

## **OUR MISSION**

Bedford Research Foundation is a Massachusetts 501(c)(3) public charity and biomedical institute conducting stem cell and related research for diseases and conditions that are currently considered incurable.

## **WHAT WE DO**

BRF conducts research in three principal areas: stem cells, prostate disease and HIV/AIDS.

### **Stem Cells**

Advances in stem cell biology have put within reach the possibility of cures for conditions such as Parkinson's disease, spinal cord injury, heart disease and diabetes. What is needed is a reliable source of stem cells with the broad range of developmental potential ("pluripotent") necessary for each cell type. Although controversial, the use of human eggs may be the most efficient way to generate pluripotent stem cells. Using mouse as a model system, BRF scientists are vigorously pursuing the possibility of generating pluripotent stem cells from unfertilized eggs, encouraged by the work of BRF Trustee Dr. Jose Cibelli who has successfully derived parthenotes from monkey eggs.

Background studies of early human embryos, conducted by BRF scientists in collaboration with medical researchers at the University of Athens, Greece, revealed a potentially important role for circadian rhythms in early embryos and stem cells. Studies are ongoing to discover what circadian genes are important to cell development, and to design culture conditions to support stem cell circadian rhythms.

In parallel, BRF scientists are taking advantage of a new technology, reported in 2013, to improve the efficiency of modifying stem cells for specific treatments, such as resistance to HIV infection, and development into essential cell types, such as nerves and immune cells.

### **Prostate Disease**

Current research is expanding diagnostic capabilities of semen specimens to identify cancer and infections of the prostate. BRF scientists have developed the first comprehensive library of bacteria types detectable in semen specimens by state-of-the-art molecular biology techniques. This work is funded primarily through *The Robert C. Eyre Research Fund*. Dr. Eyre, one of the BRF's medical researchers, is a leading urologic surgeon studying the etiology, diagnosis and treatment of diseases of the genitourinary tract, including infections and cancers of the prostate, kidney and bladder.

### **HIV/AIDS**

In 1996, BRF began a *Special Program of Assisted Reproduction* (SPAR) to help men infected with HIV father children without transmitting the virus to mothers or babies. The program required BRF sponsorship because of federal statutes prohibiting funding from the National Institutes of Health (NIH) for research involving fertilized human eggs. The work was possible because BRF scientists have been studying HIV transmission since the beginning of the AIDS pandemic in the early 1980's. As of April 2015, 230 HIV-free babies have been born through SPAR.

Current work is focussed on developing stem cells resistant to HIV infection. Since HIV infects blood cells through specific receptors on the surface of the cell, if that receptor were missing, the cell would not become infected. It has been known since the beginning of the AIDS pandemic that it would be possible to cure HIV infection by transplantation of bone marrow cells resistant to HIV, but it was not until 2009 that proof of this principle was obtained when an AIDS patient with cancer underwent a bone marrow transplant to cure his cancer with bone marrow cells that were naturally resistant to HIV

because they were missing the HIV receptor (“CCR5”). Approximately 1.5% of humans are missing CCR5 on the surface of their cells.

To take advantage of this possible treatment/cure for HIV, BRF scientists are studying ways to efficiently “knock-out” the gene in stem cells. The most direct approach is to knock out the gene in the eggs before they develop into stem cells, because each succeeding cell will be genetically identical to the egg. Studies are ongoing.

## **WHO WE ARE**

Ann A. Kiessling, PhD, Director of BRF, is an expert in HIV/AIDS and stem cell biology. Dr. Kiessling has published more than 100 scientific papers and is the author of *Human Embryonic Stem Cells*, the first textbook on the subject. Prior to devoting herself full time to the Foundation, she directed a lab at Harvard Medical School for over 25 years.

BRF is guided by its Board of Trustees, made up of medical, legal and other experienced professionals, including Professor Jose Cibelli of Michigan State University, a pioneer in stem cell research, and Chairman Alan S. Geismer, Esq., of the law firm Sugarman, Rogers, Barshak & Cohen. The BRF Ethics Advisory Board chaired is by Arthur Applbaum, Professor of Ethics and Public Policy at Harvard’s Kennedy School of Government. Carol M. Warner, Matthews Distinguished Professor of Biology at Northeastern University, is chair of the BRF Science Committee.

## **BRIEF HISTORY**

BRF began its work in 1996. Its initial project, the *Special Program of Assisted Reproduction (SPAR)*, was created to facilitate healthy conception for couples with a male partner infected with HIV. The first SPAR baby was born healthy and infection-free in 1998. With the help of over 200 collaborating clinics nationwide, more than 230 healthy babies have been born through SPAR.

In addition to breakthroughs in HIV, BRF’s SPAR research led to the creation of innovative methods of testing for diseases of the male genital tract, including the prostate. Success and expertise in fertility research and treatment lead to BRF scientists implementing the first human egg donor program for stem cell research in September 2000.

## **WHY WE DO IT**

BRF exists to pursue research with the most curative potential for diseases affecting millions of people today. A 200-fold growth since its inception testifies to the excitement and importance of program goals. Through continued education and intense research efforts, BRF will change the pace of progress for diseases that currently have no cure.

A moratorium on federal funding for crucial areas of biomedical research means public charities like BRF are the only means of bridging the gap between what the government supports and what people need. Now more than ever, BRF’s innovative, cost-effective research efforts are essential to the development of life-saving procedures and cures.

## **HOW WE DO IT**

Bedford Research Foundation is a nonprofit, 501(c)(3) Massachusetts public charity. BRF has far lower operating costs than larger institutions, meaning more research results from every donation received. BRF relies on the insightful generosity of corporations, organizations and individuals to continue its vital work.

## **HOW YOU CAN HELP**

Support BRF by joining a network of hundreds of donors helping to shape the future of science and medicine. Financial contributions can be designated for specific programs such as stem cell or prostate research, or can go toward general research and operating costs. Donations can be given in honor or in memory of a friend, colleague or family member. Volunteers, in-kind and other support are always welcome. If you would like to help, please visit [www.bedfordresearch.org](http://www.bedfordresearch.org).