SOMETHING BETTER THAN HOPE

BRAINSTORMING NEURODEGENERATION

Leveraging Genomics, Stem Cells, Gene Therapy and Novel Clinical Trials for Field-wide Advancement

IDEATION WORKSHOP

SAN FRANCISCO AIRPORT MARRIOTT WATERFRONT

APRIL 15 – 16, 2019

CIRM

CALIFORNIA'S STEM CELL AGENCY

Every Moment Counts. **Don't Stop** Now.

BRAINSTORMING NEURODEGENERATION

Leveraging Genomics, Stem Cells, Gene Therapy and Novel Clinical Trials for Field-wide Advancement

IDEATION WORKSHOP

SAN FRANCISCO AIRPORT MARRIOTT WATERFRONT

APRIL 15 – 16, 2019

MEETING GOALS:

- Discuss novel models to accelerate therapeutic development for neurodegenerative diseases (NDs)
- Discuss proof of concept examples where genomics and large datasets have enabled progress in ND
- Prioritize elements of common utility
- Explore benefits and considerations for a neutral collective effort across NDs
- Discuss incentive structures to encourage alignment
- Propose an operational framework(s) to move from concept to reality

SOMETHING BETTER THAN HOPE

CIRM
CALIFORNIA'S STEM CELL AGENCY

Every Moment Counts. **Don't Stop** Now.

Session I: Leveraging Genomics and Big Data (45 mins)

- *Chair: Carlos Bustamante*
- *Panelists: Joshua Stuart, Ernest Fraenkel, Howard Federoff*
- *Anchoring Questions:*
  - *What can the ND community glean from current genomics approaches?*
  - *What should the ND community look to model? What should be avoided?*
  - *Where have industry efforts failed and is there an opportunity for current data platform technologies to augment probability of success?*

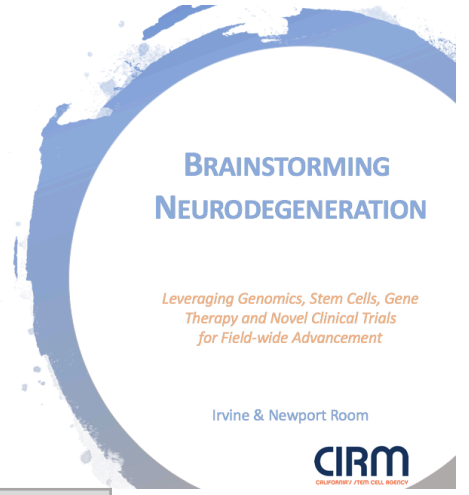
Session II: iPSC Models, Creating Standards, Utilizing Banks (45 mins)

- *Chair: Lorenz Studer*
- *Panelists: Kristin Baldwin, Clive Svendsen, Genie Jones, Stuart Lipton*
- *Anchoring Questions:*
  - *Do we know enough to create standards? Can more complex models (i.e., CNS organoids, chip-based approaches) be standardized at this time?*
  - *How do we utilize existing banks and establish requirements for future banks?*
  - *Where could consolidated efforts be useful to the community?*

Session III: Exploring a Neurodegeneration Consortium Model (45 mins)

- *Chair: Clive Svendsen*
- *Panelists: Lucie Bruijn, Margaret Sutherland, Leslie Thompson,*
- *Anchoring Questions:*
  - *What can be learned and broadly applied from the Answer ALS model?*
  - *What is the existing ND-specific consortium landscape? What are the features & assets?*
  - *Where are the gaps left by existing consortia? How could a new combined approach address those gaps?*

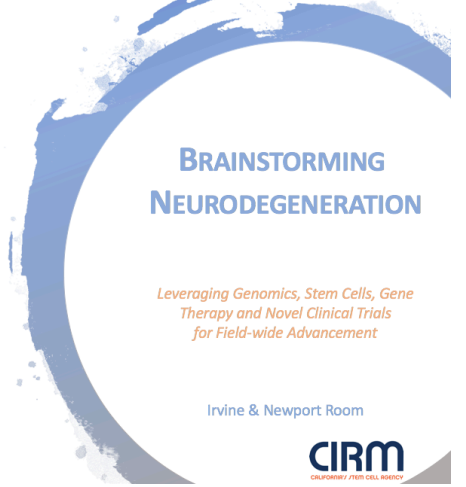
Session III: Exploring a ND Consortium Model



List and identify features and assets of existing ND consortia that you are either (1) active in or (2) aware of. Please rank attractive features on a 1 – 5 scale (5 being best).

CONSORTIA	ACTIVE	FOCUS AREAS	KEY ASSETS	WHAT ELSE IS NEEDED
Acme Consortia	☑ Yes ☐ No	☑ Genomics ☑ iPSC ☐ Registry ☑ Clinical ☐ Other	Clinical Trials Access to Doctors Access to Research Disease Education Community Support	~~4~~ Registry, patient monitoring and follow up. 5 4 2 5
	☐ Yes ☐ No	☐ Genomics ☐ iPSC ☐ Registry ☐ Clinical ☐ Other		
	☐ Yes ☐ No	☐ Genomics ☐ iPSC ☐ Registry ☐ Clinical ☐ Other		
OTHER COMMENTS				

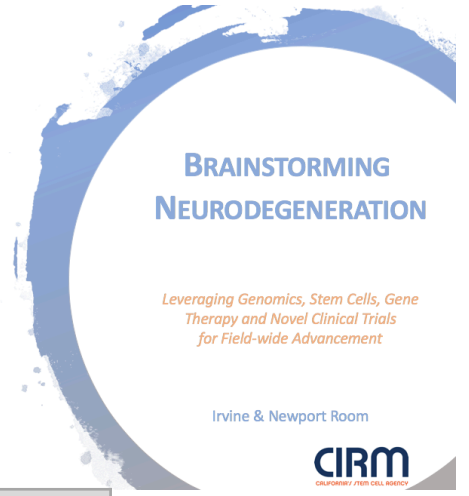
Session III: Exploring a ND Consortium Model



List and identify features and assets of existing ND consortia that you are either (1) active in or (2) aware of. Please rank attractive features on a 1 – 5 scale (5 being best).

CONSORTIA	ACTIVE	FOCUS AREAS	KEY ASSETS	WHAT ELSE IS NEEDED
	☐ Yes ☐ No	☐ Genomics ☐ iPSC ☐ Registry ☐ Clinical ☐ Other		
	☐ Yes ☐ No	☐ Genomics ☐ iPSC ☐ Registry ☐ Clinical ☐ Other		
	☐ Yes ☐ No	☐ Genomics ☐ iPSC ☐ Registry ☐ Clinical ☐ Other		
OTHER COMMENTS				

Session III: Exploring a ND Consortium Model
Value Assessment for Patients and Advocates



Please indicate (1) whether you have participated or your willingness to participate and your (2) perceived value in participation. Please rank value elements on a 1 – 5 scale (5 being best).

CONSORTIA	ACTIVE	KEY ASSETS / ATTRACTIVE FEATURES	WHAT ELSE IS NEEDED
	☐ Yes ☐ No		
	☐ Yes ☐ No		
	☐ Yes ☐ No		
OTHER COMMENTS			

Session IV: Accelerating Drug Development Based on Patient Data (45 mins)

- *Chair: Ernest Fraenkel*
- *Panelists: Mark Frasier, Ralph Kern, Omar Khwaja, Merit Cudkowicz, David Higgins*
- *Anchoring Questions:*
  - *How can the ND community leverage genomic and clinical data, patient-derived iPSCs, etc. to accelerate drug development? What are the challenges?*
  - *Are there current exemplars in other disease areas that the ND community should look to model?*
  - *Does industry perceive value in a consortium approach utilizing pooled data sets?*
  - *Patient perceived value in participation*

Session V: Clinical Trials in Regenerative Medicine – Benefits of a Consortium (45 mins)

- *Moderator: Abla Creasey*
- *Panelists: Malin Parmar (ESC-based), Jun Takahashi (iPSC-based), Howard Federoff (Gene Therapy)*
- *Anchoring Questions:*
  - *What could a cell or gene therapy approach offer that is different from traditional/past approaches?*
  - *Are there approaches in other disease areas that the ND community should look to model?*

Session VI: Taking Regenerative Medicine ND Candidates to the Clinic (45 mins)

- *Chair: Daniela Bota*
- *Panelists: Wilson Bryan, Robert Pacifici, Marg Sutherland*
- *Anchoring Questions:*
  - *Regulatory considerations and challenges for consortium sponsored trials*
  - *What regulatory advantages or potential challenges would a consortium model pose to the development of novel endpoints, access to expedited regulatory designations and the use of adaptive trial design for ND?"*
  - *What are the key infrastructure gaps preventing advancement of regenerative ND candidates to the clinic?*
  - *What solutions could be applicable (e.g., data platforms for imaging and surrogate measures, registries and data repositories, etc.)?*

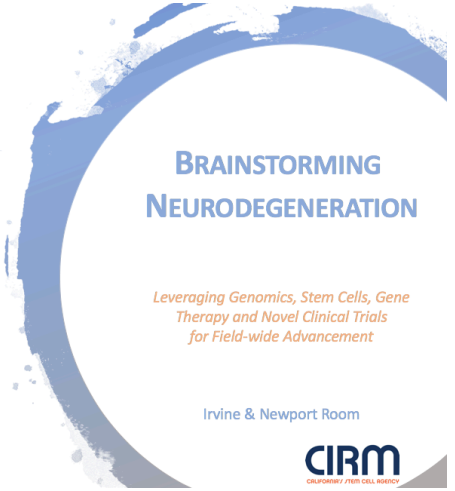
Breakout Session: Assessing the Value of a Neurodegeneration Consortium (90 mins)

Key Questions for Consideration:

- ***Feasibility****– Is the field ready for a cross-cutting ND consortium? What common challenges do current disease-specific consortia face? Where can redundancy be minimized?*
- ***Components*** *– Given the current landscape of disease-specific consortia/efforts, what elements (e.g., platforms, processes, etc.) would it make sense to pool together/consolidate? What elements should be handled by disease-specific entities?*
- ***Incentives –*** *What would incentivize stakeholders to join a neutral/centralized consortium? What challenges need to be addressed?*

Breakout: Could a ND Consortium Accelerate Therapy Development?

The value of a network may be measured in its ability to achieve greater or more efficient results than the member organizations would if they were acting independently



What can we get that we otherwise do not already have?
What are the components necessary to obtain that value?
How feasible is it to implement?
What incentives would facilitate key stakeholders to participate?

Session VII: Would an ND Consortium Accelerate Therapy Development: Considerations for a Path Forward (60 mins)

- *Co-Chairs: Ekemini Riley and Kent Fitzgerald*
- *Panelists: Katja Brose, Mark Frasier, Walter Koroshetz, Maria Millan*
- *Anchoring Questions:*
  - *Taking the breakout discussions into consideration, what could a path forward look like?*