

BIOMEDICINE

Children rise from baking soda

Children whose growth has been stunted by a rarely reported kidney disease can attain and maintain normal height by being treated with a rather common chemical: baking soda (sodium bicarbonate). These children have renal tubular acidosis (RTA), a disease in which the kidneys fail to flush excess acid from the body.

Researchers at the University of California Medical Center in San Francisco found in a 13-year study that by neutralizing this excess acid with the alkaline baking soda, they could reverse the stunted growth in children and prevent infants with the disease from ever becoming affected in the first place. Elizabeth McSherry and Curtis Morris Report in the February *JOURNAL OF CLINICAL INVESTIGATION* that six children of "dwarf" size grew to normal size within three years, their rate of growth increasing two to three fold. Preventive baking soda therapy permitted two infants who had been diagnosed as having RTA to grow at the normal rate.

This rather logical treatment was tried before, but seemed ineffective. McSherry and Curtis investigated the problem and discovered that children required three to four times more bicarbonate to neutralize the backed-up acid than that required by adults with RTA. The children's kidneys dump much of the administered bicarbonate into the urine.

The size of the doses varied from patient to patient. Doses were increased as the children got older and bigger; they will be decreased as the patients reach adulthood, though all probably will remain on limited doses for the rest of their lives. The only side effect was a slightly distended stomach after the treatment.

... and vitamin D metabolite

Children with a variety of other kidney diseases also have suppressed growth. Bones grow slowly because calcium and phosphorous, the chief minerals making up bones, are poorly absorbed from the intestine. Existing bones are often torn down to buffer the increased acid in the blood stream backed up from the failing kidney. Taking a vitamin, but a very special one, can solve some of the problems.

Researchers at the University of Wisconsin School of Medicine in Madison report in the Feb. 2 *NEW ENGLAND JOURNAL OF MEDICINE* that growth can be accelerated with long-term treatment of the Vitamin D metabolite, 1,25 dihydroxyvitamin D₃ (1,25-vitamin D). Russel W. Chesney and co-workers treated six prepubescent children with chronic renal failure from four to 26 months. They report that in the four patients they were able to treat for a long enough time to make comparisons, the rate of growth increased from 2.6 to 8 centimeters per year. Before treatment started, the children had been receiving pharmacological doses of vitamin D, but had still developed rickets.

How does the metabolite 1,25-vitamin D work, when the mother molecule vitamin D can't?

It has long been known that vitamin D increases the intestinal absorption of calcium and phosphate necessary for bone formation. But only within the last ten years was it discovered that the vitamin D taken in through the diet or manufactured in skin exposed to sunlight is not the active form of the vitamin. Vitamin D must be hydroxylated twice — first in the liver, then in the kidney. The resulting 1,25-vitamin D then acts on the intestine, increasing calcium and phosphorous absorption.

Children with chronic renal failure can't hydroxylate the vitamin D in the kidney and rickets develop. The administration of 1,25-vitamin D bypasses the need for the kidney and the children increased in height 27 to 113 percent of that expected for their chronological age.

FEBRUARY 25, 1978

EARTH SCIENCES

Earthquakes down, volcanoes up

Dubiously heralded as the year of the earthquake, 1976 claimed 700,000 deaths, mostly in the great China quake. In 1977, the earth seems to be repenting its seismological savagery: Worldwide earthquake activity and deaths dropped below normal, but (there's always a twist) volcanic eruptions, which were below normal in 1976, returned to the average level. Based on data gathered from 3,000 worldwide seismograph stations, the United States Geological Survey reports that 36 significant earthquakes occurred in 1977, compared with at least 50 in 1976. Significant quakes are those registering 6.5 on the Richter scale and causing deaths or extensive damage. Fourteen quakes equaling or exceeding 7.0 occurred in 1977; the yearly average is 19 of that magnitude. Earthquake fatalities were well below the yearly average of 10,000. Of the total estimated 2,800 deaths, most were reported in Rumania (about 1,500), Iran, Indonesia and Argentina. In contrast, the Smithsonian Institution's Scientific Event Alert Network reported more than 35 active volcanoes, compared with 10 in 1976. The dramatic increase is actually a return to the normal level of two or three dozen eruptions a year, a USGS spokesman said. The eruptions of Akutan and Pavlof in Alaska and Kilauea in Hawaii contributed the United States' share of volcanic activity and created the nation's newest hill — a 34-meter high product of Kilauea called "Puu Kia'i" meaning "Hill of the Guardian."

Effects of tropical storms

Two main goals were outlined for the Global Atlantic Tropical Experiment when it began in June 1974 (SN: 11/23/74, p. 332). As part of the Global Atmosphere Research Program, GATE was to provide data for computer modeling of weather patterns and to study how small-scale weather factors, such as small tropical showers, affect large-scale ones, such as hurricane development. Although a relationship had been shown elsewhere, there was some question whether one existed in the GATE area (from eastern Africa to the west coast of South America) and whether it would be typical enough to factor into the computer modeling. Now, based on GATE data, Richard J. Reed, an early planner of GATE now of the University of Washington, says he and his group have verified that the interaction between the east-west jet stream just south of the Sahara and the small showers that release heat and rainfall stokes the large-scale weather motions that may create hurricanes. The accuracy of the data makes it suitable for inclusion in computer modeling, Reed said. "The data must be included to provide better models for predicting hurricane development and longer range prediction of middle latitude patterns," he said.

The world through gold-colored windows

Invest in the energy crisis: Gold plate your windows. According to the Gold Institute, 24-carat gold is now being used in glass windows to conserve energy, cut fuel bills and "improve the appearance of buildings." Some new office buildings in Canada, Europe and the United States are reportedly using small amounts of gold in their windows to reflect heat and glare in the summer and to prevent loss of heat in the winter. One ounce of gold coats 400 to 1,000 square feet of glass, depending on the method used. Although the gold glass costs \$5 to \$9 per square foot, compared with \$2.25 to \$3 a square foot for non-insulated windows, developers claim the energy savings quickly compensate for the extra cost. In Dallas, developers estimate that on a summer day the gold reflective glass saves 31,400 kilowatt hours of energy in their office complex — enough to light houses on 50 city blocks every night for a week.

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