**Introduction**

Ciguatera fish poisoning (CFP) is endemic to the U.S. Virgin Islands (USVI), affecting up to 4,000 people annually. In St. Thomas, the primary preventative CFP measure is a reliance on the knowledge and experience of local fishermen to identify fish species and fishing grounds previously implicated in CFP. Unfortunately, illnesses are still common and without a rapid and reliable field test or species-specific testing, reducing the risk of CFP will be difficult. This study employed four geolocations to evaluate the prevalence of Caribbean ciguatoxins (C-CTX's) in four fish species commonly found in local markets on St. Thomas, USVI: Ballistes vetula (Queen triggerfish), Ocyurus chrysurus (Yellowtail snapper), Epinephelus guttatus (Red hind), and Haemulon plumieri (White grunts).

**Research Questions**

- Are consumers at risk of low level ciguatoxin exposure?
- Is low level ciguatoxin exposure preventable?
- Can acute ciguatoxin illness be prevented?
- Can we identify any species specific trends for ciguatoxin content?
- Is there a relationship between ciguatoxin content and location where the fish was caught?

**Sampling Location:**

- East of St. John
- South East of St. John
- South West of St. Thomas
- North West of St. Thomas

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**Methods**

The following species were targeted for collection by standard fishing practices, at historic and commonly utilized locations.

**Fig. 5.** Balistes vetula (queen triggerfish) N=20

**Fig. 6.** Ocyurus chrysurus (yellowtail snapper) N=17

**Fig. 7.** Epinephelus guttatus (red hind) N=20

**Fig. 8.** Haemulon plumieri (white grunts) N=20

**Ciguatoxin Extraction**

**Fig. 9.** Ciguatoxin extraction and cleanup

**Fig. 10.** Toxin binding site

**Neuro-2a Mouse Neuroblastoma Cell Assay:**

- The Neuro-2a cell assay (ATCC CCL-131) is a cell-based assay dependent on in vitro method for sodium channel toxins.
- This method can distinguish between toxins that activate or block voltage gated sodium channels.
- Provides a semi-quantitative measure of ciguatoxin concentration in biological matrices relative to toxin standards.

**Results Continued**

- Is there a relationship between ciguatoxin content and geographical location?
- Are consumers at risk of low level ciguatoxin exposure?
- Are ciguatoxin fish poisoning preventable?
- Can acute ciguatoxin fish poisoning be prevented?
- What are the effects of low level ciguatoxin exposure?

**Conclusions**

- **Yes:** 100% of fish tested contained detectable levels of Caribbean ciguatoxins.
- **Yes:** Levels were at or exceeded FDA guidance levels by species.
- **Yes:** With the potential to accumulate high levels of ciguatoxin and utilize fishing grounds of low risk. Risk to consumers and species was assessed.
- **Yes:** Has this study identified any species specific trends regarding ciguatoxin content?
- **Yes:** This study has shown that Yellowtail Snapper (Ocyurus chrysurus) consistently had the lowest ciguatoxin content across sites.
- **Yes:** There is a relationship between ciguatoxin content and location where the fish was caught.
- **Yes:** We found that none of the four fish species collected from the North West collection site tested in this study contained detectable levels of Caribbean ciguatoxins. **Fig. 11.** Read plates

**Fig. 12.** Compared results to a known standard

**Fig. 13.** Ciguatoxin toxicity of fish by species and geographical location

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**References**

**Fig. 1-5:** Photos from events cataloged by the St. Thomas Fisherman’s association website [http://sttfishassoc.org/]

**Fig. 5:** Photo of artwork fish replica by Marino Creations Toxicology [http://mariocreations.homestead.com/artwork.html]

**Fig. 7:** [Yellowtail Snapper](http://www.floridafishtalk.com/yellowtailsnapper001.htm).

**Fig. 3:** [White Grunts](http://www.floridafishtalk.com/whitengrouts.htm).

**Fig. 14:** [Poster presenters](http://www.floridafishtalk.com/posterpresenters.htm).

**Fig. 4:** Map created using Google maps: [https://maps.google.com](https://maps.google.com)

**Fig. 5:** Photo of artwork fish replica by Marino Creations Toxicology [http://mariocreations.homestead.com/artwork.html]

**Fig. 1:** Image courtesy of Christopher Loeffler.