

# Feasibility of Physiologic Biomonitoring of Occupational Heat-Related Illness in Central Florida Farmworkers

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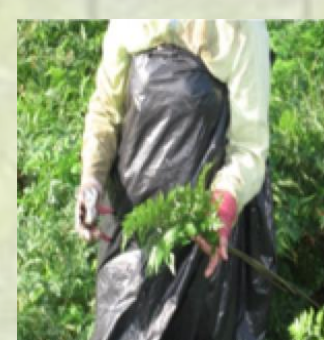
**Objective:** To determine the feasibility of field-based, physiologic biomonitoring in farmworkers

*"... if they [other workers] are invited they should accept because it is something good and is a benefit; it is not a waste of time and it is done during work time and is not noticeable, and is easy to handle."*  
 – Participant comment during exit interview

## Study Population

In the summers of 2012 and 2013, we conducted preliminary work to assess the feasibility of conducting a large scale study of HRI in Central Florida fernery workers.

A fernery is an agricultural operation where ornamental ferns (like those used in floral arrangements) are grown. Large black shade cloths are supported 9 feet above the ground by steel rebar, creating a hot, humid occupational environment.



Exclusion Criteria
Weight <80 lbs
History of disease of the esophagus
Previous surgery of digestive tract
Swallowing difficulties
Presence of a pacemaker
Diagnosis of Hypertension
Currently Pregnant

	Approached	Enrolled
2012	37	20
2013	32	24

Inclusion Criteria
18-54 years of age
Worked in a fernery for >14 days
Currently working in a fernery
Latino Descent
Males and females

### Reasons for Non-Enrollment

- ❖ Ineligible due to a history of type II diabetes or hypertension
- ❖ Spouse not eligible (when couples wished to enroll as a pair)
- ❖ Incompatible work schedules with the study days
- ❖ Transportation barriers
- ❖ Only one potential participant declined participation due to uncertainty regarding the study measures (i.e. uncomfortable with the idea of swallowing and being monitored by a temperature sensor pill)

## Community Partnership

The Farmworker Association of Florida, Inc. (FWAF) is a membership organization of over 8000 farmworker families that seeks to empower farmworkers to respond to and gain control over the social, political, economic, workplace, health, and environmental justice issues that affect their lives.

The FWAF provided access to its members for study recruitment, promotoras (community outreach workers), field office space and invaluable field and community expertise.



## Methods

Variable	2012 Measure	Feasibility	2013 Measure	Feasibility	Final Method
Wet-Bulb Globe Temperature	Florida Automated Weather Network	Ease of access via archived download. Data every 10 minutes.			Florida Automated Weather Network
Core Temperature	Ingestible CorTemp® monitoring via intestinal temperature	Accurate method, need to improve administration protocol to attenuate premature sensor passage	Ingestible CorTemp® monitoring with late evening administration at home with meal.	Improved data capture windows. All participants adhered to pill administration protocol.	Ingestible CorTemp® Monitoring with late evening self-administration at home with meal.
Heart Rate	Polar® S610-HR monitor	Comfortable, affordable, easily concealed under clothing.	Polar® S610-HR monitor. Utilized electrode gel to improve device conductivity.	Yielded improved data collection with decreased noise.	Polar® S610-HR monitor
Energy Expenditure	Actigraph® GT3X+ (Wrist placement)	Potentially interference with wrist movement, not concealable	Actigraph GT3X+ (Waist placement)	Concealable, validated placement site; magnitude of capture may differ between populations	Actigraph® GT3X+ (Waist placement)
Dehydration	1) Total body weight changes 2) Study provided water bottle to track water intake	Difficult to capture total intake and output during workday. Participants preferred own water containers.	1) Blood osmolality 2) Urine osmolality 3) Self-reported fluid intake /type 4) Body weight change (adjusted for food/fluid intake, number of voids and bowel movements)	Multiple measures improve accuracy. Methods accepted by participants.	1) Blood osmolality 2) Urine osmolality 3) Self-reported fluid intake /type 4) Body weight change (adjusted for food/fluid intake, number of voids and bowel movements)

Typical Day During Feasibility Study Staffing: 1 Nurse & 1 promotor	
03:45	Arrive at Farmworker Association Office
04:00	Begin Pre-Workday Visits (5 visits, 20 minutes each scheduled according to work start time)
06:00	End Pre-workday Visits and secure equipment
09:30	Return to Farmworker Association office to set-up for post-workday visits
10:30	Begin post-workday visits as workers return from work
15:00	Last post-workday visit (Varies)
15:00-15:45	Site Break Down Staff Debriefing
16:15	Unload equipment
19:15	Download physiologic data from recorders and perform data back-up
20:30	Pack-up equipment/supplies for next study day

## Conclusion

This pilot provides support that physiologic monitoring in agricultural populations is not only feasible, but has the potential to advance occupational heat exposure assessment in an unprecedented way. Knowledge gained has informed the design of a larger multi-site study.