an increased number of blooms, and are they causing an increase in human-health effects? It turns out these are not easy to answer, because there is very little surveillance going on and we don’t have a good baseline in human populations.”

Fleming and an interdisciplinary research team (toxicologists, veterinarians, physicians, and oceanographers among them) are in their sixth year of studying the phenomenon. She looks specifically at the effects of aerosolized Florida red tide neurotoxins on a group of about 120 asthmatics in Sarasota (a separate Centers for Disease Control study also monitors non-asthmatic lifeguards), assessing their respiratory functions and symptoms before and after beach exposure both during and apart from red tides.

“We have found that the Florida red tide definitely increases asthma in asthmatics,” she reports. “Acute exposure for one hour—or even less—at the beach is all it takes. We have also shown that in areas where Florida red tide is a frequent event, there are even increased admissions to the emergency room for pneumonia, bronchitis, and asthma during red tides. Now we’re looking at more sub-chronic effects, such as the development of pneumonia.” Her colleagues are exploring other effects, such as on placentas, fetuses, and breast milk in animals. “We also want to look at interventions,” she says. “I’d like to leave the community with something they can use—tell them what they can do” to ease or prevent harmful effects.

At the same time, Fleming points out that Karenia brevis is apparently not all bad. Her fellow investigators on the study, Daniel G. Baden and Andrea Bourdelais of the University of North Carolina-Wilmington, and their team of researchers, have discovered that the organism also produces its own “anti-toxin,” which, when given to sheep, stopped the brevetoxin from causing asthma. “It turns out that this ‘brevenal’ is 1,000 times more powerful than any other drug” for easing mucous conditions in the lungs of sheep, and “has been patented for future use in drug trials with people who have cystic fibrosis.”

Baden, formerly of the University of Miami, was among those who first encouraged Fleming to study marine and freshwater toxins. Initially she worked on ciguatera fish poisoning, “a really nasty” illness caused by eating fish (including grouper, barracuda, amberjack, snapper, hogfish, and kingfish) carrying toxins produced by a marine microalga, Gambierdiscus toxicus, that blooms on coral reefs where fish feed. “[Victims] often don’t get diagnosed,” she notes. “They have pain in their teeth, pain during intercourse, they are fatigued, and people just think they are crazy, when it’s really ciguatera. Then, after a while—weeks, months, even years—the symptoms go away. We think the toxin continues in the body, but nobody has really looked at that.”

Fleming’s efforts on all fronts last year earned her an academic award as Florida’s “Outstanding Woman in Public Health.” She credits her successes to a collaborative approach and a management style that entails “learning when you are supposed to be in charge and when you need to let other people be in charge and do what they are good at.” She also thrives on interdisciplinary research. “I like to do new things,” she says, “and to feel a little out of my depths at all times, so I can say, ‘I have no idea what you are talking about’—and then learn something new!”

She admits that collaboration has its challenges. In the Oceans and Human Health Recreational Microbes Study (“poop in the water”), for example, the research team spent several hours defining “splash zone”—within which the ocean water slides back and forth on the shore—so they could all understand and measure the same span. The most detail-oriented researchers become irritated when the “big ideas” people wave their hands around while making grand statements, Fleming reports. “You put the oceanographers and the biomedical people in the same room, and boy, do they...