

# Update on Stem Cells: Parthenotes

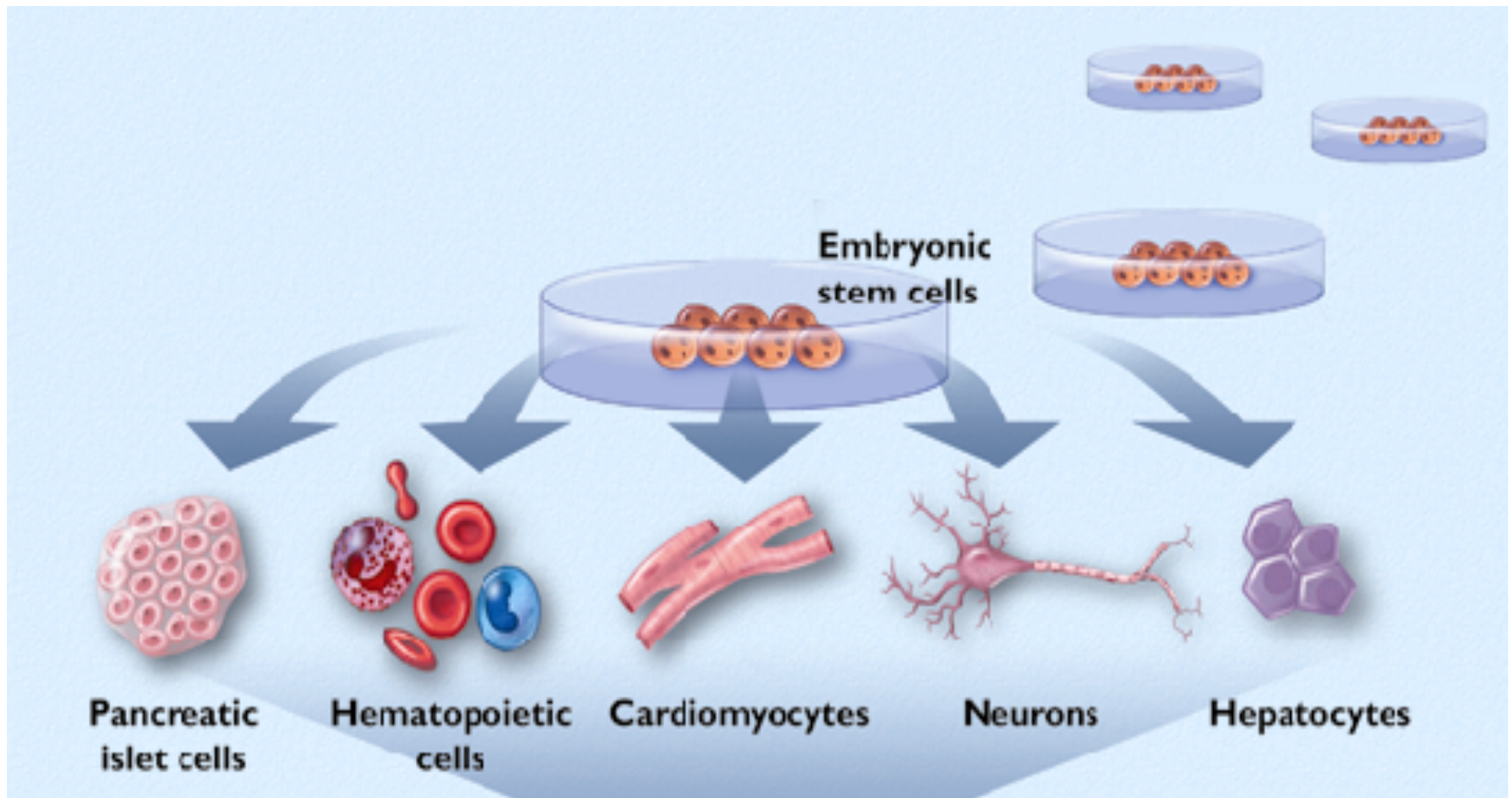
American Nuclear Society  
New England Chapter  
June 6, 2017

Ann A. Kiessling, PhD  
Bedford Research Foundation

December, 1999



# Mouse embryonic stem cells isolated in early 1980's

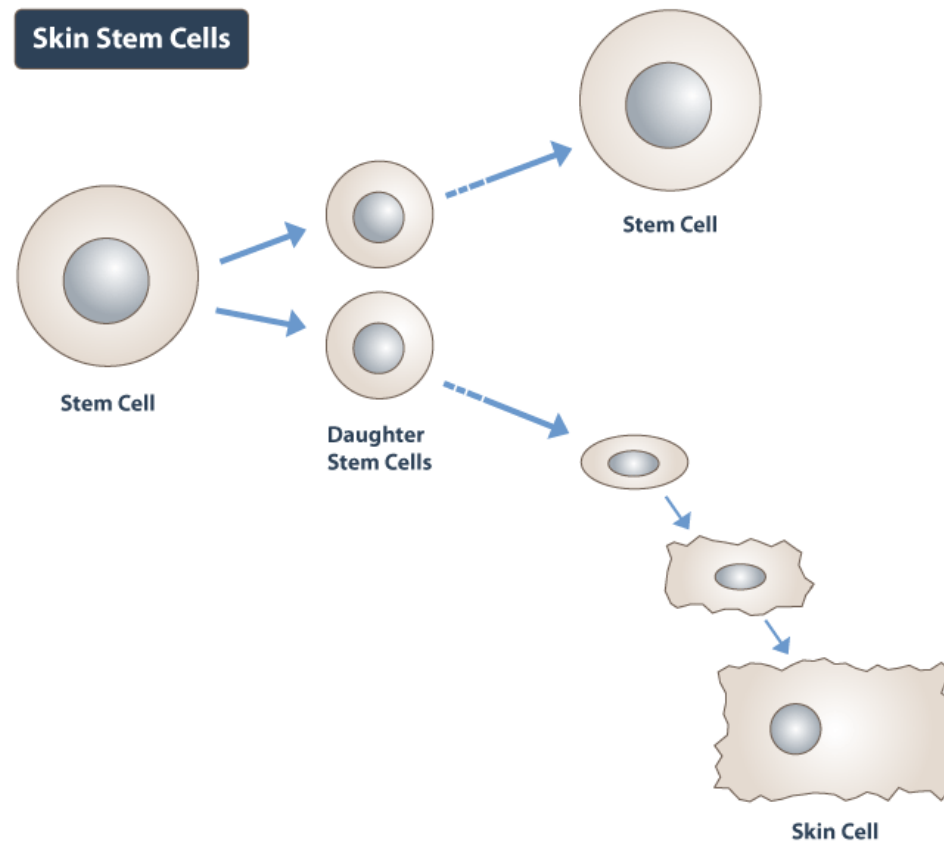


# What is a stem cell?

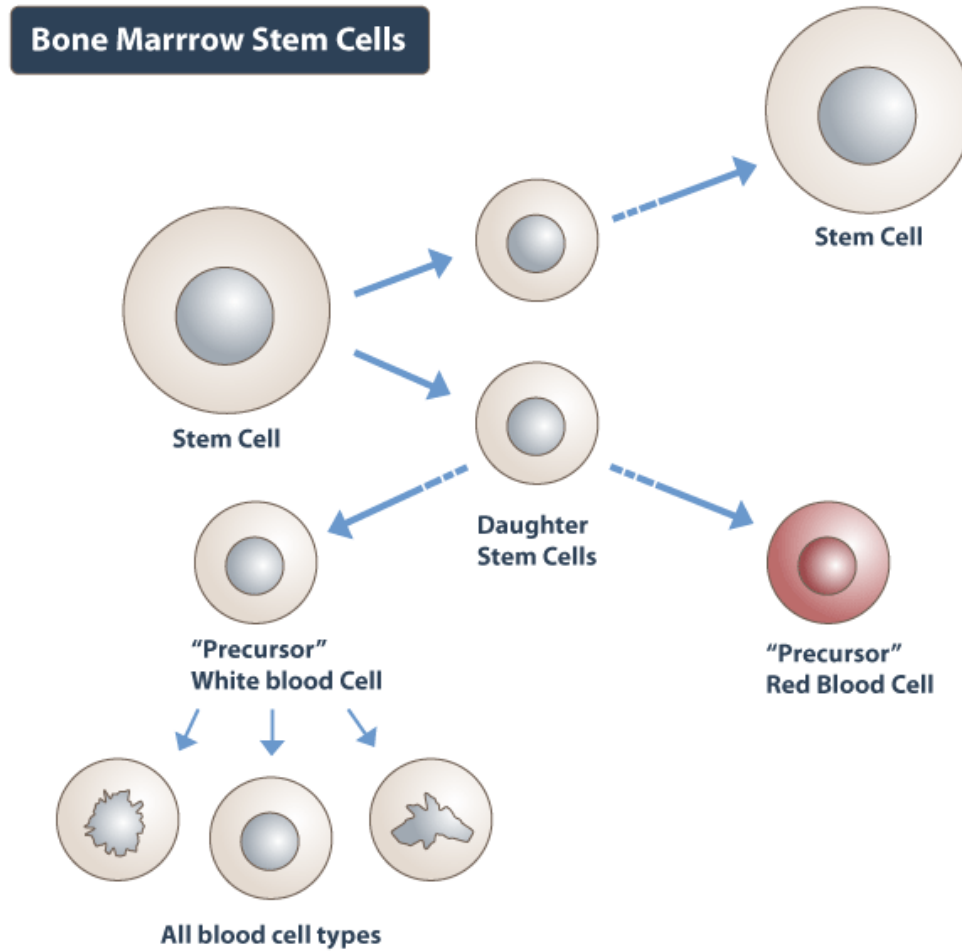
A reserve cell that can divide multiple times, giving rise to one new stem cell, and one new committed cell that will differentiate into a specific tissue



# Skin stem cell



# Bone marrow stem cell



# Sources of human stem cells:

- adult tissues
- fetal tissues
- blastocysts

# Pluripotent Stem Cells

?

parthenotes?

Testis?

?

bone marrow?

cord blood?

Induced?

embryonic?

?

fat cells?

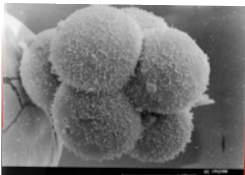
?



?



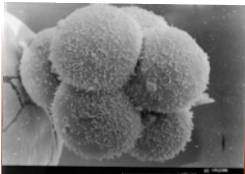
# CHALLENGE: Generation of stem cells HLA-matched to all people



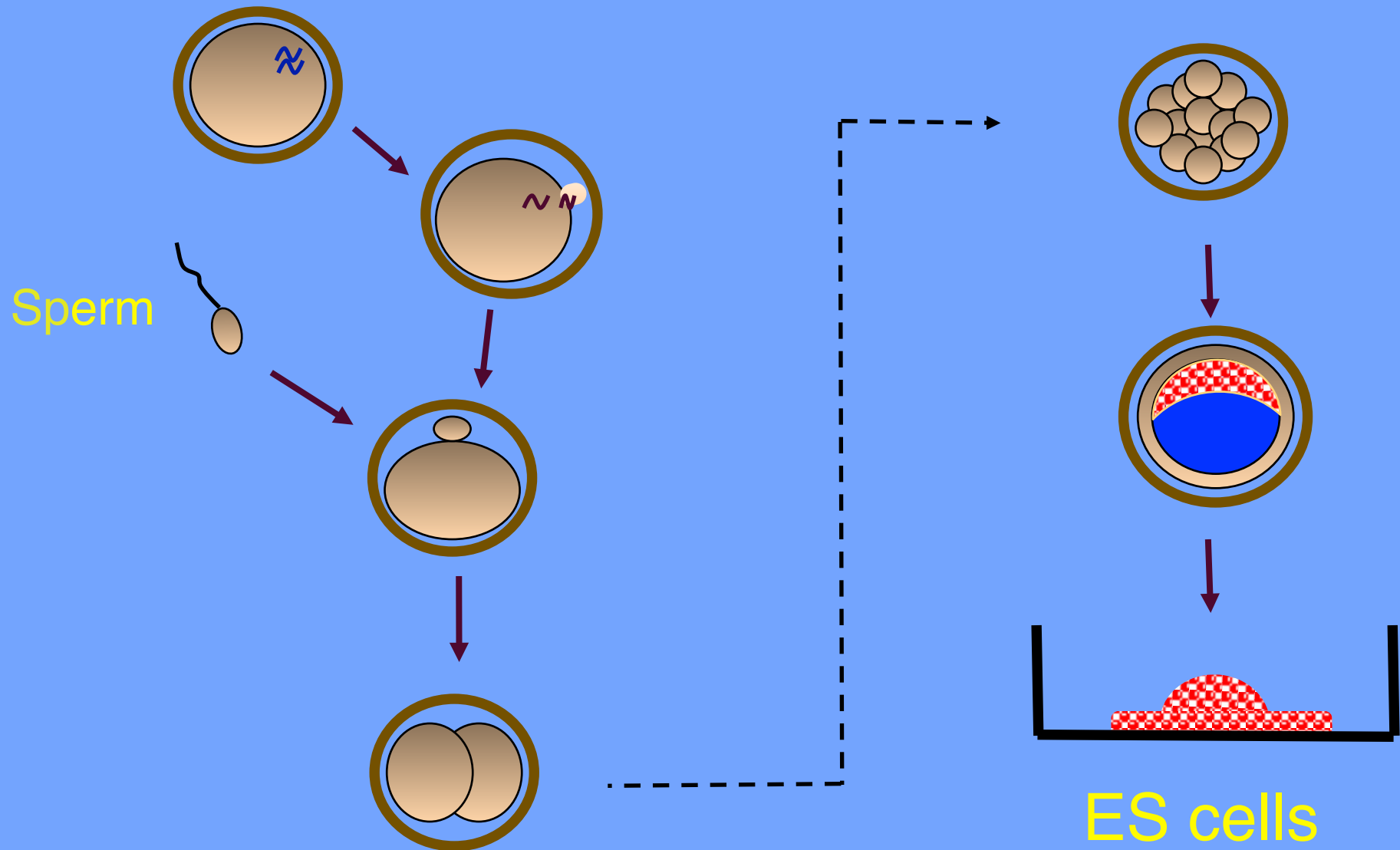


# Stem Cells:

- Embryonic stem cells programmed to divide relentlessly
- Adult stem cells programmed NOT to divide until called upon
- Cord blood and bone marrow stem cells are “adult” stem cells -- have limited growth potential



# Embryo Blastocyst Stem Cells



# Cleaving blastomeres (mouse):



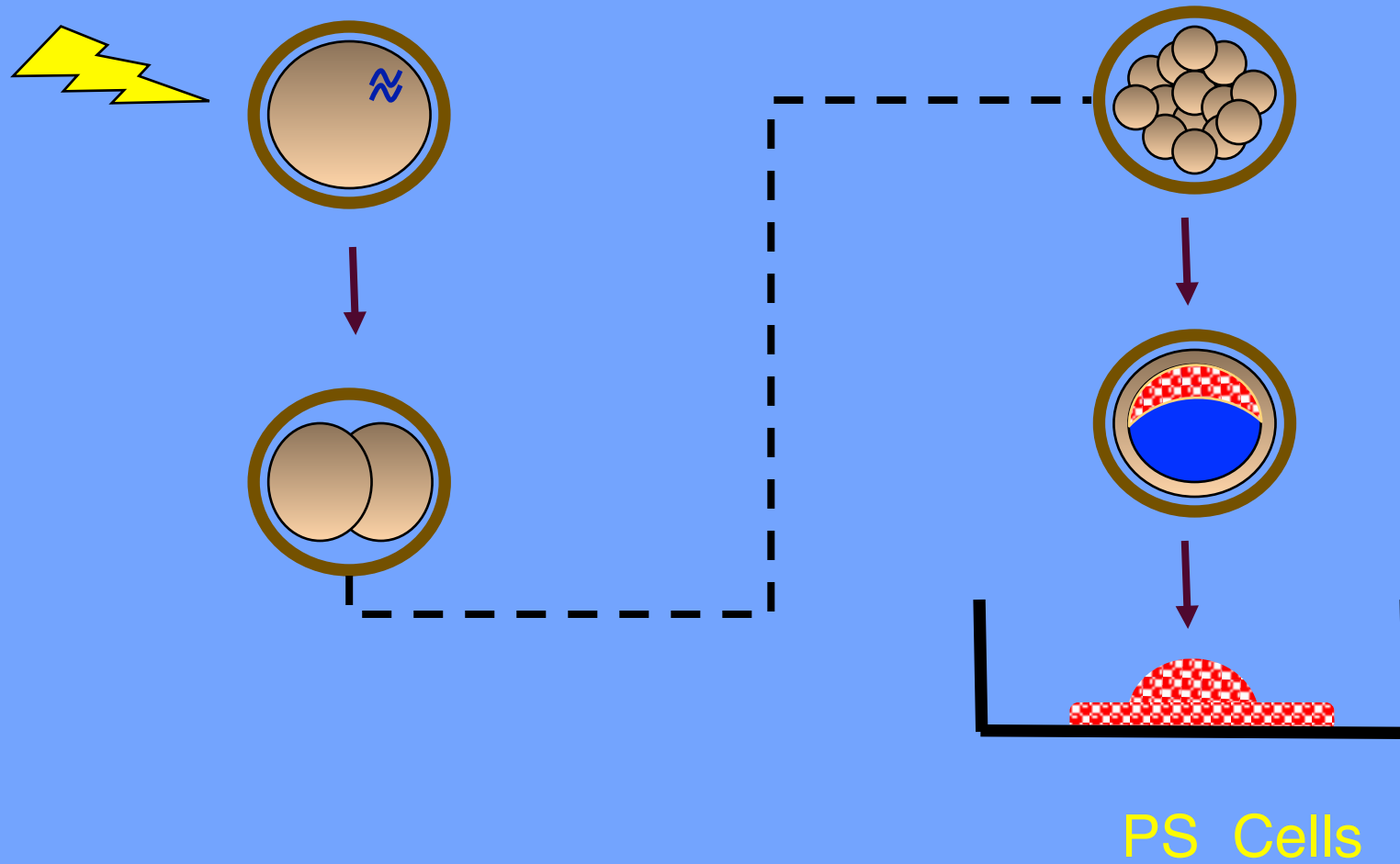
*(One minute  
equals  
seven hours)*

*Research sponsored by Bedford Research Foundation  
[www.bedfordresearch.org](http://www.bedfordresearch.org)*

Wong et al, Nature Biotechnology, 2010:

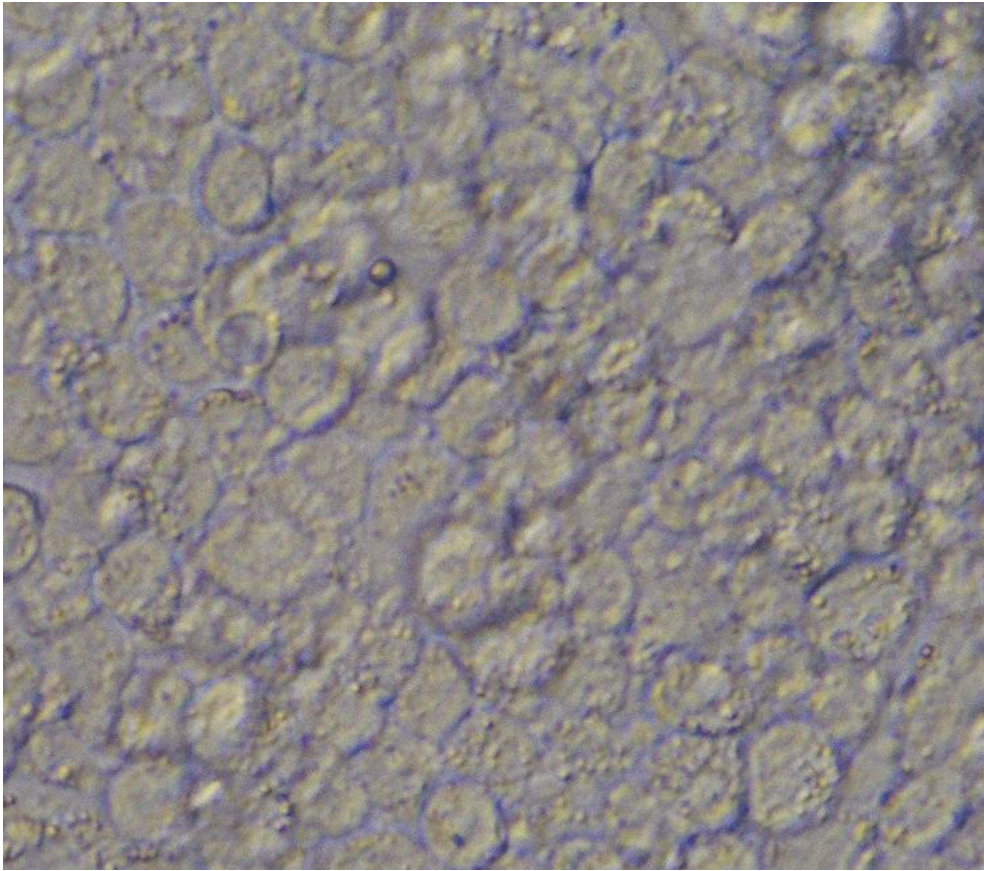


# Parthenogenesis

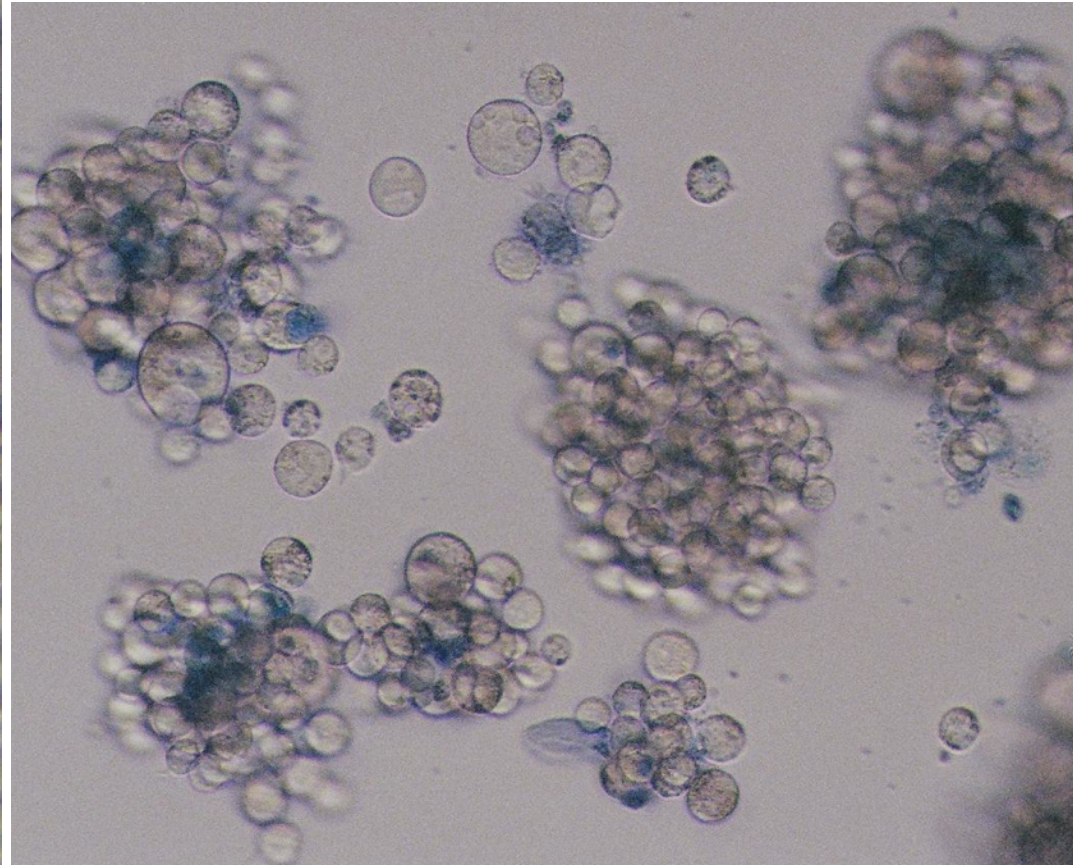




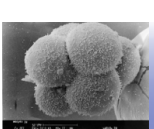
# Mouse parthenote stem cells



gelatin coated plate

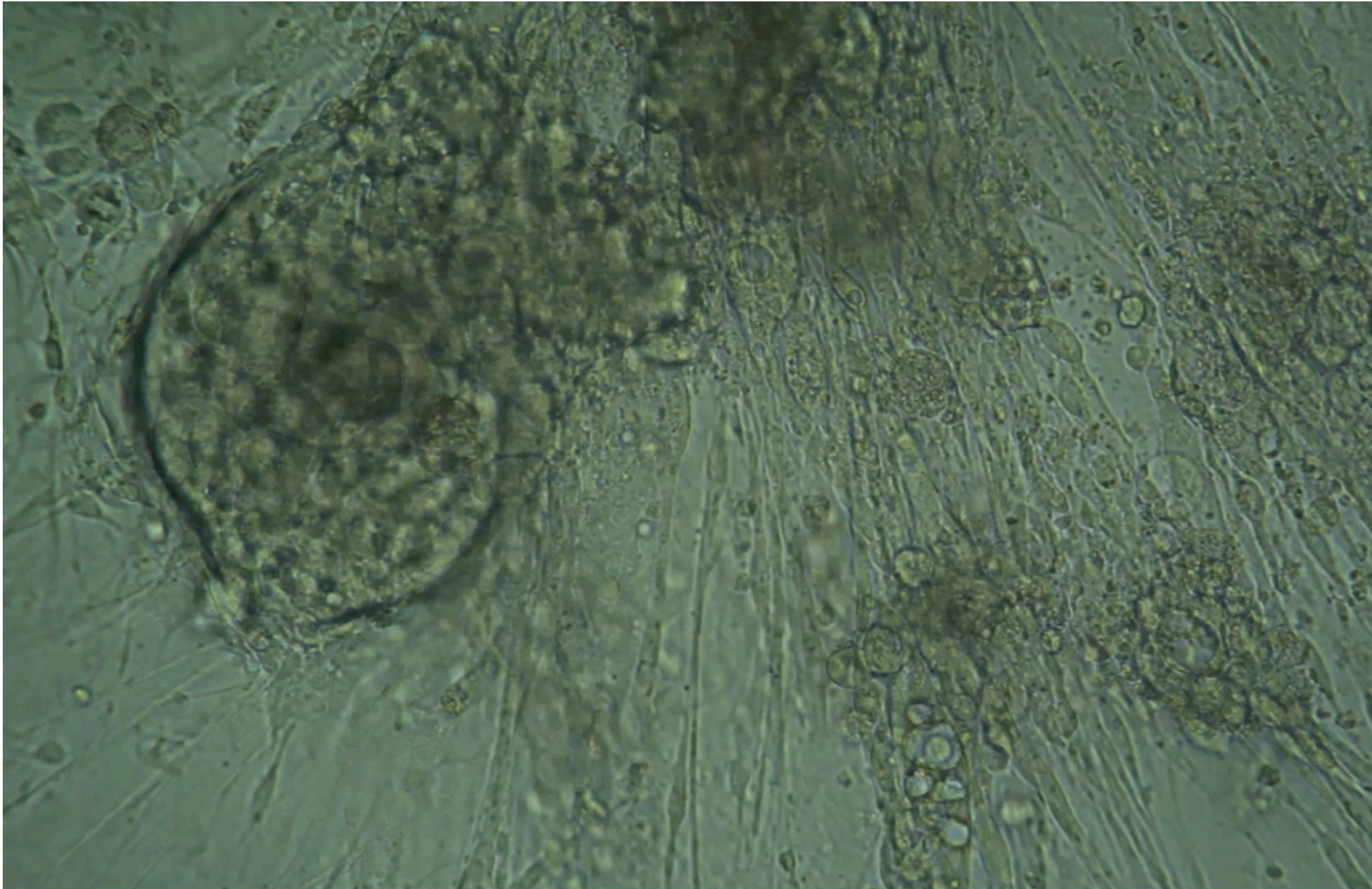


suspension culture





# Mouse ES cells to cardiomyocytes:



# New guidelines (Obama):

- No federal funds for derivation of hES lines from embryos
- Okay to use federal funds for studies on hES lines if consent forms for embryo donation meet specific guidelines
- No federal funds for derivation or studies of parthenote stem cell lines

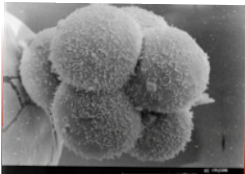
# First primate parthenote stem cell line was from Macaques:

DEVELOPMENT

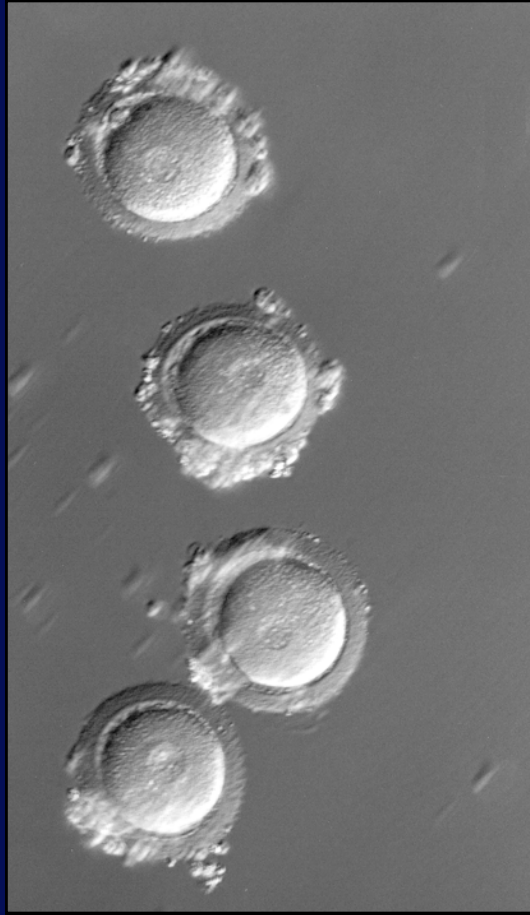
SCIENCE VOL 295 1 FEBRUARY 2002

## Parthenogenetic Stem Cells in Nonhuman Primates

Jose B. Cibelli,<sup>1</sup> Kathleen A. Grant,<sup>2\*</sup> Karen B. Chapman,<sup>1</sup>  
Kerriane Cunniff,<sup>1</sup> Travis Worst,<sup>2</sup> Heather L. Green,<sup>2</sup>  
Stephen J. Walker,<sup>2</sup> Philip H. Gutin,<sup>3</sup> Lucy Vilner,<sup>1</sup>  
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Michael D. West<sup>1\*</sup>



# Parthenogenesis by *Macaca fascicularis* eggs:



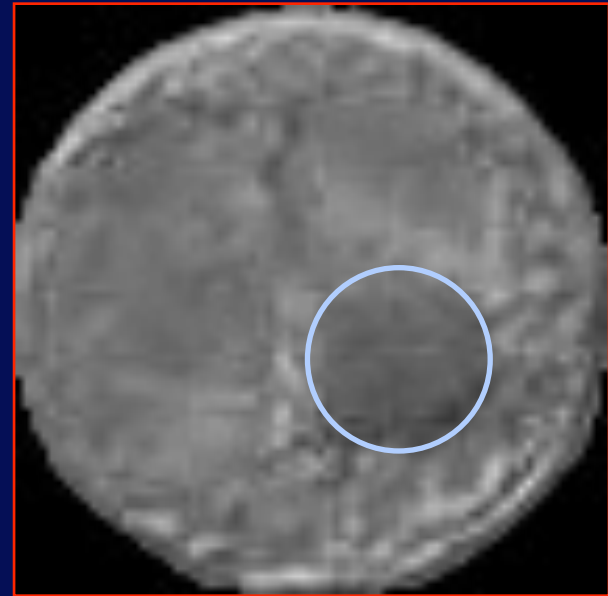
Cibelli, et al., Science, 2001



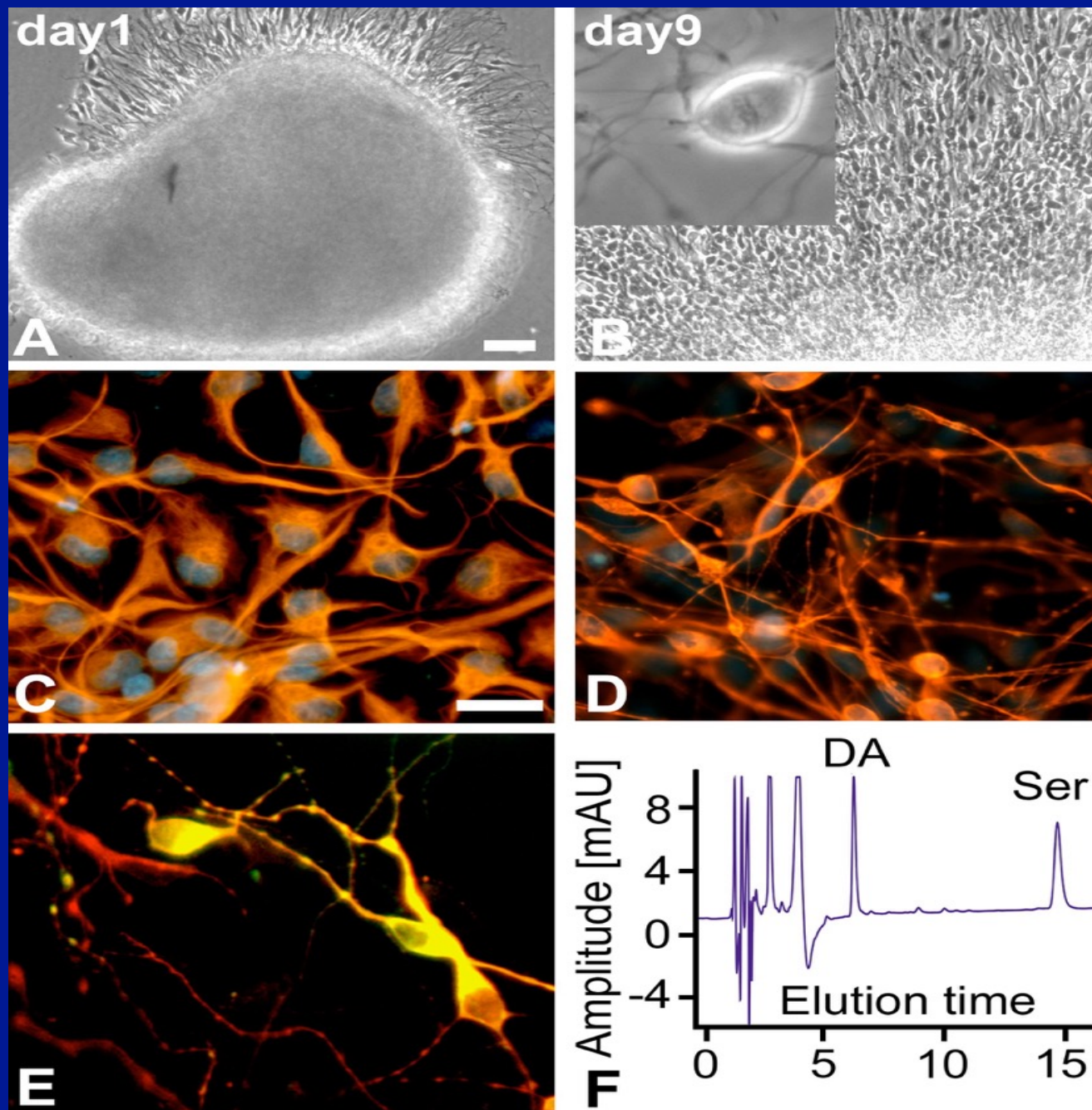
# Parthenogenesis by *Macaca fascicularis* eggs:



Egg Donor

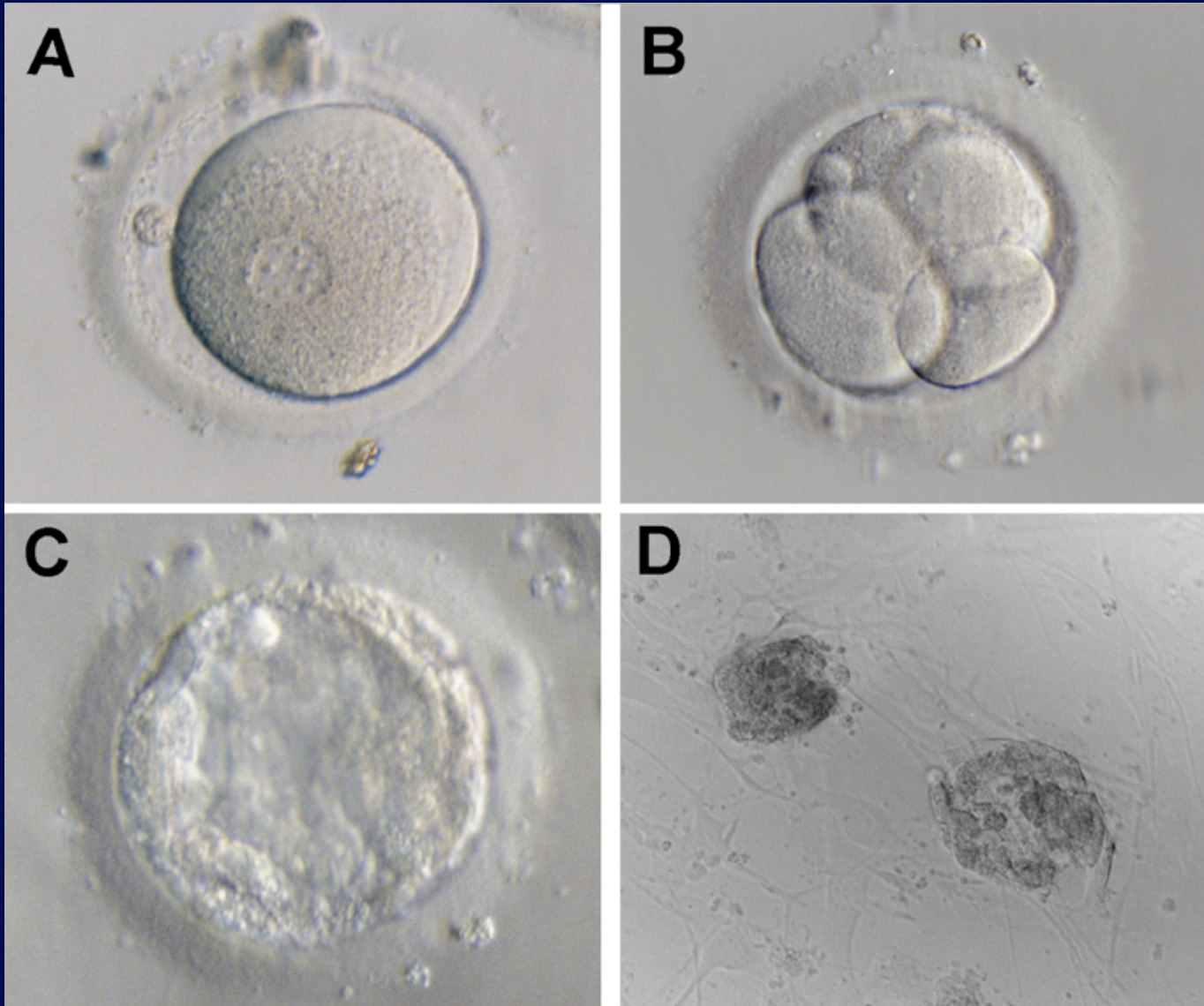


Cibelli, et al., Science, 2001

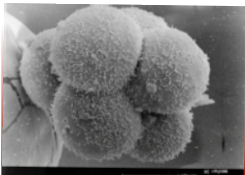




# Parthenogenesis by frozen human eggs:



# CHALLENGE: Generation of stem cells for EVERYbody



ClinicalTrials.gov is getting an update. Our new design arrives on June 19th. [Learn more.](#)

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## ClinicalTrials.gov

**IMPORTANT:** Listing of a study on this site does not reflect endorsement by the National Institutes of Health. Talk with a trusted healthcare professional before volunteering for a study. [Read more...](#)

6113 studies found for: stem cells

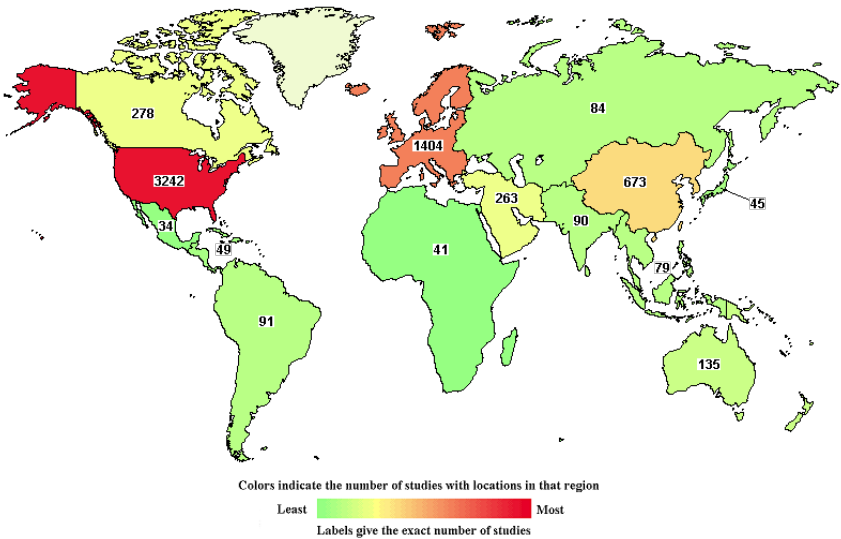
[Modify this search](#) | [How to Use Search Results](#)

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6113 studies found, shown on map.

[A similar map is available for all studies in ClinicalTrials.gov](#)

Click on the map below to show a more detailed map (when available) or search for studies (when map not available).



Source:<https://ClinicalTrials.gov>

Region Name	Number of Studies
World	6113
Africa <a href="#">[map]</a>	41
Central America <a href="#">[map]</a>	49
East Asia <a href="#">[map]</a>	673
Japan	45 <a href="#">[studies]</a>
Europe <a href="#">[map]</a>	1404
Middle East <a href="#">[map]</a>	263
North America	3376
Canada <a href="#">[map]</a>	278 <a href="#">[studies]</a>

**Hints:**

Click on a [\[map\]](#) link to show a map of that region.

Click on a [\[studies\]](#) link to search within your current results for studies in that region. Use the back button to return to this list and try another region.

Studies with no locations are not included in the counts or on the map.

Studies with multiple locations are included in each region containing locations.



ClinicalTrials.gov is getting an update. Our new design arrives on June 19th. [Learn more.](#)

Preview our new design at [ClinicalTrials.gov/beta/](#)

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51 studies found for: embryonic stem cells

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List

By Topic

On Map

Search Details

51 studies found, shown on map.

[A similar map is available for all studies in ClinicalTrials.gov](#)

Click on the map below to show a more detailed map (when available) or search for studies (when map not available).

Colors indicate the number of studies with locations in that region

LeastMost

Labels give the exact number of studies

Source:<https://ClinicalTrials.gov>

Region Name	Number of Studies
World	51
Africa <a href="#">[map]</a>	2
East Asia <a href="#">[map]</a>	11
Europe <a href="#">[map]</a>	11
Middle East <a href="#">[map]</a>	6
North America	14
United States <a href="#">[map]</a>	14 <a href="#">[studies]</a>
North Asia <a href="#">[map]</a>	1

Hints:

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Studies with no locations are not included in the counts or on the map.

Studies with multiple locations are included in each region containing locations.

# Bedford Research Foundation:

- Moved to new facilities in 2015:



# Bedford Stem Cell Research Foundation

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