

Konza Prairie Natural Research Area

Mark Lundgren '03

My summer research took place at Konza Prairie Natural Research Area of the Flint Hills area of northeast Kansas (39°05'N, 96°35'W). Konza is one of the largest unplowed tallgrass prairie sites remaining. The area is largely populated by a variety of forbs and grasses with big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scopastrum*), and Indian grass (*Sorghastrum nutans*) dominating.

The Konza experience was somewhat unique in that I was able to develop and carry out my own research with the help and guidance of my mentor. Woody plant invasion is becoming an increasingly more important issue for various types of agriculture. My research basically looked at nutrient cycling in areas where woody plants have taken hold in the tallgrass prairie. These nutrient cycling characteristics were looked at across burn treatment (1, 4, 20 year burn cycles) and island size (you can get an estimate of how established a clump of Dogwood is based on "island size").

This is a great internship for ecologically minded people from Grinnell. When trying to get this internship, be sure to play up our wonderful CERA. Not many other colleges have their own tallgrass prairie. The researchers are very generous in giving their time and ideas to your project. Konza is a wonderful research facility, and, since this is an REU position, it pays fairly well.

Mentors:

Jana Heisler, John Briggs ([Arizona State University](#))

Wells Center for Pediatric Research, Indiana University School of Medicine

Margaret Hainline '04

This summer I worked in a lab studying the c-Kit receptor in stem cells. c-Kit is a receptor tyrosine kinase that is essential for the proliferation, migration, and survival of stem cells and their differentiation into red blood cells. The absence of c-Kit expression is lethal while mutations in c-Kit expression cause anemia and various types of cancer. I worked in the lab of Dr. Reuben Kapur, which focuses on studying the role of the c-Kit receptor in molecular hematopoiesis (the making of red blood cells).

My project this summer was to map out the Src and PI3-Kinase pathways--two of the biochemical pathways that become activated when the c-Kit receptor becomes activated-- and then to determine the roles these pathways play in hematopoiesis. My results showed that Src plays a major role in cell migration and survival and cooperates with the PI3-Kinase pathway to mediate cell proliferation. Then, the results from western blots of proteins were used to create a scheme of the specific molecules that become activated in the Src and PI3-Kinase biochemical pathways.

The program in which I participated was the Summer Student Internship Program at the Wells Center for Pediatric Research, Indiana University School of Medicine, Indianapolis, IN.

Visit the website of the Wells Center (www.iupui.edu/~wellsctr)

Biological Sciences, University of Missouri - Columbia

Rachel J. Nielsen '04

Faculty Mentor: Dr. Mark D. Kirk, Biological Sciences Funded by National Science Foundation - REU (Life Sciences)

Title: Double labeling for neural markers of neuralized mouse embryonic stem cells and effects of immunosuppression on stem cell integration into the injured murine retina

Abstract: Embryonic stem (ES) cells provide promising opportunities for the treatment of degenerative diseases because these cells have the ability to differentiate into any cell type and they have the potential to divide indefinitely. We are looking at a certain group of neurodegenerative diseases called the neuronal ceroid-lipofuscinoses (NCLs) also known as Batten Disease. In humans, these disorders are characterized by degeneration in the retina and central nervous system (CNS) that leads to blindness, seizures, cognitive decline and premature death. We propose that stem cells can replace the cells lost in the retina and CNS due to the disease process underlying NCLs. Alternatively, stem cells maybe used to deliver therapeutic agents that will prevent neurodegeneration due to the NCLs.

One of the drawbacks of ES cell therapy is the possibility that the host's immune system might attack and kill the transplanted ES cells rendering them useless. We examined if immunosuppression is necessary for neuralized mouse ES cells to integrate and survive in the retinas of mice that exhibit rapid retinal degeneration. Since the mammalian eye is to a great extent immune privileged, we expect to see that there is no need to immunosuppress the subjects for this type of therapy. We chose CBA/J mice, a strain of mice with rapid retinal degeneration, as our model organism. We transplanted neuralized mouse ES cells into the eyes of 5 CBA/J mice. Three of these mice were immunosuppressed with daily oral doses of cyclosporin (10mg/kg), and left 2 CBA/J mice with functioning immune systems and transplants of neuralized ES cells as controls. We determined that mouse ES cells survived and integrated into the eyes of both groups of mice.

We also performed double-labeling experiments to test whether individual neuralized mouse ES cells grown in culture can express more than one type of neural marker. We did not find any stem cells that expressed both astrocyte and neuronal markers.

The website were you can get more information about the research going on at the University of Missouri - Columbia is as follows -- <http://www.lsurop.missouri.edu>.