

# **Small Effect Sizes in Health Studies of Exogenous Chemical Exposures: Population Versus Individual Risk**

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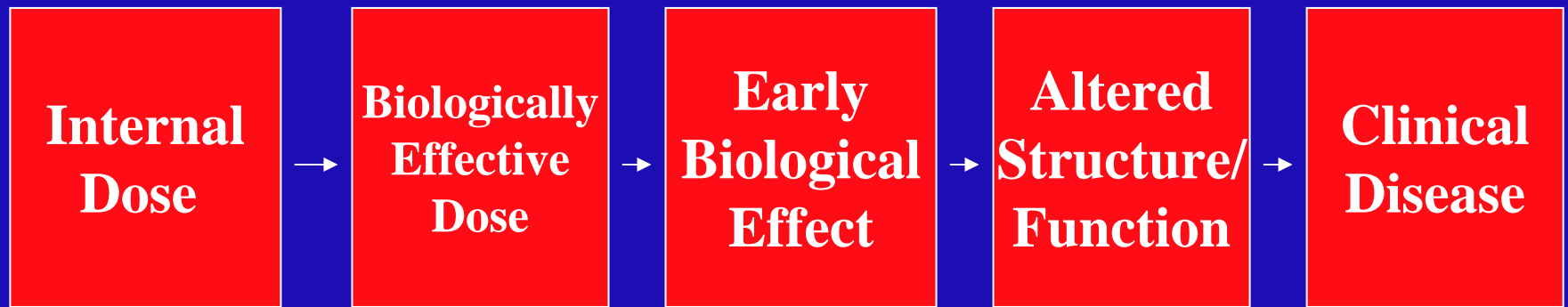
***The critical question:*** How big does an effect have to be to be “important” from a public health standpoint?

e.g., what’s the significance of:

- 3% decrease in mean sperm count or T<sub>4</sub> levels
- decrease of 2 weeks in mean age at menarche

Not  
“diseases”  
*per se*

# Biologic Marker Continuum: National Research Council Model



**“subclinical” neurobehavioral deficits**

# “Altered Structure/Function”

- Often, changes are quantitatively, not qualitatively, different from normal function-- *slightly more or less of something normally present* (c.f. tumor)
- Not apparent to “naked eye”- systematic measurement required to detect the change

# The Clinical Perspective

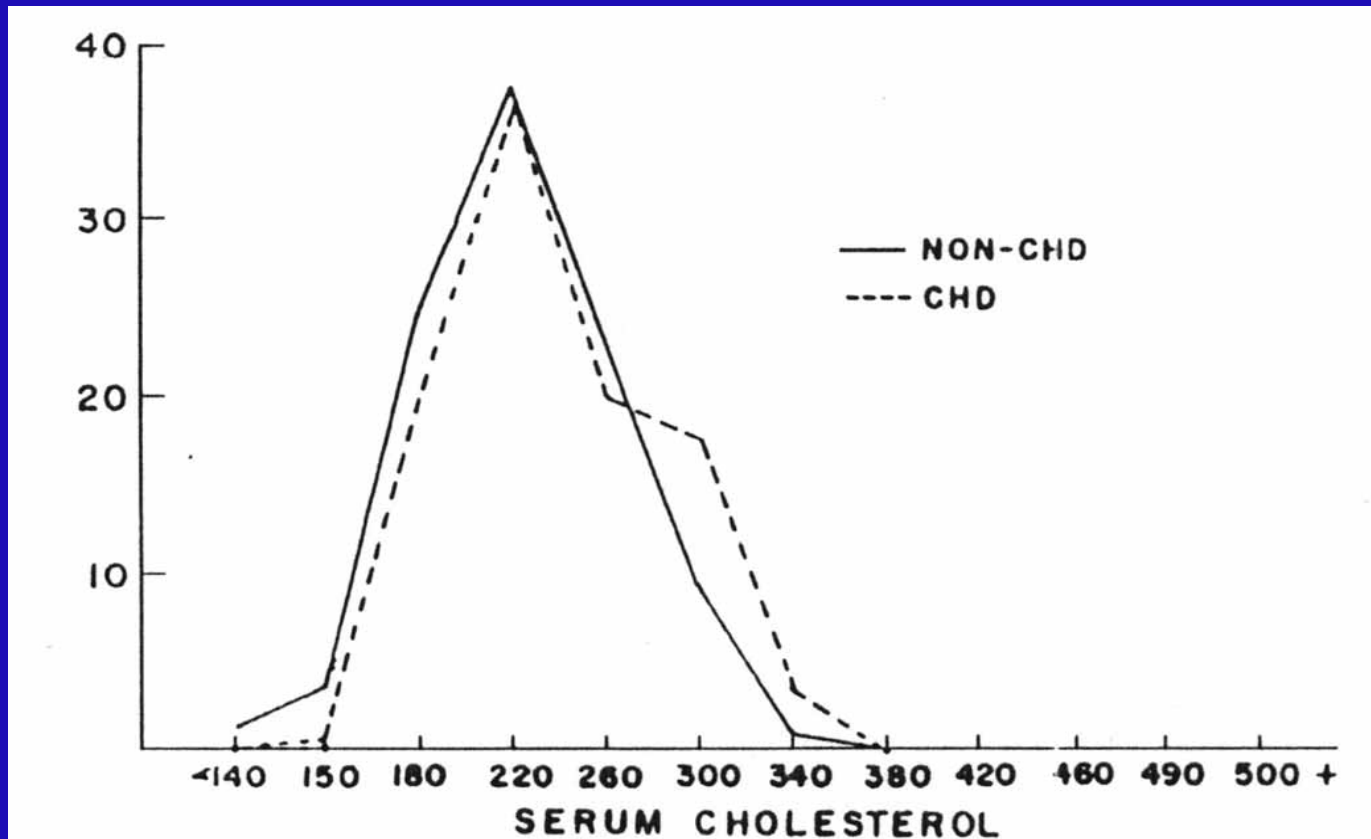
- A small exposure-related decrement in structure or function is **unimportant** because, even among individuals with higher exposures, function generally remains “within normal limits” and minor variations WNL are of little import (e.g., utilization of health care resources)
- For transparency and clarity, exposure standards should be set to prevent *impairments that bring people to medical attention because they might meet diagnostic criteria for a “disease”*

## Risk of Down Syndrome (DS) by Maternal Age

Maternal age (years)	DS cases/1000 births	Total Births (as % of all ages)	% of Total DS cases
<30	0.7	78	51
30-34	1.3	16	20
35-39	3.7	5	16
40-44	13.1	0.95	11
>44	34.6	0.05	2
All ages	1.5	100	100

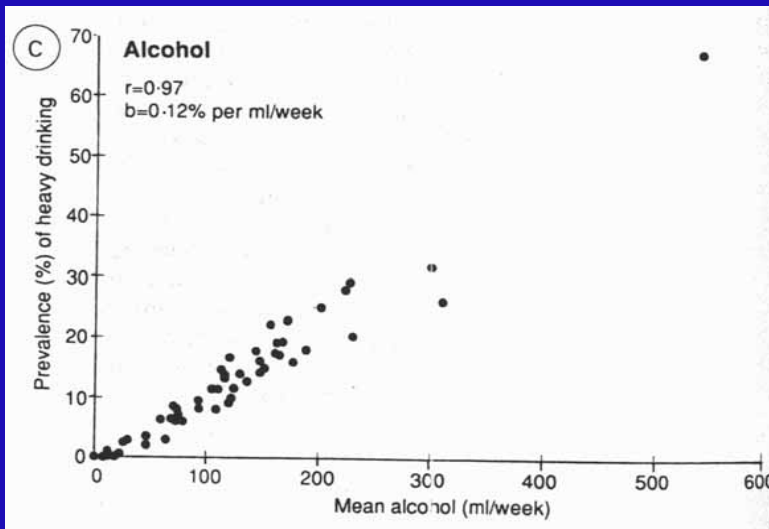
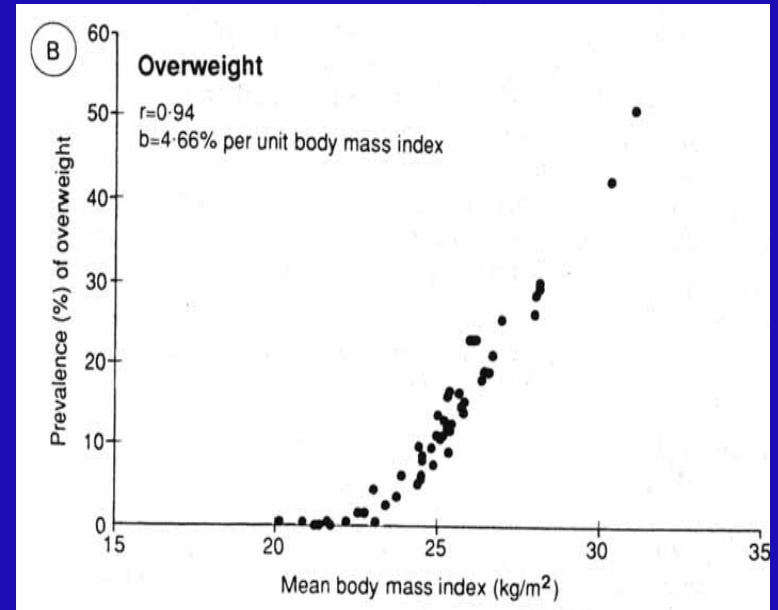
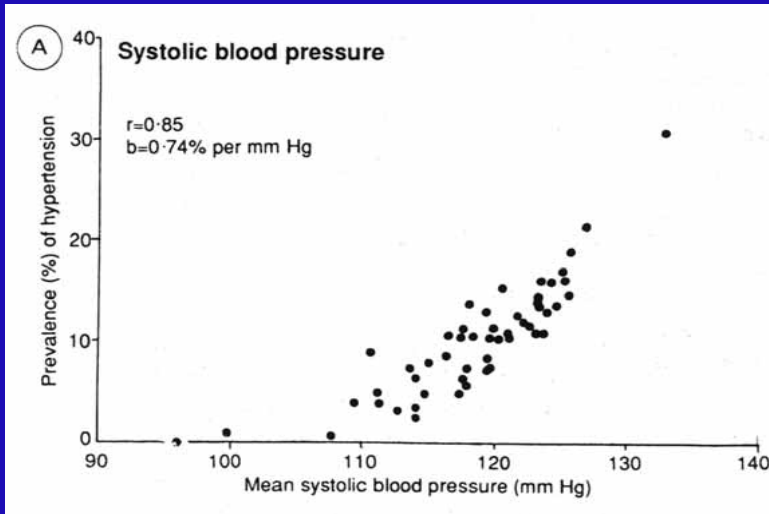
Alberman & Berry, *Community Med* 1979; 1: 89-96.

# Sick Individuals vs. Sick Populations: Coronary Heart Disease and Serum Cholesterol



**Figure 3** Percentage distribution of serum cholesterol levels (mg/dl) in men aged 50–62 who did or did not subsequently develop coronary heart disease (Framingham Study<sup>5</sup>)

# Relationship between population mean and prevalence of deviant values in 52 population samples (N=10,079, ages 20-59; Intersalt Study)



1. Correlations are high
2. Slopes are fairly steep
3. Population mean is informative about overall morbidity in the population

Rose & Day. *Brit Med J* 1990; 301: 1031-1034.