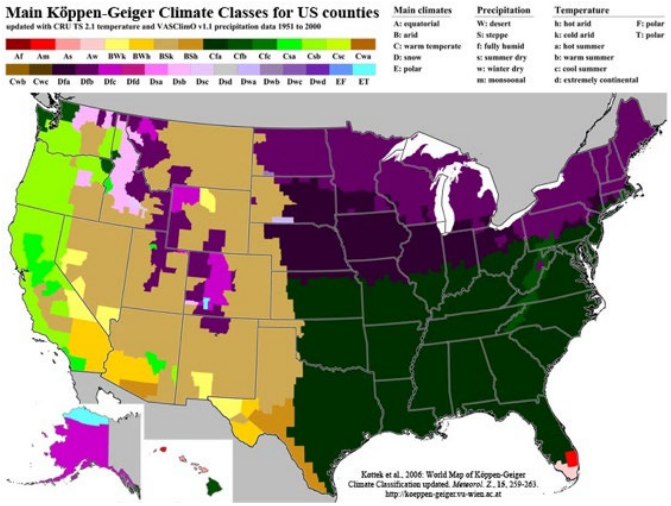
Lecture Series
Unique Infectious Diseases, Poisonings and Envenomations of the Southwest



- 14 Lectures; 1 hour
- CME provided
- Lectures are all archived on ATP
- Target audience: Emergency Room Physicians; Family Physicians, Internal Medicine physicians, EMT, nurses, medical students

Topics

Human diseases due to:

- Inhalation/Ingestion
  - Hantavirus
  - Coccidioidomycosis
  - Basidiobolomycosis
- Plant poisonings
  - *Datura*
  - Mescal
  - Brevetoxins
- Animal poisonings
  - Colorado river toad
  - Sting ray barbs
  - Ciguatera
  - Sea Urchin spines
- Bites
  - Tick bites: *Rickettsia rickettsia, Rickettsia parkeri*, *Rickettsia phillipi*; TBRF, *B. burgdorferi*

- Animal bites: rabies
  - Rattlesnake bite
  - Gila monster bite
  - Black widow
  - Arizona brown recluse
  - Kissing bug bites: Chagas disease
- Mosquito bites: WNF, WEE, *Dirofilaria immitis*
- Fly bites: tularemia (*Chrysops discalis*)
- Flea bites: plague
- Sandfly bites: Leishmaniasis
- Black fly bites: *Onchocerca lupi*
  Paragonomus kellcotti
- Stings
  - Massive Bee attacks
  - *Centruroides sculpturatus*
  - Other scorpions, ant stings

Each Lecture

- Start with a description of an actual case familiar to the lecturer
- Discuss the pathogenesis of disease
- Discuss the pathogen or poison
- Discuss treatment

Acutely confused Medical Professor after a Trip to New Orleans enters the ER. History is always the key to the problem…

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Case Study

Professor (78-year-old) gives paper in a New Orleans, Louisiana conference on kissing bugs.

Returns to Tucson and the next day has watery stool and vomiting X 1; no other problems

A day later he is confused, unkept, undressed and staggering when walking; brought to ER by wife

At ER: afebrile; Sodium 124; pulse 38; RR of 12; complains of hot and cold intolerance; begging for blankets and then tossing them off; rude and cursing at employees

Case Study

Because of sodium level and bradycardia, placed in ICU.

Ate redfish and oysters at Felix's 48 hours before. While leaving New Orleans ate grilled oysters at New Orleans airport before leaving.

Patient awoke that evening in ICU, was lucid and coherent and made diagnosis

Clue to diagnosis: the city where conference was held, food choices, mental confusion and heat and cold intolerance

DIAGNOSIS

Neurotoxic Shellfish Poisoning NSP

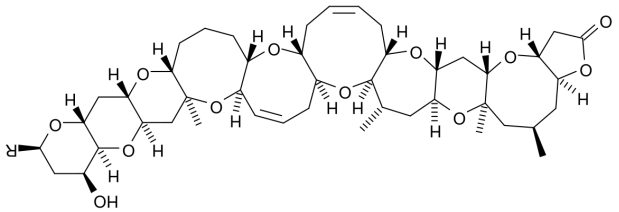
Toxin elaborated by *Karenia brevis* associated with "red tide"

NSP Clinical Syndromes: Ingestion



Latent time to symptoms .25-24 hours
Signs & Symptoms: torso neck & face erythema

- **Gastrointestinal;**
  1. nausea,
  2. vomiting,
  3. diarrhea,
  4. abdominal pain



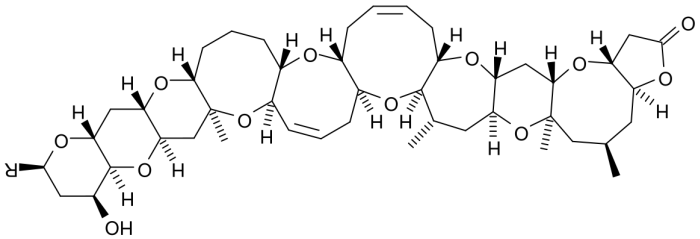
- **Neurologic; more prominent**
  1. paresthesias (circumoral, hot& cold feeling and reversal),
  2. vertigo,
  3. incoordination,
  4. dilated pupils,
  5. convulsion
  6. bradycardia
  7. rare respiratory paralysis and death
  8. Personality changes, profound—patients have ended up in mental hospitals

Treatment

- Supportive, only
- Reports of long term, neurologic sequelae
- Water restriction for hyponatremia
- Observation of bradycardia

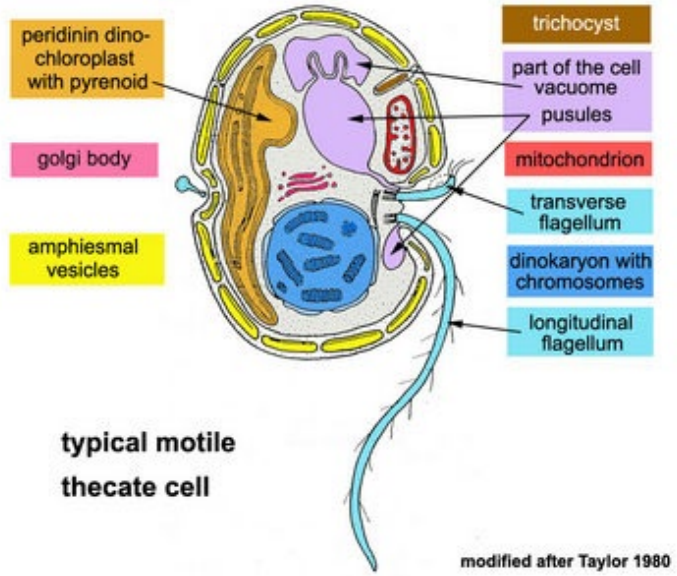
The Brevetoxin (PbTxs): Neurotoxic Shellfish Poisoning

- Ten BTxs are known; all are from red tide algal bloom of K. *brevis*.
- *Very lipid soluble,* ***heat stable (grilled oysters)***.
- *BTxs concentrate in bivalves.*
- *Route of exposure to BTxs is Ingestion or inhalation.*
- *Clinically important & most potent ones are BTx-1, 2, 3*
- *Ladder like structures of polyethers*



What elaborates the Brevetoxins?

Typical Dinoflagellate: *Karenia brevis*



Tree of Life Web Project Protist Diversity Workshop July 2008
Patrick Keeling, Brian S. Leander, Alastair Simpson, David R. Maddison, and Katja Schulz

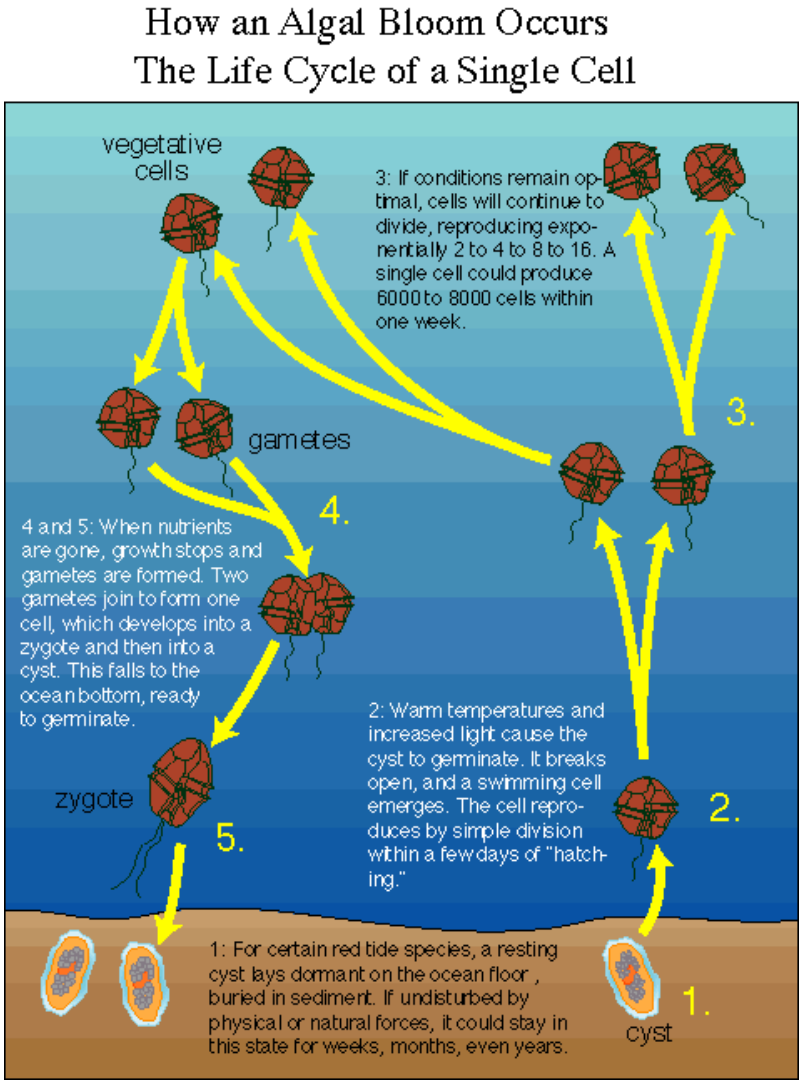
Karenia brevis life cycle:

Stage I : Initiation, germination of the cyst

Stage II : Growth in numbers

Stage III: Maintenance

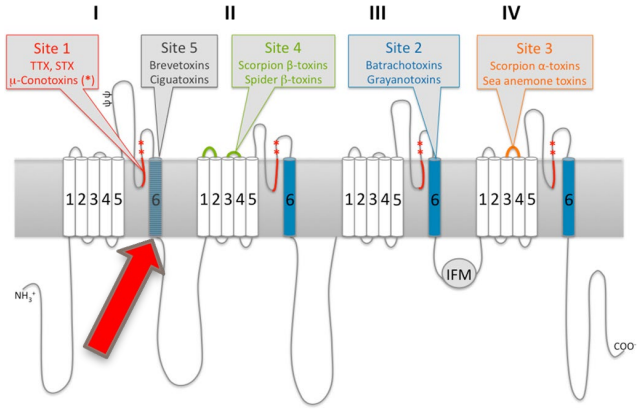
StageIV: Termination & dispersal



Routes of Expos

- Ingestion---Shellfish concentrate the toxins
- Inhalation

Site of Brevetoxin Binding on Voltage–Gated Sodium Channel



1. PbTxs in nerve, muscle, cardiac tissue binds, at site 5 of alpha subunit, enhancing opening & inhibits channel sodium channel closer. This causes continuous activation leading to paralysis and fatigue.

1. PbTxs in lower airway's smooth muscle causes activation of cholinergic nerve fiber's sodium channel leading to acetylcholine release, causing bronchorrhea & bronchospasm.

2. PbTxs: additionally, is known to cause **histamine release** from the mast cells.

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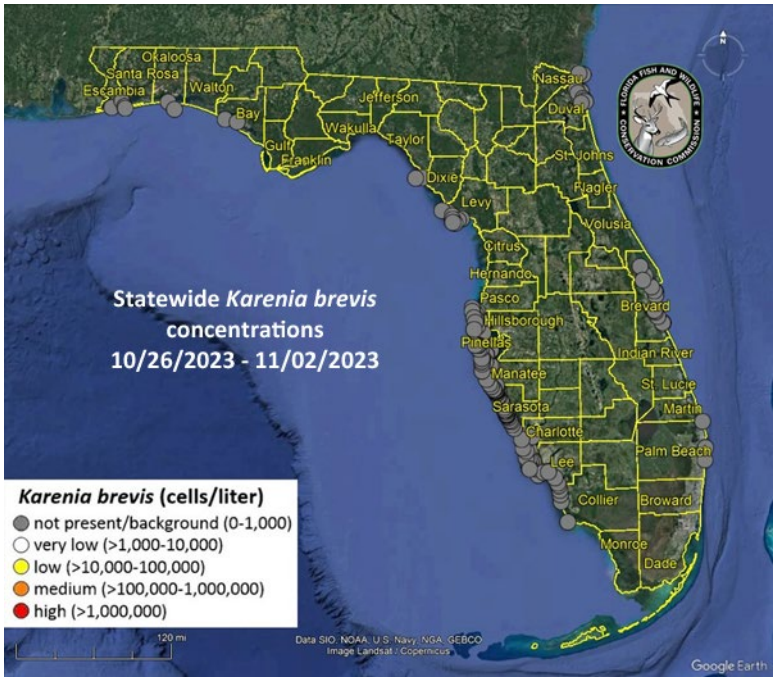
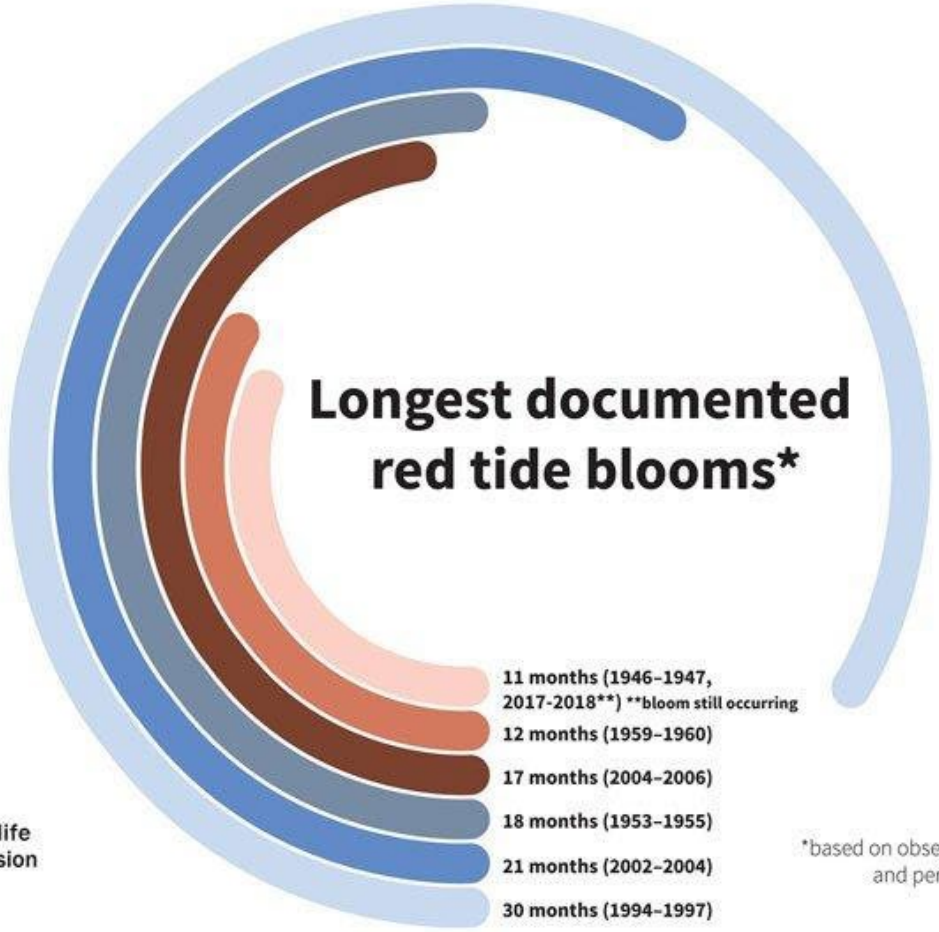
in the US
Sarasota, Florida

Red Tide in Florida



Description	K. brevis abundance	Possible effects (K. brevis only)
NOT PRESENT- BACKGROUND	background levels of 1,000 cells or less	no effects anticipated
VERY LOW	> 1,000 - 10,000 cells/L	possible respiratory irritation; shellfish harvesting closures when cell abundance equals or exceeds 5,000 cells/L
LOW	> 10,000 - 100,000 cells/L	respiratory irritation; shellfish harvesting closures; possible fish kills; probable detection of chlorophyll by satellites at upper range of cell abundance
MEDIUM	> 100,000 - 1,000,000 cells/L	respiratory irritation; shellfish harvesting closures; probable fish kills; detection of surface chlorophyll by satellites
HIGH	> 1,000,000 cells/L	as above, plus water discoloration



Florida Fish and Wildlife Conservation Commission
MyFWC.com

*based on observations of >100,000 *Karenia brevis* cells/L and periods of suspected continuance of red tide