Temporal and Spatial Variations in Birth Defects in Atlanta

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National Center on Birth Defects and Developmental Disabilities
Metropolitan Atlanta Congenital Defects Program (MACDP)

- A population-based surveillance system of birth defects among infants and fetuses 20+ weeks of gestation
  - Five metropolitan Atlanta counties
  - Active case ascertainment
  - Clinical information reviewed by clinical geneticists

- Operated and funded by CDC since 1967
MACDP Population

- Births to residents of 5 counties
- In 2002:
  - 50,000 live births
  - 1,500 cases
MACDP Objectives

- Monitor for trends, clusters
- Describe morbidity and mortality
- Serve as case registry for studies of risk factors
- Guide and assess prevention interventions
- Educate and advocate
To monitor for temporal clusters.
To monitor for temporal trends
(D05) VENTRICULAR SEPTAL DEFECTS

--Hospital Cases--

TRENDS AND SIGNIFICANT CHANGES IN REPORTED INCIDENCE,
METROPOLITAN ATLANTA CONGENITAL DEFECTS PROGRAM (MACDP)

Jan 1968 - Dec 2001
(Rates per 10,000 live births)

Null ARL = 300 months for increases and for decreases.
Prevalence of hypospadias

- Abnormality of urethral meatus
- 0.31-47 per 10,000 births
- Risk factors
  - Maternal age
  - Parity
  - Low birth weight
- Increasing prevalence in recent years
Prevalence of hypospadias by severity

- All hypospadias
- 1st degree
- 2nd & 3rd degree

Year of birth

Prevalence (per 10,000)
Rates of hypospadias by census tract, 1990-2000
Hypospadias, 1990-2000

Analysis for possible clusters of census tracts with high rates

Location IDs included.: 130890219.03

Population............: 238

Number of cases.......: 17 (6.24 expected)

Overall relative risk.: 2.726

P-value................: 0.186
Rates of NTDs, by Census Tract, 1990-2000

Rate per 10,000 infants

- 0
- 2.4 - 8.6
- 8.7 - 18.7
- 18.8 - 491.8
NTD possible cluster, 1990-2000
ASD possible cluster, 1990-2000

MOST LIKELY CLUSTER

Location IDs included.: 130670313.05, 130670313.04, 131210078.03

Number of cases........: 46       (24.89 expected)

Overall relative risk.: 1.848

P-value..................: 0.095
ASD possible cluster, 1990-2000
Odds Ratios and 95% CI for VSD and CO, Southern California, 1987-1993

Ritz et al. (2002)

<table>
<thead>
<tr>
<th>Carbon monoxide in 2nd month, ppm</th>
<th>Odds Ratio</th>
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<tr>
<td>&lt;1.14</td>
<td>1</td>
</tr>
<tr>
<td>1.14-1.59</td>
<td>2</td>
</tr>
<tr>
<td>1.60-2.46</td>
<td>3</td>
</tr>
<tr>
<td>&gt;2.46</td>
<td>4</td>
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Graph showing odds ratios and 95% confidence intervals for VSD and CO in Southern California, 1987-1993, based on data from Ritz et al. (2002).
HELIX-Atlanta Purpose

- To link data
  - identify, implement, and evaluate feasible linkage methods
  - conduct valid analysis methods
  - inform public health action to improve health of communities
  - evaluate the utility and sustainability

hazard, exposure, and non-infectious health effect surveillance and monitoring

environmental public health surveillance
Air Quality Data: State AIRS Network

- State air quality compliance monitoring network
- Criteria pollutants only
  - $\text{PM}_{10}$, NO$_2$, SO$_2$, CO, O$_3$ (and PM$_{2.5}$ since 1999)
- Data from multiple monitors, # increasing over time
Air Quality Data: ARIES

- Located in downtown Atlanta
- Operating 8/1/98-present
- Extensive ambient air quality measurements
Air Quality Data: ARIES

- PM$_{10}$
- PM$_{2.5}$
- PM$_{10-2.5}$
- PM$_{2.5}$ components
- Ultrafine PM
- O$_3$
- NO$_2$
- CO
- SO$_2$
- Polar VOCs

Sulfates
Water-soluble metals
Acidity
Organic carbon
Elemental carbon
HELIX-Atlanta Partners

NASA Data:

- Collected to study Earth processes: weather, climate, natural hazards
- Petabytes on air, water, land, ice; from space, air and ground
- Resolutions scalable from global to local, daily to decadal
- Designed to answer research questions useful to public health
Land Surface Temperature

Range 11°C (19 - 30°C)  
October 23, 2003 - Day

Range 9°C (10 - 19°C)  
October 23, 2003 - Night

SAFER • HEALTHIER • PEOPLE™
Plans for 2004

- Continue collaboration with:
  - HELIX-Atlanta environmental public health tracking effort to develop a linkage prototype
  - National Birth Defects Prevention Study in studies of risk factors for birth defects