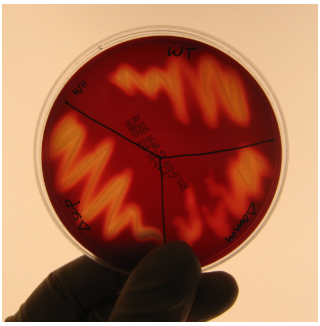
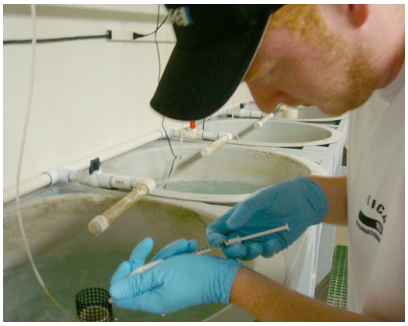
DEVELOPING A VACCINE TO PREVENT *STREPTOCOCCUS INIAE* INFECTION IN FISH

Victor Nizet, UCSD School of Medicine

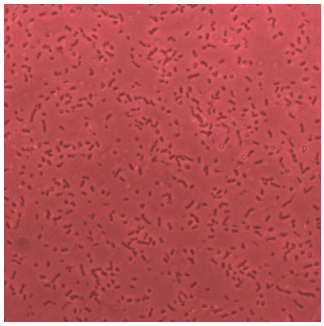


The bacterial pathogen *Streptococcus iniae* grows on a blood agar plate. *S. iniae* is closely related to the Strep A and B bacteria that commonly infect children. Photo: Jeff Locke

A juvenile hybrid striped bass used in vaccine studies. Photo: Jeff Locke



Sea Grant Trainee Jeff Locke injects a juvenile hybrid striped bass with *S. iniae*. Photo: Carlo Milani



S. iniae cocci chains visualized using light microscopy. Photo: Jeff Locke

SUMMARY

With Sea Grant support, medical researchers helped fish growers develop a control method for a deadly bacterial infection that costs the global aquaculture industry about $100 million annually.

BACKGROUND

Twenty-six species of fish, including hybrid striped bass, tilapia and rainbow trout, are known to be susceptible to meningitis (brain swelling) from *Streptococcus iniae*, a bacterial pathogen that is closely related to the Strepococcus strains that cause "Strep throat" in children. Outbreaks are most common at fish farms where warm-water species are raised at very high densities.

PROJECT

The vaccines currently on the market for preventing *S. iniae* infections are classical vaccines based on exposing fish to killed versions of the pathogen. The objective of this project was to combine pharmacology and genetic science to create a live-attenuated vaccine to prevent *S. iniae* infections in fish. Such a vaccine is of interest because it opens the door to being able to inoculate fish orally through feed, instead of having to inject fish individually, which is labor intensive and costly. Viable, cost-effective vaccines also obviate the need to administer antibiotics to diseased fish.

OUTCOMES

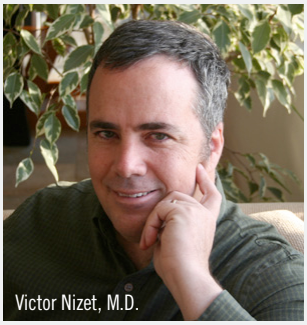
Applying techniques developed for human medicine, researchers identified the genes of *S. iniae* responsible for pathogenesis and then mutated these genes to weaken the pathogen's virulence. In a series of laboratory experiments, the scientists then verified that fish exposed to this mutated, weakened pathogen still developed antibodies to the real pathogen. This ultimately led to the creation of a live-attenuated vaccine. The technology for producing the vaccine has since been patented.

COLLABORATORS

Kent SeaTech Corp. (now Kent BioEnergy Corp.)

STUDENTS

Jeffrey B. Locke, Ph.D. / Tristan Carland, Ph.D.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PUBLICATIONS

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