

EMBRYOLOGICAL DEVELOPMENT

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Summary of Research

Dr. Podrabsky is using modern genomic techniques to understand how environmental influences can affect embryological development, using the annual killifish as a model system. These fish are unique because they produce embryos that enter a state of dormancy called diapause. While dormant these embryos can withstand extreme heat as well as the total lack of oxygen. The unique characteristics of this species of fish make it an excellent model for understanding how environmental parameters can interact with the genes important for embryological development of an organism to cause life-long changes in form and physiology. The research is focused on two areas: 1) examining the effects of incubation temperature on the induction of diapause; and 2) investigating the mechanisms that these fish use to support survival of heart and brain tissue during exposure to long-term anoxia.

Potential for Commercialization and Job Creation

The work started at PSU has the potential to lead to new therapies and cures for heart disease, stroke, and cancer. By understanding how these embryos globally control cell proliferation and metabolism, then it may be possible to control cancerous cell growths in humans. Also, by understanding how the hearts and brains of these embryos can withstand months of anoxia (the human brain can handle only a few minutes) then it may be possible to mediate and prevent damage from heart attacks and strokes.

Total Research Funding

Dr. Podrabsky has received \$460,000 from the national science foundation over 4 years (diapause metabolism work); and \$260,000 from the American Heart Association over 4 years (anoxia tolerance, heart physiology work).

Student Involvement

Much of the work outlined in these grants will be completed by graduate students in Dr. Podrabsky's lab as part of their graduate education. There are currently 5 graduate students in the lab working on various aspects of these projects and undergraduate students are also involved in the lab. During the last two years, 5 undergraduates have worked in the laboratory on research.

Website

The website is under development, however Dr. Podrabsky has been highlighted in "The Journal of Experimental Biology," and in "Science" magazine.