

**Integrated Public Health Research:
Accomplishments, Current Status
and Public Health Significance:
Emergency Room, Follow up
Studies and Outreach**

Barbara Kirkpatrick and Colleagues



CDC Grant #U50-CCU423360-01

Red Tide Research Projects

- Emergency Room
- 10 day follow up study and Inland Transect
- Medical and Community Outreach

Key Personnel

- Lorrie Backer, CDC
- Lora Fleming, UM
- Andy Reich, MS, FI DOH
- Judy Bean, Cincinnati Children's Hospital
- Kate Nierenberg, MML
- Gary Kirkpatrick, MML
- Terry Kane Lung Associates of Sarasota
- Rich Pierce, MML
- Mike Henry, MML
- And help from many others – thanks!

ER Study: Objectives

- Is there an Increased Burden to the Medical Community during Red Tide?
- Local pulmonary physicians report increased office visits prior to and during reporting of a red tide bloom by the media

Study Site

- Sarasota Memorial Hospital (Sarasota, FL)
 - Emergency room data all electronic database
 - Facility serves 63.3% of Sarasota County's Population



Methods

- Retrospective Cohort study
- Exposure Data
 - **Exposure** Oct 1 – Dec 31, 2001
 - **Non-Exposure** Oct 1- Dec 31, 2002
 - Based on Mote Marine Laboratory's *K. brevis* cell count database
 - Same months to account for seasonal allergies and seasonal population

Methods

Health Endpoint and Other Data

- Patient age, residence zip code, Date of admission
 - Repeated admissions from same person possible
- Zip codes separated
 - Coastal
 - On water: Barrier island or Mainland
 - Inland

Methods

Health Endpoint and Other Data

- ICD 9 codes for respiratory diseases
- Evaluation by physician collaborators selected ICD 9 codes (92% Respiratory)
 - Pneumonia
 - Bronchitis
 - Asthma
 - Upper airway disease
- All Other Diseases

Statistical analysis

- Age-Standardized ER Admission rates calculated
 - Florida 2000 population
- Rate Ratios
 - 2001 Rate/2002 Rate
 - > 1 means ELEVATED RISK
 - < 1 means DECREASED RISK
 - 95% confidence intervals

Results- Environmental Data

Cell Count Averages by Month in Cells/L

	EXPOSED (2001)	UnEXPOSED (2002)
September	1,419,435	50,329
October	302,895	207
November	399,020	2,333
December	53,070	173

Results

- No overall sig. change in admissions for the 2 periods
- 19% increase in pneumonia during red tide
- When separated by zip code
 - Coastal residents had a 54% increase in admissions compared to non red tide
 - Pneumonia 31%, bronchitis 56%, asthma 44%, and 64% upper airway disease

(manuscript in press, *Harmful Algae*)

Public Health Significance

- Increased rates consistent with acute response
 - Animal models & Human Studies
- May be chronic health effects from Florida red tide toxins
 - Pneumonia
 - Bronchitis
- Location of residence important

Limitations

- No individual exposure or underlying health information
- No assessment of daily toxin levels in air
- Only one venue of health care: emergency rooms

ER Study: Synergism & Collaborations

- Local pulmonary group and local hospital, FL DOH, CDC, UM, Wood's Hole
- This study assisted NIEHS grant renewal
- OHH grant to Dr. Cathy Walsh, MML, investigating brevetoxin exposure in human cell line response
- ECOHAB proposal to assess economic impacts- DOH a partner (submitted)
- Companion study proposed to assess GI illness rates
- NOAA HAB Bulletin modeling project

Red Tide Research Projects

- Emergency Room
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This study

- Research questions
 - Are maximum effects being captured immediately after people come off the beach?
 - Is there a latent response (such as in occupational asthma)?
 - Do effects subside shortly after leaving the beach?

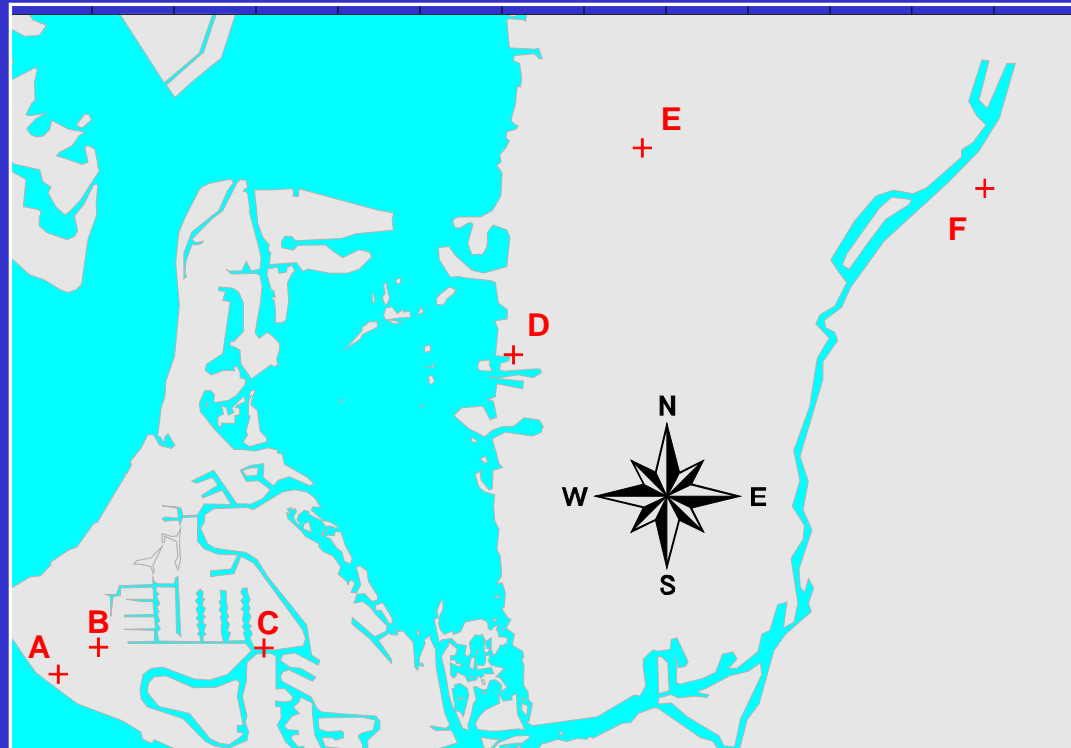
Methods

- Participants were asked to record:
 - Daily respiratory peak flow
 - Daily symptom log
 - Follow up telephone calls on Day 1 and Day 10
- High volume air samplers on an inland transect for 5 days
- During a red tide (Feb and Mar 2005) and with no red tide (May 2004)

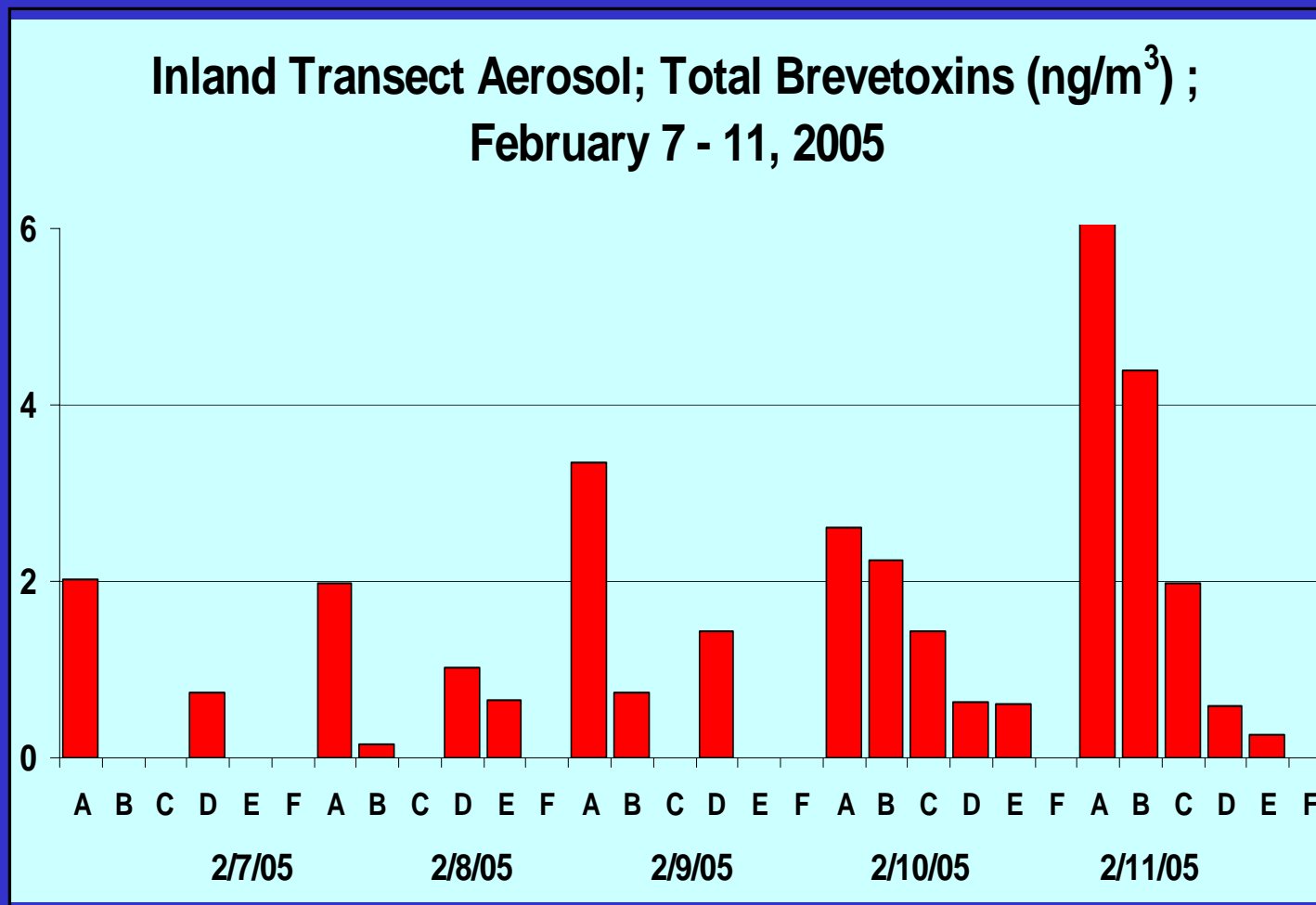


Environmental Sampling

- Six high volume air samplers placed on an inland transect

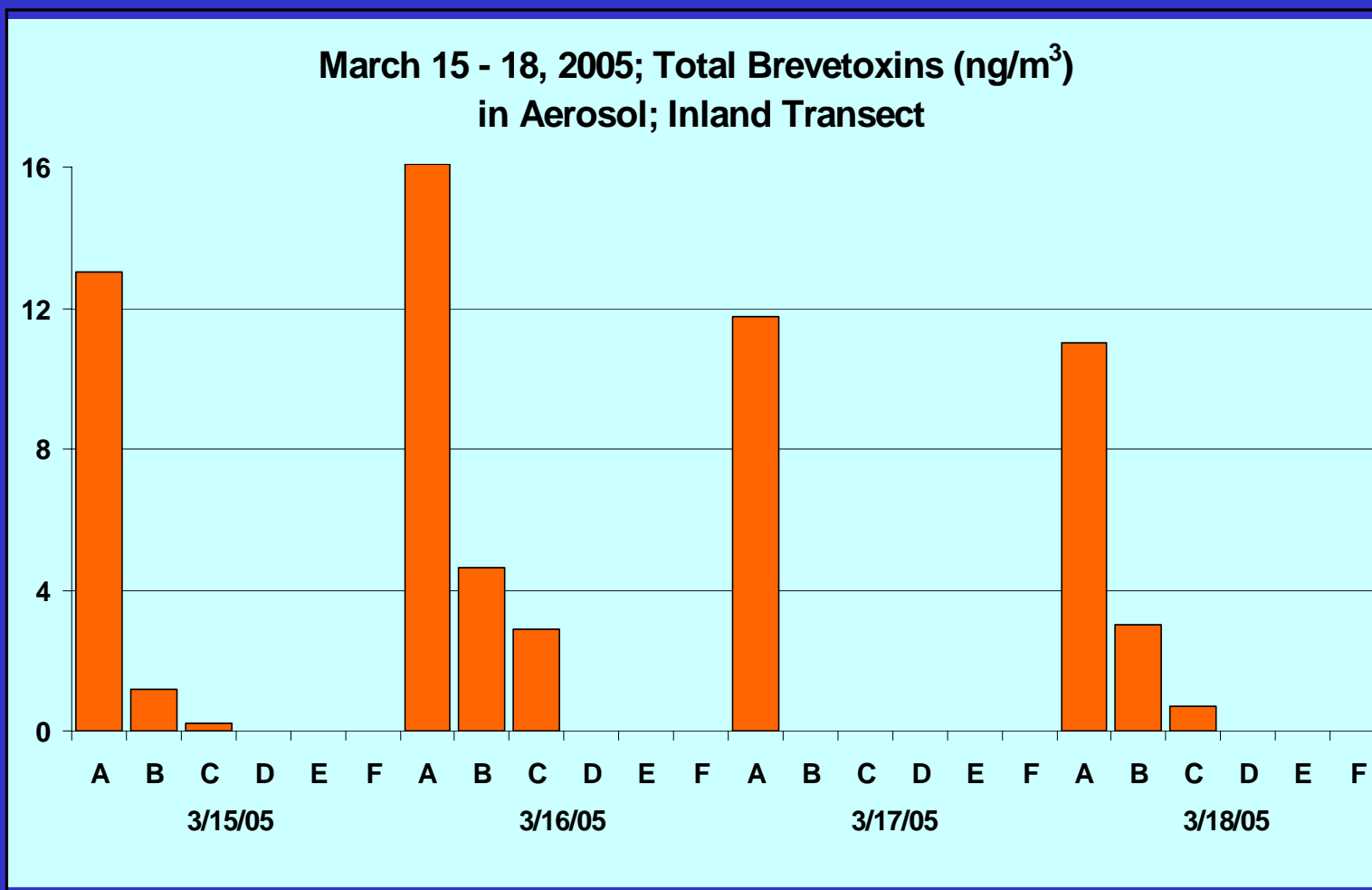


Environmental Sampling Results: February 2005



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Environmental Sampling Results: March 2005



Results

- Peak flow
 - No significant changes
- Symptoms
 - First 5 days- changes



9/3/03 Sensitive Red Tide Study Follow Up Check List.
 Name: _____
 Study number: _____
 Date of Day One: _____ Month/day/year Initial Peak Flow Measurement: _____

Thank you for being in our follow-up study! Please read the brief instructions below and complete this form over the next 10 days by filling it in each day.

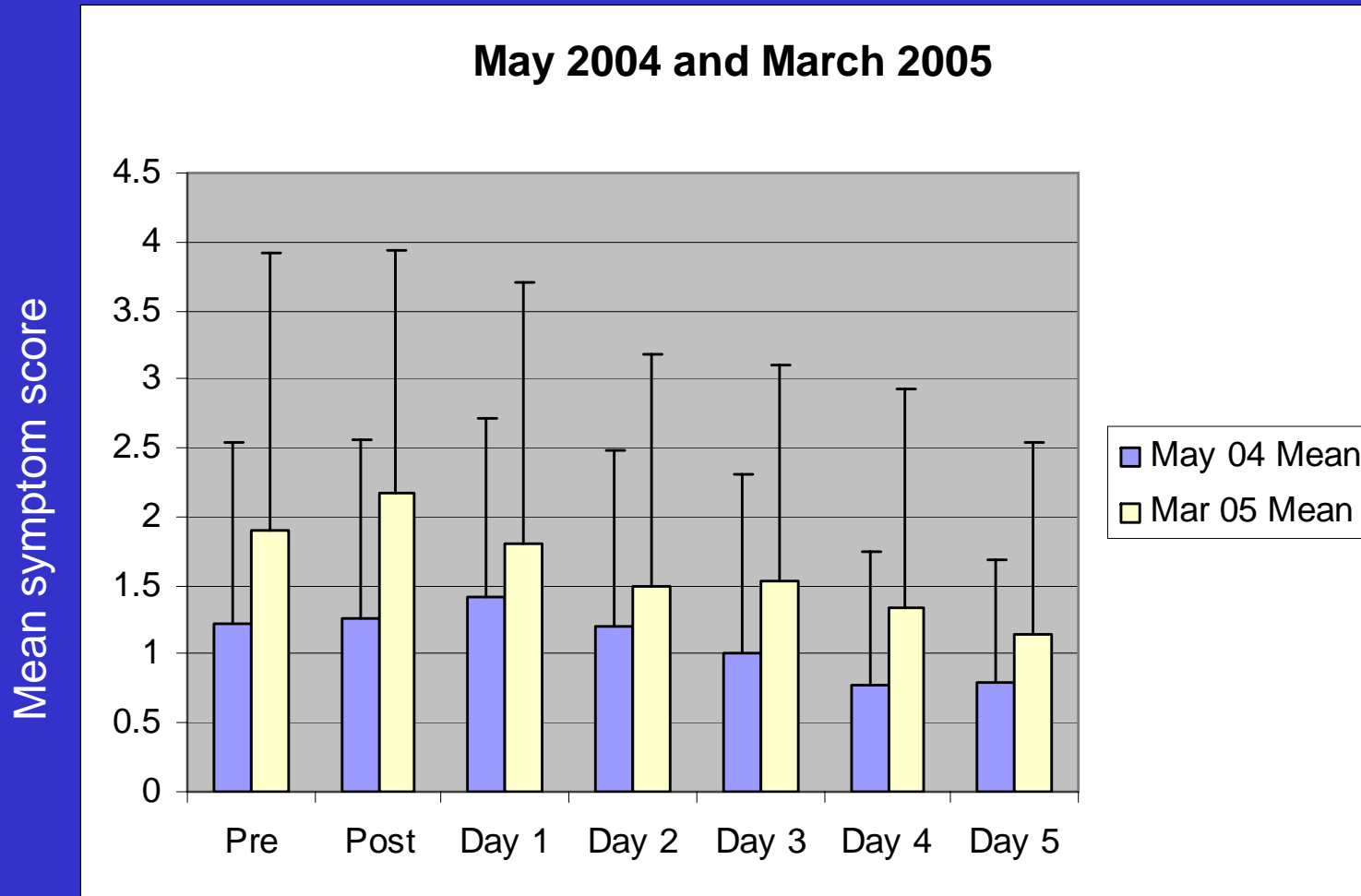
Instructions:
 There are three parts to this form: one for symptoms, one about doctor visits, and one about Peak Flow.

Each day for the next 10 days, please record your breathing symptoms in Question 1 of this form. Check YES (✓) if you are feeling the symptom at the time you are filling out the form or leave it blank if you are not having the symptom at that time. It is important that you do this every day to make sure we get the best information about your symptoms.

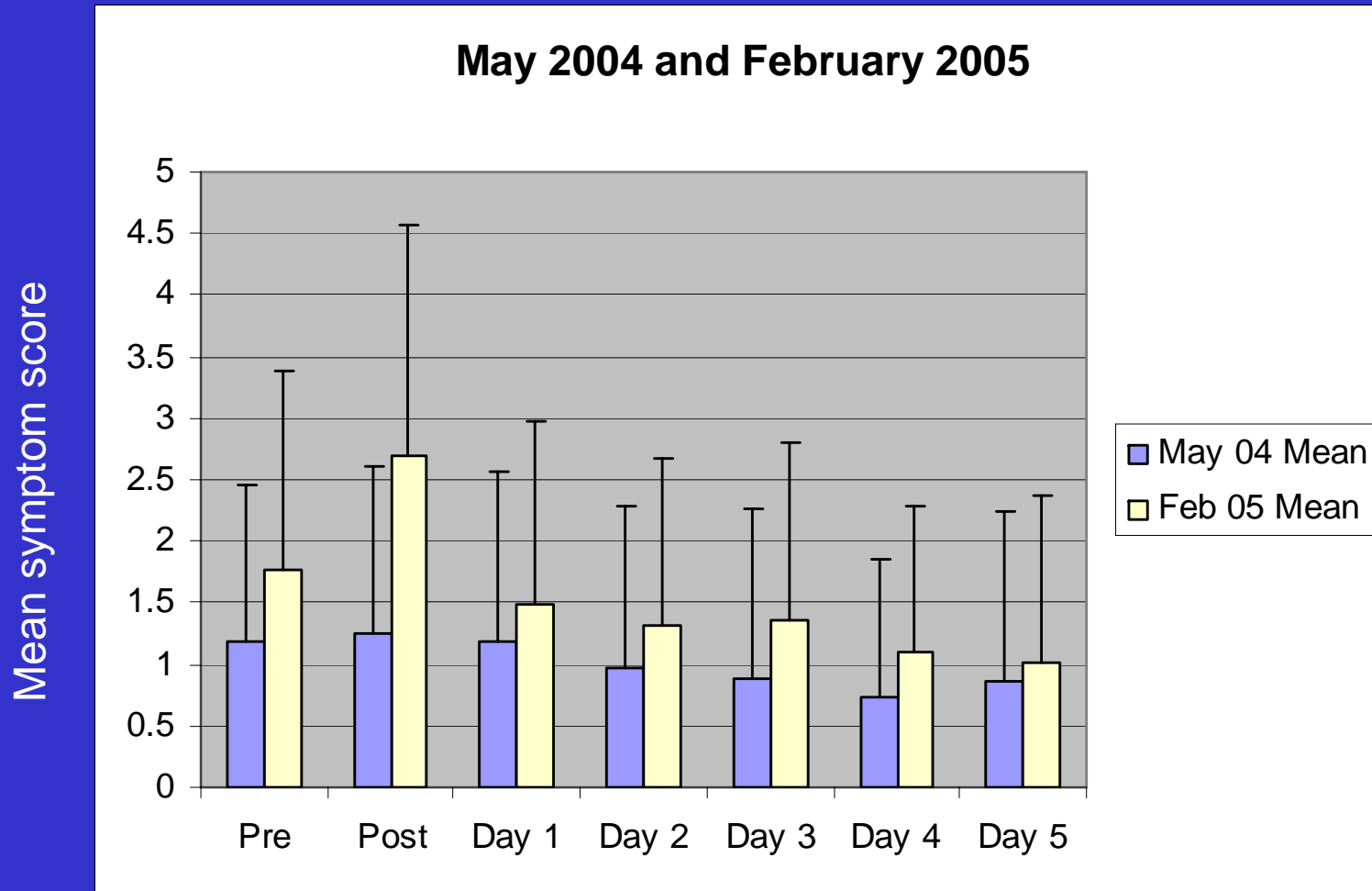
For Question 2, tell us if you have seen any health care professional for any breathing problems on that day. For Question 3, please do your Peak Flow measurement every morning when you wake up, and record the results on the form.

	Days	1	2	3	4	5	6	7	8	9	10
Question 1.	Date:										
a) Cough											
b) Wheezing											
c) Throat irritation											
d) Shortness of Breath											
e) Chest tightness											
f) Nasal congestion											
g) Eye irritation											
h) Headache											
i) Itchy skin											
j) Diarrhea											
k) Fever											
l) Productive cough											
m) Other: Specify ?											
Question 2. Did you visit a Doctor, Walk in Clinic, Emergency Room Today?											
Question 3. What is your Peak Flow measurement?											

Results - Symptoms



Results - Symptoms



Environmental Data

	Wind Direct.	Cell Count cells/L	Water Toxin $\mu\text{m/L}$	Air Toxin ng/m^3	Personal Air Toxin ng/m^3
March 2005	Onshore	59,000 - 200,000	2.25 - 11.957	7.10 - 69.00	30.4 \pm 27.7
Feb 2005	Off shore	1,05,000 - 4,630,000	13.36 - 128.02	<0.01 - 0.14	< LOD

Conclusions

- Research questions
 - Are maximum effects being captured immediately after people come off the beach?
 - Yes, indicated by this initial data
 - Is there a latent response?
 - Not indicated by this initial data
 - Do effects subside shortly after leaving the beach?
 - No. Symptoms gradually subside over a 5 day period
- The 1 hour exposure at the beach appears to trigger a response.

Discussion/ Future plans

- Continue follow up in collaboration with asthma study – 5 more years
- Peak flowmeter- changing to more sensitive instrument
- Capture during moderate to high exposure
- Monitor inside subgroup of homes for possible internal exposure



Follow up study- Public Health Significance

- Change we are finding after a 1 hour beach exposure doesn't worsen over time- but persist.
- Implications- results from ER study and this study suggest continued symptoms after exposure
- In asthmatics, we can no longer say "if you leave the beach, you will be OK"

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Medical and Community Outreach

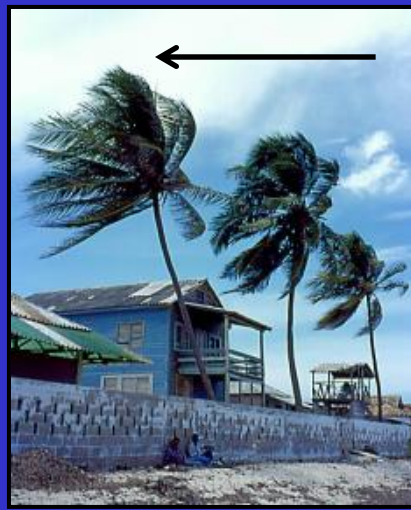
- Medical Community
 - 14 presentations
 - Audience = MDs, RNs, RTs, EMTs
- Community Outreach
 - 28 presentations
 - Panhandle to Naples

Scientific Community

- International and National HAB conference
- American Public Health Association
- Coastal Zone Conference
- Estuarine Research Federation conference
- American Society of Oceanography conference
- FL Environmental Health Association
- NOAA *Karenia* State of the Science workshop

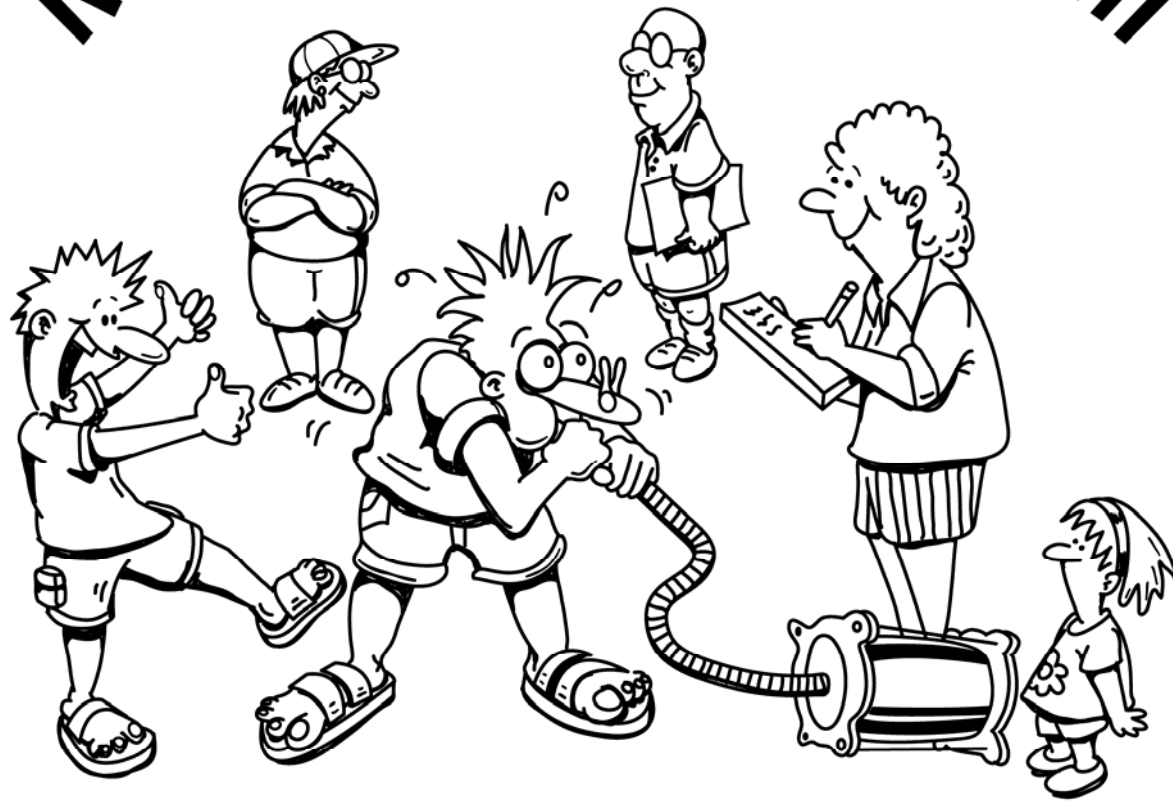
Public Health Significance

- Informed citizenry
- Informed medical community- accurate information transfer, improved reporting



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Red Tide Research Team



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