

Cancer Clusters

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Background facts

- Cancer is common $> 1/3$
- “Cancer” means ~ 300 different types
- Cause of much cancer unknown
- Known risks for cancer are predominantly lifestyle choices - tobacco, alcohol, diet
 - Others: sexual behavior, sunlight, radiation, reproductive patterns, genetics (family history)
- Cancer occurs many years after “exposure”

Background issues

- The complex exposures we all have
- Site of exposure vs. residence
- Defining boundaries / populations
- Variety of types of cancer
- Variety of causes of cancer
- The meaning of “statistically significant”
- Perception of “risk”

Statistical significance

would happen $< 1 / 20$ by chance alone

Divide AZ into 100 equal pieces of ~50,000 population
(ignore boundary problem)

Then for a given cancer, expect +/- 5 “clusters”

For the 80 most common types, expect 400 “clusters”

(Many, if not most of those 100 areas will have a cluster
of at least one type, some will have multiple)

Which are “real?” (caused by some exposure) Some are!

Now investigate a given cluster

If no suspect cause, thousands of exposure variables

If limit investigation to 1,000 questioned variables, by random chance alone, 1 in 20 will appear significantly associated

Expect +/- 50 statistically significant associations

Which are real? (contributed to cancer) Some may be!

West Central Phoenix

- 10 years and 3 major studies
 - Mortality study
 - Incidence study
 - Case-control study

WCP Case-control

- Boundaries defined / included comparison with entire metro area
- Controls matched
- Extensive questionnaire (>500 + parts)
- Environmental samples (air, soil, dust, EMF)
- ~ 7 years

Not associated

- Proximity to wells
- Proximity to gas stations
- Proximity to industrial sites emitting VOCs
- Mother smoking
- Parent work with:
 - Solvents
 - Pesticides
 - (wear clothing home)
- Mosquito repellants
- Source of water
- Various appliances
- Vehicular traffic
- Ionizing radiation
- Perinatal complications
- Superfund sites
- Etc etc etc

- **Weakly associated (O.R. > 1 - 1.8)**
 - Grapefruit / juice, charcoal broiled meat
 - Black-and-white but not color TV
 - Father's hobby of auto repair
 - Cigarette smoking by father or any parent
 - Some chemicals (but others protective)
- **Moderately associated (O.R. 1.8 - 5.0)**
 - Living a certain distance from tank farms, but not closer (3 mi and 5 mi)
 - Liquid pesticides, but not spray
 - Cigar or pipe smoking by father
 - Marijuana by non-parent
 - Model building
 - Ham, bacon, sausage, hot dogs, burgers, coffee, cola

Strongly associated (O.R. > 5.0)

- NOTHING

Bottom line:

We really can't say what might have given
any of these children leukemia

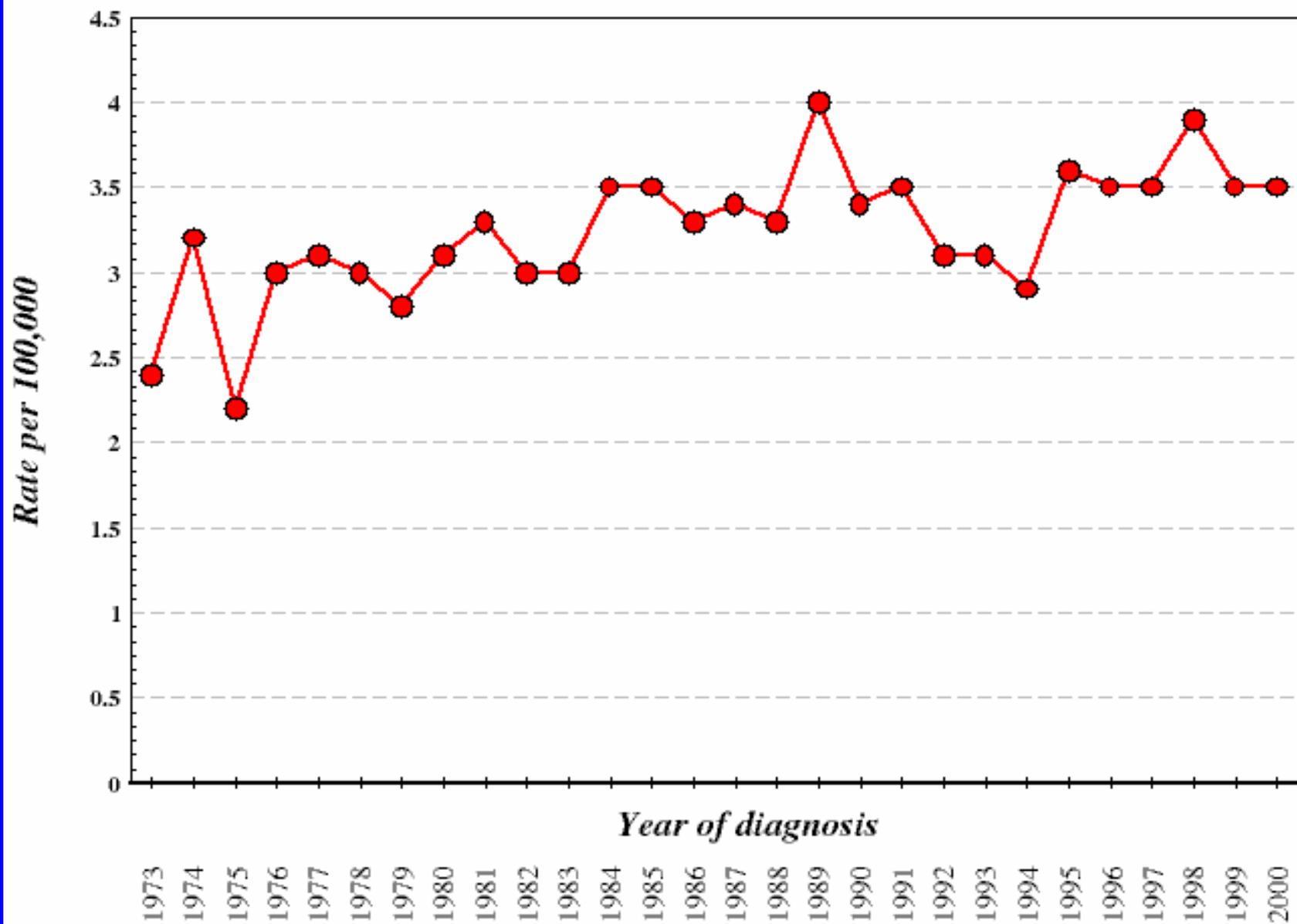
Other past attempts

- More than 100 epi investigations by CDC
- Many more by states
- ~1,500 “cluster” reports / yr

- Results: NO cause EVER identified

- CDC stopped doing these (except Fallon)

Acute Lymphocytic Leukemia, age 0-14, 9 US SEER Registries



The ethical question

“First, do no harm”

Doing the investigation implies that there may be an answer if we just look hard enough.

Launching an epi investigation may miseducate the community, raise unwarranted expectations, create significant emotional investment in a hopeless search and cause other real harm... vs. ? value of reassurance.

Sierra Vista

- 10 cases since 1995
- +2 more diagnosed after moving away
- Residential histories on most but not all
- Mostly but not all acute lymphocytic leukemia

“Biosampling” in Sierra Vista

- First time to this extent (except Fallon)
- Members of case households
- “Control” members of other households
- Extraordinarily sensitive tests for levels of chemical exposures

Goals of Biosampling

- CANNOT identify cause or any info related to leukemia
- Small group snapshot of environmental exposures
- Nothing to compare to

? worst things to do

- Launch investigation to appear responsive
- Imply that there may be more to be done
- Stall ... prolong issue in public eye
- Avoid explaining the issue of stats
- Hold huge public meeting that can't educate