

Sidney Q. Cohan (1915-1999)

Sidney Q. Cohan studied birth defects in the US during the twentieth century. Cohan helped to discover that if a pregnant woman ate too much vitamin A her fetus faced a higher than normal risk of teratogenic effects, such as cleft palate. A teratogen is a substance that causes malformation of a developing organism. Cohan also identified the teratogenic effects of several other substances including a lack of normal magnesium and prenatal exposure to the antibiotic tetracycline. Cohan's experiments with vitamins and other chemicals brought attention to how nutrition and environmental agents adversely affect human pregnancy outcomes.

Cohan was born on 31 July 1915 in New York City, New York, to immigrant parents. Cohan attended Brooklyn College in the borough of Brooklyn in New York City, and received his bachelor's degree in 1935. He then attended New York Medical College in Valhalla, New York, and obtained his medical degree in 1939. Following his graduation, Cohan began his pediatric residency at Beth Israel Hospital and at Willard Parker Hospital, both in New York City. From 1941 to 1946, Cohan served in the United States Medical Corps in Europe during World War II. In 1947, Cohan finished his residency in pediatrics at Beth Israel Hospital. Immediately after completing his residency in 1950, Cohan became a clinical instructor of pediatrics at the New York University School of Medicine in New York City, New York. That year, he married Shirley M. Stone, another pediatrics resident at New York University School of Medicine.

In 1953 and 1954, Cohan published papers about his experiments in which he fed pregnant rats too much vitamin A. In the experiments, Cohan fed pregnant rats large amounts of vitamin A each day, significantly greater than the amount recommended for pregnant women. In his experiments, Cohan found that if pregnant rats ingest too much vitamin A during the first twelve to sixteen days of gestation, they carried fewer litters to term and birthed rats with congenital malformations. The congenital malformations included unusually large tongues (macroglossia), cleft palate, and eye defects. The most common malformation Cohan observed was brain protrusions outside of the skull. From those effects, Cohan concluded that excessive vitamin A acted as a teratogen, an agent that can cause defects in a developing embryo or fetus.

Cohan's discovery of vitamin A's teratogenicity was one of the first discoveries that indicated nutritional excesses and deficiencies in a pregnant woman's diet had the ability to adversely affect fetal development. Cohan's work prompted hundreds of other experiments in the following decades examining how excessive vitamin A and its metabolites, called retinoids, impacted fetal development. Those studies found over seventy types of birth defects that affected nearly every internal organ resulting from the excess intake of vitamin A. Researchers studied excess vitamin A ingestion in multiple species and substantiated Cohan's 1953 findings in those later experiments.

Around the same time Cohan was conducting his vitamin A research, Josef Warkany and James G. Wilson, two physicians at the University of Cincinnati College of Medicine in Cincinnati, Ohio, were also researching the potential causes of birth defects. Warkany and Wilson contacted others researching birth defects, and in 1954 they hosted an informal meeting at the University of Cincinnati College of Medicine. Following that meeting, Warkany and Wilson sent a questionnaire to twenty-one scientists to gauge interest in forming a society for the research of birth defects. When the Teratology Society informally began in 1958, Cohan served as secretary. In 1960, the society became official and Cohan continued to serve as its secretary through 1964, when he became professor of clinical pediatrics at New York University School of Medicine. A year later, in 1965, Cohan was elected president of the Teratology Society, a position he held until 1966.

In the 1960s, Cohan began to research tetracycline's effects on fetal development. Tetracyclines

are a group of antibiotics generally used for treating infections in the urinary tract, respiratory tract, and intestines, as well as for treating acne and rosacea. In 1962 and 1963, Cohlan and Gerrit Bevelander, a researcher at the New York University College of Dentistry in New York City, published their results on tetracyclines. Previous studies had shown that tetracycline could cross through the placenta and into a developing fetus, depositing in the fetus's bones. Cohlan and Bevelander demonstrated that various doses of tetracycline during periods of gestation in a pregnant rat resulted in smaller than normal and deformed skeletons.

In 1969, Cohlan became professor of pediatrics at New York University School of Medicine and director of the pediatric service at University Hospital at the New York University School of Medicine, later called Tisch Hospital. While holding those positions, Cohlan continued his research on causes of birth defects. In 1971, while working with Joseph Dancis and Dawn Springer at the New York University School of Medicine, Cohlan published a paper about how lack of magnesium in pregnant rats affected their offspring. Cohlan observed that when pregnant rats ate a diet deficient in magnesium starting on day two of gestation, only one out of eight rats gave birth to a litter. When the researchers deprived the pregnant rats of magnesium starting on the tenth day of gestation, the rat fetuses were born weak, small, and anemic, lacking adequate red blood cells in the blood. The researchers found that the earlier fetuses were deprived of magnesium, the more their development was disrupted. From those conclusions Cohlan and his colleagues established the importance of maintaining normal of magnesium, especially in early pregnancy.

Several years later, in 1977, Cohlan published new research on the effects of tetracyclines. Cohlan observed that tetracycline stained the teeth of infants exposed to tetracycline prenatally and children exposed to tetracycline during infancy and early childhood. He noted that when pregnant women ingested as little as one gram of tetracycline per day for three consecutive days during the third trimester of pregnancy, their infants had yellow, grey-brown, or brown stains. Postnatally, Cohlan demonstrated that tetracycline stained teeth from birth until age seven or eight.

Later during his career, Cohlan and his wife Shirley M. Stone, also a pediatrician, worked together to treat children with behavioral tics. In 1984, Cohlan and Stone published the paper "The Cough and the Bedsheet," which detailed how they treated thirty-three patients with psychogenic cough. They defined psychogenic cough as a cough that remained weeks to months after the incidence of an upper respiratory infection. Researchers hypothesized that such coughs were psychological rather than physiological in cause. Cohlan and Stone hypothesized that if a doctor presented a logical explanation for the cough and accompanied that by some kind of treatment, they could alleviate the psychogenic cough. They tested that hypothesis by convincing child patients that their cough resulted from weak chest muscles that prevented them from containing their cough, and proposed that wrapping a bed sheet around their chest would stop the cough within two days. Cohlan and Stone reported that the technique worked to cease the cough for all but two patients. Cohlan and Stone's technique remained the standard method of treating psychogenic cough until 1991, when researchers in the US, John V. Lavigne, Robert Fauber, and A. Todd Davis, proposed an alternative method that involved a parent monitoring a child's cough and reinforcing less coughing by either social or material rewards.

In 1990, Cohlan retired from his private practice, though he continued to hold his pediatrics professorship at New York University School of Medicine. He and his wife spent the summers of their retirement on Fire Island outside of Long Island, New York. On 12 August 1999, Cohlan died at the age of 84 at the New York University School of Medicine's Tisch Hospital in New York City.

Sources

1. Bevelander, Gerrit, and Sidney Q. Cohlan. "The Effect on the Rat Fetus of Transplacentally Acquired Tetracycline." *Neonatology* 4 (1962): 365-70.
2. Brent, Robert L. "In Memoriam: Dr. Sidney Q. Cohlan (1915-1999)." *Teratology* 62 (2000): 1-3.
3. Cohlan, Sidney Q. "Excessive Intake of Vitamin A as a Cause of Congenital Anomalies in the Rat." *Science* 117 (1953): 535-6.

4. Cohlan, Sidney Q. "Congenital Anomalies in the Rat Produced by Excessive Intake of Vitamin A During Pregnancy." *Pediatrics* 13 (1954): 556-67.
5. Cohlan, Sidney Q. "Teratogenic Agents and Congenital Malformations." *Medical Progress* 63 (1963): 650-9.
6. Cohlan, Sidney Q. "Tetracycline Staining of Teeth." *Teratology* 15 (1977): 127-9.
7. Cohlan, Sidney Q., Gerrit Bevelander, and Teodulita Tiamsic. "Growth Inhibition of Prematures Receiving Tetracycline: A Clinical and Laboratory Investigation of Tetracycline-induced Bone Fluorescence." *American Journal of Diseases of Children* 105 (1963): 453-61.
8. Cohlan, Sidney Q., Joseph Dancis, and Dawn Springer. "Fetal Homeostasis in Maternal Malnutrition. II. Magnesium Deprivation" *Pediatric Research* 5 (1971): 131-136. <http://dx.doi.org/10.1203/00006450-197103000-00005> (Accessed February 17, 2016).
9. Cohlan, Sidney Q., and Shirley M. Stone. "The Cough and the Bedsheet" *Pediatrics* 74 (1984): 11-5
10. "Cohlan, Sidney Q., Dr." *The New York Times*, August 14, 1999. <http://www.nytimes.com/1999/08/14/classi-notice-deaths-cohlan-sidney-q-dr.html> (Accessed February 17, 2016).
11. Lavigne, John V., Davis, A. Todd, and Robert Fauber. "Behavioral Management of Psychogenic Cough: Alternative to the "Bedsheet" and Other Aversive Techniques." *Pediatrics* 87 (1991): 532-7.
12. Saxon, Wolfgang. "Sidney Q. Cohlan, 84, Doctor and Researcher of Birth Defects." *The New York Times*, August 17, 1999. <http://www.nytimes.com/1999/08/17/nyregion/sidney-q-cohlan-84-doctor-and-researcher-of-birth-defects.html> (Accessed February 17, 2016).
13. Wilson, James G., and Josef Warkany. "The History of Organized Teratology in North America." *Teratology* 31 (1985): 285-96.