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# ARCH

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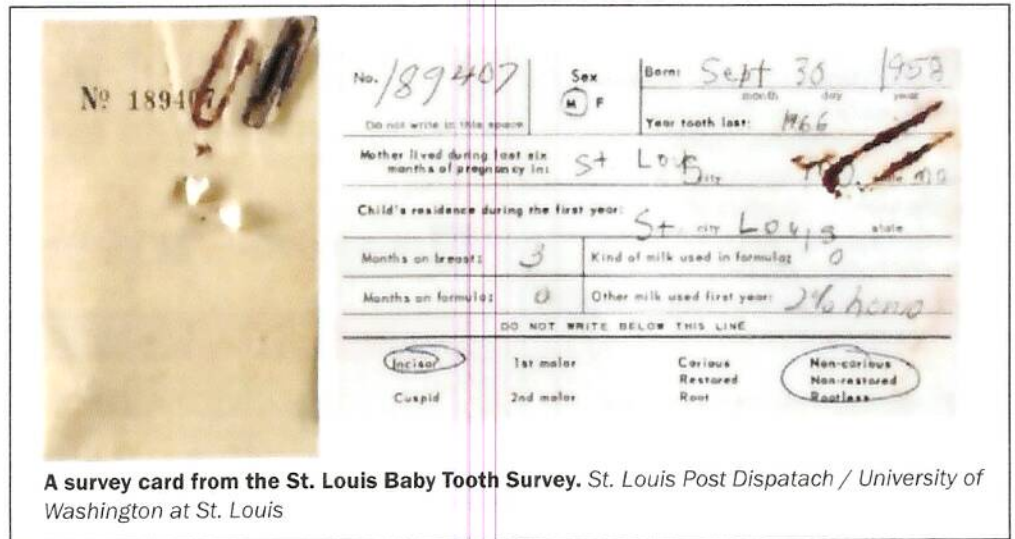


# The Historic Radiation Baby Tooth Study

## IN ST. LOUIS IN THE 1950s AND 60s

The 1950s and 1960s Cold War tests that exploded hundreds of nuclear weapons into the atmosphere posed a great threat to human health. The large mushroom clouds of each test contained highly toxic and radioactive fallout. The fallout, which consisted of 100 isotopes not found in nature, soared into the stratosphere, moved with prevailing winds, and re-entered earth through precipitation. Humans ingested these cancer-causing chemicals through food and water.

**BY JOE MANGANO**  
RADIATION AND PUBLIC HEALTH PROJECT



**A survey card from the St. Louis Baby Tooth Survey.** *St. Louis Post Dispatch / University of Washington at St. Louis*

In all, above-ground tests had the same explosive power of 30,000 Hiroshima bombs. Concerns about fallout were widespread, but initial efforts to halt testing lagged, as American and Soviet leaders competed fiercely for nuclear superiority.

But a unique study measuring buildup of fallout in bodies strengthened these efforts, sped the passage of the 1963 test ban. The study was conducted in St. Louis, and dentists played a major role in making it a success.

### ORIGINS OF THE ST. LOUIS BABY TOOTH STUDY

The St. Louis Baby Tooth Survey grew out of an August 1958 article in the journal *Nature*, by Herman Kalckar, a biochemist with the U.S. Public Health Service. Kalckar had conferred with Seymour Kreshover, a dentist and physician at the National Institute for Dental Research. He proposed measuring levels of radioactive Strontium-90 in baby teeth.

Sr-90 was one of the 100-plus isotopes in fallout. Chemically similar to calcium, the tiny metal particles making up Sr-90 sought out bone and teeth when ingested through food and water.

Almost all Sr-90 in shed baby teeth reflected uptake in late pregnancy and early infancy. Kalckar proposed that all nations measure buildup of Sr-90, to better understand the health threats to children.

St. Louis scientists and citizens had already convinced federal officials to begin testing local milk for levels of Sr-90 and other radioisotopes. They had invited Linus Pauling to speak at Washington University, and helped Pauling draft a petition – later signed by 9,235 scientists

and presented to the United Nations - calling for an end to above-ground testing.

But something more was needed – and the baby tooth study proposed by Kalckar proved to be just the thing. The Greater St. Louis Committee for Nuclear Information (CNI), consisting of citizens



**Button pins like this one were sent to children in recognition of their donation of a tooth.** *St. Louis Post-Dispatch August 1, 2013*



and scientists, gave approval on December 10, 1958.

The CNI quickly formed a scientific advisory committee consisting of leaders at Washington and St. Louis Universities dental schools, along with state and local dental societies, (see Appendix). Washington University obtained a five-year grant for \$197,000 from the National Institute of Dental Research to cover lab costs, the first of several such grants.

## COLLECTING, TESTING, AND ANALYZING BABY TEETH, 1959-1971

Soliciting donations of baby teeth required help from the community. Distributing flyers and 3 x 5 information cards to schoolchildren was a major source of donations. Libraries, churches, scout groups, public officials, junior leagues, and YMCAs/YWCAs also assisted. A speaker's bureau of professionals was created to educate people in these groups about the study.

Dentists played several roles in generating donations of teeth (eventually 320,000). Some participated in the speaker's bureau. Dental offices and city dental clinics kept flyers and 3 x 5 cards in their offices, and reminded parents to fill out the cards and send their child's teeth to the CNI. Each tooth was placed in a small envelope.

After CNI received teeth, some local dentists volunteered their time to examine each tooth. They added information to cards by classifying them as 1st molars, 2nd molars, cuspids, or incisors, as uptake of Sr-90 varied by type of tooth. They also noted if teeth were carious or had fillings, so lab personnel would be alerted to remove them.

Harold Rosenthal PhD, a physiological chemist at Washington University's School of Dentistry directed lab testing, conducted by Isotopes Inc. of Westwood, New Jersey using a specialized radiation counter. As findings were received, journal articles were produced, often co-authored by dentists. The first, by physician Louise Reiss (the study's first director) was published in November 1961, and sent to President John F. Kennedy's science advisor.

## IMPACT OF THE BABY TOOTH STUDY – PAST AND PRESENT

Results showed a steady rise in Sr-90 in

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teeth starting in 1951, when large-scale tests began in Nevada. Eventually, about a 60-fold rise was observed by the peak of the mid-1960s. Kennedy's speech supporting a test ban treaty noted that fallout affected children "with cancer in their bones" – a direct reference to the tooth- and bone-seeking Sr-90. In 1963, the treaty was signed into law by the U.S., Soviet Union, and the United Kingdom.

The baby tooth study had a great impact – not only in St. Louis, but in multiple states that joined the study by submitting teeth. Similar studies (with similar results) were conducted in several European nations. Sharp declines in Sr-90 were observed in the five years after the test ban. Having achieved its goal, the baby tooth study ended.

Decades later, Washington University staff, looking for storage space, found shoe boxes containing 100,000 teeth still not, in envelopes paper-clipped to the 3 x 5 card. The school donated the teeth to the Radiation and Public Health Project (RPHP), a research group studying Sr-90 in baby teeth near U.S. nuclear reactors. RPHP is finishing 1960s the study by analyzing the link between early-life fallout and later-life risk of cancer; initial results showed Sr-90 in teeth of those who died of cancer by

age 50 was more than double that in healthy controls.

Found in the boxes of teeth were 3 x 5 cards, each containing the names and contact information (at the time) of over 300 St. Louis-area dentists – and 100 dentists from other states. These were the dentists who requested flyers and cards for their offices in the 1960s.

A well-deserved salute is merited for these dental professionals who took time out of their busy schedules to assist in a historic study that helped reduce toxic radioactivity in human bodies.

**About the Author:** Joseph Mangano is an epidemiologist, and Executive Director of the Radiation and Public Health Project. More on the baby tooth study is available at [www.radiation.org](http://www.radiation.org), or by contacting [josephmangano962@gmail.com](mailto:josephmangano962@gmail.com).

*Appendix - Original Members, CNI scientific advisory committee: John Bird DDS, assistant dean WU School of Dentistry, chair of CNI committee; LeRoy Boling PhD, dean WU School of Dentistry; Stephen Forrest DDS, dean of St. Louis University School of Dentistry; Philip Vierheiler, president of the St. Louis Dental Society; Elias Khalifah DDS, editor of the Missouri State Dental Association journal; Donald Flieder DDS, associate professor of dental pathology, St. Louis University dental school; John Gilster DDS, associate professor of dental pediatrics at WU Harold Rosenthal PhD, chair of department of Physiological Chemistry, WU School of Dentistry.*