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EDUCATION

The Scripps Research Institute, La Jolla, CA

March 2010

Ph.D. Chemical Biology | *Insight into the Reprogramming of Cell Fate with Small Molecules*

Graduate Thesis Research, Advisor – Professor Peter G. Schultz

My research focuses on the identification and characterization of chemicals that reprogram cell fate. In particular, we found that histone deacetylation is responsible for maintaining the lineage identity of oligodendrocyte precursor cells, where pharmacological inhibition of histone deacetylase activity reverts precursor cells back to the multipotent stem state [2]. More recently, we have developed a small molecule screening platform to identify chemical complements for the reprogramming factors that induce pluripotency in somatic cells. Implementation of this strategy has led to the identification of compounds that can replace the reprogramming factors Klf4 and Sox2 [5,8]. Current and future efforts with these compounds have begun to unravel the mechanisms at play during epigenome overhaul.

University of Michigan, Ann Arbor, MI

December 2004

B.S. Chemistry and Biochemistry

Graduated with distinction and highest honors in chemistry

Dean's List: Fall & Winter 2001; Winter 2002; Fall 2003; Fall & Winter 2004

Undergraduate Thesis Research, Advisor – Professor Gary D. Glick

My research focused on testing the in vitro activity of a new class of pro-apoptotic compounds with therapeutic properties in several models of autoimmunity. Aspects of this work included combination studies to determine what properties are necessary for selectivity, elucidating the cellular mechanism of action [3,6] and enhancing efficacy [1].

PUBLICATIONS

8. Staerk J*, **Lyssiotis CA***, Foreman RK, Bollong M, Zhu S, Garcia M, Bouchez L, Lairson LL, Charette BD, Brinker A, Cho CY, Jaenisch R & Schultz PG. (2010) Inhibition of c-Src kinase activity functionally substitutes for Sox2 during the direct reprogramming of murine fibroblasts to iPS cells. Manuscript in Preparation. [*shared authorship]
7. Zhu S, Wurdak H, Wang Y, Galkin A, Tao H, Li J, **Lyssiotis CA**, Yan F, Tuu B, Miraglia L, Walker J, Sun F, Orth A, Harris J, Schultz PG & Wu X. (2009) A Genomic Screen Identifies TYRO3 as a MITF Regulator and Melanoma Oncogene. *Proc. Natl. Acad. Sci.* 106. 17025-17030.
6. Blatt NB, Boitano AE, **Lyssiotis CA**, Opirari AW & Glick GD. (2009) Bz-423 Superoxide Signals B Cell Apoptosis via Mcl-1, Bak, and Bax. *Biochem. Pharmacol.* 78. 966-973.

5. **Lyssiotis CA***, Foreman RK*, Staerk J*, Garcia M, Mathur D, Markoulaki S, Hanna J, Lairson LL, Charette BD, Bouchez L, Kunick C, Brinker A, Cho CY, Schultz PG & Jaenisch R. (2009) Reprogramming of Murine Fibroblasts to iPS Cells With Chemical Complementation of Klf4. *Proc. Natl. Acad. Sci.* 106. 8912-8917. [*shared authorship]
 - » PNAS most read articles, June 2009.
 - » Highlighted in *Nature Cell Biology* **11**, 796 (2009).
 - » Highlighted in *Nature Reports Stem Cells*, May (2009).
 - » Highlighted in *Regenerative Medicine* **4**, 371-374 (2009).
 - » Highlighted in *Assay and Drug Development Technologies*, August (2009).
4. Zhu S, Wurdak H, Wang J, **Lyssiotis CA**, Peters EC, Cho CY, Wu X & Schultz PG. (2009) A Small Molecule Primes Embryonic Stem Cells for Differentiation by Targeting NME2. *Cell Stem Cell.* **4**, 416–426.
 - » Highlighted in *Cell Stem Cell* **4**, 373-374 (2009).
 - » Highlighted in *Nature Chemical Biology* **5**, 456-457 (2009).
 - » Highlighted in *Molecular Interventions* **9**, 167 (2009).
3. Blatt NB, Boitano AE, **Lyssiotis CA**, Opipari AW & Glick GD. (2008) Bz-423 Superoxide Signals Apoptosis via Selective Activation of JNK, Bak, and Bax. *Free Radic. Biol. Med.* **45** (9), 1232-42.
2. **Lyssiotis CA**, Walker J, Wu C, Kondo T, Schultz PG & Wu X. (2007) Inhibition of Histone Deacetylase Activity Induces Developmental Plasticity in Oligodendrocyte Precursor Cells. *Proc. Natl. Acad. Sci.* **104**, 14982-14987.
 - » Highlighted in *Cell* **131**, 197-198 (2007).
1. Bednarski JJ, **Lyssiotis CA**, Roush RR, Boitano AE, Glick GD & Opipari AW. (2004) A novel benzodiazepine increases the sensitivity of B Cells to receptor stimulation with synergistic effects on calcium signaling and apoptosis. *J. Biol. Chem.* 279, 29615 – 29621.

REVIEWS

11. **Lyssiotis CA**[#], Lairson LL, Boitano AE, Wurdak H, Zhu S & Schultz PG[#]. (2010) Chemical Control of Stem Cell Fate and Developmental Potential. *Angew. Chem. Int. Ed.* Submitted, invited review. [[#]corresponding author]
10. **Lyssiotis CA**[#], Charette BD & Lairson LL. (2009) Reprogramming Developmental Potential. Lakshmi U, Chesnut JD & Thyagarajan B, eds. In: *Emerging Technology Platforms for Stem Cells*. New York, NY. John Wiley & Sons Press, Inc. 51-85. [[#]corresponding author]

TALKS

- “Chemical Methods to Reprogram Developmental Potential.” *Genomics Institute of the Novartis Research Foundation Board Meeting, San Diego, CA – (March 2009).*
- “Reprogramming of murine fibroblasts to iPS cells: Chemical Complementation of Klf4.” *Stem Cells and Regenerative Medicine World Congress, Palm Springs, CA – (January 2009).*
- “Chemical Complementation of Klf4 in a reduced reprogramming cocktail.” *Graduate Student Retreat, San Diego, CA – (September 2008).*

FELLOWSHIPS AND DISTINCTIONS

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| 2010-current | Damon Runyon Post-doctoral Fellowship
<i>Reversing the Warburg Effect in Basal-like Breast Cancer: A Unique Point for Therapeutic Intervention</i>
Prof. Lewis Cantley; Harvard Medical School |
| 2010 | Human Frontiers Science Foundation Short Term Fellowship (June 1st – August 31st) |

Analysis of the Role of Pyruvate Kinase Isoform Expression in Pancreatic Cancer
Prof. Doug Hanahan; Ecole Polytechnique Federale de Lausanne

2006-2009 National Science Foundation Pre-doctoral Fellowship
Probing Signal Transduction Pathways in Stem Cells with Small Molecules
Prof. Peter Schultz; The Scripps Research Institute

2005 American Chemical Society Outstanding Senior Award
2005 Sidney Fine Teaching Prize Nominee
2005 Eli Lilly Chemistry Scholarship
2004 Eli Lilly Research Fellowship
2004 Smeaton Research Fellowship
2003 Lubrizol Chemistry Scholarship
2002 Smeaton Research Fellowship

TEACHING EXPERIENCE

Graduate Student Instructor

Advisor: Professor Peter G. Schultz
Bio-organic Chemistry, *Fall 2007*

Undergraduate Student Instructor

Advisor: Professor Brian P. Coppola
Introductory Organic Chemistry 210 Honors, *Fall 2003*
Advanced Organic Chemistry 216 Honors, *Winter 2004*
Introductory Organic Chemistry 210 Honors, *Fall 2004*
Organic Chemistry 215 Honors, *Winter 2005*

REFERENCES

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