeth cleaning; Fluoride treatment; Fillings and Teeth pulled.  
 Consumer Assistance Unit: 1-800-766-9012 1-785-291-4144 (in Topeka)  
 MediKan consumers are not eligible for KAN Be Healthy.

N17. Conclusion from a study of youngsters living in non-fluoridated and optimally fluoridated areas (J. Amer. Dental Assn. 6 / 2000) Specific changes in early childhood behaviors could prevent most of the clinically noticeable dental fluorosis in children. D. G. Pendry, D.D.S., Ph.D. Dept. Behav. Sci. and Comm. Health, School Den. Med., U.Conn. Hlth Ctr.

N18. Economic Calculations: Multifactor and Complex: (derived from Natick study: original report of 55 pages with references, data tables. See at [www.cadvision.com/fluoride/index.htm#natick](http://www.cadvision.com/fluoride/index.htm#natick) )

A. Dental fluorosis increases 10 to 30% with the use of fluoride. It is very expensive to treat. That the number of dentists increases with mass use of indicates an increased need which has attendant higher dental bills for the public. (in theory, the need for service should decrease)

- 1) 1976: The CBS News almanac showed there were **76.7** dentists per 100,000 population in fluoridated cities, and **only 59.2** in non-fluoridated cities (based on thirty representative cities).
- 2) Three US cities that have been fluoridated the longest: *Grand Rapids, Michigan, Newburgh, NY, and Evanston, Illinois*. These cities averaged 121 dentists per 100,000 population, which was more than double the national average - after 25 years on fluoridated water.

B. Some of the costs of using ingested fluoride in hopes of preventing cavities:

1) Direct Process Costs:

- a. Only 20% of fluoride purchased and added to the water is used for food preparation and drinking purposes.
- b. training of personnel,
- c. amortization costs
- d. repairs and replacement of both privately owned and town-owned equipment due to increased corrosion. From these facts, two interesting pieces of data emerge.

2) Indirect costs/calculations:

- a. environmental impact; at least 80% of fluoridated returns to the local river and environment. Fluoride accumulates in and is toxic to living cells. This amount adds to water run-off from fertilizer and pesticides which contains fluoride.
- b. It is a fact is that 55% of the children in communities having unfluoridated water are cavity free. Clearly, fluoridation is not cost effective for this segment of the population.

3) costs are borne by residents who choose not to drink fluoridated water (e.g. those over sensitive to fluoride, and others)

- a. purchase of unfluoridated water from other sources (\$3-4 per week)
- b. purchase of fluoride removal equipment
- c. Increased medical costs for those oversensitive and others with associated with fluoride: kidney, heart, hip fractures, thyroide. etc.

4) Legal costs to the town to defend against lawsuits

5) Increased plumbing costs resulting from corrosion.

C. References from Natick study relevant to cost calculations (money & health)

1. Diesendorf, M, How science can illuminate ethical debates - A case study on water fluoridation., Fluoride, 28(2):87-104, (1995)
2. Colquhoun, J, Why I changed my opinion about water fluoridation, in Perspectives in Biology and Medicine, (in press)
3. Waldbott, GL, et. al., Fluoride - The Great Dilemma, Coronado Press (1978)
4. Koop, CE, Chem. & Engin. News, 28:2 (1988)

5. Breda, DJ, et al., Letter from the Natick Board of Health to J. Moran, Feb. 10, 1997
6. (Authorship unknown), List of National and International Organizations that Endorse or Support Water Fluoridation, (undated)
7. Natick Annual Town Report., p 37., (1996). Drinking/cooking gallonage estimated using the values of five gallons per household per week and 12000 households. The calculation for the annual amount of fluorosilicic acid required to fluoridate Natick's water is:  $\{[(1.5 \times 109 \text{ gal})(3785 \text{ g/gal.})/106/456 \text{ g/lb}]/0.792\}$  The quantity in brackets [ ] is the required number of pounds of F- and the value 0.792 is the number of pounds of F- per pound of fluorosilicic acid
8. Conley, F, Natick Town Administrator via Ball, J, Clerk/Selectman
9. Sargent, E, (Superintendent of Water Supplies, Wilmington, MA), Letter to townspeople of Wilmington, Feb. 28, 1962
10. Ripa, L., A Half-century of Community Water Fluoridation....Review and Commentary, J. Pub. Hlth. Dent., 53; 17 (1993)
11. Brunelle, JA and Carlos, JP, Recent trends in dental caries in US children and the effect of water fluoridation, J. Dent. Res., 69:723-727 (1990)
12. Szpunar, SM and Burt, BA, Dental Caries, fluorosis, and fluoride exposure in Michigan schoolchildren, J. Dent. Res., 67:802-806 (1988)
13. Lewis, DW and Banting, DW, Water fluoridation: current effectiveness and dental fluorosis, Community Dent. Oral Epidemiol., 22:153-158 (1994)
14. Bevis, M, 10 Years of Fluoride leaks, spills and overfeeds in the U.S., National Fluoridation News, p.3, Nov. 1981

N19 Independent study of water fluoridation contracted by Natick, Mass.

This summary is presented as a review of salient points water fluoridation should the Council be again requested to re-consider it by the Board of Health (in spite of the Council's mandate to seek alternatives to fluoriation).

Findings:

- a. Recent studies of the incidence of cavities in children show little to no difference between fluoridated and non-fluoridated communities.
- b. 10-30% of Natick's children will have very mild to mild dental fluorosis if Natick fluoridates its water (up from probably 6% now).
- c. About 1% of Natick's children will have moderate or severe dental fluorosis. Dental fluorosis can cause great concern for the affected family and may result in additional dental bills. It should not be dismissed as a "cosmetic" effect.
- d. Fluoride adversely effects the central nervous system, causing behavioral changes and cognitive deficits.
- e. There is good evidence that fluoride is a developmental neurotoxicant; it affects the nervous system of the developing fetus at doses that are not toxic to the mother. Such neurotoxicity manifests as lower IQ and behavioral changes.
- f. Water fluoridation shows a positive correlation with increased hip fracture rates in persons 65 years of age and older, based on two recent epidemiology studies.
- g. Some adults are hypersensitive to even small quantities of fluoride, including that contained in fluoridated water.
- h. The impact of fluoride on human reproduction at the levels received from environmental exposures is a serious concern; e.g. a correlation between decreasing annual fertility rate in humans and increasing levels of fluoride in drinking water.
- i. Animal bioassays suggest that fluoride is a carcinogen, especially for tissues such as bone (osteosarcoma) and liver. The potential for

carcinogenicity is supported by fluoride's genotoxicity and pharmacokinetic properties.

- k. Fluoride inhibits or otherwise alters the actions of a long list of enzymes important to metabolism, growth, and cell regulation.
- j. Sodium fluorosilicate and fluorosilicic acid, the two chemicals Natick intends to use to fluoridate the water supply, have been associated with increased concentrations of lead in tap water and increased blood lead levels in children.
- l. If Natick fluoridates its water supply at the proposed level, most children under the age of three will daily receive more fluoride than is recommended for them.

Conclusion: The Committee reached the firm conclusion that the risks of overexposure to fluoride far outweigh any current benefit of water fluoridation.

N20. Research findings regarding adding fluoride to drinking water:

- a. Fluoridation does not decrease caries: Colquhoun, J. Health Studies, 11:2, pp. 85 (1987) J. Canadian Den. Assn, 53, p 763 (1987), Fluoride 23, p 55 (1990); Calif. Dept. Hlth records, Writ of Mandate, Citizens Against Fluoridation vs. Attorney Gen. D. Lungren, 7/1996; Studies in USA, New Zealand, Canada, Europe,
- b. The FDA mandated that fluoridated toothpastes display a poison warning label.
- c. Fluoride drops and tablets are not approved by the U.S. FDA as safe or effective. A four-year Natl. Study, Robert Wood-Johnson Foundation, Spec. Rept, p.18 (Feb. 1983)
- d. Fluoride, when used in treating a disease, is classified as **a drug**. U. S. Pub.Health Service / FDA; 21 C.F.R. § 355.3(c) (1996).
- e. Hydrofluorosilic (HFSA) acid put in drinking water is NOT the same as nature's calcium fluoride. It is up to 87 times more toxic than naturally occurring fluoride in rivers.
- g. HFSA is **contaminated**. It's recycled from industrial scrubbers; is a toxic waste.
- l. Industry saves vast amounts of money selling their toxic waste to cities water departments.
- J. Fluoride **accumulates** in most of the human body slowly building to show toxic effects.
- k. Fluoride is highly toxic to cells; 15 times stronger than arsenic. Fluoride disrupts enzyme action in all living cells, thus, it is associated with many illnesses. Dr. J. Yiamouyiannis, 1993.
- l. Fluoride increases the absorption of lead in children (Intn'l of Environ. Studies, 9/99).
- m. Fluoride is more toxic than lead and like it, damages the brain/mind development of children, produces abnormal behavior in animals and reduces IQ in humans. H L. Needleman, U. Pittsburgh's Sch. Medicine
- n. It makes aluminum more bioavailable with neurological impairment. Alterations in Neuronal and Cerebrovascular Integrity, JA Varner, et.al, Brain Research Vol. 784, pp. 284-298 1998
- o. Causes pitted and discolored teeth (fluorosis) which increases 10 to 30% with fluoridated water. It's the first visible sign of fluoride poisoning; it has markedly increased over the last 40 years. Science, 217, p. 26 (1982); JADA, 108, p. 56 (1984); J. Pub Hlth Dentistry, 46, p184 (1986); Dr. M. Diesendorf, Mar.2000
- p. At least 9 studies since 1990 (4 published in the JAMA) found hip fracture rates substantially higher in fluoridated communities . e.g. Jacobsen SJ, et.al JAMA Vol. 264, p. 500 (1990)
- q. The EPA and Surgeon Generals Shapiro and Koop agree on adverse health effects the ingestion of fluoride: "death, gastrointestinal hemorrhage

- or irritation, arthralgias, and crippling fluorosis." Water Regs., Fluoride, 50 Fed. Reg. 47,142, 47,143
- r. Fluoride causes iodine deficiency; it can result in hypothyroidism and frequently in hyperthyroidism. Galetti PM, et.al., J Clin Endocrinol 18:1102 (1958)
  - s. Fluoride associated with lower IQ: Li, XS et.al.; Fluoride 28:4, p 189, 1995; Zhao, LB, et.al., Fluoride, 29:4 pp. 190, 1996
  - t. Fluoride causes cancer, Dr. D. Burke, Chief Chem. U.S. Natl. **Cancer Instit.** (& other studies)
  - u. The American diet contains too much fluoride; it already exceeds the dose advocates want.
  - v. The **dose** received by a person **cannot be controlled** when waster is fluoridated.
  - w. Iodine, put in the water to treat goiter (1920's) was removed for lack of control.
  - x. Having ALL persons drink fluoride is risky for certain groups with special health conditions.
  - y. Teeth develop strong and healthy without fluoride, **it is not an essential nutrient**. J. Forman, M.D., PREVENTION, June 1964; J. J. Miller, Ph.D. PREVENTION, July 1964; G. L. Waldbott, M.D., Fluoridation: The Great Dilemma, 20 (1978).
  - z. Other sources of **fluoride are now available and the** dose can be controlled in tablet and vitamin preparations which were more than twice as effective as fluoridated water in preventing cavities. G L. Waldbott, M.D., Fluoridation: the Great Dilemma, 307 (1978).
  - aa. Ministering to poor kids is the chief reason for fluoridation. But they are prone to calcium, magnesium deficiencies and, therefore, more at risk for its negative effects.
  - bb. "These (topical products) are "superior to fluoridated water" (Pediatric Nursing, 1997)
  - cc. The Canadian Dent'l Assn. recommends NO fluoride supplements for children under three.
  - dd. 98 % of countries in Western Europe have rejected fluoride; so do Japan and China.
  - ee. EPA professionals oppose fluoridation: Dr. J. W. Hirzy, [www.nteu280.org](http://www.nteu280.org)
  - ff. Dentists and physicians disagree; So whom do you trust? Is yours a faith or fact decision?
    - 1) Experts reverse their position: 1) H. Limebck, B.Sc., Ph.D. in Biochemistry, D.D.S, president, Canadian Assn for Dent. Research;
    - 2) Dr. John Colquhoun, BDS, MPhil Ph.D., DipEd., Chf. Dent. Officer, New Zealand
  - ff. 15,000 members of the Assn. Amer. Physicians and Surgeons, oppose fluoridation.
    - ii. Since 1996 these Associations no longer endorse Water Fluoridation:
 

American Heart Assoc.;	American Academy of Allergy & Immunology
American Cancer Society;	Chronic Fatigue Syndrome Activation Network
American Diabetes Assoc.	National Institute of Law Municipal Officers
American Chiropractic Assoc.;	American Civil Liberties Union
Nat'l Kidney Foundation;	American Psychiatric Assoc.;
Soc. of Toxicology	
  - hh. The EPA has published a disclaimer; they do not endorse fluoridation,
    - ii. Most cities are enticed to fluoridate by money-grants, e.g. San Diego's \$4 mil.
    - jj. When put to public vote most US cities reject it; at least 78 since '94; many after 10 to 43 years.
    - kk. Proponents avoid public votes, because they are most often defeated.
      - ll. Proponents quietly influence city officials and public health agencies; avoiding the public.
    - mm. An **independent analysis of fluoridation** paid for by Natick [Mass.] recommended against fluoridation. [www.cadvision.com/fluoride/index.htm#natick](http://www.cadvision.com/fluoride/index.htm#natick) )
    - oo. It costs more to treat dental fluorosis than to fill a cavity; it's uneconomical

- for many reasons.
- pp. 99% of fluoridated public water is not drunk; it goes into rivers & the food chain.
  - qq. In Calif., counties with 100% fluoridation have dental costs which are **10% higher**.
  - rr. The ADA reported 17 percent more income in fluoridated communities. (*JADA, 84, 1972*)
  - ss. There are double the national average number of dentists in 3 long time fluoridated cities: *Grand Rapids, Michigan, Newburgh, NY, and Evanston, Illinois. Why?*
  - tt. ADA saves face by ignoring new data which would force them to recant about the systemic use of fluoride.
  - uu. Putting any health-related chemical in water **takes away individual freedom of choice**.
  - v v. Water should be treated to maintain purity; not to deliver medicine.
  - ww. Mass medication is unethical; physicians treatment must be based on individual diagnosis.
  - xx. There is no compelling State interest to mandate prophylactic drugs for a noncontagious disease; reasonable alternatives exist, therefore, fluoridation statutes will fail the law's *strict scrutiny test*. Pace Environmental Law Review Vol 14, #2, Summer 1997 by Douglas A Balog
  - yy. The federal government concedes that the purported benefit of fluoridation is limited, as it applies only to developing enamel in the teeth of children up to the age of nine. Natl Primary Drinking Water Regulations; Fluoride, 50 Fed. Reg. 47,156, 47,171
  - zz. Proponents of fluoridation admit that it does not provide any health benefits for an adult. Natl Primary Drinking Water Reg, Fluoride, 50 Fed. Reg. 47,142 -47,155 (codified at 40 C.F.R. § 141.51).
  - aaa. State laws authorizing fluoridation do not benefit the majority of the public, and so do not promote their health, safety, and welfare. Pace Environ. Law Rev. V.4, #2, Summer 1997, D. A. Balog
  - bbb. Fluoridating public water in an attempt to target children whose permanent teeth are still developing is like using a shotgun to shoot an apple off someone's head; sure, you hit the apple, but the side effects are undesirable. 1997, D. A. Balog
  - ccc. Toxic sodium fluoride because it is regulated as an active ingredient under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), Rodenticide Act, 7 U.S.C. §§ 136a, 136a-1
  - ddd. As one of the two most widely used fluoridation substances, hydrofluosilicic acid, is only approximately 23% in concentration, with the other 77% consisting of industrial waste water containing lead, arsenic, cadmium, mercury and a host of other contaminants.

N21 . Fluoride tablets for addition to home water dispensers. Parents could fluoridate a gallon water jug (or dispenser). Fluoride drops or tablets routinely come in 0.25, 0.5 and 1.0 milligrams which can then be administered as per prescription. Physicians and parents would retain control over the dose received and avoid risks of overdose which accompany mass-dosing through fluoridated drinking water.

The advantage of this method is its specificity. It could be directly targeted to high-risk groups. Of course, it could be available for others wanting fluoridated water. In addition, parents of these children would have a choice between it and other dental health options.

A critic of this method of fluoride delivery might raise the prescription question. Fluoride vitamins and supplements require a prescription. The fact is all methods of fluoride delivery carry problem of dose-control. Currently parents are trusted to monitor children's use of fluoride toothpaste. They must respect the warning that only a pea-sized amount be

used and that none swallowed. Parents dispense vitamins and supplements, too. Therefore, they can be trusted to add the equivalent of one tablet per gallon to their home supply of drinking water. This option has the additional benefit of avoiding the extra expenses which would be borne by those in the general population who want or need to avoid fluoride. They would not have to purchase expensive water purifiers or bottled water.

- N22 Rinses: This hygiene method carries a risk of swallowing just as do gels and toothpaste. The amount of risk is partly dependent on the concentration level of fluoride in the agent. Fluoride in drinking water is less concentrated. However, over time, its fluoride accumulates in bone, brain, and other tissue, its use over time produces toxic effects, e.g. fluorosis. Following fluorosis, are more serious bone effects and other health consequences. Duration of use, purity of substance, and its dose, and method of application (topical is safer than systemic—ingestion) are major critical factors determining the appearance of toxic effects of fluoride. All these must be weighed in choosing an alternative.

Although fluoridated water has a less concentrated dose, it could be used as an inexpensive rinse. Schools practice swish and swallow programs. In this case, target children could be taught how to swish and spit with fluoridated water.

*Respectfully submitted: Research Sub-committee FAT-Ks. Wichita Affiliate*

## THE ECONOMICS OF WATER FLUORIDATION

Fluoride Awareness Team of Kansas, October, 2000

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### CONCLUSIONS:

The cost of fluoridation is extremely more complex than proponents indicate. In fact, an accurate estimate of costs almost impossible to derive. This report presented many of the most significant factors that necessary to address in order to arrive at a realistic understanding of fluoride's economic impact. Because water fluoridation is intended to be a permanent program, its financial impact should be given especially careful consideration.

Surprisingly, the need to explore the costs of water delivery of fluoride may be obsolete. This bold statement is based on the lead article in the July 2000 issue of the Journal of the American Dental Association. The primary action of fluoride is *topical*, not systemic. Therefore, drinking fluoridated water is not necessary to affect the teeth. The dentist's article supports a nearly two decade-old position held by many others. This information obviates the need to make economic comparisons between any preventive dentistry alternative and water fluoridation. Therefore, options to water delivery can be compared with each other without becoming entangled in the complications of and controversy over water delivery.



Indeed, cost comparisons should be made between alternatives selected without reference to water fluoridation. There are strong reasons for this statement: 1) As noted above, the action of fluoride does not require drinking it daily. 2) The risks attendant to topical applications are far less than with the ingestion of fluoride (systemic). 3) The costs of water fluoridation are extremely difficult to accurately determine. 4) Non-water delivery alternatives spare citizens with health conditions antagonistic to fluoride. 5) Non-fluoride options exist that inhibit caries causing bacteria. 6) Non-water delivery alternatives spare the environment from fluoride contamination because an amazing 99 percent of the chemical intended to the target group ends up in the river.

A precise calculation of the economic impact of fluoridation would be presumptuous. Even with the information provided herein, weeks of additional research work would be needed to arrive at a comprehensive formula. Advocates of fluoridation do not include several expensive cost factors in their cost/benefit estimates. They simply select the most obvious factors. Also, they select estimates of fluoride efficacy that are inflated and are contradicted by several scientific studies. Studies showing little or no beneficial effects of fluoride are excluded and dismissed as flawed. In point of fact, a recent statement in a British review (York) admitted that *most if not all early studies* upon which advocates build their case were poor. They averaged a rating of about 2-3 on a scale from 0 to 8.

Advocates exclude an important cost factor, the ongoing monitoring of fluoride's effects. A responsible community plan must include ongoing measures that determine the cost/benefit ratio of any permanent health program. If fluoridation is instituted, funds should be allocated for "before-during-and-after" data collection and analysis. Fiscal prudence demands that authorities do not just "set it and forget it". Fluoride is a known cumulative toxin. It must be monitored in humans and the environment.

At the very least, monitoring must include dental caries changes and fluorosis effects. The evidence of increased hip fracture rate suggests that it too should be measured. The current rate should be compared to future annual rates. Assessment programs should also be instituted for certain cancers and kidney problems. There is no way to know the true cost/benefit ratio so human health and city budgets are put at risk. Without a monitoring program, a decision to deliver fluoride through drinking water is based on gambling based on faith in a highly scientifically debated topic. There is good reason to insist on monitoring effects. It is a fact that cities were prompted to fluoride by the Public Health Service *before* the first safety-effectiveness study was completed. Local governments must monitor their own systems.

Another less obvious cost factor needs to be weighed; the continuing decrease in dental caries. Dosing the entire population for a diminishing number of citizens increases the cost-per-potential beneficiary. Consideration might also be given to the fact that this decline occurs in both fluoridated and unfluoridated communities.

In addition, a comprehensive discussion of fluoride's economics includes the costs of promoting and opposing it. Huge sums of money are spent promoting fluoridation by

dental insurance companies, dental societies, and U.S. Government agencies fund. That money ultimately comes from the same group of persons, consumers and taxpayers. Finally, to be complete, the vested financial interested of industry must be mentioned. It is vastly less expensive to sell waste fluoride to municipalities than to place it in a number one toxic waste site. That the American Dental Association profits from touting fluoride is of interest. At the very least, the emotional "cost" of embarrassment is avoided by all the Public Health Service officials, personnel in other government agencies, and professionals that have promoted fluoridation.

When all obvious and subtle factors are considered, there are no savings to the community from drinking water delivery of fluoride.

### **INTRODUCTION:**

The reader is advised to reconsider delving into the complexities of calculating the full costs of fluoridation in the light of the latest statement about fluoride's topical action. This means that drinking fluoridated water is not necessary to affect the teeth. The lead article for the July 2000 issue of the Journal of the American Dental Association repeats this nearly two decade old position. If fluoride is desired, it should be applied to tooth surfaces by toothpastes and other means. Choosing recommended topical applications reduces this document to the level of academic interest. There will be little if any need to comparisons any dentistry alternative and water fluoridation. (See an extended discussion and references in a separate document provided by the FAT-Ks)

Any attempt to estimate the actual cost of fluoridation meets with great complexity. Calculations involves far more than the purchasing the chemical, controlling its corrosive nature, new equipment, maintenance and personnel. This document attempts to discuss some of the most significant costs of fluoridation.

A realistic and comprehensive cost calculation must include the costs of treating the side-effects of physical conditions linked to fluoride exposure. These costs could easily dwarf the simple delivery costs and any estimated savings.

Of special interest when considering the overall economics of fluoridation is the money to be made when industry is permitted to dispose of its toxic waste by diluting and selling it to municipalities for citizens to drink.

General costs also include the money spent to promote and oppose fluoride. These dollars could be used to fund optional dental health programs.

By way of introduction, the following discussion will offer an overview of the economic debate and its complexities. The CDC's comments presented here capture the spirit of fluoridation proponent's position: *"Compared with other methods of community-based dental caries prevention, water fluoridation is the most cost effective for most areas of the United States in terms of cost per saved tooth surface."*

*"Water fluoridation reduces direct health-care expenditures through primary prevention of dental caries and avoidance of restorative care. Per capita cost savings from 1 year of fluoridation may range from negligible amounts among very small communities with very low incidence of caries to \$53 among large communities with a high incidence of disease (CDC, unpublished data, 1999). One economic analysis estimated that prevention of dental caries, largely attributed to fluoridation and fluoride-containing products, saved \$39 billion (1990 dollars) in dental-care expenditures in the United States during 1979-1989 .*

One spokesman for the opposition responds to the CDD. Dr. Paul Connett, Professor of Chemistry says:

First of all, if we assume that fluoride provides a benefit to teeth, which cannot be provided by other means (e.g., xylitol), the cost comparison which should be made is between the costs of delivering fluoride through the public water supply and delivering fluoride (or other cavity preventing agents) via toothpaste and other topical applications.

A comparison of this sort could be made by **comparing the costs accrued by European or Japanese oral health programs with those of the United States** (which should include the significant sums the US spends promoting fluoridation). Unfortunately, the CDC does not give any indication about what other methods were compared with fluoridation, and what the results of these comparisons were.

Secondly, in calculating the costs of fluoridation, the **CDC appears not to have taken into account the costs of treating dental fluorosis**, an issue they have clearly avoided in its modern context (see our response 10). This is a particularly important omission considering the fact that the President of the Canadian Association for Dental Research, Dr. Limeback, has stated that in **Canada they are spending more money treating dental fluorosis than they would spend treating the very small increase in dental decay that might result if fluoridation were halted**. According to Limeback, treating dental fluorosis has now become a multi-billion dollar industry (Limeback, 2000, video).

When recognizing this and the fact that upwards of two thirds of children living in fluoridated communities have dental fluorosis, the crudeness of the CDC's cost-benefit equation becomes evident.

Thirdly, and perhaps most significantly, the CDC has not taken into account the large potential costs of increased hip fractures in the elderly which are possibly associated with fluoride exposure (see our response 30). The US spends up to \$10 billion a year treating hip fractures, and one in four of elderly patients who experience a hip fracture DIE within a year of their operation and about 50% never return to an independent existence (NPR, 2000). If it is confirmed that fluoridation does contribute towards an increase in hip fracture (along with other health effects), these costs would dwarf the savings calculated **by the CDC**.

Aggressive, early management of pelvic fractures by a skilled Trauma team can help reduce the current 55% mortality rate. South Med J 93(8):760-762, 2000

Dr. Connett's assessment is supported by this comment: "When the actual costs of dental care delivered in fluoridated and non-fluoridated cities are compared, residents of fluoridated cities seem to reap no economic benefit from fluoridation." Chemical & Engineering News. August 1, 1988.

Some of the complexities involved in the economics of fluoridation will now be addressed.

### **SIMPLISTIC vs. IN-DEPTH CALCULATIONS**

Considering the details of economic calculations, the easiest aspect of cost estimation involves the insertion of a certain dose of fluoride into the municipal water supply. These costs can and have been determined based on the experience of fluoridated water systems throughout the nation. For example, the CDC cites a range of costs from \$0.31 to \$2.12 per person depending on the size of the community (1988 dollars). These figures are misleading for many reasons that are offered here to illustrate the multiple factors that must be included in any cost formula:

1. The per-person-per year cost is based on delivery to the entire population when, at best, less than 20 percent is the target group. When carefully analyzed, the figure shrinks to about 7 percent. The estimated cost should be divided by a proper fraction of the portion of the population of concern. When calculated in this way, the cost of delivery to those that advocates seek to serve, will increase about 14 times.
2. The CDC could have used a different calculation. It would compare costs of European and Japanese oral health programs with those of the United States. This figure would help evaluate the cost/benefit analysis of other dental health methods with fluoridation. This comment illustrates that many different economic calculations can be made. The reader must judge which is more realistic.
3. The most expensive cost of fluoridation is the treatment of its side effects. The undisputed side effect is the dose-related and increases significantly when added to the human diet. For example, dental fluorosis can cost from \$100 to \$1000 per tooth to treat. The incidence of this side effect is known to increase from 15 to 80 percent when fluoride is added to the daily intake through drinking water. A recent British survey said 12.5% of children will have moderate to severe fluorosis (one in eight children). A rough estimate for Wichita of these treatment costs for the target group add about \$35 to the cost per child (\$850,000 to treat 2800 children). According to a leading dental researcher and practitioner, Dr. Limeback, treating dental fluorosis has now become a multi-billion dollar industry.
 

The expensive treatment of other conditions linked to fluoride ingestion markedly increase the final and realistic cost of ingested fluoride (e.g. hip fractures, bone and thyroid cancers)
4. The human cost of suffering and the costs born by citizens who are oversensitive to must be included in the calculation.
5. There will be costs associated with avoiding fluoride is borne by citizens.
6. The price difference is great between the kinds of fluoride compound selected. Ninety percent of cities uses the cheapest; inexpensive because it comes directly from the waste systems of industry. In its calculations, the CDC does not discuss the nature of the most used fluoride. The purest grade is very expensive, namely, the pharmaceutical grade that is used in research to determine safety and efficacy. No one knows the hidden costs in using less pure fluorosilicic acid of industrial waste. The list of contaminants in this fluoride compound is undisputed.

7. It is unclear if the CDC included the costs of controlling the extra corrosion of water systems caused by fluoride.
8. No one knows the extent of the effects of the extra lead released and ingested along with the costs of treatment of lead's effects. (Children's uptake is increased with fluoridation))
9. No one knows the long term effects of the tons of fluoride released into the environment annually. The river literally becomes a toxic waste dump because less than one percent of the amount added to the public water supply never reaches its intended target, the children's teeth. These intangible costs are realistic because fluoride accumulates in the environment. It inhibits the operation of important enzymes necessary for life in humans, animals, and plants.

The nature and length of this document demonstrates the complexity of the economic factors attendant with water fluoridation. A list of some specific information from many cities is included in order to help the reader gather information.

## MULTIPLE FACTORS IN THE CALCULATION

1. Independent scientists studied fluoridation for Natick, Mass.
  - A. The economic costs in a massive program such as the fluoridation of a public water supply is difficult to treat exhaustively.
  - B **Direct Process Costs:** training of personnel, amortization costs, repairs and replacement of both privately owned and town-owned equipment due to increased corrosion (unrelated to lead issues) which is known to occur. (9) The environmental impact is also a factor.
  - C. **Cost-effectiveness of Fluoridation:** Two important factors when considering the 'savings' attributable to reduction in caries caused by fluoridation: 1) It is a fact that modern DMFS scores are much lower in all communities than was the case when fluoridation was first started. (11) Thus there are fewer cavities in the population and that *any percentage reduction in the incidence of cavities involves many fewer incidences* than was previously the case. 2) 55% of the children in communities having un-fluoridated water are cavity free. (12) Clearly, fluoridation is not cost effective for this segment of the population.
  - D. **Calculating cost effectiveness of fluoridation is very complex.** One has to consider the savings due to (possibly) fewer cavities in some children and the cost to treat those children. It is also true that there will be increased treatment costs due to dental fluorosis (between 10-30% of children in communities that fluoridate develop some form of dental fluorosis). Although these costs are not borne by the community at large, they should be considered in any assessment of cost-effectiveness. (13) It seems clear that **there will be a greater increase in fluorosis than there will be a reduction in cavities.**
  - E. **Indirect Costs:** Include: 1) costs borne by individual residents choosing not to drink fluoridated water; 2) individuals who may incur medical or dental costs due to drinking fluoridated water; 3) costs to the town such as amortization, repair, etc., of equipment necessary to the program. These costs include (but are not limited to) the following identifiable items:
    - Increased dental costs (not covered by insurance) to treat fluorosis
    - Purchase of unfluoridated water from other sources (\$3-4 per week)
    - Purchase of fluoride removal equipment
    - Increased medical costs
    - Legal costs to the town to defend against lawsuits (see below)
    - Increased plumbing costs resulting from corrosion. (9)
  - F. References for this Natick section:

8. Conley, F, Natick Town Administrator via Ball, J, Clerk/Selectman
9. Sargent, E, (Superintendent of Water Supplies, Wilmington, MA), Letter to townspeople of Wilmington, Feb. 28, 1962
10. Ripa, L., A Half-century of Community Water Fluoridation....Review and Commentary, J. Pub. Hlth. Dent., 53; 17 (1993)
11. Brunelle, JA and Carlos, JP, Recent trends in dental caries in US children and the effect of water fluoridation, J. Dent. Res., 69:723-727 (1990)
12. Szpunar, SM and Burt, BA, Dental Caries, fluorosis, and fluoride exposure in Michigan schoolchildren, J. Dent. Res., 67:802-806 (1988)
13. Lewis, DW and Banting, DW, Water fluoridation: current effectiveness and dental fluorosis, Community Dent. Oral Epidemiol., 22:153-158 (1994)

**CHEMICAL COST:** This factor will vary drastically according to the kind of fluoride compound uses. However, it may be one of the easiest costs to determine.

1 Hydrofluorosilicic acid costs around \$60 per ton as opposed to \$1096.00 per ton for Sodium fluoride (and this is not the pure food grade fluoride). This is the lowest bid price that Vancouver WA could get for bulk Sodium Fluoride in Feb 2000. [ *MOTION Awarded bid for year 2000 purchase of approximately 69 tons of sodium fluoride to Cascade Columbia Distribution Company of Sherwood, Oregon, in the amount of \$75,527.40. Products used in municipal drinking water are exempt from Washington State sales tax. (Kari Mullikin, Buyer, 696-8231, Norm Kramm, Operations Superintendent, 735-8893)* <http://www.ci.vancouver.wa.us/minutes/feb22-00.htm>

Keep in mind that there is sodium fluoride which is extracted from HF (which would be sold in bulk for fluoridation) and then there is a pure food or pharmaceutical grade that is used in medications and dental fluoride products. It appears that the purest form of sodium fluoride can not be purchased in bulk form for fluoridation purposes. It is only for pharmaceutical uses. This may be the form used in laboratory research. It appears that the price for a ton of true food grade sodium fluoride would be at least double that of the industrial grade of sodium fluoride purchased by Vancouver.

The following recent quote illustrated the kind fluoride used, that it is contaminated, and that some proponents are not clear on their chemistry, when they do mention it:

During a briefing, the following was stated by **Sheila Jones, Information Officer, British Fluoridation Society (Oct. 11, 2000):**

*"Only two compounds of fluoride are permitted for artificial fluoridation in the UK: hexafluorosilicic acid (H<sub>2</sub>SiFH<sub>6</sub>), and disodium hexafluorosilicate (NaH<sub>2</sub>SiFH<sub>6</sub>). These compounds are included on the Drinking Water Inspectorate's list of approved substances. They achieve the desired concentration of fluoride (1 part per million) reliably and safely, and must meet Department of Environment purity specifications."*

Ms. Jones, purports to be an expert on drinking water fluoridation, and yet, she made several egregious errors: She got the formulas wrong: The correct empirical formulas are H<sub>2</sub>SiF<sub>6</sub> and Na<sub>2</sub>SiF<sub>6</sub> respectively..

Despite the BFS claims that the fluorosilicates used in drinking water fluoridation are 'assessed' by whichever body, the fact remains that NO SAFETY TESTING DATA EXIST FOR THE FLUOROSILICATES USED IN DRINKING WATER FLUORIDATION. The fluorosilicates used in artificial water fluoridation

schemes include Arsenic, Beryllium, Lead, Cadmium, Vanadium, Mercury, Silicon and Radionuclides, etc. The Department of the Environment provides NO 'purity specifications'.

## **CORROSION EFFECTS AND CONTROL:**

Cities having used different compounds and different methods of insertion will have to be surveyed to determine the repair and replacement costs of equipment before and after fluoridation.

A. Comments by a Corrosion Control Engineer: reprinted from National Fluoridation News, July-September, 1975

A sample of a broken rusted pipe and a container of sludge from a Seattle apartment house was analyzed by the Food, Chemical and Research Laboratories, Inc. on March 27, 1972. The sample of pipe showed 1,044 ppm and the sludge 475 ppm of fluoride.

Dr. Willard E. Edwards, a consulting corrosion control engineer of Honolulu asking for a reason for the high fluoride content of the pipe and sludge. He replied:

In general, fluoride has a great affinity for iron oxide. It often softens previously hard pipe scale or iron oxide in steel pipes and tanks. This softened scale is often loosened and carried away from its previous location, thus allowing new iron oxide to form and corrode and weaken pipes and tanks under pressure.

Fluoride increases the electrical conductivity of water. In general, the higher the electrical conductivity of water, the higher its ability to allow corrosion to occur to metals it contacts. Where steel pipes or fittings are connected to brass, bronze or copper fittings, pipes or tanks, an electrogenic (corrosive) action takes place in the presence of fluoridated water, between the steel and the other metals. The steel becomes anodic while the brass, bronze or copper is cathodic, and the steel corrodes. This is called bi-metallic corrosion, and it occurs whenever two different metals are electrically (mechanically) connected in the presence of an electrolyte like fluoridated water.

Excessive corrosion can often be reduced by adding various chemicals to a water supply that has been fluoridated, but of course this adds to the cost of the maintenance and operation of the water system, and it makes the water less pure. I can honestly say that trouble due to pipe and tank corrosion greatly increases within a year after fluoridation is introduced.

## **TREATMENT OF SIDE EFFECTS:**

This will probably be the *largest cost consequence* of water delivery of fluoride. It will overshadow projected dental treatment savings.

A. Fluoride has "side-effects" when taken internally. Generally speaking, many in the population are oversensitive (hypersensitive) to fluoride. The number of these persons in the population must be determined in order to include in the calculation their treatment costs of treatment. Most will not know of their sensitivity in advance. They will go undiagnosed for long periods as case studies have shown. Fluoride intoxication has a long list of symptoms. Most physicians will not recognize the cause. Proponents, ignore this factor in cost-savings statements, to wit, the CDC's comments: "*Although other fluoride-*

containing products are available, water fluoridation remains the most equitable and cost-effective method of delivering fluoride to all members of most communities, regardless of age, educational attainment, or income level." Dr Paul Connett's response highlights information that must be added to the complex picture of fluoridation economics: "The statement that "fluoridation remains the most equitable and cost effective method" is an opinion that has been rejected by most of the advanced industrialized world. [Connett would have evaluators consider international experience.] This is particularly important considering the fact that on average there is little difference in DMFTs (Decayed, Missing, and Filled Teeth) between fluoridated and unfluoridated industrialized countries (Diesendorf 1986, Moore, 1996).

B. The CDC touts delivering fluoride "to all members" of the community, "regardless of age, educational attainment, or income level." Connett contends that serious problems are glossed over in this argument. 1) fluoridated water is not beneficial to infants. (Institute of Medicine, 1997, p 301). 2) the fluoride swallowed in the infant and early childhood years does not fortify the developing teeth. Featherstone, July 2000, JADA

Connett says the CDC needs to explain why its effectiveness is defined by delivering fluoride these and all oversensitive parts of the population, namely, the elderly, people with deficiencies of calcium, magnesium, and/or vitamin C, and people with cardiovascular and kidney problems" (ATSDR, 1993, p 112). 3) Those people with ailing kidneys and/ or undergoing dialysis treatments are vulnerable. Dr. George Waldbott (1978) and Dr. Hans Moolenburgh (1987) have provided case studies and described double blind studies supporting these claims.)

C. Some details:

1) Fluorosis: Treatment of dental fluorosis. It increases with the beginning of fluoridation. Fluorosis increases as the concentration increase (dose increase).

A) The cost of even a modest 10% increase in fluorosis will add considerable costs to fluoridation at about \$700 per tooth.

2) Hip fractures: D. C. Kennedy, DDS from San Diego, comments: "This is not a small matter, it is about life and death. The surgical cost of repairing a hip fracture is \$35,000. 25% of the victims die in the first 30 days. Only 11% of the victims ever return to independent living. 100% of the victims are debilitated and few, if any, of the elderly ever regain their former ability to walk normally. The research clearly shows that water fluoridation increases the number of people who will suffer this devastating injury.

A) The annual cost of hip fractures in the US is \$7 billion US, so a 15% reduction would save over \$1 billion. Kleerekoper, M (1992) J Amer. Med. Assoc 268 (6), 781-782 Aug 12th

B) The cost osteoporotic fractures of the forearm, spine and hip, is estimated at a "conservative" \$45.2 billion to the US Chrischilles, E Shireman, T & Wallace, R. (1994) Costs and health effects of osteoporotic fractures Bone 15 (4), 377-386, Jul/Aug ; Riggs, BL, Stephen, MD, Hodgson, SF O'Fallon, WM, Chao, EYS, Wahner, HW, Muhs, JM, Cedel, SL & Melton, LJ (1990) Effect of fluoride treatment on the fracture rate in postmenopausal women with osteoporosis New England Journal of Medicine 322 (12), 802-809, Mar 22<sup>nd</sup> [If only 5 % of the problem was attributed to by fluoridation, it would cost Wichita citizens \$3.15 million per year.]

3) Musculo skeletal disorders: One in four Americans is affected by musculoskeletal injuries and disorders, including hip fractures, osteoporosis, arthritis and ligament damage, according to a report released in Washington. Total costs of musculoskeletal conditions in America increased 18 percent in five years -- from \$215 billion in 1995 to \$254 billion in 2000, (National Center For Health Statistics) [This is \$1016 per person, if 10% of 25% of all Wichitans (viz., 8750) is aggravated by fluoridation, then the cost is \$8.89 million / year]



**COST OF AVOIDING fluoridated water:**

Assume only 1% of the 350,000 (Wichita, Ks.) served decide to purchased bottled water at 50 cents a gallon. This cost is \$637,000. Even half that yearly cost would be considered quite conservative, equaling \$318,000.

[ The yearly cost per persons would be \$182 (365 X 50 cents/gallon). One percent of the 350,000 citizens served by Wichita Water Department would be 3500 citizens. The final annual cost would be \$637,000 (3500 X \$182). A conservative figure might slash this by half resulting in a cost to these persons of \$318,500.]

**ENVIRONMENTAL CONTAMINATION:**

How can this cost be estimated? The toxic nature of fluoride and the amount released suggest that this cost can be significant. Ninety-nine percent of fluoridated municipal goes directly into the environment. The element fluorine does not degrade. Each year in the United States 80,000 tons of hydrofluosilicic acid, 60,000 tons of sodium silicofluoride and 3,000 tons of sodium fluorides are put into public water supplies (Sum = 143,000 tons of fluoride products to be added to public water supplies. Present estimates in 1995 run about 200,000 tons annually. Chemical Engineering News in 1988 Literally thousands of pounds of fluoride will be added to Wichita's currently suspect river (estimate 70 – 90 tons per year).

A. Calgary, Canada: 150 tons of fluoride will be dumped into the Bow River each year (the city uses over 600 tons of 25% hydrofluosilicic acid every year) Jamieson, D Personal communication from Calgary City Engineering Dept. in response to a request for information.1990.

B. Compare Calgary's amount to Baie Comeau, Quebec where the Reynolds Aluminum Company was only allowed to discharge 36.5 tons (100 kg/day) of fluoride into the St. Lawrence river each year under pollution control regulations. (Picard, A, Montreal decision to delay fluoridation pleases environmentalists, irks dentists. Toronto Globe & Mail, November 11th, A11 1989). The Bow river is a major trout river and fluoride is harmful to fish spawning, hatching or growth (Waldbott, GL, Burgstahler, & McKinney, (1978) Fluoridation: the great dilemma. Lawrence, Kansas: Coronado Press, 423 pp). It is a pollutant. (Hammer, (1983) Letter from Rebecca Hammer, Deputy Assistant Administrator for Water for the US Environmental Protection Agency to Dr. L. A. Russell, DMD, Newtonville MA, Mar 30th)

**DENTAL CARE COSTS BETWEEN CITIES WITH/ WITHOUT FLUORIDATION**

A. From 1958 to 1970, **increases in dental costs were virtually identical** in the **10 most fluoridated states and the 10 least fluoridated states.**

B. Patients on public assistance, California: fluoridated cities had higher claims:

Dr. David C. Kennedy, DDS Past President, International Academy of Oral Medicine and Toxicology, cited a study of the 1994 and 1995 California Medi-Cal data that shows that, after 45 years of fluoridation, the fluoridated counties cost the state of California significantly more for dental care per eligible recipient than the non fluoridated counties; (N = 56 counties total). ...supporting the study by Cornelius Steelink that showed an increase in dental caries, rather than a decrease in dental caries when fluoride ingestion is

increased, and refuting the claim of significant dental benefit. The costs increase as the amount of fluoride increases.

1) The 100% Fluoride counties spend 10% more than 0% counties. If fluoride was effective, there should be a decrease in costs.

Data provided by the State of California, Department of Health

Services, Medical Statistics Section for recipients qualified for Medi-Cal dental treatments for 1994 and 1995 and filed with California County Superior Court.

C. Louisiana study: Claims higher dental costs in unfluoridated areas.

*Water Fluoridation and Costs of Medicaid Treatment from Dental Decay* Barsley, R.; Sutherland, J.; & McFarland, L., Louisiana, 1995-1996.

D. Texas study: Claims higher dental costs in unfluoridated areas.

E. In spite of continued decreases in caries since before fluoridation was begun, the cost of dental services in the US rapidly increases - from \$13.6 billion in 1979 to \$27.1 billion in 1985 - in parallel with the increasing environmental saturation of fluoride from many sources. This is almost exactly a doubling of dental costs in six years. Inflation cannot account for changes on this a scale. *If fluoride was as effective as claimed (up to 60% reduction in caries) that the costs offset inflation costs.*

#### **DATA BY CITY:**

**Caution:** *This limited information does not include the "hidden" costs as listed above. However, a sense of the variability between cities demonstrates one of the problems in arriving at even a simple estimate of just the delivery costs of fluoride by water systems.*

**ARKANSAS CITY, Kan.** uses Sodium Silicofluoride. They still use the old gravity fed hopper system.

**BREMERTON,** Washington (pop. c.39,000), February 8, 1998

The Bremerton City Council original estimate, \$90,000. The final budget in Bremerton \$300,500 for Fluoridation. Then, \$910,000 then was budgeted for corrosion control that includes a LYE injection system.

*[Estimate: With a population of about 39,000. The cost is about \$7.70 per resident/year. The original 90,000 would cost \$2.31 per resident.]*

**Seattle** has spent many millions of dollars on this since their water was fluoridated. This expenditure was necessitated by their pipe joint leaks city-wide. This would also happen in Bremerton without the million dollar lye kicker.

February 8, 1998 <http://www.sonic.net/~kryptox/press/news98.htm>

*[If this full amount (\$910,000) is necessitated by the extra acidity of fluoride, then an additional \$23.33 must be added to the cost. Therefore, the total cost is estimated to be \$7.70 + \$23.33 = \$31.03 per person per year. Proponents of fluoridation have for years, cited a cost of 50 cents.]*

#### **CALGARY, CANADA**

Pre fluoridation estimate: the annual running costs for water fluoridation were estimated at \$230,000 CDN per year just for the chemicals (Note 20), of which

99.9% was destined not to be drunk, but to be flushed straight down the sewers.

Note 20: Then there was the cost of amortizing the \$1.2 million capital equipment expense, plus staff and maintenance costs. These likely should have included the new plastic-lined water pipes laid by the city. The city has denied there is any connection, but the old cast iron pipes were susceptible to corrosion caused by the water fluoridation, as had been found in US cities (e.g. Seattle), and the timing of the replacement was most fortuitous.

Today, the City of Calgary spends approximately **\$500,000 per year for purchasing hydrofluosilicic acid** [ *Wichita is half its size, perhaps it would spend \$250,000 for the chemical alone.*] ... and a significant amount on mechanical maintenance, monitoring and repayment of capital costs. If fluoridation were stopped today, Healthy Calgary estimates the City would save approximately \$750,000 dollars this year alone.

In terms of value-per-dollar one must seriously question whether fluoridation is the most effective use of money for cavity reduction. In 1998, the Calgary Regional Health Authority conducted a very successful social marketing campaign prior to the plebiscite at a cost of \$250,000. Imagine the positive impact if \$750,000 were used on a good nutrition campaign! To date, no one in the City is actively promoting sugar reduction.

Does fluoridation lull Calgarians into a false sense of security regarding the need for proper nutrition and dental hygiene?

### **CARSON CITY, NEVADA**

A. *Las Vegas Sun*, Jan. 19, 2000, Adrienne Packer: The district's board of directors, which consists of all seven Clark County commissioners, unanimously agreed to spend \$408,672 for a year's worth of fluoride that will be injected into the valley's water system beginning March 1. [The county population is about 750,000, and includes Las Vegas, Henderson, and Boulder City]

B. *Las Vegas Sun*, April 08, 1999 CARSON CITY (AP) ..... Giunchigliani's bill calls for the state to pay the \$6.4 million startup costs of the fluoridation.

C. The Las Vegas Valley Water District estimates fluoridation would cost \$4.4 million for startup equipment, and then about \$500,000 a year in operational costs. In Washoe County about 260,000 pop. (includes Reno), startup costs would be about \$2 million and \$513,000 a year for operational costs.

D. The Southern Nevada Water Authority estimates it will cost about \$3.9 million for the equipment and an annual cost of about \$489,600. Fluoridation will cost customers about 3 cents per 1,000 gallons of water used during the first year and less than half of one cent per 1,000 gallons the following years.

**CLEVELAND, O** Pop: 505,600; cost \$220,000/ yr. = 43 cents /person/yr.  
From Cleveland Plain Dealer Article

**EL DORADO, KS.** Pop. 30,000 (including rural water districts served); Spends \$2843

to bring fluoride up .75 ppm. The city uses a dry form of fluoride, Sodium Fluorosilicate. This form of fluoride is about 70% available.

There is a simple formula to figure out the cost of feeding any chemical: (70% avail., so we divide by .70) lbs./day = (mg/L) (8.34) (MGD) .70

Its water naturally has a concentration of about .25 mg/L of fluoride. Fluoride costs about \$.25 / lb. Using this formula it costs us about \$2.23 per million gallons to add fluoride to the water. The feed system is fairly simple, a standard dry chemical feeder with a mixing tank.

Last year they treated 1,275 million gallons, which brings the cost of fluoridation to \$2,843 for a population of roughly 30,000 people (this includes rural water districts).

**GILBERT, OKLAHOMA.** *The Arizona Republic*, April 27, 2000, Edythe Jensen  
It will cost \$150,000 to install fluoridation equipment. Population about 30,000.

**HUTT CITY,** (New Zealand) November 11, 1999 *No Fluoride Even if it Costs*  
Most Petone residents (N=1000 people surveyed) want a non-fluoridated water supply, even if they have to pay extra to keep it, an independent survey has found. It will cost an estimated \$550,000 cost of altering fluoride dosing equipment at Waterloo pumping station so that the supply to the new Rahui reservoir has no added fluoride.

The results: If there were no cost to residents, 76% would prefer unfluoridated water and 13% fluoridated. If the cost was \$2 extra per year for 15 years, 75% wanted non-fluoridated, 16% fluoridated. At a cost of \$15 per ratepayer per year, 68% would prefer non-fluoridated, 22% fluoridated.

<http://www.huttcity.govt.nz/services/works/water.shtml>  
[water.services@huttcity.govt.nz](mailto:water.services@huttcity.govt.nz)

**MERCED, CALIF.** If Merced at population of 60,000 spends \$75,000 annually to fluoridate. The cost per resident is \$1.25.

<http://www.modbee.com/metro/story/0,1113,145065,00.html>

**NATICK, MASS.** The projected annual cost for fluoridation of the Natick wells is believed to be a minimum of \$35,000 per year. (8) Other estimates range from \$30,000 to \$50,000 per year. [The rough estimate is about \$1.15 per citizen given its population: \$35,000/ 30,500 population. Note: compare the 0.50 figure cited by advocates.] The Natick water department pumps approximately 1.5 billion gallons of water per year. to Natick consumers. Of this amount, (0.208 per cent) is used in the preparation of food and for drinking purposes. (7) Fluoridation of 1.5 billion gallons of water to the 1 ppm level will require 15,720 lbs. of H<sub>2</sub>SiF<sub>6</sub>. (7)

**SEATTLE, WASHINGTON.** (pop. c. 517,000) Dumps 225 tons of industrial grade F each year into the water supply.

**VANCOUVER, WASH.** HF runs around \$60 per ton as opposed to \$1096.00 per ton for Sodium fluoride (and this is not the pure food grade fluoride). This is the lowest bid price

that Vancouver WA could get for bulk Sodium Fluoride in Feb 2000. [ *MOTION Awarded bid for year 2000 purchase of approximately 69 tons of sodium fluoride to Cascade Columbia Distribution Company of Sherwood, Oregon, in the amount of \$75,527.40. Products used in municipal drinking water are exempt from Washington State sales tax. (Kari Mullikin, Buyer, 696-8231, Norm Kramm, Operations Superintendent, 735-8893)*  
<http://www.ci.vancouver.wa.us/minutes/feb22-00.htm>

**WICHITA, KANSAS.** The 18,000 to 24,000 children in Wichita are the prime target group which proponents want to drink fluoridated water. Wichita has 350,000 citizens. The target group comprises is 7 % of the total citizenry. At minimum, the estimated cost in Wchita is \$175,000 (@ \$0.50 per resident. However, if only target children were used \$175,000 would be divided by 24,000. Then, the cost per child is about \$7.29 to deliver fluoridated water to these children. Again this figure is far from the fifty cent estimate; it is a gross underestimation given the many other variables in the complete fluoride cost formula.

### **COST PER PERSON:**

A. Decay has declined over the last 25 years, now 50% of children are caries free in adult teeth (1). 80% of caries occurs in only 15% of the population (2) Progression rates are decreasing (4) Cavitation occurs later - only 40% of outer ½ dentin x-ray decay has cavitated (5)

1 NIDR. Oral Health of United States Children. National Survey of Dental Caries in U.S. School Children: 1986-1987. Washington, DC: DHHS pub no (PHS) 89-2247, 1989.

2 Krasse B. In: Caries risk. Chicago: Quintessence Publ Co. 1985. pp 85.

3 Berkey C, Douglass C, Valechovic R, Chauncey H. Longitudinal radiographic analysis of carious lesion progression. Community Dent Oral Epidemiol 1988;16:83-90.

4 Ekanayake LS, Sheiham A. Reducing rates of progression of dental caries in British schoolchildren. Br Dent J 1987;163:265-269.

5 Pitts NB, Rimmer PA. An in vivo comparison of clinical caries status. Caries Res 1992;26:146-152

B. 55% of the children in communities having un-fluoridated water are cavity free. This figure reduces the number of persons benefiting from the fluoride dispensed to everyone, increasing the cost per target person value. Szpunar, SM and Burt, BA, Dental Caries, fluorosis, and fluoride exposure in Michigan schoolchildren, J. Dent. Res., 67:802-806 (1988)

C. Such reduction in caries suggests less potential benefit from dollars spent because the entire population continues to be exposed expense regardless of need.

D. Once the total costs are calculated, the value of this figure will depend on the population used as the divisor. Usually the entire fluoridated population is used. However, to compare fluoridation costs with non-universal forms of delivery, only the same recipients must be used in all calculations. At this time, it appears that many relevant costs are based on informed *estimates* so that a solid figure is probable impossible to derive. The cost/savings accepted will depend largely on the degree to which the observer accepts the validity of research linking fluoride exposure to various human ills. It is clear that government health agencies have not pursued research in many areas in which research has suggested a strong influence from ingestion of fluoride, even at and

below the claimed "optimal" dose. However, it appears that enough is known to conclude that projected savings in dental treatment will be greatly offset by a combination of all relevant implicated effects of fluoride.

E. Most proponents use the figure of 50 cents per citizen. For example, the Kansas Health Institute (KHI) researchers selected *only one review study* on which to rely for the important cost calculation that was used to make comparisons, and from which they drew an important economic conclusion.

F. The CDC offers a more differentiated analysis than the KHI: *Water fluoridation costs range from a mean of 31 cents per person per year in U.S. communities of greater than 50,000 persons to a mean of \$2.12 per person in communities of less than 10,000 (1988 dollars)*.

G. The product-exposure efficiency of water delivery is extremely poor. Only 1% of all water processed by a water department, is drunk by citizens of a community; the remainder, 99%, feeds the environment and local rivers. It has no impact on dental health. Economically speaking, this fact means that only one cent of every dollar spent on the chemical has human impact.

In 1967, Dr. F.B. Exner calculated that for each thousand dollars spent for fluoridating water, less than 50 cents goes for the intended purpose of supplying each child with one quart of fluoridated water per day.

H. This poor efficiency factor is dramatically reduced when using the size of the target group as a measure: only 7% of the total population (in Wichita, Ks.) In this case, only seven percent of one cent's worth of fluoride reaches the intended target. Wichitans will be asked to spend 99.93 cents to deliver .07 cents of fluoride to the children.

## **COSTS OF PROMOTION and OPPOSITION**

A. The costs to the Nation must include the millions (billions?) of dollars of taxpayers money spent over the last 50 years. Private insurance companies and professional groups (ADA and local dental societies) have contributed to the overall costs. The cost of passing and defending against legislation in cities and states must also be included as well as the cost of litigation. All these costs are directly or indirectly borne by citizens.

## **ALTERNATIVES TO FLUORIDATION**

Preventive dental options exist that do not contain fluoride as well as others that do. Non-fluoride options avoid the strong risk factors associated with fluoride because of its inherent toxic nature. Methods requiring the ingestion of fluoride are considered to have little effect on dental health and carry greater health risks than fluoride applied directly to the teeth by toothpaste, rinses, and other methods. Alternatives can be evaluated by several criteria: effectiveness, safety, cost, convenience, compliance, and moral/ethical grounds. Moral and ethical issues pertain to methods of delivered that impose the drug on all citizens regardless of need, desire, or medical condition (universal or mass dosing). Any such alternative violates medical ethics because the citizen is not individually

evaluated by his physician or dentist, prescribed for, nor followed up. Methods that target specific individuals with demonstrated need are preferred.

Cost comparison should be made between alternatives selected without reference to water fluoridation. There are strong reasons for this statement: 1) As noted above, the action of fluoride does not require drinking it daily. 2) The risks are less with topical applications. 3) Non-fluoride caries fighting options exist. 4) The costs of water fluoridation are extremely difficult to accurately determine. 5) Non-water delivery alternatives spare citizens with health conditions antagonistic to fluoride. 6) Non-water delivery alternatives spare the environment which ultimately receives over 99 percent of the chemical intended to the target group.

See the separate report about alternatives: Alternatives To Water Fluoridation. It offers an extended discussion about this topic. See also the critique of the KHI's report. It concludes that the information offered lacks depth and completeness. The report and the authors appear to minimize the attractiveness of options to water fluoridation. Indeed, the report is replete with indications of favoritism toward universal delivery of fluoride. Their bias is not strictly founded in on a thorough analysis of the scientific literature.

#### **FINANCIAL INCENTIVES TO COMMUNITIES:**

- A. California: An organization called the Fluoridation 2000 Committee has raised \$10 million to pay the one-time costs for agencies starting fluoridation.
- B. Sacramento received \$1.4 million for its equipment and will start fluoridation April 1, 2000.
- C. Los Angeles, which has been fluoridating since August, 2000 received \$2 million.
- D. The calculation ignores significant factors, a few are discussed below.
- E. Delta Dental Plan of California has contributed at Least \$100,000 and company resources for the promotion of fluoridation.  
<http://dentalhealthfoundation.org/now5.html>
- F. A \$30,000 pledge by the California Dental Association (CDA) to hire a professional Fundraiser for two years.
- G. Dr. David Kennedy, San Diego Dentist, claims that the fluoridation industry is pouring \$50 million a year into campaigns to get California communities fluoridated. That's because only 15-1/2 percent of Californians are forced to drink fluoridated water, compared with half of the people across the nation.
- H. 1980 From March 1980 to December 1980, the Houston Health Systems Agency allocated \$1,399,822 federal tax dollars to promote fluoridation in Texas. The Texas Department of Health gave instructions to the Health Systems Agency on how to promote fluoridation. It stated: "A low profile of government pressure will be maintained. Convince citizens that they will receive personal health benefits without local tax money expenditures."

- I. The USPHS campaign, evidence: More than \$94,000 was spent on media promotion of fluoridation in Portland, Oregon, and \$5000 for the poll on why fluoridation failed to pass.
- J. Of a \$90,000 federal grant for fluoridation, that city officials in Phoenix, Arizona had never requested, \$38,000 was earmarked for media promotion. Here is more evidence of the USPHS campaign.
- K. 1990 Procter and Gamble spends \$30 million advertising Crest on US television. On March 5th the ADA News published a photo of ADA President Mike Overbey accepting a check for \$100,000 from Procter and Gamble: "to commemorate the 30<sup>th</sup> Anniversary of ADA's recognition of Crest."

### INDUSTRY PROFITS FROM FLUORIDATION

A. It would cost up to \$8,000 per truckload to dispose of this hazardous waste. At a rate of emissions into the air of 155,000 tons/year, in addition to an estimated 500,000 tons of emissions into lakes, ocean, rivers (not counting fluoridation) - this adds up to savings of \$6 Billion dollars/year to industry!

- 1) another estimate: Using harvested forms of fluoride for fluoridation purposes sidesteps the usual costs of disposing of toxic waste, says Dr. W. Hirzy. Instead of the \$250 million to \$300 million a year cost of disposal, he says, "Human bodies are used as the disposal site."

### DENTAL PROFESSION BENEFITS:

A. The JADA, Feb., 1972 reported that dental incomes and dental costs per person are higher in fluoridated communities. Up to 17 % more income in fluoridated communities; and larger patient loads (J. ADA, 84, Feb.1972, p 384 )

B. More dentists practice in fluoridated areas:.. 1976: The CBS News almanac showed there were **76.7** dentists per 100,000 population in fluoridated cities, and **only 59.2** in non-fluoridated cities. This was based on a study of thirty representative cities. *This figure may, in part, be attributed to the treatment of fluorosis.*

"Dentists in fluoridated communities serve a substantially larger patient load than dentists in fluoride-deficient communities..." J. Amer. Dental Assn. 84:255-367, 1972.

1) Three US cities that have been fluoridated the longest: *Grand Rapids, Michigan, Newburgh, NY, and Evanston, Illinois.* These cities averaged **121 dentists per 100,000 population, which was more than double the national average** - after 25 years on fluoridated water.

### SUMMARY OF COST/SAVINGS FACTORS

*COSTS: Any actual and estimated savings from using fluoridated water must be included in the cost-savings calculation.*

Amortization costs



Chemical (depends on the particular compound)  
 Corrosion control chemicals  
 Repairs and replacement of privately owned and publicly owned equipment due to corrosion  
 Training of personnel  
 Avoiding fluoridated water: purchase of unfluoridated water or removal equipment  
 Environmental impact costs (almost impossible to estimate)  
 Defending against lawsuits

*Treatment of "side" effects*

Fluorosis : it increases by 10 to 60 % ; c. \$700 per tooth.  
 Cardiovascular  
 Elderly  
 Kidney problems. or undergoing dialysis treatments  
 Lead effects  
 Osteoporetic fractures of the forearm, spine and hip, osteoporosis, arthritis and ligament damage.  
 Undernourished: those deficient in calcium, magnesium, and/or vitamin C,



**Different cost comparisons:** 1) comparisons of costs or savings based on comparisons of dental care costs for populations with and without fluoride. Studies: California, Louisiana, Texas

2) Perhaps a useful estimation of fluoridation costs would result from a comparison of the costs of dental health programs in fluoridated cities in the U.S. with the programs in non-fluoridated countries.

**Calculating cost per person:** The yearly cost of fluoridation can be divided in three ways: 1) by the number of citizens in a community (the usual method reported) 2) by the number in the specific target group, viz., children in need; and 3) by the number in the target group in need (since not all can be assumed to be needy in spite of group membership).

**SAVINGS EXPECTED:** These are based on beliefs that ingested fluoride prevents decay and the costs of treating it. How do any actual savings differ from programs using each of the fluoride delivery alternatives, and the non-fluoride alternatives?

**ALTERNATIVES TO FLUORIDATION** must be used to put fluoridation as a dental health intervention into perspective.

**OTHER ECONOMIC FACTORS [ not specifically included in cost/savings calculations ]**

Dental Economics: (dentists appear to benefit from fluoridation):  
 Income Up to 17 % more\_  
 More dentists practice in fluoridated areas  
 Dentists in fluoridated communities serve a substantially larger patient load  
 Cost of promoting fluoridation  
 Industry savings from waste disposal; up to savings of \$6 Billion dollars/year

**HOW WIDELY ESTIMATES CAN VARY: (an arsenic example \*)**

"The AWWA Research Foundation (AWWARF) did an independent analysis of the costs of implementing the *arsenic* drinking water regulation at varying MCLs (minimum contamination levels) . The differences in estimates were significant. The differences are:

5 ppb                      10 ppb                      20 ppb

EPA Estimate:      \$378 million/year   \$164 million/year      \$62 million/year

AWWA Estimate: \$1.46 billion/year      \$605 million/year      \$55 million/year

These widely differing cost estimates need to be reconciled before the final rule is promulgated. AWWA and AWWARF are working with EPA to better understand the differences."

\* [NOTE: Fluoride is almost as toxic as arsenic, but the EPA allows 4 ppm contamination; million, not billion; the same is true for lead; it is regulated at parts per BILLION, not million. **Fluoride is more toxic than lead, only slightly less toxic than arsenic.** ] In Europe the permitted upper limit for fluoride in drinking water is 1.5ppm, more stringent than our 4 ppm. Most of Europe rejects water fluoridation (10 countries).