BEDFORD
RESEARCH FOUNDATION

Massachusetts 501(c)(3) not for profit organization
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Stem Cells For *Every*Body

Twenty-Two Years of Progress

Bedford Research Foundation is TWENTY TWO

Founded in 1996 to conduct research that cannot be funded by the National Institutes of Health, Bedford Research scientists have achieved ground-breaking milestones, including:

- **1998** Special Program of Assisted Reproduction (SPAR) designed to protect wives of HIV-infected men from infection during conception
- **2000** World's first program of egg donation for stem cell research
- **2001** Report on artificially activated human eggs (parthenotes)
- **2002** First Activated Egg Symposium
- **2003** Textbook "Human Embryonic Stem Cells"
- **2006** Research program with University of Athens to understand parthenogenesis; study ongoing
- **2008** First detection of prostate cancer genes in semen specimens for screening test; study ongoing

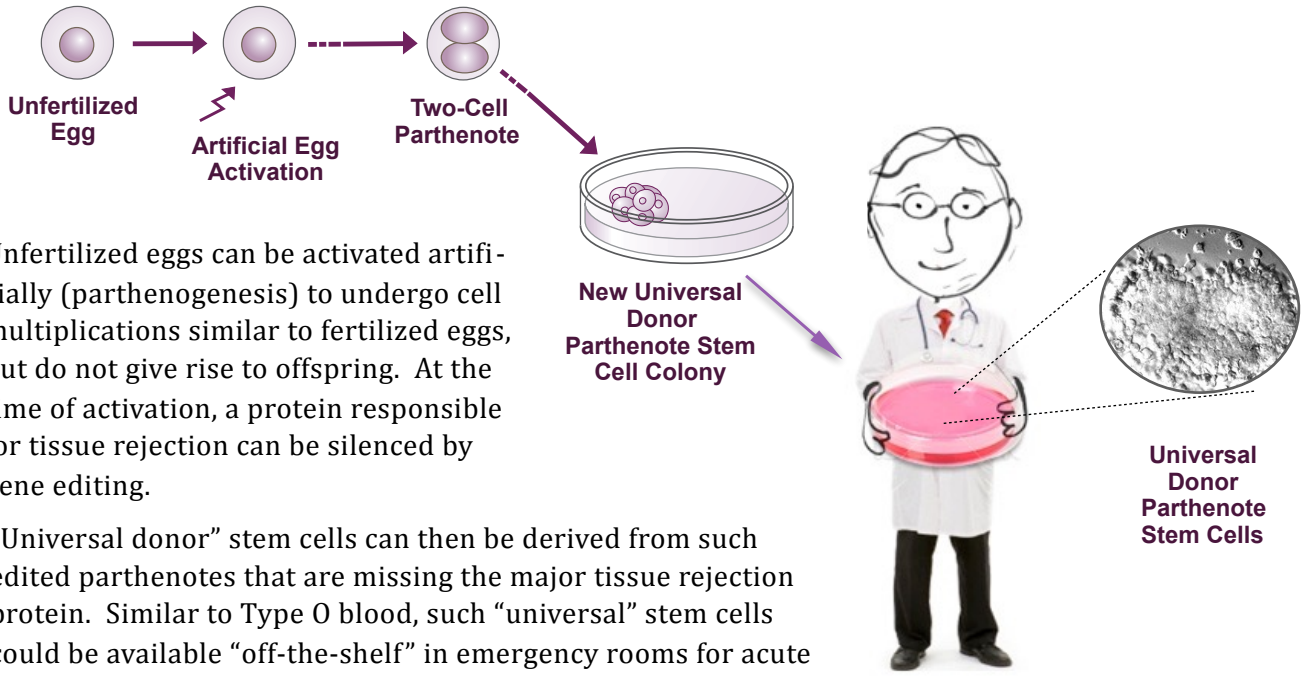
Open House Ribbon Cutting for New Lab Space
(L to R: Senator Mike Barrett, Professor Fred Davis, Trustee Margaret Wray, Director Ann Kiessling, Representative Ken Gordon

- **2009** Discovery that circadian rhythms may be important to stem cells; study ongoing (see Science Highlights, October 2017)
- **2009** First Spinal Cord Workshop "What are the Barriers to Cure?"
- **2010** First description of genes important to deriving stem cells from unfertilized human eggs
- **2010** First International Meeting on Spinal Cord and Neurodegenerative Diseases in Taiwan
- **2012** First circadian microscope system to observe activated mouse egg development for 5 days.
- **2014** First observations of active circadian rhythm genes in early mouse embryos; study ongoing (Science Highlights, October 2017)
- **2015** Number of SPAR babies hits 300, all babies and mothers have tested negative for HIV
- **2017** Discovery of method in a mouse model system to markedly increase the efficiency of deriving "universal" stem cells resistant to rejection when transplanted.
- **2017** Development of mouse "universal" stem cells that are also resistant to HIV infection..
- **2018** Development of ethical guidelines for women to donate frozen eggs for stem cell research

Important note: This work cannot be federally funded because of the Dickey-Wicker Amendment to the budget of the National Institutes of Health, put in place in 1996 and renewed annually. BRF scientists need private donations for research to develop "universal" stem cells for *Every*body.

Donate to the Foundation **Your donations could help everyone you know**

Stem Cells for *Every*Body



Unfertilized eggs can be activated artificially (parthenogenesis) to undergo cell multiplications similar to fertilized eggs, but do not give rise to offspring. At the time of activation, a protein responsible for tissue rejection can be silenced by gene editing.

"Universal donor" stem cells can then be derived from such edited parthenotes that are missing the major tissue rejection protein. Similar to Type O blood, such "universal" stem cells could be available "off-the-shelf" in emergency rooms for acute injuries, such as heart attack, stroke and spinal cord injury. This would be a major step forward in stem cell therapies for acute, as well as chronic conditions.

Research Program a Success in Mouse Stem Cells

Dr. Joel Lawitts microinjects CRISPR/Cas "gene editing" enzymes into mouse eggs to neutralize two genes at once: (1) the gene that leads to tissue rejection, and (2) the gene that allows HIV infection of cells. These are the first steps in generating off-the-shelf stem cells for *every*body that are also resistant to HIV infection.

"Dr. Kiessling and her staff have shown their determination to tackle some of the most difficult health problems of our time."

- Representative Ken Gordon

From the Director

The derivation of gene edited, universal human stem cells from unfertilized eggs will be controversial, perhaps more so now following the reports from China of "Gene editing" of human embryos (see Science Highlights).

Fortunately, we have meritorious individuals serving as our Ethics Advisory Board, our Human Subjects Committee and our Stem Cell Research Oversight Committee. Their guidance has helped us forge ahead into areas of stem cell development that larger institutions have shied away from because the work cannot be funded by our federal government. The "Dickey-Wicker Amendment" to the budget of the National Institutes of Health has been renewed annually and prohibits funds to be used for studies of unfertilized human eggs. We have for years believed unfertilized eggs ("parthenotes") will be a broadly applicable source of "universal" human stem cells for ***every*** body. Since human egg research MUST be privately funded, research progress depends entirely on private donations.

With over 30 years of research experience in human egg biology and stem cell derivation, BRF scientists are uniquely qualified to push this exciting field forward, and we need everyone's support!

Our goals for 2019 include using the research findings we have made in unfertilized mouse eggs in 2016 and 2017 toward similar studies with unfertilized human eggs. The single copy of each chromosome in unfertilized eggs can be gene edited to eliminate the major protein on the surface of cells that causes tissues to be rejected following transplantation. Such "universal donor" stem cells can then be used to treat acute conditions, such as heart attack, spinal cord injury, and stroke, as well as chronic conditions, such as Parkinson's Disease, diabetes, Lou Gehrig's disease, Alzheimer's Disease, Hutington's Disease. We won't know the full therapeutic potential of human parthenote stem cells until the cells are actually derived. We need everyone's help to accomplish this goal!

Sincerely,

Ann A Kiessling, PhD
Director, Bedford Research Foundation

Donate Today

"Bedford Research scientists are developing stem cells from eggs, not from embryos, thus bypassing many of the ethical dilemmas associated with stem cell research."

-Sen. Michael J. Barrett
State Senator, Bedford, MA.

Philanthropy Is The Key To Continued Progress

The average cost of each experiment is $90,000. Because much of our overhead is covered by fee-for-service laboratory tests, ***92% of every dollar donated*** goes directly toward these experiments. This innovative funding model allows Bedford Research scientists greater flexibility to move quickly in promising new research directions.

Continued Progress requires meeting our annual funding goal of $450,000 in 2019.