Researchers identify autism clusters in California

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Researchers at UC Davis have identified 10 locations in California where the incidence of autism is higher than surrounding areas in the same region. Most of the areas, or clusters, are in locations where parents have higher-than-average levels of educational attainment. Because children with more educated parents are more likely to be diagnosed with an autism spectrum disorder, one need look no further for a cause, the authors say. The other clusters are located close to major autism treatment centers.

The clusters are located primarily in the high-population areas of Southern California and, to a lesser extent, in the San Francisco Bay Area. The researchers said that, while children born within the clusters during the study period were more likely to be diagnosed with autism, the majority of the state's children with autism were born in adjacent areas outside the clusters.

For the rigorous study, published online today in the journal *Autism Research*, scientists examined nearly all of the approximately 2-1/2 million births recorded in the state of California from 1996 through 2000. About 10,000 children born during that five-year period were later diagnosed with an autism spectrum disorder, according to the state Department of Developmental Services (DDS).

After mapping the state's birth cohort based on where the mothers lived at the time when their children were born, the researchers pinpointed birth locations of children who were later diagnosed with autism. The

study looked for areas of higher incidence within each of the service zones of DDS's regional centers, which coordinate services for individuals with developmental disorders like autism.

"This is the first time that anyone has looked at the geography of autism births in California in order to see whether there might be some local patches of elevated environmental risk. This method ignores unknown widespread factors (such as a regional pollutant) that could increase autism incidence," said Karla Van Meter, the study's lead author. Van Meter is an epidemiologist and was a doctoral student in the UC Davis Department of Public Health Sciences and at the Center for Animal Disease Modeling and Surveillance when the study was conducted.

"This spatial study was extremely rigorous because we developed a methodology that greatly improved accuracy in identifying areas of higher autism incidence. With so many possible environmental health risk factors, we see this method as generally useful for focusing studies on exposures that are elevated in such clusters," Van Meter said.

However, the researchers said that in this investigation the clusters probably are not correlated with specific environmental pollutants or other "exposures." Rather, they corellate to areas where residents are more educated.

"What we found with these clusters was that they correlated with neighborhoods of high education or neighborhoods that were near a major treatment center for autism," said senior author Irva Hertz-Picciotto, a professor of public health sciences and a researcher with the UC Davis MIND Institute.

"In the U.S., the children of older, white and highly educated parents are more likely to receive a diagnosis of autism or autism spectrum disorder. For this reason, the clusters we found are probably not a result of a

common environmental exposure. Instead, the differences in education, age and ethnicity of parents comparing births in the cluster versus those outside the cluster were striking enough to explain the clusters of autism cases," Hertz-Picciotto said.

Autism is a neurodevelopmental disability characterized by impaired social development and communication and restricted, repetitive behaviors. It is considered a lifelong condition that develops by the time a child is 3 years old. The researchers limited their study to the five-year period between 1996 and 2000 in order to allow all of the children born during that time to grow to an age by which they probably would have received a diagnosis — 6 years old.

Van Meter said that the increased risk of autism in these areas is roughly a doubling of the incidence of autism over the incidence in the surrounding zone. For example, for the cluster area located in the service zone of the San Diego Regional Center, the autism incidence was 61.2 per 10,000 births and, in the rest of the Regional Center service zone, 27.1 per 10,000 births. For the Harbor Regional Center the incidence was 103.4 and 57.8, respectively. Van Meter added that it is important to remember that most of the children with autism were not born in the cluster areas.

In Southern California, the areas of increased incidence were located within these Regional Center service zones:

1. The Westside Regional Center, headquartered in Culver City, Calif., which serves the communities of western Los Angeles County, including the cities of Culver City, Inglewood and Santa Monica;

2. The Harbor Regional Center, headquartered in Torrance, Calif.,

which serves southern Los Angeles County, including the cities of Bellflower, Harbor, Long Beach and Torrance;

3. The North Los Angeles County Regional Center, headquartered in Van Nuys, Calif., which serves the San Fernando and Antelope valleys — two clusters were located in this regional center's service zone.

4. The South Central Los Angeles Regional Center, headquartered in Los Angeles, which serves the communities of Compton and Gardena;

5. The Regional Center of Orange County, headquartered in Santa Ana, Calif., which serves the residents of Orange County; and

6. The Regional Center of San Diego County, headquartered in San Diego, which serves people living in Imperial and San Diego counties.

In Northern California, the areas of increased incidence were located within these regional centers' service zones:

7. The Golden Gate Regional Center, headquartered in San Francisco, which serves Marin and San Mateo counties and the City and County of San Francisco. Two clusters were located within the Golden Gate Regional Center's service zone; and

8. The San Andreas Regional Center, headquartered in Campbell, Calif., which serves Santa Clara, Santa Cruz, Monterey and San Benito counties.

Two areas of increased incidence were located in Central California regional centers' service zones:

9. The Central Valley Regional Center, headquartered in Stockton, Calif., which serves Fresno, Kings, Madera, Mariposa, Merced and Tulare counties; and

10. The Valley Mountain Regional Center, headquartered in Fresno, Calif., which serves Amador, Calaveras, San Joaquin, Stanislaus and Tuolumne counties.

The South Central and Valley Mountain Regional Centers autism clusters were listed as "potential clusters" because their clusters met a reduced set of statistical conditions.

All of these areas were identified using a sophisticated new biostatistical testing procedure developed by Van Meter in collaboration with study co-author Lasse Christiansen and constructed on Christiansen's earlier statistical work. This method looked for combinations of events, in this case, autism, within a set of locations, in this case, births, whose occurrence would not be expected to occur at random. This is the first application of that method. UC Davis undertook the epidemiological study as a step toward identifying geographic risk factors for autism in California, Van Meter said.

The study also examined demographic factors recorded on the children's birth records that are known to be associated with both autism and residential location. These included having an older parent — a known autism risk factor. The researchers found a statistically significant but small association of the cluster areas with older parental age at the time their child was born.

Hertz-Picciotto said that the findings do not counter the idea that the environment plays a role in autism, but rather, help to focus attention toward certain types of exposures.

"Because of the strong link between demographics, particularly parental education, and the locations of clusters, other explanations for these pockets of high autism incidence, such as localized sources of exposure, are not likely," Van Meter explained.

"The risk for a child with highly educated parents to be diagnosed with autism is probably not caused by the location of the mother's residence or any local shared environmental exposures," she said. "Our result indicates that the most likely sources of environmental hazards for autism in California are in or around the home or else are widespread."

"The strong link between demographics, particularly parental education, and the locations of the clusters validated the effectiveness of the statistical method that we employed because it successfully identified areas where a known risk factor was concentrated," she added.

Provided by University of California - Davis

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