

Monday, November 19,
2007

[Make Today@UCI Your Home Page!](#) | [Contact University Communications](#) | [UCI Home](#)

[Home](#)[Calendar](#)[Newsroom](#)

- [Zot!Wire](#)
- [Press Releases](#)
- [Tipsheets](#)
- [Experts](#)
- [Broadcast](#)

[Services](#)

- [UCI in the News](#)
- [Healthcare](#)

[News](#)[Feature Stories](#)

- [Arts & Humanities](#)
- [Campus Life](#)
- [Education](#)
- [Environment & Energy](#)

[Energy](#)

- [Health & Medicine](#)

[Medicine](#)

- [Science & Business](#)

[Business](#)

- [Society & Culture](#)

[Culture](#)[Quick Facts](#)

- [Economic Impact](#)

[Impact](#)

- [Distinctions](#)

- [Fact Sheets](#)

- [Statistics & Reports](#)

[Reports](#)[Resources](#)

- [Publications](#)
- [Graphic Identity](#)
- [Style Guide](#)
- [Meet the Media](#)

[Chancellor's Site](#)[Site](#)[Emergency Readiness](#)

[Home](#) > [News](#) > [Press Releases & Media Advisories](#) > Press Release

Study shows how embryos regulate vitamin A derivatives

High, low retinoic acid concentration can cause birth defects

Irvine, Calif., November 19, 2007

Human embryos that get too much or too little retinoic acid, a derivative of vitamin A, can develop into babies with birth defects. New research at UC Irvine shows for the first time how embryonic cells may regulate levels of retinoic acid, giving scientists insight into how it acts as a signal between cells to control development of the brain, limbs and many other tissues in embryos.

Thomas Schilling, Richard White, Qing Nie and Arthur Lander of UCI studied the behavior of retinoic acid in zebrafish embryos, which often are used in genetic studies as models for human development because the transparent embryos are easy to examine and develop rapidly. The zebrafish genome also has been completely sequenced.

Retinoic acid is important to human health. In addition to its vital role in embryo development, it is used to treat patients with certain types of leukemia, and it is included in many acne medications because of its profound effects on skin cells. Vitamin A is found naturally in many foods, including liver, carrots, broccoli, kale and sweet potatoes.

"Vitamin A in the diet gets converted into retinoic acid, which scientists have known since the 1960s has amazing effects on cells and tissues," said Schilling, associate professor of developmental and cell biology at UC Irvine. "If you don't get enough vitamin A in your diet – or if you get too much – your body compensates for that. Our study helps explain how this regulation occurs."

This study appears Nov. 20 in the journal *Public Library of Science Biology*.

Within a certain range, cells can regulate levels of



Thomas Schilling



Zebrafish. Photo by Lukas Roth

Related Links

PHOTO LINKS

[Larger image of Schilling](#)

[Larger image of zebrafish](#)

WEB LINKS

[Developmental and Cell Biology](#)

[Public Library of Science Biology](#)

Contact

Jennifer Fitzenberger

retinoic acid. Schilling and his colleagues found that if the level becomes too high, an enzyme called cyp26a1 degrades the excess and brings it back to normal. When levels drop too low, proteins called fibroblast growth factors, or FGFs, stop the retinoic acid from degrading as rapidly.

"Those two things work together to keep the whole system adjusted to the right level," Schilling said. "Retinoic acid induces its own degradation, and FGFs, also present in the embryo, have the opposite effect by inhibiting retinoic acid degradation."

Zebrafish embryos used in this study were genetically engineered to be unable to make enough retinoic acid. The UCI scientists implanted tiny retinoic acid-soaked beads, which gradually released retinoic acid into the embryos. Using genetically altered fish embryos in which cells become fluorescent in response to retinoic acid when illuminated with an ultraviolet light, the scientists tracked how the retinoic acid moved within the embryos. This study is among the first to examine the distribution of retinoic acid.

These data were analyzed in a mathematical model based on the different biological components of the embryo. This type of collaboration between biologists and mathematicians is key to understanding how signals work and act together in complex biological systems.

Previously, scientists focused on where retinoic acid is made within an embryo, "but now we're hoping the results of our study will shift the focus of research to how the degradation of retinoic acid is controlled," Schilling said. Hopefully this someday will help scientists better predict how retinoic acid behaves in the human body, leading to more effective drug treatments.

This study was funded by the National Institutes of Health.

About the University of California, Irvine: The University of California, Irvine is a top-ranked university dedicated to research, scholarship and community service. Founded in 1965, UCI is among the fastest-growing University of California campuses, with more than 27,000 undergraduate and graduate students and about 1,800 faculty members. The second-largest employer in dynamic Orange County, UCI contributes an annual economic impact of \$3.7 billion. For more UCI news, visit www.today.uci.edu.

Television: UCI has a broadcast studio available for

949-824-3969
jfitzen@uci.edu

Archives

[Oct. 2007](#)
[Sept. 2007](#)
[Aug. 2007](#)
[July 2007](#)
[June 2007](#)
[May 2007](#)
[April 2007](#)
[March 2007](#)
[Feb. 2007](#)
[Jan. 2007](#)
[2006](#)
[2005](#)
[2004](#)
[2003](#)
[2002](#)
[2001](#)
[2000](#)
[1999](#)
[1998](#)
[1997](#)
[1996](#)
[1995](#)

live or taped interviews. For more information, visit www.today.uci.edu/broadcast.

News Radio: UCI maintains on campus an ISDN line for conducting interviews with its faculty and experts. The use of this line is available free-of-charge to radio news programs/stations who wish to interview UCI faculty and experts. Use of the ISDN line is subject to availability and approval by the university.

[[back to top](#)]

A Service of University Communications © Copyright 2002-2007 UC Regents

