BEDFORD STEM CELL RESEARCH FOUNDATION

Massachusetts 501(c)(3) not for profit organization
P: 617-281-7902 E: info@bedfordresearch.org W: www.bedfordresearch.org

Bedford Research Stem Cells Glow!

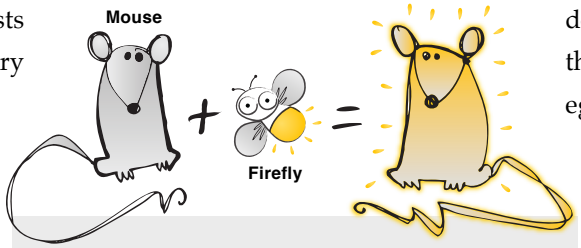
Breakthroughs in understanding circadian rhythms in stem cells.

Fall 2014: Bedford Research scientists are following up on their discovery that stem cells have a circadian rhythm that may need to be supported for optimum development in the laboratory.

In the body, the daily pattern of light and dark controls many signals sent out by the brain, such as those that trigger changes in body temperature, and feelings of hunger and sleepiness.

Stem cells may especially need circadian signals to differentiate into specific cell types, such as neurons or bone marrow — but what type of signal should they receive in the laboratory? And what frequency? There is growing evidence that each type of cell needs a different circadian signal.

To answer this question, Bedford Research scientists have taken advantage of a genetically engineered mouse that has the firefly "glow" gene (Luciferase) attached to one of the circadian rhythm genes (the "Period 2" gene). Tissues in this PerLuc mouse "glow" when Period 2 is active.



The PER2Luc mouse has circadian genes coupled with firefly "Luciferase" genes. When the circadian genes turn "on" they glow, dimly, like a firefly.

Until this fall, Bedford Research scientists have been unable to discover the circadian signal needs of their two new lines of stem cells from the PerLuc mouse because of the lack of a microscope sensitive enough to detect and photograph the glow of a small number of cells.

The good news is that such a microscope has been developed, and this year became available in the U.S. The bad news is that the system costs $160,000 and is not yet available anywhere on the east coast.

Olympus loaned Bedford Research scientists a demonstration LV200 for a couple of weeks this fall during which we discovered that our PerLuc stem cells do, indeed "glow" (Figure 1), and that the "glow" actually begins soon after egg activation, and increases with the transition into stem cells (Figure 2).

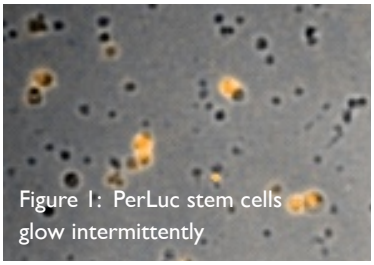


Figure 1: PerLuc stem cells glow intermittently

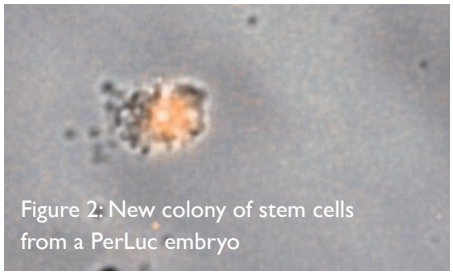


Figure 2: New colony of stem cells from a PerLuc embryo

These exciting new findings provide strong support for the importance of circadian rhythms in stem cell growth and development. One of our goals is to raise funds to purchase the new microscope system as soon as possible in order to discover what circadian signals stimulate differentiation of each cell type.

PROSTATE DISEASE RESEARCH UPDATE
Developing a better screening test for prostate cancer.

BSCRF SCIENCE ADVISORY COMMITTEE GROWS
Dr. Jose Cibelli joins as chair and welcomes four new members.

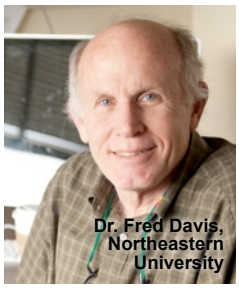
DONATE TO THE FOUNDATION
Your private donations make our important work possible.

Bedford's Science Advisory Committee Grows

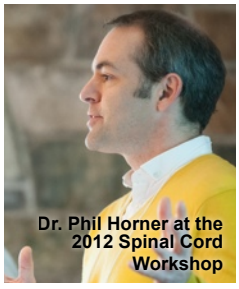
Dr. Jose Cibelli joins as chair and welcomes four new members.

In January of 2014, Bedford Trustee, Dr. Jose Cibelli, head of the Cellular Reprogramming Lab at Michigan State University, joined Bedford's Science Advisory Committee as its Chair. This summer, the Committee welcomed new members: Dr. Fred Davis, Professor of Biology (specializing in Circadian Rhythms) at Northeastern, Dr. David DiGiusto, Director of the Lab for Cellular Medicine at City of Hope Cancer Center, Dr. Phil Horner, Professor of Neurological Surgery at the Institute for Stem Cell & Regenerative Medicine at University of Washington, and Dr. Steve Sheridan, Senior Researcher at Harvard Medical School Center for Genetic Research. We're thrilled to have these prestigious committee members join founding member Dr. Carol Warner.


Dr. Jose Cibelli at the 2013 Activated Egg Symposium


Dr. Fred Davis, Northeastern University


Dr. David DiGiusto at the 2013 Activated Egg Symposium


Dr. Phil Horner at the 2012 Spinal Cord Workshop


Dr. Steve Sheridan, Harvard Medical School

Progress in Stem Cell Engineering

There is strong evidence that "off-the-shelf" stem cell therapies, i.e. one that can be delivered to any patient, will be possible in the future. In order to create such therapies, we will need stem cells that have been engineered for specific regenerative medicine treatments, such as bone marrow stem cells that are resistant to HIV.

Using "activated" mouse eggs (called "parthenotes") as a model system, Bedford Research scientists have made substantial progress adapting new technologies to "knock-out" the receptor for HIV. The same technology is being applied to new cell lines for studies of nerve development.

We're Moving!

After 16 years at Davis Square in Somerville, MA, we are moving to a larger space in Bedford, MA. The need to develop an FDA-approved laboratory module for "bench to bedside" stem cell research, plus a unique "lease to purchase" opportunity prompted the move. We have two years to raise $800,000 to purchase the building. We are seeking support from state life science research funds as well as philanthropists.

We have one pledge of $75,000. To find out more about endowing the laboratory please email ryan@bedfordresearch.org so we can take advantage of the lease opportunity and the savings in overhead that can be diverted to the research.

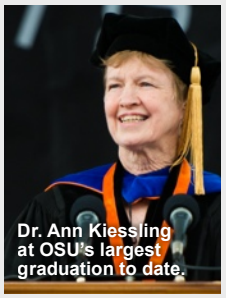
Prostate Disease Research Update


Dr. Robert Eyre

Patient recruitment into the prostate cancer screening project is ongoing. The goal of the project is to develop semen screening tests that will help diagnose and stage prostate cancer as well as reflect overall male health. A group of urologists in Texas have recently joined the research project and will help recruit patients for the next phase of the work.

OSU Commencement

In June, Dr. Kiessling was honored to give the commencement address at Oregon State University. Over 25,000 people filled Reser Stadium where Dr. Kiessling highlighted the importance for graduates in all fields to stay involved with government throughout their lives to help our democracy, and to help shape the course of science and society. Dr. Kiessling was presented with an Honorary Doctorate, and even took on the rival ducks! *(See the video on our site!)*


Dr. Ann Kiessling at OSU's largest graduation to date.

Lifetime Achievement

In March, Dr. Kiessling received a Lifetime Achievement Award at the 2014 HIV Congress held in Mumbia, India. This award recognizes her work on understanding HIV infection, establishment of the SPAR program, and her current work with HIV Stem Cell Therapies.


Dr. Kiessling with Dr. Anil Purohit

A Track Record Of Translating Basic Research To Patient Care

In 1996, the Bedford Research Foundation was formed in response to a need for specialized tests and services that were not available anywhere in the world. Today, we still provide these specialized tests and it has led us to a new model of funding:

"The Foundation is a forward thinking institution that covers overhead costs by fee-for-service testing, thus allowing philanthropic donations to go directly to research."

- Alan Geismer, Chairman, Board of Trustees

Our work to derive a human stem cell line that is resistant to HIV infection (Engineered to "knock-out" the HIV receptor. See the video on our site!) cannot be federally funded because of an amendment restricting the budget of the National Institutes of Health. This research is, therefore, entirely dependent upon philanthropy.

In addition to basic science, our team is also focused on moving stem cell research from "bench to bedside." Capital is needed to equip an FDA-approved laboratory module in our new location. Please consider donating today, every gift makes a difference.

The Research Team

Donate Today

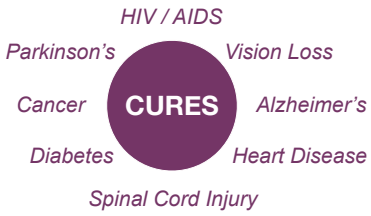
"Bedford's stem cell work this year has moved the field closer to the realization of a curative therapy for HIV."

- Dr. David DiGiusto

Director of the Laboratory for Cellular Medicine at City of Hope & Bedford Research Science Advisory Committee Member Since 2013

Each Experiment Brings Us Closer

The average foundation laboratory experiment costs $90,000. Because most of our overhead is covered by fee-for-service laboratory tests, every dollar you donate goes directly toward these experiments. This innovative funding model allows Bedford Research scientists greater flexibility to move the work quickly in promising new directions. **Progress requires meeting our annual funding goals.** ***Please become a supporter and help us do more experiments this year.***



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RESEARCH FOUNDATION
PO Box 1028
Bedford, MA 01730

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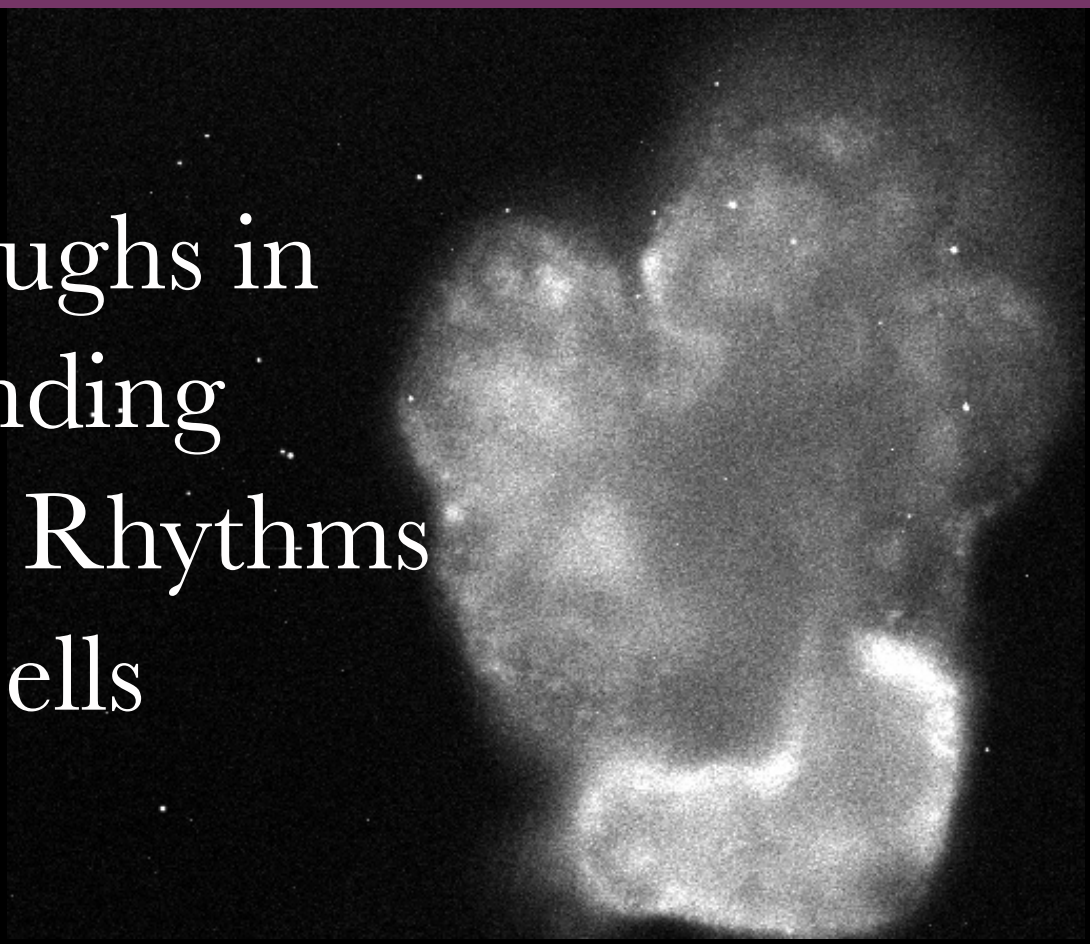
Breakthroughs in Understanding Circadian Rhythms in Stem Cells



FOUNDED IN 1996, BEDFORD STEM CELL RESEARCH FOUNDATION IS A BIOMEDICAL INSTITUTE THAT EXISTS TO CONDUCT STEM CELL AND RELATED RESEARCH FOR DISEASES AND CONDITIONS THAT CURRENTLY HAVE NO EFFECTIVE METHODS OF TREATMENT OR CURE.