Japan-UCSD Collaboration
Through Moores Cancer Center Initiatives

Tomoko Hayashi, MD. PhD.
Today’s Talk

I. Cancer Immunotherapy Campaign

II. Next Generation Life Science Talent Initiative
CANCER IMMUNOTHERAPY CAMPAIGN

Center for personalized cancer immunotherapy
Center for Personalized Cancer Immunotherapy*

- **Co-Directors**
  - Ezra Cohen [MCC]
    - Clinical Science
  - Stephen Schoenberger [LIAI]
    - Translational Science

- **Background and Philosophy**
  - Every individual’s immune system is different; every cancer is different.
  - Creating personalized approaches to transform oncology treatment

[final name TBD]
• Mission
  – Develop therapy and improve cure rates for all cancers based on interactions of a person’s tumor and immune system
  – Develop commercialization of personalized treatment to the treatment targeted and personalized to specific sub-classes of patients.
Cancer Immunity Cycle

Priming and activation:
- CD28/B7.1
- CD137/CD137L
- OX40/OX40L
- CD27/CD70
- HVEM
- GITR
- IL-2
- IL-12
- CTLA4/B7.1
- PD-L1/PD-1
- PD-L1/B7.1
- Prostaglandins

Cancer antigen presentation:
- TNF-α
- IL-1
- IFN-α
- CD40L/CD40
- CDN
- ATP
- HMGB1
- TLR
- IL-10
- IL-4
- IL-13

Traffic of T cells to tumors:
- CX3CL1
- CXCL9
- CXCL10
- CCL5

Infiltration of T cells into tumors:
- LFA1/ICAM1
- Selectins
- VEGF
- Endothelin B receptor

Recognition of cancer cells by T cells:
- T cell receptor
- Reduced pMHC on cancer cells

Killing of cancer cells:
- IFN-γ
- T cell granule content
- PD-L1/PD-1
- PD-L1/B7.1
- LD-3
- Arginase
- IDO
- MICA/MICB
- TGF-β
- B7-H4
- BTLA
- TIM-3/phospholipids

Release of cancer cell antigens:
- Immunogenic cell death
- Tolerogenic cell death

Novel and Unique Programs

• Cell Therapy
  – Tumor Infiltrating Lymphocytes [TIL]
    • TIL 3.0 – TCR engineered
  – Chimeric Antigen Receptor T Cells [CAR-T]
    • ROR1
    • FZD7
  – Induced Pluripotent Stem Cells [iPSC] Natural Killer Cells

• Vaccine Approaches
  – Dendritic Cell Vaccines
  – Tumor Neoantigen Vaccines
    • Mutation based
    • Splice Variant based

• Immune Response Modulation
  – Radiotherapy
  – Toll-like Receptor
  – Repolarizing Tumor Microenvironment
Cancer Immunotherapy Progress to Date

• Faculty Recruitment
• Cell Processing Center opening summer 2016
  – Ribbon Cutting June 9th
• Philanthropy
  – $6.5M Ralph and Fernanda Whitworth, The Immunotherapy Foundation
## Cancer Immunotherapy Campaign

<table>
<thead>
<tr>
<th>Funding Priorities</th>
<th>Cost Minimum</th>
<th>Cost Maximum</th>
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<tr>
<td><strong>Faculty</strong></td>
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<td>Directors (2)</td>
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<td>Novel Cell Therapy Director</td>
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<td>Cancer Cell Therapy Scientist</td>
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<td>Associate Professors (3-6)</td>
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<td><strong>Research</strong></td>
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<td>Pilot Grants</td>
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<td>Accelerator Grants</td>
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<td>Translation Research Grants</td>
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<td>Fellows</td>
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<td>Cell Processing Program</td>
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<td>Immunotherapy Clinical Trials</td>
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<td>Immune Monitoring Program</td>
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<td><strong>Endowment for Operations</strong></td>
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NEXT GENERATION LIFE SCIENCE TALENT INITIATIVE

Support young life science researchers obtaining knowledge for innovation/development/business
Next Generation Life Science Talent Initiative

Funding by Japanese Government (i.e. JSPS, Dispatching young Japanese researchers abroad)

Innovation/Development/Business Training Program

Postdoctoral Fellows/Visiting Scholars

Research + Innovation/Development/Business Training Program

Funding by Supporting Industrial Partners (membership)
Empowering Japanese Scientists - San Diego

- Operating “Next Generation Life Science Talent Initiative” by planning and executing the programs
- Provide opportunity to know San Diego ecosystem
  - Mentorship from a variety of advisors
  - Entrepreneurism Center at UCSD, CONNECT etc
- Establish of tailored programs to fulfill individual requirements
- Support the fellows and their families by establishing strong Japanese community in San Diego
Empowering Japanese Scientists - San Diego Members and Advisors

**EJS-SanDiego**
**UCSD**

**UCSD Office**
**Nihonbashi @Japan**

**Member**
- Tomoko Hayashi (UCSD)
- Tomomi Kurosu (UCSD)
- David Vera (UCSD)
- Takayuki Kimura (LIAI)
- Tokio Matsuzaki (TSRI)
- Kota Onishi (UCSD)
- Manabu Kagiyama (California Properties)

**UCSD partner**
- Miwako Waga (UCSD)
- Members of 4Diego

**Advisor**
- Kan Suzuki (Min. Education, Tokyo/Keio U)
- Kanetaka Maki (National Graduate Institute For Policy Studies)
- Akio Kurokawa (Tokyo U)
- Makoto Azuma (Kyoto U)
- Yukari Mitsuhashi (Kyoto U)
- Yasuhiko Kamikubo (Kyoto U)
- Osamu Takeuchi (Kyoto U)
- Hiroyuki Shinchi (Kagoshima U)
- Rocky Mitsuhashi (ERT Asia)

**Advisor**
- Dennis A. Carson (Professor, UCSD)
- Eki Seki (Cedars Sinai Medical Center)
- Naoki Sakurai (CEO, Tanabe Research Laboratory, USA)
- San Diego BioForum (Kadoya)
Japan-UCSD Collaboration for Talents and Projects through Nihonbashi Office
Immune Response – Activating T Cells

Tumor Cells

Dendritic Cells

CD4 Helper T-cells

CD8 Cytotoxic T-cells

Treatment Approaches by UCSD

- CAR-T cells using ROR1 and FZD
- Tumor Antigen Specific T cells therapy
- Tumor NeoAntigen Discovery and Vaccine
- iPSC-Natural Killer Cells
- Immune Response Modulation by TLR ligands, radiation, Pi3Kγ