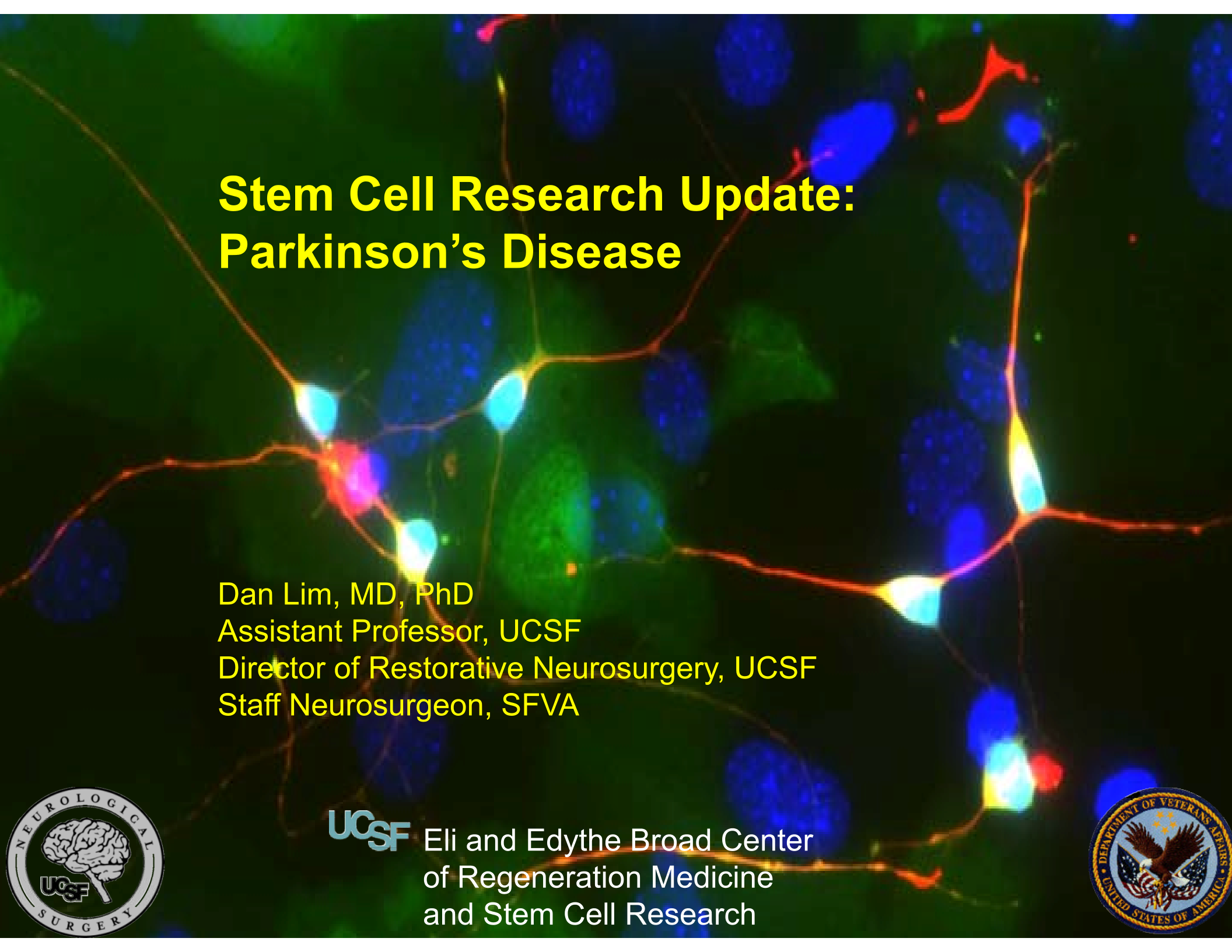

Stem Cell Research Update: Parkinson's Disease

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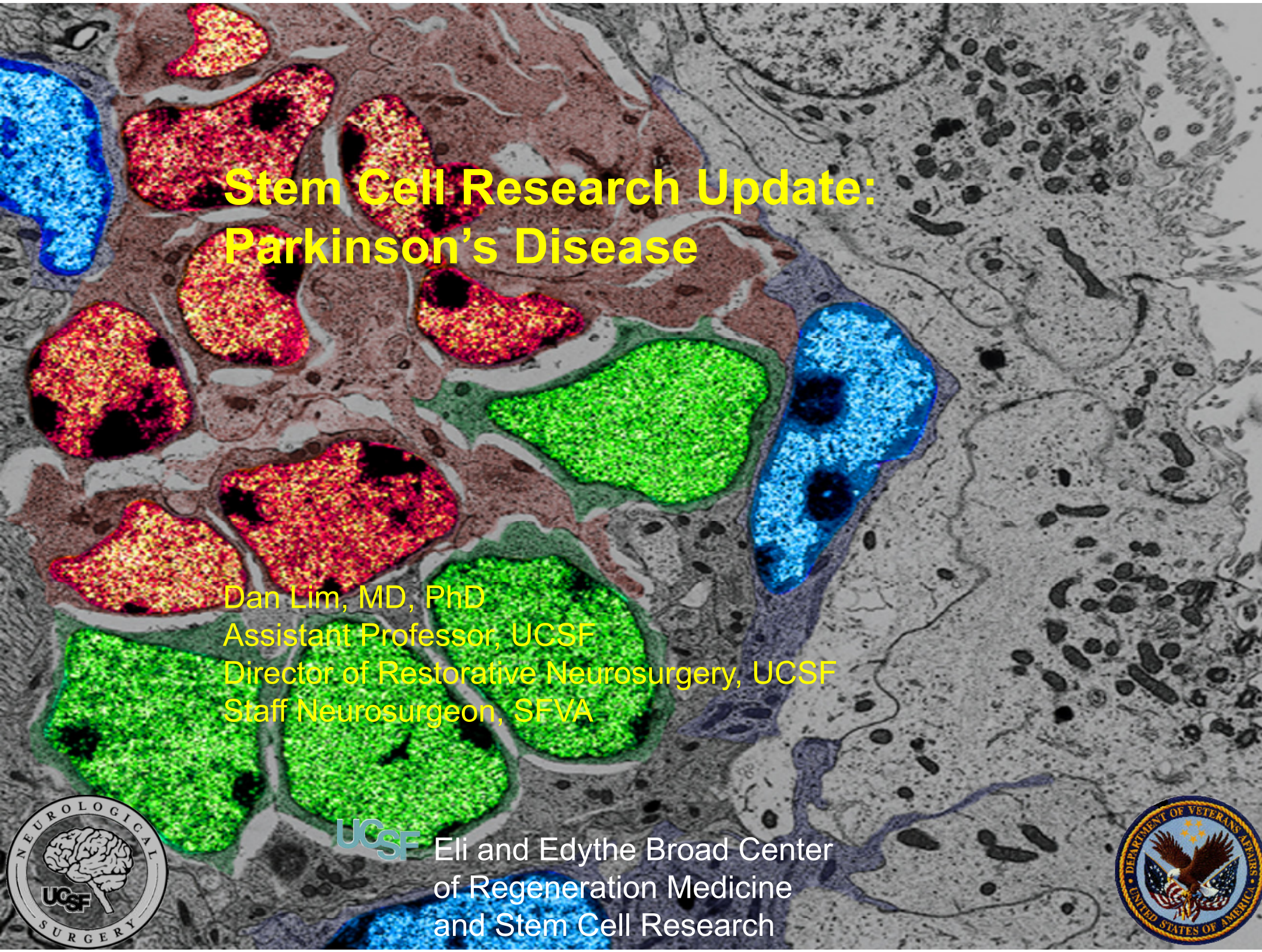
Assistant Professor, UCSF
Director of Restorative Neurosurgery, UCSF
Staff Neurosurgeon, SFVA

UCSF Eli and Edythe Broad Center of Regeneration Medicine and Stem Cell Research



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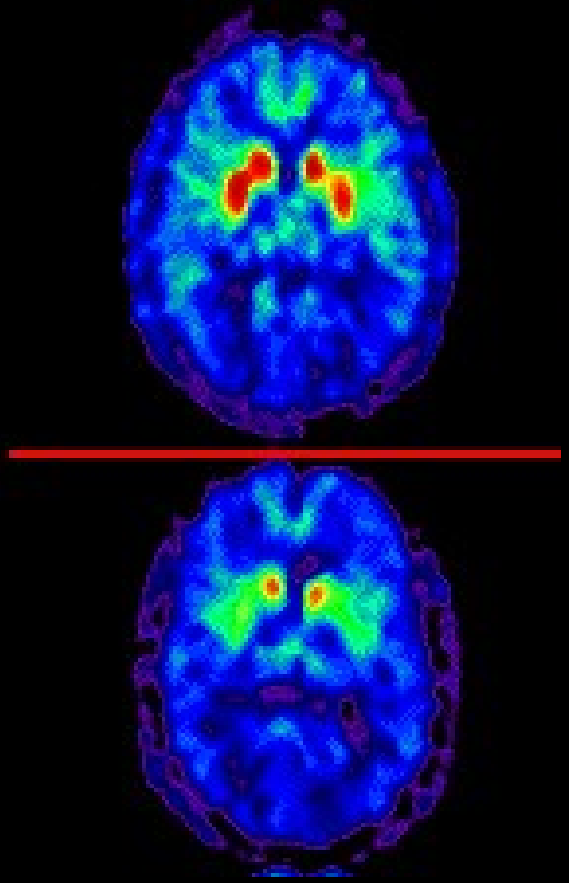
In Parkinson's disease (PD), there is a loss of neurons that connect from a part of the brain called the substantia nigra to the **putamen.**

These neurons normally produce the neurochemical **dopamine** for the putamen.

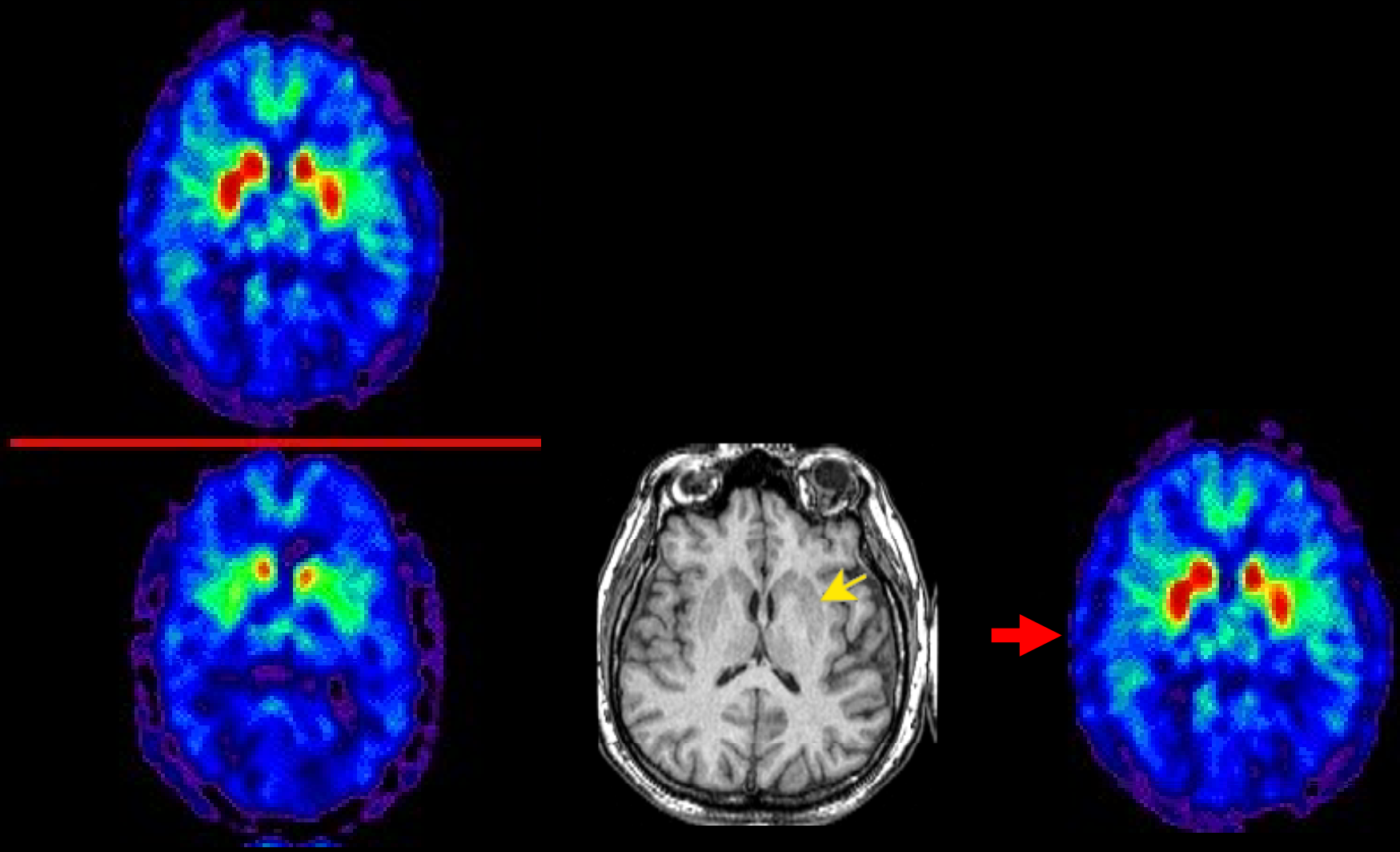
Thus, in PD, *there is a loss of dopamine in the putamen*.



Normal FD-PET scan

Loss of dopamine in Parkinson's disease

image from U. Michigan



Transplanted cells may have advantages to medical therapy….

may provide a continuous source of dopamine

may provide dopamine in a more physiologically relevant context

But past experience with transplantation gave mixed results.

transplanted cells were from donor fetal brains

improvements were marginal

15-50% of patients had unwanted side effect of dykinesias

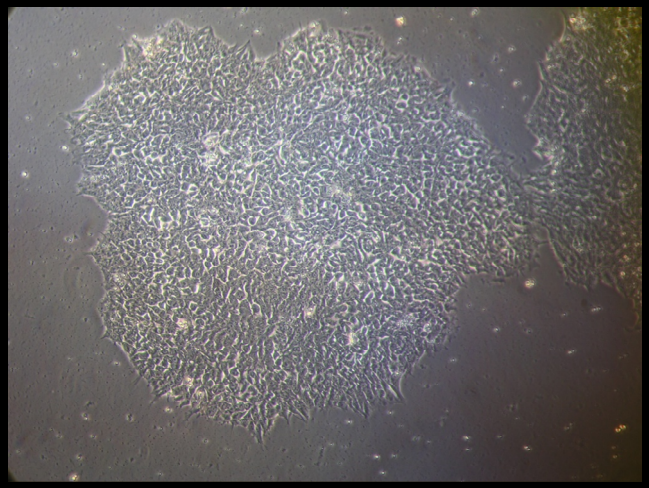
Why the new hope?

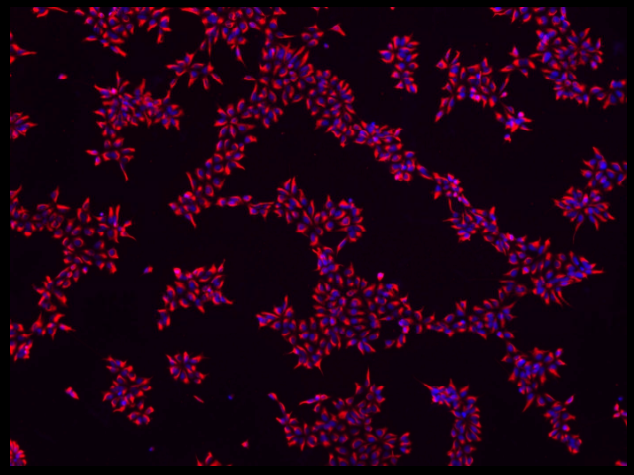
The promise of embryonic stem (ES) cells….

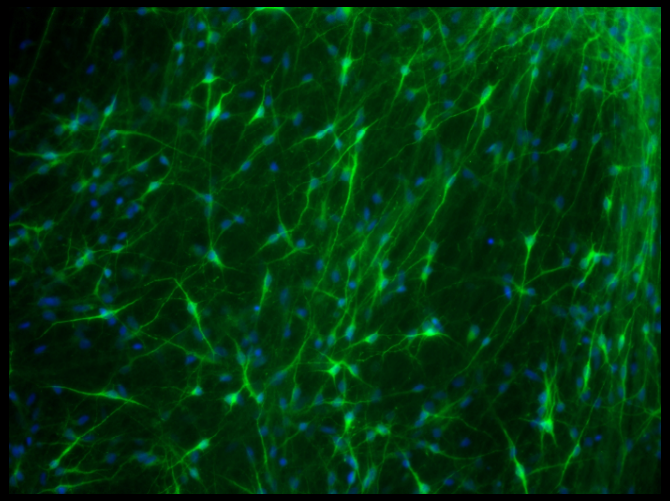
Limitations of past studies included variability of types of cells grafted and the difficulty in obtaining sufficient numbers of cells.

A more pure population of dopamine neurons may reduce side effects.

ES cells can produce essentially unlimited numbers of dopamine neurons.







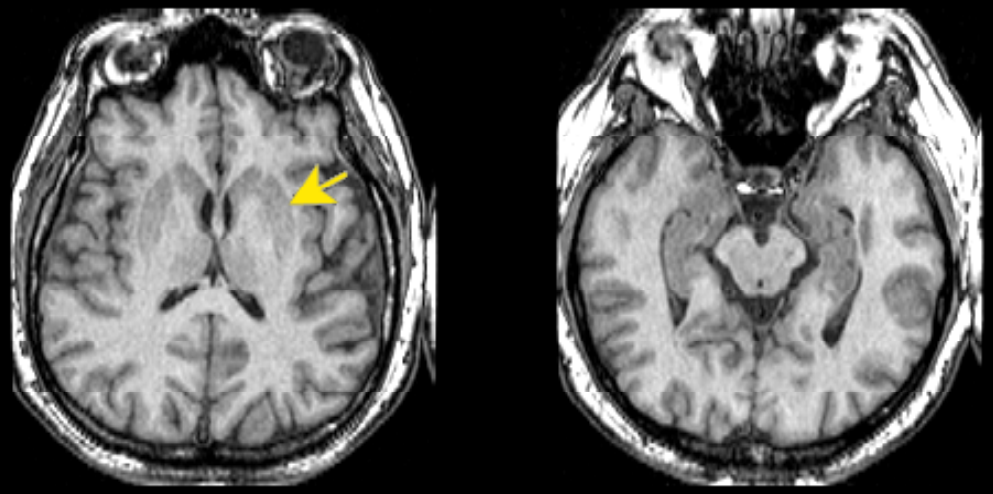
images from X. Zeng

Important considerations….

Safety. There is a potential risk of tumors from any ES cell-derived therapy. There is also a risk of immune rejection.

Long term efficacy. Some reports suggest that transplanted cells may also become sick from PD after several years.

Is the putamen the best target for transplantation?



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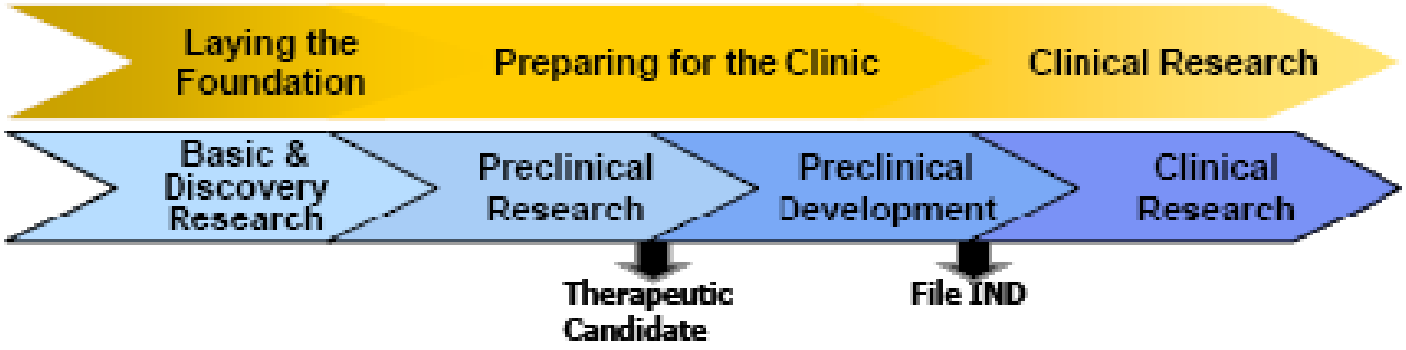

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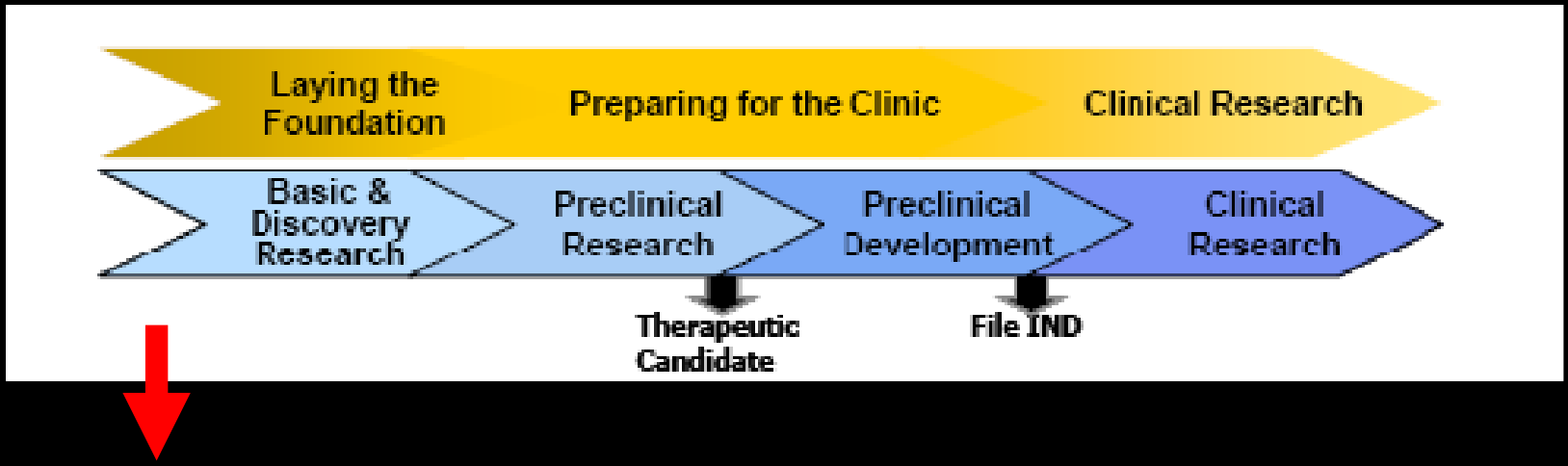

Lim Lab (UCSF)

Epigenetics of neural stem cells

(How do adult neural stem cells "remember" how to make the many different types of neurons and support cells in the brain?)

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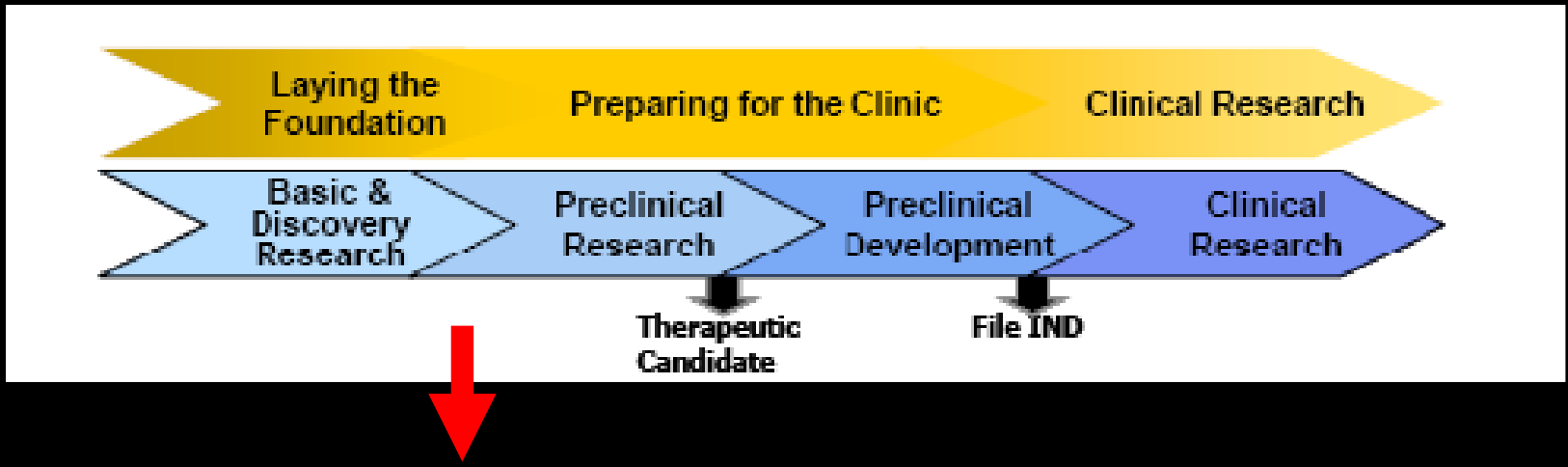

Xianmin Zeng (Buck Institute)

CIRM Disease team grant application leader

Development of dopamine neurons from human embryonic stem cells

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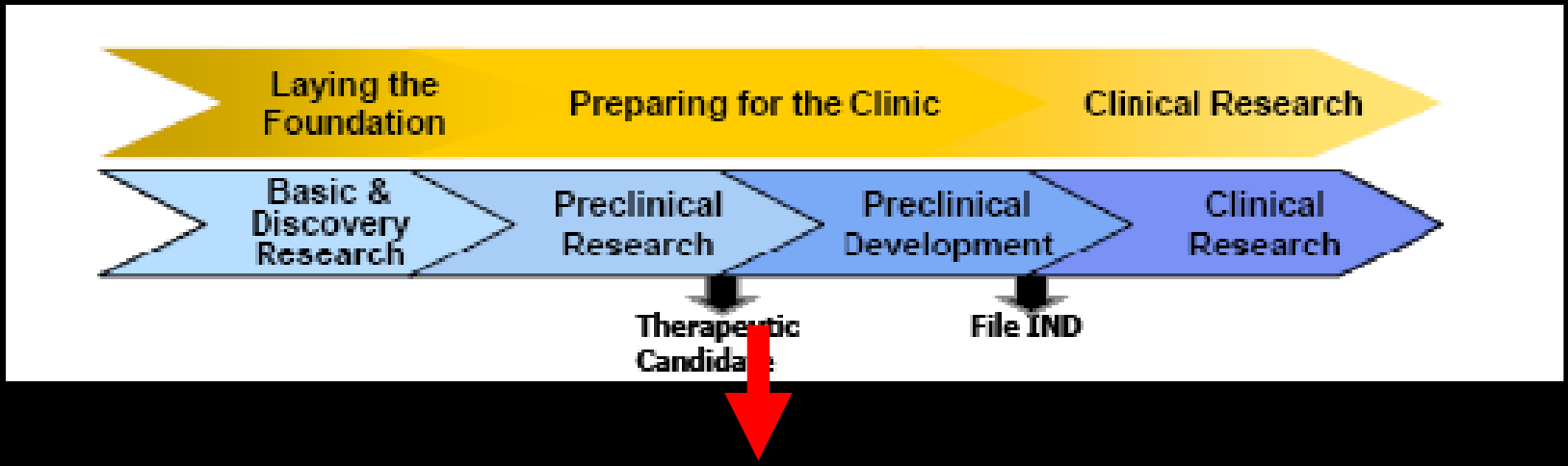

Dr Krtolica (StemLifeLine)

Production of clinical grade cells for human transplantation.

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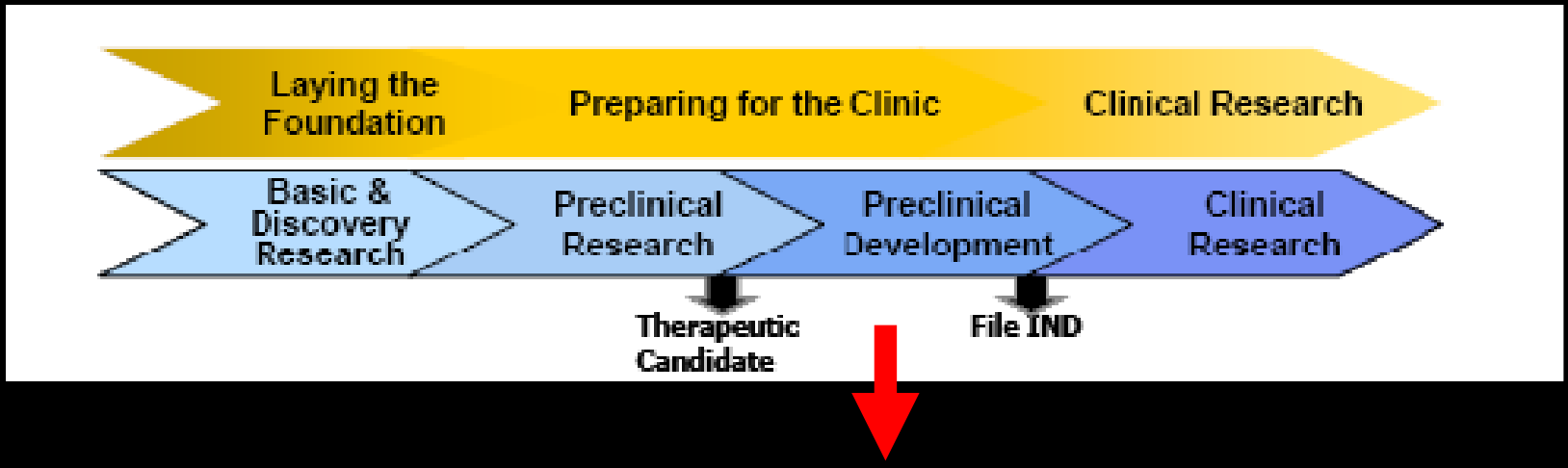

Dr. Quik (Parkinson's Institute)

Preclinical testing of cell transplantation efficacy and safety

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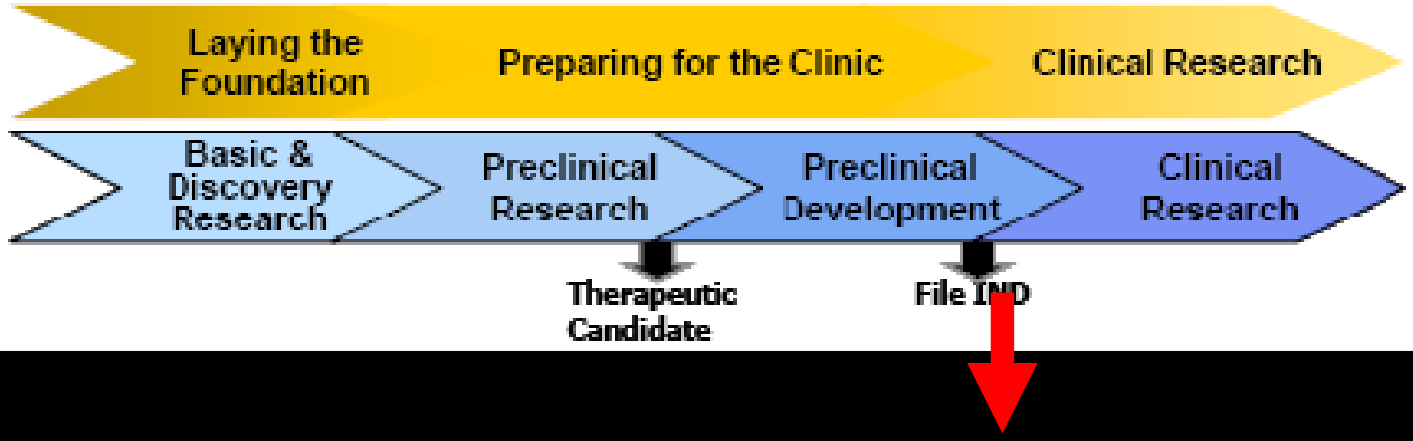

Lim, Marks, Aminoff

(UCSF)

Preclinical Data Review, IND filing, clinical trial design

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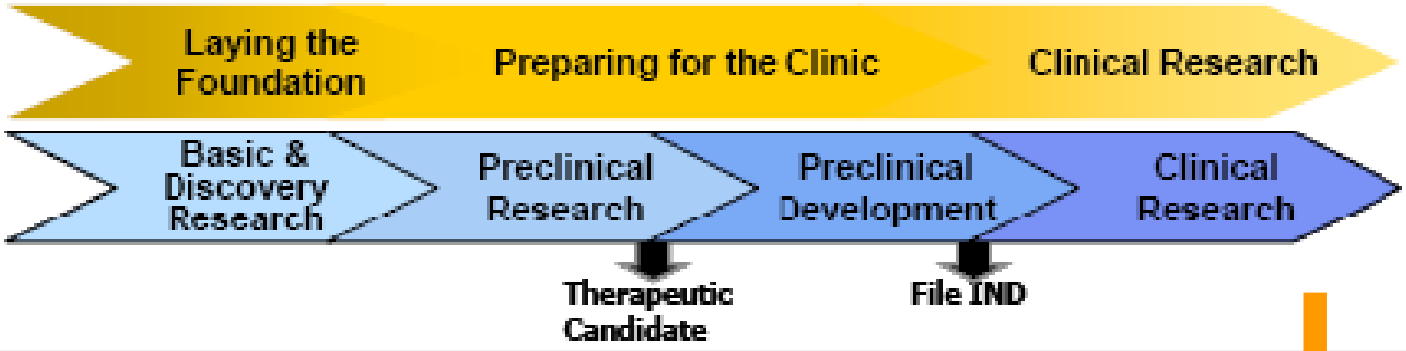
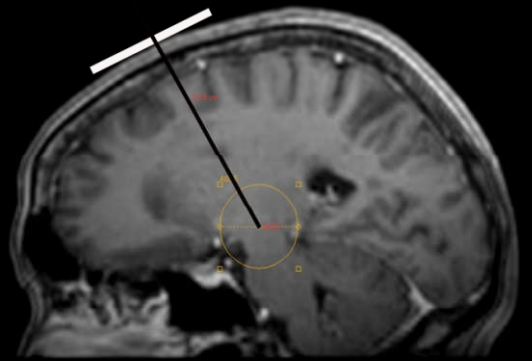


Larson, Starr, Martin (UCSF)

Interventional MRI for neurosurgery



Susan Heath, RN
Monica Volz, RN
Robin Taylor, RN
Paul Larson, MD
Phil Starr, MD, PhD
Bill Marks, MD
Michael Aminoff, MD
Jill Ostrem, MD
Alec Glass, MD

Xianmin Zeng (Buck Institute)

Sandler Family Foundation, NIH DP2 New Innovator Award, Sontag Foundation, VA Merit Award, CIRM, NCIRE, CTSI/UCSF, REAC/UCSF, NREF/ACS