"Examination of correlation between red tide *brevetoxin* exposure and chronic CNS effects"

THE ROSKAMP INSTITUTE RED TIDE STUDY

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The Roskamp Institute:

- Nonprofit biomedical research Institute dedicated to:
  - Understanding Central Nervous System (CNS)-related disorders
  - Pioneering new treatments for CNS conditions
- 65 Basic research Scientists and Clinicians
- Funded by NIH, MOD, VA, grants, contracts and donations

The Roskamp Institute:

- Basic clinical research studies (wide range of technologies)

- Clinical studies and trials:
  - Neurodegenerative Disorders (Alzheimer's and other dementias)
  - Traumatic Brain Injury
  - Environmental exposures (Gulf War Illness)
  - Others

- Chronic neuro-inflammation common to all the above
  - Does *brevetoxin* cause CNS inflammation?
  - Are older brains more vulnerable to *brevetoxin* exposure?

Longitudinal Red Tide Study:

- Pilot study began June 2019
- Full study began May 2020, funded by the National Institute of Environmental Health Sciences (NIEHS)

- Goal: examination of the relationship of *brevetoxin* exposure to short- and long-term neurological signs and symptoms

- *In collaboration with:*
  - Dr. Barbara Kirkpatrick, Gulf of Mexico Coastal Ocean Observing System
  - Dr. Richard Pierce, Mote Marine
  - Dr. Lorraine C. Backer, the Center for Disease Control

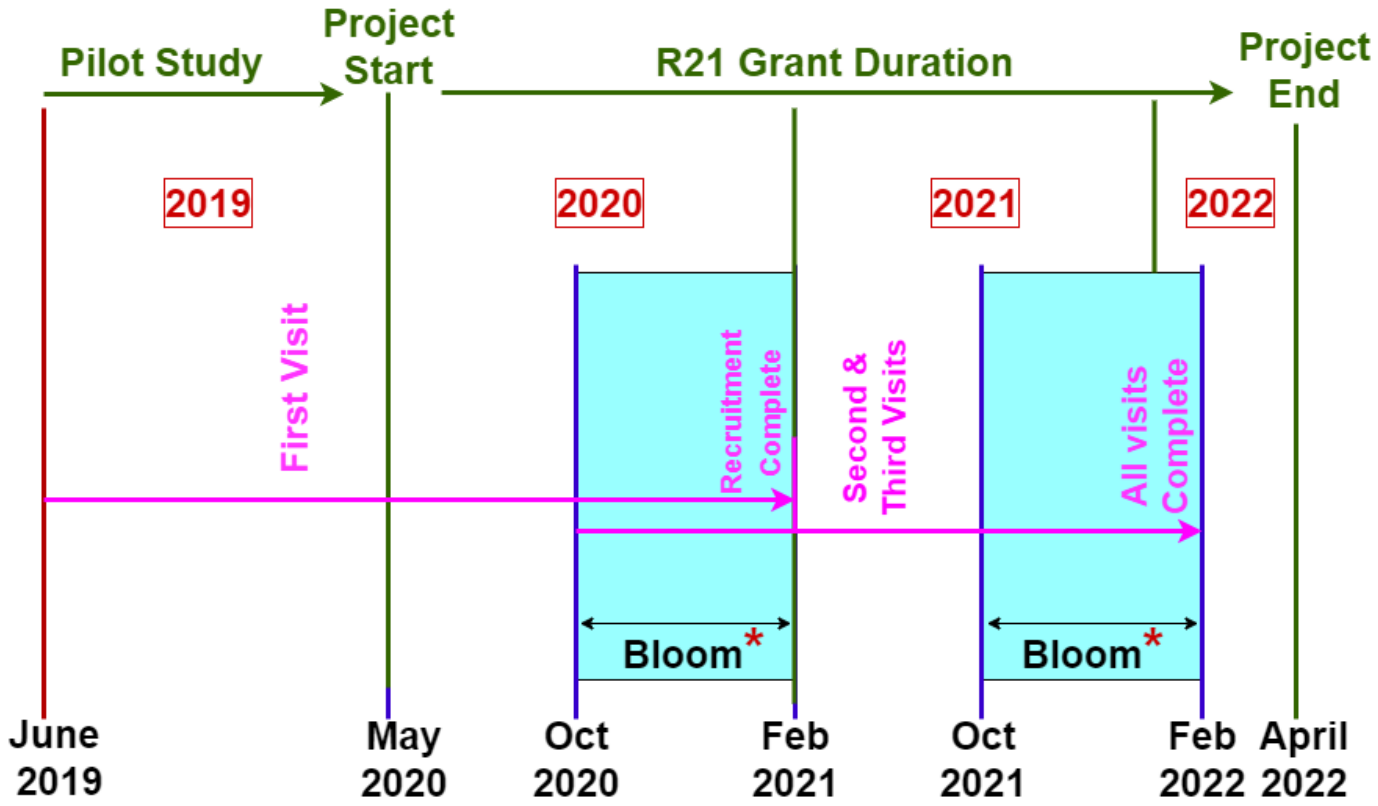
Rationale:

- Neurotoxin Ingestion: Neurotoxic shellfish poisoning (NSP) causes acute neurological symptoms –
  - headaches, dysesthesia/distal paresthesias, ataxia, slurred speech, dizziness, loss of consciousness, convulsions, and progression to partial paralysis.
- Neurotoxin Inhalation: More chronic development of generally less severe neurological symptoms.
  - A study of emergency departments reported an increase in primary neurological diagnoses in residents of the Gulf Coast during the Florida red tide blooms between 2005-2009.
  - Commonest symptom headache/migraine

Objectives of the study:

- Correlations between toxin levels and CNS effects?
- Correlations between toxin-related immune responses and CNS effects?
- Correlations both during and outside of red tide blooms?
  - Do *brevetoxin* antibody titers correlate with neurological complaints?
  - Do *brevetoxin* T- & B-cell reactivities correlate with neurological complaints?

Study Design:



*Projected bloom time frames based on historical data provided by the FWRI.

Methods:

- A 2-year longitudinal study
  - Inclusion criteria: 18+ years, willing to complete health survey and donate blood/urine at study visits
- 210 (400) Volunteers will be assessed during and outside of Red Tide blooms.
- Estimation of exposure to aerosolized *brevetoxin:*
  - Estimated individually based on time in residential/work zones calculated from wind speed and direction (Cheng, et al. 2005).
- Biofluid assessment: quantification of *brevetoxin* and antibodies in blood by ELISA

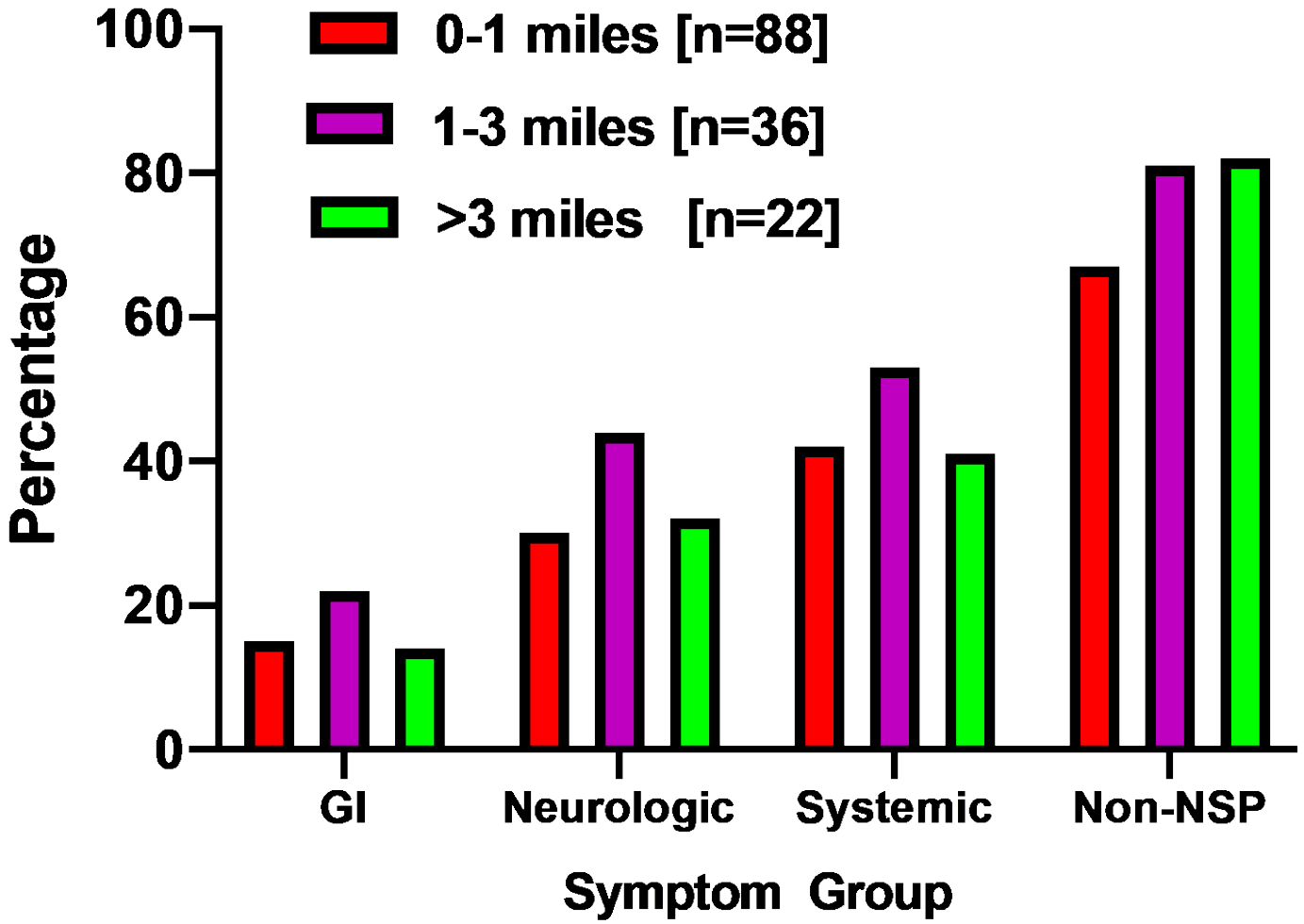
Progress to date:

- Recruited: 146 participants, with complete health surveys and biosamples
- Number of repeat visits: 28 participants
- Baseline symptom analysis
- Initial antibody results

Table 2: Demographics of Manasota residents (n=146).

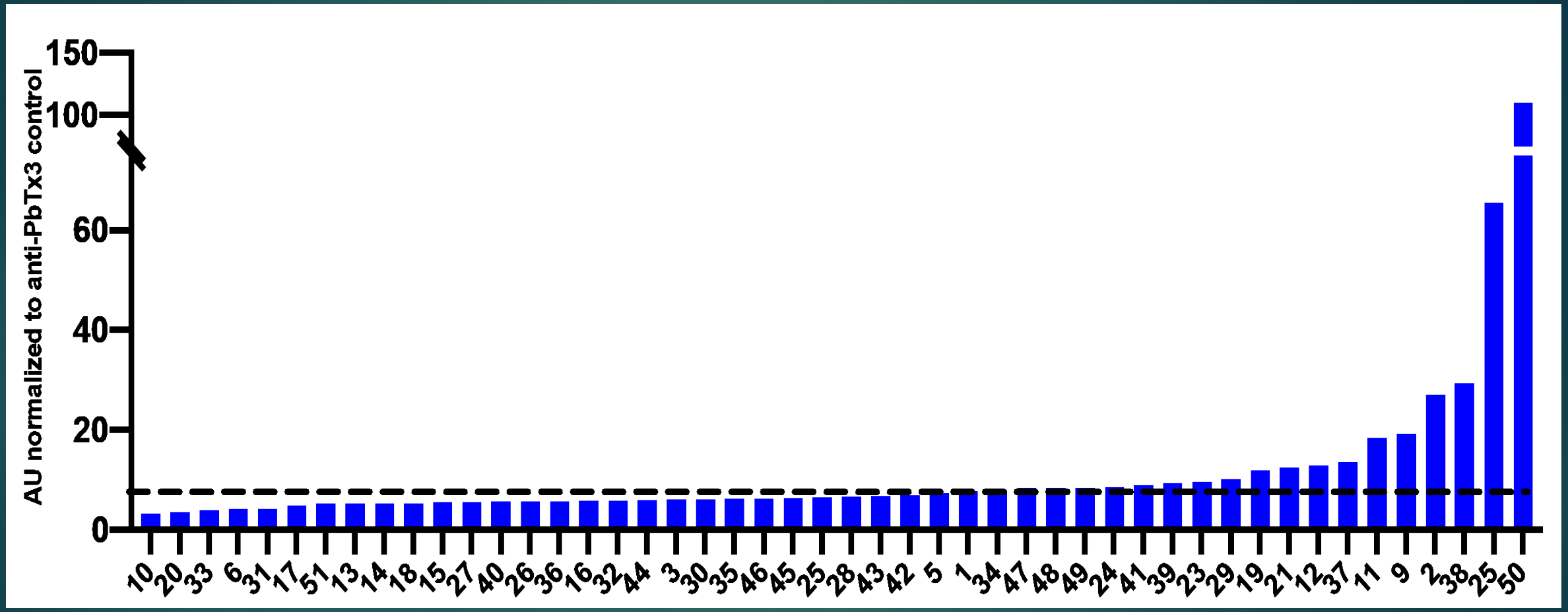
	Mean (SD)
Age	61.48 (14.62)
Sex	
Female	87 (59.6%)
Male	59 (40.4%)
Race	
Not stated	4 (2.7%)
American Indian	1 (0.7%)
Asian	0 (0%)
Pacific Islander	0 (0%)
Black/African American	2 (1.4%)
White/Caucasian	139 (95.2%)
Ethnicity	
Not stated	10 (6.8%)
Hispanic	5 (3.4%)
Non-Hispanic	131 (89.7%)

Study population:



Baseline symptom (prior 30 days) reporting by Manasota residents:

Anti-*brevetoxin* antibodies:



Summary:

1. Examination of acute and chronic neurological signs and symptoms with *brevetoxin* exposure in a Manasota cohort
2. 210 participants, longitudinal design
3. High recruitment rate (400 planned)
4. Baseline differences in immune biomarkers of *brevetoxin* exposure
5. Opportunities to examine repeat and novel challenge of *brevetoxin* in study cohort

Any Questions?

- If you want to learn more about this and other clinical research studies at the Roskamp Institute, please call **Megan Parks at (941) 256-8018 ext. 3008.**