

Animals as Sentinels for Environmental Health Do Shared Resources Equal Shared Risks?

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Animals as Sentinels

- *1916* Burrell and Siebert
 - Recommended that canaries be used for CO detection in mining operations

Why use Sentinels?

- May share human environment
- Respond analogously to toxic insults
- Shorter, compressed lifespan
- Freedom from some confounding factors
- Couple measures of exposure with clinical or sub-clinical effects
- Detect biological effects preceding disease
- Reduce some of the uncertainties in predicting human risk

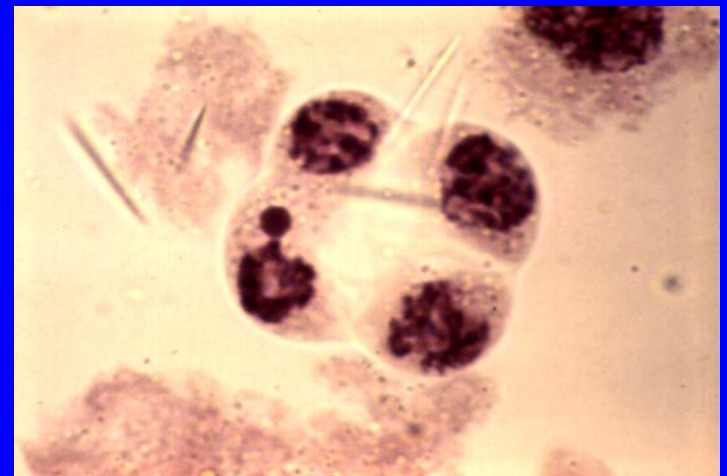
Environmental Contamination in a North Carolina Community

- Small town in North Carolina
- 5 pesticide burial sites identified in 1980s
- Contaminated with pesticides



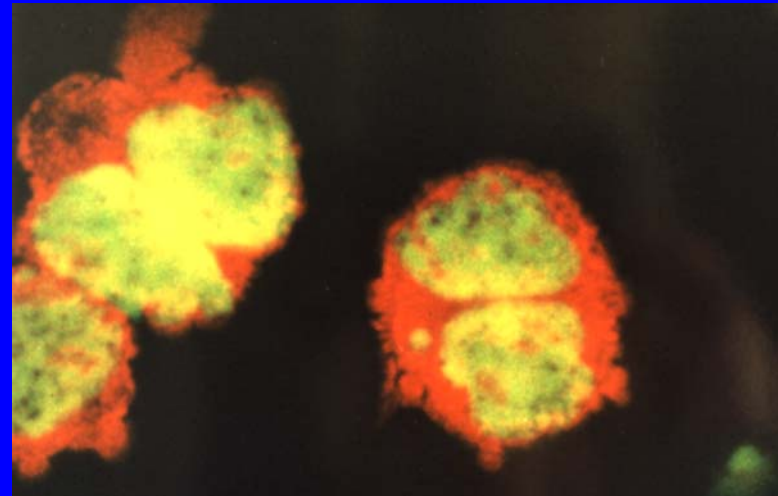
Plants as Sentinels: Genotoxicity

- Tradescantia
Mirconucleus Assay
- Frequency of
micronuclei (MN) in
pollen mother cells
- Results: Exposed
plants had a higher
MN frequency than
controls



Pet Dogs as Sentinels: Genotoxicity

- Questionnaire
 - Status and health history of dog and household
 - Drinking water sources
- Blood sample
 - Serum chemistry
 - PBL subtyping
 - PBL micronucleus assay
- Results: Animals using community water had higher risk for genotoxicity



Health Risks for People: Genotoxicity

- Questionnaire
- Blood samples
 - Peripheral blood lymphocyte typing
 - Organochlorine concentrations
 - Immune markers
- Results: Community members (in comparison to unexposed nearby community) had:
 - More individuals with low percentage of CD16 PBLs (marker for natural killer cells)
 - Lower responses in the mitogen stimulation assay
 - Higher IgM levels
 - Lower CD4/CD8 cell ratio



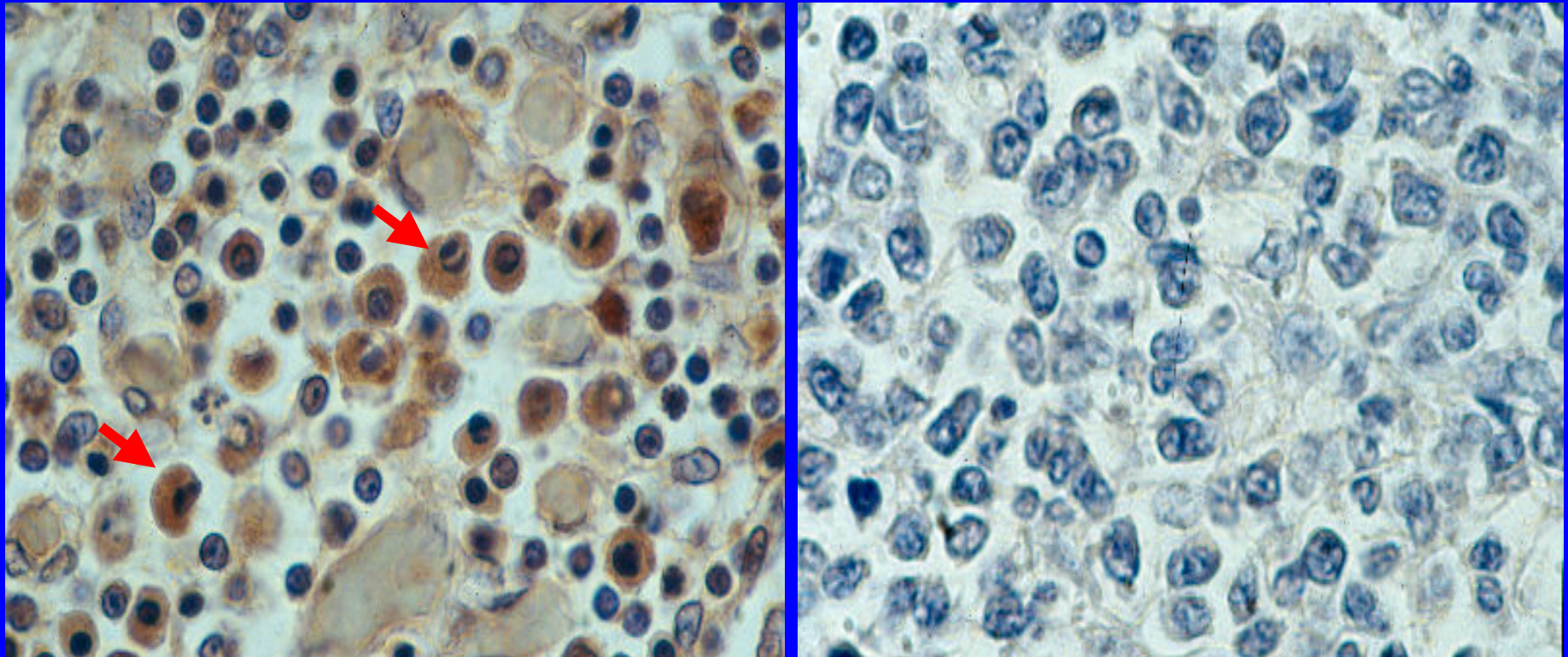
This isn't tap water , is it ?

Marine Animals and People Shared Resources--Shared Risks?



Sentinels: Can they Help us Develop Biomarkers of Exposure?

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Environmental Contaminants in the Resident Population of Sapelo Island and their Seafood

A pilot project to assess marine mammals as possible sentinels for human populations

Principal Investigators:

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CDC Project Coordinator

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CDC Lead Scientist

Sapelo Island Study Questions

- Can marine mammals serve as sentinels for human populations that depend on the same seafood resource?
- How do human body burdens of persistent environmental contaminants compare to those of bottlenose dolphins?
- How do human body burdens of persistent environmental contaminants compare to concentrations of environmental contaminants in seafood from local coastal waters?
- Can we do this?

Sapelo Study: Project Design

- Recruit nine study participants
 - Long time residents or consistently visit Sapelo Island for at least 5 years
 - Eat locally-caught seafood at least twice a week.
- Dorset Hurley from the Sapelo Island National Estuarine Research Reserve will assist with the recruitment efforts.
- Present our study to Sapelo Island Cultural Revitalization Society (SICARS) for their feedback and approval.

Sapelo Island Study: Study Activities

- Take a screening questionnaire to determine eligibility;
- Read and sign a consent form;
- Complete a study survey pertaining to the amount and type of seafood eaten;
- Provide us with a blood, urine and hair sample;
- Donate at least two samples of freshly caught seafood meals from SINERR or nearby coastal area.

Sapelo Island Study: Analyses

- 80 PCBs (approximately) that includes dominant congeners for Aroclor 1268 (ship paint);
- Chlorinated pesticides
- Dioxins
- POPs
- PBDEs
- PFOs (maybe)
- Heavy metals: Lead, Cadmium, Mercury and Selenium

Sapelo Island Study: Co-Investigators & Collaborators

- Charles Dodson
CDC Lab
- Dorset Hurley
Sapelo Island National Estuarine Research Reserve
- John Kucklick
National Institute of Standards and Technology
(NIST)
- Lori Schwacke
NOAA

Other Sentinel Pilot Projects

- Charleston Harbor
- Biscayne Bay

Questions?