

Florida Red Tide and Human Health

Prepared for the

Aquatic Toxins Program
Division of Environmental Health
Florida Department of Health

under

Centers for Disease Control and Prevention
Grant #U50-CCU423360-01

by

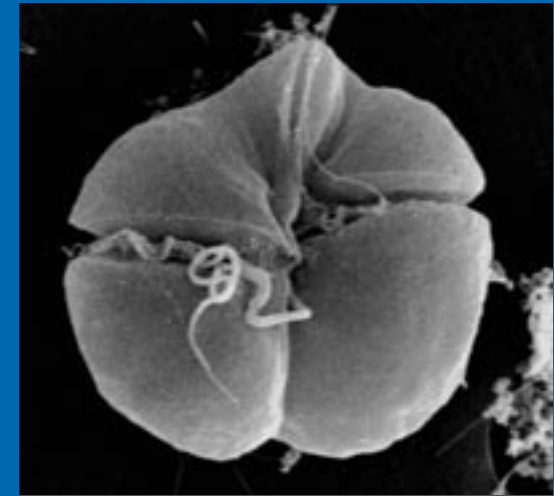
Mote Marine Laboratory
Center for Ecotoxicology
Environmental Health Program
Sarasota, Florida

September, 2004

Top Ten Questions

Florida Red Tide Organism

Karenia brevis (*Gymnodinium breve*)



- Photosynthetic – produces oxygen
- Blooms - millions of cells / liter
- Annual blooms in Gulf of Mexico
- Swims upward, sinks downward
- Produces a chemical/toxin
- Wind and wave action aerosolize toxins

Question 10

Is it safe to eat fish during a Florida red tide?



YES!!

- ✓ As long as the fish acts 'normal' on the hook-vigorous/fighting
- ✓ Eat **ONLY** the filleted meat – no organs/entrails

Question 9

Can I order/eat seafood in a restaurant when there is a red tide?



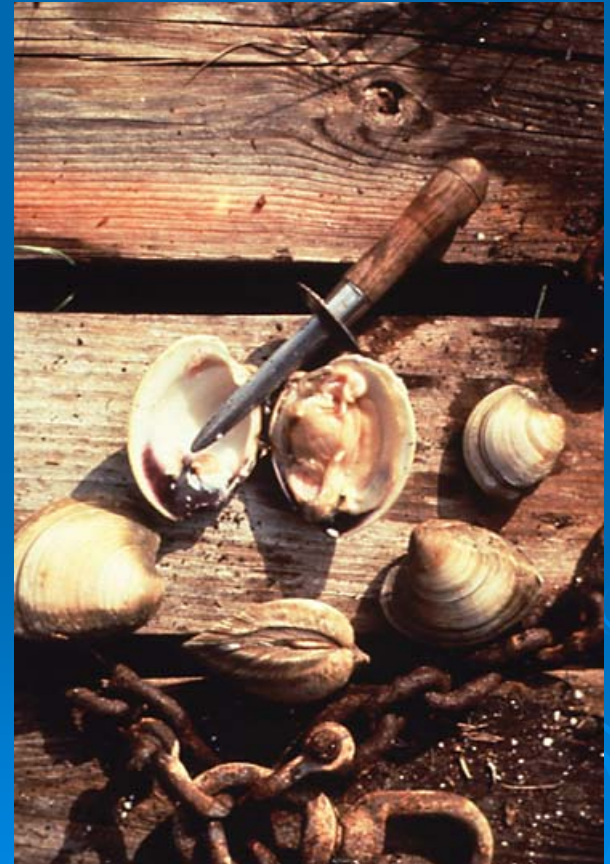
YES!!!!

The United States has an extremely effective shellfish monitoring program and commercially purchased shellfish is safe for toxins.

NSP- Neurotoxic Shellfish Poisoning

Caused by Red Tide

- ✓ Ingestion of contaminated seafood (bivalves- oysters and clams)
- ✓ Symptoms include tingling and/or numbness of the lips, tongue, throat, hands, and feet
- ✓ Neurologic; Gastrointestinal
- ✓ Acute Onset (30 min-3 hr)
- ✓ Short Duration (days)



Question 8

Can I go out shell fishing during a red tide?



NO! During red tides, the local shellfish beds are closed by the state. To know areas affected, see the state website at:

<http://research.myfwc.com/features/>

Question 7

If I cook the seafood, will heat deactivate the toxin?

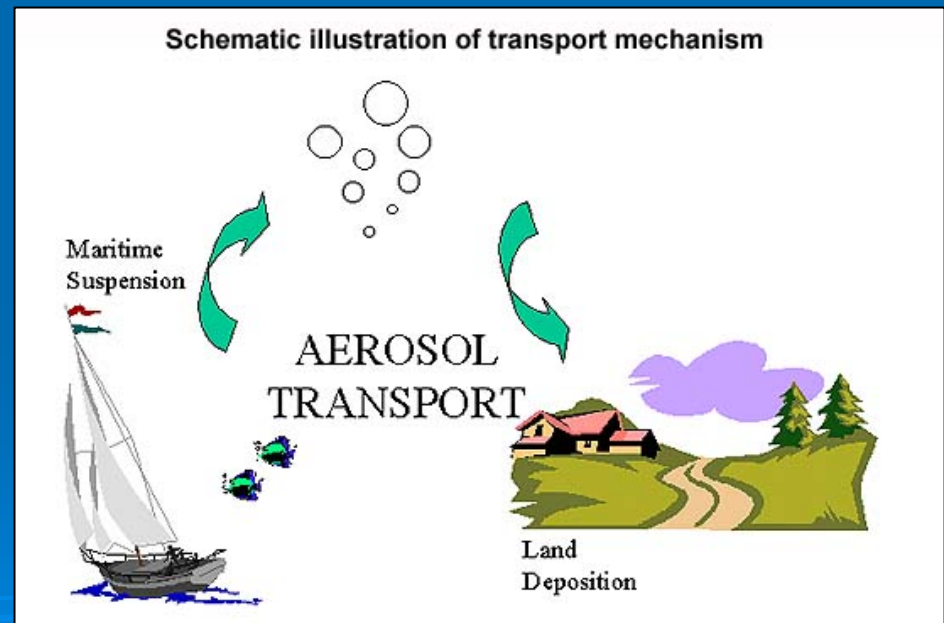


NO! The toxins are resistance to heat and storage – so if the shellfish have toxins in them – you will get sick.

Question 6

How far inland do the red tide toxins travel?

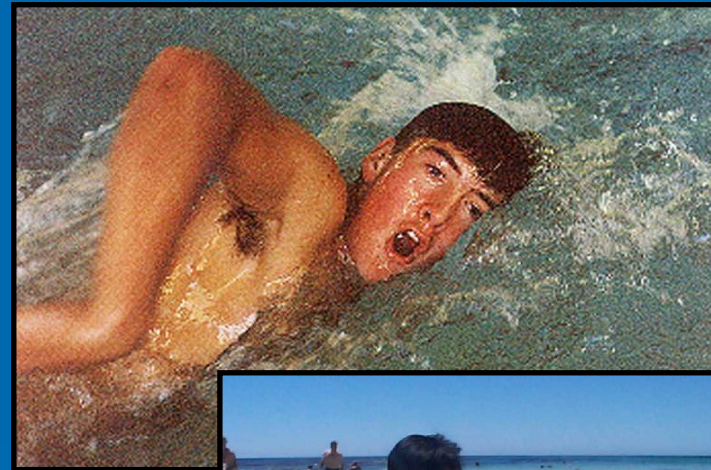
Stayed tuned-
research to be
conducted in the next
year or two!



Question 5

Is it OK to swim during a red tide?

A qualified yes. The red tide toxin **MAY** cause a skin rash- if so, leave the water and shower off in freshwater as soon as possible. Also, its unknown what bacteria are in the water if there is a lot of dead fish in the water.



Question 4

Is there a time of day when there is less red tide in the air?

Check the marine forecast. When winds are OFFSHORE less toxins will be in the air.



Question 3, 2, 1

3. My husband and I are both healthy people, but when we go to the beach during red tides, we cough a lot. Is the red tide affecting our lungs?
2. My neighbor jogs every day on the beach, even during red tide. Is it safe?
1. My sister has asthma, should she go to the beach during red tide?

The Florida Department of Health and its Collaborators are trying to Answer these Questions through Health Research Studies

- Centers for Disease Control and Prevention
- Lovelace Respiratory Research Institute
- Mote Marine Laboratory
- Mount Sinai Medical Center
- University of Miami Rosenstiel School of Atmospheric and Marine Science
- University of North Carolina Wilmington Center for Marine Science
- University of Cincinnati Biostatistics Department
- University of Miami Pulmonary Medicine Department

Question 3

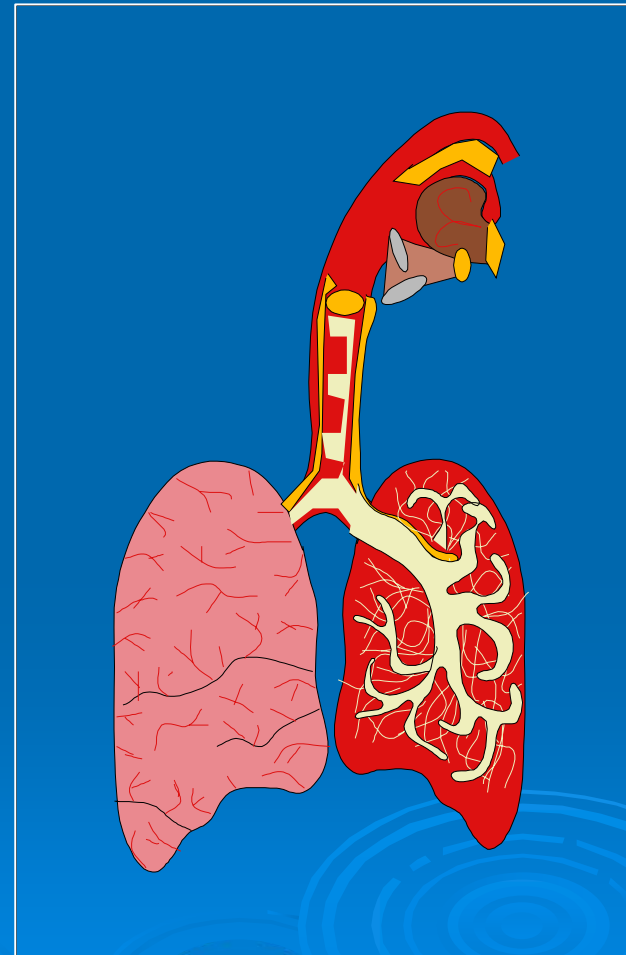
My husband and I are both **healthy people**, but when we go to the beach during red tides, we cough a lot. Is the red tide affecting our lungs?

Studies of Sarasota County lifeguards (2001-2002)

- 5 days pre/post shift
- Symptoms
- Lung Capacity
- During a red tide and with no red tide

Results

- No significant change in **lung function** while working outside during red tide
- Significant for increased **upper airway symptoms** during red tide (cough, throat irritation, eye tearing)



Question 2

My neighbor jogs every day on the beach, even during red tide. Is it safe?

- ✓ Lifeguard study, 2003.
- ✓ Measured symptoms and lung capacity before and after **exercise** on stationary bike.
- ✓ During red tide and with no red tide.



Results

Increased **upper airway** symptoms but no change in **lung function**.



Question #1!

My sister has asthma, should she go to the beach during red tide?

Current study with ~120 participants with diagnosis of asthma or chronic lung disease.

Assessed:

- ✓ Symptoms pre/post 1 hour walk on the beach
- ✓ Lung capacity pre/post 1 hour walk on the beach
- ✓ Air monitoring for toxins during sampling
- ✓ Participants did **NOT** change their medication regime for study.



How much red tide toxin was in the air?

Date	Temp (°C)	Humidity (%)	Average Wind Speed (KPH)	Wind Direction	Amt. in Water (um/L)	Amt. in Air (ng/m³)
Unexposed Period						
1/17/03	12.2 ± 1.6	68 ± 5	25.6 ± 3.4	off shore	0.07±0.06	0.09±0.17
1/18/03	8.3 ± 1.6	47 ± 5	10.9 ± 3.7	off shore	0.09±0.07	0.01±0.02
1/19/03	13.3 ± 1.1	53 ± 7	12.4 ± 4.0	off shore	0.07±0.03	0.00±0.00
Exposed Period						
3/29/03	24.4 ± 0.5	83 ± 4	10.5 ± 5.4	partly on shore	3.52±1.96	36.57±17.51
3/30/03	18.9 ± 2.2	84 ± 6	24.9 ± 6.0	partly on shore	14.01±8.06	3.71±2.63
3/31/03	12.8 ± 1.1	32 ± 12	22.7 ± 2.6	off shore	0.23±0.31	0.02±0.04

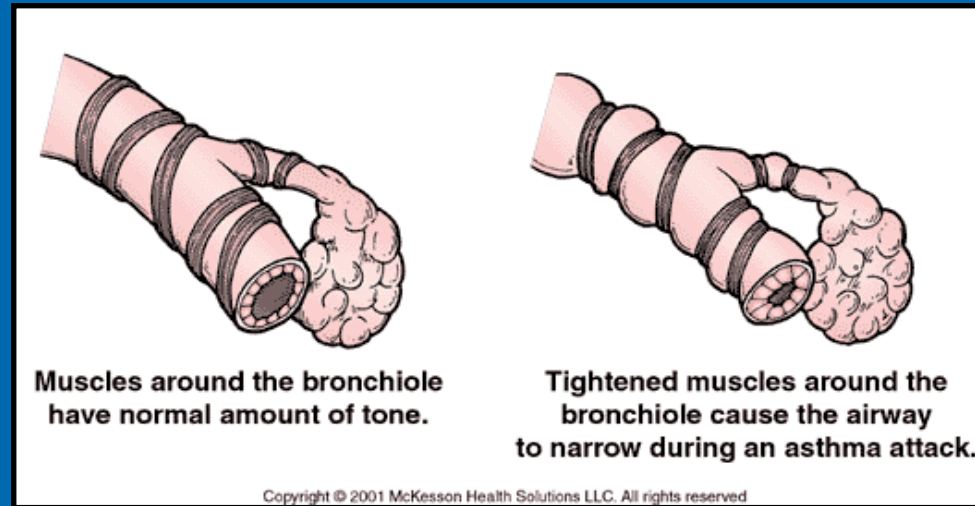
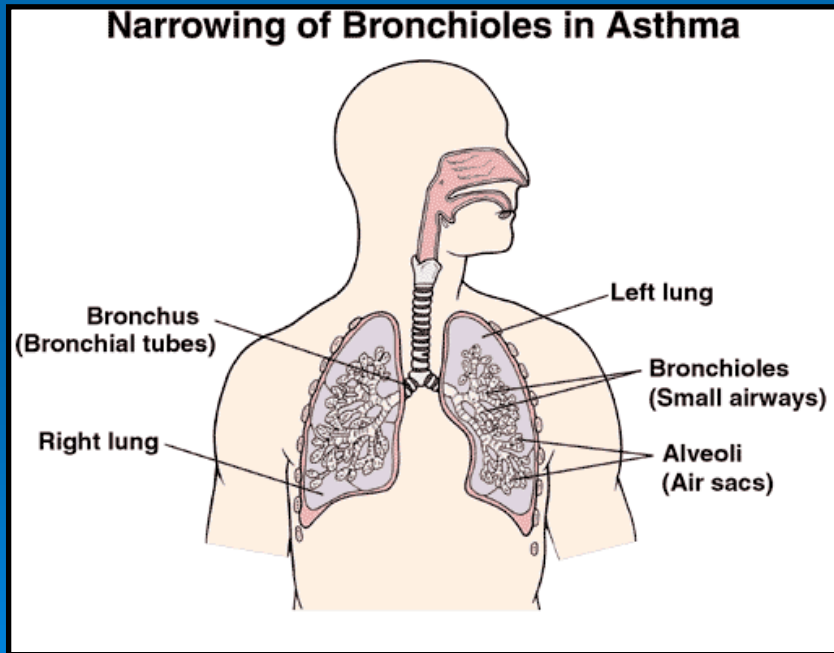
Pierce, Henry, Blum and Hamel
Mote Marine Laboratory

Was there a measurable
respiratory effect from the airborne
toxins?

In the symptoms people reported?



Was there a measured difference: In the breathing measurements?



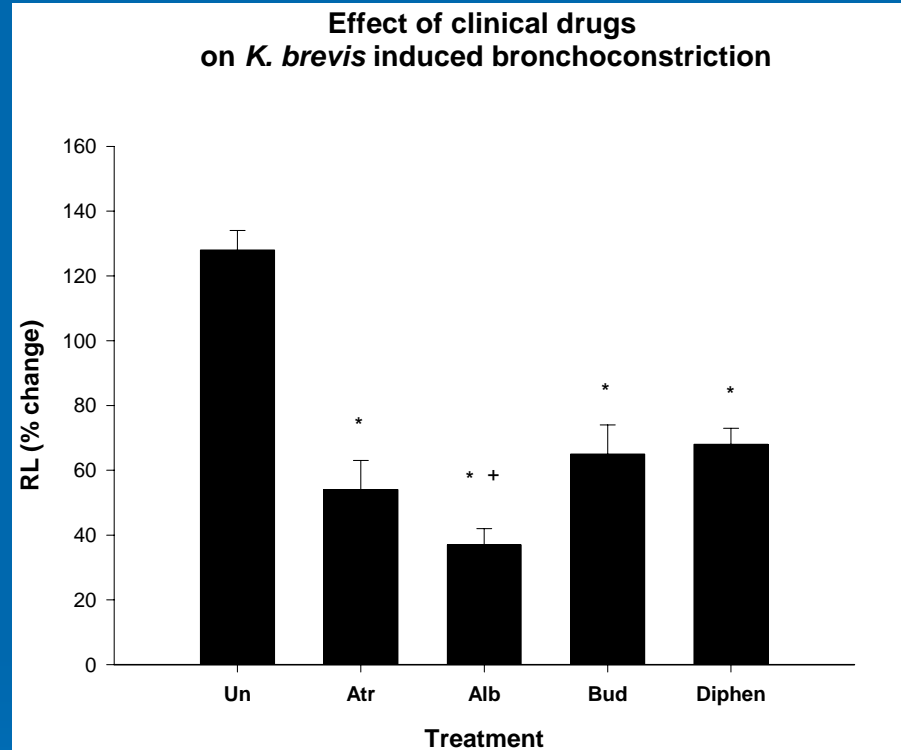
Results from Year 1

Increase in cough, wheezing, chest tightness, throat irritation, eye irritation after 1 hour walk on the beach.

Decrease in lung function parameters for asthma (FEV_1 and FEF_{25-75}). No asthma attacks! Just a small decrease.

What can we learn from the Animal Models?

Which clinically available drugs affect toxin –induced airway effects?

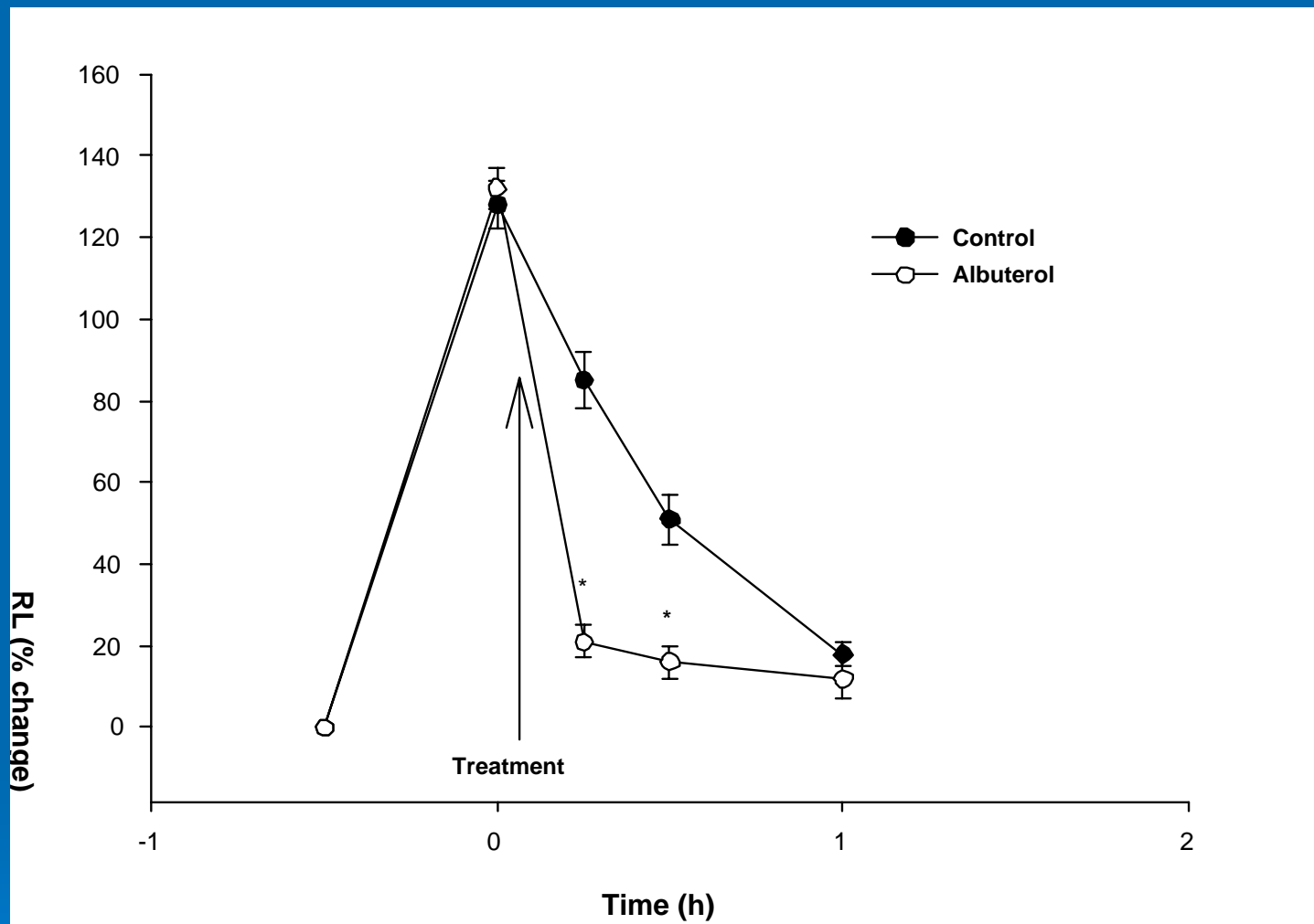


Abraham and Zaias
Mount Sinai Medical
Center, Miami, FL

values are mean \pm se for 4 – 6 sheep * $P < 0.05$ vs. untreated; + $P < 0.05$ vs. diphenhydramine;

K. brevis 100 pg/ml

Albuterol reverses *K. brevis* induced bronchoconstriction



values are mean \pm se for 5 sheep * P < 0.05 vs. control

Conclusion from the animal model- **not** tested in people at this time

- Pre treatment with common medicines such as antihistamines, inhaled steroids, bronchodilators, and anticholinergics will decrease the response to inhaled brevetoxins.
- Post treatment with bronchodilators will reverse most of the affects from inhaled toxins.

The Top Ten Again!

10. Is it safe to eat fish during a red tide? **YES!**

9. Can I order/eat seafood in a restaurant when there is a red tide? **YES!**

8. Can I go out shell fishing during a red tide? **NO!**

7. If I cook the seafood will heat deactivate the toxin? **NO!**

6. How far inland do the red tide toxins travel?

To be studied soon!

5. Is it OK to swim during a red tide?

A qualified yes.

4. Is there a time of day when there is less red tide in the air?

Check the marine forecast for offshore winds.

3. My husband and I are both healthy people, but when we go to the beach during red tides, we cough a lot. Is the red tide affecting our lungs?

No, just upper airway symptoms.

2. My neighbor jogs every day on the beach, even during red tide. Is it OK?

Yes, recent studies indicate its only an upper airway issue- not lung.

1. My sister has asthma, should she go to the beach during red tide?

A careful yes- considering:

- ✓ the severity of her asthma
- ✓ her current health (head cold, allergies, etc)
- ✓ the marine forecast (offshore vs. onshore winds, wind speed),
- ✓ and the severity of the red tide bloom.

More research ahead.....

- Follow participants for 10 days after beach exposure for late onset of symptoms
- Follow participants for 2 more years (at least)
- Transport of aerosols inland and human impacts
- Investigate prevention/mitigation of effects in people- such as filter masks, antihistamines
- Further investigate allergy component of response

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To report illnesses related to Red Tide,
call the toll free Aquatic Toxins Hotline
at 1.888.232.8635